JOINT 5th SASA INTERNATIONAL CONFERENCE & 2nd RWANDA BIOTECHNOLOGY CONFERENCE

BOOK OF ABSTRACTS

TRANSLATIONAL SCIENCE AND BIOTECHNOLOGY ADVANCES IN AFRICA

Kigali Conference & Exhibition Village (KCEV)
4-6 October 2017 | Kigali, Rwanda
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>WELCOME NOTE By Vice Chancellor</td>
<td>07</td>
</tr>
<tr>
<td>WELCOME NOTE by SASA Executive president</td>
<td>08</td>
</tr>
<tr>
<td>WELCOME NOTE by Program chair</td>
<td>09</td>
</tr>
<tr>
<td>ORGINIZING COMMITTEE</td>
<td>12</td>
</tr>
<tr>
<td>PROGRAMME</td>
<td>17</td>
</tr>
<tr>
<td>ABSTRACTS</td>
<td></td>
</tr>
<tr>
<td>Keynote speakers</td>
<td>31</td>
</tr>
<tr>
<td>Oral presentations</td>
<td>45</td>
</tr>
<tr>
<td>Posters presentations</td>
<td>155</td>
</tr>
<tr>
<td>INDEXES</td>
<td>185</td>
</tr>
</tbody>
</table>
WELCOME

NOTE
Welcome to our joint 5th SASA and 2nd UR Biotechnology 2017 Conference in Kigali, a city uniquely well suited to host such an event. Science and biotechnology have emerged to be truly disruptive and transformative with substantial global impact. They are now covering different areas such as Bioprocessing Technology, Immunology, Drug Discovery, Chemical Biology, Computational Biology, DNA Biotechnology, Agriculture, Pharmacogenomics, Biogeochemistry, Biodiversity, Conservation, Biomedical Sciences, Water Management, Personalized Medicine, Stem Cell Biology, interfacing with innovation and entrepreneurship as well as policy and ethics.

With a main theme of “Translation Science and Biotechnology Advances in Africa”, we are hopeful that the exciting scientific presentations linked to the above various areas at this meeting can help give all of us pause to take pride in how far we have come and to create excitement in anticipation of what is next in science and biotechnology.

The scientific research advances and innovations we will hear about during this conference will energize all of us, and also will highlight the challenges that I hope can tip Africa to even more outputs in the future. Around the world, increasing constraints on national and philanthropic budgets have created a crisis in the funding of scientific investigation. This is occurring at a time when research in science and biotechnology has never been more powerfully placed to advance the health and wellbeing of those in low-income settings. As we move forward, we need to anticipate where research is moving us, how these can be applied to improve health and economy for all, how we can continue to engage and support investigators new to all scientific fields, and how we can help society as a whole better understand the promise of science and biotechnology. Over the next three days in this beautiful city, we will have the opportunity to meet scientists, make new friends, and hear from the best and the brightest keynote speakers about amazing advances in science and biotechnology. We hope that all of you can also use this time to engage in conversation about how you would like to boost research in science and biotechnology in Africa. In addition, this conference will be preceded by two workshops in biotechnology and minimally invasive laparoscopic surgery, which aim to apply the current innovative applications in these respective fields.

On behalf of the University of Rwanda, I would like to extend our special appreciation to the Belgian partners ARES (the Belgian Academy for Research and High Education) for the 20th anniversary of great cooperation between both institutions. Besides being the main sponsor of this conference, they also play a key role in teaching and research advancement at the University of Rwanda. I also take this opportunity to thank the organizers of this conference for providing an enriching and mind-opening experience and congratulate other main sponsors including Medtronic and Promega Companies. I look forward to interacting with many of you over the coming days.

Prof. Phil Cotton
Vice Chancellor
University of Rwanda
Please first allow me to say a word or two about SASA. It was launched in 2011, by African scientists around the world and in Africa, and participant scientist friends of Africa from the U.S.A., Canada, Europe, China, India, Brazil and Russia. It was inaugurated and held its First Annual International Scientific Conference under the theme “The Advancement of Science in Africa” on April 25-28, 2013 at the University of Limpopo, South Africa. Following the resounding success of that first conference, SASA held its second such Conference in Kampala, Uganda, May 6-10, 2014 under the theme “Science Innovation for Economic development” that included a joint collaboration colloquium with the Global Knowledge Initiative organization entitled “The African Collaboration Colloquium”. The Third such Conference under the theme “Science Research & Education in Africa” was held in Toronto, Canada in August 28-31, 2015; its Proceedings have just been published by Cambridge Scholars Publishers and can be viewed under the link: http://www.cambridgescholars.com/science-research-and-education-in-africa (please see also the attached Poster from Cambridge Scholars). The Fourth Conference under the theme “Advancing Africa's Sustainable Development Through Science, Technology and Innovation” was held in Nairobi, Kenya, August 24-26, 2016 and its Proceedings will likewise be published by Cambridge Scholars Publishers on or about end of 2017.

We are now holding the Fifth SASA International Scientific Conference here in Kigali, Rwanda, jointly with the Rwanda Academy of Sciences & Biotechnology and the University of Rwanda. Its theme is “Translational Science and Biotechnology in Africa”. It includes several important sub-themes: Non-Communicable and Infectious Diseases (emphasis: neurological diseases, cancer, diabetes, HTA, neglected diseases, etc.); Precision and Personalized Medicine; Pharmaceuticals and Pharmacogenomics; Bio; Biochemistry and Microbial Ecology; Biotechnology in Agriculture; and Wildlife Biodiversity and Conservation.

Quite a bit has been said and written about the dismal state of science and research in Africa. Africa lags behind all other in terms of indices of scientific activity as measured by the number of academic researchers per 1 million population, the number of masters, doctoral and postdoctoral output, the number of publication output, the number of Africans attending and presenting at major international scientific meetings, the number of African citizens who are scientists or engineers, continents and Africa's contribution to global research and development (R&D). Despite the gloomy picture, over the past decade Africa has also been a continent with a heightened tempo of scientific activity; increasingly attracting major international funding for science and research projects. In addition Africa has also seen a huge surge in the number of institutions of higher learning, an increase in the number of major funding agencies and absolute money amounts dedicated to supporting science and research programs in Africa. Further, there has been a marked increase in the number of national academies of science and civil society scientific organizations.
Not to be left out of the act in progress, African governments have also increased the tempo of national political awareness about the societal good of science, and some have made modest increases in funding science and research programs. Indeed the picture is not all gloomy: a 2014 World Bank report shows signs of improvement in certain aspects of scientific activity, notably an increase in the quantity and quality of research, and a modest increase in the number of scientific publications. While some progress is happening in continent wide science and research activity, Africa is still way back compared to the rest of the World. Even countries favored by major international funding agencies have, as yet, not made the cut to attain World class status in science, research, innovation and certainly not in invention. SASA’s objectives are, inter alia, to find ways of overcoming the hurdles, to confront challenges, to avoid pitfalls and to search for the way forward for Pushing the Frontiers of Science in Africa.

Joachim Kapalanga, MD, PhD
Executive President
Society for the Advancement of Science in Africa
On behalf of the Local Organizing Committee, welcome to the joint 5th SASA and 2nd UR Biotechnology Conference in Kigali Conference and Exhibition village. The Program Committee has developed an exceptional program. This year, we received 168 abstracts, from which 133 were chosen for plenary/platform oral presentations and more than 35 of the remaining abstracts are being presented as scientific posters. In addition, there are 20 invited sessions, chosen from keynote speeches proposals submitted this year.

The Program Committee has worked to assemble an exciting and fulfilling scientific program that balances basic, translational science and biotechnology research advances with sessions that address timely issues. Different plenary and concurrent sessions on various sub-themes will be organized and these include non-communicable diseases, pharmaceuticals and pharmacogenomics, precision and personalized medicine, improving health care skills and innovations in Africa, infectious diseases, biogeochemistry and soil geochemistry, biotechnology in agriculture, wildlife, biodiversity, water, environment, conservation, as well as social science in biotechnology.

The meeting begins on Wednesday 4th October 2017 at 9:30 am with official opening ceremonies and will be followed by the plenary presentation on “Biotechnology and Development: an overview of the challenges and Opportunities for Africa” by Prof. Jacob Souopgui.

Each day will feature both concurrent invited and platform presentations with various topics. Poster presentations will be held on each of three days during lunch and break time and all posters will remain on display throughout the three days in the exhibition area. This year’s meeting, two symposia will be organized on days 2 and 3 during lunch time by two pharmaceutical & biotechnology companies on new applications and innovations.

The University of Rwanda and partners and continue to share a strong commitment for academic development of trainees. The Program Committee will offer several pre-conference workshops in biotechnology and minimally invasive laparoscopic surgery designed to assist our trainee in their transition towards professional independence.

The meeting will conclude on Friday 6th October 2017 with the Distinguished Speakers from 1:30 pm to 2:30 pm. To determine whether the programmatic changes we implemented were successful, and to gather suggestions for future meeting, we will be sending an online survey after meeting to all attendees. Please kindly take the time to complete the survey and provide us with valuable feedback that we can consider for future meetings. We will also take this opportunity to send online “Certificate of Attendance” to all attendees.
Developing a program for such meeting is a complex process, requiring the coordinated efforts of many individuals over thousands of person-hours. This year I have had a privilege of working with a truly exceptional Program Committee - each member generously volunteering his or her expertise and time to develop an outstanding scientific program. I am really grateful to the all Organizing Committee Members and SASA Organization for their enthusiastic dedication and tireless work in making this meeting the success that it is.

Finally, my deepest appreciation goes to ARES, Medtronic Co., Promega Co., and Connect Rwanda the main sponsors of this conference.

I hope that you enjoy the meeting, and again, a warm welcome to Kigali!

Prof. Leon Mutesa
Organizing Committee Chair
2017 UR-SASA Conference
ORGANIZING COMMITTEE

Leon Mutesa, Chair of the Overall Program
Alain Fymat, Chair of Scientific Committee
Jacob Souopgui, Chair of the International Committee
Vivien Munyaburanga, Chair of the Logistic Committee
Jean Paul Coutelier
Christine Leroy
Francis Akena Adyanga
Morris D. C. Komakech
Joachim Kapalanga
Emilio Ovuga
Peace L. Buto
Marie Coursel Nininahazwe
Gisele Umwiza
Belle Ange Niyonshuti
Remy Serge Isabane
Jerome Usengimana
Gitare Mugabo
Gisele Sabo Ishimwe
Djalia Umutangampundu
Dieudonne Yezakuzwe
Dante Mugabo Uwimfura
Tina Nyunga
Grace Ineza Umuhoza
Peace Aradukunda
Mediatrice Uwanyirigira
Dieudonne Mutangana
Peter Rwiibasira
Nicole Umurungi
Assouma Mbabazi
Nshimiyimana Youssouf, Graphic Designer
AGENDA PRECONFERENCE BIOTECHNOLOGY WORKSHOP
From 28th September to 3rd October 2017
Biotechnology Centre, University of Rwanda,
Huye Campus

THEME
Strategy to meet biotechnology training and research objectives in Rwanda

Under the auspices of the UR Vice Chancellor,
Professor Philip COTTON

LOCAL ORGANIZATION COMMITTEE
Eng. Vivien MUNYABURANGA
Dr. Raymond MUGANGA
Dr. Jean-Pierre MUNYAMUPUNDU
Mss. Mediatrice UWANYIRIGIRA
Mr. Alain NYIRIMIGABO
Mr. JUSTIN
Mr. Jean-Claude TOMANI
Pr. Léon MUTESA

EXPERTS FROM ABROAD
Pr. Luc VANHAMME (Belgium)
Pr. Stephen GHOGOMU (Cameroon)
Pr. Jacob SOUOPGUI (Belgium)
Dr. Philippe POELVOORDE (Belgium)
Pr. Chigwa NOUBACTEP (Germany)
Mr. Ferdinand NGALE NJUME (Cameroon)
Dr. Carlos ROSSINI (Holland)
Dr. Hemanth SHENOI (USA)

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OUR MISSION

Providing innovative biological reagents and integrated systems used in research and applied technology worldwide.
PROGRAM
Joint 5th SASA International Conference and 2nd Rwanda Biotechnology Conference
Date & Venue: 4-6 October 2017,
Kigali Conference & Exhibition Village

**PROGRAM SUMMARY**

<table>
<thead>
<tr>
<th>DAY 1: WEDNESDAY 4 OCTOBER 2017</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>8:00 AM</strong></td>
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<td>9:30 – 9:40 AM</td>
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<tr>
<th>AKAGERA Ballroom</th>
<th>URUKARI Ballroom</th>
<th>INYAMBO Ballroom</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Session 1:</strong> Non-Communicable Diseases</td>
<td><strong>Session 2:</strong> Pharmaceuticals &amp; Pharmacogenomics</td>
<td><strong>Session 3:</strong> Precision and Personalized Medicine</td>
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<tr>
<td>Key note speakers:</td>
<td>Key note speakers:</td>
<td>Key note speakers:</td>
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<tr>
<td>Dr Jean Paul Rwabihama (Clinical Epidemiology &amp; Aging Unit University of Paris Est-Créteil, FRANCE)</td>
<td>Prof Roland Marini Djang’eing’a (Université de Liège, Liège, BELGIUM)</td>
<td>Prof. Alain L. Fymat, BA, BS, MA, MS, PhD (International Institute of Medicine and Science USA)</td>
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<tr>
<td>Dr. Joachim Kapalanga, MD, MSc, PhD, (Western University Ontario, CANADA)</td>
<td>Dr Olivia Jansen (Laboratoire de Pharmacognosie Université de Liège BELGIUM)</td>
<td>Dr Tsiry Rasamiravaka MD, PhD (University of Antananarivo, MADAGASCAR)</td>
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<tr>
<td>Professor Emilio Ovuga (Gulu University, UGANDA)</td>
<td>Concurrent invited sessions</td>
<td>Concurrent invited sessions</td>
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</tbody>
</table>
### DAY 2: THURSDAY 5 OCTOBER 2017

<table>
<thead>
<tr>
<th>Time</th>
<th>AKAGERA Ballroom</th>
<th>URUKARI Ballroom</th>
<th>INYAMBO Ballroom</th>
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<tbody>
<tr>
<td>8:00 AM</td>
<td>Registration Open</td>
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</tbody>
</table>
| 8:30 AM – 5:00 PM | **Session 4:** Improving Health Care Skills And Innovations in Africa  
**Key note speakers:**  
Dr Jean Robert Nzamushe  
(Head department of Emergency Surgery, University of Lille (CHU de Lille), FRANCE)  
Dr Benjamin Tatete Okitasombo  
Hôpital de Nivelles, BELGIUM  
Dr. Bertin Njinou  
Clinique des Ormeaux Vauban in le Havre, FRANCE  
Dr Lawrence Ayong  
Yaoundé, CAMEROUN |  
**Session 5:** Infectious Diseases  
**Key note speakers:**  
Prof. Hirotaka KANUKA  
Department of Tropical Medicine, Center for Medical Entomology, Jikei School of Medicine, Tokyo  
Prof. F Brombacher & Dr. Reto Guler  
University of Cape Town, South Africa  
Prof. Luc Vanhamme  
Institute of Molecular Medicine and Immunology Free University of Brussels, BELGIUM  
Prof. Leon Mutesa  
Laboratory of Human Genetics, College of Medicine and Health Sciences, University of Rwanda  
Prof. Batina Agasa  
University of Kisangani, D.R.C |  
**Session 6:** Biogeochemistry and Soil Geochemistry  
**Key note speakers:**  
Prof. Monique Carnol  
InBios-Plant and Microbial Ecology University of Liege-Belgium  
Prof. François Xavier Naramabuye  
College of Agriculture and Veterinary Medicine, University of Rwanda, RWANDA  
Prof. Sam Lanfranco  
York University, Toronto Canada |
<table>
<thead>
<tr>
<th>Time</th>
<th>AKAGERA Ballroom</th>
<th>URUKARI Ballroom</th>
<th>INYAMBO Ballroom</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 AM</td>
<td>Registration Open</td>
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</tbody>
</table>
| 8:30 AM - 12:30 PM | **Session 7:** Biotechnology in Agriculture  
**Key note speaker:** Prof. Charles Bucagu  
College of Agriculture and Veterinary Medicine University of Rwanda, RWANDA  
*Concurrent invited sessions* | **Session 8:** Wildlife, Biodiversity, Water, Environment & Conservation  
**Key note speaker:** Prof. Beth Kaplin  
Center of Excellence in Biodiversity & Natl Res Management, University of Rwanda, RWANDA  
Prof. Chicgoua Noubactep  
Hydrobiochemistry, University of Goettingen, ALLEMAGNE  
*Concurrent invited sessions* | **Session 9:** Social, Economic Sciences and Biotechnology  
**Key note speaker:** Prof. Dennis Raphael, PhD  
York University, Toronto, CANADA  
*Concurrent invited sessions* |
## DAY 1: WEDNESDAY 4 OCTOBER 2017: Opening Ceremony

<table>
<thead>
<tr>
<th>Time</th>
<th>AKAGERA Ballroom</th>
<th>URUKARI Ballroom</th>
<th>INYAMBO Ballroom</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 AM</td>
<td>Registration Open</td>
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</tr>
<tr>
<td>9:30 – 9:40 AM</td>
<td>Welcome remarks &amp; Conference Overview by Prof Leon Mutesa</td>
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<tr>
<td>9:40 – 9:45 AM</td>
<td>Remarks from the president of SASA, Prof Joachim Kapalanga</td>
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<tr>
<td>9:45 – 9:50 AM</td>
<td>Remarks from the chair of scientific conference Prof Alain Fymat</td>
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<tr>
<td>9:50 AM – 10:00 AM</td>
<td>Key note speech: Biotechnology and African country development: Challenges and Opportunities, Prof. Jacob Souopgui</td>
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<tr>
<td>10:00 – 10:10 AM</td>
<td>Welcome remarks from the UR Vice Chancellor</td>
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<tr>
<td>10:10 – 10:20 AM</td>
<td>Remarks &amp; Official Opening from the Guest of Honor</td>
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</tr>
<tr>
<td>10:20 – 10:30 AM</td>
<td>Group Photo &amp; Coffee Break</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## DAY 1 Wednesday 4 October 2017: Plenary and Concurrent Invited sessions

### Concurrent Invited sessions

<table>
<thead>
<tr>
<th>Time</th>
<th>AKAGERA Ballroom</th>
<th>URUKARI Ballroom</th>
<th>INYAMBO Ballroom</th>
</tr>
</thead>
<tbody>
<tr>
<td>11:00 AM</td>
<td>Session I: Non communicable diseases</td>
<td>Session II: Pharmaceuticals and Pharmacogenomics</td>
<td>Session III: Precision and Personalized Medicine</td>
</tr>
<tr>
<td>11:00 AM – 11:25 AM</td>
<td>Keynote address N1: by Dr Jean Paul Rwabihama * Rights of Patients which chronic non-communicable diseases: ethical and public health issues* Moderators: Francis Akena Adyanga, Monique Cornol</td>
<td>11:00AM-11:25AM: PP/001/OC: “Chemical Synthesis, Efficacy and Safety of Anti-Malarial Hybrid Drug Comprising of Sarcosine and Aniline Pharmacophores as Scaffold” by Jean Baptiste Niyibizi</td>
<td>11:00-11:25AM: Keynote address N6: Therapeutics Delivery beyond the Brain Protective Barriers by Prof. Alain L. Fymat Moderators: Naramabuye Francois and Stefan Jansen</td>
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**Keynote Address**

**Keynote Session by Prof. Joachim Kapalanga**

**Keynote Address No 1**

**Keynote Address No 2**

**Keynote Address No 3**

**Keynote Address No 4**

**Keynote Address No 5**

**Keynote Address No 6**
### 1:00PM – 2:00PM

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
</tr>
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<tbody>
<tr>
<td>2:00PM – 2:25PM</td>
<td>Plenary: Keynote address Nº 2 Shared behavioral Endophenotype in neurodevelopmental disorders by <strong>Kapalanga Joachim</strong>, Venue: AKAGERA Ballroom Moderators: Jacob Souogui and Lawrence Ayong</td>
</tr>
<tr>
<td>2:30PM – 2:45PM</td>
<td>NCD/007/OC: Early Detection of Coronary Artery Disease in Asymptomatic Diabetic Patients Undergoing SPECT Myocardial Perfusion imaging with Tc-99m Sestamibi (Tetrafluoroborate by <strong>Moussa</strong></td>
</tr>
<tr>
<td>2:45PM – 3:00PM</td>
<td>NCD/008/OC: Distribution and roles of the OneCut transcription factors during spinal dorsal development by <strong>Kabiyiza K. U.</strong></td>
</tr>
<tr>
<td>3:00PM – 3:15PM</td>
<td>NCD/009/OC Clinical outcomes of cardiac surgery for rheumatic heart disease patients followed at three rural sites in Rwanda by <strong>Rusingiza Emmanuel</strong></td>
</tr>
<tr>
<td>3:15PM – 3:30PM</td>
<td>NCD/010/OC Effects of Vitamin D Status on the Evolution of Non-Communicable Oral Diseases by <strong>Murererehe Julienne</strong></td>
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### 3:30PM – 4:00PM

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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</thead>
<tbody>
<tr>
<td>4:00PM – 4:25PM</td>
<td>Keynote address Nº 3 Where there is inadequate mental health service: Role of the society for the advancement of Science in Africa (SASA) by <strong>Emilio Ovuga</strong></td>
</tr>
<tr>
<td>4:00PM – 4:15PM</td>
<td>PP/009/OC: NLRP3 Inflammasome/Caspase-1 Inhibition by Herbal Recipes Extracts Traditionally Used in Rwanda for Asthma Treatment by Jean Claude Didelot TOMANI</td>
</tr>
<tr>
<td>4:25PM – 4:40PM</td>
<td>NCD/011/OC: &quot;Prevalence, Awareness and Treatment Rates of Hypertension Among Patients Attending General Outpatient Department of Gulu District, Northern Uganda&quot; by <strong>Walubembe J.</strong></td>
</tr>
<tr>
<td>4:40PM – 4:55PM</td>
<td>NCD/012/OC: &quot;Epidemiology and Clinical Features of Breast Cancer in Rwanda&quot; by <strong>Umurungi Nicole M.</strong></td>
</tr>
<tr>
<td>5:10PM – 5:25PM</td>
<td>NCD/014/OC: Risk of preterm and low birth weight newborns in women with non communicable periodontal diseases by <strong>P. Uwambaye</strong></td>
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### 5:15PM – 5:30PM

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<tr>
<td>5:15PM – 5:30PM</td>
<td>PP/014/OC: Modeling the interactions between MC2R and ACTH models from Human by <strong>Mutangana Dieudonné</strong></td>
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### 5:30PM END OF DAY 1
<table>
<thead>
<tr>
<th>Time</th>
<th>AKAGERA Ballroom</th>
<th>URUKARI Ballroom</th>
<th>INYAMBO Ballroom</th>
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<tbody>
<tr>
<td>8:00AM-9:25 AM</td>
<td>Keynote address Nº 1: &quot;Effect of Agroecological Practices on Fertility of a Cultivated Tropical Ferigineous Soil of Eastern Burkina Faso&quot; by A. Coulibaly</td>
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<tr>
<td>9:00 AM-9:15 AM</td>
<td>&quot;Prevalence of Malaria Parasites and Vector Species Abundance in Huye District, Southern Rwanda&quot; by Chantal Nyirakanani</td>
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<tr>
<td>10:00 AM-10:15 AM</td>
<td>&quot;Assessment of Elephantiasis and Associated Risk Factors Among People Living in Musanze&quot; by A.Y. Uwitonze</td>
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<tr>
<td>10:15 AM-10:30 AM</td>
<td>&quot;Updating Rwanda Reference Soils Database in Disturbed Lands – Case study: Gatumba Mining District- Ngororero District (Western Rwanda)&quot; by Dative Imanirareba</td>
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<tr>
<td>11:00 AM-11:25 AM</td>
<td>Keynote address Nº 5: &quot;Human apolipoproteins L : Killing African trypanosomes and acting in programmed cell death&quot; by Prof. Luc Vanhamme</td>
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<tr>
<td>11:25 AM-11:40 AM</td>
<td>&quot;Effect of Long-Term Application Of Organic and Inorganic Fertilizer on Soil Microbial Population and Biomass Carbon and Nitrogen in Volcanic Highland Region of Western Rwanda&quot; by Hamoud Rukangantambara</td>
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### 11:45 AM-12:00 PM: INN/008/OC: "Utilization of Maternal and Reproductive Health Services in Northern Uganda and Their Implications on Burden of Non-Communicable and Infectious Diseases" by Emmanuel Candia

### 11:40 AM-11:55 AM: ID/007/OC: "Implementation of Integrated Vector Management (IVM) Approach for Control of Malaria and Other Vector Borne Diseases: The Experience of Rwanda" by Emmanuel Hakizimana


### 12:00 PM-12:15 PM: INN/009/OC: "Building Public-Health Research Capacity on Non-Communicable Chronic Diseases through Romania – USA cooperation" by Radu Pirlog

### 11:55 AM-12:10 PM: ID/008/OC: "Cellular Response Pattern in School-Aged Children Infected with Schistosomiasis Before and After Chemotherapy" by Edward Okonjo

### 11:55 AM-12:10 AM: BSB/007/OC: "Molecular Weight and Trace Metal Distributions in Fulvie and Humic Acid Fractions of Volcanic Soil in Musanze District, Rwanda" by Hamudu Rukangantambara

### 12:15 PM-12:30 PM: INN/010/OC: "Synchronization of Patient Data Among Health Facilities Through Electronic Medical Records System: A Case Study of Kabgayi District Hospital" by Charite Niyitegeka

### 12:10 PM-12:25 PM: ID/009/OC: "Prevalence of Hepatitis C Virus Infection and Its Risk Factors among Patients Attending Rwanda Military Hospital, Rwanda" by Esperance Umumararungu

### 12:10 AM-12:25 AM: BSB/008/OC: "Catabolic profiles of cultivable microbial communities in forest soils of Western Algeria along a latitudinal gradient" by Borsali Amine

### 12:30 PM-12:45 PM: INN/011/OC: "Classification Of Glomerular Hyperfiltration, Normal Glomerular Filtration, Kidney Dysfunction Stages By Body Composition, Siriraj Score, Keith-Wagner Score, Hemodynamics, And Atherogeneity Indexes" by Mvitu Muaka Moise

### 12:25 PM-12:40 PM: ID/010/OC: "Ov28CRP, a cysteine rich Onchocerca volvulus excretory secretory product with a serodiagnostic potential for human onchocerciasis" by Ferdinand Ngale Njume

### 12:25 PM-12:50 PM: Keynote address No 17: "Strengthening African Research Capacity, Evidence-Based Discourse and Policy Development in an African Context" by Prof. Sam Lanfranco

### 12:45 PM-1:00 PM: INN/012/OC: "Laparoscopic pyelolithotomy and ureterotomy: a feasible minimally invasive treatment option in a single center in Cameroon" by Cyril Kamadjou

### 12:40 PM-1:05 PM: Keynote address N² 15: "Drepakis: contribution to the management of Sickle Cell disease in the city of Kisangani (DRC)" by Prof. Marini RD & Batina A.S.

### 1:00 PM-2:00 PM: Lunch Break & SYMPOSIUM BY PROMEGA IN AKAGERA Ballroom

#### (The Promise of biotechnology – Addressing the challenges of research and applied sciences)

### 2:00 PM-2:25 PM: Plenary session. Venue: AKAGERA Ballroom, Keynote address N² 9 "Extra Corporeal Enteral prosthesis (ECEP): An external ambulatory device to restore digestive flow in patients with double ostomy" by Dr Jean Robert Nzamushe

#### Moderators: Jacob Souopgui, Christian Ndongang

#### 2:30 PM-2:55 PM: Keynote address N² 10: "Robotic-assisted radical prostatectomy - the 5-year initial experience. Functional and oncological outcomes" by Dr.Bertin NJINOU

### 2:30 PM-2:55

#### POSTER & STAND EXHIBITION

### 2:30 PM-2:55PM

#### POSTER & STAND EXHIBITION

#### 2:55 PM-3:20 PM: Keynote address N² 11: "Laparoscopic artificial urinary sphincter in women for type iii incontinence: preliminary results" by Dr.Bertin NJINOU

#### 2:55 PM-3:20: POSTER & STAND EXHIBITION

### 2:55 PM-3:20 PM: POSTER & STAND EXHIBITION

#### 3:30 PM-4:00 PM: Break

### 4:15 PM-4:30 PM: INN/012/OC: Methylophilic Recombinant Pichia Pastoris For Phytase Production On D-Mannitol/Methanol Optimisation" by Ndayambaje Jean Bernard

### 4:15 PM-4:30 PM

#### POSTER & STAND EXHIBITION

### 4:15 PM-4:30 PM

#### POSTER & STAND EXHIBITION

### 4:30 PM-4:55 PM: Keynote address N² 12: "An electricity-free reverse transcription LAMP assay for high sensitivity detection of Plasmodium falciparum infections" by Dr. Lawrence Ayong

### 4:30 PM-4:55 PM

#### POSTER & STAND EXHIBITION

### 4:30 PM-4:55 PM

#### POSTER & STAND EXHIBITION
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<tr>
<td>9:00AM-9:15PM</td>
<td>Session VIII: Biotechnology In Agriculture</td>
<td>Session VIII: Wildlife, Biodiversity, Water, Environment &amp; Conservation</td>
<td>Session IX: Social, Economic Sciences and Biotechnology</td>
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<tr>
<td>10:30AM-11:00AM</td>
<td>Break</td>
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<td>Time</td>
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<td>11:00AM-11:15AM</td>
<td>BA/009/OC- Influence of the Application of Natural Phosphate Rocks on the Performances of Direct Seeding Mulch-Based Cropping System Using Styloanthes guianensis (Aublet) Swartz as Cover Crop in the Conditions of the Bateké Plateau (Kinsasha Province, DRC) by B.P. Bulaka</td>
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<td>11:00AM-11:15AM</td>
<td>WBBWE/007/OC- Performance evaluation of biogas system in kiramuruzi sector by M.Assouma</td>
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<td>11:00AM-11:15AM</td>
<td>SS/006/OC- The ‘Paddy Paradox’ Revisited: How Rice Farming Impacts on Household Economic Status and Malaria Risk in Eastern Rwanda by Alexis Rulisa</td>
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<td>11:15AM-11:30AM</td>
<td>BA/010/OC- Response of Coffee Genotypes to Regeneration From Callus by Aline Tuyishime</td>
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<td>11:15AM-11:30AM</td>
<td>WBBWE/008/OC- Cheap Ceiling materials from Waste paper recycling as a solution to deforestation and waste management by Aradukunda</td>
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<td>11:15AM-11:30AM</td>
<td>SS/007/OC- Estimation of Water footprint of Coffee production in Rwanda by M.C.Nininahazwe</td>
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<td>11:15AM-11:30AM</td>
<td>WBWEC/010/OC- Assessing cultural ecosystem services and human wellbeing in communities around Nyungwe national park, Rwanda by A.Ndemezo</td>
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<td>11:15AM-11:30AM</td>
<td>SS/008/OC- Social Network Analysis of Aquaculture Projects on Provisioning Services Enhancement of Peatland Forest Ecosystem in Central Kalimantan, Indonesia by Francisca Kilonzi</td>
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<td>11:30AM-11:45AM</td>
<td>BA/011/OC- Biotechnology in Agriculture: Influences on Human Health and Environmental Health by Rosalie Uwayezu</td>
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<td>11:30AM-11:45AM</td>
<td>WBBWE/009/OC- Wastewater reuse for irrigation and generation of energy: Case study of Musanze Prison by P.M.Niyonkuru</td>
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<td>11:30AM-11:45AM</td>
<td>WBWEC/011/OC- Use of slow sand filtration system in the production of clean water for rural areas, Case study: Huye District by Muvunangabo, F</td>
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<td>11:30AM-11:45AM</td>
<td>SS/010/OC- Investigation of microbial films in biofilters for wastewater treatment by Benjamin Manirakiza</td>
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<td>11:30AM-11:45AM</td>
<td>WBWEC/013/OC- Heavy Metal Removal by Combining Anaerobic Upflow Packed Bed Reactors with Water Hyacinth Ponds by Sekomo</td>
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<td>11:30AM-11:45AM</td>
<td>SS/011/OC- Environmental impact assessment and land suitability of Nduba landfill in Gasabo district by C.Byamungu</td>
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<td>12:00PM-12:15PM</td>
<td>BA/013/OC- Food Security Enhancement Through Irrigation In Drought Prone Areas by Nyunga</td>
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<td>12:00PM-12:15PM</td>
<td>WBBWE/010/OC- Bamboo (Bambusa vulgaris) Regeneration by Cutting Methods of Culm Cuttings at URC-CVM Busogo Campus Tree Nursery by Twagirayezu Leandre</td>
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**12:00 PM - 1:30PM LUNCH & SYMPOSIUM BY MEDTRONIC IN AKAGERA Ballroom**
(Laparoscopy in low resource settings: challenges & solutions)

**1:30PM-2:00PM CLOSING CEREMONY IN AKAGERA Ballroom**
| NCD/001/PC: Classification of Stages of Severity of Hypertensive Retinopathy Using Wong-Mitchell Among Patients With Acute Stroke at Teaching Hospital of Kinshasa by Mvitu Muaka Moise, Longo-Mbenza Benjamin, Voumbo Matumona Yolande, Monkondji Mobe Etienne, Muaka Diela Marie-Josée, Ndjali Deldel Christelle, Mbungu Fuele Simon |
| NCD/002/PC: Hemorragic Stroke Defined By Factor Analysis with Keith-Wagner Grades Of Hypertensive Retinopathy At Teaching Hospital Of Kinshasa, Dr Congo by Mvitu Muaka Moise, Longo-Mbenza Benjamin, Voumbo Matumona Yolande, Monkondji Mobe Etienne, Muaka Diela Marie-Josée, Ndjali Deldel Christelle, Mbungu Fuele Simon |
| NCD/003/PC: Ageing For Ischaemic Stroke Defined By Factor Analysis With Keith-Wagner Grades Of Hypertensive Retinopathy At Teaching Hospital Of Kinshasa, Dr Congo by Mvitu Muaka Moise Longo-Mbenza Benjamin, Muaka Diela Marie-Josée, Ndjali Deldel Christelle, Mbungu Fuele Simon |
| NCD/004/PC: Classification of Glomerular Hyperfiltration, Normal Glomerular Filtration, Kidney Dysfunction Stages by Body Composition, Siriraj Score, Keith-Wagner Score, Hemodynamics, and Atherogenicity Indexes by Mvitu Muaka Moise, Longo-Mbenza Benjamin, Voumbo Matumona Yolande, Monkondji Mobe Etienne, Muaka Diela Marie-Josée, Ndjali Deldel Christelle, Mbungu Fuele Simon |
| NCD/005/PC: A pilot study on metabolic newborn screening in Rwanda by Mutesa L, Hitayezu J, Uwineza A., Debray F.G., Boemer F., Bours V., Heales S |

**Session II: Vaccines and Vaccine Delivery**

| PP/001/PC: Is Liquid Medicine a Hidden Danger to Non-Communicable Oral Health of Children in Rwanda by Chrispinus Hakimu Munema, Emmanuel Bwimwo, Eliane Horerimana Ingabire, Bernard Ondari, Gatarayihina Agnes and Uwambaye Peace |
| PP/002/PC: Structure Interaction Between the Predicted 3D Model of Mouse Zinc finger MYND Domain-Containing Protein 19 (Q9CQG3) and Co-Factor Products AdoHcy – Suggestion of Compound Candidates for Cancer, Obesity, Cardiovascular Diseases, and Other Potent Drugs Development by Mutangana Dieudonne*, Mugabo Robert, Gumizamu Caroline and Shyaka Wagner Grades Of Hypertensive Retinopathy Using Wong-Mitchell Among Patients Attending a University Teaching Dental Clinic in Kigali, Rwanda by Uwitonze AM, Isyogi M, Mutangana Dieudonne, Mugabe Robert, Gumizamu Caroline and Shyaka Wagner |

**Session III: Precision and Personalized Medicine**

| PPM/001/PC: Factors Associated with Orthodontic Treatment Among Patients Attending a University Teaching Dental Clinic in Kigali, Rwanda by Uwitonze AM, Isyogi M, Mugabe Robert, Gumizamu Caroline and Shyaka Wagner |
| PPM/002/PC: Knowledge and Attitude of Adult Rwandese Towards Replacement of Posterior Teeth by Uwitonze Anne Marie and Isyogi Moses |

**Session IV: Improving Health Care Skills and Innovations in Africa**

| INN/001/PC: To Assess Nurse’s Knowledge about Head Injury and Nursing Management of Patient with Head Injury in ICU, CHUK by Carine Higo |
| INN/002/PC: Health Care Technology Training by June Madete |
| INN/003/PC: Docking studies of L-adrenaline onto the predicted three-dimensional model structure of Carbonic anhydrase II (P00918) from human, using computational methods by Mutangana Dieudonne, Mugabe Robert, Gumizamu Caroline and Shyaka Wagner Methods With Keith-Wagner Grades Of Hypertensive Retinopathy At Teaching Hospital Of Kinshasa, Dr Congo by Mvitu Muaka Moise, Longo-Mbenza Benjamin, Voumbo Matumona Yolande, Monkondji Mobe Etienne, Muaka Diela Marie-Josée, Ndjali Deldel Christelle, Mbungu Fuele Simon |
| INN/004/PC: Health Care Technology Training by June Madete |
| INN/005/PC: Introducing Biotechnology Laboratories At University Of Rwanda by Mediatricre Uwayrijiira’and Antoine Nsabimana |

**Session V: Infectious Diseases**

| ID/001/PC: Characterization of Q146Y0 Protein from Burkholderia Xenororans Using in silico Methods by Mutangana Dieudonne, Lupande DM, Bikubanya L, Kabego L, Khonde RK, Kinunu FB, Ngoma PK and Lunguya OM |
| ID/002/PC: Multiresistant Germs in Suppurative Infections at the Provincial Referral Hospital of Bukavu, DR Congo by Lupande DM, Bikubanya L, Kabego L, Khonde RK, Kinunu FB, Ngoma PK and Lunguya OM |

**Poster presentation**

**Session I: Non communicable diseases**

| NCD/008/PC: Multiresistant Germs in Suppurative Infections at the Provincial Referral Hospital of Bukavu, DR Congo by Lupande DM, Monecke S, Khonde RK, Cirezi BM, NGOMA PK, Muller E, Nkwaka NM, Reissig A, Lunguya O, Kabinda JM and Ehrich R |

**Session II:paintbook**

| PP/001/PC: Is Liquid Medicine a Hidden Danger to Non-Communicable Oral Health of Children in Rwanda by Chrispinus Hakimu Munema, Emmanuel Bwimwo, Eliane Horerimana Ingabire, Bernard Ondari, Gatarayihina Agnes and Uwambaye Peace |
| PP/002/PC: Structure Interaction Between the Predicted 3D Model of Mouse Zinc finger MYND Domain-Containing Protein 19 (Q9CQG3) and Co-Factor Products AdoHcy – Suggestion of Compound Candidates for Cancer, Obesity, Cardiovascular Diseases, and Other Potent Drugs Development by Mutangana Dieudonne*, Mugabo Robert, Gumizamu Caroline and Shyaka Wagner |

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<tr>
<th>Session VI: Biogeochemistry &amp; Soil biogeochemistry</th>
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<tr>
<td>BSB/001/PC: Soil microbial properties and soil nutrient content under exotic and native tree species in Southern Rwanda</td>
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<th>Session VII: Biotechnology in Agriculture</th>
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<td>BA/001/PC: Factors Affecting Regeneration Potential of Selected Kenyan Cassava Genotypes using In vitro Somatic Embryogenesis by Ngugi Mathew Piero, Oduor Richard Okoth, Wanyonyi Christine Nakhumicha</td>
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| BA/002/PC: Sudden cardiac arrest: a threat for African country health system by Dr. Carnot TANIE – CHIREC Group Brussels – BELGIUM |

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<tr>
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<tr>
<td>WBWEC/001/PC: The Impact of Cultural Tourism in Enhancing the Community to Participate in Wildlife Conservation in Volcanoes National Park by Kibogo A. and Kyamujara W.</td>
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| WBWEC/003/PC: Construction materials from recycled plastics as a solution to solid waste management by M.Gitare, R.S.Isabane, T.Turatimana, Munyaturanga |

| WBWEC/004/PC: Stable Isotope analysis for dam leakage source detection by Vincent de Paul Mugwaneza, Peace L. BUTO |

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<tr>
<th>Session IX: Social, Economic Sciences and Biotechnology</th>
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<tr>
<td>SSB/001/PC: A Digital Citizen Science Platform for Malaria Vector Surveillance and Control in Ruhuha, Rwanda by Marilyn M. Murindahabi, Deidre Bosch, Asingizwe Domina, Leon Mutesa, Emmanuel Hakizimana, Marjou Poortvliet, Arnold J.H. van Vliet, Sander Koenraadt, Peter Feindt and Willem Takken</td>
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| SSB/002/PC: Early Childhood Tooth Buds Removal Practice ("Ibyinvo"): A Preventable African Health Problem by Muhire Valens, Nsabimana Evariste, Uwayezu Donat, Eleana Stoufi, Mohammed Razzaque |

| SSB/003/PC: Consumption of Bushmeat at Lubumbashi, Democratic Republic of Congo: Sociocultural Approaches by Tshikung, K.M. |

| SSB/004/PC: Gender Participation in the Local Chicken Value Chain in Northern Uganda by Akite, I., Kule, E, Mugonola, B., Okot, M.W.Kuganze, D.R.&Aryemo, I.P. |

| SSB/005/PC: Adherence to Ivermectin is more associated with perceptions of Community Directed Treatment with Ivermectin organization than with onchocerciasis beliefs by Fanny Nadia Dissak-Delo, Guy-Roger Kamga, Perrine Claire Humblet, Annie Robert Jacob Souopgui, Joseph Kamgno, Marie José Essi, Stephen Mbigha Ghogomu, Isabelle Godin |

| SSB/006/PC: Study of cultural impact of ex-situ conservation facilities on the population in the Lubumbashi region and perspectives for growing involvement of these structures in information and sensitization on environmental protection by Tshikung, K.M. |
PRECONFERENCE LAPAROSCOPIC SURGERY WORKSHOP
Agenda – Workshop
From 2nd to 3rd October 2017
Kigali University Hospital (CHUK) and Rwanda Military Hospital (RMH)

THEME
A view on the Minimally Invasive Surgery Practice and Outlook in Rwanda and East Africa

Under the auspices of the Rwandan Ministry of Health,
Honorable Dr. Diane GASHUMBA

LOCAL ORGANIZATION COMMITTEE
Dr. Martin NYUNDO (CHUK)
Dr. Antoine NIFASHA (CHUK)
Dr. David NTIRUSHWA (CHUK)
Dr. King KAYONDO (RMH)
Dr. Africa GASANA GUIDO (RMH)
Eng. Vivien MUNYABURANGA (UR ARES)
Pr. Léon MUTESA (UR and RMH)
Dr. Faustin NTIRENGANYA (CHUK)

EXPERTS FROM ABROAD
Dr. Christian NGONGANG (Belgium)
Dr. Jean Robert NZAMUSHE (France)
Dr. Bertin NJINOU (France)
Dr. Benjamin TATETE (Belgium)
Dr. Cyril KAMADJOUN (Cameroon)
Mrs. Violette HOMAKEYA (Belgium)
Dr. Didier SHANGO (Belgium)

Local Contact:
Dr Martin NYUNDO
Consultant General Surgeon
Head, Clinical Services Division
President, Rwanda Surgical Society
E-mail: nyundomartin@gmail.com
Tel: +250 788 418 727 | +250 723 283 209

Contact Abroad:
Pr. Jacob SOUOPGUI (Belgium)
Email: jsouopgu@ulb.ac.be

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Further, Together
MINIMALLY INVASIVE SURGERY (MIS) KEYHOLE SURGERY

BENEFITS OF MINIMALLY INVASIVE SURGERY (MIS)

1. LESS POST-OPERATIVE PAIN
2. SHORTER HOSPITAL STAY
3. FASTER RECOVERY TIME
4. FASTER RETURN TO WORK AND NORMAL ACTIVITIES
5. BETTER COSMETIC RESULTS (SMALLER SCARS)
6. FEWER COMPLICATIONS OF SURGERY

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KEYNOTE SPEAKERS
INVITED KEYNOTE SPEAKERS

DAY 1 – WEDNESDAY 4 OCTOBER 2017

Opening Session 10:00 – 10:30 am

Professor Jacob SOUOPGUI
Université Libre DE Bruxelles (Brussels, BELGIUM)
Email: Jacob.Souopgui@ulb.ac.be

Professor J. SOUOPGUI was born in Cameroon and did his primary, secondary and university studies in his country. He studied biology, completed an MSc in Biochemistry in 1994 and his first PhD in Molecular Parasitology in 1999 at the University of Yaoundé 1, Cameroon. Motivated to improve his background training and research skills, he moved to the University of Göttingen in Germany in 1999 where he performed his second PhD in Molecular genetics of Development and was graduated in 2002. After his first postdoc training in Germany, he moved to Belgium in 2006 where he did a second postdoc and was granted a chair in Developmental Biology in 2009 at the Université Libre de Bruxelles (ULB). Jacob SOUOPGUI is a Professor of molecular genetics and Biotechnology at the ULB-BioPARK, and since 2012 he created and is the Chair of the Laboratory of Embryology and Biotechnology. His main research interest focuses on understanding the origin of some human malformation and genetic diseases. Besides his fundamental research goals, Professor SOUOPGUI is very active in the field of R&D aiming at strengthening capacity building in African countries. He is presently one of the team leaders of the Belgian institutional support to the University of Rwanda and is in charge of technology platform implementation to support research and teaching in the field of biotechnology and life sciences. Jacob is a coordinator and partner in four big (5 years) healthrelated research grants in Cameroon and in Rwanda.

SESSION I: NON-COMMUNICABLE DISEASES

Dr. Jean Paul Rwabihama
Clinical Epidemiology and Aging Unit
University of Paris Est-Crêteil,
FRANCE
Email: rwabihama2002@yahoo.fr

Dr Jean Paul Rwabihama is a Medical Doctor in internal medicine from University of Rwanda and Specialist in Geriatrics after 4 years of training in Paris. He received a Master of Science in Health Law at Diderot Paris University in 2007 and completed his PhD in Ethics and Public Health at the Toulouse University (France) in 2012; he was a PhD fellow at the Kennedy Institute of Ethics, Georgetown University, Washington DC (USA). He served as vice-chair of the professional practice assessment committee at Henri Mondor University hospitals from 2012 to 2016. Since 2015, Jean Paul Rwabihama joined the Clinical Epidemiology and Ageing Unit (EA4393), affiliated to Institut Mondor de Recherche Biomédicale (IMRB), at University of Paris-Est Créteil, as a Senior Researcher. His research topics are focused on patients’ rights, end of life issues, clinical ethics, and therapeutics in the elderly patients and prevention of venous thromboembolic disease. Currently, he is a Senior Consultant in Geriatrics at Paris Public Hospitals (AP-HP), Henri Mondor University hospitals, Geriatric department of Essonne. On a part-time, Jean Paul Rwabihama collaborates with the French Ministry of Justice as a legal expert at Court of Appeal of Paris. He has been appointed by several high courts of the Paris region to carry out medical assessments in penal and civil cases.
Dr. Joachim Kapalanga, MD, MSc, PhD
Western University Ontario
CANADA
Email: jokapalanga@gmail.com

Dr. Joachim Kapalanga is a Physician-Scientist and an Educator who has held faculty and leadership positions in various institutions and organizations. Dr. Kapalanga was educated at Yale University, the State University of New York, Queens University, McMaster University and at the University of Guelph. Dr. Kapalanga is Professor (Adj) of Pediatrics at Schulich School of Medicine and South Western Ontario Academic Health Network-Research Group, and faculty with the South Western Ontario Medical Education Network/Schulich School of Medicine/Western University. He is also faculty at McMaster University. He is a Research Group member of the South Western Ontario Academic Health Network (SWAHN)/Schulich School of Medicine at Western University. Dr. Kapalanga is Chief of Pediatrics Grey Bruce Health Services, Ontario and Consultant Pediatrician and Medical Geneticist Summerside Medical Centre (SSMC), Prince Edward Island (PEI). He is a Visiting Professor, Gulu University. In 2007 Dr. Kapalanga was appointed Associate Professor and Head Division of Medical Genetics at Upstate Medical University/State University of New York (SUNY). Between 2002 to 2007 Dr. Kapalanga was Assistant Professor and Member Prince Edward Island Health Research Institute/University of Prince Edward Island. Between 2003 to 2007, he was also chairman of the Perinatal Committee SSMC/Prince County Hospital, head of the PEI Newborn Screening Program and PEI Representative at the Fetal Alcohol Spectrum Disorder Canadian Expertise (FACE) Research Round table. Between 2008 to 2011 He was appointed to Council, College of Physicians and Surgeons of Prince Edward Island. He was also Lecturer at Dalhousie University between 2007 to 2010. Between 1998 to 2011 Dr Kapalanga was a Clinical Instructor in Genetics at Yale University and between 1995 to 1998 Assistant Clinical Instructor in pathology and pediatrics at SUNY, Brooklyn. Dr Kapalanga obtained an MSc degree in Human Genetics from the University of Guelph, a PhD degree in medical genetics from Queen's University. He subsequently did a postdoctoral fellowship at McMaster University. He also did residency training in pathology at SUNY Health Sciences Centre/Kings County Hospital and University Hospital, Brooklyn, residency training in pediatrics at SUNY/Maimonides Medical Center, a postdoctoral fellowship and residency at Yale University. Dr. Kapalanga is a fellow of the American College of Medical Genetics, Fellow of the American Academy of Pediatrics, Diplomat of the American Board of Medical Genetics, Diplomate of the American Board of Pediatrics and an Associate Fellow of the Canadian College of Medical Genetics. Dr. Kapalanga is a member of the American Medical Association, American Society of Human Genetics, FACE Research Roundtable, Canadian Congenital Anomalies Network Surveillance Network, Canadian Medical Association, the Ontario Medical Association and founding member of the African Society of Human Genetics. Dr. Kapalanga’s current scholarly and research pursuits are in neurodevelopmental and neurobehavioral genetics, in the emerging field of epigenetics and in cancer genetics. He espouses multidisciplinary, multicenter and international research.

Professor Emilio Ovuga
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Emilio Ovuga, PhD, is Professor of Psychiatry and Mental Health of Gulu University. Dr. Ovuga holds a joint Doctor of Philosophy in Suicidology and Suicide Prevention, and Psychiatric Epidemiology of Karolinska Institutet and Makerere University. Dr. Ovuga is the founding Chairman of Bonvitae Agro-Industries Limited (BAIL) whose goal is to develop agricultural technologies to diversify agricultural practices and food production to feed the hungry in conflict-ridden Sub-Saharan Africa. He is the SASA Vice-President for the Africa Region. Dr. Ovuga served as Dean of the Faculty of Medicine at Gulu University (2006-2012). He was the founding Chairman of the Forum of Research and Ethics Chairpersons in Uganda (FRECU) (2009-2015) and, of Gulu University Research and Ethics Committee
(GUREC) (2007-2017). Dr. Ovuga has held various positions of responsibility at Makerere University from 1989-2006; as Psychiatrist at Mathare Mental Hospital in Nairobi, Kenya (1981-1982); Provincial Psychiatrist in Western Kenya (1982-1984); and Senior Psychiatrist in the Transkei Homeland of South Africa (1984-1989). Dr. Ovuga has developed and promoted a sustainable research culture at Gulu University, which was established in Northern Uganda in 2004. Consequently undergraduate students of Gulu University are able to conduct research and publish their research findings in international peer-reviewed journals. He has empowered communities to take charge and responsibility of their social and health situations and in improving their relations with government departments. Dr. Ovuga contributed to the establishment of the African Program for Onchocerciasis Control (A.P.O.C.) as a member of the WHO/TDR research team on the psychosocial importance of, and treatment of onchocerciasis in Sub Saharan Africa (SSA). Dr. Ovuga is a researcher, educator, administrator, mentor, and has conducted research and mentored students in wide-ranging fields in health, social sciences, business, agriculture and ICT.

Prof. Leon Mutesa
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Prof. Leon Mutesa obtained his MD from the university of Rwanda in 2003; he was then awarded a PhD scholarship from French speaking Universities CIUF/CUD-Belgium Cooperation and joined the Center for Human Genetics at the university of Liege-Belgium. In 2009 he graduated with a PhD in Medical Sciences (human genetics) and joined the College of Medicine and Health Sciences at the University of Rwanda as Senior Lecturer then Associate Professor of human genetics. Currently, he serves as Head of Center for Human Genetics. Since starting his genetic career, he specifically drove new developments and implementation of a reference center for medical genetics in Rwanda, the only one in the East African Region where he is developing genetic clinical practice, molecular, cytogenetic and newborn screening analyses. He has conducted several research projects in African patients with genetic disorders and mainly focused on chromosomal and molecular disorders such as sickle cell anaemia, chromosomal abnormalities, and cystic fibrosis-like disease. Dr Mutesa is author of more than 70 publications in peer-reviewed journals and has been invited as a key speaker and abstract presenter in more than 40 national and international scientific conferences. Dr Mutesa also served as the Director of Department of Clinical Laboratory Dept. at the Kigali University Teaching hospital which is the largest referral hospital with an average of 30,000 newborns every year. In recognition to his research achievements and project management skills, he was appointed by the Government of Rwanda from 2011-2013 as Director of Medical Research Center in Rwanda Biomedical Centre under Ministry of Health, where he coordinated health related research activities in all national medical institutions. Currently, he is Principal Investigator and manager of more than six major research grants in various aspects including cytogenetic and molecular studies, malaria, HIV, PTSD, epigenetics and newborn screening.

Prof. Batina Agasa
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Prof. BATINA AGASA did his studies at the University of Kisangani where he obtained his diploma as Medical Doctor in 1989.

He began his scientific activities in 1990 as Assistant at the Faculty of Medicine at the same university and obtained in 1996 the diploma of specialist in internal medicine.
After having worked many years as clinician and researcher at the university clinics of Kisangani he moved to Belgium where he obtained in 2005 a specialization in Immuno-hematology Transfusion, and in 2007 a diploma of Advanced Studies in Health Sciences at the Université Libre de Bruxelles (ULB) where he obtained his PhD in Medical Sciences in 2011.

Besides his researches in internal medicine, transfusion medicine, sickle cell disease and onchocerciasis, Mr Batina is active in cooperation between the University of Kisangani and partners universities such as University of Douala (Prof. E.Mpondo), ULB (Prof. Béatrice Gulbis) and University of Liège (Prof. Philippe Hubert, Prof. Roland Marini, Prof. Vincent Bours).

He had also several responsibilities: Contact point of the local program against AIDS/GTZ (German Technical Cooperation/Blood safety), Coordinator of Provincial Blood Transfusion Center, Deputy Director of the National Blood Transfusion Center.

Batina is full Professor at the University of Kisangani and acting Dean of the Faculty of Medicine and Pharmacy since 2013. He is also invited Professor at the Evangelic University in Africa (Bukavu) and other universities in DRC.

SESSION II: PHARMACEUTICALS AND PHARMACOGENOMICS

Prof. Roland MARINI DJANG’EING’A  
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Prof. Marini was born in Congo (DRC), where he did his studies up the university level. He obtained his Pharmacy diploma in 1993 at the University of Kinshasa.

After having worked in a medicines distribution program in a protestant missionary center in North-Eastern of Congo and gained experiences in Zimbabwe Drug Control Laboratory, he moved to Belgium in 1996, starting by recognizing his Pharmacy diploma and then obtaining a specialization in Industrial Pharmacy in 1998 and MSc in Drug Analysis 2000 at the University of Liège (ULg). In 2006, he obtained his PhD in Analytical Chemistry in the field of uncertainty measurement at ULg. Besides his fundamental research goals in counterfeit medicines, analytical method development / validation and pharmaceutical industry’s experience, Professor Marini is acting as the Good Manufacturing Processes (GMP)-Qualified Person of the entire Pharmacy Department at ULg. He is also WHO-Expert in medicines quality control for the WHO-Prequalification Program. Roland is very active in academic cooperation with Central African countries on Quality Control and Assurance of medicine and medicinal plants, on Sickle cell sickness. He initiated with other actors (Prof Hubert at ULg, Prof Kadima at UR) the Edulink program of Master in Quality Control and Quality Assurance and R&D programs. He is coordinating several ARES-projects with DRC, Burkina Faso, Benin and Rwanda.

Roland is Adjunct Professor and Lecturer at the ULg, full Professor at the University of Kisangani, and invited Professor at the University of Douala, the University of Rwanda and the University of Kinshasa. He is also trainer at Pharmaceutical enterprises.

Olivia Jansen Pharmacien PhD  
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Dr Jansen is a post-doc researcher at the Laboratory of Pharmacognosy at the University of Liège – ULg (Belgium). After achieving her Pharmacist Degree at ULg in 2002, she completed two research masters (DEA) in the same University, one in “pharmaceutical sciences” and the other in “chemistry and pharmacology of
natural compounds", dealing with the cytotoxic and anticancer properties of plants from the Uzbek flora and alkaloids isolated from Haplophyllum genus. Then, she travelled to Burkina Faso for 2 years, where she was giving technical assistance on the project "Spiruline Nayalgué" (BF Health Ministry/Technap/Ocades) to set up a quality system and "Good Production Practices" for the local production of spirulina. In Burkina Faso, she was also collaborating with the French NGO "Jardins du monde", who’s valorizing local plants and knowledges in primary healthcare systems, using the applied ethnopharmacological approach. In the aim to prepare her PhD thesis, this collaboration led to the selection of several plants locally used to cure malaria or fevers. In 2007, she came back to the Laboratory of Pharmacognosy in Liège where she began a PhD thesis about the antiplasmodial properties of plants used in traditional medicine in Burkina Faso to treat malaria. She was also giving assistance in pedagogic activities linked to the course of Pharmacognosy (practical sessions for phytochemistry, lessons on ethnopharmacology, training of PhD students ...) as well as collaborating in several Cooperation projects coordinated by Prof. M. Frédérich, notably in Burkina Faso and in Rwanda. She defended her PhD thesis in biomedical and pharmaceutical sciences in 2013. She is now working on a Belgian project that aims to extract and valorize high added value secondary metabolites from selected tropical plants, grown in optimized conditions.

She is still particularly interested in ethnopharmacology and the study of the link between traditional uses and knowledges about plants and the possibility to valorize active and safe plants to improve the health level of the local populations, as well to discover new active compounds to cure parasitic disease as malaria.

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Tsiry Rasamiravaka is a Medical Biologist and Microbiologist, Associate Professor of Biotechnology and Microbiology at University of Antananarivo and scientist collaborator at the Laboratory of Plant Biotechnology (Free University of Brussels, Belgium). Fields of interest: Plants-Bacteria interaction with particular emphasis on the modulation of bacterial virulence factors expression through cell-to-cell communication and the exploration of medicinal and/or endemic plants as source of unrevealed anti-virulence compounds.

Dr Rasamiravaka obtained a MD degree in Medical Biology from the University of Antananarivo, a PhD degree in Sciences from Free University of Brussels. Between 2014 to 2016, He did a postdoctoral fellowship granted by ARES-CCD at Free University of Brussels and at University of Antananarivo. In the purpose to understand the effectiveness and anti-infective properties of African plants used in traditional medicine, Dr Rasamiravaka gained in experience in the isolation, the identification and the characterization of major bioactive compounds from bioactive plants material based on ethnobotanical and traditional practice knowledge. He has an expertise in screening antimicrobial activities of African and Malagasy medicinal plants against Pseudomonas aeruginosa, Escherichia coli and Staphylococcus aureus strains.

In the ongoing struggle against bacterial infection, antibiotics are commonly used to kill pathogenic bacteria. Since few decades, inhibition of bacterial virulence and/or biofilm formation are proposed as alternative strategies to minimize the selection pressure and the concomitant emergence of resistances experienced with strategies targeting basic cell mechanisms and leading to pathogen’s death. This disruption of bacterial behaviors represents an interesting anti-pathogenic approach that may reduce the use of antibiotics and restore their effectiveness among resistant strains. Consecutively, Dr Rasamiravaka focuses his activity in the research of modulators of Pseudomonas aeruginosa quorum sensing, biofilm formation and motilities. He has already a strong collaboration with Prof. Pierre Duez (University of Mons) and Prof. Mondher El Jaziri (Free University of Brussels) that led to identification of natural compounds such naringenin, oleanolic aldehyde coumarate and cassipourol which particularly disrupt QS mechanism and biofilm formation by Pseudomonas aeruginosa. This strong research collaboration led to several common publications.
SESSION III: PRECISION AND PERSONALIZED MEDICINE

Prof. Alain L. Fymat, BA, BS, MA, MS, PhD, PhD
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Prof. Alain L. Fymat is the current President/CEO and Professor at the International Institute of Medicine and Science with a previous appointment as Executive Vice President, Chief Operating Officer and Professor at the Weil Institute of Critical Care Medicine, both Institutes located in Rancho Mirage, California, USA. He was formerly Professor of Radiology, Radiological Sciences, Radiation Medicine (Oncology), and Physics at several U.S. and European Universities (University of California at Los Angeles, University of Southern California, Loma Linda University, California; University of Lille, France). Previously, he was Deputy Director (Western Region) of the U.S. Department of Veterans Affairs, Veterans Health Administration (Office of Research Oversight), and Director of the Magnetic Resonance Imaging Center and for a time Acting Chair of Radiology at its Loma Linda, California Medical Center.

In an earlier research career, at the California Institute of Technology (Jet Propulsion Laboratory, a NASA contractor), he was actively engaged in atmospheric sciences, environment, climatology, and space exploration.

He was an investigator in several experiments within the U.S. Earth and space exploration program. He was an Advisor to the U.S. National Research Council, National Academy of Sciences for its post-doctoral programs tenable at the Jet Propulsion Laboratory. His industrial experience was with the U.S. Strategic Defense Initiative (Ballistic Missile Defense Program) researching and designing atmospheric probes and electromagnetic sensors operating in stressful nuclear environments.

Dr. Fymat's current research interests lie at the interface between science and medicine (particularly molecular medicine, nanomedicine, and human genetics/epigenetics/ecogenetics). He has extensively published (in excess of 300 publications including patents, books & monographs, book chapters, refereed articles). He has received numerous research grants from government, academia and private industry, and has consulted extensively with these entities. He is a current Editor of the “Journal of Nanobiotechnology” (an international open journal of PubMed). He is a Board member of several institutions including (Chair: Medical & Technical Advisory Board of Janus Medical Systems Pte, Ltd. Singapore, that develops breakthrough electronic personal and hospital medical records; Health Advisor: American Heart & Stroke Association, Coachella Valley Division). With interest in Africa, Dr. Fymat is also associated with the Society for the Advancement of Science in Africa-SASA (Vice Chair; Member, Executive Council; Director, Scientific Directorate; Chair, Scientific Committee; Chair: 2013 Program, Polokwane, South Africa; Chair: 2014 Program, Kampala, Uganda, Chair: 2015 Program, Toronto, Canada).

SESSION IV: IMPROVING HEALTH CARE SKILLS AND INNOVATIONS IN AFRICA

Dr Jean Robert Nzamushe
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Docteur Nzamushe Jean Robert was born in 1971 in Lille (France). He made his primary and secondary school in Kinshasa. In 1997, he obtained his diploma of Medical Doctor from The Universty of Sint Luke Belgium (UCL). In 2004, he achieved his specialization as a General and Visceral Surgeon from the same University. From 2004 till 2015, he works as a Visceral Surgeon in the Emergency Surgery Department of University of France (CHU de Lille). He accomplished two Masters; One in biomaterial (University of Lille, 2013) and another in
Surgical science (University of Paris-Sud, 2014). His work on short gut proximal syndrome and reinfusion, with the Inserm Clinical Research Unit CIC-IT 807 (Professor Regis Logier) resulted in five patents, some publications, communications in International Congress and many others awards. In 2015, he took the head of the Emergency Surgery Department of University Hospital of Lille (CHU-France) and specially works on mass casualty management in case of terrorist attacks.

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Dr. Benjamin TATETE OKITASOMBO graduated from the Université Libre de Bruxelles (ULB) in 2000. He then started his training in general surgery. From 2006 he began a specialization in vascular surgery in the ad hoc Department at ULB ERASME University Hospital in Brussels until 2012. Since 2012 until now he is a vascular surgeon and an independent phlebologist in the Jolimont Group working precisely at the Nivelles-Tubize hospital in the south of Brussels. He develops and is responsible for the vein-lymphatic clinic, with an emphasis on new endovascular techniques and more particularly the endothermic technique of radiofrequency. He has initiated the implementation of this new technology in Kinshasa, DR Congo and results are very encouraging (see: African vein and vascular service (AVSmedical) www.avsmedical.net).

Dr. Bertin NJINOU
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Dr. Bertin NJINOU works at Clinique des Ormeaux Vauban in le Havre, France. Surgeon urologist Diploma of the Faculty of Medicine of the Catholic University of Louvain in Belgium. Former assistant of university clinics saint luc in brussels. Former university hospital practitioner of mont godinne university clinics. Urologist surgeon at the Ormeaux-vauban clinic in havre in france. Specialized in laparoscopy and robotics. Specialized in urological cancerology and pelvic floor reconstruction. Director of the medical and surgical center of urology and minimally invasive surgery of Douala in Cameroon Chairman of the board of directors of the clinique des ormeaux in havre in France.

Dr. Lawrence Ayong
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Dr. Lawrence Ayong is chief of service and head of the Malaria Research Unit at Centre Pasteur of Cameroon. He obtained his PhD in Biomedical Sciences from the University of Central Florida, USA, followed by postdoctoral training in molecular parasitology at the University of Georgia Athens, USA. He then moved to the Institut Pasteur Korea in South Korea, where he served as head of the Antimalarial Drug Discovery group for three years before returning to Cameroon to initiate his own research group with initial funding from the Institut Pasteur International Division. His research revolves around the discovery of new diagnostic and preventive tools to help accelerate malaria control and elimination globally.
SESSION V: COMMUNICABLE DISEASES

Prof. Hirotaka KANUKA,
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Prof. F. Brombacher
University of Cape Town, South Africa
International Center for Genetic Engineering and Biotechnology (ICGEB),
Cape Town Component and Institute of Infectious Diseases and Molecular Medicine (IDM), Division of Immunology,
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Prof. F. Brombacher studied Biology, with Diploma in Genetics, 1989 at the Alberts-Ludwigs University Freiburg, Germany; PhD in Molecular Immunology at the Max Planck Institute (MPI), 1989, pioneering transgenic mouse models in the group of Nobel Laureate G. Koehler. Subsequent Research Fellow at MPI and Sandoz Ag (now Novartis), Switzerland, he was called back to the MPI as Group Leader in 1994, working on infectious diseases using knockout mouse models. 1998, he moved to the University of Cape Town, South Africa, as Professor, and A-rated by NRF, was awarded an extramural MRC Unit and an International Wellcome Trust Senior Research Fellow in 2000. Thereafter, Fellow for Life at UCT in 2005 and South African Research Chair and Coordinator at ICGEB Cape Town component. His group investigates fundamental immunological mechanisms in human diseases, including tuberculosis, African trypanosomiasis, leishmaniasis and helminthic infections, including bilharzia – four of the top ten WHO declared human threats to combat, in addition to chronic diseases like allergic asthma and colitis. His research strategy is based on knowledge by gain or loss of function approaches in animal models. Together with transcriptomics and proteomics approaches biomarkers and host-directed drug targets are identified and verified in humans. His H factor is 65 with more than 18000 citation and 197 international peer-reviewed publications.

Prof. Luc Vanhamme,
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Luc Vanhamme is Professor of Molecular Parasitology at the Free University of Brussels and Director of Research at the Belgian National Fund for Scientific Research. He has been giving classes of molecular parasitology, host-parasite interactions, genetic engineering and biotechnology at the Free University of Brussels and also, in the frame of cooperation programs, as invited professor at the Lebanese University in Beirut, Lebanon, University of Bandjoun in Cameroon or Central University of Ecuador in Quito. He also gave lectures at the Makerere University in Kampala, Uganda. He worked on cancer during his PhD and post-doc. He has been working for more than twenty years on molecular aspects of antigenic variation and human serum resistance in African trypanosomes. He has recently participated to researches on Onchocerca. He has taken part in various cooperation programs from the TDR-WHO (for which he has been an expert), Human frontier scientific program, or Belgian ARES-CUD. He has been research associate at the University of Southern California, Los Angeles, Department of Microbiology, invited Scientist at the ILRAD (Nairobi, Kenya), and
also worked in Cameroon. He has published close to a hundred papers and book chapters, most of them on African trypanosomes and is holder of several patents. During his more than twenty years of work on African trypanosomiasis in a molecular biology laboratory, he always missed the lack of contact and return to the people suffering from the sickness. With his recent involvement in a program of research on Onchocerca, he found an opportunity to directly interact with patients and help them in the field.

SESSION VI: BIOGEOCHEMISTRY, SOIL GEOCHEMISTRY

Prof. Monique Carnol,
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Monique Carnol is Professor of Ecology at the Department Biology, Ecology, Evolution of the Science Faculty at Liège University (ULg), Belgium. After her Biology studies at ULg, she performed a 3.5 year stay at the Institute of Terrestrial Ecology, Merlewood Research Station, UK for her doctoral research on « Nitrogen deposition and nitrification in coniferous forests » (PhD, 1997, ULg). She worked on several research contracts and performed a post-doctoral stay at the Netherlands Institute of Ecology, Centre for Terrestrial Ecology, Heteren, NL, before being appointed as associated professor (2002) and professor (2017) at ULg. She also holds a higher education diploma (DES) in University and High School Pedagogy (2008, ULg). Her group investigates the role of soil microorganisms in terrestrial ecosystem functioning, within topics such as management impacts, soil quality, cave microbiology, catchment biogeochemistry, tree species impacts, climate change, molecular microbial diversity, and biodiversity-ecosystem functioning. A recent cooperation project with Rwanda triggered her curiosity on African ecosystem functioning. She teaches soil ecology and microbiology, global carbon cycle and climate change, and scientific communication. She is the head of the Laboratory of Plant and Microbial ecology (Research unit InBioS, ULg).

Prof. François Xavier Naramabuye
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Professor François Xavier Naramabuye is a full Professor of soil science in the department of Soil Science at the University of Rwanda. He got his first degree in Agriculture-rural engineering from the National University of Rwanda (1999) where he started his academic career. He got his PhD in Applied Environmental soil science from the University of Kwa Zulu-Natal-RSA (2005) where he continued his academic career as a lecturer of soil science. Back to his home University (Rwanda), he started developing postgraduate programs in agroforestry and soil management. He is currently coordinating PhD and MSc programmes in soil science and crop science. He is heading a Research, Innovation and Postgraduate Laboratory of soil and Plant Analysis where PhD and MSc students are performing research projects. He has extended his academic and research activities to other universities including: Sokone University of Agriculture (Tanzania), Braunschweig Technical Institute of Science (Germany), Zent Istvan University (Hongary) and SLU university (Sweden) where he is collaborating in research and PhD supervision. In 2008, he established and leaded a Centre for Environment Entrepreneurship and Sustainable Development. He is coordinating and involved in a number of international research projects in the fields of agriculture, water and environment. He has contributed scientifically to the field of soil science by publishing a number of articles. He has coordinated a number of rural development and government programs and projects including: Development and coordination of the Rwanda Land Reform system (2006-7). He has coordinated the national study on development of
grouped habitat in the rural area of Rwanda. MINALOC (2009), the development of a program on land management and land administration for Rwanda in collaboration with NIRAS an international Swedish company (2009), the development of a Program for a sustainable rural settlement for Rwanda (2008-9), Soil Health Management in Rwanda for AGRA (2008), the Land Reform Task Force in Rwanda (2006-7), Supervision of various projects from Ministry of Agriculture/RSSP, Conducting a study on Best Practices of irrigation and water harvesting in Rwanda, NBI/EWUAP (2007).

Dr. Sam Lanfranco
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Dr. Sam Lanfranco is Professor Emeritus and Senior Scholar (Economics), at York University (Toronto), where he continues to teach. He started working issues of information and communication technologies (ICT) and development in the late 1970’s while at UNCTAD (Geneva), was on the founding board of the Toronto Free Net, was a member of the founding team for the Bellanet Secretariat at IDRC (Ottawa), and is recent past Chair of the Board of the Ottawa based Canadian Society for International Health (CSIH), Past President of his local Milford Village fall fair board, treasurer of the local Mariners Museum, and a member of the founding board of Habitat for Humanity, Canada. He continues to work on issues of ICT organizational development and social process, recently presented a panel presentation on ICANN Internet governance issues at ICANN 45. He is also an advisor to the Ambedkar Centre for Justice and Peace (ACJP) in Mumbai, India, and advisor to a number of internet start up initiatives in Canada and the United States. His current research is on the application of crowd-sourced information for supply line accountability and transparency.

SESSION VII: BIOTECHNOLOGY IN AGRICULTURE

Prof. Charles Bucagu
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Dr BUCAGU Charles (Ass. Professor) is the Dean of the School of Agriculture and Rural development in the college of Agriculture, University of Rwanda. He received his first degree in Agricultural Sciences from the National University of Rwanda (1999). He was then recruited as academic staff the same year. He pursued his master training at the University of Pretoria, South Africa, with specialisation in Agronomy. He has been involved in several activities including teaching, research, administration and community outreach. From 2004 to 2006, he was coordinating a USAID funded project on development of of high value Crops while offering teaching course at National University of Rwanda. In 2013, he earned a PhD in Agroforestry, from Wageningen University, The Netherlands. He has published a number of papers both in local and international journals. Upon completing his training, he returned home and was appointed to lead the School of Agriculture at University of Rwanda. In that capacity, he contributed in expanding areas of post-graduate training including the establishment of Masters in Crop Sciences. Dr BUCAGU Charles is involved in consultancy work with various stakeholders in Agricultural sector. He is part of the team that developed the National Coffee Policy and Regulations framework for Rwanda. He led a team that completed a comprehensive study on post-harvest losses in various commodities in Rwanda (Maize, Potato, Milk and Tomato) on behalf of FAO. Dr Bucagu has extensively worked on integrated agricultural production systems in Rwanda.
SESSION VIII: WILDLIFE, BIODIVERSITY, WATER, ENVIRONMENT & CONSERVATION

Prof. Beth Kaplin
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Professor Beth Kaplin is trained as a wildlife biologist, ecologist and conservation scientist and has published numerous articles and book chapters on tropical ecology, seed dispersal, and primate ecology and conservation. She is a Professor at University of Rwanda (UR) where she teaches and mentors BSc, MSc and PhD students in the Biology Department, School of Science, College of Science & Technology. She is on leave from the Environmental Studies Department at Antioch University New England (AUNE), USA where she has supervised MSc and PhD students for the last 18 years. She is founding director of the Center for Tropical Ecology & Conservation at AUNE which trains future leaders in research and conservation of tropical landscapes. From 2006 to 2015, Dr. Kaplin received funding from the MacArthur Foundation to develop BSc conservation science programs at UR, and an MSc in Biodiversity Conservation and Natural Resources Management. She also created the Regional Network for Conservation Educators in the Albertine Rift to support conservation in the region (Rwanda, Burundi, DRC, Tanzania, and Uganda) especially within HLIs. She was appointed Acting Director of the newly forming Center of Excellence in Biodiversity and Natural Resource Management at UR in 2016. The mission of this Center is to coordinate knowledge and research on biodiversity and resource management in Rwanda and the region. She is active in the global Society for Conservation Biology and the Association for Tropical Biology and Conservation, member of the Board for the Albertine Rift Conservation Society, and Associate Editor for the journal Biotropica. She maintains an active research program on forest ecological processes, primate ecology and conservation, protected areas conservation and management, and human-wildlife interactions in tropical forests, especially in Rwanda.

Prof. Chicgoua Noubactep
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Professor Chicgoua Noubactep was born and went to school in Cameroon. He studied Chemistry at the University of Yaoundé (Cameroon) where he earned a Msc. degree in 1992. From 1992 to 1995 he worked as Assistant Researcher at the Laboratory of Physical Chemistry of the University of Yaoundé I. In 1995 he joined the Technical University of Dresden (Germany) and later the Bergakademie of Freiberg (Germany) where he earned his PhD (2002). His PhD work dealt with studies for groundwater remediation using metallic iron (Fe0). Since 1998, Prof. Dr. Noubactep has been working on water treatment using Fe0. The topic of his habilitation thesis (2011) was “Metallic Iron for Safe Drinking Water Provision”: University of Göttingen, Germany. Currently he is an associate professor there. Prof. Noubactep’s research focuses on safe drinking water provision for households and small communities (e.g., rural), self-reliance in safe drinking water provision, and migration and mitigation of contaminants in the hydrosphere. Prof. Noubactep has published more than 110 peer-reviewed articles. He is currently leading an international research team with partners in Cameroon, Tanzania and Uganda to make research on ‘water treatment with Fe0’ frugal. This research is regarded as the key for universal self-reliance for safe drinking water provision. Prof. Noubactep is also engaged in several non-governmental organisations (NGOs), including the Association for Culture and Sustainable Development (CDD e.V.), Göttingen/Germany.
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He is Vice-President of Local Organizing Committee for the current UR-SASA International Conference.

After finishing his studies in Civil Engineering at former National University of Rwanda in 2002, Vivien Munyaburanga worked for same University since 2005 to date. He later obtained a Master of Science in Urban & Regional Planning focusing mainly on urban infrastructures management from the International Institute for Geo-Information Science and Earth Observation (ITC) The Netherlands in 2007. He was then affiliated researcher at the Centre for Geo-Information Systems (CGIS) from 2007. He became then Head of Department of Civil Engineering in former NUR.

He currently serves as Lecturer and Coordinator of Water and Environmental Engineering Program under Civil Engineering Department in the School of Science and Technology at University of Rwanda where he is playing a major role in coaching and motivating students. Vivien Munyaburanga also serves as Coordinator of UR-ARES Project, a Cooperation Project between the University of Rwanda and the Belgian Academy of Research and Higher Education, a federation of higher education institutions from Wallonia-Brussels Federation.

Vivien Munyaburanga is also Consultant and key player at Rwanda Standard Board where he serves as Chairman of Rwanda National Technical Committee on “Building and civil engineering”. He is at the same time Chairman of East Africa Secretariat Technical Committee on “Cement, limes, clay and related products”. He is an effective and result oriented leader.

SESSION IX: SOCIAL, ECONOMIC SCIENCES AND BIOTECHNOLOGY

Prof. Dennis Raphael, PhD
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Dennis Raphael, PhD, is a Professor of Health Policy and Management at York University in Toronto. The most recent of his over 300 scientific publications focus on the health effects of income inequality and poverty, the quality of life of communities and individuals, and the impact of government decisions on Canadians’ health and well-being. Dr. Raphael is editor of “Social Determinants of Health: Canadian Perspectives” and “Tackling Health Inequalities: Lessons from International Experiences”, co-editor of “Staying Alive: Critical Perspectives on Health, Illness, and Health Care” and author of “Poverty in Canada: Implications for Health and Quality of Life. Two new books: “Immigration, Public Policy, and Health: Newcomer Experiences in Developed Nations” and the 2nd edition of “Health and Illness” were published in the Fall of 2016.
Biotechnology and African Country Development: Challenges and Opportunities

Jacob SOUOPGUI
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Biotechnology is in its simplistic term use of biological processes, organisms, or systems to manufacture products intended to improve the quality of human life. Early on, biotechnologists were farmers who developed improved species of plants and animals by cross-pollination or cross-breeding. Nowadays, biotechnology has expanded in sophistication, scope, and applicability. Biotechnology plays an important role in socio-economic development. This is recognized by many developed countries. Development of strategies to achieve this with specific goals in key sectors like health and agriculture are found in most countries. Moreover, biotechnology has enormous potentials for the development of Africa. It is, however, less established and is advancing very slowly. While the development is not even and the gap among countries is increasing, there are many promising trends. In Rwanda for example, a strong support from the Government to promote biotechnology is a good point for other African countries. Additional positive factors that are in favor of strong and sustained growth of biotechnology in this country include economic growth, empowerment of developed human resources, growing market, the increasing ICT innovative capacity, and the emphasis on research in basic life sciences among others.

As African countries are not doing well in biotechnology development, promoting and sustaining the growth would need changes and course corrections in the policies and strategies. Countries have to strengthen their national innovation systems and enhance their capacity to translate research into products. In this context, a dire need of North-South reliable and sustainable technology transfer is required with strong support of the Diaspora and pharmaceutical companies. Besides this, regional, bilateral and multilateral initiatives in capacity building are essential for biotechnology to grow further in many countries that lack the indigenous capacity in many areas including regulating biotechnology. Emphasis in South-South cooperation should therefore be the priorities of the states.

African countries should switch from their current position of spectator and consumer to that of actor of science and biotechnology revolution. Research in biotechnology has a wide ranging applications in agriculture, health, pharmaceuticals, biogeochemistry, biodiversity, water management, conservation, wildlife and industry among others. Agriculture is a crucial sector in terms of contribution to Gross Domestic Products (GDP), employment, livelihood and food security. For a region endowed with rich biodiversity and forest resources, biotechnology offers enormous scope in overcoming declining productivity in agriculture, developing varieties that are more suited to biotic and abiotic stresses, increasing the potential for value addition and reduction in use of pesticides, empowering pharmaceutical R&D.
WEDNESDAY 4 OCTOBER 2017, CONCURRENT INVITED SESSION.

SESSION I: NON-COMMUNICABLE DISEASES (NCD)

Room: AKAGERA Ballroom, 11:00AM – 1:00PM, Moderators: Francis Akena Adyanga, Monique Carnol

11:00AM-11:25AM Keynote address 1: Dr Jean Paul Rwabihama

Rights of patients with chronic non-communicable diseases: Ethical and public health issues

The increasing of life expectancy has led to the emergence of chronic non-communicable diseases. The care of patients treated for these progressive pathologies retain a curative aspect in an environment where the therapeutic arsenal is sometimes limited, especially in emerging countries. Medical management does not sufficiently involve behavioral preventive approaches and alternative therapeutic means to relieve the patients. These patients, often unaware of their clinical situation, are not involved in the development of the care project, which compromises the prevention of these pathologies and the therapeutic adherence of patients. However, the involvement of a patient to a care project is a vector that guarantees its smooth running. This improves the quality of management of chronic pathologies and allows respecting the dignity of the patient. Several studies have highlighted this situation, pointing out the impact of the failure to respect the patients’ rights on the quality of care and calling on the authorities in certain western countries.

Among the behavioral measures, the improvement of doctor-patient relationship is a flagship principle based on respect for ethical principles, among which respect of autonomy enjoys a privileged place. In order to respect the dignity of a patient, the medical team should establish a partnership relationship with him, which requires information, free and informed consent. This new relationship between patients and caregivers has not been integrated into several care structures, particularly in internal medicine departments where most of non-communicable chronic pathologies are managed. Based on the principle of wellness, the medical team imposes a care program that often does not integrate the specificities of the patient, thus putting at risk the success of a therapeutic education program or care whose objective is only that of relieving the patient and not getting his cure. In a terminal phase of a severe non-communicable pathology, this patient appears as an object of care and not a care partner.

When medical care no long allows the treatment of a chronic pathology at the severe stage, the patient’s involvement becomes even more essential to participate in the medical decision and suitable alternative care should be proposed to him: palliative care, an international right indicated for improving the quality of patients’ life. This is acute care centered on the prevention and best control of symptomatic complications of incurable pathologies. Many patients with severe non-communicable pathologies are unfortunately withdrawn from the care system, whereas there are therapeutic alternatives that can be adapted to the degree of evolution of non-communicable pathology and their specific characteristics. According to the WHO, more than 20 million people with advanced chronic conditions, including nearly 80% in developing countries, needed palliative care in 2011. Access to symptomatic treatment of patients with chronic and progressive pathologies is therefore a public health issue.

As a therapeutic strategy among others, the improvement of doctor-patient relationship in a traditionally paternalistic context would enable the patient to assert his rights while respecting his autonomy and to participate in a care plan. This might contribute to improve the medical management of non-communicable pathologies.
**11:25AM-11:40AM** NCD/001/OC: The ’emergent’ global killer without an agent: A critical discourse analysis of global health Non-Communicable Disease Responses

Morris DC Komakech

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Global concerns over high mortality burden of Non-Communicable diseases (NCDs) in low and middle-income countries (LMICs) focuses on productivity and development. According to the narrative, NCDs are a major factor of productivity that could undermine anti-poverty investments. However, the NCD dominant narrative of individualization, risk factors analysis, and lifestyle changes contradicts and conceals the roles of multinational corporations in high NCD incidence and the under development of LMICs.

Using critical discourse analysis as a tool, and applying it within global political economy framework, we critically analyze the complex nature of the Non-Communicable Disease Alliance (NCDA) and its partnerships. We conducted content analysis of the NCDA Strategic Plan (2016-2020) and World Health Organization’s global plan for the prevention and control of NCDs (2013-2020) for word or phrase references to corporations’ roles and corporate behaviors that expose populations to harmful products. These documents are the blueprints of global health response to the global NCDs crisis.

We confirmed that both the NCDA and WHO (a) are influenced by multinational corporations that manufacture and distribute alcohol, pharmaceuticals, medical technologies, ultra-processed foods and sweetened beverages; (b) use concealment and legitimation in discourse formulation to obscure the role of multinational corporations in NCD causation debate; and (c) the NCD dominant narratives promote corporatist interests in emerging markets. The dominant narrative of individualization, medicalization, and lifestyle changes influence both macro and micro-level health policies on NCDs. Consequently, health interventions in LMICs fail to address structural inequalities and inequities that cause NCDs and, instead, perpetuate them. The LMICs need to rethink their alignment to the “development” agenda formulated and imposed by global North.

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**11:40AM-11:55AM** NCD/002/OC: Gestational Diabetes Mellitus and Its Associated Risk Factors in Pregnant Women at Selected Health Facilities in Kigali City, Rwanda

1Jean Baptiste Niyibizi*, 2Florien Safari, 3Jean Bosco Ahishakiye, 4Jean Bosco Habimana, 5Herbert Mapira and 6Ngule Chrispus Mutuku

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Gestational Diabetes Mellitus (GDM) is the most common complication of pregnancy that causes chronic hypertension, increased rate of cesarean delivery, fetal mortality and morbidity.

The main objective of this study was to determine the prevalence of GDM in pregnant women attending Kimironko, Kicukiro and Muhima Health Centers. Specific objectives were to determine the blood glucose during the second trimester in pregnant women aged between 21 and 45 years, to find out the frequencies of pregnant women presenting with GDM according to age, and to assess risk factors associated with GDM.

A cross-sectional study was carried out at Kimironko, Kicukiro and Muhima Health centers using sample size of 96 pregnant women. Blood glucose levels were measured using glucose oxidase method with glucometer. Data were analyzed using Microsoft Excel and SPSS.

Out of 96 pregnant women who participated in the study, 8.3% were found to have GDM with the mean ±2SD of 194.12 ± 25.53 mg/dl of their blood glucose results. The highest proportion of GDM was revealed in pregnant women aged between 26-30 years, representing a frequency of 5.2% whereas 2.1% of GDM was reflected in women aged between 21-25 years. The lowest proportion of GDM fell in age group of 31-35 years contributing to 1% of the total GDM. There were no cases of GDM in pregnant women in the 36-40 or 41-45 age groups. The mean ±2SD of participant's age groups was 27.12 ± 5.01 years. In addition, while obesity did not show to be associated with GDM, age and family history were found to be risk factors of GDM.

The findings of this study revealed that the prevalence of GDM was 8.3% and the most affected pregnant women were in the age group of 26-30 years.

**11:55AM-12:10PM NCD/003/OC: Prevalence of Non-Communicable Dental Caries in Primary School Children in Rwanda**

Emmanuel Nzabonimana, †Micongwe Moses Isyagi, †Uziel Nsabimana, ‡Rajab Sasi, ‡Donna Hackley and ‡Karl Self DDS

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Dental caries are a cause of dental morbidity and absenteeism amongst school children. Worldwide, prevalence of caries in 6-12 year olds ranges from 24% to 97% depending on country. To determine the caries experience and impact on oral health quality of life, primary school children were selected from two primary schools in Kigali City, Rwanda.

A cross-sectional study on dental caries’ experience was performed using an abbreviated version for children of the questionnaire Oral Impact on Daily Performance (OIDP) and a WHO survey form for the assessment of dental caries. It involved 384 children aged between 6-12 years old at Gitega and Kabusunzu Primary Schools, Nyarugenge District, Kigali, Rwanda. Data for dental caries experience and oral impacts were recorded and analyzed with the statistical package SPSS 20 for frequency and associations.
Caries affected 126 (32.8%) children studied and was less prevalent in 6-9 than 10-12 year olds. Male students, 72 (18.8%), had more caries than female students, 54 (14.4%). 218 (56.8%) pupils reported caries associated oral impacts, including difficulty in eating, difficulty in cleaning teeth and poor school performance. Difficulty in cleaning teeth was the commonest impact affecting 105 (27.5%) of children.

In conclusion, non-communicable dental caries experience and its detrimental oral impacts on performance are likely to increase unless strategic preventative oral health interventions are implemented to mitigate oral impacts on daily performance.

12:10PM-12:25PM NCD/004/OC: Prevalence of Neurocognitive Disorders in the General Wards of a Regional Referral Hospital in Northern Uganda

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Global dementia prevalence in those aged above 60 years is about 5-7% but reported to be lower in sub-Saharan Africa at 2-4%. Data on prevalence of dementia for northern Ugandans is so far lacking.

We used a cross-sectional descriptive study design to determine the prevalence of neurocognitive disorders in non-psychiatric wards at a regional referral hospital in Northern Uganda. The hospital admits approximately 7224 adult patients annually. We sampled 333 adult in-patients admitted to the hospital during the study period (February to April-2017) using a sample size table for clinical studies (David Machin et al., 2009). We recruited consenting adult in-patients consecutively till the sample size was achieved. We collected data using the Diagnostic and Statistical Manual for Mental Disorders (DSM IV, American Psychiatry Association-APA, 1994) criteria and used the Statistical Package for Social Sciences (SPSS), version 11.0 for analysis.

Findings are summarized below. The age of the patients ranged from 18 to 95 years with a mean age of 39.4 and standard deviation of 1.76. Approximately eighty two percent (82.9%) were below the age of 60 years and 17.1% were aged 60 years and older. Females comprised 55.3% and males 44.7%. About 14.1%, 53.5% and 32.4% respectively had increased, decreased and intermediate odds of having dementia. Age (P=0.0001) and gender (P=0.045) predicted dementia prevalence. Those aged below 60 were 0.937 times less likely to have dementia. Males were 2.965 times likely to have dementia. Just over seven percent (7.5%) of the patients had dementia. Seventy eight percent of the patients with dementia were aged above 60. Sixteen percent of the patients were HIV-positive. Thirty two percent of the patients aged less than 60 years had dementia with 12% of these being HIV-positive while 20% were HIV-negative.
We conclude that many of the respondents were below the age of 33 years. The prevalence of dementia was 7.5% and the prevalence of dementia increased with age. Early onset of dementia (age ≤ 60 years) was probably due to HIV infection.

12:25PM-12:40PM NCD/005/OC: Assessment and Management of Acute Dental Pain in Selected Health Centers in Kigali, Rwanda

Marie Claire Ineza, Moses Isyagi

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Dental pain is the most common reason why people visit a dentist. In developing countries, access to oral health services is limited. In Rwanda, primary health care services are the patient’s first point of contact. The majority of non-dental health workers in health centers have little formal training in diagnosis and management of dental diseases and they believe that dental problems are dentists’ responsibility. Also, they may not be aware or reluctant to provide care for oral related complaints including acute dental pain. It has been observed that most patients referred from health centers came to the dental clinic in acute pain or with complications like cellulitis.

This study is aimed to determine the assessment and management of acute dental pain in primary health care centers by non-dental health care workers (NDHCWs). The specific objectives were to determine the practice amongst NDHCWs in assessing acute dental pain, to assess how non-dental health care workers manage acute dental pain, and to determine the criteria used by NDHCWs to refer patients in acute dental pain for further dental treatment.

A cross sectional study carried out at Muhima, Kicukiro, Gikondo and Kimironko health centers using a sample size of 60 NDHCWs. A census method was used to select participants because of a limited number of NDHCWs who received out patient.

The findings of this study revealed that two thirds of NDHCWs limited their assessment of acute dental pain to patient history and observation in the assessment of acute dental pain. They are unaware of signs of acute dental pain due to pulpitis, periodontitis and pericoronitis, which can lead to failure in diagnosis. In the management of acute dental pain by NDHCWs, Ibuprofen and Amoxycillin were the drugs of choice. The referral of patients for definitive care is delayed and done only when medication fails.

In conclusion the training of NDHCWS in assessment and management of acute dental pain and/or the presence of oral health care workers is essential in health centers in Rwanda.
Sudden cardiac arrest (SCA) (or sudden death), is defined as a sudden and unforeseen arrest of any cardiac and respiratory activity without any obvious external cause such as trauma or poisoning, and occurring in a patient without any previous morbidity.

It is an important public health problem throughout the world. In European countries and the US, due to the availability of data through national registries of cardiac arrest, it is estimated to represent between 55-110 / 100,000 inhabitants/year.

The lack of such databases in African countries (especially sub-saharan) renders such epidemiological studies difficult in this region, and thereafter the estimation of its impact on society in terms of public health.

Otherwise, SCA of traumatic origin (road accidents, natural disasters and others) represents a significant part of death in this region, and its treatment is still a major health challenge.

The mortality after SCA remains very high, about 90%, even in more developed countries. There are however a package of measures which, all implemented together, improves survival of patients in general. So, optimal medical treatment with well conducted resuscitation allows the doubling or tripling of chances of survival after the occurrence of a SCA.

Strategies for resuscitation do exist and have been well defined. They differ in terms of the origin of the cardiac arrest, with a particular emphasis placed on conditions surrounding its occurrence: sudden, traumatic, in- or extra-hospital.

ILCOR (international committee for the coordination of techniques and protocols of resuscitation) has published updated guidelines for the medical management of patients with SCA. They are what we call «the survival chain» within which each link has a special significance. This ranges from early recognition of SCA, alerting for emergency and first aid, to the specialized medical treatment. Their implementation in Africa should be a priority, even more if we consider the low level of literacy in the population, especially in rural areas, the poor quality of infrastructure (such as roads, as well as technical aspects related to medical care) and their importance in the proper functioning of this chain of survival.

It's all about a multidisciplinary intervention which should, at the end, lead to the improvement of survival, wellness and life expectancy of local population.

The goal of the proposed lecture is to take notice of all the measures and provisions, to educate local populations and authorities, and to help in training for the optimal management of patients suffering from sudden cardiac arrest.
A certain behavioral endophenotype (BEP) characterized by impaired executive function, emotional regulation, cognition, learning and social adaptation is shared by four neurodevelopmental disorders (NDD): fetal alcohol spectrum disorders (FASD), attention deficit hyperactivity disorder (ADHD), fragile X syndrome (FXS) and autism spectrum disorders (ASD). The genetic defect is known in FXS but specific genetic defects or single genes have not yet been conclusively identified in FASD, ADHD, and ASD. Even with the putative mutation not all carrying it are affected. While the genetic factors involved in these NDD are disparate, the shared BEP is identifiable clinically. Further, pathogenic factors in gene expression and epigenetic regulation are critical in the etiopathogenesis of all four NDD. The logical question to ask is whether or not there is a shared ‘final pathway’, which represents a profile of epigenetic modifications and gene expression that is an explanation for the shared BEP. The objectives of this study are to: 1) demonstrate BEP component distribution patterns and frequency in FASD, ADHD, FXS and ASD, and 2) determine whether or not the patterns and frequencies are significantly different or similar. We hypothesize that the distribution and frequency of the components of the BEP are similar and not significantly different among the four NDD. We further hypothesize that a shared ‘final pathway’ representing a profile of epigenetic modifications and related differential gene expression is the explanation for the shared BEP. From a multicenter and multiclinic patient sample, clinical records of 89 FASD, 98 ADHD, 79 FXS and 82 ASD patients aged 6 to 18 and 100 controls were examined. The occurrence of the BEP components in each subject were recorded. The distribution of BEP components was analyzed across the 4 NDDs. We demonstrated that there were no significant differences in frequency distribution of the BEP components among the four NDD. There were no significant differences in frequencies of deficits in social adaptation, cognition, learning, and emotional regulation among the four NDD (p > 0.05). There was weak significant (p<0.05) difference in the frequency of occurrence of executive function between ADHD and FXS patients. There were significant differences between the control group and each NDD (p<0.01). These results demonstrate that the specified BEP is shared by the four NDD. The tendency for these disorders to cluster endophenotypically suggest a shared underlying etiopathogenic pathway. As the underlying etiologic genetic factors or genes are disparate for each NDD, a shared ‘final pathway’ representing a profile of epigenetic modifications and differential gene expression is not inconceivable. In the classical paradigm for elucidating the etiopathogenic molecular basis of a genetic disorder, a broad diagnostic category is used as the basis for identifying a causative gene or genes. However, the endophenotypic heterogeneity of NDDs confounds the classical approach and produces disappointing results. The results in this study point to another strategy to overcoming clinical complexity. This novel strategy identifies shared molecular mechanisms in NDD patients with a shared endophenotype rather than in NDD patients with the same diagnosis but little central phenotypic kurtosis. The NDD patients with a shared BEP will be used in a subsequent study to elucidate profiles of epigenetic modification and differential gene expression in an attempt to identify a shared ‘final molecular pathway’.
CONCURRENT INVITED SESSION.

Akagera Ballroom. Wednesday 4 October 2017. 2:30PM – 5:30PM

Moderators: Komakech Morris, Raphale Dennis

2:30PM-2:45PM NCD/007/OC: Early Detection of Coronary Artery Disease in Asymptomatic Diabetic Patients Undergoing SPECT Myocardial Perfusion imaging with Tc-99m Sestamibi (Tetrafluoroborrate).

Moussa, I. A. Soli, H. Sadou Maiga, A. Ada, M. Arzika, M. Abari and A. Issa Ado

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In developed countries, mortality from coronary disease has been falling in recent years. Myocardial perfusion imaging (scintigraphy) occupies a special place because of its sensitivity, specificity and noninvasive. Coronary disease although proven common in asymptomatic diabetic in literature, never the object of study in African black people.

The general objective of this study is to detect silent myocardial ischemia into asymptomatic diabetic patients.

This is a prospective, cross-sectional descriptive study ranging from 11 November 2014 to 12 March 2016, which concerned 138 Black asymptomatic diabetic patients. All the patients received an initial image acquisition 40 minutes after 10mCi injection of 99mTc-Sestamibi at the maximum of the stress. The acquisition was performed using a Mediso dual-head gamma camera equipped with a low-energy, high-resolution collimator (LEHR). The acquisition matrix was 128 × 128 with a zoom of 1.2. Three hours later after the stress, a second acquisition was performed 40 minutes after injection of 30mCi of Tc-Sestamibi. Synchronization to the ECG was done both in the effort and rest. The images were reconstructed using the Emory software.

The informed consent of each patient was obtained and the study was approved by the National Ethics Committee.

The mean age of the patients was 51.89 ± 9.18 years with extremes ranging from 29 to 73 years, sex ratio 0.60, and mean duration of diabetes progression was 7 ± 4 years.

2:45PM-3:00PM NCD/008/OC: Distribution and roles of the Onecut transcription factors during spinal dorsal development

K.U. Kabayiza1,2, G. Masgutova1, A. Harris1, V. Rucchin1, B. Jacob3 and F. Clotman1

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Dorsal interneurons in the spinal cord process, integrate and relay somatosensory information from peripheral sensory neurons to higher brains centres. Some embryonic dorsal interneuron populations migrate ventrally and participate in motor circuits. Correct establishment of regional neuronal identities and proper migration of neuronal populations during embryogenesis are necessary for proper formation of these neuronal circuitries.

Onecut proteins are transcriptional activators present in the CNS during embryonic development. Previous studies showed that OC factors control neuronal differentiation and migration in multiple regions of the CNS. In this work, we investigated the presence of OC factors in the dorsal spinal cord and their role during dorsal interneuron development.

Immunofluorescence labelling on mouse spinal cord sections was used to identify dorsal interneuron populations and determine the distribution of Onecut proteins. Phenotypic analyses of mouse mutant lines devoid of OC proteins were carried out to explore the role of OC factors in the differentiation and in the migration of dorsal interneurons.

Immunofluorescence labelling showed that dorsal interneuron populations contained OC factors at early steps of their development. The presence of OC proteins rapidly decreased during development but was maintained longer and in more cells in more ventral populations. Analyses of mutant embryos showed that the number of Phox2a-positive dl5 interneurons was significantly reduced in the absence of OC factors. Moreover, the spatial distribution of dl3, dl5 and dl6 subpopulations along dorso-ventral and medio-lateral axes of the spinal cord was modified in the mutant embryos.

This study showed that OC factors are dynamically and differentially distributed in most early-born dorsal interneuron subpopulations. They are required for production of a subset of dl5 interneurons and they regulate the spatial distribution of dl3, dl5 and dl6 interneuron subpopulations. Hence, Onecut transcription factors are involved in the regulation of spinal dorsal interneuron diversification and distribution during embryonic development.

3:00PM-3:15PM NCD/009/OC Clinical outcomes of cardiac surgery for rheumatic heart disease patients followed at three rural sites in Rwanda

Emmanuel Rusingiza 1, 2 *, Ziad El-Khatib 3, 4, 5, 6, Bethany Hedt-Gauthier 3, Neo Tapela 4, Gedeon Ngoga 4, Symaque Dusabeyezu 4, Cadet Mutumbira 2, Francis Mutabazi 2, Emmanuel Harelimana 2, Joseph Mucumbitsi 9, Gene F. Kwan 3,7, Gene Bukhman 3, 8

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9 King Faisal Hospital, Kigali, Rwanda
10 Harvard School of Public Health, Boston, USA
### Background:
Rheumatic fever and rheumatic heart disease (RHD) remain a major cause of morbidity and death in children and young adults in low- and middle-income countries. After heart surgery in these countries, optimal follow-up is needed for patients’ survival. To address this need, a model of decentralization of care has been implemented in three rural district hospitals to identify patients needing surgery and postoperative follow-up of patients.

### Methods:
We described the outcomes of 54 RHD patients from rural Rwanda who received operations for advanced valvular lesions. Data have been extracted from medical charts at the integrated non-communicable disease clinics of the three hospitals.

### Results:
The majority of patients were adults (46/54; 85%) and 74% were females. The median age at the time of surgery was 46 years in adults and 8 years in children. The majority of the patients received their surgery in Rwanda (40/49; 82%). Over the two third of patients were under the New York Heart Association Classification (NYHA) stage III and IV before surgery. Almost all patients (95%) became under NYHA II and I after surgery. The mitral valve was the mostly affected valve by rheumatic lesions. Valve replacement was done among all males and 85% of females. Mechanical valve replacement was done among 79% of males and 56% of females, while bioprosthetic replacement was done among 21% and 44% of males and females respectively. The mortality rate was 7.4% (4/54), post-biological valve replacement. Valvular surgery consisted mostly of single valve (56%) and double valve (41%). Patients came for clinical follow-up for a median of 14 visits per year. The INR was checked for a median of 24 times in postoperative period for all patients. The INR follow-up visits was 96%, and the median of patients with INR <2.0, post mechanical replacement, was 16%.

### Conclusion:
Outcomes of post-operative RHD patients tracked rural Rwanda health facilities were generally good. The major complications that led to death occurred in patients who underwent bioprosthetic valve replacement while anticoagulation management was not a major issue.

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### 3:15PM-3:30PM NCD/010/OC: Effects of Vitamin D Status on the Evolvement of Non-Communicable Oral Diseases

Julienne Murererehe, 1Anne-Marie Uwitonze, 1Peace Uwambaye, 1Agnes Gatarayiha, 1M. Shawkat Razzaque

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Normal humans of all ages have the innate ability to produce vitamin D following sunlight exposure. Inadequate vitamin D status has been shown to be associated with a wide variety of diseases, including oral diseases. Insufficient sunlight exposure may accelerate some of these diseases, possibly by impairing vitamin D synthesis. In this presentation, we will briefly discuss the possible role of vitamin D on the genesis of various oral diseases. We will also explain the potential benefits of safe sunlight exposure on oral health. The beneficial effects of vitamin D on oral health are not only limited to its direct effects on the tooth mineralization, but are also exerted through the anti-inflammatory functions and the ability to stimulate the production of anti-microbial peptides. Inadequate vitamin D status in the body can induce dentin and enamel defects during
tooth development, and may also increase the incidence of dental caries. An association between vitamin D levels and evolvement of gingivitis is also noted. Maintaining disease free oral health is important, as a bidirectional association between periodontal diseases and various systemic diseases are noted in different non-communicable diseases, including type 2 diabetes mellitus, preterm low-birth weight infant and cardiovascular diseases. Such bidirectional association might be related to low vitamin D activities. From the available information, it is apparent that safe sunlight exposure should be encouraged, when available, to maintain optimal vitamin D levels to have a healthy oral function. Of particular importance, sunlight provides more than 80% of required vitamin D to the human body.

3:30PM-4:00PM Break

Concurrent Invited Session.

SESSION 3: NON COMMUNICABLE DISEASES

Akagera Ballroom. Wednesday 4 October 2017. 2:30PM – 5:30PM

Moderators: Komakech Morris, Raphale Dennis

4:00PM-4:25PM Keynote address 3: Professor Emilio Ovuga

Where there is Inadequate Mental Health Service: Role of The Society for the Advancement of Science in Africa (SASA)

Emilio Ovuga, Gulu University, Email: emilio.ovuga@gmail.com

Mental disorders are common worldwide. The global burden of disease due to mental disorders has been estimated at 14%. Mental disorders are reported to contribute 7.4% of disability adjusted life years (DALYs) and 22.9% of years lived with disability (YLD). However resources allocated to promote mental health and provide care are inadequate. Mental health is accorded low priority by society and national governments in Africa. The treatment gap for various mental disorders has been reported as varying from 32.2% for schizophrenia to 78.1% for alcohol and substance use disorders. This is notwithstanding efforts by some national governments to integrate mental health services into general health care, and decentralize mental health services to lower levels of national health care delivery systems. There is limited awareness and appreciation that mental disorders can be treated, controlled or even cured. Human resources for mental health are grossly inadequate and attraction to the specialty of psychiatry remains low because of little financial gain and perceived stigma associated with the discipline. Animistic practices lead communities in Africa to turn to supernatural forces for cure and healing. The majority of individuals therefore lack access to available basic modern mental health services.

Basing on the biopsychosocial model of mental illness, the origins of mental health problems in Africa can be categorized into hereditary, physical and nutritional factors; adverse psychological experiences; and chronic socio-economic stressors. Of particular interest for preventive and mental health promotion purposes are the problems of infectious diseases, chronic malnutrition,
Oral Abstract

domestic violence, and abuse and neglect; and chronic armed conflict.

In this paper I shall outline some approaches to make mental health services available to people close to where they live. I shall advocate for the involvement of lay community representatives in the provision of mental health first aid as a strategy to prevent or at least delay the progression of mental illness, enhance early remission, promote retention of affected individuals in treatment, reduce stigma and discrimination, and improve the quality of life of individuals as well as to promote psychosocial functioning. I shall conclude with some recommendations on the role of the Society for Advancement of Science in Africa.

4:25PM-4:40PM NCD/011/OC: Prevalence, Awareness and Treatment Rates of Hypertension Among Patients Attending General Outpatient Department of Gulu District, Northern Uganda

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Hypertension is the most reported non-communicable disease in Uganda. However, many people are not aware that they have high blood pressure and a few of those who are aware of the condition are on treatment. The aim of the study was to determine the prevalence, awareness and treatment rates of hypertension in Gulu District, Northern Uganda.

The methodology followed was a cross sectional descriptive study involving 424 participants who were recruited consecutively from four government health units in Gulu District. The World Health Organization’s STEPs tool was used to collect data on demographic and behavioural characteristics, and physical measurements. Hypertension was defined as Systolic blood pressure (SBP) ≥ 140 and/or Diastolic blood pressure (DBP) ≥ 90mm Hg or currently on anti-hypertensive medication. Logistic regression was used to identify factors associated with hypertension.

Of the 424 participants surveyed, 323(76.2%) were females, mean age was 36.1 +/- 14 years. The overall prevalence of hypertension was 21.0%. Just over thirty eight percent (38.2%) of the participants with hypertension were aware they were hypertensive and only 21.3% were currently on antihypertensive treatment. The only modifiable risks associated with hypertension were lack of enough exercise (p =0.0007, 95% CI 1.1842-1.3258) and a higher body mass index (P=0.001, 95% CI 4.8531-7.8531)

We conclude that the prevalence of hypertension in Gulu is high. Only 38.2% of persons with hypertension were aware of their hypertension, indicating a high burden of undiagnosed and uncontrolled high blood pressure in Gulu district, Northern Uganda.
4:40PM-4:55PM NCD/012/OC: Epidemiology and Clinical features of breast cancer in Rwanda

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ABSTRACT

Background and Objective: Breast cancer is a growing crisis in the developing world, with a majority of breast cancer deaths occurring in the low income countries including Rwanda. The lack of established diagnostics and treatments of breast cancer in developing complicates its management. Breast cancer is a disease caused by abnormal breast cells division leading to the malfunction of breast hormones thus causing breast cancer. The objective of this analytical study was to asses the epidemiology and clinical features of breast cancer in Rwanda through cases received from three referral hospitals: Kigali University Teaching Hospital (CHUK), Rwanda Military Hospital (RMH) and Butare University Teaching Hospital (CHUB) among suspected breast cancer patients from all over the country.

Methods: Data were collected from August 2015 to January 2017 by considering information recorded from Out Patients Department (OPD), surgery and laboratory log books and from the archives of patients tested and diagnosed with breast cancer in that period. Microsoft Excel and Statistical Packages for Social Sciences (SPSS 19.0) have been used for data entry and analysis. The total of 550 patients were collected and merely 278 breast cancer cases were used in the study since they provided more information and were histologically confirmed.

Results: Breast cancer incidence rate frequency from August 2015 to January 2016 was 27.70%, from February 2016 to July 2016 was 32.01% and from August 2016 to January 2017 was 40.29% henceforth the average of incidence rate frequency is 33.33% per semester. Amid the diagnosed breast cancer in that period 97.04% of the cases arise in female whereas 2.87% arise in male. The most frequent breast cancer type was invasive ductal carcinoma with 80.43% and the least common were mucinous carcinoma and infiltrating medullary carcinoma with 1.08% for each. According to the age, people between 51 and 60 years old are more likely to be affected with a frequency of 31.73%.

Discussions and Conclusion: The breast cancer frequency observed in this study shows the healthy problem caused by this disease but still underestimation as most patients do not seek for its diagnosis. More deep study and research to increase the awareness and determine the causes of breast cancer in Rwanda is needed for its control. This will help in detecting, preventing, treating and monitoring breast cancer in Rwanda.

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**Background**

Rates of invasive cervical cancer (ICC) and ICC-related mortality are particularly high in Sub-Saharan Africa, which also has the highest rates of HIV infection in the world. Now, over 12 million HIV-infected (HIV[+]) women in Sub-Saharan Africa are living longer because of antiretroviral therapy, only to increase their likelihood of dying from ICC. However, these women are already exposed to human papillomavirus (HPV), the viral cause of cervical cancer, and will not benefit from or be targeted for prophylactic HPV vaccination. Thus, cervical cancer screening of women, especially HIV[+] women, is needed for the foreseeable future. We are conducting a cervical cancer screening study of ~5,000 HIV[+] women, aged 30-54 years, living in Rwanda to compare different screening strategies.

**Methods**

We are evaluating screening tests (high-risk HPV [hrHPV] testing and visual inspection after acetic acid [VIA]), traditional triage tests (HPV16/18/45 detection and VIA), and promising new biomarkers for triage (E6/E7 oncoproteins, and genotype-specific HPV viral methylation and load, and p16/Ki-67 immunocytochemistry) of screen-positive women. During the screening visit, a nurse administers a questionnaire on demographics and ICC risk factors and a specimen is collected for HPV testing by GeneXpert, and then VIA and digital imaging using the Enhanced Visual Assessment (EVA) system (MobileODT) are conducted. At colposcopy for screen-positive women, two additional specimens are taken for biomarker evaluations followed by rigorous colposcopic evaluation that includes 4-quadrant microbiopsies/biopsies and endocervical curettage (ECC) for those women whose squamocolumnar junction is not entirely visible and/or their lesion extends into the endocervical canal.

**Results**

By early 2017, we had screened 2,250 women with available HPV results. The prevalence of high-risk HPV (hrHPV) infection among our study population is 26.3%, with 6.1% HPV16+, 5.5% being HPV18/45+, and 14.7% other hrHPV+. The trend of hrHPV prevalence differs among age groups and hrHPV prevalence increases with the number of sexual partners. We have noted a decrease in the age-specific hrHPV prevalence compared to previous studies in HIV[+] women in Rwanda.

**Discussion**

Falling hrHPV prevalence in HIV[+] women may be indicative of high coverage and compliance with HIV management with anti-retroviral therapy in Rwanda. More results with pathology as well as E6/E7 oncoprotein testing results will be presented at the conference.
**5:10PM-5:25PM NCD/014/OC:** Transgenerational Epigenomics of Trauma and PTSD in Rwanda: new project

Prof. Dr. Leon Mutesa, MD, PhD

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The goal of the proposed work is to characterize the transgenerational genomic impact of genocide exposure and post-traumatic stress disorder (PTSD) in women survivors of the Rwandan genocide and their offspring.

PTSD is a common and debilitating mental disorder that has a profound public health impact. Between April and June 1994, almost one million people died in the Rwandan genocide against ethnic Tutsi. Twenty years later the long-term impact is illustrated by the prevalence of PTSD in Rwandan adults at 26.1% and there is strong evidence pointing towards the transgenerational transmission of PTSD. PTSD has a known etiologic component: exposure to an extreme traumatic stressor involving life threat, which induces a biological cascade that includes epigenetic modification of loci whose activity contributes to psychopathological development. In addition, our study in Rwanda showed that transmission of PTSD to the offspring of genocide-exposed mothers was associated with transmission of biological alterations of the hypothalamic-pituitary-adrenal (HPA) axis and epigenetic modifications of the glucocorticoid receptor (NR3C1) gene, a key player in the glucocorticoid receptor regulatory network (GRRN).

Building upon these recent findings, the proposed work seeks to characterize the transgenerational epigenetic effects of PTSD and trauma exposure due to the Rwandan genocide. We will employ genome-scale technologies and focus initial analyses on regulation of GRRN and related HPA axis genes, which have been associated with PTSD in recent genome-wide work. Specifically, we will test 100 DNA samples from our existing biobank, previously established in support of our pilot study. We will extend the existing biobank by collecting new specimens from women who were pregnant during the Rwandan genocide and their resulting children, as well their younger siblings, and a demographically matched, non-genocide exposed control group.
Poor quality medicines in Africa: how to combat this real scourge

Poor (or low) quality medicines remain a crucial problem of public health around the world. They encompass falsified /counterfeit, substandard or degraded drugs [1]. If proportion of 1% is estimated in developed countries, they are globally about 10 % of counterfeit drugs according to Food and Drug Administration, with 30% in low income countries and astonishing values (80 %) reported in some African countries [2]. The consequences and dangers of such medicines are therapeutic failure, drug poisoning, microbial resistance or even death. For the pharmaceutical industries, there are loss of image, loss of financial income and employment. There is need to combat this scourge, but most of the time, means are very limited and even lacking.

In this context, several means or tools are developed by the ULg Pharmacy Department including the simple ones including organoleptic tests [3], simple analytical tests such as analytical balance, pH-meter, thin layer chromatography (TLC), UV-visible spectrophotometry to the more complex including liquid chromatography (LC) coupled to UV-Vis detector, or to mass spectrometry, nuclear magnetic resonance, Raman imagery (RIM) and near infrared (NIR) spectroscopy associated with the principal component analysis (PCA).

In this way, we have analyzed several suspected samples obtained via the public health authorities of the D.R. Congo, Benin and Rwanda after their seizure or through collaborations. The results are presented by therapeutic class, namely:

**analgesics:**
- by using LC and complementary information from victim patients, we were able to discover an abnormal presence of a benzodiazepine at very high doses in paracetamol tablets which was the cause of unusual adverse effects (sedative effects, polyuria and hypotension) in patients who have consumed it;

- by using the NIR-PCA, we were able to elucidate the substitution of an excipient (glycerol) by diethylene glycol in paracetamol syrup which caused the death of a hundred babies [2].

**antimalarials:**
- we faced cases of arthemether-lumefantrine tablets which had no therapeutic effect. By means of TLC and LC, the absence of these two active ingredients was clearly demonstrated, but the presence of starch was revealed by RIM;

- another case of quinine tablets that had no expected pharmacological effect was faced. The use of several combined techniques (TLC, LC-MS, NMR and RIM) allowed to detect the presence of a substance with an imidazole structure (antamoeba) [4].

**antibiotics:**
- the case of amoxicillin powder which after reconstitution in hospital caused poisoning of the babies until death for some was investigated. The reconstitution of the suspension in the laboratory had revealed the misuse of hydrogen peroxide instead of distilled water;
- we participated to a large-scale study (80 samples of amoxicillin powder) that showed 8% of overdose [6].

The cases presented indicate that there are effectively poor quality medicines and there is need to sustain strong collaborations while reinforcing appropriate measures to protect users.

11:25AM-11:40AM PP/001/OC: Chemical Synthesis, Efficacy and Safety of Anti-Malarial Hybrid Drug Comprising of Sarcosine and Aniline Pharmacophores as Scaffolds

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Malaria is a disease caused by protozoan plasmodium. The main objective of this study was to synthesize, determine the efficacy and safety of an antiplasmodial hybrid drug comprising of sarcosine and aniline derivative for management of plasmodial infections. The sarcosine-aniline hybrid was synthesized by coupling sarcosine and 3-Chloro-4-(4-chlorophenoxy) aniline. These pharmacophores were selected based on in silico studies that showed that they can bind protein ligands of plasmodium. The hybrid drug was synthesized by adding thionyl chloride to sarcosine in order to form acylchloride, which was then added to aniline to form sarcosine-aniline hybrid.

The IC50 of sarcosine-aniline hybrid was 44.80 ± 4.70 ng/ml compared to that of aniline which was 22.86 ± 1.26 ng/ml. The IC50 of control drugs were 2.63 ± 0.38 ng/ml, 5.69 ± 0.39 ng/ml for artesunate and chloroquine, respectively. There was a significant difference between IC50 of sarcosine-aniline hybrid and aniline derivative (P<0.05). There was also a significant difference between sarcosine-aniline hybrid and standard drugs used to treat malaria including artesunate and chloroquine (P<0.05). The ED50 of sarcosine-aniline hybrid drug was 6.49mg/kg compared to that of aniline which was 3.61mg/kg. The ED50 of control drugs were 3.56mg/kg, 2.94mg/kg and 1.78 mg/kg for artesunate-aniline hybrid, artesunate and chloroquine, respectively. There was a significant difference (P<0.05) between ED50 of sarcosine-aniline hybrid and both controls such as aniline derivative, artesunate, artesunate-aniline hybrid and chloroquine.

Cytotoxicity results revealed that sarcosine-aniline hybrid was safe to vero cells with CC50 of 50.18±3.53µg/ml, whereas the CC50 of artesunate, chloroquine and doxorubicin were 19.69±3.26, 57.96±3.85 and 1.96 ± 0.59 µg/ml, respectively. Sarcosine-aniline hybrid was significantly less toxic compared to artesunate, chloroquine and doxorubicin (P<0.05). Sarcosine-aniline hybrid was also safe to mice, as no mouse died after administering them with 2000mg/kg of hybrid drug for 14 days.
**11:40AM-11:55AM** PP/002/OC: In silico repositioning using target-similarity search identifies approved drugs that have in vitro antimalarial activity against Plasmodium falciparum


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Recent reports on artemisinin resistance in Southeast Asia warrant urgent discovery of novel drugs for treatment of malaria. Search for new chemical entities often fails at safety and toxicity stages of drug development. Drug repositioning offers an alternative strategy where drugs that have already been approved for other diseases and conditions are used to treat malaria and other diseases. This study screened approved drugs for antimalarial activity using an in silico chemogenomics approach prior to in-vitro verification.

All the Plasmodium falciparum proteins sequences available at NCBI RefSeq were used to perform a similarity search between these proteins and putative target proteins of approved drugs in Therapeutic Target Database, DrugBank and STITCH 4.0 databases. Drugability indices of the potential drug targets were obtained from TDR targets database. Functional residues of the drug targets were determined using ConSurf server which were used to fine tune the similarity search. A literature search at PubMed and Google Scholar identified drugs that have been previously been tested against malaria, these were excluded from further analysis. Finally, drug susceptibility assays using SYBR Green method was done to validate the antimalarial activity of the untested drugs.

This study predicted 133 approved drugs could target 28 P. falciparum proteins. Published literature showed 99 of these drugs have been tested against malaria, most of which have antimalarial activity. A representative group of 10 of the 34 untested drugs were screened using in vitro drugs susceptibility tests and 8 out of the 10 showed antimalarial activity with IC50 values below 100 µM.

We conclude that these results show that target similarity can been used to correctly identify approved drugs with antimalarial activity, validating it as a viable method for repositioning drugs for antimalarial use.

**11:55AM-12:10PM** PP/003/OC: Determination of Blood Concentration Levels of Psychotropic Medications in Rwandan Patients

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In Rwanda, no therapeutic monitoring of psychotropic drugs is done. This results in difficult treatment optimisation and exposition to a high risk of toxicity and drug ineffectiveness for patients
under treatment. This study aimed to determine blood concentration levels of psychotropic drugs in Rwandan patients and identify problems associated with the lack of therapeutic drug monitoring of these drugs.

The analysis was performed on 1 ml of serum sample using prazepam as internal standard. Regarding the step of sample preparation, we used a liquid-liquid extraction with a mixture of organic solvents: diethyl ether/dichloromethane/hexane/n-amyl alcohol (50/30/20/0.5:V/V). A Waters Alliance 2695 was used for analysis. The chromatography was run on a Symmetry C8 column and as mobile phase acetonitrile and phosphate buffer (pH 3.8) were used.

Concerning the results, serum samples from 128 patients were analysed. Twenty-one different psychotropic drugs belonging to various pharmacological classes were detected and quantified. Analytical results were put into 3 categories based upon therapeutic reference ranges (TRR) of various drugs: subtherapeutic, therapeutic and supratherapeutic. For a total of 237 analyses, results within TRR represented 46% while 47% and 8% of results were respectively below and beyond therapeutic reference ranges.

It was therefore concluded that patients under psychotropic treatment in Rwanda are exposed to both the risk of drug ineffectiveness and the risk of toxicity (54%) with only 46% of results within the therapeutic reference range. Consequently, therapeutic drug monitoring is needed to optimize psychotropic treatment in Rwandan patients.

12:10PM-12:25PM PP/004/OC: Effect of Moringa oleifera Aqueous Extract on Proliferation, Apoptosis and Immunomodulatory Activity of Lympho-Monocytoid Cells and PBMCs from Healthy Donors

Marina Potestà*, Antonella Minutolo**, Angelo Gismondi, Lorena Canuti, Maurice Kenzo, Marco Cirilli, Sandro Grelli, Rosario Muleo, Antonella Canini, Vittorio Colizzi and Carla Montesano*

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Moringa oleifera Lam. (MO) is one of the most distributed species of Moringaceae family, which is also widely used in African traditional medicine. Different studies documented anti-inflammatory, immune-stimulatory and pro-apoptotic properties of MO leaf extract. Considering the limited data available about MO mature seeds, we evaluated, in lymphoid and monocytoid cells and PBMCs from healthy donors (HD PBMCs), the anti-proliferative and pro-apoptotic effects of different MO mature seed aqueous extracts (MOE). We also investigated the possible effects of MOE treatment in CD4+ T cells differentiation mechanism and in immune restore.

Our results clearly demonstrated which MOE reduced cell growth and induced apoptosis in human tumor cells but not in HD PBMCs. Recent works have reported that miRNAs derived from plant foods are also functional in mammals, regulating the expression of host genes and, for this reason, the effects of miRNAs extracted from MOE on human cell proliferation and death regulation was
We demonstrated the ability of MO miRNA pool to induce Bcl2 and SIRT1 mediated apoptosis in tumor cells, as also performed by total MOE. In addition, MOE treatment had immunomodulatory effects in PBMCs, changing the differentiation process of CD4+ T cells in activated PBMCs, and restoring CD3+CD4+ subtype in PBMCs exposed to a chemotherapeutic (cyclophosphamide).

In conclusion, MOE was able to regulate proliferation, apoptosis and immune response in different ways in healthy cells in contrast to cancer ones and our results suggested that MO effects were due to the combination of different components, especially miRNAs.


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Some plants of the Artemisia family like Artemisia annua are renowned worldwide. One of its molecules, artemisinin, has been extensively used in antimalarial drugs. But, like all other monotherapies, it has led to resistances not only in South-East Asia, but also in at least 10 African countries. Artemisia afra is an indigenous, perennial plant growing from the Cape to Addis Ababa and Kinshasa. Its use has been described in the traditional medical literature of these countries against many diseases including malaria.

The immunostimulating and anti-HIV properties of Artemisia afra were first described by Fr Vanderkooy in 2012. This has been confirmed in 2013 by C. Tchandema and P. Lutgen in another paper. In malaria-infected patients, Artemisia afra increased CD4+ and eliminated trophozoites. More recent results from large scale (1000 patients), double blind, randomized clinical trials by Munyangi and coworkers in Maniema RDC are breaking news comparing A. annua and A. afra with ACTs (Coartem and ASAQ). For all the parameters tested, herbal treatment was significantly better than ACTs: Faster clearance for fever and parasitemia, absence of parasites on day 28 for 99.5 % of the Artemisia treatments, and 79.5% only for the ACT treatments. More importantly, there was even the observation of the total absence of gametocytes after 7 days treatment with the herb. The efficiency was equivalent for A. annua and A. afra. The trial included 465 children from 2-5 years of age.

In parallel with the clinical trials against malaria, the above authors have completed another large-scale randomized, double blind trial against schistosomiasis, comparing Artemisia vs Praziquantel. The treatment efficiency was 97 % in the Artemisia arm and 71% in the Praziquantel arm. Very impressive is the fact that the Artemisia treatment led to an unexpected almost complete absence of eggs in feces after 2 months.

So far, only symptomatic patients have been treated and the question remains open whether Artemisia plants had also prophylactic properties. Munyangi has now completed a first randomized
trial with $2 \times 100$ primary school children in the province of Maniema. The objective was to study the impact of a prophylactic treatment of 3 cups/week of A. annua infusion. The results are overwhelming. In the second and third month of the treatment, parasitemia and gametocytemia have completely disappeared in the Artemisia arm, but in the control arm the parasite carriage remains constant over the 3 months.

The same team now has completed trials against Buruli ulcer, with extraordinary results. The treatment consisted in the administration per os of an A. afra decoction during 14 days and the application of a poultice containing an A. afra extract during 28 days. These produces were from “Mother Nature” in Burundi. A number of 21 patients completed the full treatment, some others were lost from sight. Those who took the complete treatment were totally cured, without any need for surgical intervention. No remanent limitation in movements or other sequelae were noticed as it often happens after antibiotic treatment. No remaining mycobacteria could be detected after the treatment.

The prescriptions of WHO provide (WHO/EDM/TRM/2000.1) that there is no requirement for pre-clinical toxicity testing if a substance or plant has been used over three or more generations for a specific health related or medicinal purpose. The European Medicines Agency (EMA) also provides (DTHMP directive) that herbal medicines may be approved in a simplified procedure if traditional use is documented for at least 10 years.

12:40PM-12:55PM PP/006/OC: Natural Products and Molecules in Drug Discovery: Umuravumba -One of the Most Popular Medicinal Plants in Rwanda

Dr. Jean-Olivier Zirimwabagabo

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Researchers in the pharmaceutical industry are used to screen natural products in high-throughput assays against molecular targets. It has long been considered that natural product structures have the characteristics of high chemical diversity, biochemical specificity, and other precious molecular properties that make them favorable as drugs or lead structures for drug discovery thereby providing a good inspiration in medicinal chemistry. The application of bioactive naturals as isolated and characterized compounds to modern drug discovery and development started only in the 19th century. Aspirin, the most common used drug against headache, was chemically modified from a well-known natural product [1] Quinine, which was itself used worldwide against malaria [2]. Due to the limit of availability and difficulties of extraction of Nature’s products, organic chemists have turned their attention to the organic synthesis of these products. However, some compounds have been found very complex and costing money for their organic synthesis. Obviously, natural products will remain an extremely important source of medicinal agents.

Inspired by the use of Tetradenia riparia (called in Rwandese: “Umuravumba”) in traditional medicine in Rwanda, we sought to investigate and understand the role of different active molecules in this
plant’s extract for their curative properties [3]. It has been reported that different molecules in Umuravumba such as desacetylumuravumbolide or Sandaracopimaradiene-7,18-diol showed a wide range of pharmacological activities such as cytotoxicity against human tumour cells, and antimicrobial and antifungal activity [4]. From 2014, our current target is haemorrhoids. The pomade Muravikim made from the extract of Umuravumba was found to have a positive effect when applied to haemorrhoids patients [5].

1:00PM – 2:00PM LUNCH BREAK

2:00PM-2:25PM Akagera Ballroom. Plenary session.

Wednesday 4 October 2017. 2:00PM – 2:25PM

Moderators: Jacob Souopgui, Lawrence Ayong

Keynote address 2: Shared Behavioral Endophenotype in Neurodevelopmental Disorders

Joachim Kapalanga1,2,3, B. Laufer1, A. Chokroverty-Hoque1, D. Wong3. 1. Western, University, 2. Grey Bruce Health Services, 3. Summerside Medical Centre.

A certain behavioral endophenotype (BEP) characterized by impaired executive function, emotional regulation, cognition, learning and social adaptation is shared by four neurodevelopmental disorders (NDD): fetal alcohol spectrum disorders (FASD), attention deficit hyperactivity disorder (ADHD), fragile X syndrome (FXS) and autism spectrum disorders (ASD). The genetic defect is known in FXS but specific genetic defects or single genes have not yet been conclusively identified in FASD, ADHD, and ASD. Even with the putative mutation not all carrying it are affected. While the genetic factors involved in these NDD are disparate, the shared BEP is identifiable clinically. Further, pathogenic alterations in gene expression and epigenetic regulation are critical in the etiopathogenesis of all four NDD. The logical question to ask is whether or not there is a shared ‘final pathway’, which represents a profile of epigenetic modifications and gene expression that is an explanation for the shared BEP. The objectives of this study are to: 1) demonstrate BEP component distribution patterns and frequency in FASD, ADHD, FXS and ASD, and 2) determine whether or not the patterns and frequencies are significantly different or similar. We hypothesize that the distribution and frequency of the components of the BEP are similar and not significantly different among the four NDD. We further hypothesize that a shared ‘final pathway’ representing a profile of epigenetic modifications and related differential gene expression is the explanation for the shared BEP. From a multicenter and multiclinic patient sample, clinical records of 89 FASD, 98 ADHD, 79 FXS and 82 ASD patients aged 6 to 18 and 100 controls were examined. The occurrence of the BEP components in each subject were recorded, the distribution of BEP components was analyzed across the 4 NDDs. We demonstrated that there were no significant differences in frequency distribution of the BEP components among the four NDD. There were no significant differences in frequencies of deficits in social adaptation, cognition, learning, and emotional regulation among the four NDD (p > 0.05). There was weak significant (p<0.05) difference in the frequency of occurrence of executive function between ADHD and FXS patients. There were significant differences between the control group and each NDD (p<0.01). These results demonstrate that the specified BEP is shared by the four NDD. The tendency for these disorders to cluster endophenotypically suggest a shared underlying etiopathogenic pathway. As the underlying etiologic genetic factors or genes are disparate for each NDD, a shared ‘final
pathway’ representing a profile of epigenetic modifications and differential gene expression is not inconceivable. In the classical paradigm for elucidating the etiopathogenic molecular basis of a genetic disorder, a broad diagnostic category is used as the basis for identifying a causative gene or genes. However, the endophenotypic heterogeneity of NDDs confounds the classical approach and produces disappointing results. The results in this study point to another strategy to overcoming clinical complexity. This novel strategy identifies shared molecular mechanisms in NDD patients with a shared endophenotype rather than in NDD patients with the same diagnosis but little central phenotypic kurtosis. The NDD patients with a shared BEP will be used in a subsequent study to elucidate profiles of epigenetic modification and differential gene expression in an attempt to identify a shared ‘final molecular pathway’

Concurrent Invited Session.

Urukari Ballroom. Wednesday 4 October 2017. 2:30PM – 5:30PM

Moderators: Roland Marini, Jean Paul Coutelier

2:30PM-2:55PM Keynote adress 5: Dr Olivia Jansen

Ethnopharmacology and malaria in Africa: Focus on Mezoneuron benthamianum

Olivia JANSEN and Michel FRÉDÉRICH

University of Liege, Belgium

Despite some improvements in malaria control in the last five years, this parasitic disease remains a major public health problem in many African countries, causing about 400 000 deaths in 2015 through the continent, mainly by children under the age of five [1].

Malaria is caused by a protozoan parasite Plasmodium sp. and transmitted by Anopheles mosquitoes. The problem of parasite resistance towards common available medicines such as chloroquine, mefloquine, quinine, and more recently artemisinin, is a real threat in the control of the disease and in this context, the discovery of new treatment is urgently needed.

The vegetal kingdom remains the main source of pharmacologically active compounds against Plasmodium as attested by the famous quinine, isolated from Cinchona sp., artemisinin extracted from Artemisia annua and also atovaquone derived from lapachol found in several Bignoniaceae. All these substances are related to plants with traditional use against fever and malaria. Beside these well-known examples, various new antiplasmodial compounds are frequently discovered from Nature, particularly following an ethnopharmacological approach, as reviewed by several authors in recent years [2-6]. Then, the pharmacological and phytochemical study of plants from traditional pharmacopoeias can be of first interest not only to discover new antimalarial “lead compounds”, but also to valorize local vegetal species whose efficacy and safety would have been demonstrated in laboratory and clinical investigations [7]. As demonstrated in several works from Wilcox [8], better knowledge of plants from traditional pharmacopoeias and local valorization of validated traditional remedies in Improved Traditional Medicine (ITM) could allow the access to
effective, standardized, available and affordable therapeutics for management of malaria by local populations.

In this context, the laboratory of Pharmacognosy of Liège (Belgium) is involved in several collaborations with African Universities and Research Centers for the research and the analysis of plants and natural products that can be valorized for malaria treatment. Our methodology, based on an ethnopharmacological approach, will be illustrated by the example of Mezoneuron benthamianum, a plant from Guinea, which is traditionally used to treat malaria in this country [9] and showed promising results in a preliminary small-scale ethnomedical study. In our study we evaluated the activity of M. benthamianum leaves hydroethanolic extracts against P. falciparum using the in vitro p-LDH assay, and we identified the compounds responsible for its activity through a bioassay-guided fractionation process. The active compounds belong to several phytochemical classes, including flavonoids, pheophorbide and gallic acid derivatives, contributing together to the global antiplasmodial activity of the extract against P. falciparum parasite. This study [10] gives some concrete evidence to support the ethnopharmacological use of Mezoneuron benthamianum leaves extract in the management of malaria. The active compounds can be further studied for their antiplasmodial potential, as well as their suitability to be used as quality markers for the standardization of this herbal drug from the Guinean traditional pharmacopeia.

14:55PM-15:10PM PP/007/OC: Blend of Essential Oils for the Prevention or Alternative/Complementary Treatment of Neurological Disorders

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Epilepsy, convulsive seizures and headaches are the most common chronic neurological disorders affecting respectively 5 to 10 and 15 to 30 out of every 1000 persons. They remain a major public health problem, not only because of their health implications but also for their social, cultural, psychological and economic consequences. Nearly 80% of people with these diseases reside in developing countries. Cerebral complications of infectious diseases are one main cause of epilepsy, migraines and in general brain disorders in Africa. One serious problem in low-income countries is the poor availability and high cost of medication.

Extensive laboratory work and clinical studies have led to the formulation of blended essential oils with ethnomedical applications into three related phytomedicines for alternative or complementary treatments of convulsions, migraines and strong agitation.

Traditionally, dry leaves of Myrothamnus moschatus are smoked like a cigar to treat convulsion and migraines. Freshly collected aerial parts of Myrothamnus moschatus were therefore extracted by steam distillation. The essential oil obtained was analyzed by GC/FID and GC/MS. In parallel, the analysis of the chemical composition of active and passive smoke was performed by using the solid phase micro-extraction (SPME) technique. The most striking difference was the presence
of limonene in the smoke of Myrothamnus moschatus while in very small quantities in dry leaves and essential oil of the plant. Based on these results, a blend of essential oil of Myrothamnus moschatus and Citrus sp was formulated under the trade name Fanalarofy® for the prevention or alternative/complementary treatment of convulsions.

On the other hand, leaves of Cinnamosma madagascariensis are traditionally used in fumigation to treat convulsion with strong agitation. A blend of essential oil of Myrothamnus moschatus and Cinnamosma madagascariensis under the trade name Fanalasarotra® was also formulated to treat strong agitation.

Further, an essential oil of Myrothamnus moschatus was formulated under the trade name Fanalanendo® for the prevention or alternative/complementary treatment of migraine.

These medicinal products are innovative for being culturally accepted, markedly affordable, rapidly acting and easy to administer via inhalation.

15:10PM-15:25PM PP/008/OC: Assessment of Anti-Mycobacterial Activity of Some Selected Congolese Medicinal Plants

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Tuberculosis is an infectious disease that kills approximately 3 million people annually worldwide. The emergence of multi-drug resistance, extensive drug resistance and lengthy therapy reduce the patient compliance and therefore comprise control strategies.

In this study, the leaves of Terminalia ivorensis, Carapa procera, Fagara macrophylla, Anacardium occidentale, Ficus spp. and Drepanoalpha were extracted with petroleum ether, ethyl acetate, and methanol in order to assess the anti-mycobacterial activity against M. tuberculosis H37Rv and Mycobacterium tuberculosis spp. on Lowenstein-Jensen medium and Middlebrook 7H10 agar using a qualitative approach.

The activity was determined as to whether there was growth or not and the crude extracts were screened for the presence of phytochemicals namely alkaloids, flavonoids, tannins, anthocyanins, leucoanthocyanins, total polyphenols and saponins.

These extracts were found to be active against mycobacteria culture strains in Middlebrook 7H10 agar where there was inhibition of the growth than in Lowenstein-Jensen slants where only the methanolic extract showed good activity on both strains. The presence of phytochemicals like alkaloids, flavonoids, tannins, saponins, anthocyanins, quinones known to be of medicinal importance point out a possible source for anti-mycobacterial agents to address the problem of multidrug resistance.
The in vitro findings of this study provide a partial support for the use of these plants in the management of various infectious diseases as lead to drug discovery and should be reiterated and recommend for a clinical trial using an animal model.

3:30 PM – 4:00 PM Break

Concurrent Invited Session.

Urukari Ballroom. Wednesday 4 October 2017. 2:30PM – 5:30PM

Moderators: Roland Marini, Jean Paul Coutelier

4:00PM-4:15PM PP/009/OC: NRLP3 inflammasome/Caspase-1 Inhibition by Herbal Recipes Extracts Traditionally Used in Rwanda for Asthma Treatment

*Jean Claude Didelot TOMANI1,2, Lea Olive Tchouate Gainkam3, Marie Jeanne Mukazayire2, Raymond Muganga1, Michel Frederich4 and Jacob Suoupgui3

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Asthma is a chronic inflammatory disease which affects more than 300 million people worldwide (1). Depending on the inflammatory patterns involved, there are two main subtypes of asthma, the eosinophilic and the nucleophilic (2). Corticosteroids are widely used as a main treatment of the disease despite their several harmful side effects. Moreover, some patients showed also resistance to the treatment mainly those with inflammasomes and IL-1beta in their subtypes (3). Inflammasomes are multimeric proteins responsible for the upregulation of IL-1beta and IL-18 into their mature forms through the activation of caspase-1 (2). In Rwanda, some traditional healers claim to treat asthma with plant-based recipes, though there is no scientific proof so far.

Our study is aimed at evaluating the anti-inflammatory effect of plant recipes used in Rwanda against asthma in order to select potential candidates for further characterization of the active compounds.

Plants were collected from an ethnobotanical survey, shade-dried and powdered. Recipes were then reconstituted according to the traditional healers's guidelines and submitted to water and methanol-dichloromethane extraction. The toxicity of the plant extracts was evaluated on THP-1 derived macrophages using Cell-Titer Glo assay (Promega) and on Xenopus embryonic development using FETAX. The anti-inflammatory effect of the plant extracts was carried out using the Caspase-Glo® 1 Inflammasome assay on THP-1 -derived macrophages.

The organic solvent extraction yield was higher than the aqueous form. Both organic and aqueous extracts showed more than 95% of cell viability up to 200 µg/ml except for one extract that
inhibited 25% of the cell viability. Some extracts have also shown dose-dependent effect on Xenopus embryos development. At 200µg/ml, aqueous extract causes embryos death after 5h of treatment while the 100µg/ml induced the gastrulation delay and stopped the embryos development at the neurula. However, the 50µg/ml had no effect on embryos development as compared to non-treated embryos. Plant extracts inhibited caspase-1 activation in a dose-dependent manner. Some extracts were more efficient (up to 90% inhibition) than the commercial reference inhibitor.

In conclusion, taken together, Xenopus embryos are more sensitive to the studied plant extracts than THP-1-derived macrophages cells. This study has also shown that the inhibition of inflammasome/caspase-1 is one of several key mechanisms of action in asthma treatment by tested traditional medecines. Some recipes are strong candidates to the treatment of asthma and other-inflammasome-mediated diseases. Further investigations are needed to characterize active molecules.

4:15PM-4:30PM PP/010/OC: Antioxidant Potential of Black Tea Cultivars Produced in Rwanda

Nyandawi Jean Baptiste* and Muganga Raymond

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Rwanda produces one of the best quality teas in the world and tea, mostly black tea, is one of Rwanda’s main cash crops (1). However, few studies have been so far done on Rwandese black teas for its potential benefits, especially antioxidant activity (2,3).

The present study aimed at determining the antioxidant activity of Rwandese highland black teas available on Rwandese market and comparing with one black tea from Belgium (Lipton). Crude tea extracts were obtained by ethanol 50 % extraction and were powdered by evaporation to dryness under reduced pressure at 40°C. Antioxidant activity was evaluated using the ABTS test method (4) and gallic acid was used as reference. The values of IC50 for each black tea have been determined and also p-values calculated using GraphPad Prism V to compare the antioxidant activity from different black tea cultivars.

The results showed that all plant samples inhibited ABTS radical activity in a dose-dependent manner. The best antioxidant activity was found for Rubaya tea (200.8 µg/ml) followed by Highland tea (271.4 µg/ml), Sorwathe tea (363.9 µg/ml), Damarara tea (417.2 µg/ml) and Lipton (Belgian) tea (526 µg/ml). However, the difference between Rwandese teas was not statistically significant (p-value > 0.05). Similarly, the antioxidant activity difference between Rwandese teas and the Belgian one was not statistically significant as well.

Rwandese black teas have significant levels of antioxidants. Those antioxidants have several health potential benefits which make tea the most consumed beverage next to water. However, few
Rwandans are benefiting from its beneficial properties. This study recommends Rwandese to renovate tea consumption habit in order to fully gain its health potential benefits.

4:30PM-4:45PM PP/011/OC: Antiplasmodial and Antioxidant Activities, Acute Toxicity and Phytochemistry of Leaf Extracts of Dalbergia katangensis Lechenaud

Bashige Chiribagula Valentin1,2,3*, Bakari Amuri Salvius1, Kahumba Byanga Joh1, Duez Pierre2 and Lumbu Simbi Jean-Baptiste3

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Malaria has a negative impact on the health of the population of endemic countries like the Democratic Republic of Congo (DRC) due to highest morbidity. This situation gives rise to the reinforcement of the current means of its management and the use of plants constitutes one of the alternatives.

This study evaluates the antiplasmodial, antioxidant and toxic activities of the leaves of Dalbergia katangensis, a plant used in traditional Bukavian medicine against malaria. It also quantifies the phenols and flavonoids available to the plant.

Prussian blue test, aluminum trichloride test, pLDH assay, DPPH assay, and 14-day methods are used respectively for the determination of phenols and flavonoids and for evaluating of antiplasmodial, antioxidant and toxic activities. The results are analyzed by GraphPad with P value < 0.05.

All extracts were found to be active and practically non-toxic. Methanol extract showed the highest antiplasmodial activity (IC50 = 0.98 ± 0.1 μg / mL), antioxidant activity (IC50 = 0.8 ± 0.1 μg / mL), the highest phenols (C = 350.1 ± 0.7 mg EQ / g; p < 0.001), and the highest flavonoids (C = 82.2 ± 3.1 mg EQ / g; p < 0.001) total content. The aqueous extract is the least toxic (LD50 = 8912.5 mg / Kg).

We conclude that Dalbergia katangensis’s leaves are active on Plasmodium falciparum and practically non-toxic. Their use in traditional Congolese medicine against malaria would be justified.

4:45PM-5:00PM PP/012/OC: Identification, Isolation, Structural Determination by LC-MS and NMR of Alkaloids from Holarrhena floribunda and Determination of their Activity on Mycobacterium ulcerans, the Causal Agent of Buruli Ulcer

A. Yemoa1, J. Gbenou2, D. Affolabi3, M. Moudachirou2, A. Bigot1, R. Marini4,5, S. Anagonou3, F. Portaels6, A. Martin7, and J. Quetin-Leclercq8

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Buruli ulcer (BU), commonly known as Bairnsdale ulcer, caused by Mycobacterium ulcerans, is one of the most neglected but treatable tropical diseases. While anti-mycobacterial therapy is often effective for the earliest nodular or ulcerative lesions, surgery is sometimes necessary for advanced ulcerated lesions. In Benin, the first recourse to treat BU is often traditional treatment. Holarrhena floribunda is reported to be used successfully in traditional treatment of BU and extracts were shown to possess anti-mycobacterial properties [1].

Our research question was: Does Holarrhena floribunda contain compounds effective on Mycobacterium ulcerans, the causative agent of BU? Our hypothesis was that Holarrhena floribunda contains anti-mycobacterial alkaloids.

By preliminary TLC, we confirmed the presence of alkaloids in the anti-mycobacterial crude dichloromethane extract of Holarrhena floribunda. A series of chromatographs were used (atmospheric pressure and medium pressure column normal phase chromatography) and gel filtration on SEPHADEX LH20 to obtain five alkaloid containing sub-fractions from a first one active on M. ulcerans according to the resazurin microtiter assay [1]. These fractions were analyzed by HPLC-HR MS (ESI+) and the one containing a pure compound by NMR.

We determined that fractionation of the enriched alkaloid extract allowed the identification of four different alkaloids in five different fractions and isolation of one of them with high purity. The structure of the major compound was identified as holadysamine (3-methyl amino pregna5,16-dien-20-ol) by MS and NMR. HPLC-HRMS/MS indicated that the three other compounds had molecular formulas of, respectively, C22H37ON (MW:331.29), C21H33ON (MW: 315.26), and C23H37ON (MW: 343.29) and could correspond to holaphyllinol, holamine or holaphyllamine and a new alkaloid. Pure holadysamine was found to be more active (MIC = 50 g/mL) than fractions containing the other alkaloids but less active than rifampicin (MIC = 2 g/mL).

In conclusion, our results show that anti-mycobacterial extracts of aerial parts of H. floribunda, used by traditional healers to treat BU, contain several alkaloids. Holadysamine was found to be the most active one (MIC = 50 g/mL), but this activity is lower than that of rifampicin and could not totally explain the effectiveness which may be the result of synergistic effects with other plants as may occur with antibiotics [4].

15PM PP/013/OC: The Impact of Herbal Medicines’ Use in Patients Under Highly Active Antiretroviral Therapy

*Kabayundo Jonsiane¹ and Muganga Raymond²

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Concurrent use of natural health products (NHPs) with antiretroviral drugs (ARVs) is widespread among human immunodeficiency virus (HIV)-infected patients in search of treatments that will help rebuild the immune system, address drugs' side effects, and perhaps even combat HIV. In Rwanda, it is sure that a large majority of the people still use resources of traditional medicine to solve health problems (MOH, 2010). However, few data are available about the possible impact of herbal medicine on HIV patients' outcome. This study aimed at assessing possible effects of concomitant use of antiretroviral drugs and herbal medicines in Rwanda.

Patients from the Rango Health Center were interviewed and data were collected and analyzed. We found that the majority of the participants (67.3%) reported that they use herbal medicines either before or after starting antiretroviral therapy, and 29.85% reported that they use herbal medicines along with antiretroviral drugs. The mostly used plants by patients were Tetradenia riparia (24.76%), followed by Vernonia amygdalina (16.61%), Ocimumum suave (12.22%), Aloe sp (3.76%), Leonitines ptaefolia (2.82%), Psidium guajava (2.5%), Vernonia lasiopus (2.19%), Eucalyptus sp (2.19%), and Trapaelum majus (1.88%). Gastric irritation, severe nausea, diarrhea, constipation, lack of appetite, worsening of disease status and even treatment change have been reported in 6.71% of all patients who have used traditional medicines. From all patients who have used traditional medicines 66.6% of them were using herbal medicine along with antiretrovirals among whom 44.4% changed their ARV regimens. Disease improvement has also been reported in 85.93% of patients who have used herbal medicines along with antiretroviral drugs.

We conclude that concomitant herbal medicines' use with antiretroviral drugs may affect drugs' pharmacokinetics parameters and patients' outcome. Further studies are needed to determine possible interactions of the used herbal medicine's constituents and antiretroviral drugs.
structure of ACTH was built based on ab initio technique. The MC2R model was later successfully docked onto the ACTH structure. Molecular dynamics (MD) simulation for 20 ns was used to compute the binding free energy of MC2R with ACTH model under implicit solvent conditions.

Concurrent Invited Session.

Wednesday 4 October 2017

SESSION III: PRECISION AND PERSONALIZED MEDICINE.

Room: INYAMBO Ballroom
Moderators: Francois Naramabuye, Stefan Jansen
11:00-11:25AM Keynote address 7: Prof. Alain L. Fymat, BA, BS, MA, MS, PhD

THERAPEUTICS DELIVERY BEYOND THE BRAIN PROTECTIVE BARRIERS

Alain L. Fymat, PhD, PhD
International Institute of Medicine and Science, California, USA

There are approximately 400 known neural disorders some of which being due to a disruption or failure of the blood brain barrier (BBB) such as, for example: meningitis (an inflammation of the meninges or membranes surrounding the brain and spinal cord); epilepsy (chronic or acute seizures caused by inflammation); multiple sclerosis (MS - a disease of the immune system or/and the breaking down of the BBB in a section of the brain or spinal cord); Alzheimer disease (AD - a disease in which amyloid beta contained in blood plasma enter the brain and adhere to the surface of astrocytes); possibly prion and prion-like diseases such as Parkinson disease (PD) and AD; HIV encephalitis (a precursor of HIV-associated dementia in which latent HIV can cross the BBB inside circulating monocytes in the blood stream); and systemic inflammation (sterile or infectious) that may lead to effects on the brain, cause sickness behavior and induce or/and accelerate brain diseases such as MS and PD. There are currently active investigations into treatments for a compromised BBB. As a consequence of the growing aging population, many such neurodegenerative diseases, cancer and infections of the brain will become more prevalent. Of interest here are those disorders requiring treatment by delivery of drugs across the brain protective barriers.

I will review the difficulties inherent in the delivery of drugs across the BBB in the treatment of the above neurological disorders, and discuss the mechanisms for drug targeting both “through” and "behind" the BBB. I will also suggest approaches for the enhancement of drug delivery including physiological approaches, chemical and biological delivery, disruption of the BBB system, the use of molecular Trojan horse systems, and the various nanoparticle and nano delivering devices.
Oral Abstract

11:25AM-11:40AM  PPM/001/OC: Vitamin D Levels in Mother Baby Pairs: A Cross-Sectional Prospective Study in a Rwandan Tertiary Hospital

Florent Rutagarama ab, Raymond Muganga a, Diane Stafford c, Katja Konrad d, Raissa Teteli b, Muhammed Semakula e, Musafite Aimable f, Paul Laigong g and Leon Mutesa b

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Sunlight contributes up to 90% of vitamin D production but pregnant women, especially in the final trimester, may experience vitamin D deficiency. This study aimed at exploring Vitamin D status in mother baby pair and associated factors.

This is a cross-sectional prospective study conducted on mother baby pairs at one of the Rwandan referral hospitals. Mothers coming for their last ante-natal consultation, in labour, and neonates referred from other centres before 24 hours of life were included. Univariate and bivariate analyses were done to evaluate the association between demographic, clinical and biological data and 25 Hydroxy vitamin D level, which are considered as predictors and outcome variable.

The majority of neonates (65%) and 38% of mothers were found to be vitamin D deficient. Having had a meal rich in vitamin D in the last 24 hours and in the last week were associated to adequate vitamin D levels. There is a strong positive correlation between maternal and neonate 25 Hydroxy vitamin D levels (r = 0.760). In conclusion, we observed a high rate of vitamin D deficiency in mother baby pairs. Further studies are needed to explain the cause of vitamin D deficiency in sunny regions.

11:40AM-11:55AM  PPM/002/OC: A Clinical Decision Support System for Type 2 Diabetes Associated with HIV in Low Income Countries/ Case of Rwanda

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Since the advent of Information and Communication Technologies in determining complex transformations in human activities, there were also significant changes in the health area. With decisive impact on the practical professional exercise, Clinical Decision Support Systems (CDSS) are one of the highlights, especially those developed for use in mobile devices.

Human immunodeficiency virus (HIV) infected persons may be at increased risk for developing type 2 diabetes mellitus because of viral co-infection and adverse effects of treatment. Also,
the reasons of deaths in developing countries are shifting from communicable diseases towards non-communicable diseases (NCDs) like type 2 diabetes. The aim of this study is to develop and implement a clinical decision support system, aiming to support decision purposes in the treatment and management of HIV patients with type 2 diabetes mellitus.

It is a groundbreaking exploratory study which emerges as a way of contributing to the qualification of health professionals working in primary care. User access will be free of charge, and in addition to the general registration data, it will require the identification of users’ location by the National Register of Health Establishments. The application will provide an updated knowledge base that will guide treatment and management of HIV patients with type 2 diabetes mellitus, also offering examples of related clinical cases, providing conceptual support material on type 2 diabetes mellitus. The application data will be stored offline, allowing database synchronization whenever internet access is available, aiming to make a report of the epidemiological map of diabetes 2 associated with HIV cases in Rwanda.

11:55AM-12:10PM PPM/ 003/OC: The Effect of Diabetes on Refractive Error Changes

Fiston Kitema Gatera and Ekemri Kingsley Kene.

University of Rwanda, School of Health Sciences, Ophthalmology Department

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During hyperglycemic treatment, a number of diabetic patients suffer from blurred vision. It was noted since the 19th century that fluctuations of glucose level in blood mostly hyperglycemia, leads to changes in refractive errors. Since that initial observation, different reports have been highlighting reasons and types of changes. It has been highlighted that high blood sugar leads to hyperopic changes or myopia in early onset of diabetes or right after the start of medications.

The aim of this review is to assess the effect of diabetes on refractive error changes during hyperglycemia and control period for diabetic patients. The literature revealed that when sugar level is high (hyperglycemia), there is a rise in refractive error towards hyperopic changes. During the diabetic control period, there is reduction in refractive power thus changes in visual acuity. Fluctuations in refractive power of the eye are caused by osmosis in the crystalline lens of the eye, no power variation when the eye is pseudophakic (absence of natural crystalline lens in the eye). In addition refractive error changes noted are in most cases towards hyperopia than myopia. Therefore, fasting plasma glucose should be taken into consideration while prescribing glasses for both myopic and hyperopic diabetic patients. Moreover, education should always be given to these patients in case they experience vision changes from time to time.
12:10PM-12:25PM  PPM/004/OC: Development of Low Digestible Pasta for Diabetic Population

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Diabetes is still one of the non-communicable diseases highly prevalent in Africa. Even though there is no medical treatment available for this disease, food solution remains minimal on the continent. This study have been therefore designed to develop low digestible pasta adapted to diabetic patient metabolism.

For this purpose, Dioscorea schimperiana has been chosen as the additional ingredient in pasta development. Yam flour was obtained after an improved drying process. Flours were blended with Durum semolina flour at different proportions (10, 20, 30 and 60%). Nutritional value, cooking profile, starch digestibility, antioxidant capacity and sensory analysis were assessed.

The soluble and insoluble fibers were increased with the addition of yam flour. Solid leach out was observed within the range of 8% in all the pasta samples. Sensory evaluation revealed that pasta with up to 30% yam flour was acceptable. The scavenging properties against free radicals were higher in yam based pasta. In vitro starch digestibility, rapidly digestible starch decreased with the addition of yam flour.

In conclusion, this study suggests that Dioscorea schimperiana can be used as a low glycemic index ingredient to produce food for diabetic persons.

12:25PM-12:40PM  PPM/005/OC: Personalized Medicine and Efficiency of Generalized Targeted Clinical Trials

Aboubakar Maitournam

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For a long time restricted to developed countries, cancer is nowadays also a real concern in, for example, the urban areas of Africa due to changes in diet, lifestyle and more generally to the so-called globalization. Furthermore, in terms of pure scientific research, cancer diseases are the driving forces, which boost the current genomic era and its corollaries as upcoming stratified and personalized medicines. The genomic era is impacting almost every scientific and technological field, and is characterized by massive generation of data. Thus, beyond its biological roots, genomics relies heavily in particular on mathematics in general, statistics, probabilities, data mining, computer sciences and imaging, but also on physics and chemistry, in a multidisciplinary way. In practice, the burgeoning field of genomic technologies can improve the diagnosis and treatment of numerous diseases in a targeted manner. Indeed, on the one hand, genomics-based technologies
have proved that many common diseases are heterogeneous collections of molecularly distinct entities. On the other hand, molecularly targeted therapeutics is often effective only for a subset of patients with a conventionally defined disease. Consequently, the efficiency of targeted clinical trials is closely linked to the statistical design of phase III randomized clinical trials for the evaluation of a molecularly targeted treatment, when there is an assay predictive of which patients will be more responsive to the experimental treatment than to the control regimen.

We will first present the updated definitions of personalized medicine. Secondly, we will explore the connection between the latter with stratified medicine, targeted clinical trials efficiency and the big data paradigm. Thirdly, we will present the extension of targeted clinical trials efficiency by considering a further stratification of responder patients leading to a general formula of sample size calculation. Then, we will illustrate our findings on the relative efficiency of targeted clinical trials, in the case of two strata (responder versus non-responder patients) with “real-world” examples. Finally, we will discuss the issues of assay sensitivity and specificity, prevalence of responder patients in the studied population and the implications of personalized medicine on African scientific research and policy.

12:40PM-12:55PM PPM/006/OC: Oral Hygiene Practices and Periodontal Health Status of Students with Vision Disability in Rwamagana, Rwanda

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Oral health is an important aspect of overall health for all students, and is particularly more important for students with special health needs. Practice of oral hygiene can be used to help the students with vision disability to improve their health status. Many studies reported that these students have high amount of oral diseases, mostly periodontal diseases, compared to people with good vision due to inadequate practices of oral hygiene. Several studies have found that the oral hygiene of the people with vision disability was significantly worse than people with good vision with a further disadvantage of not knowing early their oral health problems. This is similar to the observation done towards the students with vision disability from HVP (Home de la Vierge des Pauvres) Gatagara-Rwamagana who attended dental service in Rwamagana hospital. They come with different dental problems, mainly poor oral hygiene and periodontal disease.

This cross-sectional study aimed to assess the oral hygiene practice and periodontal health status of students with vision disability from HVP Gatagara-Rwamagana. Specific objectives were to assess oral hygiene practice among students with vision disability and to assess the periodontal health status of students with vision disability from HVP Gatagara-Rwamagana. The population of this study consisted of both male and female students of HVP Gatagara-Rwamagana secondary school, which is one of the special schools in Rwanda with vision disability students. A census sampling method was used to choose the participants of the study and the total number of students was 113. A self-administered questionnaire translated in Braille system was used for data collection; regarding their oral hygiene practices and they were clinically examined to assess their periodontal health. Data collected was analyzed using SPSS version 2.0.
The findings revealed that 85% of students brushed their teeth once a day, out of 95% never used dental floss. The mean value of plaque and bleeding indices were 70 and 40 respectively. However; nearly 12% of population presented periodontal pockets deeper than 3.5mm.

We concluded that the students with vision disability from HVP Gatagara-Rwamagana had poor oral hygiene due to lack of vision. Consequently, they presented with increased gingivitis prevalence. It is the dental professional responsibility to promote their oral health status and improve their quality of life.

1:00PM – 2:00PM LUNCH BREAK

14:00PM-14:25PM Akagera Ballroom. Plenary session.

Wednesday 4 October 2017. 2:00PM – 2:25PM

Moderators: Jacob Souopgui, Lawrence Ayong

Keynote address 2: Shared Behavioral Endophenotype in Neurodevelopmental Disorders

Joachim Kapalanga1,2,3, B. Laufer1, A. Chokroborty-Hoque1, D. Wong2, 1. Western, University, 2Grey Bruce Health Services, 3Summnsede Medical Centre.

A certain behavioral endophenotype (BEP) characterized by impaired executive function, emotional regulation, cognition, learning and social adaptation is shared by four neurodevelopmental disorders (NDD): fetal alcohol spectrum disorders (FASD), attention deficit hyperactivity disorder (ADHD), fragile X syndrome (FXS) and autism spectrum disorders (ASD). The genetic defect is known in FXS but specific genetic defects or single genes have not yet been conclusively identified in FASD, ADHD, and ASD. Even with the putative mutation not all carrying it are affected. While the genetic factors involved in these NDD are disparate, the shared BEP is identifiable clinically. Further, pathogenic alterations in gene expression and epigenetic regulation are critical in the etiopathogenesis of all four NDD. The logical question to ask is whether or not there is a shared ‘final pathway’, which represents a profile of epigenetic modifications and gene expression that is an explanation for the shared BEP. The objectives of this study are to: 1) demonstrate BEP component distribution patterns and frequency in FASD, ADHD, FXS and ASD, and 2) determine whether or not the patterns and frequencies are significantly different or similar. We hypothesize that the distribution and frequency of the components of the BEP are similar and not significantly different among the four NDD. We further hypothesize that a shared ‘final pathway’ representing a profile of epigenetic modifications and related differential gene expression is the explanation for the shared BEP. From a multicenter and multiclinic patient sample, clinical records of 89 FASD, 98 ADHD, 79 FXS and 82 ASD patients aged 6 to 18 and 100 controls were examined. The occurrence of the BEP components in each subject were recorded. The distribution of BEP components was analyzed across the 4 NDDs. We demonstrated that there were no significant differences in the distribution of the BEP components among the four NDD. There were significant differences between the control group and each NDD (p<0.01). These results demonstrate that the specified BEP is shared by the four NDD. The tendency for these disorders to cluster endophenotypically suggest a shared underlying etiopathogenic pathway.
As the underlying etiologic genetic factors or genes are disparate for each NDD, a shared ‘final pathway’ representing a profile of epigenetic modifications and differential gene expression is not inconceivable. In the classical paradigm for elucidating the etiopathogenic molecular basis of a genetic disorder, a broad diagnostic category is used as the basis for identifying a causative gene or genes. However, the endophenotypic heterogeneity of NDDs confounds the classical approach and produces disappointing results. The results in this study point to another strategy to overcoming clinical complexity. This novel strategy identifies shared molecular mechanisms in NDD patients with a shared endophenotype rather than in NDD patients with the same diagnosis but little central phenotypic kurtosis. The NDD patients with a shared BEP will be used in a subsequent study to elucidate profiles of epigenetic modification and differential gene expression in an attempt to identify a shared ‘final molecular pathway’.

14:30PM-14:45PM PPM/007/OC: Mortality Predicted by Incident Hematological Malignancy, Bacteremia and Lack of Chimiotherapy at Kinshasa University Clinics

Mireille Solange Nganga Nkanga1, Benjamin Longo-Mbenza2, Yolande Voumbo Matoumona2, Etienne Mokondjimobe3, Ange Antoine Abena3, Jacques Silou1, Jacques Bikaula Ngwidiwo1, Antoine Lufimbo Katawandja1, Alain Nganga Nzonzila4, Paul Roger Beia Kazadi3, Donatien Kayembe Nzongola-Nkasu1

1Department of Medical Biology, Kinshasa University Clinics, Faculty of Medicine, Democratic Republic of Congo
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4Saint Joseph Hospital
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The objective of this study was to identify environmental, epidemiological, clinical, therapeutic, and onco-hematological factors able to predict case fatality.

This was a retrospective cohort study in black patient’s ≥ 20 years managed for recurrent fever, infections, anemia, and bacteremia between 2009 and 2015 at Kinshasa University Clinics, DRC. The outcomes such as incident HM and case fatality were assessed using univariate relative risk (RR) and multivariate proportional hazard ratio (HR) by Cox regression analysis, while Log-Rank test was performed for comparisons by Kaplan Meier curves.

Out of 105 patients (male: female ratio = 1), 60% (n= 63) and 57.1% (n= 60) experienced incident HM and case fatality, respectively. There was a significant univariate association between age ≥ 50 years, rainy season, hemolytic anemia, HM, bone pain, elevated Erythrocyte sedimentation, splenomegaly, abdominal pain, neutropenia, El Nino years, thrombocytopenia, multi-transfusions, bacteremia, lack of chemotherapy, and mortality. After adjusting for confounders using Cox regression models, only incident HM (HR = 16.8; 95% CI, P< 0.0001), lack of chemotherapy (HR = 6.9, 95% CI, P< 0.002), and bacteremia (HR= 4.2; 95% CI, P= 0.020) were the most significant and independent predictors of mortality.

In a separate analysis for HM patients, the mortality rates did not vary (P> 0.05) across HM subtypes: 71.4% (n= 10/14) in multiple myeloma, 84.3 % (n= 15/18) in acute myeloid leukemia, 70% (n= 7/10) in myelodysplastic syndromes, 80% (n= 8/10) in chronic myeloid leukemia, 33.3% (n= 2/6) in acute myeloid leukemia, and 80% (n= 4/5) in acute lymphoid leukemia.
We conclude that HM is a major cause of morbidity and mortality with epidemic rates explained by lack of chemotherapy, and recurrent bacteremia among Bantu patients facing aging, climate change, rainy seasons, and lack of palliative care.

14:45PM-15:00PM PPM/008/OC: HPV DNA Testing and Pap Smear Cytology Co-Testing as a “Test of Cure” in Patients Previously Treated for Cervical Lesions by LEEP at Kenyatta National Hospital

R. Chibvongodze*, C. Nyirakanani, J.A Ojwang, O.M Mutuku, J.R. Ndung’u and C.M. Kyama

Human Papilloma Virus (HPV) infection is a pre-requisite for the development of the majority (99.7%) of precancerous cervical lesions. Treatment of cervical precancerous lesions reduces the risk of invasive cervical cancer by 90%; however treated women still have five times the risk of invasive cancer compared to women who have always had a normal Pap smear, thus, special follow-up measures are critical to reduce these risks.

Currently, the follow-up protocol at the Kenyatta National Hospital (KNH) involves screening with Pap smears only, which have their own limitations such as subjectivity in their interpretation. The incorporation of high-risk HPV genotype testing in addition to Pap smear cytology testing is the approach with the most potential to increase the efficiency and effectiveness of screening in this group of women.

To achieve the objective of determining the utility of co-testing by conventional Pap smear and HPV testing as a ‘test of cure’ in patients previously treated for cervical lesions by LEEP at KNH, a cross sectional descriptive study was designed. The setting was KNAT and the Kenya Aids Vaccine Initiative (KAVI)’s molecular laboratory.

The subjects were women on follow-up for cervical lesions post-LEEP treatment.

Out of the 25 participants, 22(88%) had a report of Negative for Intraepithelial Lesion or Malignancy (NILM) while 3(12%) had a report of Atypical Squamous Cells of Undetermined Significance (≥ASCUS). 16 (64%) were positive for HPV. HPV-56 was the commonest HPV-subtype detected in 11 patients (41%). The Cohen’s Kappa correlation between Pap smear and HPV DNA test was not statistically significant: $k=0.143$, 95% confidence interval (CI): -0.17 to 0.46, $p=0.166$. There was no statistically significant association between HIV status and pap smear findings post Loop Electrosurgical Excision Procedure (LEEP), $X^2=0.711$, $p=0.399$.

We conclude that co-testing with HPV DNA testing and Pap smear is a useful approach to stratify women with no cytological abnormalities according to their risk of residual disease.
**RESEARCH QUESTION:**
Is immune dysfunction a mediator of atherosclerotic cardiovascular disease occurrence?

**HYPOTHESIS:**
Atherosclerosis and its ensuing heart conditions are immunologically based disorders.

**BACKGROUND**
Atherosclerotic related cardiovascular disease (AS related CVD) is a leading cause of death worldwide (1). There are repeated observations of an exaggerated and premature atherogenic process amongst autoimmune disease sufferers that is not entirely explained by traditional risk factors (2, 3). It is unclear whether the latter observation is due to the ensuing treatments or the autoimmune process itself.

**METHODOLOGY**
We systematically reviewed literature across five electronic databases up to June 2016, to establish the association between autoantibodies and atherosclerosis (4). We targeted analytical studies examining an association between autoantibodies and AS related CVD outcomes using adult samples without clinical autoimmune disease. Quality analysis was carried out using the Newcastle-Ottawa scale and the Cochrane Risk of Bias Quality Assessment Tool. Studies were pooled using random effects models.

**RESULTS**
We identified 51 primary articles. Results showed that raised levels of anti-cardiolipin Immunoglobulin (Ig) G (Odds Ratio [OR] = 1.30; 95% CI: 1.15 – 1.49), anti-oxidised low density lipoprotein IgG (OR = 1.25; 95% CI: 1.11 – 1.41), unspecified anti-cyclic citrullinated protein (OR = 3.09; 95% CI: 1.49 – 6.41) and anti-human heat shock protein 60 IgA (OR = 1.57; 95% CI: 1.15 – 2.16) increased the risk of AS related CVD outcomes. Alternatively, anti phosphorylcholine IgM (OR = 1.31; 95% CI: 1.14 – 1.50) and anti-malondialdehyde low density lipoprotein IgM (OR = 0.81; 95% CI: 0.71 – 0.93) conferred protection against CVD.

**DISCUSSION**
The association between autoantibodies and AS related CVD outcomes amongst a non-clinical autoimmune sample strengthens the case for an immune mediated atherogenic process in its own right (3). In the future, we may benefit from the use of autoantibodies as markers of disease risk whilst modulation of immune responses using existing treatments may be a promising new approach for disease management.
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CONCLUSIONS
Autoantibodies may play an important role as mediators of AS related CVD independent of therapeutic treatments.

DAY 2 Thursday 5 October 2017

8:30AM-8:55AM Plenary session. AKAGERA Ballroom

Moderators: Joachim Kapalanga, Olivia Jansen

Keynote address 8: Prof. Hirotaka KANUKA

Boosting new arms to tackle pathogen-vector mosquitoes

Hirotaka Kanuka1,2

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A variety of arthropods carry and transmit infectious pathogen into another living organism. The arthropod that transmits a disease is known as a vector, and the disease is referred to as a vectorborne disease. These arthropods, which are haematophagous, form a major group of disease vectors with mosquitoes, flies, sand flies, lice, fleas, ticks, and mites transmitting a number of diseases such as malaria, dengue, filariasis, Chagas disease, and leishmaniasis. Understanding the molecular mechanisms of the responses of disease-transmitting vectors against pathogens is of great importance for current efforts to develop novel strategies for control of vector-borne diseases. The pathogens like virus, protozoan parasites, and parasitic nematodes undergo substantial stage-specific losses during those developments in the vector, which in some cases lead to complete refractoriness of the vector against those pathogens. The underlying genetics of vector competency are complex and multifactorial. Completion of the genome sequences of major vector species such as Anopheles gambiae and Aedes aegypti, together with the development of transgenesis in those species and the extension of RNAi and gene-editing techniques (TALEN and CRISPR/Cas9) to vectors, has allowed comparative and functional genomic approaches of the vector and pathogen interaction. In this talk, a highly complex interplay between pathogen and vector which has been (partly) unveiled by our recent findings will be discussed in addition to its implication to vector competency to mediate pathogen transmission.
CONCURRENT INVITED SESSION.

Thursday 5 October 2017

SESSION IV: IMPROVING HEALTH CARE SKILLS AND INNOVATIONS IN AFRICA

Room: AKAGERA Ballroom,

Moderators: Jacob Souopgui, Christian Ngongang

8:55AM-9:10AM INN/001/OC: In silico use of related sequences to optimize selection of primers and restriction enzymes for molecular markers

*Reagan Moseti Mogire², Rosaline Macharia³, Henry Kissinger¹, Joel Bargul, Steven Ger Nyanjom¹

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Molecular markers are used extensively for genetic analysis in medical research. One major challenge about their use is optimizing them for a particular sequence to meet a particular objective. This is worse if the target nucleic acid sequence is unknown, which is often the case in Random Amplified Polymorphic DNA (RAPD).

Typically, optimization of the choice of the primer sequence in RAPD involves repeating the technique with different primers till those that give the best results are found, which is quite costly. This study established in silico how sequences that have varying levels of phylogenetic relatedness can be used to predict the outcome of an amplification. In vitro based markers work by either amplification of particular nucleic acid segments using Polymerase Chain Reaction (PCR) or by restriction digestion which both depend on enzymes that recognize particular “DNA words” in nucleic acids.

R software was used to search all the possible 2, 3, 4, 5, 6, 7, 8, 9 and 10 letter DNA words in a group of prokaryotic or eukaryotic genomic sequences that had varying level of similarity. Random sequences were included as controls. Afterwards, multiple regression was used to determine correlation in the occurrence of these DNA words across the sequences.

It was found that there was positive correlation between sequences, with the ones that are closely related having the strongest correlation of up to 0.99 compared to those that have low similarity between them having a correlation as low as 0.4. Correlation decreased with length of the DNA words. The level of correlation of occurrence of DNA words is directly proportional to the level of similarity between the sequences.

We conclude that sequences that are 50% similar could give a correlation of above 0.7. This gives a statistical basis for using related sequences to optimize selection of restriction enzymes and PCR primers.
9:15AM-9:30AM  INN/002/OC: Molecular Techniques for DNA Methylation Analysis in Cancer Research

Abdoulkarim Uzabakiriho

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With few exceptions, all cells in a person’s body have the same DNA and genes. As cells divide and grow, different genes are expressed, resulting in different cell types. There are many ways to control gene expression in eukaryotes, but DNA methylation is one of epigenetic mechanisms that cells use to lock genes in the “off” position. DNA methylation occurs by the addition of a methyl (CH3) group to the DNA strand itself, often to the 5th carbon atom of a cytosine ring within CpG dinucleotides, which results in 5-methylcytosine (5-mC). This conversion of cytosine bases to 5-mC is catalysed by DNA methyltransferases (DNMTs) enzymes using a S-adenosylmethionine (AdoMet or SAM) donor. Methylation of DNA occurs in the promoter region of genes, which is the area that initiates replication of the gene. These changes can involve hypomethylation and/or hypermethylation that lead to cell differentiation and growth disorders.

In recent decade, researchers have linked abnormal DNA methylation to human diseases such as lupus, muscular dystrophy and cancer. In many different cancer types, aberrant DNA methylation has been shown to play a major role in tumorigenesis and cancer development. Thus, investigating DNA methylation status is important for early diagnosis of cancer, prognosis and prediction of response to therapies. For this extent, we discuss the molecular techniques for DNA methylation analysis with potential clinical applications in cancer research.

9:30AM-9:45AM  INN/003/OC: Utility of Saliva as a Biomaterial for Screening Communicable Diseases in African Countries

1 Agnes Gatarayiha, 1 Julienne Murererehe, 1 Peace Uwambaye, 1 Chrispinus H. Mumena and 2 Mohammed S. Razzaque

1 University of Rwanda, College of Medicine and Health Sciences, Kigali, Rwanda.
2 Harvard University School of Dental Medicine, Boston, USA

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There is an increased mortality due to various communicable diseases in the African countries, mostly due to late diagnosis of diseases and their treatments. In these diseases, the biomarker serves as an indispensable gold standard for monitoring numerous infectious diseases, including malaria, transfusion transmissible blood diseases (HIV, HCV, and HBV), tuberculosis, and typhoid fever. Blood is routinely used as a biomaterial for clinical diagnosis of many of these infectious diseases, but such laboratory practice is not always risk free, particularly in African countries where blood-based laboratory analysis poses risk of infection and disease transmission. In contrary, saliva is a noninvasively obtainable biomaterial that is successfully used for early detection of infectious diseases, such as early detection of Plasmodium falciparum Histidine-Rich Proteins 2 (PfHRP-2) in saliva, which is diagnostic for malaria patients, even those tested negative for PfHRP-2 in their blood.
We will present the utility of saliva as a biomaterial for detecting various communicable and non-communicable diseases. Whole saliva, collected from the patients with various communicable and non-communicable diseases, will be used to evaluate the biomarkers for early detection.

It has been found from recent studies that some biomarkers appear in saliva much earlier than in blood. For instance, a significant elevation of salivary phosphate content was associated with the evolvement of childhood obesity, while no such changes in phosphate levels were noted in plasma among the same group of children (collected simultaneously with saliva). It has also been shown that saliva used as quick, easy and reliable method for detecting the microbial and production of inflammatory cytokines, including interleukin-1a and 1b in patients with periodontal diseases.

In this presentation, we will highlight the importance of adopting salivary biomarkers as a part of patient screening system and to reduce the burden on blood-based laboratory analysis. More importantly, they reduce the risk of blood-related disease transmission, and make it more cost-effective without affecting the quality of the patient care in African countries including Rwanda.

9:45AM-10:00AM  INN/004/OC: Prevention and Management of Non Communicable Diseases: A Policy Perspective

1Judith Waswa*, 2Louise Ngugi and 3Angelica Mweni

1Department of Nutrition and Dietetics, Technical University of Kenya
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Non communicable diseases (NCDs) are currently a leading cause of poor quality of life and death globally. The World Health Organization (WHO) has reported an increase in the prevalence of NCDs in developing countries in the recent past. This trend is likely to impede development and retard the attainment of Sustainable Development Goals (SDGs). This trend calls for concerted efforts to avert the situation. NCDs are driven by the negative effects of globalization, for example, unfair trade and irresponsible marketing, rapid and unplanned urbanization and increasingly sedentary lives. They are further exacerbated by other factors including tobacco use and availability, and cost and marketing of foods high in salt, fat and sugar. Although individual efforts like lifestyle change are required in fighting the immediate causes of NCDs, the underlying causes are well beyond individual efforts. Governments have a responsibility of protecting their citizens from emerging health issues by enacting and enforcing appropriate laws.

This paper analyses the efforts made by governments in the East African region towards prevention and control of NCDs. Although all the governments have put in place policy frameworks for prevention and control of NCDs, gaps still exists. Some of the policies also remain archive documents and others public relations documents. This paper brings into focus the importance of legislation in prevention and control of NCDs.
**10:00AM-10:15AM** INN/005/OC: Laparoscopic Radical Prostatectomy Using an Extraperitoneal Approach: Initial Experience in 20 Cases in a Single Center in Douala, Cameroon

*Kamadou C¹, Tenke C¹, Sandjon JP², Kamga J³, Kameni A¹ and Njinou B¹*

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The purpose of this research is to evaluate the operative, oncologic and functional results of laparoscopic radical prostatectomy based on an initial series of 20 patients. We developed a pure extraperitoneal approach with pelvic lymph node dissection. This approach seems more comparable to the open technique and avoid potential risks. We evaluated the perioperative parameters (blood loss, operative time, transfusion rate) and postoperative results (oncological results, continence and potency) after our first 20 cases.

Between January 2011 and April 2014, we performed 20 laparoscopic radical prostatectomy. On average, patients were 62 years old (range 53-73), and had preoperative mean PSA values of 20.44 ng/ml (3.2-44.30). The clinical stage was T1 in 90% of cases, and T2 and T3 in 10% of cases. In the large majority of cases (17 patients), Gleason score was less than 7. We used a pure extraperitoneal approach and we performed a descending technique starting with the dissection at the bladder neck. The seminal vesicles dissection is comparable to the open approach.

We found that no deaths were observed in this series. No conversion was required. The mean operative time was 198 minutes (120-300), including the lymphadenectomy phase that was considered necessary in 75% of patients. The mean post operative bladder catheterization time was 10 days. The mean hospital stay was 3 post-operative days. The pathological stage was less than pT2 in 16 patients (80%). Positive nodes were found in 15% of the patients (3/20). At a mean follow-up of 6 months, 65% of patients were free of biochemical recurrence. Detectable post operative PSA at 3 months were observed in 6 patients. The continence rate (no pad) was 45% at 3 months. After a nerve sparing procedure in 13 patients, the total potency rate at 6 months was 30%.

**In conclusion**, this study confirms the value in our experience of the laparoscopic approach of radical prostatectomy, which allows satisfactory cancer control associated with low perioperative morbidity and encouraging functional results in terms both of continence and erectile function.
SESSION IV: IMPROVING HEALTH CARE SKILLS AND INNOVATIONS IN AFRICA

Room: AKAGERA Ballroom,

Moderators: Jacob Souopgui, Christian Ngongang

11:00AM-11:25AM Keynote address Dr Benjamin Tatete Okitasombo

Hôpital de Nivelles, BELGIUM

Minimal invasive approach in management of legs venous ulcer : Stand point of vascular surgeon in 2017

Dr Benjamin TATETE (Hôpital de Nivelles, BELGIUM)

Venous legs ulcer represent a most common leg ulcer 80%. It’s a medical problem in our low developed countries, by a difficulty to diagnose, its long multidisciplinary and expensive management, and discouragement. Generally it’s worst feeling in our habits, we think the necessity of best diagnose, because venous leg ulcer represent approximately 50% of incompetence saphenous veins bad treated. We propose to privilege a new minimally invasive approach by endogenous treatment of incompetence saphenous veins with radiofrequency ablation procedure, involve a healing of venous leg ulcer during 4 or 6 weeks, this is a save methods, approved by literature and we can perform in subsaharan countries ( except South Africa ) with low cost. Cases experienced during one year in Kinshasa will be disussed.


11:30AM-11:45AM INN/006/OC: Transurethral Lithotripsy With Rigid Ureteroscopy for Proximal and Distal Stones: Results of a Single Center in Cameroon

*Kamadjou C, Kameni A, Tenke C and Njinou B

Centre Médico Chirurgical d’Urologie et de Chirurgie Mini Invasive, Douala, Cameroun

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The purpose of this research is to evaluate the efficacy and safety of intracorporeal lithotriptors, Lithoclast (EMS, Switzerland) in retrograde rigid ureteroscopy of proximal and distal ureteric calculi. A cohort of 20 patients with ureteral calculi underwent Lithoclast lithotripsy using a 8/9.8F rigid ureteroscope. We reviewed the medical records from January 2010 to December 2014. Of the stones treated, 14 were lower ureteric, 1 was middle ureteric, and 9 were upper ureteric stones. The mean diameter of the stones was 8 mm (4-15). Two senior consultants performed the procedure.

Of the 24 stones, 100% were successfully fragmented: 35% of the lower, 5% of the middle and 45% of the upper ureteric stones. Median operative time was 45 minutes (range 25-65 minutes). The average number of procedures was 1 with 18 patients requiring one, and 2 patients requiring
two because of bilateral ureteral calculi. Post-operative stenting was done in all patients for 2 weeks. The post-operative hospitalization was 1 day. Significant complications include 2 cases of ureteric perforation who needed prolonged internal ureteral stenting.

In sub-Saharan Africa, rigid ureteroscopy was associated with shorter operation time and post-operative hospitalization period. These data also suggest that it is safe and more effective than open surgery in the aspect of high stone-free rate with low complication rates. We believe that it is an excellent treatment modality for managing ureteral calculi.

11:45AM-12:00PM INN/008/OC: Utilization of Maternal and Reproductive Health Services in Northern Uganda and Their Implications on Burden of Non-Communicable and Infectious Diseases

1Emmanuel Candia*, 2-3Jonathan Izudi, 1Joanita Kirikumwino, 1Bob Bale Henrey, 1Madrine Aromorach Juliet, 1Emmanuel Okech, 4Barbra Akello Comfort, 4Boniface Oyoo, 4Sylvia Awor and 7Twalib Aliku Olega.

1Faculty of Medicine, Gulu University, Gulu, Uganda  
2Makerere University School of Public Health, Kampala, Uganda  
3International Health Sciences University, Kampala, Uganda  
4Faculty of Agriculture and Environmental Studies, Gulu University, Gulu, Uganda  
5Faculty of Education, Gulu University, Gulu, Uganda  
6Department of Reproductive Health, Faculty of Medicine, Gulu University, Gulu, Uganda  
7Department of Pediatrics and Child Health, Faculty of Medicine, Gulu University, Gulu, Uganda

Use of maternal and reproductive health services (MRHS) significantly reduces maternal morbidity and mortality from non-communicable diseases (NCDs) and infectious diseases through timely screening; adequate child spacing, treatment and/or prophylaxis. However, utilization of MRHS remain low despite availability in Northern Uganda. We assessed the level and determinants of utilization of MRHS in Amuru and Gulu districts, Northern Uganda.

In this cross-sectional study, we conducted semi-structured interviews with 385 women of child bearing age (WCBA), ages 15-49 years, who were enrolled consecutively through house-to-house visits, focus group discussions, and in-depth interviews with WCBA, village health team (VHT) members and midwives from four parishes. Adequate utilization was: modern family planning (MFP)-current use and no unmet need; or antenatal care (ANC)-attendance, first visit within first 12 weeks of pregnancy, at least four ANC visits, three doses of fansidar, two HIV tests and tetanus toxoid (TT) vaccinations during their most recent pregnancy. Quantitative data was double-entered in EpiData and analyzed with STATA at univariate, bivariate and multivariate levels. Level of statistical significance was 5%. Qualitative data was processed and thematically analyzed using ATLAS.ti.

The mean age of the respondents was 27.5±6.79 years and the mean parity was 4±3. Of the 385 respondents, 332 (86.2%) were married, 346 (89.9%) were peasants, and 275 (71.4%) ended with primary education. 157 (40.8%) were using MFP and 122 (31.7%) had unmet need for MFP; 381 (99%) attended ANC, 79 (20.6%) had timely first ANC visit, 265 (68.8%) had at least four ANC visits, 242 (62.9%) had at least two HIV tests, 284 (73.8%) received at least two doses of TT vaccinations and only 95 (24.7%) received at least three doses of fansidar; giving overall utilization of 163 (42.3%; 95% CI: 36.1-49.4). Utilization of MRHS was associated with attainment
of at least secondary level of education (APRR=1.53; 95% CI: 1.53-5.09; p=0.001); residing in the 3 parishes of Lacor (APRR=2.15; CI: 1.05-4.43; p=0.037), Padunyu (APRR=2.35; CI: 1.14-4.84; p=0.021) and Palema (APRR=2.47; CI: 1.23-4.95; p=0.011); 5-kilometer distance and above to the health facility (APRR=1.43; 95% CI: 1.07-1.92; p=0.016) and reporting difficulty in accessing health facility (APRR=1.62; 95% CI: 1.28-2.04; p<0.001).

We conclude that utilization of MRHS is low in Northern Uganda and expectant women in Northern Uganda are at increased risk of NCDs and infectious diseases. Mass sensitization and health education, increased resource allocation and improvement in women’s education are needed to enhance utilization.

12:00PM-12:15PM INN/009/OC: Building Public-Health Research Capacity on Non-Communicable Chronic Diseases through Romania – USA cooperation.

*Radu Pirlog1, Marina Dascal2 and Razvan M. Chereches3

1 Radu Pirlog * – Research Technician, Cluj-School of Public Health, Babes-Bolyai University, Cluj-Napoca Romania.
2 Marina Dascal – Research Technician, Cluj-School of Public Health, Babes-Bolyai University, Cluj-Napoca Romania.
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This study is based on the following research question: what extent can we build population-driven research capacity in the field of non-communicable chronic diseases in Romania, a middle-income country with a low performance national public health system?

Our hypothesis was that following the transition years of 1989-1991, the population evidence-based approach to the public health system in Romania was missing. Nowadays, non-communicable chronic diseases (NCD) account for approximately 90% of all deaths in Romania, 61% of all deaths are caused by diseases of the circulatory system and 16% by cancer. We present a model for improving NCD research capacity through a capacity-building program that aims to train scientists in the prevention and management of NCDs in Romania, using a population-based approach with a strong research focus through bilateral collaboration between Babes-Bolyai University, Cluj-Napoca, Romania and the University of Iowa, USA.

In order to achieve the purpose of the project, 4 types of trainings were developed: long-term training (PhD level), intermediate-term training (5 months – MPH level), short-term training (2 to 6 weeks) and short-term equivalent distance trainings (online courses). Also, returning trainees who participated in intermediate-term or long-term trainings were able to get support for a pilot-research project conducted jointly with faculty mentors.

Our results indicate that during the implementation period of the project a number of 26 researchers from CHPPH participated in training programs at the University of Iowa, 3 pilot-research projects were funded for returning trainees and 8 articles and presentations were published until now.

We managed to train a cadre of experts able to assess the magnitude of the main NCD’s from Romania such as cancer, cerebro-vascular diseases and lung diseases who are able to build research projects that address these issues and translate research results into public health policy and into programs of care that will improve the national public-health system in the following years.
We will present a working model for strengthening the research capacity required for success in public-health through training, research, networking, workshops and institutional collaboration with international partners.

12:15PM-12:30PM INN/010/OC: Synchronization of Patient Data Among Health Facilities Through Electronic Medical Records System: A Case Study of Kabgayi District Hospital.

Charite Niyitegeka and Jean Paul Niyoyita

University of Rwanda, Department of Health Informatics

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The use of modern information technology in healthcare is to increase the reliability, accessibility and productivity of service delivery in a health system. However, in most developing countries, particularly in sub-Saharan Africa, sharing data and reporting has been dominated by paper-based data collection and storage and this reduces the quality services in the health sector. The aim of this research is to identify the factors associated with poor synchronization of patient data flow in health facilities.

In this observational study design, a quantitative and qualitative approach was used to meet the objectives through retrospective information on electronic medical records (EMR) data sharing. Pre-defined variables like strategy approach, innovation, and data synchronization in the system was evaluated. A census method was conducted in the HIV/ART Department focusing on the EMR system. The total population of this study was 42. Including health providers, the EMR information technology (IT) manager, the medical doctor, nurses, data managers from health centers and supervisors from the health centers. We used a purpose method to select the research participants. The results of this study showed that healthcare professionals prefer using the EMR for data sharing rather than using a paper-based method. The study also showed that the outcome of EMRs increased the quality of healthcare deliveries. The results showed that the EMR system was intended to share information at different facilities, however, according to the results, this is not possible because the system currently provides different patients’ identifications.

Based on the findings, there is a need to synchronize the system so that all patients and caregivers from different places can easily access and use patients’ information.

12:30PM-12:45PM INN/011/OC: Classification Of Glomerular Hyperfiltration, Normal Glomerular Filtration, Kidney Dysfunction Stages By Body Composition, Siriraj Score, Keith-Wagner Score, Hemodynamics, And Atherogenicity Indexes

Mvitu Muaka Moise1,5, Longo-Mbenza Benjamin2,5, Voumbo Matumona Yolande3, Monkondji Mobe Etienne4,4, Muaka Diela Marie-Josée4,5, Ndjali Dedel Christelle6, Mbungu Fuele Simon5

1 Université de Kinshasa, Université Kasa-Vubu, Lomo Médical
2 Université de Kinshasa, Walter Sisulu University, Lomo Médical

Classification Of Glomerular Hyperfiltration, Normal Glomerular Filtration, Kidney Dysfunction Stages By Body Composition, Siriraj Score, Keith-Wagner Score, Hemodynamics, And Atherogenicity Indexes
Objective: To discriminate Kidney Dysfunction (KDF) forms in Hypertensive Retinopathy (HR).

Methods: 124 patients admitted within the Departments of Internal Medicine and Ophthalmology at the Teaching Hospital (TH) of Kinshasa, between 2015 and 2016. KDF was defined by creatinine clearance (CrCr) disorders: glomerular hyperfiltration (CrCr ≥ 125 mL/min; n=31), Normal filtration (CrCr = 90-124 mL/min; n=30), CKD (CrCr = 60-89 mL/min; n=32), CKD (CrCr = 30-59 mL/min; n=30), and CKD (CrCr < 30 mL/min; n=28), using univariate ANOVA and multivariate DA.

Results: Age, heart rate, HDL-C, LDL-C, TG, hypertension duration, Keith-Wagner (KW) grades, TC/HDL-C, TG/HDL-C, and LDL/HDL-C ratios varied significantly (p<0.05) across KDF forms: highest values of heart rate, HDL-C, and LDL-C related to glomerular hyperfiltration, and highest values of TG, KW grades, TC/HDL-C, TG/HDL-C linked to CKD CrCr < 30mL/min.

After adjusting for confounders using DA, only TG/HDL-C (tolerance = 0.964; F to remove = 8.530 and Wilks’ Lambda = 0.637), LDL/HDL-C ratio (tolerance = 0.856; F to remove = 5.528 and Wilks’ Lambda = 0.594), and TC/HDL-C (tolerance = 0.846; F to remove = 5.018 and Wilks’ Lambda = 0.587) did discriminate KDF forms (Lambda = 0.515; p<0.0001; Eigen value = 0.002, cumulative variance = 100%; Canonical correlations = 0.042).

Conclusion: Ophthalmologists are not integrated in the management of hyperfiltration (CrCr ≥ 125 mL/min) and terminal KDF and markers of atherogenesis at mild and severe HR in Kinshasa, DRC.

1:00PM-2:00PM Lunch Break.

2:00PM-2:25PM Plenary session. Thursday 5 October 2017
AKAGERA Ballroom.

Moderators: Jacob Souopgui, Christian Ngongang

Keynote address: Dr Jean Robert Nzamushe

(Head department of Emergency Surgery, University of Lille (CHU de Lille), FRANCE)
Extra Corporeal Enteral prosthesis (ECEP): An external ambulatory device to restore digestive flow in patients with double ostomy.

Some intestinal pathologies such as Inflammatory Bowel Diseases (IBD), mesentric ischemia or tumor can lead to surgical resection of a large part of the small bowel. Unfortunately, some of these patients are operated in emergency conditions which contraindicate a direct suture between the proximal and distal part of the small bowel after resection because of high risk of intra-abdominal leakage.

To avoid this risk, the upstream and downstream intestinal segments are brought through the skin as proximal and distal stoma, usually temporary, waiting better local and general conditions to do the final anastomosis. According to the level of the resection, the patient may present a short gut
syndrom, means that the residual proximal part of the small bowell is not sufficient to reabsorb the quantity of succus entericus required for the survival of the body. In this case, the proximal stoma may debit too much liter per day. This loss need to be offset by intravenous nutrition and hydration support. Several solutions exist to create an artificial continuity between the two stomas and to avoid this situation, but these methods are bulky for the patient and require hospitalization.

We develop an ambulatory device - ECEP (Extra Corporeal Enteral Prosthesis) - which is a small engine equipped with a pump, allowing by pass between the upstream and downstream intestinal segments. The aim of this system is to restore a digestive flow, to free the patient from any intravenous support and to improve his quality of life.

CONCURRENT INVITED SESSION.

Thursday 5 October 2017

SESSION IV: IMPROVING HEALTH CARE SKILLS AND INNOVATIONS IN AFRICA

Room: AKAGERA Ballroom,
Moderators: Jacob Souopgui, Christian Ngongang

2:30PM-2:55PM Keynote address: Dr.Bertin NJINOU

Robotic-assisted radical prostatectomy - the 5-year initial experience. Functional and oncological outcomes

Bertin Njinou Ngininkeu (1)(2)

1 Centre Medico-Chirurgical d’Urologie et de chirurgie mini-Invasive, Douala, Cameroun
2 Clinique des Ormeaux-Vauban, Le Havre, France

OBJECTIVES:
Radical prostatectomy (RP) remains a standard for localized prostate cancer treatment. The objective was to evaluate, in our personal experience, the oncological and functional outcomes in patients undergoing robotic-assisted radical prostatectomy (RARP), 6 years after the first intervention in our clinic.

METHODS:
A first series of our single experience of 250 patients consecutively operated in our institution with this technique between July 2011 and January 2017 and with a 5-year follow-up evaluated in January 2017. The oncology monitoring is ensured with a PSA test every six months during the first three years and once a year the years after if the level remains undetectable.

RESULTS:
Patient stratification according to D’Amico risk categories was 16% low risk, 56.7% intermediate risk and 27.3% high risk. Median console time was 90 min (range 60-120). Median blood loss was 300 ml (range 50-1300), transfusion being required in 2.9% of the cases. Histopathological examinations showed pT3 in 40.8% of the cases, with a positive surgical margin rate of 21.1%,
13.6% for pT2, and 32.1% for pT3. Continence rate (0-1 daily safety pad) at 6, 12, 24 and 55 months was 88.3, 88.8, 90.1, and 93.7% respectively. Overall sexual function restoration rate at 6, 12, 24 and 55 months was 41.1, 44.4, 47.4 and 53%, respectively. Biochemical recurrence rate during follow-up was 6.9%.

**CONCLUSIONS:**
The technique RARP seems to be a reliable technique whose functional results studied from meta-analysis seem to be superior in terms of rapidity of recovery of the continence and erection in comparison with open surgical or laparoscopic approach.

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**2:55PM-3:20PM Keynote address:** Dr.Bertin NJINOU

**LAPAROSCOPIC ARTIFICIAL URINARY SPHINCTER IN WOMEN FOR TYPE III INCONTINENCE: PRELIMINARY RESULTS**

Bertin Njinou Ngninkeu *(1)(2)*

*(1) Centre Médico-Chirurgical d’Urologie et de chirurgie mini-Invasive (CMCU), Douala, Cameroun*

*(2) Clinique des Ormeaux-Vauban, France*

**INTRODUCTION:**
To evaluate the feasibility by laparoscopy of the AMS 800 artificial urinary sphincter in women

**METHODS:**
Seven women with genuine stress incontinence due to intrinsic sphincter deficiency were operated by transperitoneal laparoscopy. Primary criterion was negative Marshall test. We performed laparoscopic promonto-fixation (LPF) in one patient in the same procedure. Five patients had previous TVT with complications regarding failure, perforation and erosion of bladder mucosa and urethra. Laparoscopic explantation of TVT was performed 3 months previously. In the last case, previous urethropexy and LPF in association with TVT were performed 10 and 1 year ago respectively. The cuff was placed around the bladder neck.

**RESULTS:**
Mean age was 68.8(50-79) years. Mean closure pressure was 24.5(20-28) cm water. There was no erosion or extrusion. The only significant risk factor was previous surgery. The operative time was<3 hours. The hospital stay was 8 days. The mean follow-up was 6(3-13) months. Activation was done 6 to 8 weeks after implantation. Social incontinence (1 pad use with moderate leakage) and improvement of quality of life was reported in one patient. In this case the balloon was changed to obtain more pressure. Resolution of incontinence was achieved in 5 patients.

**CONCLUSIONS:**
The AMS 800 can be successful implanted by laparoscopy to treat women type III incontinence. A long-term follow-up is warranted.
Thursday 5 October 2017

SESSION IV: IMPROVING HEALTH CARE SKILLS AND INNOVATIONS IN AFRICA

Room: AKAGERA Ballroom,

Moderators: Jacob Souopgui, Christian Ngongang

4:15PM-4:30PM INN/012/OC: Metholophic Recombinant Pichia Pastoris For Phytase Production On D-Mannitol/Methanol Optimisation

Ndayambaje Jean Bernard1, Habinshuti Janvier2, Ingabire Angelique2, Nteziyaremye Beneyo Emmerence2

University of rwanda/college of science and technology, chemistry department

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D-mannitol addition as a co-substrate with methanol at the induction phase during fermentation by Pichia pastoris (Mut+) is a new beneficial technology for recombinant protein production.

The major challenges as heat generation and high oxygen demand are increasing during induction phases with methanol at large scale and this causes high oxygen demand during cultivation time.

One way possible to reduce the oxygen demand for getting more protein productivity is the addition of D-mannitol along with methanol during induction time.

The co-feeding strategy was optimized to produce phytase activity of 10280 U/ml which is two and half time higher compare to methanol fed alone and we are sure it could be used as food additives for non ruminant animals.

A deep understanding of regulation of AOX1 promoter, the physiology of the cells and which are being used to govern protein production during methanol/D-mannitol strategy is still not developed at large.

4:30PM-4:55PM: Keynote address: Dr. Lawrence Ayong

An electricity-free reverse transcription LAMP assay for high sensitivity detection of Plasmodium falciparum infections

Lawrence Ayong1, Sylvie Kemleu1, Dylan Guelig2, Carole Eboumbou1, 4, Estelle Essangui1, 4, Steven Diesburg2, Abas Mouliom3, Bernard Melingui3, Jeanne Manga1, Christiane Donkeu2, Annie Epote3, Gaétan Texier1, 5, Paul LaBarre2, Robert Burton2

1Malaria Research Laboratory, Centre Pasteur du Cameroun, BP 1274 Yaoundé, Cameroon
ABSTRACT

With decreasing malaria burdens worldwide, the need for field diagnostic tools with sensitivities capable of detecting the rising proportions of submicroscopic malaria parasite cases has become more crucial. We report here the development of a reverse transcriptase-based and electricity-free loop-mediated isothermal amplification assay that is based on detection of high abundance RNA transcripts in whole blood samples. The optimized assay detected Plasmodium falciparum infections in as little as 0.25 ng of total parasite RNA, and exhibited a detection limit of 0.08 parasites/µL when tested directly on 50 nl of whole blood samples. Assay positivity was observed as early as eight minutes from initiation of the RT-LAMP and in most cases the reaction was complete under twenty minutes. Compared to reference RT-PCR, assay sensitivity was 96% for RT-LAMP using equivalent amounts of total RNA extracts and 90% using whole blood lysates. Together, the data highlight the benefits of targeting high abundant RNA transcripts in molecular diagnostics, and the potential usefulness of our malaria RT-LAMP assay in epidemiological settings with high prevalence of low to moderate malaria parasite densities.

DAY 2 Thursday 5 October 2017

8:30AM-8:55AM: Plenary session. AKAGERA Ballroom

Moderators: Joachim Kapalanga, Olivia Jansen

Keynote address 7: Prof. Hirotaka KANUKA

Boosting new arms to tackle pathogen-vector mosquitoes

Hirotaka Kanuka1,2

1Department of Tropical Medicine, 2Center for Medical Entomology, Jikei School of Medicine, Tokyo

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A variety of arthropods carry and transmit infectious pathogen into another living organism. The arthropod that transmits a disease is known as a vector, and the disease is referred to as a vector-borne disease. These arthropods, which are haematophagous, form a major group of disease vectors with mosquitoes, flies, sand flies, lice, fleas, ticks, and mites transmitting a number of diseases such as malaria, dengue, filariasis, Chagas disease, and leishmaniasis. Understanding the molecular mechanisms of the responses of disease-transmitting vectors against pathogens is of great importance for current efforts to develop novel strategies for control of vector-borne diseases. The pathogens like virus, protozoan parasites, and parasitic nematodes undergo substantial stage-specific losses during those developments in the vector, which in some cases lead to complete refractoriness of the vector against those pathogens. The underlying genetics of vector competency are complex and multifactorial. Completion of the genome sequences of major vector species such as Anopheles gambiae and Aedes aegypti, together with the development of transgenesis in those species and the extension of RNAi and gene-editing techniques (TALEN and CRISPR/Cas9) to vectors, has allowed comparative and functional genomic approaches of the
vector and pathogen interaction. In this talk, a highly complex interplay between pathogen and vector which has been (partly) unveiled by our recent findings will be discussed in addition to its implication to vector competency to mediate pathogen transmission.

SESSION V: INFECTIOUS DISEASES

9:00AM-9:15AM  ID/001/OC: Prevalence of Malaria Parasites and Vector Species Abundance in Huye District, Southern Rwanda

1,3 Chantal Nyirakanani*, 1Moses Masika, 1Dustan Mukoko and 2Kato J Njunwa,

1University of Nairobi, 2University of Rwanda, 3Catholic University of Rwanda

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Malaria is a leading cause of mortality and morbidity in sub-Saharan Africa including Rwanda. Effective control of malaria requires knowledge of vector species but information on species distribution in Rwanda is limited. The aim of this study was to determine the prevalence of malaria parasites and vector species abundance in Rukira cell, Huye district, Rwanda.

A total of 222 children under five years randomly selected from 13 villages were examined. Data on malaria vectors and risk factors were collected. Adult mosquitoes were collected indoors by light traps and Pyrethrum Spray Catch, and outdoors by light traps. Female Anopheles mosquitoes were identified to species level by morphological characteristics. Screening for Plasmodium falciparum circumsporozoite protein and host blood meal sources was achieved by Enzyme-linked Immunosorbent Assays. Anopheles larvae were sampled using dippers and raised into adult stages which were identified morphologically.

16. falciparum infection was detected by microscopy in 12% of children. Age and use of net was associated with malaria infection. Anopheles gambiae sensu lato comprised 70% of the 567 Anopheles collected. Others were Anopheles funestus 4%, An. squamosus 16.5%, An. maculpalpis 6.5%, An. ziemanni 1.7%, An. pharoensis 1.2 % and An. coustani 0.1%. The human blood index was 0.509 while Sporozoite rate was 1.9%. 661 Anopheles larvae were collected from 22 larval habitats including An. gambiae s.l (89%) and An. ziemanni (11%). The absolute breeding index was 86.4%.

We conclude that Plasmodium falciparum infection is high among children under five in Rukira cell. Children should be protected from mosquito bites by ensuring that they sleep under insecticide-treated nets. The dominant malaria vector was Anopheles gambiae sensu lato however secondary vectors may also play a role. Indoor residual spray and larval control should be done in the area to reduce malaria transmission.
9:15AM-9:30AM: ID/002/OC: Diabetes Mellitus in Tuberculosis Patients and Its Impact on Clinical Presentations

Pacifique Ndishimye1,2, Cenariu Mihai, Olga Soritau, Daniela Homordean, Abderrahim Sadak and Carmen Monica Pop

1“Iuliu Hațieganu” University of Medicine and Pharmacy, Cluj Napoca, Romania
2INES-Ruhengeri, Musanze, Rwanda
3Immunopathology Laboratory, UASVM, Cluj Napoca, Romania
4“Leo Daniello” Pneumology Hospital, Cluj Napoca, Romania
5Faculty of Sciences, Mohammed V University, Rabat, Morocco

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Tuberculosis (TB) and diabetes mellitus (DM) are both important health issues and their association may be the next challenge for global TB control worldwide. The epidemiological features of TB in the diabetics have been extensively studied, but immunologic responses of TB patients in diabetic condition are still not completely understood.

The main objective of this study is to provide an update on the clinical and epidemiological features of TB in the diabetic population and also to determine the immunological profile of TB patients with and without DM.

The study enrolled 135 eligible patients with TB who presented in 2015 at Leo Daniello Pneumology Hospital, Romania and compared clinical features of patients with (38 cases) and without DM (97 cases). A control group of 23 healthy individuals was also enrolled in this study. The levels of IFN-γ, TNF-β and IL-10 cytokines were measured in the plasma using commercially available enzyme-linked immune-sorbent assay (ELISA). Regulatory T-cells (CD4+CD25+ Foxp3+) and CD4+ Activated T-cells (CD38+ HLA-DR+) were analysed using BD FACSCantoTM II Flow Cytometry. Data were analyzed using GraphPad Prism version 5.0.

The results showed that TB patients with diabetes presented a higher frequency of negative sputum smears and lower lobe involvement compared to patients without DM. No significant difference was observed in the frequency of pleural effusions or isolated pleural TB between patients with and without DM. An increased risk of multi-drug resistant TB (MDR-TB) was observed among diabetics. The results also showed higher IL-10, lower IFN-γ and a lower frequency of regulatory T-cells in TB-DM versus TB-no DM patients.

Improved understanding of the bidirectional relationship of the two diseases is necessary for proper planning and collaboration to reduce the dual burden of DM and TB.

9:30AM-9:45AM ID/003/OC: Serosurveillance on Ebola Infections in the Northern District of Sierra Leone during the 2014-2015 Outbreak


1Sorok University, Poland
2Ghent University, Belgium
3University of Bologna, Italy
4ISGlobal, Barcelona, Spain
5University of Florence, Italy
6University of Bari, Italy
7University of Antwerp, Belgium
8University of Modena and Reggio Emilia, Italy
9University of Milano-Bicocca, Italy

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The presence of detectable antibodies against Ebola virus (EBOV) in asymptomatic individuals after exposure suggests a putative role for antibody response in the control of Ebola Virus Disease (EVD) and provides information on EBOV seroprevalence in at risk populations.

To assess the extent of asymptomatic or mild cases of Ebola virus infection in community contacts (CCs) and professional contacts of EVD cases (survivors or deaths), we carried out an epidemiological survey and serological analyses among EVD survivors and their contacts in the District of Bombali, Sierra Leone. The survey has been authorized by the Ethical Committee of the Ministry of Health and Sanitation of Sierra Leone, and covered 256 individuals: 68 EVD survivors assisted at Loreto Clinic and leaving in the surrounding of Makeni; 79 Health Care Workers (HCWs) from Holy Spirit Hospital and Loreto Clinic in Makeni; a rural population of SandaLoko Chiefdom in Bombali District, with four survivors and their 105 community contacts (HHCs). Using a sensitive and specific ELISA method, we found a ZEBOV-specific IgG seroprevalence of 95.6% among the 68 survivors; of 3.8% among the 79 HCWs and 11.4% among the CCs.

Our data suggest a circulation of sub-clinical EBOV infections among contacts of EVD patients and HCWs although several studies have shown different results obtained by using different assays, different ELISA tests and also variations in the definition of contact. Our data open several interesting questions on the virulence and pathogenicity of the Ebola virus in Sierra Leone.

Ivermectin (IVM) still remains the only safe drug for the mass control of onchocerciasis. However, recent reports show that there are populations of adult Onchocerca volvulus worms responding sub-optimally to IVM treatment. This response is indicative that resistance may be setting in. However, molecular assays must be carried out to confirm this hypothesis.

The assessment of the parasitological response profile of O. volvulus to IVM and genetic analysis of target genes become imperative for detection of resistance. Beta (β) tubulin isotype I gene, known to be one of these targets has been found to be associated with IVM selection in some nematodes. Some endemic regions of Cameroon have been under IVM treatment for almost two decades and it is not yet known if resistance is already emerging in these regions.

The objective of this study is to investigate if resistance is developing in an onchocerca volvulus-endemic region of Mbonge, South West Region of Cameroon. Onchocercal nodules were surgically
removed from onchocerciasis patients in two cohorts with different treatment histories: a group that had received repeated doses of IVM for at least the previous 3 years, and a control group with no history of IVM treatment. The reproductive status of each female worm from excised nodules was assessed by the microscopical examination of their uteri.

Results revealed that whereas there was a predominance of the G allele in the naïve population, this was substituted by the T allele in the IVM-exposed population thereby suggesting that IVM selects for the T allele which may reduce worm fertility rate. Reverse transcription (RT) PCR of β-tubulin transcripts showed comparable expression levels in both IVM exposed and naïve worms. Restriction fragment length polymorphism of the β-tubulin gene indicated that most of the IVM-exposed worms possessed the G allele thereby indicating that this allele may be implicated in IVM selection. This evidence of IVM selection suggesting that IVM resistance may be emerging in the Mbonge Sub-Division of Cameroon imposes the need for monitoring.

10:00AM-10:15AM ID/005/OC: Assessment of Elephantiasis and Associated Risk Factors Among People Living in Musanze

* A.Y. Uwitonze¹, N. A. Mugemangango¹, T. Bishyizehagari², E. Bizimana¹, T. Habyarimana¹, P. Ndishimye¹ and L. Mutesa³

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*Lymphatic Filariasis (LF), commonly known as elephantiasis, is a neglected tropical disease. Infection occurs when filarial parasites are transmitted to humans through mosquitoes. LF and Podoconiosis are two major types of elephantiasis, which live in the lymphatic system and can cause extreme swelling of the extremities and genitals. It is estimated that 4 million people are affected by podoconiosis worldwide and 5 to 10% of the population in endemic area. These patients are not only physically disabled, but suffer mental, social and financial losses contributing to stigma and poverty. Currently, 947 million people in 54 countries are living in areas that require preventive chemotherapy to stop the spread of infection. There is a lack of updated data/information about the prevalence of elephantiasis in Rwanda.

This study has tried to respond to the following question: What are the causal agents of elephantiasis among patients attending Imidido People’s Organization? A high prevalence of lymphatic filariasis and/or podoconiosis could be found among patients attending Imidido People’s Organization.

In this study, 119 patients attending Imidido people’s organization were involved. The blood samples from patients were collected during the night and stained with giemsa to be analyzed under microscopy. Podoconiosis was confirmed when a negative result for Wuchereria bancrofti was found under microscopy, then, a structured questionnaire was used to assess associated risk factors. Hygienic behavior associated with the disease was also considered.

In this phase of the study, results show 100% podoconiosis. Females were more affected than males with a prevalence of (68.1%) and (31.1%) respectively. A high prevalence of podoconiosis was observed among patients ≥60 years old, illiterate and farmers being mostly affected. Rugarama and Kinoni sectors were the most affected among assessed sectors.
This study has evidenced that there is a vicious cycle of poverty and podoconiosis. A deep analysis of volcanic soil will be performed to explore, confirm and establish the relationship between podoconiosis and volcanic soil in Musanze, Northern Rwanda.

10:15AM-10:30AM  ID/006/OC: Spatial-temporal Distribution of Mosquitoes and Risk of Malaria Infection in Rwanda

*Emmanuel Hakizimana1,2, Corine Karema3,4, Dunia Munyakanage1, John Githure5, Jean Baptiste Mazarati6, John Eric Tongren7, Willem Takken2, Agnes Binagwaho8,9,10 and Constantianus J.M.Koenraadt

1Malaria and Other Parasitic Diseases Division, Rwanda Biomedical Centre (RBC), Ministry of Health, Rwanda; 2Laboratory of Entomology, Wageningen University & Research, Wageningen, The Netherlands; 3Swiss Tropical and Public Health Institute, University of Basel, Switzerland; 4University of Basel, Switzerland; 5Abt Associates Inc. Integrated Vector Management Project, MOPDD, Rwanda; 6Biomedical Services Department, RBC, Kigali, Rwanda; 7USAID/PMI Office, Kigali, Rwanda; 8Department of Global Health and Social Medicine, Harvard Medical School, Boston, USA; 9Geisel School of Medicine, Dartmouth College, Hanover, USA; 10University of Global Health Equity, Kigali, Rwanda

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The purpose of this research is to determine the spatial and temporal variations of mosquitoes in the domestic environment, as well as to assess biting behavior and infection patterns of the main malaria vectors in Rwanda. Mosquitoes were collected monthly from 2010 to 2013 by human landing catches (HLC) and pyrethrum spray collections (PSC) in seven sentinel sites. Mosquitoes were identified using morphological characteristics and PCR. Plasmodium falciparum sporozoite infection rates were determined using ELISA.

A total of 340,684 mosquitoes was collected by HLC and 73.8% were morphologically identified as culicines and 26.2% as anophelines. Of the latter, 94.3% were Anopheles gambiae s.l., 0.5% Anopheles funestus and 5.4% other Anopheles species. An. gambiae s.l. was the dominant group of anophelines in the collections, with An. arabiensis and An. gambiae s.s. represented with 84.4% and 15.6%, respectively. The proportion of An. gambiae s.l. collected indoors was 51.3% in 2010 and 44.9% in 2013. A total of 17,018 mosquitoes was collected by PSC of which 20.5% were An. gambiae s.l. and 79.5% were culicines. The mean indoor resting density for An. gambiae s.l. ranged from 0.3-3.8 mosquitoes/house/night. P. falciparum infection rates in mosquitoes varied from 0.87-4.06%. The entomological inoculation rate (EIR) ranged from 1.0 to 329.8 with an annual average of 99.5 infective bites/person/year.

This longitudinal study shows, for the first time, the abundance, species composition, and entomological inoculation rate of malaria mosquitoes collected throughout Rwanda. The results suggest a high level of malaria transmission and a gradual shift in the dynamics of malaria vectors over time.

10:30AM-11:00AM Coffee Break.
DAY 2 Thursday 5 October 2017 11:00AM-1:00PM

Concurrent Invited Session.
URUKARI Ballroom
Moderators: Jean Paul Coutelier, Francis Akena

SESSION V: INFECTIOUS DISEASES

11:00AM-11:25 PM Keynote address: Prof. F Brombacher

Immunology of Tuberculosis: from genes to biomarkers and host directed therapy

Frank Brombacher & Reto Guler
University of Cape Town, South Africa

Large scale expression profiling combined with deepCAGE transcriptomics on various mammalian cell types and tissues contributed to a better insight in expression, coordination and regulation of genes and non-coding RNA during cellular differentiation. We redefined the transcriptional regulatory dynamics of differentially activated classical (M1) or alternative (M2) macrophages and identified new genes and noncoding RNA species.

From genes to biomarker: One of the genes, basic leucine zipper transcription factor (Batf2), was differentially expressed in M1, hence suitable for a new biomarker for classical activated macrophages, as demonstrated in human patients. Batf2 knockdown experiments and subsequent expression profiling demonstrated important roles for regulation of immune responses by inducing of inflammatory and host-protective genes. Mycobacterium tuberculosis (Mtb) infection in macrophages further induced Batf2 and augmented host-protective Batf2-dependent genes. Subsequent experimental Mtb infection in Batf2 deficient mice resulted in reduced inflammation and histopathology with increased survival compared to infected wild type mice. Together, these finding suggests that Batf2 induces inflammation, which may overshoot during Mtb infection with detrimental consequences. Further, Batf2 may be used as a new predictive biomarker for tuberculosis disease and a potential candidate for host-directed targeting in tuberculosis.

From genes to host-directed therapy: Patients with hypercholesterolemia receiving statin therapy are more resistant to M. tuberculosis infection, with reduced bacterial burdens, compared with those of healthy donors. Statin treatment in experimental murine Mtb infection studies confirmed the beneficial role of increased host protection with reduced lung burdens and improved histopathology of infected mice. Mechanistically, by metabolic rescue experiments, we demonstrated that statins reduces membrane cholesterol levels, and thereby promoted macrophage phagosomal maturation and autophagy, which diminishes Mtb infection in macrophages. Hence, statins could be candidates for human host-directed therapy.
Although Rwanda experienced an incremental increase of malaria incidence since 2013, the scaling-up of malaria control interventions carried up at the beginning of this era demonstrated a substantial impact on the burden of malaria. It was shown that the implementation of existing core vector control interventions using mainly long lasting insecticidal nets (LLINs) and indoor residual spraying (IRS) encountered many challenges towards effective control of vector-borne diseases and, thereafter, require an urgent response. In recognition of the above challenges, the Government of Rwanda has embarked on development and implementation of an integrated vector management (IVM) strategy to ensure efficacy and sustainability of vector control efforts.

Thus, over the last 7 years, the Ministry of Health (MoH) has already transitioned to an integrated vector management (IVM) strategy. In 2010, the national vector control program was assessed with the aim to identify the prevailing gaps, the constraints and the opportunities to change specific drivers, which will be thereafter based on the five pillars of IVM. Specifically, systematic actions were taken to strengthen human resources via a combination of targeted training programs for national staff, entomology technicians based at sentinel sites, district administration, and community leadership. Additionally, long-term human resource development was emphasized (e.g. vector control post-graduate research in-country). A vector control system was built including: restructuring of national malaria control program to integrate a comprehensive vector-borne control for multiple diseases, a deliberative process for development of a national IVM policy framework and strategic plan, national insecticide resistance strategic plan, and a nationwide entomological surveillance program integrated into existing health centers. Furthermore, a modern central entomology laboratory and insectary was constructed in Kigali for molecular and biochemical characterization of disease vectors and parasites, and experimental huts were set up at Ruhuha, South-Eastern of Rwanda for semi-field evaluation of innovative vector control tools.

The results from these actions have been dramatic in the framework of evidence-based decisions. In situ capacity strengths are in place and include comprehensive local vector summaries, routine transmission indices, current insecticide resistance profiles, pesticide and LLINs quality control monitoring schemes and data from field experiments on innovative vector control tools such as Bti, new insecticides, mosquito repellents, etc... The above information empowered MoH, its partners and decentralized entities to self-direct community interventions and geographically target interventions. Nonetheless, there is more to be done, but we believe these action and policy modifications have placed Rwanda upon a strong foundation to implement vector control interventions in regards to the IVM principals and moving forwards to the sustained control of vector borne diseases and their elimination in the long term.
11:40AM-11:55AM  ID/008/OC: Cellular Response Pattern in School-Aged Children Infected with Schistosomiasis Before and After Chemotherapy

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Human Schistosomiasis is a parasitic infection that affects millions of people in as many as 78 countries globally. Children under the age of 14, with chronic disease suffer from anemia and malnutrition, which contribute to lost days at school and pervasive learning disabilities. Schistosomiasis induces multiple cellular and humoral responses, which have been known to correlate with the acute and chronic form of the disease.

This study sought to determine the cellular responses patterns in school-aged children (SAC) before treatment, and six and twelve weeks after treatment.

Cytokine profiles of IL2, IL4, IL5, IL10, TNF, and IFNγ were determined in the serum samples by flow cytometry. The specific intensity of the cytokine expressed and intensity of the fluorescence were analyzed. Data was later subjected to statistical analysis to determine significant differences at P≤0.05. Comparison of cytokine levels before and after chemotherapy revealed a shift in the cytokine expression with down-regulation and up-regulation. All the cytokines except TNF showed a decline in their expression after six and twelve weeks of treatment. There were statistically significant differences in the expression in IL2, IL4, IL10 and IFNγ except in IL5 and TNF. Reduction in worm loads following treatment leads to a reduction in the expression of these cytokines. In addition there were possible cross regulatory effects in both the expression of Th1 and Th2 cells with IFNγ being affected by the expression of IL10. High concentration of IL5 and TNF in comparison to the other cytokines suggested that individuals may have been suffering from morbidity associated with S. mansoni infection.

We conclude that after treatment with PZQ, the cytokine levels reduced except for TNF, showing an immune response associated with therapeutic intervention and that the down regulation of the cytokines after chemotherapy is related to reduction of adult parasites and morbidity.

11:55AM-12:10PM  ID/009/OC: Prevalence of Hepatitis C Virus Infection and Its Risk Factors among Patients Attending Rwanda Military Hospital, Rwanda

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In Rwanda, the prevalence of viral hepatitis (HCV) is poorly understood. The current study investigated the prevalence and risk factors of HCV infection in Rwanda. A total of 324 patients attending Rwanda Military Hospital were randomly selected and a questionnaire was administered to determine the risk factors. Blood was collected and screened for anti-HCV antibodies and seropositive samples were subjected to polymerase chain reaction method. Hematology abnormalities in the HCV infected patients were also investigated.

Anti-HCV antibody and active HCV infection were found in 16.0% and 9.6% of total participants, respectively. Prevalence was highest (28.4%; 19/67) among participants above 55 years and least (2.4%; 3/123) among younger participants (18–35 years). There was a significant (P=0.031) relationship between place of residence and HCV infection with residents of Southern Province having significantly higher prevalence. The hematological abnormalities observed in the HCV infected patients included leukopenia (48.4%; 15/52), neutropenia (6.5%; 2/52), and thrombocytopenia (25.8%; 8/52). The HCV infection was significantly higher in the older population (>55 years) and exposure to injection from traditional practitioners was identified as a significant (P=0.036) risk factor of infection.

Further studies to determine the factors causing this high prevalence of HCV in Rwanda are recommended.

12:15PM-12:40PM: Keytone address: Prof. Luc Vanhamme


Luc Vanhamme

Institute of Molecular Medicine and Immunology, Free University of Brussels.

There are more than a dozen known species of African trypanosomes. They are presumably able to infect all African mammalian species. Humans are protected from infection by most of these species by a component of their serum that is lytic for trypanosomes. Two trypanosome species, namely Trypanosoma brucei rhodesiense and Trypanosoma brucei gambiense are nevertheless able to infect humans because they express an antidote against the lytic factor. We have identified the human lytic factor as a serum protein, apolipoprotein L1, that interferes with the trypanosome lysosome and mitochondrial integrity. We have also characterized the genes involved in trypanosome resistance to this lytic factor in Trypanosoma brucei rhodesiense and Trypanosoma brucei gambiense. It nevertheless turns out that some African populations as well as baboons express a modified version of the apolipoprotein L1 that is not neutralized by Trypanosoma brucei rhodesiense. A modified recombinant version of apolipoprotein L1 could be used as a trypanocidal drug. We have recently pinpointed physiological roles of members of the apolipoprotein L multigenic family. They act in programmed cell death in various types of cells in the body and play physiological roles in the control of the population of immune cells during an immune response. They could also play a role in pathologies such as cancer and kidney diseases. Thus the conserved physiological functions of apolipoproteins L have been hijacked during evolution to ensure protection of the more evolved mammals (some apes and humans) against African trypanosomes.
Sickle cell disease (SCD) or sickle cell anemia (SCA) is a hereditary, blood disorder characterized by the presence of hemoglobin S (Hb S). It is due to a mutation of the structural gene encoding Hb and whose amino acid glutamic acid has been replaced by valine. The consequence of this mutation is a poor fixation of oxygen by HbS, loss of its solubility and polymerization in the deoxygenated state. HbS then takes a serrated or sickle-like shape that is difficult to move in blood vessels which are then clogged and causing pain, while Hb S is prematurely destroyed causing anemia [1-4].

SCA anemia is the most frequent genetic disease in the world [5; 6] with more than 50 million subjects suffering from severe homozygous form. In sub-Saharan Africa regions, 2% of newborns are affected and 50% of them will not go beyond 5-years in the absence of treatment [7]. Healthy carriers of the gene can represent 10 to 40% of the population [8].

The DRC is the third most affected country after India and Nigeria [9]. This disease is commonly called “maladie ya makila mabé”, “akufa lobi” in the local language, lingala, or “bad blood disease”, “he will die tomorrow” mentioning the stigma of sickle-cell anemia. 2 to 3% of children are born sickle-cell anemia in the DRC and 300 000 babies each year in the world [10]. Kisangani city and its surroundings present high proportion but not always well diagnosed due to insufficiency of facilities and trained medical people [11; 12].

In this context, we drawn and submitted for fund at ARES a project called DREPAKIS that aims to contribute to the improvement of public health and to reduce socio-economic and cultural poverty related to sickle cell anemia in Kisangani. Alarming facts were the particularly high rates of SS -sickle cell homozygotes - but also of heterozygotes AS, lack of future SS homozygous babies with a very short life expectancy, lack of knowledge of sickness both at the community level and among health providers, the difficult or impossible treatment of sickle cell disease, and the exorbitant cost and inaccessibility of effective treatments in developed countries.
The authors present the project proposal specifically that aims to improve the capacities of health professionals, associations and communities in screening, prevention and optimal and targeted management of sickle-cell anemia in the city of Kisangani through its University, based on the following interdisciplinary strategic directions for implementation:

- i) rapid and accessible screening of target individuals to update accurate blood mapping in Kisangani and strengthen disease prevention;

- ii) optimal overall management and optimized treatments based on the quality of "modern" and herbal medicines;

- iii) epidemiological monitoring-surveillance-accompaniment integrating the social, cultural, psychological and public health of the sickness. The ownership of the project will be reinforced by the involvement of local and community associations and training, and its sustainability ensured by 5 trained PhD including specific thematic, North-South and South-South exchanges, a functional laboratory and operating protocols proven. Action strategies will target the normative level (sensitization of national authorities) and the level of support (involvement of provincial authorities) in the health pyramid in D.R. Congo.

1:00PM-2:00PM: Lunch Break

2:00PM-2:25PM: Plenary session. Thursday 5 October 2017

AKAGERA Ballroom.
Moderators: Jacob Souopgui, Christian Ngongang

Keynote address 9: Dr Jean Robert Nzamushe
(Head department of Emergency Surgery, University of Lille (CHU de Lille), FRANCE)

Extra Corporeal Enteral prosthesis (ECEP): An external ambulatory device to restore digestive flow in patients with double ostomy.

Some intestinal pathologies such as Inflammatory Bowel Diseases (IBD), mesentric ischemia or tumor can lead to surgical resection of a large part of the small bowel. Unfortunately, some of these patients are operated in emergency conditions which contraindicate a direct suture between the proximal and distal part of the small bowel after resection because of high risk of intra-abdominal leakage.

To avoid this risk, the upstream and downstream intestinal segments are brought through the skin as proximal and distal stoma, usually temporary, waiting better local and general conditions to do the final anastomosis. According to the level of the resection, the patient may present a short gut syndrom, means that the residual proximal part of the small bowell is not sufficient to reabsorb the quantity of succus entericus required for the survival of the body. In this case, the proximal stoma may debit too much liter per day. This loss need to be offset by intravenous nutrition and hydration support. Several solutions exist to create an artificial continuity between the two stomas and to avoid this situation, but these methods are bulky for the patient and require hospitalization.

We develop an ambulatory device - ECEP (Extra Corporeal Enteral Prosthesis) - which is a small engine equipped with a pump, allowing by pass between the upstream and downstream intestinal
segments. The aim of this system is to restore a digestive flow, to free the patient from any intravenous support and to improve his quality of life.

8:30AM-8:55AM: Plenary session. AKAGERA Ballroom
Moderators: Joachim Kapalanga, Olivia Jansen
Keynote address 7: Prof. Hirotaka KANUKA

Boosting new arms to tackle pathogen-vector mosquitoes

Hirotaka Kanuka\textsuperscript{1,2}

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A variety of arthropods carry and transmit infectious pathogen into another living organism. The arthropod that transmits a disease is known as a vector, and the disease is referred to as a vector-borne disease. These arthropods, which are haematophagous, form a major group of disease vectors with mosquitoes, flies, sand flies, lice, fleas, ticks, and mites transmitting a number of diseases such as malaria, dengue, filariasis, Chagas disease, and leishmaniasis. Understanding the molecular mechanisms of the responses of disease-transmitting vectors against pathogens is of great importance for current efforts to develop novel strategies for control of vector-borne diseases. The pathogens like virus, protozoan parasites, and parasitic nematodes undergo substantial stage-specific losses during those developments in the vector, which in some cases lead to complete refractoriness of the vector against those pathogens. The underlying genetics of vector competency are complex and multifactorial. Completion of the genome sequences of major vector species such as Anopheles gambiae and Aedes aegypti, together with the development of transgenesis in those species and the extension of RNAi and gene-editing techniques (TALEN and CRISPR/Cas9) to vectors, has allowed comparative and functional genomic approaches of the vector and pathogen interaction. In this talk, a highly complex interplay between pathogen and vector which has been (partly) unveiled by our recent findings will be discussed in addition to its implication to vector competency to mediate pathogen transmission.
CONCURRENT INVITED SESSION. INYAMBO BALLROOM

Moderators: Emilio Ovuga, Francois Xavier Naramabuye

SESSION VI: BIOGEOCHEMISTRY AND SOIL GEOCHEMISTRY

9:00AM-9:25AM: Keytone address 15: Prof. Monique Carnol

The role of soil microbial diversity and activity in ecosystem functioning

Prof. Monique Carnol,
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Monique Carnol is Professor of Ecology at the Department Biology, Ecology, Evolution of the Science Faculty at Liège University (ULg), Belgium. After her Biology studies at ULg, she performed a 3.5 year stay at the Institute of Terrestrial Ecology, Merlewood Research Station, UK for her doctoral research on « Nitrogen deposition and nitrification in coniferous forests » (PhD, 1997, ULg). She worked on several research contracts and performed a post-doctoral stay at the Netherlands Institute of Ecology, Centre for Terrestrial Ecology, Heteren, NL, before being appointed as associated professor (2002) and professor (2017) at ULg. She also holds a higher education diploma (DES) in University and High School Pedagogy (2008, ULg). Her group investigates the role of soil microorganisms in terrestrial ecosystem functioning, within topics such as management impacts, soil quality, cave microbiology, catchment biogeochemistry, tree species impacts, climate change, molecular microbial diversity, and biodiversity-ecosystem functioning. A recent cooperation project with Rwanda triggered her curiosity on African ecosystem functioning. She teaches soil ecology and microbiology, global carbon cycle and climate change, and scientific communication. She is the head of the Laboratory of Plant and Microbial ecology (Research unit InBioS, ULg).

9:25AM-9:40AM BSB/001/OC: Soil Microbial Properties and Soil Nutrient Content under Exotic and Native Tree Species in Southern Rwanda

1,2 Peter Rwibasira*, 2Francois Xavier Naramabuye, 2Donat Nsabimana and 1Monique Carnol

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Erosion has been ranked as the primary cause of soil degradation in Rwanda, a land that has naturally inherited very acidic soils with low contents of organic matter. With its hilly landscape and heavy rainfall, Rwanda loses annually millions of tons of its fertile soil from unprotected slope hills. Forests plantation seems to be an efficient option, not only for land protection and restoration, but also as a timber and household energy source. Tree species may influence soil quality and soil microbial activity via litter decomposition and root exudation. Although most of these introduced fast growing exotic tree species are now scattered all over the country, their effects on soil microbial processes is unknown. A 200 ha arboretum of Ruhande with various exotic and native tree species was used in this study to assess the impacts of tree species on soil properties. The aims of this
study were to investigate (i) the effects of tree species on soil physico-chemical properties, (ii) compare microbial processes under different tree species.

Tree species were selected based on their importance, adaptability throughout the country and relevance to daily use. Soil was sampled in 3 plot replicates per species (grouped into exotic (Exot), agroforestry (Agro), native (Nat) and mixed native species (MNS)) and in each sample 2 horizons (organic and mineral) were taken separately. Samples were analysed for physico-chemical properties (pH, moisture, organic matter content, exchangeable cations) and microbial properties (net N mineralization, potential bacterial and archaeal nitrification, respiration potential, microbial biomass C and N, metabolic quotient).

We observed a higher nutrient content in the thin organic horizon: Ca\(^{2+}\) = 5215.3 vs 2396.8 (MNS), 3242.9 vs 507.5 (Exot) mg kg\(^{-1}\) in organic versus mineral respectively. Mean values of pH were 5.1 vs 4.2 (Agro), 5.3 vs 4.7 (MNS), 4.4 vs 3.8 (Exot), and 5.4 vs 4.3 (Nat) in organic versus mineral respectively. Mean values for soil microbial biomass carbon were 1065.2 vs 326.4 (Agro), 1733.4 vs 490.6 (MNS), 1638.7 vs 271.5 (Exot), and 1463.3 vs 267.4 (Nat) µg C g\(^{-1}\) of soil in organic versus mineral horizon respectively. Preliminary analyses indicate higher soil microbial activities and alleviation of soil acidity under native tree species compared to the exotic species. Further results will be presented and discussed.


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The conservation and restoration of degraded agricultural soils in eastern Burkina Faso are two important processes in the context of global change (climate and anthropogenic forcing). The main objective of this study was to understand mechanisms that influence these two processes by analyzing the effect of several agroecological practices (Zaï, stone-rows and compost) on tropical ferigineous soils in the Sudano-Sahelian context.

Field trials were carried out on cultivated plots (sorghum, millet, maize) developed in Zaï (Z) and in stone-rows (SR) with contribution of compost (C) since 2006 on five peasant fields. These treatments were compared with absolute witness (AW) (traditional practices) and also with natural vegetation (NV) soils. The effect of these different agroecological practices on soil biological activity, fine elements, organic carbon, total nitrogen, pH and soil microbiological activity was evaluated.

Organic carbon contents were 7.30 mg g\(^{-1}\) soil for Z + SR + C, 6.83 mg g\(^{-1}\) of soil for SR + C; 5.97 mg g\(^{-1}\) soil for NV and 4.03 mg g\(^{-1}\) soil for AW. Soil total nitrogen was greater under NV (1.17 mg g\(^{-1}\) of soil) than agroecological fields (SR+C: 0.57 mg g\(^{-1}\) of soil; Z+SR+C: 0.56 mg g\(^{-1}\) of soil) which are also higher than AW (0.17 mg g\(^{-1}\) of soil). Agroecological practices had the same effect in the pH, available phosphorus (Pa) content and electric conductivity (EC). Additionally, there was
a significant difference between agroecological practices and AW for C, N, EC and not for pH and Pa.

Results also showed that agroecological practices have a positive effect on the mineralization activity of soil microorganisms. These differences were confirmed by the Shannon-Weaver and Equitability index. Also, agroecological developments have a positive effect on the soil fertility in eastern Burkina Faso.

9:55AM-10:10AM BSB/003/OC: Pedological Characterization of Soils Developed from Volcanic Parent Materials of Northern Province of Rwanda

*Providence Uwitonze¹, Balthazar Michael Msanya¹, Peter Wilson Mtakwa¹, Solange Uwingabire¹ and Sylvere Sirikare²

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A study was carried out on soils developed from volcanic parent materials of the Northern Province of Rwanda to expose the current soil conditions aiming largely on pedological characterization but, to a certain extent, also on assessment of potentials and limitations of soils for production of major crops in the area.

Three representative pedons (KNG-P1, KNG-P2, and GHNG-P1) were identified and described. Soil samples were collected and analyzed for physico-chemical properties. Pedons were classified using USDA Soil Taxonomy and FAO-WRB for Soil Resources.

Results show that soils were shallow to very deep and well drained. Texture was generally loamy with bulk densities ranging from 0.39 to 1.34 g/cm3. Topsoils were medium acid to mildly alkaline, with high to very high OC ranging from 3.97 to 13.03% and CEC soil ranging from 31.4 to 56.8 cmol (+)/kg. pHNaF was > 9.5 in Pedons KNG-P1 and KNG-P2 reflecting exchange complex dominated by amorphous materials and/or humus complexes. Phosphorus retention capacity (PRC) ranged from 6.25% to 99.58% and only Pedons KNG-P1 and KNG-P2 met the “andic properties” requirement of PRC ≥ 85%. Melanic index values indicated that these two pedons were characterized more by fulvic than humic acids. Nutrient imbalance was common in studied soils, implying suboptimal nutrient uptake and toxicity. Degree of weathering of studied soils was low as indicated by their weathering indices. Using field and laboratory data, Pedons KNG-P1 and KNG-P2 were classified as Andisols/Andosols and GHNG-P1 as Mollisols/Phaeozems. Studied soils were rated as marginally suitable to moderately suitable for the major crops of the area.

Application of P fertilizers coupled with efficient placement to enhance P, and soil conservation should be underscored in study area.
SESSION VI: BIOGEOCHEMISTRY AND SOIL GEOCHEMISTRY

11:00PM-11:25PM: Keynote address 16: Prof. Francois Xavier Naramabuye

Updating Rwanda soil fertility database for a sustainable agriculture planning and land use trade offs analysis

Naramabuye Francois Xavier
College of Agriculture and Veterinary Medicine, University of Rwanda

Rwanda landscape, climate variation and intensive pressure on land resources have resulted into a rapid change in soil, water, forestry and biodiversity resources. Any sustainable economic plan shall be based on evidence, especially in a countries like Rwanda where the pressure on land resources in exponentially increasing due to rapid population increase. Indeed, the relatively soft and vulnerable geology made dominantly of shales, coupled with high rainfall (Congo Nile Watershed Divide and Central plateau) has resulted into a rapid change in top soil properties. Deforestation and overcultivation has produced hidge soil materials transport to cover marshlands. The removal of such an amount of top soil materials has completely the soil fertility of those lands. Existing data base is almost 30 years old and is no longer relevant to any soil fertilizer recommendation. There is a an urgent need to update the soil database and protect the existing soils against further degradation. Pilotes studies have been initiated in highly disturbed areas to attempt an update useful to feed any agriculture production project. Further studies shall be conducted to assess the changes in various soil parameters including the soil microbiology.

11:25AM-10:40AM

BSB/004/OC: Effect of Long-Term Application Of Organic and Inorganic Fertilizer on Soil Microbial Population and Biomass Carbon and Nitrogen in Volcanic Highland Region of Western Rwanda

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Soil microbial population and biomass are the main driving force in the decomposition of organic minerals. They are frequently used as an early indicator of changes in soil properties resulting from soil management and environment stress in agricultural ecosystem.

The purpose of this research was to assess the effect of organic and inorganic fertilizers on soil microbial population, biomass carbon and nitrogen over a long time at Busogo sector, Musanze District, Rwanda.
Tithonia diversifolia, Alnus accuminata and erythrina abyssinica were applied as organic resources, and urea was employed as an inorganic source. Soil was sampled at 0-25 cm depth before applying fertilizer, thereafter, and at harvesting. Soil microbial biomass carbon and nitrogen were determined by the fumigation extraction method while carbon evolution was measured by the fumigation incubation method.

The results indicated a general increase in soil microbial biomass carbon, nitrogen, and carbon dioxide evolution in the two seasons with the control recording having a lower value than in all the other treatments. Microbial biomass carbon, nitrogen and carbon dioxide evolution was affected by both the quality of the inputs added and the time of plant growth. The tithonia recorded relatively higher values of microbial biomass carbon, nitrogen, and carbon evolution than all the other treatments. A significant difference was recorded between the control and organically treated soils at the two seasons for the microbial biomass nitrogen and carbon dioxide evolution. Both the microbial biomass C and N showed a significant difference P<0.005 in the difference months of the two seasons.


Hamoud Rukangantambara

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Soil organic carbon (SOC) and its labile fractions are strong determinants of chemical, physical, and biological properties, and soil quality. The highland region in northwest Rwanda is one of the most eroded landscapes in Rwanda. Alternative practices may be evaluated to control soil erosion. Our purpose was to determine how three different tillage practices for wheat (Triticum aestivum L.) affected soil organic carbon (SOC) and nitrogen content in three sites: Congo-Nile divide, Volcanic and Buberuka highland.

Conventional tillage (CT) with residue removal, shallow tillage (ST) with residue cover, and no-tillage (NT) with residue cover were investigated. Carbon and nitrogen in various aggregate-size classes and various labile organic C fractions in the 0-15 and 15-30-cm soil layers were evaluated. The ST and NT treatments had 14.2 and 13.7% higher SOC stocks and 14.1 and 3.7% higher total NT stocks than CT in the upper 15 cm, respectively. Labile C fractions: particulate organic C (POC), permanganate oxidizable C (KMnO₄-C), hot-water extractable C (HWC), microbial biomass C (MBC) and dissolved organic C (DOC) were all significantly higher in NT and ST than in CT in the upper 15 cm. KMnO₄-C, POC and HWC were the most sensitive fractions to tillage changes. The portion of 0.25-2mm aggregates, mean weight diameter (MWD) and geometric mean diameter (GMD) of aggregates from ST and NT treatments were larger than from CT at both 0-15- and 15-30-cm soil depths. The ST and NT treatments had significantly higher SOC and Nt in the 0.25-2mm fraction at both depths and significantly higher Nt content in the upper 15 cm. Positive significant correlations were observed between SOC, labile organic C fractions, MWD, GMD, and macro-aggregate (0.25-2mm) C within the upper 15 cm.

We conclude that both variants of conservation tillage (NT and ST) increase SOC stock in the high rainfall areas of northern-west Rwanda and are therefore more sustainable practices than those currently being used.
Oral Abstract

11:55AM-12:10PM  BSB/006/OC: Molecular Weight and Trace Metal Distributions in Fulvie and Humic Acid Fractions of Volcanic Soil in Musanze District, Rwanda

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The quality of humus substances plays an important role for soil organisms, which affects the properties and functions of soil. Moreover, humus is an important part of soils where the more important parameter is quality rather than quantity. Qualitative indicator of humus in the soil is the ratio of humic acids (HK) and fulvic acids (FK) through their respective molecular weight distribution. In the case of the ratio HK:FK lower than 1, fulvic acids predominate in the soil and humus is of poor quality. It is therefore important to monitor changes in content.

Humus substances were extracted from soil by the Na4P2O7 solution method at 0-15 cm depth. Molecular weight and trace metal distributions of fulvic and humic acid fractions of volcanic soil were assessed by using a gel filtration technique in combination with spectrophotometry. A binary molecular weight distribution was found both in the fulvic acid fraction and in the humic acid fraction. The fulvic acid fractions with molecular weights of less than 1.6×10^3 and of 6×10^3–10^4 accounted for 38–56 % and 22–47 % of the total fulvic acids, respectively, and the humic acid fractions with molecular weights of 10^3–10^5 and of over 2×10^6 accounted for 57–83 % and 17–28 % of the total humic acids, respectively. The components with molecular weights of over 1.6×10^3 contained 56 %, on average, of the Fe, Zn and Cu in the fulvic acid fraction, and the components with molecular weights of over 10^4 contained 56 %, on average, of these metals in the fulvic acid fraction.

12:10PM-12:25PM  BSB/007/OC: Catabolic profiles of cultivable microbial communities in forest soils of Western Algeria along a latitudinal gradient

Borsali Amine Habib, Zouidi Mohamed, Hachem Kadda, Gros Raphael and Theoneste Hagenimana

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Introduction: In Algeria, the soil degradation related to the biological properties in the surface layers is a major problem to the ecological balance and the development of forest massive. This phenomenon is the most important factor limiting the growth and productivity of forest plants in arid and semi-arid zones. Recurrent drought-type events are likely to have direct effect on soil microflora in its diversity and functionality. Research questions: How do these bioclimatic stages affect the distribution and abundance of microorganisms in forest soils and, what are their resistance and functional resilience capacities? Objective: To study the catabolic profiles of cultivable microbial communities of forest soils in western Algeria along a latitudinal gradient. Materials and methods: The research was carried out by sampling soils of surface horizons in five study plots of about 400 m² each, selected in each study zone, making a total of fifteen plots in all three studied zones. Five samples of soil in each plot were randomly taken between 0-15 cm of depth and brought to the laboratory for analysis. Catabolic profiles were determined following the modified protocol of Garland and Mills (1991) with using of Biolog® Ecoplates method (BIOLOG Inc., Hayward, CA). Statistical analysis of data was done by using the Primer-e software.
version 6 (Primer-E Ltd, UK) for principal component analysis (PCA) and permutation multivariate variance analysis (PERMANOVA).

**Results:** A greater diversity and catabolic wealth were found in the Tlemcen zone, considered as sub-humid. There was a significant effect of the bioclimatic stage on the soil biological wealth and diversity while the gradient of aridity was the contributing factor to discriminate different study areas.

**Conclusion:** There is a need to protect these soils to avoid a definitive risk of desertification in all these zones.

**12:25 PM-12:50 PM: Keynote Address N°17.**

**Strengthening African Research Capacity, Evidence-Based Discourse and Policy Development in an African Context,**

**Dr. Sam Lanfranco,**

*Professor Emeritus, Economics Department, York University, Canada*

Humans consider themselves unique among animals. We are “tool makers”, with a thirst for knowledge and its application to the world around us. From our beginnings the quest for a more safe and secure existence drove curiosity and planted the seeds for scientific enquiry and innovation as we know them today.

A useful milestone in this quest was the Soviet Union inaugurated “Space Age” with its 1957 launch of Sputnik, the world’s first artificial satellite. This achievement triggered something akin to a “panic attack” within Europe and North America. This resulted in an accelerated space race with the U.S. first to the moon in 1968. It fueled a massive expansion in post-secondary education and research capacity starting in the decade of the 1960s. This also occurred when the formal end of colonialism presented the need for newly independent nations to build their own educational and scientific establishments.

We are the half a century mark for this massive global expansion in education and scientific capacity. In this talk I will reflect on the current state of affairs within academia and research, in order to identify opportunities and challenges facing the advancement of science in Africa. I will also explore the challenges facing evidence-based decision making. I will not be talking about the well known and ongoing problems of resource and funding shortages, leaving that to others.

I am going to focus on academic and research activity, and how current and emerging practices within those areas strengthen, or hamper, the advancement of science in its African context. The “take away” from this presentation will be (should be) food for thought with regard to how the academic and scientific communities handle choices and decisions within their own remits, and how those strengthen or hamper the advancement of science in Africa and science in the service of Africans.
**DAY 2: 12:25 PM-12:40 PM:**

**ID/010/OC : Ov28CRP, a Cysteine Rich Onchocerca volvulus Excretory Secretory Product with a Serodiagnostic Potential for Human Onchocerciasis**

Ferdinand Ngale Njume\(^1,2\), Stephen Mbigha Ghogomu\(^2\), Robert Adamu Shey\(^1,2\), Lea Olive Tchouate\(^1\), Philippe Poelvoorde\(^1\), Perrine Humblet\(^3\), Annie Robert\(^5\), Joseph Kamgno\(^4\), Luc VanHAMME\(^1\), Jacob Souopgui\(^1\)

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Human Onchocerciasis is a debilitating skin disease that ultimately leads to blindness if untreated. It is caused by the nodular nematode O. volvulus which currently infects about 18 million people worldwide. WHO control programs are currently requiring sensitive and specific diagnostic tools to replace the poorly sensitive skin-snip test in monitoring progress made towards elimination of the disease. Limited attempts have been made towards the development of an antigen-capture test for immuno-diagnosis of the disease. One major drawback to the identification of suitable diagnostic antigens has been the limited knowledge on the biology of Onchocerca volvulus and the set of antigens involved in host parasite interplay. We sought to characterize an Excretory Secretory Product (ESP) of O. volvulus herein denoted Ov28CRP in an effort towards the design of an antigen capture test for human onchocerciasis. Ov28CRP transcript was found to be expressed in all investigated parasite stages by RT-qPCR and the full-length protein was detected in in-vitro ESPs of adult male, adult female and L3 stages of O. volvulus by western blot using antibodies against a synthetic peptide of Ov28CRP. The full length recombinant protein was found to differentiate between patient sera and controls both by western blots and IgG based ELISA. Analysis of humoral immune responses to the recombinant Ov28CRP found the IgG2 and IgG4 subclasses to better differentiate between patient serum and control sera than the IgG1 and IgG3 subclasses. We conclude that Ov28CRP is a secreted protein of O. volvulus with potential roles in ensuring disease progression that can be exploited for the design of an antigen capture test for human onchocerciasis.
11:45AM-1:00PM: POSTER EXHIBITION

1:00PM-2:00PM Lunch Break.

2:00PM-2:25PM Plenary session. Thursday 5 October 2017

AKAGERA Ballroom.

Moderators: Jacob Souopgui, Christian Ngongang

Keynote address: Dr Jean Robert Nzamushe

(Head department of Emergency Surgery, University of Lille (CHU de Lille), FRANCE)

Extra Corporeal Enteral prosthesis (ECEP): An external ambulatory device to restore digestive flow in patients with double ostomy.

Some intestinal pathologies such as Inflammatory Bowel Diseases (IBD), mesentric ischemia or tumor can lead to surgical resection of a large part of the small bowel. Unfortunately, some of these patients are operated in emergency conditions which contraindicate a direct suture between the proximal and distal part of the small bowel after resection because of high risk of intra-abdominal leakage.

To avoid this risk, the upstream and downstream intestinal segments are brought through the skin as proximal and distal stoma, usually temporary, waiting better local and general conditions to do the final anastomosis. According to the level of the resection, the patient may present a short gut syndrom, means that the residual proximal part of the small bowell is not sufficient to reabsorb the quantity of succus entericus required for the survival of the body. In this case, the proximal stoma may debit too much liter per day. This loss need to be offset by intravenous nutrition and hydration support. Several solutions exist to create an artificial continuity between the two stomas and to avoid this situation, but these methods are bulky for the patient and require hospitalization.

We develop an ambulatory device - ECEP (Extra Corporeal Enteral Prosthesis) - which is a small engine equipped with a pump, allowing by pass between the upstream and downstream intestinal segments. The aim of this system is to restore a digestive flow, to free the patient from any intravenous support and to improve his quality of life.
Analysing options for enhancement of farm productivity in Rwanda

Charles Bucagu
College of Agriculture and Veterinary Medicine, University of Rwanda

Strategies for raising agricultural productivity on farms are recognized as key for ensuring food security and reducing poverty in Rwanda in a sustainable manner (MINAGRI, 2009). Crop Intensification Program (CIP) has been established by the Government of Rwanda (GoR) to raise crop productivity on farms and improve income and nutritional status in the country. The programme undertakes a multi-facet approach that includes facilitation of inputs (improved seeds and fertilizers), consolidation of land use, provision of extension services, and improvement of post harvest handling and storage mechanisms. The crop intensification programme (CIP) focuses on six priority crops namely maize, wheat, rice, Irish potato, beans and cassava. Due to the CIP, agricultural sector has registered a significant growth and increment of crop yield and significant funds have been allocated to buying of improved seeds for maize, Irish potatoes and cassava cuttings. Despite significant increase in food production growth rate, there is still potential to improve further productivity and therefore farmer’s income.

The on-farm yield gap is mainly due to a number of technical challenges limiting productivity on smallholder farms which are mainly related to initial soil fertility level on farms under cultivation and farmer’s management. The sustainability of crop intensification can be significantly enhanced by taking a holistic and dynamic approach that integrates technical and farmer practices on soil fertility. Exploring options for a more integrated soil fertility management is critical to ensure long-term sustainable crop yield production. In the paper, I will review the major achievement of CIP over the last few years, give an indication of yield gaps on some selected farmer and indicate the potential of some interventions (Agroforestry technologies) for improving farm productivity in Rwanda.
SESSION VII: BIOTECHNOLOGY IN AGRICULTURE

8:30AM-8:45PM BA/001/OC- Morphological Characterization of Yellow Passion Fruits in Mbeere, Embu County, Kenya

Mwirigi Peter*, Maina Mwangi and Joseph Gweyi-Onyango
Department of Agriculture Science Technology, Kenyatta University, Nairobi-Kenya

*Corresponding author email: mwirigip@gmail.com

Yellow passion fruit (Passiflora edulis f. flavicarpa Deg.) has emerged as an important high-value horticultural crop in Kenya and has gained wide adoption in Embu County due to its apparent adaptation to the hot arid conditions and a ready market for the fruit. The main objective of this study was to characterize yellow passion cultivars grown by farmers using morphological traits. Fifty nine cultivars grown in different farmers’ orchards were sampled, and 10 morphological variables measured on these accessions were subjected to multivariate analysis using Principal Component Analysis (PCA) and clustering criterion. The results indicate that scores on the first principal component (PC-1) which accounted for 19.9% of the total variation were highly correlated (correlation coefficient >0.3) to characters related to twining direction, leaf color and leaf density. PC-2 which explained 13.7% of the total variation was highly associated with twinning direction, fruit color and maturity period of the passion. PC-3 explained 13.07% of the variation and was mainly correlated to maturity period of the passion.

Component Analysis (PCA) and clustering criterion. The results indicate that scores on the first principal component (PC-1) which accounted for 19.9% of the total variation were highly correlated (correlation coefficient >0.3) to characters related to twining direction, leaf color and leaf density. PC-2 which explained 13.7% of the total variation was highly associated with twinning direction, fruit color and maturity period of the passion. PC-3 explained 13.07% of the variation and was mainly correlated to maturity period of the passion.

Correlation among characters shows four main clusters with the first cluster comprising of traits associated with fruit color, maturity period, shape of the fruit and source of the planting material; the second cluster is associated with the twining direction; the third cluster with leaf density and leaf color while the fourth cluster is associated with number of vines per plant, stem color and yield per plant. The cluster analysis separated the fifty nine accessions as different genotypes with Euclidean similarity distance ranging from 0.99 to 0.08. At 0.92 level of similarity, agglomerative hierarchical clustering Dendogram indicates that almost all the 59 accessions were distinct from each other while at 0.48 level, half of the accessions were similar to each other. The pruned Dendogram at similarity distance of 0.05 identified four main clusters 1, 2, 3 and 4 according to the local names and the major morphological characters associated with them.

This study has shown that despite the large number of cultivars, there is not significant variability since only four distinct clusters could be identified. This can be attributed to the fact that the majority of the seedlings are sourced from once source which mainly propagates the KPF3, KPF4 and KPF12 varieties. Nevertheless, this information can be used to screen for specific cultivars or for general genetic improvement and design of conservation programs. However, there is a need for further studies using molecular and other confirmatory techniques.

8:45AM-9:00PM BA/002/OC- Genomic Breeding of Orphan Crops for Improved Food Security and Nutrition in Africa: Opportunities, Targets, Applications, and Challenges

Enoch G. Achigan-Dako1, I. Hale2, O.D. Sogbohossou1,2, H. Degbey1, E. Schanz3, R.H. Mummi4, A. Van Deynze5, R. Kahane6, D. This7, Dedeou Tchokponhoue1, Charlotte A. Adje1, Carlos Houdegbe1, W. Abtwe Gebreselassie8, O. Happiness9, L. Akundabweni10, H. Zohoungbogbo1, F. Akohoue1, and J. Sibiya11

1 Laboratory of Genetics, Horticulture and Seed Sciences, Faculty of Agronomic Sciences, University of Abomey-Calavi, BP 2549 Abomey-
With the ever-growing population size, food and nutrition insecurity has become a bigger challenge in sub-Saharan Africa though the continent is endowed with a rich agricultural diversity that can be valued to overcome hunger and poverty. To this end, radical transformation of a largely underdeveloped agriculture is required over the next decades. In addition, increasing agricultural productivity among resource-poor farmers should go with no or little exacerbation of environmental problems while simultaneously coping with climate change, a critical force driving low agricultural productivity in sub-Saharan Africa.

With the new advance in genomics, new opportunities arise. Genomics is a precise, quick, non-expensive technology that complements classic breeding approaches. In this paper, we reviewed the current knowledge and use of plant genomics for orphan crops and propose ways forward to implement genomic-enabled breeding to develop high yielding cultivars, pest and disease resistant lines, climate-smart breeding populations. Orphan crops of interest include *Amaranthus cruentus*, *Hibiscus sabdariffa* (vegetables), *Colocasia esculenta*, *Sphenostylis stenocarpa* (roots), *Digitaria exilis* (cereal), *Synsepalum dulcificum* (fruit), *Vigna subterranean*, and *Macrotyloma geocarpum* (legumes).

Major steps in genome-enabled breeding are identified and discussed for each species. Steps include: 1) Understanding the reproductive biology and mating systems that increase genetic gains; 2) Proper definition of breeding objectives and target products in line with farmers and consumers’ needs and to adapt to climate hazards; 3) Inventory of available genetic resources and re-assessing genepool and germplasm for additional collections to increase geographical coverage; 4) Phenotyping and genotyping germplasm for economic and added value traits; 5) Genomic selection and molecular breeding of cultivars to increase accuracy and reduce selection cycle; 6) multi-environmental testing and end-users’ evaluation; and 7) Strengthening crop value chains to increase productivity and utilization.

With genomic breeding new opportunities in the agribusiness sector will rise up to accelerate the positive transformation of African agriculture.

9:00AM-9:15PM  BA/003/OC- Phylogeny of Plant Calcium and Calmodulin-Dependent Protein Kinases (CCaMKs) and Functional Analyses of Tomato CCaMK in Disease Resistance

Ji-Peng Wang¹†, *Jean-Pierre Munyampundu*¹,²†, You-Ping Xu², and Xin-Zhong Cai¹

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Calcium and calmodulin-dependent protein kinase (CCaMK) is a member of calcium/calmodulin-dependent protein kinase superfamily and is essential to microbe-plant symbiosis. To date, the distribution of CCaMK gene in plants has not yet been completely understood, and its function...
in plant disease resistance remains unclear. In this study, we systemically identified the CCaMK genes in the genomes of 44 plant species in Phytozome, and analyzed the function of tomato CCaMK (SlCCaMK) in resistance to various pathogens.

CCaMKs in 18 additional plant species were identified, yet the absence of CCaMK gene in green algae and cruciferous species was confirmed. Sequence analysis of full-length CCaMK proteins from 44 plant species demonstrated that plant CCaMKs are highly conserved across all domains. Most of the important regulatory amino acids are conserved throughout all sequences, with the only notable exception being observed in N-terminal autophosphorylation site corresponding to Ser 9 in the Medicago truncatula CCaMK. CCaMK gene structures are similar, mostly containing six introns with a phase profile of 200200 and the exception was only noticed at the first exons. Phylogenetic analysis demonstrated that CCaMK lineage is likely to have diverged early from a calcium-dependent protein kinase (CDPK) gene in the ancestor of all nonvascular plant species. The SlCCaMK gene was widely and differently responsive to diverse pathogenic stimuli. Furthermore, knock-down of SICCaMK reduced tomato resistance to Sclerotinia sclerotiorum and Pseudomonas syringae pv. tomato (Pst) DC3000 and decreased H2O2 accumulation in response to Pst DC3000 inoculation.

Our results reveal that SlCCaMK positively regulates disease resistance in tomato via promoting H2O2 accumulation and CCaMK genes may hold promise for durable resistance to necrotrophic plant diseases.

9:15AM-9:30PM  BA/004/OC- Biomonitoring And Zonal Cartography Of Loxodonta Africana Cyclotys (Proboscidea, Mammalia) Activity In The Era-Congo/Mai-Ndomde Redd+ Concession In Democratic Republic Of The Congo

Mathieu Bolaa Bokamba¹, Anatole Bokolo Bola¹, Gédéon N. Bongo², Pius T. Mpiana², Koto-te-Nyiwa Ngbolua²

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The Democratic Republic of the Congo is a biodiversity hotspot. It is amongst one of the most important fauna reserves either in Africa or in the world. Yet, its fauna is dangerously threatened through poaching upsurge and smuggling. Worldwide, studies show that a certain number of victim animal species is notching up on the red list of threatened species of IUCN (International Union for Conservation of Nature). This is the case of African elephants whose habitat is more and more restricted because of demographic pressure and human activities. In order to protect this natural ecological inheritance and its habitat, a scientific assignment was performed some months ago in this forest zone for confirming the existence of these elephants.

This prospective study aimed to confirm the existence of elephants in this geographical area as a main objective. The specific objectives of this study were the direct and/or indirect observation in order to collect the presence indexes of elephants in this zone on the one hand and on the other hand to elaborate the map indicating the activity zones. Several elephant indexes (fresh and recent droppings, tracks and berries) were observed. The activity zone of elephants is located out of as well as in the concession ERA-CONGO/MAI-NDOMDE REDD+. Therefore, the forest block of Ntombe Nzale grouping (mainly Ngeleku, Olingi-oyei and Ilee-Makaba villages) in the Mai-
Ndome province constitutes a priority zone for the biodiversity conservation.

9:30AM-9:45PM BA/005/OC: Gastrointestinal Parasitic Infections – Improved Traditional Medicines in the Case of a Goat Antiparasitic

Victor Okombe Embeya1, Gaël Nzuzi Mavungu1 and Célestin Pongombo Shongo1

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The importance of gastrointestinal parasitic infections is due both to their frequency and the severity of the disorders they cause. Parasitism is one of the causes of the brake on the profitability of goat farms. Breeders thus have to face this thorny challenge which constitutes a real handicap to the development of this breeding. The high costs of interventions and veterinary medicines as well as the low incomes of livestock farmers are attracting increasing interest and demand for traditional medicines.

Ethnobotanical and ethnopharmacological surveys and laboratory analysis on Vitex homasii De Wild have revealed its safety and confirmed its antiparasitic properties on goats. The use of indices of credibility has permitted to choose Vitex thomasii De Wild amongst many other recipes recorded in 2011 in the Democratic Republic of Congo. This recipe has permitted the production of an antiparasitic improved traditional medicine.

The determination of dose and conditioning, unknown in traditional medicine, followed by good manufacturing practices has led to easy administration and conservation of phytomedicine.

9:45AM-10:00AM BA/006/OC: Application of Geospatial Technologies for Agricultural Resources Monitoring and Management in Rwanda

*Benjamin Bukombe1, Ádám Csorba2, F.X. Naramabuye3, Tamás Szegi2, Yves Uwiragiye1, István Waltner2 and Erika Michéli2

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The Rwandan agriculture strongly relies in the dry seasons on the water stored in artificial reservoirs of various sizes for irrigation purposes. However, the success of irrigation depends on a wide range of soil properties which directly affect the soil moisture regime. By integrating Sentinel data and predictive modeling of soil property, the objectives of the study were to monitor the water level fluctuation in irrigation reservoirs, estimate the volume of water available for irrigation, and combine this information with soil property map products to support the decision making process.
for sustainable irrigation water management in the Southern province of Rwanda.

For water level and volume estimation, a series of Sentinel-1 (product type: GRD, acquisition mode: IW, polarizations HH and VH) data were obtained covering the study area and spanning over a period of two years. To map the extent of water bodies the Radar-Based Water Body Mapping module of the Water Observation and Information System (WOIS) was used. High-resolution optical data (Sentinel-2) were used for validation in cloud-free periods.

For sustainable irrigation water management, digital soil property map products were developed by applying and comparing two machine learning techniques (Random Forest and Support Vector Machine) on soil dataset for the region and a wide range of environmental covariates related to soil forming factors.

10:00AM-10:15AM BA/007/OC: Yield and Yield Components of Four Nerica Rice Varieties as Affected by Applications of Farmyard Manure and NPK Fertilizer

1Odhiamb Mo* and 1Muui C

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Food insecurity threatens the livelihood of African rural households who rely on cereal crops as staple food. New Rice for Africa (NERICA) are rain-fed rice varieties that require little moisture, are early maturing and high yielding with a good response to fertilizer inputs. This study aimed to evaluate the effects of combining farmyard manure (FYM) and inorganic NPK fertilizer on the yield and yield components of four NERICA rice varieties (NERICA 1, 4, 10 and 11).

Field experiments were conducted between March and July, 2015 at Agricultural Training Center, Siaya County, Kenya using a completely randomized block design. Each block measured 2 by 1 meters with three treatment replicates. Treatments were: No fertilizer, FYM (10 tonnes/hectare), recommended NPK fertilizer (60kg N, 30kg P2O5, 30kg K2O), combination of FYM + NPK (½ FYM + ½ NPK). Top soil of experimental site and FYM were sampled and tested separately for their physical and chemical properties before planting.

Statistical data analysis was done by ANOVA and means separated by LSD method at 5% significance level. Application of fertilizer on different NERICA varieties significantly (p ≤ 0.05) affected plant height, tillers per plant, panicles m-2, 1000-grain weight, and yield of NERICA. Superior characteristics for most of the measured parameters such as plant height (120 cm), tillers per plant (22), panicles m-2 (325), 1000- grain weight(29.8 g), biological yield (10,500 kg/ha), grain yield (5600 kg/ha) and harvest index (44.5%) were recorded with integrated FYM + NPK application.

Among the varieties, NERICA 11 recorded the highest grain yield (5550 kg/ha), tillers per plant (21.5), and panicles m-2 (324.5). Maximum plant height (120 cm) and 1000-grain weight (28.9g) were obtained from NERICA 4. These show that integrated application of NPK + FYM can maintain and boost productivity of NERICA rice, thus alleviating food insecurity.
**Oral Abstract**

**10:15AM-10:30AM BA/008/OC-Microbial Identification of Potato from Rwandan Coffee Beans Taste Defect**

*Ndayambaje Jean Bernard, Martin Ongol, Dushime Sylvie and Ishimwe Florence*

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Coffee is a socio-economic important plant all over the world due to its exportation and how it provides income to the farmers and the country. However, potato taste defect (PTD) affects the Rwandan coffee quality. The smell is reported to be caused by some microorganisms (bacteria) that are responsible for the off-flavor and may also be caused by a pest.

The aim of this study was to isolate, biochemically characterize, and identify bacteria-producing potato flavor from Rwandan coffee.

Five samples were obtained from different regions (Nyamasheke and Nyakizu) of Rwanda. Bacteria were isolated and enumerated in the nutrient agar media followed by culture on nutrient and tryptic soy broth media. Bacteria were also cultured in several carbon sources such as glucose, fructose, sucrose, starch, pectin and galactose to smell the odor produced by those bacteria. DNA extraction of isolates was done and the resulting DNA strands underwent three steps of polymerase chain reaction to be amplified using the Forward Primer (5’AGAGTTTGATCCTGGCTCAG-3’) and Reverse Primer (5’-GGTTACCTTGTTACGACTT-3’). The identification of bacteria producing potato flavor from Rwandan coffee beans was done through 16S rDNA method followed by sequence analysis using finchTV software and BLAST.

Earthy odor was mostly produced in all media and carbon sources but potato flavor was recorded mostly from damaged floaters and hand sorted damaged coffee beans. However, other odors such fruity and ferment were found in coffee beans to be produced by bacteria in coffee beans.

The study concluded that the presence of different kinds of bacteria including Enterobacteriaceae and Pantoea, which are responsible for the formation of Isopropyl-2-methoxyl-3-pyrazine (IPMP) in coffee beans and cause the production of the potato flavor.

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**11:00AM-11:15AM BA/009/OC-Influence of the Application of Natural Phosphate Rocks on the Performances of Direct Seeding Mulch-Based Cropping System Using Stylosanthes guianensis (Aublet) Swartz as Cover Crop in the Conditions of the Batéké Plateau (Kinshasa Province, DRC).**

B.P. Bulakali¹, J. Aloni² and G. Mergeai³

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In order to develop a direct seeding mulch-based cropping system (DSMS) adapted to the conditions of the Batéké plateau, Stylosanthes guianensis (Stylo) was used as cover crop in a trial conducted during five years at two sites.
In both experimental locations, cassava was installed in November 2009 and Stylo a month later. From the second year onwards, a local variety of Maize was sown each year at the beginning of the long rainy season (October) and Stylo was the sole crop growing on the soil during the short rains (from February to May). To produce the mulch in which maize was directly seeded, Stylo cover was cut and deposited on the ground in August each year. Four treatments were compared: (i) DSMS1 with 0 kg P ha⁻¹ (phosphate rocks), (ii) DSMS2 with 50 kg P ha⁻¹, (iii) DSMS3 with 100 kg P ha⁻¹, and (iv) a control consisting in a rotation involving the same crops (cassava followed by four years of maize) but without Stylo permanent cover and without fertilizer application. The following cassava varieties were used: Zizila (DSMS1), TME 419 (DSMS2), Butamu (DSMS3), and RAV (control).

After 5 years of continuous cultivation (2014), the total grain yield of Maize of the control was nil (0 kg ha⁻¹) in both sites while the yields obtained for the DSMS1 were all higher than 1150 kg ha⁻¹. DSMS2 was the most productive in both locations with 2613 kg grain ha⁻¹ in The Way and 2289 kg grain ha⁻¹ in Neema. The total biomass of Maize and Stylo were correlated with grain yields. The continuous sole cropping induced a significant decrease of the content in C, N, P, and Mg of the soil. The possible reason of the superiority of DSMS2 is discussed according to the characteristics of the soil, the cropping systems compared, and of the two experimental sites.

**11:15AM-11:30AM BA/010/OC Response of Coffee Genotypes to Regeneration From Callus**

*Aline Tuyishime¹, Simon Martin Mvuyekure², Joseph Nsengimana³ and Antoine Nsabimana⁴*

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In vitro plant tissue culture is a method used in biotechnology to produce the plantlets from cells in short period as compared to in vivo culture. Plant growth depends on the age of the mother plant, growth regulators, tissue source, plant physiology and the genotype. Coffee genotypes respond differently to clonal multiplication due to the variation of their gene make-up. Thus, there is lack of universal tissue culture protocol for coffee genotypes.

This study aimed to evaluate the response of coffee genotypes to in vitro multiplication. The study was conducted from 1 July 2016 to 1 April 2017 at the Rwanda Agriculture Board. Seven coffee genotypes F1 (BM139×5A, Harrar×6A, BM139×Catimor, Jackson ×6A, BM139×Batian, BM139×Ruiru, BM139×6A) were evaluated for the callus induction and regeneration. Six parameters were measured on germination capacity: embryo formed, germination rate, number of leaves, root length, rooting rate, and shoot length. Coffee leaves were used as explants using the MS (Murashige and skoog) medium supplemented with 5ml of BAP (6-benzylaminopurine) for initiation and 2 ml of IBA(Indole-3-Acetic Acid ) for germination.

Data were analyzed with analysis for variance and Duncan new range test using Genstat 17. Coffee genotypes were similar in callus induction and number of embryo formed, but they differed significantly in germination parameters. Therefore, for mass production, a multiplication protocol should be optimized for specific coffee genotypes.
11:30AM-11:45AM BA/011/OC - Biotechnology in Agriculture: Influences on Human Health and Environmental Health

Rosalie Uwayezu

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Over the past decades, the world has been facing challenges of food insecurity. Researchers have shown that 854 million people all over the world are undernourished but 96% of those people are from developing countries.

The aim of this study was to understand the impacts of biotechnology on human health and agricultural productivity. A systematic article and reports review was done on Google scholar and PubMed; the searching words were: health, developing world, biotechnology in agriculture, and environmental health. They showed that 96% of undernourished cases are in the developing world. In Africa 1/3 of those cases are undernourished, 1/4 are underweight children, and 1/3 are stunted children. Use of biotech crops in agriculture greatly contributes to poverty relief and food insecurity alleviation in developing countries. Biotech crops have a significant contribution in the promotion of human health by improving food production which, in turn, reduce malnutrition. It also improves farmer’s health by reducing their exposure during pesticides’ spraying.

Biotech crops also contribute in environmental health promotion by reducing the use of pesticides by farmers, and reducing greenhouse gases emissions (due to the use of fossil fuels), etc. Agricultural biotechnology provides significant benefits to farmers including increased crop yields and lower input costs. It also has the potential to make essential contributions for solving food and agricultural issues, and addressing human health, environmental health, and economic issues in the developing world. Further, biotechnology enables improvements that are not possible with traditional farming itself.

11:45AM-12:00PM BA/012/OC - Bamboo (Bambusa vulgaris) Regeneration by Cuttings: Comparative Study of Planting Methods of Culm Cuttings at UR-CAVM Busogo Campus Tree Nursery

Twagirayezu Leandre, Ntawenderundi David and Nduwamungu Jean*

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Bamboo is one of the fastest growing and highest yielding renewable resource with multiple uses in the world. Lack of seedlings in sufficient number has generally been a major constraint in establishing more bamboo plantations.

This study investigated the efficiency of regenerating Bambusa vulgaris through cuttings at Busogo Sector, Musanze District, using vertical and horizontal methods with and without water treatment.
The experiment consisted in a randomized complete block design (RCBD) with 4 replications. The growth and sprouting of the 64 cuttings were monitored for three months and 18 days (105 days).

In terms of planting method, the horizontal planting method showed best sprouting percentage of 68%. In terms of treatment used, the horizontal planting method without using water treatment showed slightly better sprouting percentage of 60%. The results further show that about 87% of sprouts had between 0 and 30 cm height and 98% of sprouts had basal diameter ranging from 0 to 20 mm only 105 days after planting. Indeed, the horizontal planting methods provided highest survival rate of sprouts than the vertical planting method (53%) of planted cuttings. Furthermore, the results show that 105 days after planting, cuttings with horizontal method were more productive in terms of root development. In terms of planting method using water treatment, the horizontal planting method with water treatment showed highest rooting percentage (53%).

We conclude that farmers should be trained and encouraged to use the horizontal planting method using water treatment in order to get better results in regenerating bamboo through cuttings.

12:00PM-12:15PM  BA/013/OC: Food security enhancement through irrigation in drought prone areas

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Background: The droughts in Bugesera are mainly caused by intense deforestation and climate change and affect the livelihoods of people in this district who depend on agriculture; those frequent droughts are the main cause of crop failure, lands resilience weakness, deterioration in pasture and arable land (PADAB2007).

High population density and growth have led to deforestation, soil erosion and landscape and decreased agriculture productivity.At least 22% of the Rwandan households (2.2 million people) are food insecure and are highly vulnerable to food insecurity (WFP-RWANDA REPORT).

Bugesera district counts between 15-28% of food unsecured households and Mayange district is the most affected part of the region (EDPRS II REPORT).

Objective: The main objective of this research is to design a small-scale irrigation scheme within Mukoma valley to enhancing food security.

Method: With CROPWAT8.0 software and climatic data from the meteorological station of Nyamata and Mayange, we have determined reference crop evapotranspiration, crop water requirement and water need during the whole year.

Results: The assessment of water variation has shown that the maximum water deficit will be in summer which is not our favorable growing season. The growing season will be from January to April and from September to December where the deficit will be compensated by a 500m³ reservoir.
Conclusion: The economic analysis has proved the project to be beneficial for the local population as well as the whole country to the extent that the implementation cost would be paid back within 5 years. Possible negative impacts have been identified and their mitigation measures have been recommended.

12:15PM-12:30PM BA/014/OC Semi-Continuous Fermentation of a Thermotolerant and High Acetic Acid Producing Acetobacter pasteurianus Bacterium

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Among 63 strains isolated from fruits and homemade vinegars from different ecosystems of Morocco, a thermotolerant bacterium with high production of acetic acid was selected and evaluated for its ability to perform efficient acetic fermentation at high temperature in a bioreactor. CV01 strain, isolated from cactus (Opuntia ficus-indica), was considered to be an Acetobacter pasteurianus sp. according to phylogenetic study based on 16s rDNA gene sequence analysis.

An optimal culture medium containing initial concentrations of acetic acid and ethanol of 1% (v/v) and 4% (v/v), respectively, was used. The growth kinetics of this isolate were monitored in flasks and compared with those of the wild type LMG 1625 mesophilic strain and the thermoresistant Acetobacter senegalensis reference strain. The CV01 strain exhibited abundant growth along with high amount of produced acetic acid at high temperature (41°C). Subsequently, a 20-L stirred tank bioreactor was used to assess thermotolerance and acidoresistance properties of the selected strain during semi-continuous acetic acid fermentation at 38°C.

Interestingly, a total amount of 13.4% (w/v) acetic acid was yielded at the end of fermentation. Moreover, this bacterium could produce during the same fermentation process a final concentration of 11.2 g/L gluconic acid, a sensory quality indicator in vinegar production. Finally, the enzymatic study showed that CV01 strain exhibited high ADH and ALDH enzyme activity at 38°C compared with the mesophilic reference strain LMG 1632, which was significantly susceptible to thermal inactivation.
12:30PM-12:45PM  BA/015/OC: Rabbit urine collection to create fermentation with focus on rural farmers’ self-development.

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Introduction and Objectives: Organic fertilizers are getting more attention these days to substitute chemical fertilizers which may cause soil pollution and poses a health threat to humans who later consume heavily fertilized crops. The main focus of this research is to collect and convert rabbit urine into foliar organic fertilizer in Ndera sector with the following specific objectives: Determining the best method for optimum urine fermentation process, determining the mix ratio of the fertilizer and water for foliar application and to seek methods to increase foliar uptake rate of moisture and nutrients by the plants to increase the system efficiency.

Methods: To achieve the above objectives, a 25 liters plastic drum fermenter working in closed stirred system was used in which three samples (F1), (F2) and (F3) each containing rabbit’s urine, 500ml of molasses and one liter of thick rice washing were prepared. In F1 and F2, 15g of dry yeast and 240 ml of EM4 was added respectively and the F3 remains unchanged. The liquid mixture was allowed to stay for three weeks and stirred twice a week.

Results: The results of the research indicated that F1 and F3 turned to dark red and to black colors respectively with a pungent smell of ammonia gas whereas F2 smelled like wine with brownish color. F2 was applied at ratio of 1:5; 1:10 (optimum); 1:15 and 1:20 as foliar fertilizer on tomatoes and which enabled the plant to reach the effective height and fruiting without plant stress and excess of salt deposition on leaves. Combination of sound and a special developed foliar spray (Sonic bloom) technic was recommended to increase foliar uptake rate of moisture and nutrients by more than 100% by the plants.

Conclusion: If this research is put into use, rural farmers will benefit from cheap, effective, affordable and natural fertilizer.

SESSIO N VIII: WILDLIFE, BIODIVERSITY, WATER, ENVIRONMENT & CONSERVATION

Plenary session, Keynote address21: Prof. Charles Bucagu

8:30AM-8:45AM  WBWEC/001/OC: The Project Phytokat in Katanga (Democratic Republic of Congo): Conditions for the Integration of Traditional Medicine in Modern Healthcare and a Model Answer Against Anthropogenic Erosion of Biodiversity

¹ Bakari Amuri*, ² Meerts Pierre, ³ Vandenput Sandrine, 4 Okombe Victor, 5 Ngoy Edouard, 6 Ngoy Shutcha Mylor, 7 Kahola Tabu Olivier, 8 Kampemba Mujinga Florence, 9 Nkulu Fyama Jules and 10 Duez Pierre

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The Democratic Republic of Congo (DRC) still faces multiple health problems. Notably the access to conventional medicine is limited, as in most Sub-Saharan countries. Traditional medicine is the primary, and often the only, source of care for a majority of the population and relies mainly on plants as a source of drugs. But in front of the rapid population growth such as observed in DRC (3.5% /year), the demand for medicinal plants implies a risk of extinction for several species, which requires to supplement supply by agriculture, possibly family farming. This pilot project aims to establish the necessary foundation for progress in this direction in Katanga:

1. To evaluate the conditions for the introduction of traditional practices in modern medicine;

2. To deepen (I) the botanical and agronomic study of interesting species selected based on their interest in traditional medicine and the threat to their survival in the wild. Their garden cultivation would have two major advantages namely mass production and conservation of useful medicinal species; (ii) the pharmacological and chemical study of interesting plants, to highlight their pharmacological activities, mainly those related burden of disease in the region.

3. In the context of regional erosion of plant diversity, a conservation strategy is urgent and requires an inventory of their current distribution. It is imperative to think from now on about a sustainable way of using vegetable resources everywhere in Africa whenever we can meet such a situation.

Through a multidisciplinary team, this project will aim at correcting the weaknesses identified by the recent Joint Context Analysis, performed in DRC at the Direction Générale Coopération au Développement et Aide Humanitaire (DGD) initiative, for the domain environment / natural resources: "Lack of information, knowledge and awareness among decision makers and local communities on the benefits of biodiversity-related development".

8:45AM-9:00AM WBWEC/002/OC: Genotypic Analyses of Onchocerca Volvulus βtubulin Gene in the Mbonge Sub-division (Cameroon): Evidence of Ivermectin Selection

Ivermectin (IVM) still remains the only safe drug for the mass control of onchocerciasis. However, recent reports show that there are populations of adult Onchocerca volvulus worms responding sub-optimally to IVM treatment. This response is indicative that resistance may be setting in. However, molecular assays must be carried out to confirm this hypothesis.

The assessment of the parasitological response profile of O. volvulus to IVM and genetic analysis of target genes become imperative for detection of resistance. Beta (β) tubulin isotype I gene, known to be one of these targets has been found to be associated with IVM selection in some
nematodes. Some endemic regions of Cameroon have been under IVM treatment for almost two decades and it is not yet known if resistance is already emerging in these regions.

The objective of this study is to investigate if resistance is developing in an onchocerca volvulus-endemic region of Mbonge, South West Region of Cameroon. Onchocercal nodules were surgically removed from onchocerciasis patients in two cohorts with different treatment histories: a group that had received repeated doses of IVM for at least the previous 3 years, and a control group with no history of IVM treatment. The reproductive status of each female worm from excised nodules was assessed by the microscopical examination of their uteri.

Results revealed that whereas there was a predominance of the G allele in the naïve population, this was substituted by the T allele in the IVM-exposed population thereby suggesting that IVM selects for the T allele which may reduce worm fertility rate. Reverse transcription (RT) PCR of β-tubulin transcripts showed comparable expression levels in both IVM exposed and naïve worms. Restriction fragment length polymorphism of the β-tubulin gene indicated that most of the IVM-exposed worms possessed the G allele thereby indicating that this allele may be implicated in IVM selection. This evidence of IVM selection suggesting that IVM resistance may be emerging in the Mbonge Sub-Division of Cameroon imposes the need for monitoring.

9:00AM-9:15AM WBWEC/003/OC: Insight into the Urban Growth-Driven Degradation of Green Spaces in Lubumbashi (D.R. Congo): Spatial Analysis and Perception of Local Experts

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In urban areas, ecosystem services, ranging from environmental to aesthetical benefits for population, mostly rely on green spaces. In the city of Lubumbashi (DR Congo) however, the flourishing mining activities in recent years have led to an accelerated but uncontrolled urbanization, posing serious threat to green spaces in the city. Hence, questions over the place of green spaces in providing ecosystem services in Lubumbashi have been raised. Likewise, the degree of green spaces degradation, which could potentially reflect the likelihood of green spaces to provide ecosystem services, remained also unknown for the city. The present work was undertaken as an attempt to fill these gaps, with the ultimate aim to laying foundation for better policies of green spaces management in Lubumbashi. To get a better picture of the degree of green spaces degradation in the city, a municipality-scale analysis of spatial structure of green spaces was supported by data of ecosystem services as perceived by a group of local experts in thirty-eight green spaces along the urban-rural gradient.

Our results, based on data extended on a 25-years period of observation (1989-2014), revealed a common pattern in all the municipalities of the city, showing a regressive dynamic of green spaces in favor of built-up, which in addition to a rapid demographic pressure, is exacerbated
by a lack of appropriate program of green spaces preservation. Attrition, fragmentation and
dissection of green spaces patches on one side, and creation as well as aggregation of built-up
patches, on the other, have been identified as the predominant spatial processes of landscape
dynamics in different municipalities. Data of appreciation of ecosystem services by local experts
showed marked variations on remnant and introduced patches of green spaces along the urban-
rural gradient. In general, compared to other zones, the urban zone was deemed as providing
lesser ecosystem services, presenting green spaces of reduced acreages, most often characterized
by anthropogenic vegetation. Altogether, to enhance the ecosystem services of green spaces in
the city of Lubumbashi, the results of our investigations suggest a land management taking into
account both the socioeconomic context of population and the degree of urbanization of each
municipality of the city.

9:15AM - 9:30AM WBWEC/004/OC: Determination of Irrigation Water Using Soil
Properties, Climatic Conditions and Crop Characteristics in Rugeramigozi Marshland

*Yves Uwiragiye¹, Francois Xavier Naramabuye¹, Tamás Szegi² and Erika Michéli²

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Inadequate natural resources management is one of the causes of food insecurity which is a big
challenge in the world today. Human activities are causing environmental degradation because of
a high growing population in developing countries, unsustainable agriculture, greenhouse gases,
and urbanization. High demand for agricultural products in coming years will be met by using land
and water resources in a sustainable way, increasing soil fertility, and using efficiently irrigated land
in adequate way. Indeed, it has shown that irrigated agriculture is making a great contribution to
food security and is giving more than 40% of crop production. It has also doubled in the last 50
years. The problem of water management in irrigation projects is a critical issue in many cases
for too many farmers have a limited knowledge on the importance of soil properties on water
application and water use efficiency.

The main objective of this paper is to calculate the irrigation water needed by rice in its growing
season based on soil properties, crop characteristics, and climatic conditions in Rugeramigozi
Marshland. In addition to this proposed main objective, this research intended to describe and
classify the soil of cultivated land.

In order to achieve the objective of this research, soil profiles description, soil analysis, pedo-
transfer functions, soil classification and CROPWAT 8.0 and CLIMWAT 2.0 models of the Food
Agricultural organization (FAO) were used for finding irrigation water requirements.

The results of this research are that there was a significant correlation between soil properties (bulk
density, organic matter, and soil moisture potential) and gross irrigation. A significant relationship
was found with crop evapotranspiration with irrigation water requirement.

In conclusion, soil properties, climatic conditions, and crop characteristics showed a great effect on
the irrigation water requirement of a specific crop.
9:55AM-10:10AM WBWEC/005/OC: Study of Cultural Impact of ex-situ Conservation Facilities on the Population in the Lubumbashi Region and Perspectives for Growing Involvement of these Structures in information and Sensitization on Environmental Protection

Tshikung, Ki

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Democratic Republic of Congo is one of the regions of the world offering the most important biodiversity. However, as a consequence of the overexploitation of natural resources, mostly due to insufficient respect and ignorance of the legislation concerning environmental protection, forests biodiversity tends to deteriorate in the Congo.

Information and environmental education of urban and rural populations appear as essential to support in-situ conservation actions. This study took place in Lubumbashi. It revealed a deficiency in the common awareness of the legislation concerning environmental protection, the risk of disappearance and the conservation of endangered species. Furthermore, the cultural impact of ex-situ conservation structures in this region appeared as insufficient.

Finally, this study led to a project of global involvement of ex-situ conservation structures in the Lubumbashi region through information and sensitization actions for the whole Lubumbashi’s population, adapted to the target public and to the expectations of visitors, and sorted by priority.

10:10AM-10:25AM WBWEC/006/OC: Fecal contamination of water sources in and around volcanoes national park, Rwanda

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Background: Water borne diseases are a threat to wildlife and human population especially in Volcanoes National Park (VNP) which is home to critically endangered mountain gorilla (Gorilla beringeiberingei). The aim of this study was to assess the risk of disease transmission in human, gorillas and livestock due to fecal contamination of water sources in and around the VNP.

Method: Water quality assessment was conducted using IDEXX Quanti-Tray/2000 colilert testing system to quantify both total colifom and E-coli in water samples taken at Kazi, Susa and Mudakama.

Results: The water is highly contaminated with fecal materials; 58.13 % of all samples are positive for E-coli, by which one of them have the maximum concentration (>24196MPN/100ml). All samples were also positive for total colifom bacteria; where 41.86% have maximum possible counts (>24196MPN/100ml). Kazi River is the most contaminated, followed by Susa and lastly Mudakama. Altitude, distance from the park borders and water flow influence water quality in the sampled sites.
Implications: The high concentration of indicator bacteria in VNP was observed because it was in the summer. Kazi water was the most contaminated probably because of high nutrients loads predicted by its darkness (50% of sample are highly dark, while the other 50% are moderately dark).

Conclusions: Results of this study suggest that diseases are able to be transmitted between human, wild animals and livestock because of livestock farming practices carried out near the park in addition to other activities that bring people in wildlife habitat such as water collection, tourism and research. Future studies should be conducted in both rainy and dry season in order to confirm seasonal changes of water contamination in the studied area.

10:30AM-11:00AM Coffee Break

11:00AM-11:15AM WBWEC/007/OC: Performance evaluation of biogas system in Kiramuruzi sector

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Introduction and Objectives: The proper implementation of biogas technology system requires the collection and analysis of parameters affecting biogas production and causes of biogas failure in the area time series. This study introduces the current performance of existing biogas system in Kiramuruzi sector. The main objective of this study is the performance evaluation of biogas system in Kiramuruzi sector with the following specific objectives: Assessment on the design and structural integrity of biogas system, Assessing the operation, maintenance practices and causes for biogas failure, and to determine the optimum biogas operating parameters such as temperature, pH, retention time and moisture content in the area.

Methods: To achieve the above objectives, the study sampled 35 households. Primary data were generated from field surveys using questionnaires, key informant interviews and focus group discussions.

Results: The results of the study indicated that among the household visited, 42.85% had non-operational biogas units. Looking at digester size, 20% of the plants visited were not yielding enough gas to meet the user’s energy needs. Due to parameters like temperature ranging from 22.5-30.1oc instead of being 30-40oC, moisture content on 5.47 to15% instead of 50%, and the retention time of various volumes of flexi and fixed dome digesters ranges from 77 to 100 instead of being (60-66) days. The poor performance of the systems are related to insufficient water and feed materials, low level of awareness on biogas system and the lack of locally trained technicians for maintenance.
Conclusion: The connection of toilette to biogas system may help to raise the amount of feed material, harvesting rainwater to ease the mixing of feedstock.

11:15AM-11:30AM WBWEC/008/OC: Cheap Ceiling materials from Waste paper recycling as a solution to deforestation and waste management

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Background and Objectives: Despite advent in technological, paper is still used as a didactic material, in offices, packaging and card boarding. Paper manufacturing remains a major cause of deforestation, which affects global warming, and climate change. As a response to minimize deforestation and dirtiness caused by scattered papers, this research aimed at recycling waste or used paper and make affordable roof and wall ceiling materials. The same way, it aimed at defining exact water-cement mixing ratios in order to reach the desired strength for ceiling materials. The research aimed at assessing the material strength against cracks and its water absorption.

Method: The compression of the ceiling boards was done using manual hydraulic press due to lack of modern equipment. Deinking was not found a necessity.

Results: The resulted board produced with 100 \% fiber from waste paper, is nearly the same as the commercial fiber ceiling board. From different ratios, the compressive strengths vary between 600-660 Kpa. Water absorption test showed no impact of water upon the board unless is subjected to static water for 27 hours in cold places. These ceiling boards are not easily cracked upon fall or shakings.

Conclusion: Not only will this research contribute to the minimization of deforestation, but also medium income earners will afford the cost, thus getting rid of waste paper and preserve the environment. The other advantage of this paper recycling is that it can be recycled effectively up to five times, which is economically and environmentally significant. The recycling is not only focused on ceiling boards only, but also smart dustbins.

11:30AM-11:45AM WBWEC/009/OC: Wastewater reuse for irrigation and generation of energy: Case study of Musanze prison

P.M. Niyonkuru\textsuperscript{1}, D.Umutangampundu\textsuperscript{1}, A.G.Uwinema\textsuperscript{1}

\textsuperscript{1} V. Munyaburanga\textsuperscript{2}
**Introduction and Objectives:** Musanze Prison is generating a huge amount of wastewater, which, if treated, can be reused for agricultural activities and generate energy from biogas. The wastewaters affect the road where it is discharged, bad odor to the neighboring community and to the environment in general and to inmates in particular. The objective of this project was to quantify, characterize and treat wastewater generated by Musanze central prison for irrigation and energy generation.

**Method:** The prison is located in Muhoza sector, Musanze District, in Northern Province. Wastewater quantity was estimated as equal to 80% of total water consumption. Characterization was done based on checking the water parameters of importance for irrigation purpose where three samples of grey water were collected for analysis. They were analyzed for TSS, TDS, BOD and coliforms. For the treatment, the design of a decentralized wastewater treatment system (DEWATS) was suggested. DEWATS is a combination of 4 units which are: bio-digester, anaerobic baffled reactor, planted gravel filter and an aerobic polishing pond.

**Results:** After analysis, we found that the wastewater generated is 54.4m³/day. The TSS was found to be 520 mg/l and microorganism as Ecoli was found to be 80 CFU/100ml, green colonies 160 CFU/100 ml and proteus & salmonella 240 CFU/100ml. Based on the standards of water quality for irrigation purpose as per FAO, we found that the wastewater mainly the grey water from Musanze prison can be reused untreated and irrigate fodder crops or trees for ornamental purpose. However, DEWATS is suggested to treat the same combined with black water from the toilets to generate energy and reduce the amount of coliforms and suspended solids in order to meet the standards for irrigating vegetables likely to be eaten uncooked.

**Recommendations:** The collection and reuse of raw wastewater by using DEWATS provided in this work as a technology to generate biogas energy, reduce pathogens, other contaminants from the wastewater and later reuse it for irrigating edible crops like vegetables. So far, this project could be applied from small households to the higher institutions like hospitals, schools and prisons in order to improve sanitation, increase crop production and generate energy at the same time.

**11:45AM-12:00AM WBWEC/010/OC: Assessing cultural ecosystem services and human wellbeing in communities around Nyungwe national park, Rwanda.**

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**Background:** Cultural ecosystem services and their importance have been ignored and yet they are as important as any kind of ecosystem service. In developing countries conservation biologists...
have taken materialistic perspective and presented nature world as a source of materials to be managed sustainably, but people in these nations have their own cultural values and ethics which are related to aesthetic and spiritual attachments to nature, and this began to disappear in the face of absolutes of scientific and economic rationalism. The purpose of the study was to contribute to more effective conservation of biodiversity in protected areas in Rwanda through attention to cultural ecosystem services

**Methods:** We randomly selected 60 people from 60 families we reached them from their homes to identify cultural ecosystem services provided by Nyungwe National Park. We used questionnaires to interview people from Kitabi sector which is the immediate community around Nyungwe national park. The main themes of the questionnaire: what aspect of nature do people benefit from, how do these contribute to the wellbeing and to whose wellbeing?

**Results:** The study showed that no cultural activities going within the park. However, the park provided cultural resources that residents of Kitabi sector used in their villages. Twenty plants and eleven animals were mentioned to be culturally valued by the community. Sericostachys scandens ranked high (80%) as a culturally relevant because of its medicinal prospects of its leaves in preventing miscarriages in human and animals. Consequently, the myth that drives the values of Sericostachys scandens when it flowers also increases trespass into the Park and hinders its biodiversity.

**Recommendations:** The park management to choose a single day during flowering season of Sericostachys scandens and allow people who are interested to go pick the leaves under supervision of park management.

**12:00AM-12:15AM** **WBWEC/011/OC: Use of slow sand filtration system in the production of clean water for rural areas**

**Case study:** Huye District

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**Introduction and Objectives:** The SSF Technology is a new idea and unique in Rwanda, apparently improved yet adopted from Western Europe where its implementation yielded fantastic results. This research project outlines the purification of water in Kadahokwa River using Slow Sand Filtration in Gishamvu Sector, Huye district in the Southern province of Rwanda. The overall objective of this research is to design a proper SSF to help the population living nearby KADAHOKWA River to access safe treated water for domestic use. The specific objectives are to determine the quality of Kadahokwa River, design of Slow Sand Filter and finally to propose a proper implementation.

**Methods:** To achieve the above objectives, primary data were generated from field surveys, the study also conducted some laboratory works for the determination of the level dirtiness and the concentration of some impurities existing in Kadahokwa River. Volumetric method is used to determine the flow rate of the River.

**Results:** The measured flow rate was found to be 200l/hr, according to WHO standards the person
should consume the amount of water ranging between 20-30 liters per day. By multiplying with the number of population in the sampled area, the demand was calculated as follow: Quantity = 25l/c/d * 2840 persons = 71000 l/d. The area of the slow sand filter needed is 14.79m2. The amount of microorganisms found using the Coliscan Easygel test, showed the presence of 1440 particles of E-coli, proteus and salmonera in one liter of the sample.

Conclusion: Slow sand filtration is a type of water purification system that is simple and effective that use local material and knowledge. It promotes sustainable participation of local population in the operation and maintenance of the infrastructures of the project.

12:15AM - 12:30AM  WBWEC/012/OC: Heavy Metal Removal by Combining Anaerobic Upflow Packed Bed Reactors with Water Hyacinth Ponds

Sekomo, Birame, Christian a,b; Kashiga, Vedaste c; Rousseau, Diederik b; Lens, Piet b;

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The removal of four selected heavy metals (Cu, Cd, Pb and Zn) has been assessed in an Upflow Anaerobic Packed Bed reactor filled with porous volcanic rock as adsorbent and attachment surface for bacterial growth. Two different feeding regimes were applied using low (5 mg.L-1 of heavy metal each) and high (10 mg.L-1 of heavy metal each) strength wastewater. After a start up and acclimatization period of 44 days, each regime was operated for a period of 10 days with a hydraulic retention time of 1 day. Good removal efficiencies of at least 86 % have been achieved for both low and high strength wastewater. The bioreactor performance was not much affected when the columns were operated under high strength heavy metal concentration. A subsequent water hyacinth pond with a hydraulic retention time of 1 day removed an additional 61 % Cd, 59 % Cu, 49 % Pb and 42 % Zn, showing its importance as polishing step. The water hyacinth plant in the post treatment step accumulated heavy metals mainly in the root system. Overall metal removal efficiencies at the outlet of the integrated system were 98 % for Cd, 99 % for Cu, 98 % for Pb and 84 % for Zn. Therefore, the integrated system can be used as an alternative treatment system for metal-polluted wastewater for developing countries.

DAY 3: 12:30 PM-12:45 PM

WBWEC/013/OC: Investigation of microbial films in biofilters for wastewater treatment

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The purpose of this work was to study microbial films and analyze the development of nitrifying microorganisms in the process of biofiltration of wastewater. Laboratory biofilters for the cultivation of biofilms and treatment of a model wastewater solution, as well as biofilm samples formed in the process of biofiltration of a model solution of municipal wastewater, served as research objects. In the course of the research, the results of the introduction of a cumulative culture of nitrifying microorganisms into the biofilm composition were analyzed. The analysis of biofilm samples was carried out based on the results of their fluorescent in situ hybridization (FISH).

According to the results of quantitative analysis of microbial cells and their clusters, the efficiency of the process of introduction of nitrifying bacteria into the biofilm composition after 2 weeks was 14 to 32%; this was determined by the increase in the number of nitrifying bacteria.

In the composition of nitrifiers in both biofilters, the predominant development of nitrite-oxidizing microorganisms was observed in comparison with the development of ammonium-oxidizing bacteria.

It was shown that the number of nitrifying microorganisms of both phases of the process in the last sections of the biofilters was larger (from 5 to 30%), than in the first sections of biofilters (along the flow of the liquid). In our research an accumulation of nitrates in the process of nitrification was not observed, which may be due to the fact that in the dense layers of biofilm the process of denitrification that determines the consumption of nitrates can develop. During the preparation of biofilm samples for microscopy and identification of microorganisms, it was shown that ultrasound treatment with a frequency of 40 kHz for 3 minutes can be effectively used for the disintegration of microbial aggregates with further identification of native individual cells by their molecular biological analysis and specific microscopy.

SESSION IX: SOCIAL, ECONOMIC SCIENCES AND BIOTECHNOLOGY

8:00AM-8:25AM Plenary Keynote Address keynote24: Prof. Bucagu Charles

8:30AM-8:45AM SSB/001/OC: Malnutrition and Oral Health Interdependence in the Era of Market Globalization

1Chrispinus Hakimu Mumena*, 1Agnes Gatarayiha and 2Mohammed S Razzaque

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Poor oral health causes malnutrition, which in turn leads to poor oral health. Worldwide, malnutrition is a problem for both children and elderly. Two types of malnutrition exist, nutrition deprivation and excess. On-going urbanization and economic development are associated with rapid changes in diets and lifestyle. Those changes shift human dependence from natural food to processed foods. The quality and quantity of micronutrients in processed foods is questionable.
The role of micronutrients in oral health continues to be appreciated. The role of vitamin D has recently been revealed to have paramount effects in oral health, tissue development, reduction of inflammation, reduction of dental caries and periodontal diseases. Is market globalization and urbanization supportive to oral health? More attention is needed to assess oral health in relation to human diet and behavior.

**The study question posed was:** Are oral diseases increasing with changes in diet and life styles? The methodology followed was a retrospective review of the existing literature on oral health, nutrition and life styles utilizing a PubMed search through Google Scholar search engine. Key words were: malnutrition, oral health, dental caries, and periodontal diseases. Only English language and articles within the last 10 years were considered for inclusion. Titles and abstracts were evaluated if they contained sufficient information on the association of nutrition and oral health.

We conclude that diet and nutrition affects oral health in many ways, such as craniofacial development, oral cancer, and oral infection. Dental diseases such as dental caries, developmental defects of enamel, dental erosion, and periodontal diseases may become the new challenge on top of HIV.

**Our recommendations are:** Encourage natural diets with good nutritional values; raise awareness to promote breast-feeding; reduce teeth exposure to sugary substances; advise reduction of consumption of sugary soft drinks that are a major risk factor in dental caries and dental erosion; reduce alcohol consumption and cigarette smoking; advise exposure to sunlight at least 20-30 minutes per day (between 11:00-3:00), to enrich the body with sufficient Vitamin D.

8:45AM-9:00AM  SSB/002/OC: The Disease Burden of Non Communicable and Infectious Diseases in Neglected Populations: A Cross-Sectional Study of Prisons in Post-Conflict Northern Uganda

Kamurari* S, Laker GF, Eromu I, Ochaya M, Wokorach D, Akera P and Oboke H. Gulu University, Uganda

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The world population of prisoners is ever increasing with the largest percentage of these in developing countries where social systems are poor. In Uganda, congestion rates are estimated at 162% with overwhelming communicable diseases, mental Illness, and women-related challenges. Our objective was to determine the health care problems in prisons and their likely impact on prisoner rehabilitation in a post-conflict district of Gulu, Northern Uganda.

We carried out a cross-sectional study in three Prisons in Gulu District. Prisons were selected by a proportionate stratified sampling strategy. In each prison, we selected participants by simple random sampling. We collected data using a semi-structured questionnaire designed for the study, and analyzed quantitative data using the statistical package SPSS 16. Qualitative data was collected in key informant interviews.

The results indicated that of the 278 participants, most prisoners were youth (60.9%), awaiting trial (66.3%), and most had already spent 1-5 years (59.4%) in prison. Congestion rates were as high as 325%. Two-thirds (67.6%) of the prisoners reported poor sanitation and highly prevalent communicable diseases. The commonest infections cited were: outbreaks of eye diseases, diarrhea diseases, and Malaria. Other Infections included Hepatitis, Tuberculosis and HIV. The participating
prisons lacked isolation units and sickbays. Over ninety percent (92.6%) of the prisons had inadequate healthcare with many citing lack of drugs and personnel. One in 7 respondents (13.9%) suffered from mental illness before custody and 62.5% had not received adequate psychiatric care. Almost seventy percent (69.4%) of the respondents had experienced a traumatizing event, especially armed conflict and the majority reported frequent recall of the event (87.9%). Over seventy percent (72.5%) of the respondents reported having psychological distress in prison and 90.5% of these required psychiatric assessment on SRQ-20. Forty-five percent (45.8%) had suicidal ideation. Among females, 52.2% had children in prison with 85.7% citing dire living and health conditions for both populations.

Several factors affected the rehabilitation process including, health, time on remand, living conditions and level of psychological distress. The findings of this study indicate inadequate services in the participating prisons with a burden of both infectious and noncommunicable diseases affecting prisoner rehabilitation.

9:00AM-9:15AM SSB/003/OC: Socio-economic analysis of rwasave aquaculture station to the local communities of ngoma and save sectors

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The benefits of aquaculture in rural development relate to health and nutrition, employment, income, reduction of vulnerability and farm sustainability. Considered as a profitable station, Rwasave aquaculture station has developed quickly in recent years; aquaculture has created several jobs, income, and development in culture techniques for local residents as well as contributed significantly on economic development of sectors it belonged in.

This study was conducted to evaluate the socio-economic analysis of Rwasave aquaculture station to the local communities of NGOMA and SAVE sectors. To generate information essential for knowing the socio-economic analysis of Rwasave aquaculture station to rural communities, a data collection survey was carried out. The primary data were obtained from 50 respondents with structured interview guides, which were selected using Purposive sampling technique.

The results reveals that the majority (64.0%) of the people were male while (36.0%) were in the active age distribution of 21-30 years, (26.0%) of the respondents were agriculturists and students as primary occupation while only(12.0%) were fisherman as primary occupation. Results of the study showed that there was a significant gap in the collaboration between Rwasave aquaculture station and the local communities of NGOMA and SAVE sectors where 100.0% of all respondents said that there are no extension services that are offered by the station and results from the respondents showed that people are more in need of those extension services where trainings and Farm visit came with percentage of 70.0% and 64.0% respectively. Implications of these findings were critically examined, and pertinent recommendations were proffered based on the salient findings in the study.
9:15AM-9:30AM  SSB/004/OC: A psychological look at sickle-cell anemia in the Great Lakes region: Case of Lubumbashi

By Kasongo Maloba Tshikala Philippe, PhD - University of Lubumbashi – DR Congo

Clinical Psychologist & Associate Professor in the Faculty of Psychology and Educational Sciences. His interest is in the qualitative approach, in helping relationships, in active and sympathetic listening for those who are suffering.

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Mode of presentation: Platform

Sickle-cell anemia is a genetic disorder which rages the world and especially in Africa. In the DR Congo, it affects more than 20 million people (Le Potentiel, 2012). Studies realized in Lubumbashi (Ya Pongombo Shongo & al., 2013, Luboya & al., 2014) show that, in the absence of routine neonatal screening, diagnosis is often made with a call sign, and sickle cell sufferers are stigmatized, and they have difficulties in social and educational integration. In the framework of the development research project on the management of sickle-cell anemia in Kisangani (Marini & Batina, 2017), the objective of this study is to verify the existence of a community of culture between therapists and patients (Delay & Pichot, 1967), or with their families, i.e. whether the different actors have the same conceptions of sickle cell disease, its causes and its treatment. The lack of knowledge about the disease and the lack of screening lead some patients to die before five years old. As this descriptive study, the interviews with some families from April to July 2017, followed by the thematic analysis, revealed a lack of knowledge of the disease, its causes and its detection by most families, demonological causation is favored. It was found that most do not even know their blood groups until the day of their marriage. The lack of adjustment between therapists and patients is a major difficulty in the supporting. The patient’s experience is tinged with stigmatization, it generates the physical as well as the psychological exhaustion of the patient’s family. Preventive measures, in some cases, refer to prenuptial consultation to control the risk of the disease on the offspring. In the end, interest should be directed not to the disease but to the patient. It is then necessary to privilege the bio-psycho-social model which integrates the biological, psychological and social dimensions of the disease, one to the other.

9:30AM-9:45AM  SSB/005/OC: Forest Management Agreements as a Land Use Planning Model for Wildlife Conservation: An Analysis of the Malawian Implementation Framework

Felemont Kayulayula Banda.

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Land use planning is central to environmental conservation in general and to wildlife conservation in particular. There are several land use planning models which are used for the conservation of the environment. These models are found in various legislative frameworks. Some are coercive in nature whereas some are collaborative.
The general objective of this study was to investigate whether forest management agreements are an effective land use planning model for wildlife conservation in Malawi. The operating assumption was that, collaborative approaches are more effective land use planning models relative to coercive or penal approaches.

Data for the study was collected using mixed methods. Questionnaires were administered to forestry officials, local community leaders of the areas where conservation areas are located, and to households surrounding the conservation areas selected at random.

The findings from questionnaires were compared with data collected through focus group discussions and key informants. Results of the study show that forest management agreements as a land use planning model has a high potential for wildlife conservation in Malawi. However, its effectiveness is affected by lack of follow-up on the agreements by government officials.

The paper concludes by arguing that forest management agreements are an effective land use planning model for environmental conservation where there is commitment from both government authorities and local community conservation stakeholders. On this basis, the paper proposes that more effort should be directed towards the establishment of these forest management agreements as a land use planning model than relying on penal approaches which are currently the preferred and most prevalent approaches of wildlife conservation.

9:45AM-10:00AM  SSB/006/OC: The ‘Paddy Paradox’ Revisited: How Rice Farming Impacts on Household Economic Status and Malaria Risk in Eastern Rwanda

*Alexis Rulisa¹², Fred Kaatera¹³, Chantal Ingabire¹⁴, Emmanuel Hakizimana¹⁵, Michele van Vugt⁶, Leon Mutesa¹⁷, Luuk van Kempen²

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Economic activities may entail negative externalities for public health, which is particularly problematic in poverty-stricken areas with few alternative livelihood options. The case of rice farming in eastern Rwanda fits this description, as it provides breeding sites for malaria-infested mosquitoes but at the same time generates cash income and improves nutritional standards locally. These economic benefits may in turn reduce malaria incidence through channels such as better housing and higher investment in prevention, even though people are at a higher risk due to an expansion of the mosquito population. This so-called ‘paddy paradox’ has been observed in a number of studies, but its prevalence is disputed. We add to the evidence base on the ‘paddy paradox’ by studying a case in Eastern Rwanda (Ruhuha district of Bugasera province).

The study unpacks the impact of rice cultivation on malaria incidence by comparing households that differ in their involvement in rice cultivation and proximity to the marshlands that host the rice fields. To this purpose, a large-scale survey was conducted among more than 4,000 households
(comprising 17,000 individuals) in the area from June to December 2013. Data on household demographics, economic status, malaria prevention efforts as well as health-seeking behaviour has been collected. All household members have also been screened for malaria parasitemia and anaemia, and a malnutrition assessment was carried out for under-five children. In addition, qualitative data was collected through nine focus group discussions and a set of key informant interviews. The study takes a distinct mixed methods approach by carefully triangulating the qualitative and quantitative material obtained.

It is shown that rice farming is positively and significantly associated with households’ wealth, food security, health insurance status, and protection against malaria. At the same time, it is confirmed that rice farming practices increase the risk of malaria transmission through expanded mosquito populations. Rice fields are the main breeding site in the area. Households located nearby the marshlands where rice is cultivated are the most affected by malaria. For those households who generate income from rice production directly, the income effect dominates, resulting in a lower disease burden from malaria. By contrast, households in communities that are located close to the rice cultivation areas but who do not participate in this economic activity, face a higher malaria burden.

We conclude that rice farming leads to private benefits in the economic domain, which spills over into the health domain, but at the same time creates a public health risk. As a result, the ‘paddy paradox’ hypothesis is confirmed at the level of rice-producing households, but rejected at the wider community level. Hence, strategies need to be developed that are able to tap the private benefits of rice cultivation and re-direct these to fund collective action against malaria. The paper explores various modalities that are potentially capable of doing so and discusses their financial and organizational feasibility.

10:00AM-10:15AM SSB/007/OC: Community-Based Biological Control of Malaria Mosquitoes Using Bacillus thuringiensis var. israelensis (Bti) in Rwanda: Community Awareness, Acceptance and Participation

*Chantal Marie Ingabire, Emmanuel Hakizimana, Alexis Rulisa, Fredrick Kateera, Bart Van Den Borne, Claude Mambo Muvunyi, Leon Mutesa, Michelle Van Vugt, Constantianus JM Koenraadt, Willem Takken, and Jane Alaii.

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Targeting the aquatic stages of malaria vectors via larval source management (LSM) in collaboration with local communities could accelerate the progress towards malaria elimination when deployed in addition to existing vector control strategies [indoor residual spraying (IRS) and long-lasting insecticide treated nets]. However, the precise role that communities can assume in implementing such an intervention has not been fully investigated in a systematic way, because most interventions employed vertical management of the intervention.

This study investigated community awareness, acceptance and participation in a study that incorporated the socio-economic and entomological impact of LSM using Bacillus thuringiensis var. israelensis (Bti) in eastern Rwanda, and identified challenges and recommendations for future scale-up.
The implementation of the community-based LSM intervention took place in rice fields of Ruhuha, Rwanda, from February to July 2015. The intervention included three arms: control, community-based (CB) and project-supervised (PS). Mixed methods were used to collect baseline and end-line socio-economic data in January and October 2015. A baseline quantitative survey included a random sample of 320 rice farmers and a cross section of community members (45) distributed in five focus group discussions (FGDs). Ten FGDs were conducted with 92 participants overall for the end line study.

Our results indicate that a highly perceived safety and effectiveness of Bti was reported in the quantitative survey at the start of the intervention, despite a low level of awareness. Being aware of malaria symptoms, and perceiving Bti as safe on other living organisms, significantly increased the likelihood for community participation through investment of extra labour time for Bti application. On the other hand, the likelihood for community participation was lower if respondents (1) perceived rice farming as very profitable, (2) provided more money to the cooperative as a capital (more than 3000 RWF) and (3) were already involved in rice farming for more than six years. Following six months of community-based Bti application, an increase in knowledge and skills regarding Bti application was reported. The community perceived a remarkable reduction in mosquito density and nuisance biting in treated arms. No major differences were reported across the three Bti intervention arms in terms of the implementation, however, newly identified water dams were reported and sprayed in CB when compared to PS. Main operational, seasonal, and geographical challenges included manual application of Bti, long working hours, and need for transportation means for reaching the fields. Recommendations were made for future successful Bti program implementation including addressing the above-mentioned concerns, a wider scale-up of the intervention, and government adoption of LSM as part of its vector control strategies.

We conclude that community awareness and support towards LSM increased following Bti application. A high effectiveness of Bti in terms of reduction of mosquito abundance and nuisance biting was perceived. The study confirmed the feasibility of community-based LSM interventions and served as evidence for future scale-up of Bti application and adoption into the Rwandan national malaria vector control strategies.


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Improper implementation of peatland forest activities has altered the forest ecosystem resulting to near extinct or degradation of the peatland forest and its biodiversity. To salvage the endangered peatland forest, the government of Indonesia set regulations imposing strict rules on peatland forests. These regulations banned the commercial or large scale use of forest timber products leading to permanent closure of all timber related companies. The loss of jobs by the people
who benefited directly or indirectly from the companies was the major consequence. In return the people focused on ecosystem services (ES) use for home consumption. Fish catch from the natural ponds in the forest recorded the highest caught provisioning service by the riparian communities leading to overfishing.

This research focuses on stakeholder attribute analysis for successful management of the aquaculture projects to ensure enhancement of provisioning services (fish) in the streams, ponds and rivers in the peat forest by providing an alternative source of fish to the community in a case study of Hampangen village, central Kalimantan in Indonesia.

The exclusive features in our analysis shows that the income of the stakeholders or their educational level do not necessarily influence their roles and position in the leadership network nor do they determine the ES usage from the forest. This research challenges the mainstream understanding on stakeholders’ selection based on educational background or income levels.

10:30AM-11:00AM Coffee Break

11:00AM-11:15AM SSB/009/OC: Estimation of Water footprint of Coffee production in Rwanda

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Introduction: Available data shows that Rwanda is water scarce. Its per capita fresh water availability is less than 1000m³, which is about a quarter of Africa’s average of 4000m³. Rwanda being a developing country should set-up its investments taking into consideration its freshwater scarcity with a limited annual availability and a growing demand especially for commercial agriculture.

Purposes: This study seeks to estimate the water footprint of coffee production in Rwanda to ensure it is efficient, effective and sustainable and within the acceptable norm. The purpose of the study is to establish all stages undertaken to produce 1 ton of coffee and identify water consumption at each stage given Coffee’s hidden consumption of water.

Method: The WF is a multidimensional indicator, showing volumes but also making explicit the type of water use: evaporation of rainwater (green), surface water or groundwater (blue), or pollution of water (grey). To achieve the above purposes, the study sampled 20 people including Akagera Coffee farmers, processors and quality managers plus the CEO himself, where data were generated from interviews and questionnaires and also where our observation was of a great help to match the answers with the reality. The place was chosen given its great performance despite its newness in the market place because women and men work hardly together to level up their standards of living, also the CROPWAT model was used to determine crop water requirement for coffee production during one complete season. These provided all information on all stages in coffee production that generate water consumption, the stages of focus included; production
Results: The green + blue water footprint for plantains in Rwanda (crop consuming the largest green water e.g.: coffee, rice, wheat,...) is of 1663 m³/ton of production while the green + blue water footprint of coffee production in ACP is 7381 m³/ton, it is obvious that the water footprint of the coffee production in ACP is almost 5 times the normal footprint of plantains in Rwanda.

Conclusion: The Akagera Coffee Production has relatively high water consumption even without taking into consideration the grey water footprint, the indirect water used and consumed in the supply chain of the manufacturing of machines or tools used in the coffee production, water used and consumed by the farmers in ACP for drinking, hygiene or sanitation.


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Introduction and Objectives: The EDPRS 2 which runs from 2012/13- 2017/18 has set very ambitious targets for the water supply and sanitation sector, aiming to achieve 100% coverage rate by 2017, in which it is targeting to reach 100% of rural population within 500m of an improved water source by 2017. This study main objective is to design an efficient water supply system which pumps spring water using solar energy for Akarugiranka village of Tumba sector, Huye district in the Southern Province with the following specific objectives: quantifying access to improved water supply in Akarugiranka village, design an appropriate water supply system and conduct a cost benefit analysis of this system.

Methods: To achieve the above objectives, the study sampled 412 households. Primary data was collected through topographic survey, solar radiation data from FAO CLIMWAT 2. Software like Autocad and ArcGis was also use.

Results: The results of the study indicated that among the household visited, 301 people had no access to improved water supply with Total daily water demand of 9024L/day. A 3 days storage tank capacity of 27070.32 liters was designed. The spring yield was 35 l/min which required the storage reservoir at the intake of about 2242.613 liters. Submersible Solar Water Pump by Sun Pumps (SCS8-410-120 BL) powered by 5 Hyundai Solar Modules (Hyundai HiS-S350Ti> 350 W mono solar panel) was chosen. Solar powered water supply system implementation cost was $14,040.3031 (11,513,048.54 Rwf) compared with $16,644.00318 (13,648,082.6 Rwf) for electrical water pumping system.

Conclusion: This system is feasible with 25 years as life span. It is of little cost compared to...
the other kind of pumping systems which exist in Rwanda, more especially electricity where the breakeven point of electrical pumping to solar pumping system is 3 years. After 3 years, i.e. within 22 years, electrical system will consume $38500 over solar system. If solar water pumping system is made available, drinking water crisis will be solved in this village and in rural areas in general.

11:30AM-11:45AM SSB/011/OC: Environmental impact assessment and land suitability of Nduba landfill in Gasabo district

I. C. Byamungu¹, G. Umwiza¹
V. Munyaburanga²

Introduction and objectives: With the rapid growth of the population and the urbanization of the city of Kigali, waste management has stood out to be a major concern. This prompted the city of Kigali to establish a landfill in Nduba sector, Gasabo district. But due to lack of financial means, lack of appropriate technology the results towards waste management have been far from satisfactory. This study is an evaluation of the present state of the Nduba landfill. The objective was to perform an environmental impact assessment and land suitability of the Nduba landfill.

Methods: Methods used were as follows, to assess the environment impact we used the monavari 95 method which is a set of different parameters that are evaluated and classified as acceptable or unacceptable. For land suitability we used a method entitled regional screening method. This method consist of evaluation a range of criteria describing suitability of an area to a landfill.

Results: After our study only 11.62% of all parameters were classified as excellent, 16.27% as good 16.27% as fair, 4.65% as negligible, 2.32% as weak, 11.62% as almost unsuitable, 13.95% as unsuitable, 18.6% as very unsuitable.

Key findings noted were the emissions of landfill gas into open air, possible contamination of ground water as pits used to collect liquid waste don’t have leachate barrier system.

Conclusion: With emission of landfill gas into open air this contributes to the climatic change as it comprises methane, CO2. With possible contamination of the ground water in the area, health problems can arise due to the use of water from wells connected with the ground below Nduba landfill.
Key Concepts from the Political Economy of Health Literature: Implications for Study of the African Health Scene

Dennis Raphael, PhD

A number of key concepts have emerged from the political economy of health literature which may have relevance for the study of the African health scene. These include concepts from the welfare state literature such as decommodification, stratification, and the relative responsibility ascribed to the State, marketplace, and family in allocating economic and social resources.

Other concepts include issues of power and influence of various sectors such as the corporate and business sector, civil society and the labour sector. These concepts have proven useful in making sense of the overall health of a nation as well as the extent of health inequalities in western nations. The relevance and implications of these concepts for understanding and advancing the health situation in Africa will be the focus of this presentation.
SESSION I: Non - Communicable Diseases

NCD/001/PC: Classification of stages of severity of hypertensive retinopathy using Wong-Mitchell among patients with acute stroke at teaching hospital of kinshasa

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Background: The Kinshasa experience on retinal research reports that Keith-Wagner scores 1-4 hypertensive retinopathy (HR) is incompletely differentiated in terms of severity.

Objective: The objective of the study tested whether Wong and Mitchell (W-M) mild, moderate, and severe hypertensive retinopathy (HR) forms are completely classified among Central Africans with acute stroke according to atherosclerosis.

Methods: 124 patients with acute stroke and W-M HR mild, moderate, and severe to be classified using univariate ANOVA and multivariate discriminant Analysis (DA) by heart rate, creatinine, glucose, Body Urea Nitrogen (BUN), NonHDL, TC/HDL-C, TG/HDL-C, and LDL/HDL-C ratios were admitted at the Division of Ophthalmology, Kinshasa University clinics, DR Congo.

Results: Patients with hypertensive Retinopathy less aged = 55.8±11.6 years than normal retina aged = 62±13 years; P=0.015, sex ratio: 2 man : 1 woman. Mean values of all markers varied significantly across W-M HR forms in 124 patients. However, after adjusting for TC/HDL-C, using DA, the majority of markers such as TG/HDL-C, heart rate, BUN, Creatinine, LDL/HDL-C, NonHDL, and glucose significantly (Box’s M = 214.734; P<0.0001) differentiated mild, moderate, and severe W-M HR (Function 1 with Eigenvalue = 3.206, variance = 86.4%, and canonical correlation = 0.873; Wilks’Lambda = 0.158; P<0.0001 Function 2 with Eigenvalue = 0.503, variance = 13.6%, cumulative variance = 100%, Canonical correlation = 0.579; Wilks’Lambda = 0.665; P<0.0001).

Conclusion: Wong and Mitchell hypertensive retinopathy severity is well classified and a structural marker of atherosclerosis and KDF in Central Africans.

NCD/002/PC: Hemorrhagic Stroke Defined By Factor Analysis with Keith-Wagner Grades Of Hypertensive Retinopathy At Teaching Hospital Of Kinshasa, Dr Congo

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Background: There is no valid published data about comorbidity of Stroke and hypertensive Retinopathy in Kinshasa, DR Congo (DRC).

Objective: This study aimed to characterize hemorrhagic stroke (HS) through clustering age,
hemodynamic, atherogenesis, and Keith-Wagner (KW) scores.

**Methods:** This consecutive series included 82 HS cases confirmed by CT Scan at TH between 2015 and 2016. Age, other markers of atherogenesis, arterial hypertension duration, and K-W Retinal scores 1-4, were considered using Factor Analysis for components.

**Results:** HS stroke was defined by total variance explained 67.6% with 4 components according to Eigen value and principal component analysis and Rotation Method varimax with Kaiser Normalization: Component 1 (creatinine, TG, Keith-Wagner Retinal scores, LDL-C, HDL-C, Heart rate, and Age); Component 2 (FPG, Arterial Hypertension duration, and Heart rate), Component 3 (pulse pressure, and Body Urea Nitrogen), and Component 4 (TC and age).

However, in considering atherogenicity index, Hemorragic stroke was defined by total variance explained 69.1% with 4 Components according to Eigen value and principal component analysis and Rotation Method Varimax with Kaiser Normalization: Component 1 (TC/HDL-C ratio, NonHDL, and LDL/HDL-C ratio); Component 2 (FPG, arterial hypertension duration, and Heart rate); Component 3 (Age, creatinine, and TG/HDL-C ratio), and Component 4 (PP, and Keith-Wagner Retinal scores).

**Conclusion:** Atherogenicity indexes were the best markers to characterize younger patients with lower Keith-Wagner scores (1-2) hemorrhagic stroke. Ophthalmologists must be integrated in the management of stroke and severe, uncontrolled or unknown arterial hypertension at TH.

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**NCD/003/PC: Ageing For Ischaemic Stroke Defined By Factor Analysis With Keith-Wagner Grades Of Hypertensive Retinopathy At Teaching Hospital Of Kinshasa, Dr Congo**

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**Background:** There is no valid information on comorbidity of Ischaemic Stroke (IS) and hypertensive Retinopathy (HR) in Kinshasa, DR Congo (DRC).

**Objective:** This study aimed to characterize IS stroke through clustering age, hemodynamic, atherogenesis, and KW scores.

**Methods:** This consecutive series considered 57 IS cases confirmed by CT Scan at TH between 2015 and 2016. Age, heart rate, creatinine, Fasting Plasma Glucose (FPG), Body Urea Nitrogen (BUN), pulse pressure, biologic atherogenicity indexes, total cholesterol (TC), HDL-C, LDL-C, Triglycerides (TG), arterial hypertension duration, and K-W Retinal scores were considered using Factor Analysis for components.

**Results:** IS was characterized by total variance explained 60.5% with 4 Components according to Eigen value and principal component analysis and Rotation Method Varimax with Kaiser Normalization: Component 1 (BUN, TC, LDL-C, K-W scores, arterial hypertension duration, and TG); Component 2 (creatinine, HDL-C, and K-W retinal scores); Component 3 (Age); Component 4 (Heart rate and PP).
However, in considering atherogenicity index, IS was defined by total variance explained 64.3% with 4 Components according to Eigen value and principal component analysis and Rotation Method Varimax with Kaiser Normalization: Component 1 (TC/HDL-C, KW Retinal scores, NonHDL, TG/HDL-C ratio, and creatinine), Component 2 (LDL/HDL-C, Body Uea Nitrogen, and creatinine); Component 3 (Age), Component 4 (Heart rate and PP).

**Conclusion:** Atherogenicity indexes were the best markers to characterize elderly patients with IS and severe KW scores 3-4 HR. Ophthalmologists must be integrated in the management of stroke and severe, uncontrolled or unknown HR.

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**NCD/004/PC: Classification of Glomerular Hyperfiltration, Normal Glomerular Filtration, Kidney Dysfunction Stages by Body Composition, Siriraj Score, Keith-Wagner Score, Hemodynamics, and Atherogenicity Indexes**

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**Objective:** To discriminate Kidney Dysfunction (KDF) forms in Hypertensive Retinopathy (HR).

**Methods:** 124 patients admitted within the Departments of Internal Medicine and Ophthalmology at the Teaching Hospital (TH) of Kinshasa, between 2015 and 2016. KDF was defined by creatinine clearance (Ccr) disorders: glomerular hyperfiltration (Ccr ≥ 125 mL/min; n=31), Normal filtration (Ccr = 90-124 mL/min; n= 30), CKD (Ccr = 60-89 mL/min; n= 32), CKD (Ccr = 30-59 mL/min; n= 30), and CKD (Ccr < 30 mL/min; n= 28), using univariate ANOVA and multivariate DA.

**Results:** Age, heart rate, HDL-C, LDL-C, TG, hypertension duration, Keith-Wagner (KW) grades, TC/HDL-C, TG/HDL-C, and LDL/HDL-C ratios varied significantly (p<0.05) across KDF forms: highest values of heart rate, HDL-C, and LDL-C related to glomerular hyperfiltration, and highest values of TG, KW grades, TC/HDL-C, TG/HDL-C linked to CKD Ccr < 30mL/min.

After adjusting for confounders using DA, only TG/HDL-C (tolerance = 0.964; F to remove = 8.530 and Wilks' Lambda = 0.637), LDL/HDL-C ratio (tolerance = 0.856; F to remove = 5.528 and Wilks' Lambda = 0.594), and TC/HDL-C (tolerance = 0.846; F to remove = 5.018 and Wilks' Lambda = 0.587) did discriminate KDF forms (Lambda = 0.515; p<0.0001; Eigen value = 0.002, cumulative variance = 100%; Canonical correlations = 0.042).

**Conclusion:** Ophthalmologists are not integrated in the management of hyperfiltration (Ccr ≥ 125 mL/min) and terminal KDF and markers of atherogenesis at mild and severe HR in Kinshasa, DRC.
NCD/005/OD: A pilot study on metabolic newborn screening in Rwanda

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Newborn screening refers to the practice of testing given within the first few days after birth for certain life threatening disorders that cause severe health problems if they are left undetected. These are inherited conditions including mainly metabolic disorders, hence the term "inborn errors of metabolism", but also endocrinological and hematological disorders without forgetting hearing loss and perinatally acquired infectious diseases. New Born Screening (NBS) aims at detecting and treating these disorders before clinical manifestations appear; given that they are generally rare and not apparent at birth. Fortunately, their long-term complications can be reversed by their early detection and timely management. From its inception in the early 1960s, NBS has made considerable advances (especially over the last two decades with the advent of tandem mass spectrometry technology) with regard to number of disorders screened for and coverage at individual country level and worldwide; the advantages and cost effectiveness of these programs have made their practice a routine care of the newborn infant in many developed parts of the world. Unfortunately, the NBS programs do not exist in Rwanda, and no specific data is available to facilitate their implementation. It is thought that a number of children with such undetected disorders go undiagnosed and are therefore likely to suffer from their long-term complications resulting in heavy burden to the families and strain the country’s limited resources.

Our current project aims at piloting NBS for two metabolic disorders, the congenital hypothyroidism (CH) and congenital adrenal hyperplasia (CAH), which seem to be frequent in African population but with good therapeutic outcomes in order to obtain baseline data regarding the incidence and clinical phenotype of CH and CAH present in a large cohort of infants in Rwanda. Additionally, the study assesses the feasibility of introducing a successful programme in Rwanda. The rationale of focusing on these disorders includes the fact that they can currently be treated in Rwanda, thus eliminating any ethical issues that might arise with identifying a disorder that cannot be practically addressed from a clinical perspective. Given that there is recent data concerning sickle cell disease, it is not be targeted in this pilot project.

**METHODS**

This research study utilizes a cross-sectional design with both descriptive and analytical components and will take a period of 12 months to be completed.

To ensure feasibility given the size of the country and the complexities involved in supervising data gathering at distant hospitals, the research team will enroll and collect samples at 5 hospitals in Kigali, the capital city of Rwanda during the pilot (all within 15 minutes drive of Rwanda Military Hospital (RMH) to serve as the main laboratory, 3 District Hospitals (namely Masaka, Kibagabaga and Mahima), and finally Kigali University Teaching Hospital. A total of 5,000 Rwandan newborns 5 – 8 days of age that meet the inclusion criteria, will be identified by nurses at their maternity birth site during the 12 months of study. With the signed consent form of one of their biological parents, the babies will be recruited, enrolled and screened for congenital hypothyroidism and congenital adrenal hyperplasia.

A few drops of blood from a heel prick are collected by a trained nurse or mid-wife onto filter paper and correctly dried in air at room temperature for a few hours before being sent to the laboratory at RMH. Three trained laboratory technicians will process the samples at a rate of up...
RESULTS and CONCLUSION

The preliminary results of this study show that the findings will both be useful in advancing scientific knowledge and in policy making with regard to congenital hypothyroidism (CH) and congenital adrenal hyperplasia (CAH). If differences in incidence are found in this African cohort relative to existing data from developed countries, additional research projects will be pursued in this direction.

NCD/006/PC : Epigenetic Mark Erasing In Childhood Chronic Disorders

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Certain early childhood onset chronic disorders become less severe and less frequent or are “outgrown” with advancing age even in individuals of the same genetic makeup living in dissimilar environments or individuals with dissimilar genetic makeup but live in the same environment. It is an established clinical knowledge that certain chronic early childhood disorders including allergic, immunologic, infectious, respiratory, gastrointestinal, neurodevelopmental and rheumatological disorders are “outgrown” or become milder by late childhood or early adult life (Table 1). These disorders are also known to have significant genetic predisposition, exacerbating environmental factors and epigenetic modulation. Outgrowing of disease symptoms has been observed in all ethnic/racial groups, in both sexes, in disparate geographic regions and in dissimilar environmental settings. Therefore, it is not inconceivable that epigenetic modulation of gene-environment interactions in disease etiopathogenesis, is involved in “outgrowing” a specific child hood disorder. This meta-analysis aims at analyzing and characterizing the temporal impact on disease phenotype, of epigenetic modulated gene-environment interaction in chronic childhood disorders. We hypothesize that deleterious epigenetic modulation of disease associated gene-environment interactions becomes less deleterious throughout childhood and that the epigenetic marks are erased over time. In this analysis we examined original research and review articles that addressed epigenetic mechanisms that modulate gene-disease interactions using a selected group of disorders that are prototypic of disorders that are “outgrown” with advancing age. We identified articles that addressed the genetics, epigenetics, epidemiologic, etiologic and environmental factors involved in pediatric asthma, pediatric atopic dermatitis, oligoarticular juvenile idiopathic arthritis, childhood absence seizures, pediatric ADHD and childhood bacterial disease. We used multivariate analyses of variance (MANOVA) to test the hypotheses. We report that across all ethnic/racial groups and environmentally dissimilar areas, the selected disorders become symptomatically less severe throughout childhood. We report that for each disorder
examined the differences in mean age of onset and mean age of remission between populations living in climactically dissimilar environments, between different racial or ethnic groups and between sexes was not statistically significant (p<0.05). For each of the disorder examined, there was no statistically significant difference (p<0.05) in “outgrowing” disease with advancing age even in individuals of the same genetic makeup living in dissimilar environments or individuals with dissimilar genetic makeup but live in the same environment. The finding that across all ethnic/racial groups, in different geographic areas, and environmentally dissimilar areas, the selected disorders becomes symptomatically less severe throughout childhood suggests that epigenetic modulated gene-environment interactions critical in disease etiopathogenesis become less critical with advancing age. The environment and an individual’s genotype and hence (epigenetic modulated) gene-environment interactions, which during early childhood are potent disease symptom exacerbating factors, seem to loose potency during later childhood and adult life. This further suggests that disease associated epigenetic marks in certain chronic childhood disorders are, and could be, temporally erased or reversed throughout childhood.

NCD/007/PC : Use of Next Generation Sequencing for Identifying Genetic Susceptibility for Rheumatic Heart Disease: Case of Affected Rwandan Patients

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Introduction
Rheumatic heart disease (RHD) is a major cause of acquired cardiovascular disease and premature death in children and young adults in developing countries. A high concordance rate among monoyzygotic twins and familial clustering strongly suggest a heritable component to RHD pathogenesis. However, the genetic etiology of RHD, delineating pathogenesis from disease markers, is still unknown. Therefore, we hypothesize that the transcriptome of rheumatic valvular tissue is differentially expressed compared to non-diseased tissue in appropriately matched controls.

Methods
We collected mitral (n=14) and aortic (n=3) rheumatic valve tissue from Rwandan patients during cardiac valve replacement surgery. Using standard protocols, the whole transcriptome from proband and control valves (n= 30) was sequenced, aligned to a reference transcript, and analyzed for differential expression, adjusting for age, gender, and other clinical metrics. Gene lists identifying differentially expressed genes were generated, and gene enrichment and pathway analysis were used to identify significantly enriched metabolic pathways.

Results
We identified 3,778 differentially expressed genes comparing rheumatic vs. non-rheumatic heart valves. Differentially expressed genes mediate biomolecular change through three major pathways: 1.) Immune response, 2.) Cytoskeleton remodeling, and 3.) Apoptosis and cell survival.
The genes KRAS, KDR, ITGAV, ITGB3, and MDM2 are of particular interest due to their upregulation in rheumatic heart valves and roles in intracellular signaling.

**Conclusion**

In conclusion, we found that the transcriptional profiles of rheumatic heart valves are divergent from healthy, unaffected cardiac valve tissue, and that these differences are mediated through three distinct pathways.

Our results provide insight into the biomolecular derangements affecting the pathological valvular structure and function seen in RHD. In turn, these insights provide potential targets for the development of improved therapies against this widespread and crippling disease.

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**SESSION II: PHARMACEUTICALS AND PHARMACOGENOMICS**

**PP/001/PC: Is Liquid Medicine a Hidden Danger to Non-Communicable Oral Health of Children in Rwanda?**

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Cariogenic sugar substrate in liquid medicine is known for its effects on oral health. Children taking these medicines over a prolonged period are at high risk of non-communicable oral diseases. Despite the prevalence of chronic diseases in the community, oral health status of children exposed to long-term use of such medicines is not known. Therefore, it is likely that strategies to prevent the occurrence of oral disease may not be available to this population. Poor oral health presents a challenge to their general wellbeing and overall health, in general.

This study aimed to assess the oral health status of children using long-term liquid medicines.

A prospective cross-sectional study was conducted among children exposed to liquid medicine for a long duration. Children with chronic medical conditions and using liquid medicines were recruited randomly. Standardized self-assessment questionnaires were distributed to guardians and/or parents (by hand). Questionnaires were structured to gather information on the use of liquid medicines and the disease/s that affected their children. After submission of questionnaires, the oral cavity of respective children was examined for presence of plaque, gingival bleeding, dental caries and any other oral lesions. Statistical analysis was conducted and P-value < 0.05, was considered significant.

A total of 135 children with chronic diseases between 2-12 years were studied. About 47.4% (64) were females and 52.6% (71) were males. Plaque, bleeding gums, and dental caries were found in 86.7% (117), 86.7% (117), and 82.2% (111) of the children, respectively. No significant difference was found between genders. Majority of children using more than one type of liquid medicines for prolonged period showed dental caries.
A substantial number of children using liquid medicines had poor oral health. The use of more than one liquid medicine increased probability of having poor oral health. The current findings substantiate comprehensive research on children using liquid medicine and incorporation of oral health education in pediatric clinics. Also, when available, attempt should be taken to replace liquid medications with solid tablet form medications.

**SESSION III: PRECISION AND PERSONALIZED MEDICINE**

PPM/001/PC: Factors Associated with Orthodontic Treatment Among Patients Attending a University Teaching Dental Clinic in Kigali, Rwanda

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An attractive smile is appreciated by everyone and individuals are conscious of others’ perceptions of their physical appearance. It impacts positively on self-esteem, and social and professional relationships. Malocclusion or facial aesthetics outside societal norms are perceived negatively with a negative impact on self-esteem and social acceptance. The uptake of orthodontic treatment is highly associated with a desire to have an attractive aesthetic smile and the benefits afforded. Studies on factors determining the uptake of orthodontic treatment in a Rwandan context are non-existent. We sought to determine the factors associated with orthodontic treatment uptake among patients attending a University Teaching Dental Clinic in Kigali Rwanda.

A cross-sectional study of 980 electronic medical records and files of orthodontic patients was done. Data on socio-demographic factors, presenting complaint, and diagnoses were collected. Analysis included descriptive statistics to provide information on orthodontic patients. Bivariate analysis using Chi-square test between independent variables and orthodontic treatment was done for associations. Logistic regression analysis was performed for statistically significant variables.

The majority of the study population were female (57.55%) and fell in the age group 12 to 18 years 440 (44.89%). Associations were found between orthodontic treatment and anterior open bite (P=0.009), age groups (P= 0.049), gender (P= 0.000), insurance coverage (P= 0.000) and type of insurance (P= 0.000). Being female (aOR=0.58), aged 12-30 years (aOR=1.42), insured with Rwanda Social Security Board (aOR=3.92) or Military Medical Insurance (OR=3.00), and having an anterior open bite (aOR=1.60) were found to be predictive of orthodontic treatment uptake.

Population-based surveys and screening in primary schools are needed in order to assess interceptive orthodontic treatment needs early before adolescence or adulthood.
PPM/002/PC: Knowledge and Attitude of Adult Rwandese Towards Replacement of Posterior Teeth

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Proper nutrition is an important factor in the prevention of non-communicable diseases. However, nutritional status can be compromised by tooth loss. Posterior teeth play an important role in mastication but are the most commonly extracted and least replaced prosthetically. We assessed the knowledge and attitude of adult patients towards prosthetic replacement of extracted posterior teeth at Muhima Hospital Dental Clinic using a cross sectional study design.

A semi structured interview using closed and open-ended questions was used to collect data on age, gender, profession, employment status, monthly income, level of education, residence, insurance status, knowledge and attitude towards posterior tooth loss. The collected data was analyzed for correlations between demographic data and knowledge and/or attitude of patients towards prosthetic replacement of extracted posterior teeth. Tests of significance between variables were done using Chi square test and ANOVA for comparison of means.

Of 323 adults sampled, 172 (53.3%) were unaware of the consequences of posterior tooth loss. Associations were found between change in facial appearance and age (p= 0.000), educational level (p=0.000) and income (p=0.04); food avoidance and educational level (p=0.06); mobility of remaining teeth and professions (p=0.003); mobility of remaining teeth and insurance type (p=0.02); loss of more teeth and insurance type (p=0.04). Males had a slightly more positive attitude than females (56.6% against 51.5%) towards teeth replacement. Ninety nine percent of the study population had a negative attitude towards prosthetic replacement of posterior teeth. Only one (0.3%) had replaced a missing posterior tooth.

Summarizing results of our study population, we conclude that adult Rwandese prefer not to replace posterior lost teeth. Non-replacement of posterior teeth is mostly due to lack of knowledge on consequences of posterior teeth loss, and the available treatment options. Such negative attitude is partly contributed by the low socio-economic status.

SESSION IV: BIOGEOCHEMISTRY AND SOIL BIOCHEMISTRY

BSB/001/PC: Soil Microbial Properties and Soil Nutrient Content Under Exotic and Native Tree Species in Southern Rwanda

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Erosion has been ranked as the primary cause of soil degradation in Rwanda, a land that has
naturally inherited very acidic soils with low contents of organic matter. With its hilly landscape and heavy rainfall, Rwanda loses annually millions of tons of its fertile soil from unprotected slope hills. Forests plantation seems to be an efficient option, not only for land protection and restoration, but also as a timber and household energy source. Tree species may influence soil quality and soil microbial activity via litter decomposition and root exudation. Although most of these introduced fast growing exotic tree species are now scattered all over the country, their effects on soil microbial processes is unknown. A 200 ha arboretum of Ruhande with various exotic and native tree species was used in this study to assess the impacts of tree species on soil properties. The aims of this study were to investigate (i) the effects of tree species on soil physico-chemical properties, (ii) compare microbial processes under different tree species.

Tree species were selected based on their importance, adaptability throughout the country and relevance to daily use. Soil was sampled in 3 plot replicates per species (grouped into exotic (Exot), agroforestry (Agro), native (Nat) and mixed native species (MNS)) and in each sample 2 horizons (organic and mineral) were taken separately. Samples were analysed for physico-chemical properties (pH, moisture, organic matter content, exchangeable cations) and microbial properties (net N mineralization, potential bacterial and archaeal nitrification, respiration potential, microbial biomass C and N, metabolic quotient).

We observed a higher nutrient content in the thin organic horizon: Ca2+= 5215.3 vs 2396.8 (MNS), 3242.9 vs 507.5 (Exot) mg kg⁻¹ in organic versus mineral respectively. Mean values of pH were 5.1 vs 4.2 (Agro), 5.3 vs 4.7 (MNS), 4.4 vs 3.8 (Exot), and 5.4 vs 4.3 (Nat) in organic versus mineral respectively. Mean values for soil microbial biomass carbon were 1065.2 vs 326.4 (Agro), 1733.4 vs 490.6 (MNS), 1638.7 vs 271.5 (Exot), and 1463.3 vs 267.4 (Nat) µg C g⁻¹ of soil in organic versus mineral horizon respectively. Preliminary analyses indicate higher soil microbial activities and alleviation of soil acidity under native tree species compared to the exotic species. Further results will be presented and discussed.

PP/002/PC: Structure Interaction Between the Predicted 3D Model of Mouse Zinc finger MYND Domain-Containing Protein 19 (Q9CQG3) and Co-Factor Products AdoHcy – Suggestion of Compound Candidates for Cancer, Obesity, Cardiovascular Diseases, and Other Potent Drugs Development

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Mouse Zinc finger MYND (myeloid translocation protein 8, nervy, deaf1) domain-containing protein 19 (ZMYND19) is a Melanin-concentrating hormone receptor 1 (MCH-R1) interacting zinc-finger Protein. This protein has 227 amino acids, characterized by a C-terminal MYND domain with 49 residues long. Interest in Mouse MYND19 has grown because recently published data report it to be involved in cell cycle regulation and cell growth, where its over expression is associated with cancer. Beside this, Mouse ZMYND19 is questioned for its specific interaction with the C-terminus of MCH-R1, a protein associated with cardiovascular and obesity diseases. Potent drugs have been suggested to come from Mouse ZMYND19 and ligands interactions understanding, but the problem is still unsolved. This is due to the lack of Mouse ZMYND19 three-dimension (3D) structure. It is in this context that this study predicted Mouse ZMYND19’s 3D structure for further
analyzing its structural interactions with cofactor products S-Adenosylhomocysteine (AdoHcy) using in silico approach.

In order to achieve the core objective, the FASTA sequence of Mouse ZMYND19 (Q9CQG3) was downloaded from Uniprot database. Search for structural homologs to query the sequence was done by accessing the iterated mode of PSI-blast against protein databank. CLUSTAL omega was accessed for multiple sequence alignment. The Phylogenetic analysis was performed using PHYLIP package, and 3D structure prediction was done with SWISS model/homology modeling. The predicted model was evaluated by both ERRAT and PROCHECK and docking study was performed with HEX8 package.

The alignment results reported some similarities and conserved residues whereas the consensus tree reported leucine zipper of human (5EX3) to be a good template for homology modeling practice. The evaluation of the predicted 3D model structure with ERRAT and PROCHECK suggest that the model was of good quality. Docking studies revealed a high affinity (Docking energy – 214.24KJmol⁻¹) between the predicted 3D model and AdoHcy ligand, with many interacting residues most of which are hydrophobic.

In summary, the interaction between the predicted 3D model of Mouse ZMYND19 and ligand AdoHcy suggests both compounds to be good candidates for cancer, obesity, cardiovascular diseases potent drugs development. Further studies on synthesis of the novel drugs should consider these findings.

**SESSION IV: IMPROVING HEALTH CARE SKILLS AND INNOVATIONS IN AFRICA**

**INN/001/PC: to Assess Nurse’s Knowledge about Head Injury and Nursing Management of Patient with Head Injury in ICU, CHUK**

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One of the most significant and frequently treated conditions in CHUK and Rwanda is head injury. It is also a serious problem worldwide. If inadequately managed, it leads to death, negative physiological and psychological sequel including the development of chronic neurological syndromes. In a 2014 study, the World Health Organization (WHO) showed that head injury is a critical public health and socioeconomic problem throughout the world. It is the second major cause of death worldwide, the incidence of head injury being about 131 cases per 100000 people.

This study explores the differences between knowledge about head injury and knowledge about nursing management of head injury patients in ICU for nurses with different education level and working experience.

A descriptive cross-sectional study design using a quantitative approach was used. 33 ICU nurses in CHUK were given the questionnaires of 20 questions. The findings suggest that
nurses with a bachelor’s degree had most knowledge of head injury with a score of 80% compared to those with a diploma and certificate who scored at 75%. Nurses with bachelor were also highest scored at 100% in knowledge about nursing management of head injury patient compared to nurses with diploma who scored 96%, and nurses with certificate who scored 75%. This study also highlighted that nurses who have 1-5 years of experience scored high at 77.7% about knowledge of head injury compared to those who have < 1 year and over 5 years working experience who scored 66.6%. Nurses who have 1-5 years and above scored at 100% in knowledge about nursing management of head injury patients compare to nurses who have <1 year of experience who scored at 83.3%.

In conclusion, high education levels improve overall knowledge and working experience increases knowledge of management of head injury patient.

INN/002/PC: Health Care Technology Training

June Madete

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Health technologies are considered by the World Health Organization (WHO) to be essential for ensuring that health systems operate at the level required for sustainable improvement in the health of individuals and populations. Africa lacks the skills needed to design, produce, install, maintain, manage and upgrade health technologies, leaving it reliant on foreign technical expertise. It is imperative that Africa develop a strong health technology research and development base, grounded in an understanding of the African context, to support needs-based health technology innovation for better health on the continent.

The need to produce skilled biomedical engineers is commonly recognized but it differs depending on the interest of the institutions involved. For instance, most of the early efforts in Africa seem to have focused on the training of technicians that could maintain medical devices in good working conditions. Technicians and technologists play a pivotal role in maintenance and safe use of medical devices, however, there is a demand for a more comprehensive approach to skills training and development of biomedical engineering human capital. These programmes cover a wide range of engineering, medical science, software programming and entrepreneurship courses, among others. In general, these courses are specifically designed to develop a broad-base of requisite skills in planning, procurement, designing, installing, commissioning, maintaining, decommissioning and safely disposing of biomedical devices.

The discipline of biomedical engineering has the potential to play a strong developmental role in Africa by producing graduates skilled in the development of health technologies who can make a contribution towards enhancing health care. The challenge is to develop a strategy to get Biomedical Engineering adopted and recognized as a strong Engineering field in East Africa by the Policy makers as vital and necessary specialization for the region.
INN/003/PC: Docking studies of L-adrenaline onto the predicted three-dimensional model structure of Carbonic anhydrase II (P00918) from human, using computational methods.

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In order to understand the functions of a protein, it is very important to know its three-dimensional (3D) structure. Carbonic anhydrase II (CAII) catalyzes the hydration of carbon dioxide to bicarbonate and again its dehydration by an acid to produce carbon dioxide. CAII is involved in numerous other vital reactions, for example in pH regulation and exhaling carbon dioxide during respiration. L-adrenaline plays a big role in the fight-or-flight response by increasing blood flow in muscles. The focus of the present study was to predict the 3D model structure of CAII, assess its activation by L-adrenaline through a docking approach, and analyze interacting residues.

Computational methods are more advantageous than common wet lab methods because of their time and cost effectiveness. In this study Uniprot web server was accessed to retrieve the primary structure of CAII (FASTA sequence), PSI-BLAST tool, Phylip package, Swiss Model server, ERRAT, Procheck and Hex 8.00 software were used as tools to perform similarity searching, evolutionary relationship analysis, 3D structure prediction, model assessment and evaluation, and CA II activation pattern determination, respectively.

PSI-BLAST results showed high similarity score between the query sequence (P00918) and other putative proteins. Multiple sequence alignment (MSA) results indicated highly conserved motifs between aligned and query sequences, while phylogenetic analysis suggested 4PQ7-A as a template protein for homology modeling due to its close relationship. Swiss Model was successful in predicting the 3D model structure of CAII. The predicted model was of good quality when subjected to assessment and evaluation by ERRAT and Procheck. Hex package has successfully docked the ligand L-adrenaline onto the receptor “CA II”. The negative binding energy (-195.77KJ Mol-1) was recorded and many interacting residues were obtained. Among these interacting residues, Histidine according to reports, is involved in the regulation of pH in the presence of zinc metal.

This study provided insight into the structure, function and interaction between carbonic anhydrase II when activated by L-adrenaline through a docking approach. However, the interaction might be refined by molecular dynamics simulation, which could not be attempted in this research due to lack of facilities.

INN/004/PC: Health Care Technology Training

June Madete
Health technologies are considered by the World Health Organization (WHO) to be essential for ensuring that health systems operate at the level required for sustainable improvement in the health of individuals and populations. Africa lacks the skills needed to design, produce, install, maintain, manage and upgrade health technologies, leaving it reliant on foreign technical expertise. It is imperative that Africa develop a strong health technology research and development base, grounded in an understanding of the African context, to support needs-based health technology innovation for better health on the continent.

The need to produce skilled biomedical engineers is commonly recognized but it differs depending on the interest of the institutions involved. For instance, most of the early efforts in Africa seem to have focused on the training of technicians that could maintain medical devices in good working conditions. Technicians and technologists play a pivotal role in maintenance and safe use of medical devices, however, there is a demand for a more comprehensive approach to skills training and development of biomedical engineering human capital. These programmes cover a wide range of engineering, medical science, software programming and entrepreneurship courses, among others. In general, these courses are specifically designed to develop a broad-base of requisite skills in planning, procurement, designing, installing, commissioning, maintaining, decommissioning and safely disposing of biomedical devices.

The discipline of biomedical engineering has the potential to play a strong developmental role in Africa by producing graduates skilled in the development of health technologies who can make a contribution towards enhancing health care. The challenge is to develop a strategy to get Biomedical Engineering adopted and recognized as a strong Engineering field in East Africa by the Policy makers as vital and necessary specialization for the region.

INN/005/PC: Introducing Biotechnology Laboratories At University Of Rwanda

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The University of Rwanda has a number of state-of the art laboratories located in Nyarugenge and Huye Campuses. These laboratories serve for academic research and provide students with the opportunity to get the desired practical training. The laboratory complex in Huye Campus is designed for postgraduate students and researchers while the one in Nyarugenge Campus was designed for undergraduate and postgraduate students and researchers. Laboratory complex in Nyarugenge Campus has Biotechnology laboratories which are always shared within departments. Students and researchers are invited from different colleges; College of Medicine and Health Sciences (CMHS), College of Agriculture and Veterinary Medicine (CAVM), College of Education (CE), as well as other researchers from different government and private institutions within the country and abroad. This Complex has been built and equipped with the support of African Development Bank. Applied Biotechnology Complex in Huye is a complex composed of various research laboratories, among others molecular biology and cell biology units, which are ready for molecular biology research. Applied Biotechnology Complex has been built and supplied
with new, cutting edge molecular biology equipments by ARES (Académie de Recherrche et d’Enseignement Supérieur) cooperation of the Belgian government. Through the partnership between University of Rwanda and ARES, there have been significant efforts to build capacity of laboratory technicians. This program targets short-term training (2-3 months) and it is tailored for specific needs of the laboratory (e.g. use of a particular machine).

INN/006/PC: Fabrication Lab in a Kit (FLiK): DIY Assistive Technology for Children with Disabilities in Kenya

Melanie Baljko, Michaela Hynie, Susan McGrath, Foad Hamidi, Peter Oracha Adoyo, Patrick Mbullo, Deurence Onyango

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Background: Digital technology specifically designed for people with disabilities is important in lowering boundaries to education, employment and basic life needs. Leveraging local community resources to support people with disabilities also reduces barriers, and is particularly important in contexts where access to technology is limited. In this project, FLiK (Fabrication-Lab-in-a-Kit), we are investigating the use of the participatory design of digital assistive technologies to improve the well-being of children with disabilities in Kenya through cross-sectorial academic/community collaborations. Kenya has gained worldwide recognition as a leader in the field of Information and Communication Technology (ICT) in East Africa (Smith, 2012).

Methodology: We work with two primary schools in Kisumu, Kenya. We have adopted a participatory design approach (Greenbaum and Kyang, 1991; Schuler and Namioka, 1993) in which we include users and other community stakeholders in the design, evaluation and deployment of low-cost Do-It-Yourself technology from the outset. Participatory Design originates research in a community’s needs and interests to bring about social change as part of the research process (Horowitz et al., 2009). Data collection includes focus groups with stakeholders and parents, interviews with teachers and surveys with parents, teachers, and other stakeholders. Children answer simple questions about enjoyment.

Objectives: With FLiK we aim to (1) understand the socio-economic, cultural and technological dynamics relevant to the design, development and deployment of Do-It-Yourself (DIY) digital assistive technology (DAT) for children; (2) study how the stakeholders’ personal and cultural attitudes and norms concerning the nature of disability affect the process of development and use of AT for this population; and (3) evaluate how collaborative Participatory Design (PD) processes shift the understanding of technology in addressing quality of life in participants.

Results: We report on the outcomes of the initial phase of the project in which we engaged multiple groups of participants: Four students at Maseno University in critical studies and computer science; 24 pupils with disabilities; 24 parents of children with disabilities; four teachers at our two partner schools; and 30 community stakeholders including advocates, community organizers, NGOs and government representatives. Interviews and focus groups suggest that the development of assistive technology can be an effective tool to facilitate dialogue among the various stakeholders and be a tool to challenge and question stereotypes and stigma around disabilities. Additionally, special education teachers and university students collaborated and took an active role in introducing DIY assistive technologies to their
communities, increasing the potential for social impact. The results of this research are expected to be relevant not only for Kenya but for most of East Africa and potentially other countries.

SESSION V: INFECTION DISEASES

ID/001/PC. Characterization of Q146Y0 Protein from Burkholderia Xenororans Using in silico Methods.

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Protein characterization has been very useful in discovering the protein structure and their functions in plants and human lives. In silico, in vivo and in vitro Experiments are current methods used in protein characterization but It has been found that in vivo and in vitro methods are Time consuming and very entitled to Errors from contamination therefore it is in this regard that in silico methods were preferred during this Research project.

This research project reports the in silico characterization of protein with accession number Q146Y0 which is found in bacteria Burkholderia Xenororans. The in silico method is defined as the use of computational packages, servers and database in different research experiments including protein sequence analysis and characterization.

Uniprot database was first used to retrieve the amino acid sequence of the target protein while QUARK program was used to predict the protein 3D structure by De novo method. SWISS PDB viewer was used to visualize the predicted 3D protein model, measuring distances, and torsion angles between atoms. The Evaluation of the predicted 3D structure was done by accessing different online servers namely Procheck, Errat and Expacy Protparam. Protfun 2.2 server was used in functional prediction of the target protein.

Primary structure analysis by Expacy Protparam revealed physiochemical parameters which indicated that it is basic in nature and it may be stable for a wide range of temperature. Secondary structure analysis by PDB viewer indicated that this protein consists of seven alpha helices which are joined together by coils.

The assessment results by Procheck and ERRAT servers indicated that the predicted 3D model of the protein was of acceptable limits. The results from functional prediction by using Protfun 2.2 server demonstrated that the protein is non enzyme and is involved in structure function protein transport and binding molecules, to name a few.

The in silico characterization of protein with accession number Q146Y0 helped in protein primary and secondary structure analysis, 3D structure prediction and functional prediction but more research concerning this protein is also recommended.
ID/002/OC Multiresistant Germs in Suppurative Infections at the Provincial Referral Hospital of Bukavu, DR Congo

*Lupande DM1,2, Bikubanya L1, Kabego L1,3, Khonde RK1,4, Kinunu FB1, Ngoma PK1 and Lunguya OM2

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Current management of suppurative infections is hampered by an increasing prevalence of multi-resistant strains. Management and control of multi-resistant germ infections go through surveillance and monitoring of bacteriological data. The aim of this study was to determine the prevalence of multidrug resistance (MDR) in germs isolated from suppurative infections at the Provincial Referral Hospital of Bukavu.

This is a cross-sectional and retrospective study. The socio-demographic data and the results of the laboratory analysis of patients admitted for consultation or hospitalization at the Provincial Referral Hospital of Bukavu for suppurative infections were collected from January 2014 to December 2016. Conventional microbiological methods had been performed, and the Kirby-Bauer susceptibility test by disc diffusion was used according to EUCAST 2015.

Of a total of 545 purulent secretions analyzed during our study period, 72.8% (396) have given positive cultures. Data from 249 strains were compiled and included in this study. The median age of patients was 25 years [0-72], with a sex ratio M/F of 1.4; S. aureus, E. coli, Enterobacter spp and Pseudomonas spp were the majority germs. 38.6% 95% CI (32.5-44.9) of identified germs had a multi-resistance phenotype (MDR); 10% 95% CI (4-21.5) of S. aureus were resistant to methicillin (MRSA). Vancomycin, imipenem, amikacin and cefepime were less resistant, with respectively 3%, 6%, 9.5% and 37% of resistance.

In conclusion, the prevalence of multi-resistant strains in purulent secretions is very high in our hospital and most of the usual antibiotics are not effective against these frequently isolated germs. Vancomycin, imipenem, amikacin and cefepime remain the antibiotics of the last resort and the most sensitive against these multiresistant strains frequently encountered in our study.

ID/003/OC High Prevalence of Enterotoxins and Panton-Valentine Leukocidin Producing Isolates Among Nasal Carriage Strains of S. aureus from Bukavu, DR Congo

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Community-acquired Staphylococcus aureus infections, are an important public health problem. Screening of carriers of methicillin-resistant S. aureus (MRSA) is an important factor in prevention. Our objective was to determine the prevalence and determinants of MRSA nasal carriage in Bukavu, as well as the virulence factors of nasal carriage isolates.

This is a cross-sectional, community-based analytical study, which took place in Bukavu from October 2015 to February 2016; A nasal swab was performed in all persons included in the study. Culture and identification of S. aureus were done by conventional methods. The Kirby-Bauer method was used for the antibiotic susceptibility test according to CLSI. Genotyping, resistance genes and virulence factors screening were performed by the DNA micro-arrays method.

Three hundred and twelve people were included in this study. The median age was 24 years (1-71 years). The prevalence of MRSA nasal carriage was 5.13% (16/312), MRSA carriage was not dependent on any risk factor (p-value > 0.05); 92% of strains were resistant to penicillin by blaZ gene expression; 30% of strains were resistant to Tetracycline by tetK gene expression, 100% of strains were susceptible to Augmentin. Levofloxacin, gentamicin and clindamycin had a susceptibility greater than 80%; 29% of strains were PVL+, more than 50% of strains were enterotoxinogenic and hemolytic, 20% of strains expressed the edinB gene.

This study shows a high prevalence of MRSA nasal carriage in the community in Bukavu. Overall, strains are very sensitive to the usual antibiotics, even if they are highly enterotoxigenic and hemolytic; other risk factors must be sought later to understand this phenomenon.

SESSION VI: BIOGEOCHEMISTRY, SOIL GEOCHEMISTRY

BSB/001/PC: Soil Microbial Properties and Soil Nutrient Content Under Exotic and Native Tree Species in Southern Rwanda

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Erosion has been ranked as the primary cause of soil degradation in Rwanda, a land that has naturally inherited very acidic soils with low contents of organic matter. With its hilly landscape and heavy rainfall, Rwanda loses annually millions of tons of its fertile soil from unprotected slope hills.

Forests plantation seems to be an efficient option, not only for land protection and restoration, but also as a timber and household energy source. Tree species may influence soil quality and soil microbial activity via litter decomposition and root exudation. Although most of these introduced fast growing exotic tree species are now scattered all over the country, their effects on soil microbial processes is unknown. A 200 ha arboretum of Ruhande with various exotic and native tree species was used in this study to assess the impacts of tree species on soil properties. The aims of this study were to investigate (i) the effects of tree species on soil physico-chemical properties, (ii)
compare microbial processes under different tree species.

Tree species were selected based on their importance, adaptability throughout the country and relevance to daily use. Soil was sampled in 3 plot replicates per species (grouped into exotic (Exot), agroforestry (Agro), native (Nat) and mixed native species (MNS)) and in each sample 2 horizons (organic and mineral) were taken separately. Samples were analysed for physico-chemical properties (pH, moisture, organic matter content, exchangeable cations) and microbial properties (net N mineralization, potential bacterial and archaeal nitrification, respiration potential, microbial biomass C and N, metabolic quotient).

We observed a higher nutrient content in the thin organic horizon: Ca2+ = 5215.3 vs 2396.8 (MNS), 3242.9 vs 507.5 (Exot) mg kg⁻¹ in organic versus mineral respectively. Mean values of pH were 5.1 vs 4.2 (Agro), 5.3 vs 4.7 (MNS), 4.4 vs 3.8 (Exot), and 5.4 vs 4.3 (Nat) in organic versus mineral respectively. Mean values for soil microbial biomass carbon were 1065.2 vs 326.4 (Agro), 1733.4 vs 490.6 (MNS), 1638.7 vs 271.5 (Exot), and 1463.3 vs 267.4 (Nat) µg C g⁻¹ of soil in organic versus mineral horizon respectively. Preliminary analyses indicate higher soil microbial activities and alleviation of soil acidity under native tree species compared to the exotic species. Further results will be presented and discussed.

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**SESSION VII: BIOTECHNOLOGY IN AGRICULTURE**

**BA/001/PC- Factors Affecting Regeneration Potential of Selected Kenyan Cassava Genotypes using In vitro Somatic Embryogenesis**

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Cassava (Manihot esculenta Crantz) is a valuable source of calories in countries where malnutrition is widely spread. Despite its many uses as food, feed and in industries, it’s constrained by biotic and abiotic stresses. Attempts to overcome challenges in cassava production by conventional breeding have been met with limited success. The application of genetic transformation to introduce agronomically useful traits would greatly compliment classical breeding approaches. The objective of this study was to determine the regenerability of selected Kenya cassava genotypes. Three genotypes (Ex-ndolo, Karibuni and Shibe) were collected from coastal and eastern agroecological zone based on their traits which are high yielding and early maturity and maintained at the Kenyatta University Plant Transformation Laboratory glasshouse. Clean plant materials were established in vitro and maintained on media containing Murashige and Skoog salts with vitamins, (30g/l sucrose and 3.0g/l gelrite) and used as source of explants. Picloram and 2, 4-dichlorophenoxyacetic acid were used to induce somatic embryos using leaf and stem explants under light and dark photo regimes. The differences in frequencies of somatic embryogenesis ranged between 31.95-81.48% for leaf explants and 19.65-42.83% for stem explants for all four concentrations under study while varying the photoperiod. Embryogenic calli was matured on media supplemented with different concentrations of 6-Benzylaminopurine, α-naphthaleneacetic acid and gibberellic acid before being transferred to regeneration media. Shoot development from somatic embryos had significant differences between genotypes. Ex-ndolo was highly responsive to the maturation media and formed shoots when the embryos
BA/002/PC-Sudden cardiac arrest: a threat for african country health system

Dr. Carnot TANIE
CHIREC Group Brussels – BELGIUM

Sudden cardiac arrest (SCA) (or sudden death), is defined as a sudden and unforeseen arrest of any cardiac and respiratory activity without any obvious external cause such as trauma or poisoning, and occurring in a patient without any previous morbidity.

It is an important public health problem throughout the world. In european countries and the US, due to the availability of data through national registries of cardiac arrest, it is estimated to represent between 55-110 / 100,000 inhabitants/year.

The lack of such databases in african countries (especially sub-saharan) renders such epidemiological studies difficult in this region, and thereafter the estimation of its impact on society in terms of public health.

Otherwise, SCA of traumatic origin (road accidents, natural disasters and others) represents a significant part of death in this region, and its treatment is still a major health challenge.

The mortality after SCA remains very high, about 90%, even in more developed countries.

There are however a package of measures which, all implemented together, improves survival of patients in general. So, optimal medical treatment with well conducted resuscitation allows the doubling or tripling of chances of survival after the occurence of a SCA.

Strategies for resuscitation do exist and have been well defined. They differ in terms of the origin of the cardiac arrest, with a particular emphasis placed on conditions surrounding its occurence: sudden, traumatic, in- or extra-hospital.

ILCOR (international committee for the coordination of techniques and protocols of resuscitation) has published updated guidelines for the medical management of patients with SCA. They are what we call «the survival chain» within which each link has a special significance. This ranges from early recognition of SCA, alerting for emergency and first aid, to the specialized medical treatment. Their implementation in Africa should be a priority, even more if we consider the low level of literacy in the population, especially in rural areas, the poor quality of infrastructure (such as roads, as well as technical aspects related to medical care) and their importance in the proper functioning of this chain of survival.

It’s all about a multidisciplinary intervention which should, at the end, lead to the improvement of survival, wellness and life expectancy of local population.
The goal of the proposed lecture is to take notice of all the measures and provisions, to educate local populations and authorities, and to help in training for the optimal management of patients suffering from sudden cardiac arrest.

SESSION VIII: WILDLIFE, BIODIVERSITY, WATER, ENVIRONMENT & CONSERVATION

WBWEC/001/PC: The Impact of Cultural Tourism in Enhancing the Community to Participate in Wildlife Conservation in Volcanoes National Park

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Cultural tourism is the subset of tourism and it is one of the largest industries concerned with the country or regions, especially its arts. It generally focuses on traditional communities who have diverse customs, unique form of art, and distinct social practices, which basically distinguish them from other types and forms of culture. In tourism, cultural villages are relatively new attractions which have opened opportunities for the advancement of cultural and heritage tourism in developing countries. However, there is a lack of research pertaining to information regarding the contribution of cultural villages in wildlife conservation for tourism.

This paper aims to examine the contribution of cultural villages in enhancing the community to participate in wildlife conservation, and how cultural tourism improves the livelihood of the community involved in cultural activities around Volcanoes National Park.

The research was conducted at iby’iwacu cultural village; questionnaires were personally administered to people and interviewed them face to face, and also used site observation. Basing on findings, the research was successful in that we found that cultural villages play a big role in wildlife conservation around Volcanoes National Park and also do contribute in the development of the livelihoods surrounding national parks.

WBWEC/002/PC: Biomonitoring and Zonal Cartography of Loxodonta Africana Cyclotys (Proboscidea, Mammalia) Activity in the Era-Congo/Mai-Ndome Redd+ Concession in Democratic Republic of the Congo

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The Democratic Republic of the Congo is a biodiversity hotspot. It is amongst one of the most important fauna reserves either in Africa or in the world. Yet, its fauna is dangerously threatened through poaching upsurge and smuggling. Worldwide, studies show that a certain number of victim animal species is notching up on the red list of threatened species of IUCN (International Union for Conservation of Nature). This is the case of African elephants whose habitat is more and more restricted because of demographic pressure and human activities. In order to protect this natural ecological inheritance and its habitat, a scientific assignment was performed some months ago in this forest zone for confirming the existence of these elephants.

This prospective study aimed to confirm the existence of elephants in this geographical area as a main objective. The specific objectives of this study were the direct and/or indirect observation in order to collect the presence indexes of elephants in this zone on the one hand and on the other hand to elaborate the map indicating the activity zones. Several elephant indexes (fresh and recent droppings, tracks and berries) were observed. The activity zone of elephants is located out of as well as in the concession ERA-CONGO/MAI-NDOMDE REDD+. Therefore, the forest block of Ntombe Nzale grouping (mainly Ngeleku, Olingi-oyei and Illee-Makaba villages) in the Mai-Ndombe province constitutes a priority zone for the biodiversity conservation.

WBGWC/003/PC: Construction materials from recycled plastics as a solution to solid waste management

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Introduction and Objectives: Plastic wastes not only endanger marine life but also intoxicate human beings. Worse still, traditional roads have significantly shorter design life and so do other alternative road paving techniques such as reinforced slabs and concrete paving block (developing countries). Owing to these challenges, this research aimed to minimize the quantity of plastic wastes dumped in Kigali landfills by recycling it into construction materials while considering both economic and environmental benefits. Specific objectives included to maximize the use of post-consumer plastic waste and produce alternative eco-friendly building products.

Methods: we preferred to use the method of pyrolysis where it works in a closed system at a desired temperature until the plastics get melted. We designed a prototype that match with this method where our drum will be working in the closed system, to make sure that no gas will be vaporized in the atmosphere if there is any. In this research, we used high density polyethylene because of its excellent impact resistance, high tensile strength, low moisture absorption and chemical resistance properties.

In order to achieve the stated objectives, three samples per data point were prepared and quantity of sand content was varying by 1:3; 1:4; 1:5 respectively while keeping plastic content constant. The samples were placed in mould of dimension 100, 65 mm in diameter and height respectively where they cooled and set.
**Results:** Afterwards, the respective samples were tested for compressive strength and water absorption. Compressive strength test showed the values of 21.73 N/mm², 26.15 N/mm², 4.79 N/mm² before heat exposure and 17.79 N/mm², 22.37 N/mm², 3.52 N/mm² after exposure to 35°C for 24 hours for the pavers in HDPE and sand mix ratio of 1:3, 1:4 and 1:5 respectively. Water absorption test showed an average value of 0.052% which is lower compared to the cement concrete made pavers.

**Conclusion:** The research concluded that if made and put into use, these pavers will not only reduce construction costs especially those for repairs, but also assist in environmental conservation. Roads will be cheaply constructed, and with the increased durability, accessibility will be improved and economic growth bolstered.

**WBWEC/004/PC: Stable Isotope analysis for dam leakage source detection.**

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A good monitoring method is very important for understanding the sources of a reservoir leakage and planning for effective repairing. Here we present a method for tracing the leakage sources using stable isotopes of oxygen and hydrogen isotopes and its application to the underground powerhouse of a pumped storage hydroelectricity power plant. The trends of the leaking water and the reservoir water have shown a similarity according to the oxygen and hydrogen isotopic composition. The similarities were much observed from the oxygen (δ18O) ranging between -9 to -4‰ and the hydrogen (δ2H) ranging between -40 to -30‰. The trends between the leaking water and the ground water were not much significant, but we observed the similarity from the oxygen ranging between 1 to 5‰ and the hydrogen ranging from -10 to -20‰ indicating the ground water contribution into the leaks.

The leaking water and the local meteoric line trends are assessed to analyze the possible contribution of rainfall into the leaks, and this indicates an insignificant relationship between the two parameters. This implies that the rainfall doesn’t correlate with the leaking water. The results were confirmed by the analysis of the composition of nitrate and chloride ions in water samples. The method used by combining stable isotopes and chemicals concentration ensures a good tool for similar future studies and a scientific reference for engineering to ensure dam safety.
SESSION IX: SOCIAL SCIENCE AND BIOTECHNOLOGY

SSB/001/PC: A Digital Citizen Science Platform for Malaria Vector Surveillance and Control in Ruhuha, Rwanda

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Malaria remains a public health disease that continues to devastate lives especially in the Sub-Saharan African regions in general, and in East African countries in particular. Despite the progress and efforts already made through the use of long lasting insecticide treated nets and indoor residual spraying, Rwanda is experiencing a resurgence of malaria. Factors explaining this resurgence have been attributed to climate variability, an increase in insecticide resistance, and behavior change of the mosquito vectors.

To date, surveillance systems for the management of vector-borne diseases depend on collaboration with skilled scientists including entomologists, epidemiologists, and statisticians. These skills are rarely represented in the average malaria control programs, especially in Rwanda where vector surveillance is still in its infancy. Therefore, the emerging digital technology offers a new way of prompt generation of data on malaria and entomology surveillance in low resource settings countries through public- or community-based data collection and reporting without any expertise in the concerned research field.

Our research aims to establish a citizen science approach using emerging digital technologies (web-based and mobile technology) to enable entomological monitoring and surveillance of malaria vectors. This will provide relevant data on time and at affordable cost on malaria vector species composition, abundance, spatial temporal dynamics, and malaria prevalence. Hence, it will address the current knowledge gap on mosquito ecology with the active participation of community. Moreover, it will contribute to develop novel interventions and strategies that will sustain the current national malaria control programmes. For example, such an approach will enable communities in Ruhuha (Rwanda) to become aware of the impact of water management on malaria mosquito breeding: irrigated rice fields, rainwater harvesting sites and drainage of stagnant water in the peri-domestic environment.
**SSB/002/PC: Early Childhood Tooth Buds Removal Practice (“Ibyinyo”): A Preventable African Health Problem**

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Tooth buds removal (“Ibyinyo”) is a traditional practice of removing the developing tooth buds, typically done on the infant by traditional healers who believe that removing those tooth buds will reduce the fever and diarrhea of the affected children. This practice is mostly performed in non-sterile conditions using basic sharp instrument. It is most prevalent in Africa, especially in East-African countries including Rwanda. The complications associated with this practice include septicemia, or other blood born diseases like HIV, and hepatitis. We discuss a case of a 10 years old female patient who presented with malformed canine teeth resulting from tooth buds extraction done in her early childhood.

This is a case study. After a through clinical evaluation of the patient, a treatment plan was prepared to treat her complications related to early tooth buds extraction.

In our patient, we found malformed enamel, elongated permanent right maxillary canine, and permanent mandibular left canine teeth. She also presented with a retained (primary) left maxillary lateral incisor tooth, and missing a left maxillary canine tooth. In addition, ectopic eruption of left maxillary central incisor tooth, and left mandibular canine tooth with crown malformation and missing permanent right mandibular canine tooth were also noted. These complications resulted from tooth buds removal that the patient had experienced in her early childhood. As a treatment, we reshaped her malformed right maxillary and left lower mandibular canine teeth, using composite materials, in order to improve her esthetic.

Failure to sucking, vomiting, longstanding fever and diarrhea are the most common symptoms associated with infant’s tooth buds removal. Therefore, educating parents through community-based campaigns on detrimental consequences of early childhood tooth buds removal through Ibyinyo practice might be helpful to eradicate this harmful and unnecessary practice.

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**SSB/003/PC: Consumption of Bushmeat at Lubumbashi, Democratic Republic of Congo: Sociocultural Approaches**

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Bushmeat is frequently consumed in the households of the city of Lubumbashi in the Democratic Republic of Congo. Several studies in Africa show that this foodstuff is regularly consumed by the rural and urban populations. This consumption is motivated by several reasons. Those reasons were never clarified in the city of Lubumbashi.

This study has for its goal to highlight the sociocultural aspects which justify the consumption of the bushmeat to envisage its durability. An investigation was led with 1400 households in
the municipalities of the city. A survey allowed collecting the information, which was presented in the form of percentage.

It emerges from this information that 86.6 % of the population consumes monthly bushmeat (41.3%). This consumption rests on taste (51.7 %). On the other hand, religious beliefs (29.2 %) prevent this consumption.

The order of artiodactyls is the most affected (74.2 %). The recognition of the consummate species comes from information supplied by the sellers (58.5 %). The bushmeat comes from Haut-Katanga’s district (35.2 %). It is sold in the main markets of the city of Lubumbashi (67.9%).

Bushmeat is becoming an exhaustible natural resource. Mechanisms and alternatives must be set up to allow the sustainable preservation of the wild animal species from which the meat is obtained.

**ER Participation in the Local Chicken Value Chain in Northern Uganda**

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The study was carried out to explore gender participation in the local chicken value chain in Omoro and Oyam districts of Northern Uganda. Specifically, the study focused on characterizing local chicken value chain actors, ascertaining level and determinants of gender participation and the relationship between gender, access to, and control over income from local chickens.

A cross-sectional survey was carried out targeting 200 respondents and data were collected using structured questionnaires and interview guides. SPSS version 10 and Stata SE 13 (64 bit) software were used for data analysis. Simplified gross margin was used to determine the value-added at different segments of the value chain, descriptive statistics to characterize the actors and determine the level of gender participation, correlations to ascertain the relationship between access to and control over income from local chicken and logit regression model was used to identify the determinants of gender participation.

Results revealed that the majority of value chain actors were in the age bracket of (20–48) years with a greater majority being males. Processors (UGX 1,911,274) had the highest gross margin per year followed by traders (UGX 1,415,351) while farmers had the least. Men participated more in supply of inputs, house construction, marketing and barbequing of local chickens while women participated in production activities and stewing of local chickens (Pr = 0.00). Age, education level, marital status, income control, correlated significantly (Pr = 0.00) with gender participation in local chicken value chain. Men had more access to and control over income than women.

An engendered innovation platform could therefore be established to enable an intensive or extensive training and empowerment of actors especially women in the local chicken value chain.
SSB/005/PC: Adherence to Ivermectin is more associated with perceptions of Community Directed Treatment with Ivermectin organization than with onchocerciasis beliefs

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The fight against onchocerciasis in Africa has boomed thanks to the Community Directed Treatment with Ivermectin (CDTI) program. However, in Cameroon, after more than 15 years of mass treatment, onchocerciasis prevalence is still above the non-transmission threshold. This study aimed to explore a possible association between people’s beliefs/perceptions of onchocerciasis and of CDTI program, and their adherence to ivermectin in three regions of Cameroon.

A cross sectional survey was carried out in three health districts with persistent high onchocerciasis prevalence: Bafang, Bafia and Yabassi. Participants were randomly selected in 30 clusters per district. Data were collected through an administered questionnaire and analysed using Stata 13.

Adherence to ivermectin was comparable between Bafang and Bafia (55.0% and 48.8%, respectively, p>0.05) and lower in Yabassi (40.7%). Among all factors related to program perceptions and disease representations that were studied, perceptions of the program are the ones that were most determinant in adherence to ivermectin (AOR [95%CI] = 6.82 [3.29;14.16], p<0.001). People who had a “not positive” opinion of ivermectin distribution campaigns were less compliant than those who had a positive opinion about the campaigns (40% vs 55% in Bafang, and 48% vs 62% in Bafia, p<0.01), as well as those who had a negative appreciation of community drug distributors’ commitment (22% vs 53% in Bafang, 33% vs 59% in Bafia, 27% vs 47% in Yabassi; p<0.01). The most common misconception about onchocerciasis transmission was the lack of hygiene, especially in Bafia and Yabassi.

In conclusion, although there are still frequent misconceptions about onchocerciasis transmission in Cameroon, perceptions of ivermectin distribution campaigns are more strongly associated to adherence. In addition to education/sensitisation on onchocerciasis during the implementation of the CDTI program, local health authorities should strive to better involve communities and more encourage community distributors’ work.
SSB/006/PC: Study of cultural impact of ex-situ conservation facilities on the population in the Lubumbashi region and perspectives for growing involvement of these structures in information and sensitization on environmental protection.

TSHIKUNG, KM

Democratic Republic of Congo is one of the regions of the world offering the most important biodiversity. However, as consequence of the overexploitation of natural resources, mostly due to insufficient respect and ignorance of the legislation concerning environmental protection, forests biodiversity tends to deteriorate in the Congo. Information and environmental education of urban and rural populations appears as essential to support in-situ conservation actions. This study took place in Lubumbashi. It revealed a deficiency in the common awareness of the legislation concerning environmental protection, the risk of disappearance and the conservation of endangered species. Furthermore, the cultural impact of ex-situ conservation structures in this region appeared as insufficient. Finally, this study lead to a project of global involvement of ex-situ conservation structures in the Lubumbashi region through information and sensitization actions for the whole Lubumbashi’s population, adapted to the target public and to the expectations of visitors, and sorted by priority.
PRESENTERS INDEX

ORAL PRESENTATIONS

A
A. Coulibaly, E. Hien, M. Motelica-Heino, S. Bourgerie  BSB/001/OC
A. Yemoa, J. Gbenou, D. Àfoflabi, M. Moundochirou, A. Bigot, R. Mariní,
Anagounou S., F. Portaels, A. Martin, J. Quetin-Leclercq  PP/012/OC
A. Ndemezo, B. Kaplin  WBWEC/011/OC
A.Y. Uwitonze, N. A. Mugemangango, T. Bishyizehagari, E. Bizimana, T. Habyarimana, P. Ndishimye, L. Mutesa  ID/005/OC
Abdoullaharouz, Uzabakiriho  INN/002/OC
Aboubakar Maitournam  PPM/005/OC
Agnes Gatarayiha, Julienne Murererehe, Peace Uwambaye, Chrispinus H. Mumena and Mohammed S. Razzaque  INN/003/OC
Alexis Rulisa, Fred Katera, Chantal Ingabire, Emmanuel Hakizimana, Michele Van Vugt, Leon Mutesa, Luuk van Kempen  SSB/006/OC
Aline Tuyishime, Simon Martin Mvuyekure, Joseph Nkengimana, Antoine Nsabimana  BA/010/OC
Aradukunda, D. Yezakuzwe, Munyaburanga  WBWEC/008/OC

B
B.P. Bulaka, J. Aloni and G. Mergea  BA/009/OC
Bakari Amuri, Meerts Pierre, Vandenput Sandrine, Okombe Victor, Ngoy Edouard, Ngoy Shutcha Mylor, Kahola Tabu Olivier,
Kampembwa Mujinja Florence, Nkulu Faya Jules, Duez Pierre, BSB/001/OC
Bashige Chiribagula Valentin, Bakari Amuri Salvis, Kåhumba Byango Joh, Duez Pierre, Lumbi Simbi Jean-Baptiste  PP/011/OC
Benjamin Bukombe, Dàdim Ciorna, P.K. Ngarabuye, Tomasi Szczi, Yves Uwiragije, István Wattner, Erika Michéli  BA/006/OC
Borsali Amine Habib, Zouïdi Mohamed, Hazem Khadda, Gros Raphael, Theoneste Hugenimana  BSB/007/OC

C
C.Ujeneza, A. Funmilola  SSB/003/OC
Camot TANIE – CHIREC Group Brussels – BELGIUM NCD/006/OC
Chantal Marie Ingabire, Emmanuel Hakizimana, Alexis Rulisa, Frédéric Kateera, Bart Van Den Borne, Claude Mambo Muvunyi, Leon
Mutesa, Michelle Van Vugt, Constantius JM Koenraadt, Willem Takken, Jane Aliaii SSB/007/OC
Chantal Yirakuanani, Moses Masika, Duscint Mucakwa and Kato J Njunwa  ID/001/OC
Charité Niyitegeka and Jean Paul Niyoyita INN/010/OC
Chrispinus Hakimu Mumena, Agnes Gatarayiha and Mohammed S Razzaque  SSB/001/OC
Cyril Kamadjou  INN/012/OC

D
Dative Imanireba, Francois Xavier Naramabuye and Sylvère N. Sinikare  BSB/003/OC
Djeukeu Asongni  PPM/004/OC

E
Edward Okonjo, Dorcas Yole and Darington Ogoyo  ID/008/OC
Emmanuel Candia, Jonathan Izudi, JoAnna Kikumumino, Bob Bale Henry, Madrine Amorocch Juliet, Emmanuel Okech, Barbara Akello
Comfort, Boniface Oyoa, Sylvia Arvor, Twalib Aluku Olego, INN/008/OC
Emmanuel Hakizimana, Corine Karena, Duncia Munyanakane, John Githure, Jean Baptiste Mazarati, John Eric Tongren, Willem Takken,
Agnes Binagwaho, Constantius JM Koenraadt, ID/006/OC
Emmanuel Hakizimana, Duncia Munyanakane, Kaendi Munguti and John Githure ID/007/OC
Emmanuel Nambonimana, Micongwe Moses Isyagi, Uziel Nsabimana, Rajasthan Sasi, Donna Hackley and Karl Seifi DDS NCD/003/OC
Tchokponhoue, Charlotte A. Adje, Carlos Haudegbe, W. Abtwe Gbreselassie, O. Happiness, L. Akundabweni, H. Zhunghbogbo, F.
Akohoue, J. Sibaya BA/002/OC
Esperance Umumararungu, Fabien Ntaganda, John Kagira, and Naomi Maina  ID/010/OC

F
Felemont Kayulayula Banda  SSB/005/OC
Fiston Kitema Gatera and Ekemri Kingsley Kene  PPM/003/OC
Florent Rutagarama, Raymon Muganga, Diane Stafford, Katja Konrad, Raïssa
Francisc Kilonzi, Takahiro Ota, Kazuhiro Moji, Awins Usp  SSB/008/OC

G
G. Murenzi, JD Sinayobye, T. Rurangwa, P. Mugenzi, A. Adelimeji, L. Mutesa, K. Anastos, PE. Castle 3 NCD/013/OC
Gébéron N. Borga Kato-Niyiswa Ng'obula, Joseph Malakalinga, Aaron Pambu, Fabrice Mwanza, Geséle Makengo, Théophile Mbemba and
Rudovick Kaxwala  PP/008/OC

H
Hamoud Rukangantambara  BSB/005/OC
Hamudu Rukangantambara and Julienne Gatesi  BSB/006/OC
Hamudu Rukangantambara and Julienne Gatesi  BSB/004/OC
POSTER PRESENTATIONS

C
Carine Higo : INN/001/PC
Carnot TANIE – CHIREC Group Brussels – BELGIUM: BA/002/PC
Chrispinus Hakimu Mumena, Emmanuel Bwimbo, Eliane Harerimana Ingabire, Bernard Ondari, Gatarayiha Agnes and Ntawenderundi David and Ntawamungu Jean BA/012/PC

F
Fanny Nadia Dissak-Delon, Guy-Roger Kamga, Perrine Claire Humblet, Annie Robert, Jacob Souopgui, Joseph Kamgno, Marie José Essi, Stephen Mbigha Ghogomu, Isabelle Godin: SSB/005/PC

J
June Madete: INN/004/PC
June Madete: INN/002/PC

K
Kibogo A. and Kyamujara W: WBWEC/001/PC

L
Lupande DM, Bikutwanyo L, Kabego L, Khonde RK, Kinunu FB, Njenga PK and Lunguya OM ID/002/PC
Lupande DM, Monecke S, Khonde RK, Cirezi BM, NGOMA PK, Muller E, Ngwaka NM, Reissig A, Lunguya O, Kabinda JM1 and Ehrlich R ID/003/PC

M
M.Gitare, R.S.Isabane, T.Turatimana,Munyaburanga:WBWEC/003/PC
Marilyn M. Munindahubi, Deslde Bosch, Asingizwe Domina, Leon Mutesa, Emmanuel Hakizimana, Marjine Poortvliet, Arnold J.H. van Vliet, Sander Koemradt, Peter Feindt, Willem Takken: SSB/001/PC
Mathieu Baljaux Bokamba, Anatole Bakola Bola, Géldon N. Bongo, Pius T. Mpiana, Koto-te-Nyiwa Njombola WBWEC/002/PC
Medatrice Nyirinkindi and Antoine Nsabimana INN/005/PC
Melanie Baljko ,Michaela Hynie, Susan McGrath, Foad Hamidi, Patrick Mbullo ,Deurence Onyango INN/006/PC
Muhire Valens, NsabimanaEvastiste, UwayezuDonat, EleanaStoufi, Mohammed Razzaque: SSB/002/PC
Mutangana Dieudonne, Mugabe Robert, Gumizamu Caroline and Shyaka Blaise Pascal: INN/003/PC
Mutangana Dieudonne, Mugabo Bertin, Gatanganwa Jeanne Marie, Isidore Rukunduga Rene: PP/002/PC
Mutangana Dieudonne, Mutahazi Innocent and Mary W Mainz: ID/001/PC
Mutesa L. Hifajeju Z, Uwineza A, Debray FG, Boerner F, Bours V, Heales S, NCD/005/PC
Mvitu Muaka Moise, Longo-Mbenza Benjamín, Muka Diela Marie-Josée, Ndagii Dedel Christelle, Mubungu Fuele Simon NCD/003/PC
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