Beyond Sciences Initiative

3rd International Remote Conference: Science & Society

January 27 & 28, 2018.

PARTICIPANT BOOKLET

CANCER

CHRONIC DISEASES

BIOTECHNOLOGY & BIOINFORMATICS

GLOBAL HEALTH

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Janice Wright LL.B.

Beyond Sciences Initiative

Contents

Welcome Address

Dear Colleagues and Friends,

It is with pleasure we extend a warm welcome to all participants of the 3rd International Remote Conference: Science and Society, hosted by the Beyond Sciences Initiative (BSI).

This meeting will connect research scientists, educators and students around the globe - representatives from over 42 different countries. We look forward to hearing about scientific advances from our local and international colleagues, including the social, cultural and political contexts in which they conduct their academic activities.

Our scientific program is once again exceptionally rich, with specific foci on global health, cancer, chronic diseases and bioinformatics. Our goal is to enable high caliber discussions surrounding research and community activities in order to foster international collaboration.

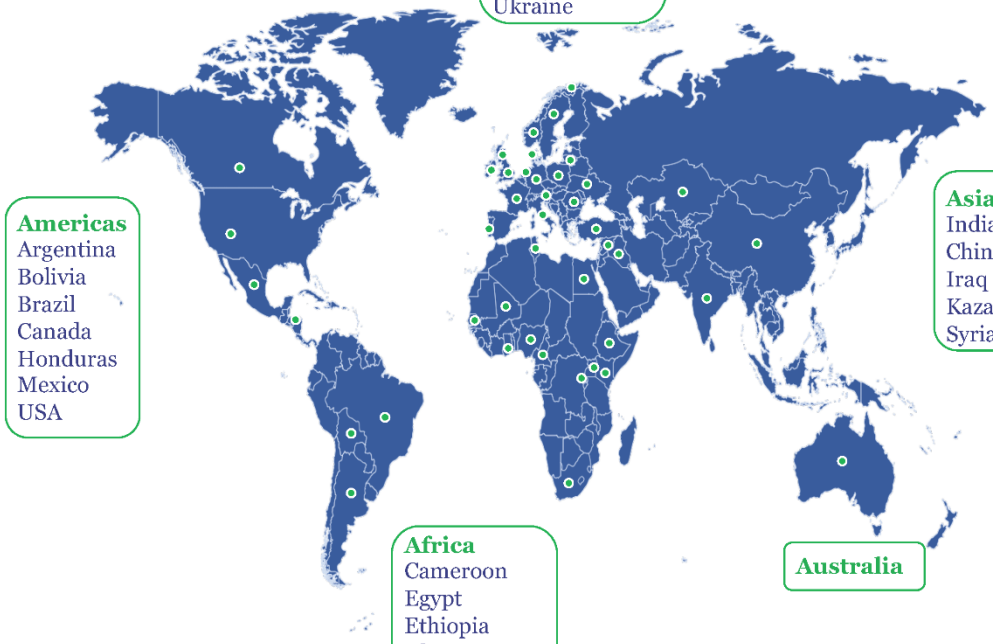
On behalf of members of Organizing Committees from BSI chapters around the globe, we thank you for your participation in our 3rd International Remote Conference. We anticipate that this Conference will provide the impetus for ongoing collaboration and networking.

Sincerely Yours,

The BSI Executive Team

Welcome to Our Global Participants

Europe
Austria
Denmark
England
France
Germany
Ireland
Italy
Lithuania
Norway
Poland
Portugal
Romania
Scotland
Sweden
The Netherlands
Turkey
Ukraine



Americas
Argentina
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Honduras
Mexico
USA

Asia
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China
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Kazakhstan
Syria

Africa
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Mali
Nigeria
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Senegal
South Africa
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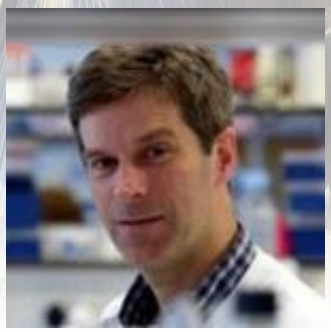
Uganda

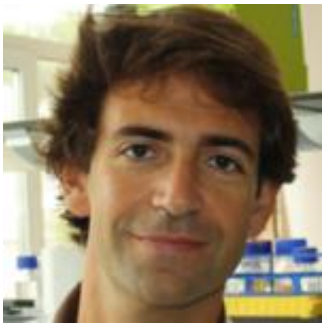
Australia

Keynote Speakers



Gerry Graham BSc, PhD, FRSE**,** is Head of the Chemokine Research Group (www.chemokineresearchgroup.org) at the University of Glasgow and Deputy Head of the Institute of Infection, Immunity and Inflammation. He works in the field of chemokine biology and is responsible for many of the seminal discoveries in this area. His two major interests in chemokine research are: (i) his group is amongst the world leaders in the study of atypical chemokine receptors and their role in the regulation of chemokine function; (ii) he is using complex genomic approaches to understand the orchestration of the chemokine-driven inflammatory response. His research is supported by a Medical Research Council Programme Grant and by the Wellcome Trust, for which he is Chair of their Expert Review Group in the Immune system in Health & Disease. He received a Wolfson Royal Society Merit Award and was elected Fellow of the Royal Society of Edinburgh.

Faith Osier, MBChB, MSc, PhD, is a 2018 TED Fellow and holds a Sofja Kovalevskaja Award from the Humboldt Foundation. She is Vice-President and President-elect of the International Union of Immunological Societies. Her research is focused on understanding how humans acquire immunity to malaria, with the ultimate aim of translating this knowledge into effective malaria vaccines. She is the leader of SMART (South-South Malaria Antigen Research Partnership), a network of researchers that have shared resources to study antibody responses to the malaria parasite in multiple longitudinal cohorts in Africa. Her research group is spread over two continents, at the KEMRI-Wellcome Trust Research Programme in Kenya and at Heidelberg University Hospital in Germany. She is passionate about the training of African scientists to tackle the health issues the continent faces.



Bruno Silva-Santos, MSc, PhD, is Professor of Immunology and Vice-Director of the Institute of Molecular Medicine of the University of Lisbon, Portugal. He trained as an immunologist at Cancer Research UK and King's College London. As an independent group leader, he has been funded by prestigious grants from the European Research Council (ERC) and the European Molecular Biology Organization (EMBO). His research is dedicated to Oncoimmunology, having dissected novel molecular mechanisms of T-cell differentiation and tumor cell recognition, published in journals such as Science or Nature Immunology, among a total of 70 international peer-reviewed papers. His translational work was recognized with various awards; and led to a start-up company focused on cancer immunotherapy, Lymphact, where he heads the Scientific Council.

Christine Stabell Benn, MD, PhD, DMSc has worked at the Bandim Health Project in Guinea-Bissau (BHP, www.bandim.org) since 1993, starting as a medical student. She spent postdoc time at the Danish National Hospital and at Stanford University. In 2010, Dr. Benn received an ERC Starting Grant. In 2012, Dr. Benn was selected by the Danish National Research Foundation to establish and lead a Center of Excellence, the "Research Center for Vitamins and Vaccines" (CVIVA, www.cviva.dk). Since 2013, Dr. Benn is Professor in Global Health at the University of Southern Denmark. Dr. Benn's research focuses on how vaccines and vitamins affect the immune system in more general ways than previously thought.

Conference Program: Day 1

Saturday, January 27, 2018

Time (EST)	Topic	Speaker
7:00 – 7:15 am	**Opening Ceremony – Introduction and Welcome from BSI**	**Dr. Eleanor Fish** Toronto, Canada
Scientific Session 1: Global Health		
7:15 – 7:50 am	**Keynote - Finding direction on the inflammation highway**	**Dr. Gerard Graham,** University of Glasgow, Scotland
7:55 – 8:10 am	***Schistosoma mansoni* infection and socio - behavioral predictors of HIV risk in women from Entebbe, Uganda**	**Sergey Yegorov** Toronto, Canada
8:15 – 8:30 am	**Atg8-associated autophagy in *Leishmania* parasites govern its mitochondrial health, differentiation and infectivity**	**Sagnik Giri** New Delhi, India
8:35 – 8:50 am	**CCR5 and CXCR4 coreceptor profile in resistant HIV exposed but seronegative individuals of Nigerian origin**	**Ibeh Bartholomew** Abuja,Nigeria
8:55 – 9:10 am	**Control of HIV infection *in vivo* using gene therapy with a secreted entry inhibitor**	**Dr. Jastaran Singh** Toronto, Canada
9:15 – 9:30 am	**HotDoc: The potential of solar-powered water infrastructure in South Sudan**	**James Thuch Madhier** Toronto, Canada
9:30 – 9:45 am	**Break**	
Scientific Session 2: Global Health		
9:45– 10:20 am	**Keynote – People and parasites: learning to win**	**Dr. Faith Osier,** KEMRI – Wellcome Trust, Kilifi, Kenya
10:25 – 10:40 am	**Cigarette smoke extracts inhibits M2 macrophage polarization and inhibition of IRE-1/XBP-1 pathway exacerbates behaviour**	**Sohail Mahmood** Hamilton, Canada
10:45–11:00 am	**Measure once and cut twice: how CRISPR/Cas is revolutionizing biotechnology**	**Dr. Jason De Melo** Toronto, Canada
11:05–11:20 am	**Effect of dietary monosodium glutamate on the development of metabolic syndrome in Sprague Dawley rats**	**Prabjot Sehmi** Nairobi, Kenya
11:25–11:40am	**Modulation of *Bulkholderia cenocepacia* virulence in response to environmental factors of lung tissue in cystic fibrosis patients**	**Ivana Bogado** Duque de Caxias, Brazil
11:45–12:00 pm	**Assessment of mental health and psychosocial support needs of refugee students in Kakuma Refugee Camp**	**Ruth Anyango** Eldoret, Kenya
12:05-12:20pm	**Hot Doc: BSI Nairobi: Knowledge, attitude and practice of drugs and substance abuse among teenagers at the Kabete Rehabilitation School**	**Esther Anyango** Nairobi, Kenya

12:20-12:35 pm	**Day 1 Closing Comments**

Conference Program: Day 2

Sunday, January 28, 2018

Time (EST)	Topic	Speaker
Scientific Session 3: Cancer		
7:00 – 7:35 am	**Keynote – Cancer immunotherapy: a paradigm shift with much promise**	**Dr. Bruno Silva-Santos,** Institute of Molecular Medicine, Lisbon, Portugal.
7:40 – 7:55 am	**A role for adseverin in MCF-7 breast adenocarcinoma cell invasion**	**Jelena Tanic** Toronto, Canada
8:00 – 8:15 am	**Sestrin2 facilitates glutamine dependent survival and mitochondrial biogenesis in cancer cells under glucose limitation.**	**Ashish Kumar** New Delhi, India
8:20 – 8:35 am	**Anticancer mechanism of a soy phytoestrogen against breast cancer**	**Dr. Swarnendra Singh** Gurugram, India
8:40 – 8:55 am	**Polymorphisms and haplotype structures from transforming growth factor beta 1 gene (TGFB1) show subtype-specific associations with susceptibility and clinical presentation in women breast cancer**	**Glauco Vitiello** Londrina, Brazill
9:00 – 9:15 am	**HotDoc: BSI goes to Kakuma!**	**Ashwinder Bhamra** Eldoret, Kenya
9:15 – 9:30 am	**Break**	
Scientific Session 4: Global Health		
9:30 – 10:05 am	**Keynote – A small jab, a big effect: non-specific immunomodulation by vaccines**	**Dr. Christine Stabell Benn** University of Southern Denmark, Denmark
10:10–10:25 am	**The Immunological Genome Project**	**Alison Cook and Kumba Seddu** Boston, USA
10:30– 10:45 am	**Mapping the 3D enhancer architecture of T-regulatory cells**	**Dr. Ricardo Ramirez** Boston, USA
10:50 – 11:05 am	**Boolean network modeling of T cell development predicts heterogeneous single cell transcriptional trajectories**	**Dr. Matthew Langley** Toronto, Canada
11:10 - 11:25 am	**Effects of nutritional and dietary supplements on renal function among university bodybuilders in Ghana.**	**John Taylor** Kumasi, Ghana
11:30 – 11:45 am	**HotDoc: Life after female genital mutilation: A case report**	**Pavanraj Chana & Atiyya Tul Munim** Eldoret, Kenya
11:45-12:00 pm	**Closing Ceremony – Awards and Acknowledgements**	

Instructions for Conference Participants

Quick Instructions

1. Register to join the conference: http://www.beyondsciences.org/conference2018/ .
2. All registrants (**participants & presenters**) will receive an invitation via e-mail latest by **Monday January 22nd, 2018** to the conference for the days they have registered. If you have registered but have not received an invitation by this date, please e-mail beyondsciencesinitiative@gmail.com.
3. The invitation email will include the details of the event as well as the option to *accept* or *decline*. Click *Accept* once you are ready to join the conference.
4. Enter your name and email address to complete your conference registration. This acts as your "login" for the platform. No additional passwords or info are required.
5. Once you have successfully joined the conference, you may access various features such as the live *chat* and the *status update* (accessed by clicking the smiley icon).

Detailed Instructions

Before the Conference

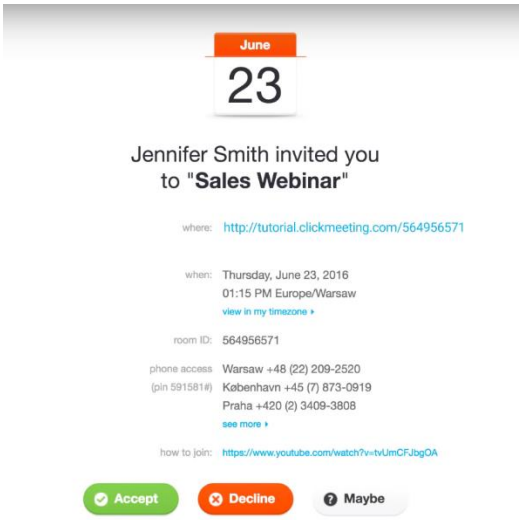
1. Be sure to have the following up-to-date:
   - Adobe Flash Player
   - Web browser (we have tested Chrome & Firefox)
2. All registrants (**participants & presenters**) will receive an invitation via e-mail latest by **Sunday January 21st, 2018** to the conference for the days they have registered. If you have registered but have not received an invitation by this date, please e-mail beyondsciencesinitiative@gmail.com.

Joining the Conference

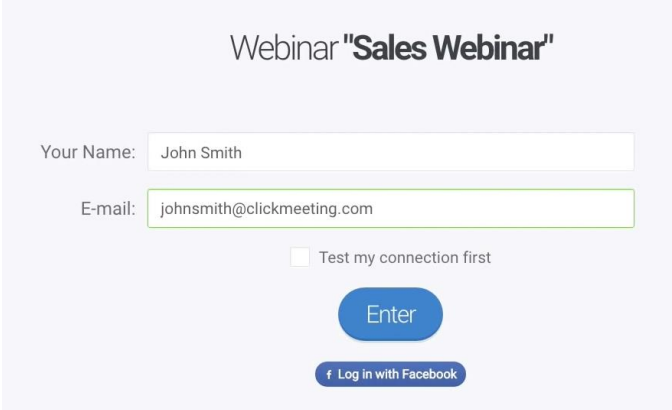
1. All registrants (**participants & presenters**) will receive an invitation via e-mail latest by **Sunday January 21st, 2018** to the conference for the days they have registered. If you have registered but have not received an invitation by this date, please e-mail beyondsciencesinitiative@gmail.com.

2. The invitation email will include the details of the event as well as the option to *accept* or *decline*. Choosing *accept* will let us know that you are attending the event and will provide you with a link to the event.

Instructions for Conference Participants



3. Upon clicking this link (on the appropriate conference date) you will be prompted to enter your name and email address to complete your conference registration. You also have the option of testing your connection via the "Test my connection first" checkbox, which might prompt you to download any additional plugins required to utilize the Clickmeeting platform.

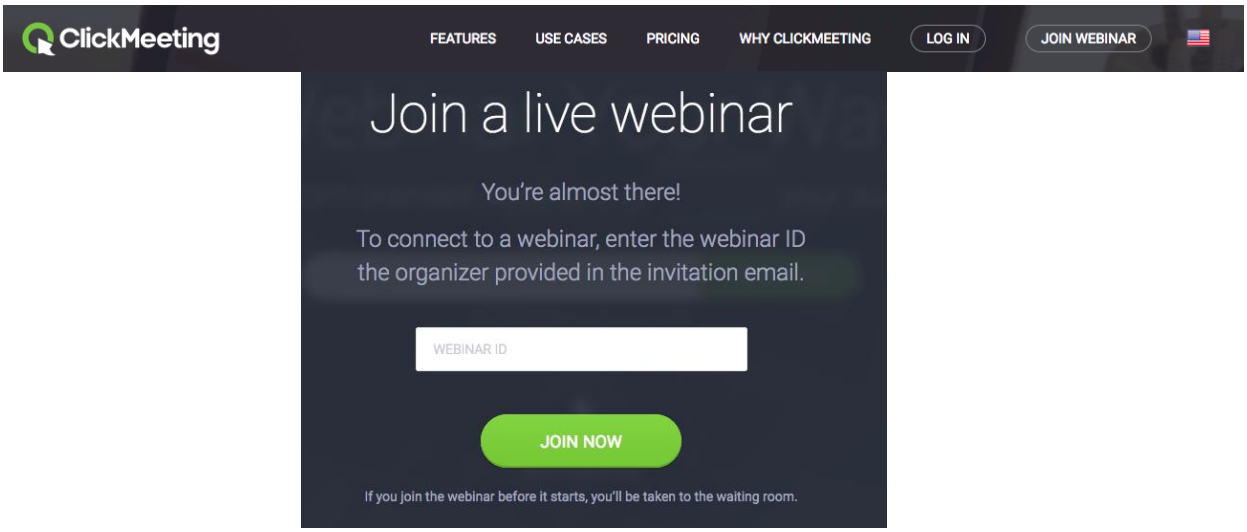


4. Alternatively, you may choose to login via your Facebook account.

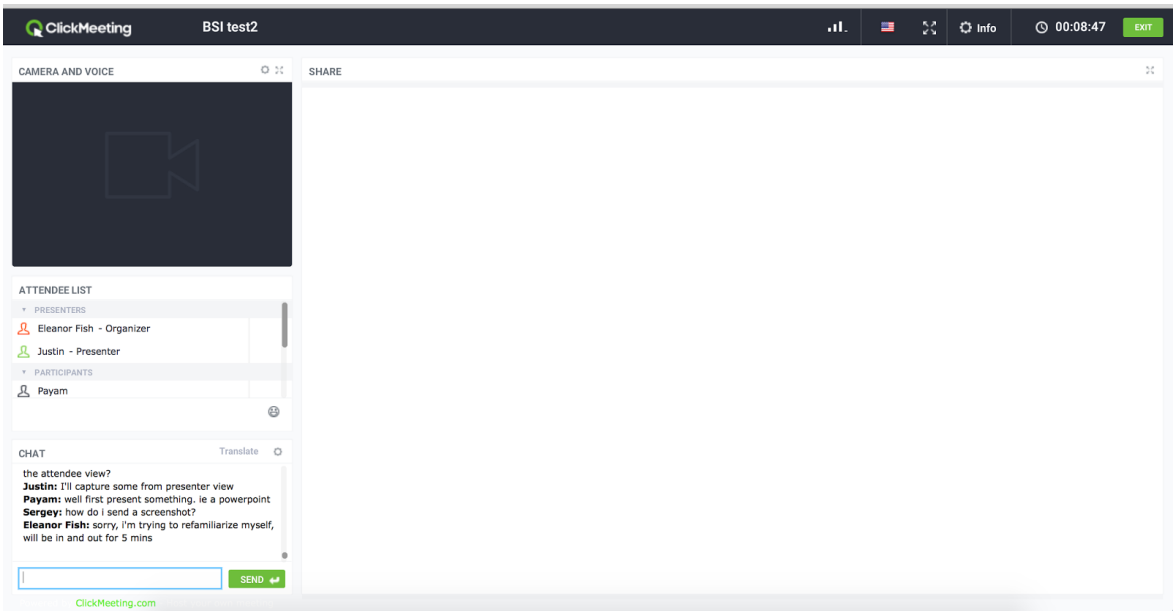
5. For further clarification on the previous three steps, please view the following Youtube video that illustrates the login procedure: https://www.youtube.com/watch?v=N5fp1G4BuZ4

Instructions for Conference Participants

6. For last minute access on conference days, we will be providing a *WEBINAR ID* on our website which may be used to access the conference. This may be done by first visiting the Clickmeeting website, clickmeeting.com, then clicking the "JOIN WEBINAR" button on the top right of the page, and finally entering the *WEBINAR ID*.



7. Once logged in, you should have a view like this:

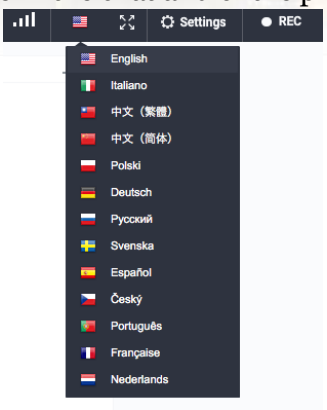


Instructions for Conference Participants

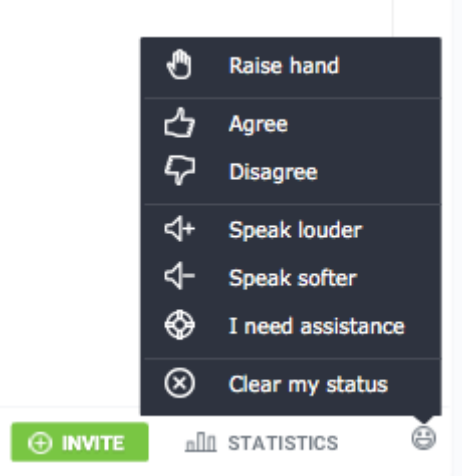
During the Conference

1. During the conference, the *chat* box in the bottom right corner may be used to share your thoughts, or to pose questions to the presenters.

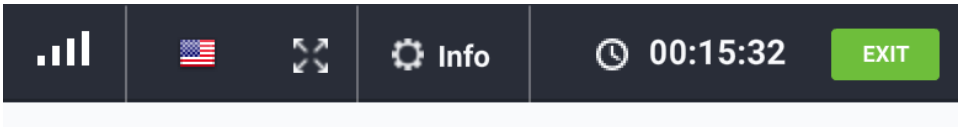
2. The interface language may be toggled by clicking the *flag icon* and choosing a language from the resultant drop-down menu. Note, however, that English will be the primary conversational language in the chat and of the presentations.



3. The grey *smiley* icon may be selected to indicate your status. For example, there exists a *Speak louder* status, which communicates a clear message to the presenter.



4. At any time during the presentation, you may choose to exit via the green *Exit* button. Note that you may access the presentation again afterward via the same link.



BEYOND SCIENCES INITIATIVE

3RD INTERNATIONAL REMOTE CONFERENCE: SCIENCE & SOCIETY

PRESENTER ABSTRACTS

SS1-1: Global Health

Timeslot: 7:55 – 8:10 am

Presenter: Sergey Yegorov
Institution: University of Toronto, Department of Immunology, Canada.
Co-Authors: Ronald Galiwango[1], Sara Good[2,3], Moses Muwanga[4], Irene Wesonga[4], Juliet Mpendo[5], Egbert Tannich[6], Andrea Boggild[7,8], Noah Kiwanuka[5,9] , Bernard Bagaya[5,10], Rupert Kaul[1,7]

[1] Department of Immunology, University of Toronto, Toronto, Canada
[2] Genetics and Genome Biology Program, The Hospital for Sick Children, Toronto, Canada
[3] Department of Biology, University of Winnipeg, Winnipeg, Canada
[4] Entebbe General Hospital, Entebbe, Uganda
[5] UVRI-IAVI HIV Vaccine Program, Entebbe, Uganda
[6] Bernhard Nocht Institute for Tropical Medicine, Hamburg, Germany
[7] Department of Medicine, University of Toronto, Toronto, Canada
[8] Public Health Ontario Laboratories, Toronto, ON, Canada
[9] Department of Epidemiology and Biostatistics, School of Public Health, College of Health Sciences, Makerere University, Kampala, Uganda
[10] Department of Immunology and Molecular Biology, School of Biomedical Sciences, College of Health Sciences, Makerere University, Kampala, Uganda

Schistosoma mansoni **infection and socio-behavioral predictors of HIV risk in women from Entebbe, Uganda**

Schistosoma mansoni infection has been associated with HIV risk; this association might be causal or mediated through shared socio-behavioral factors. In adult Ugandan women (n=58) we found that prevalent schistosomiasis was inversely associated with age (OR 0.910, p=0.047), marriage (OR 0.263, p=0.030), injectable hormonal contraceptive use (OR 0.121, p=0.002) and recent sex (trend, OR 0.350, p=0.064). These findings have implications for the design and interpretation of studies assessing *S. mansoni*-HIV interaction.

SS1-2: Global Health

Timeslot: 8:15 – 8:30 am

Presenter: Sagnik Giri
Institution: National Institute of Immunology, New Delhi, India.
Co-Authors: Chandrima Shaha[1]

[1]Cell Death and Differentiation laboratory, National Institute of Immunology, New Delhi, India

Atg8-associated autophagy in Leishmania parasites govern its mitochondrial health, differentiation and infectivity

Background: Leishmaniasis registers 1.6 million global cases every year. Leishmania multiplies within the host macrophages by evading host defensive protocols. It differentiates from promastigotes to amastigotes within the macrophage. During differentiation, it undergoes organelle based morphological changes like in mitochondria, which is key to parasite survival and infection. Autophagy may play a crucial role in maintaining survival through regulating mitochondrial homeostasis under these adverse conditions. But details related to this process are yet to be explored. We asked whether autophagy has any role in maintaining mitochondrial quality control and parasite differentiation.

Method: Leishmania Ag83 strain parasites were treated with exogenous and endogenous stress inducing drugs H2O2, PAT, Antimycin A and CCCP. Using GFP tagged Atg8 overexpressing parasites, the localisation of Atg8-associated autophagosomes were determined by confocal microscopy and mitochondrial fractionation under the aforesaid stress conditions. To analyse the role of autophagy in regulation of differentiation and infection potential, Atg8 overexpressed and knockout parasites were incubated with human macrophage THP1 cells.

Results: We found that, treatment with exogenous and endogenous stressors resulted in substantial accumulation of ATG8-associated autophagosomes on the parasite's mitochondria. Moreover, promastigote to amastigote differentiation of parasites in infected macrophages, caused increased translocation of autophagosomes to mitochondria. Notably, we observed that such accumulation was specific in response to induced or physiological mitochondrial stresses like starvation where high levels of mitochondrial superoxides were generated. Quenching of mitochondrial superoxides using MitoTEMPO was able to inhibit autophagosomal accumulation. Further, we found significant decline in the differentiation and infection potential in Atg8 knock-out parasites as compared to wild type. Disruption of mitochondrial potential in these knock-outs resulted in increased stress induced cell mortality.

Conclusion: Our findings suggest a crucial role of Atg8-associated autophagy in governing parasites' mitochondrial health and infectivity. Hence, further studies targeting the selective inhibition of parasite autophagy could be of immense therapeutic issue.

SS1-3: Global Health

Timeslot: 8:35 – 8:50am

Presenter: Ibeh Bartholomew
Institution: National Biotechnology Development Agency, Abuja, Nigeria.
Co-Authors: Josiah Habu[1], O.Obidoa[2]

[1]Bioresources Development Centre Odi, Bayelsa, National Biotechnology Development Agency, Abuja, Nigeria.
[2]Department of Biochemistry, University of Nigeria Nsukka, Nigeria.

CCR5 and CXCR4 coreceptor profile in resistant HIV exposed but seronegative individuals of Nigerian origin

Background: The mutant allele of CCR5 membrane coreceptor occurs in European populations conferring resistance. This mutation presumably does not occur in African populations hence the high prevalence of HIV in the region. The study seeks to investigate the HIV-membrane coreceptor expression profile in HIV resistant but serodiscordant-heterosexual partners of Nigeria origin which will give insight to the functional cure phenomenon existing in the region.

Methods: Thirty-four partners (serodiscordant-seronegative {SSN} and serodiscordant-seropositive {SSP}) and 15 seronegative-healthy individuals (SNH) were recruited for the study. HIV was confirmed using immunocomb-II. Flow cytometer was used to measure CD4, CD3, CD8, CCR5 and CXCR4 cell expressions. NucliSens magnetic extraction method based on Boom chemistry was used for HIV-mRNA extraction while real-time quantification was done by Nucleic Acid based amplification and detection assay (NASBA). NCBI protein Blast was used to search for sequence similarity algorithms and scores allocated using PAM matrix.

Results: We noted a significantly increased T-cell ratio in SSN group by 40% on comparison with SSP. HIV-mRNA was not detected in SSN and SNH but was highly expressed in the SSP group (9400±700). Expression profile of the co-receptors showed that SSN's CCR5 (800±45) and CXCR4 (756±80) decreased non-significantly ($p<0.05$) by 7.5% and 9% respectively when compared with SSP. Similarly, expression of CXCR4 (876±65) and CCR5 (900±152) in SSP increased slightly over SSH. SSP, SSH and SSN groups did not show any significant difference in their coreceptor expression patterns while scores were 93% similar.

Conclusions: Since cytokine-mediated increase in binding of HIV to cells is related to increased expression of CCR5 and CXCR4 coreceptors, our results indicate that the new HIV-coreceptor mutation profile observed may exonerate the coreceptor phenomenon as the major factor responsible for HIV proliferation in blacks hence the mechanism of HIV membrane fusion and seronegativity in HIV exposed black individuals needs to be re-examined.

SS1-4: Global Health

Timeslot: 8:55 – 9:10am

Presenter: Ruth Anyango
Institution: Moi University, Kenya
Co-Authors: Ernestine Bahati1, Oketch Dorothy2

[1]School of Medicine, Moi University, Eldoret Kenya.
[2]School of Nursing, Moi University, Eldoret Kenya.

Assessment of mental health and psychosocial support needs of refugee students in Kakuma refugee camp.

Background: Kakuma refugee camp is one of the largest refugee camps in Sub-Saharan Africa with an approximate population of over 200,000 people, majorly from South Sudanese and Somalia. The majority of the refugees are survivors of civil wars, organized violence, clan fighting, physical and sexual abuse. Mental health needs in this setting is therefore a significant issue. This study describes the Mental Health and Psychosocial Support (MHPSS) needs of refugee students within the camp.

Methods: The study was conducted in Somali Bantu high school in Kakuma refugee camp. The assessment was based on qualitative and quantitative tools adapted from the WHO-UNHCR Toolkit for assessing mental health and Psychosocial needs in humanitarian settings. Open ended interviews were conducted with the students. Responses were analyzed using content analysis and discussed as such.

Results: Findings are based on data collected from 60 participants. Most (67%) of the participants were of South Sudanese origin with females comprising 51.2%, compared to males comprising 48.8%.
When reporting mental health symptoms present 'all of the time' in the last year, 35.1% of respondents felt so afraid that nothing could calm them down; 10.4% felt so angry that nothing could calm them down; 15.6% felt so uninterested in things that they used to like; 26.3% felt so hopeless that they did not want to carry on living. Respondents associated the reported problems with disruptions in their regular functioning and carrying out of activities of daily living, including a decreased ability to concentrate effectively in school. Coping strategies used by the refugees included: doing nothing (32%), socializing (35%), praying (8%), fighting or getting angry (12%), crying (5%), walking out (5%) and sleeping (3%). A need for counselling was reported by 34% of respondents.

Conclusion: This assessment revealed that many refugee students in Kakuma experience a variety of MHPSS problems including sadness, fear, anger, and hopelessness. They also suffer from behavioral and social difficulties as a result of these problems.

Recommendations: Recommendations to inform future planning and implementation of mental health needs include: promoting the early detection of mental health conditions and strengthening specialized MHPSS outreach services.

SS2-1: Global Health

Timeslot: 10:25 – 10:40am
Presenter: Sohail Mahmood
Institution: McMaster University, Hamilton, Canada.
Co-Authors: James Murphy[1,2], Mark Inman[2] and Kjetil Ask[1,2]

[1]Department of Medicine, Firestone Institute for Respiratory Health, Hamilton, Ontario
[2]Department of Pathology and Molecular Medicine, McMaster Immunology Research Centre, McMaster University, Hamilton, Canada.

Cigarette smoke extracts inhibits M2 macrophage polarization and inhibition of IRE-1/XBP-1 pathway exacerbates behaviour

Background: Cigarette smoke contributes to 90% of lung cancer cases and 80% of COPD cases. These concerns loom large as lung cancer represents 13% of all cancer deaths and estimates report by 2020 COPD will be the third leading cause of death in the world. The master regulator of the ER stress response, IRE-1, in the context of cigarette smoke exposure lacks study, while its downstream pathways are activated. Both activation of the ER and cigarette smoke causes macrophages to behave as "tissue-healing" or M2 subsets that release factors promoting reconstruction of the lungs; alternatively, M1 macrophages fight diseases and promote further inflammation. Thus, we hypothesized that macrophages exposed to cigarette smoke leads to ER stress and activation of the unfolded protein response, causing M2 macrophage polarization and immune phenotype. Additionally, IRE-1 inhibition will modulate the cigarette smoke induced effects on macrophage polarization.

Methods: Bone marrow-derived macrophages were isolated and cultured from 6-week old female mice and Human THP-1 monocytes were differentiated into macrophage-like cells. Cells were treated with various doses of cigarette smoke extract, macrophage polarization mixtures and IRE-1/XBP-1 inhibitors. A multiplex assay assaying for 42 proteins (Eve Technologies) and genomic analysis using NanoString® was utilized to determine the secretion in supernatants and gene expression, respectively.

Results: Cigarette smoke extract induced activation of IRE-1/XBP-1 pathway through splicing of XBP-1 mRNA in vitro. However, upon assaying for pro-inflammatory cytokines, indicative of M1 polarization, we were unable to determine that cigarette smoke directly caused secretion of these cytokines. Furthermore, cigarette smoke inhibited the activation of M2 macrophages, an anti-inflammatory and tissue healing subset seen through arginase and CCL18 inhibition.

Conclusion: This suggests a different phenotype than classical M1 or M2 polarization being induced by cigarette smoke. In addition, it suggests the IRE-1/XBP-1 pathway having a robust role in controlling gene expression and balance of cellular proteomics.

SS2-2: Global Health

Timeslot: 10:45–11:00am

Presenter: Paul Kagori
Institution: University of Nairobi, Nairobi,Kenya
Co-Authors: Dr. Cheikh Ndao[1], Prof. Farai Nyabadza[2]

[1] African Institute of Mathematical Sciences, AIMS, Senegal
[2]Department of Mathematics, Stellenbosch University, South Africa

The dynamics of HPV and cervical cancer cells infection in the presence of immune response

Cervical cancer refers to malignant growth of abnormal cells in the cervix following persistent infection of cervical basal epithelial cells by high risk Human Papilloma Virus (HPV). HPV is the most common sexually transmitted virus with an annual estimate of at least 5.5 million. At the moment, an estimated 15% of the world population is infected with HPV. In the United States for instance, about 12,990 women were diagnosed with cervical cancer with an estimated 4,120 deaths reported in 2012 and the number rose to 248,920 in 2013. However, recent study have indicated a decline of about 1.5% of new cases of HPV especially in developed nations due to regular screening and vaccination.

We develop a mathematical model based on the modification of Tri Noor et al model to firm our understanding on the progression of cervical cells from normal cells to invasive cancer cells after infection by the Human Papillomavirus (HPV). A novel feature is that the immune response due to vaccination has been incorporated into the model. We divided the cells population into four compartments: target susceptible cells (X), infected cells (Y), pre-cancer cells (P) and cancer cells (C). This ordinary differential equation model also has free-virus (V) compartment, which infect normal cells and immune cells (T) compartment which is free virus and cancer cells specific. The existence of region where the model is epidemiologically feasible and mathematically well-posed is analysed after proving positivity of the model state variables. We then analyse local stability of the equilibrium points after computing the basic Reproductive Number Ro .

The model analysis shows that disease free equilibrium is asymptotically stable when $R_0 < 1$ and unstable if $R_0 > 1$.From sensitivity analysis of the indices of R_0, the parameters which play an important role in the progression towards invasive cancer are established.

From simulation, the cancer and free-virus killing rate (λ) effect and its prevention from unbounded growth of cancer cells population is deeply discussed. Finally, the model predicts that in the long run, under efficacious vaccine, HPV infection and cancer cells population will decrease due reduction of viral loads and increased immune cells population

SS2-3: Global Health

Timeslot: 11:05–11:20am

Presenter: Prabjot Sehmi
Institution: University of Nairobi, Nairobi, Kenya.
Co-Authors: Waweru Peter[1], Bukachi Fredrick[1]

[1]Department of Medical Physiology, University of Nairobi, Nairobi, Kenya

Effect of dietary monosodium glutamate on the development of metabolic syndrome in Sprague Dawley rats

Introduction: Metabolic syndrome (MetS) is a combination of hypertension, insulin resistance, glucose intolerance, dyslipidaemia and central obesity. A major cause of mortality and morbidity in the world. With its prevalence on the rise, it is important to identify and modify the risk factors that contribute to its development. Monosodium glutamate (MSG) is a sodium salt of glutamic acid used in the food industry as a flavour enhancer. There is evidence that MSG decreases pancreatic β cell mass but it is still unknown whether the use of MSG is associated with the development of MetS.

Method: Forty freshly weaned (4 weeks old) Sprague Dawley were used. The rats were assigned into four groups (n = 10): A normal diet group(Normal), a high fat (20%)-high sugar (30%) diet (HF/HS), a high fat-high sugar with addition of 2 mg/g body weight/day MSG (HF/HS/MSG), and a high fat-high sugar with addition of 2 mg/g body weight/day MSG and lactisole (HF/HS/MSG/L).
Fasting blood glucose (FBG) levels were measured on days 7, 14, 21, 28, 35, 42, 49, and 56 to assess hyperglycaemia. Insulin tolerance tests on days 14, 28, 42 and 56 on each of the rats to assess presence of insulin resistance. Serum triglycerides (TG) and serum high-density lipoprotein cholesterol (HDL) done on day 56 to assess dyslipidaemia. At the end of the 56 days, a Western blot for ER (Endoplasmic Reticulum) stress markers done on pancreatic tissue.

Results: At the end of the study period, the HF/HS/MSG showed significantly increased levels of FBG, insulin resistance, and serum TG in comparison to the HF/HS. There was a significant decrease in HDL in the HF/HS/MSG in comparison to the HF/HS.However, there was no significant difference in the levels of FBG,insulin resistance, serum TG, and serum HDL in the HF/HS/MSG/L when compared to the HF/HS diet suggesting the inhibition MSG by lactisole. Western blot analysis illustrated increased expression of CHOP, a marker for Endoplasmic Reticulum stress, in the HF/HS/MSG.

Conclusion: The present study shows that chronic intake of dietary MSG with a high fat and high sugar diet leads to MetS, as demonstrated by the hyperglycaemia, dyslipidaemia, and increased insulin resistance. The increased expression of ER stress marker CHOP in the Western blot may provide a partial explanation for the results. It is recommended to carry out a follow-up study on humans as the experimental findings in the rat demonstrate potential deleterious effects of MSG in humans.

SS2-4: Global Health

Timeslot: 11:25–11:40am

Presenter: Ivana Bogado
Institution: Universidade Unigranrio, Duque de Caxias, Brazil
Co-Authors: Erica Aparecida-dos-Santos-Ribeiro-da-Silva[1,2] Maria Cristina da-Silva-Lourenço[1] and Eidy de-Oliveira-Santos[3,4]

[1]Fundação Oswaldo Cruz (FIOCRUZ)
[2]Universidade Estadual do Rio de Janeiro (UERJ)
[3]Programa de Pós Graduação em Biomedicina Translacional (Biotrans) Unigranrio/UEZO/INMETRO
[4]Universidade Estadual da Zona Oeste (UEZO)

Modulation of *Bulkholderia cenocepacia* virulence in response to environmental factors of lung tissue in cystic fibrosis patients

This work aims to study the modulation of virulence factors produced by *Burkholderia cenocepacia* under conditions associated with mucus characteristic of Cystic Fibrosis (CF), such as high osmotic pressure, high iron concentrations and the presence of mucolytic agents used in the treatment of CF, for instance, N--acetyl –cysteine (NAC). For analysis of virulence factors, an ET--12 clone of *B. cenocepacia* was employed. Different concentrations of these substances were used: NaCl (0.1M, 0.3M, 0.4M and 0.5M), Ferric Citrate (or Ammoniacal Citrate) at 1, 10µM and NAC (0.5, 1.0 and 2.0 mg/mL). Phenotypic tests were performed to confirm the characteristics of the strain. The agar diffusion technique and a growth curve were applied to study the effect of culture conditions. Virulence expression was assessed through biofilm formation assay and proteomic analysis using intracellular protein extracts and culture supernatant. In the screening performed by the agar diffusion technique, there was no inhibition. A growth curve to evaluate the behavior of ET--12 determined that the bacteria takes, on average, 6 hours to reach the log phase. It does not grow in the presence of NAC (2.0mg/mL), EDTA (10mM) and 0.4M/ 0.5M of NaCl, besides its growth is stimulated by iron at 1µM and 10 µM. On the other hand, biofilm formation was slightly reduced in presence of iron (1 and 10 µM), decreased in a dose--dependent manner at high osmotic pressures (0.1M, 0.3M, 0.4M and 0.5M NaCl), and was completely inhibited in the presence of EDTA (10 mM). The NAC inhibited the biofilm expression at concentrations of 0.5mg/mL and 2.0mg/mL, and surprisingly, it seemed to stimulate this process at the concentration of 1.0mg/mL ($p<0.05$). Furthermore, ET--12 protein extracts from ET--12 (secreted) and cellular (intracellular) culture supernatants are being obtained in LB containing 0.4M NaCl, 10µM ferric citrate and 1mg/mL of NAC for the analysis of expressed proteins in these conditions. In general, iron, EDTA, NAC and NaCl negatively modulated biofilm expression, the main virulence factor of ET--12. This preliminary data should be confirmed by further testing. The results obtained will contribute to a better understanding of the mechanism of pathogenesis and to improve the infection control and treatment of CF patients.

SS2-5: Global Health

Timeslot: 11:45–12:00 pm

Presenter: Raja Rekik
Institution: Institut Pasteur de Tunis, Laboratory of Transmission, Control and Immunobiology of Infection, Tunis, Tunisia
Co-Authors: Ahlem Ben Hmid[1,2], Chayma Lajnef[1], Imen Zamali[1], Ines Zaraa[3], Mélika Ben Ahmed[1,2,4]

[1]Laboratory of Clinical Immunology, Institut Pasteur de Tunis, 1002, Tunis, Tunisia;
[2]Université de Tunis El Manar, Faculté de Médecine de Tunis, 1068, Tunis, Tunisia;
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[4]Laboratory of Transmission, Control and Immunobiology of Infection, LR11IPT02, Institut Pasteur de Tunis, 1002, Tunis, Tunisia;

AhR transcription is decreased in skin of vitiligo patients

Background: Vitiligo is a chronic depigmentary skin disorder resulting from a selective destruction of melanocytes (Ezzedine et al., 2015). The pathogenesis of the disease is incompletely deciphered but several findings support the hypothesis of an autoimmune pathogenesis. Several pathomechanisms could be responsible of the loss of melanocytes in vitiligo. Herein, we analyzed the role of aryl hydrocarbon receptor (AhR), a ligand-dependent transcription factor, which plays a key role in melanocyte homeostasis and pigmentation after UVB stimulation

Methods: Total mRNA was extracted from the skin biopsies obtained from five newly diagnosed and untreated vitiligo patients in either the lesional, perilesional (the adjacent normal appearing skin) and the non-vitiliginous skin and from four healthy controls. Biopsies were incubated in RNA later® (Qiagen) during 24h and then stored at −80°C until use. Total RNA was extracted from frozen biopsies using Rneasy mini kit (Qiagen) according to the manufacturer's procedure. After retro-transcription using MMLV reverse transcriptase (Invitrogen), the expression of the AhR mRNAs was analyzed by quantitative real-time RT-PCR using available gene expressed assay® and Taqman PCR Master Mix (Applied Biosystems).

Results: Herein, we analyzed the role of aryl hydrocarbon receptor (AhR), a ligand-dependent transcription factor, which plays a key role in melanocyte homeostasis and pigmentation after UVB stimulation. Our data revealed a significantly decreased transcription of AhR in the non-lesional skin of vitiligo patients compared to the normal skin of healthy controls. Moreover, a progressive increase in the AhR transcription from the normal skin to the perilesional and the lesional skins of vitiligo patients has been noticed. This may be ascribed to a feedback response to counteract the deleterious inflammatory response. However, the AhR mRNA level in the perilesional and lesional skins of vitiligo patients did not reach this of the normal skin of healthy controls.

Conclusion: The significant decrease of the baseline AhR transcription could represent a susceptibility factor for the development of vitiligo. It could also explain the variable efficiency of UVB therapy in vitiligo patients. Evaluating the level of AhR transcription could, thus, be a predictive factor of the response to such therapy.

SS3-1: Cancer

Timeslot: 7:40 – 7:55am

Presenter: Jelena Tanic
Institution: University of Toronto, Toronto, Canada
Co-Author: Yongqiang Wang[1], Michael Glogauer[1], and Christopher McCulloch[1,2]

[1]Department of Laboratory Medicine and Pathobiology, University of Toronto, Toronto, Canada
[1]Faculty of Dentistry, University of Toronto, Toronto, Canada

A role for adseverin in MCF-7 breast adenocarcinoma cell invasion

Background: The regulation of the assembly of subcortical actin filaments is important for the formation of cell extensions, which are involved in matrix invasion by cancer cells. Extensions degrade the extracellular matrix in local invasion but the regulatory mechanisms are not defined. Therapeutic targeting of matrix invasion could decrease cancer metastasis-associated morbidities. Adseverin (ADS) is a Ca2+-dependent, actin-capping and severing protein that is upregulated in gastric, prostate, and bladder cancers. In response to increased levels of intracellular Ca2+, ADS severs subcortical actin filaments, thereby enabling rapid alterations of cell membrane structure and function, which are likely required for cancer invasion of the matrix. Suppression of ADS expression reduces migration and the proliferative potential of metastatic cancer cell. We hypothesized that ADS is required for subcortical actin remodeling, which in turn is important for the release of matrix metalloproteinases from extracellular vesicles at the cell membrane.

Methods: The expression of ADS in MCF7 in breast cancer cell lines was examined by immunoblotting and RT-PCR analysis. An ADS knockout cell line was generated with CRISPR-Cas9. Exosomes were precipitated from ADS WT and KO cells using ExoQuick-TC and quantified using nanoparticle tracking analysis by Nanosight NS300. Cell spreading and extension formation on collagen and fibronectin was examined by confocal microscopy. For assessment of matrix-degrading potential, collagenase expression and activity were assessed after plating cells on fibrillar collagen.

Results: We found that ADS is expressed by MCF-7 breast adenocarcinoma cells, which is previously undocumented. Compared with controls, knockout of ADS was associated with reduced release of exocytic vesicles, and reduced ability to degrade fibrillar collagen.

Conclusions: ADS mediates the exosomal release of matrix-degrading proteins from the tips of invasive, actin-rich structures is required for the formation and maturation of invadopodia. These processes enable matrix degradation that is essential for cell migration and metastasis.

SS3-2: Cancer

Timeslot: 8:00 – 8:15am

Presenter: Ashish Kumar
Institution: National Institute of Immunology, Cell Death and Differentiation Lab, New Delhi, India
Co-Author: Chandrima Shaha[1]

[1]Cell death and Differentiation Laboratory, National Institute of Immunology, New Delhi, India

Sestrin2 facilitates glutamine dependent survival and mitochondrial biogenesis in cancer cells under glucose limitation.

Background: Tumour cells mostly reside in a milieu where availability of nutrients mainly glucose is less than required. Glutamine is one of the vital and versatile nutrient which cancer cells consume avidly which confer metabolic plasticity in cancer cells, hence mechanisms related to glutamine metabolism has been identified as targets. Sestrin2/SESN2 is a member of evolutionary conserved family of proteins which has been recently appreciated to play an important role in cancer cell metabolism. Recently SESN2 has been shown to positively regulate cancer cell survival under glutamine depletion. We questioned how Sestrin2 rewires cancer cell metabolism under glucose limitation and how that influence mitochondria biogenesis.

Methods: Cells were cultured in high glutamine and low glucose media and analysis of cancerous potential was done by cell death and cell migration assays were done. Further, to evaluate the role of SESN2 in metabolic reprogramming under glucose limitation, siRNA mediated silencing of expression was done and intracellular glutamine levels and mTORC1 versus mTORC2 activation was measured. Mitochondria biogenesis was evaluated by activation of mitochondria biogenesis marker, PGC1-α using immunoblotting and real-time PCR. Mechanism of PGC1-α activation was deciphered by analysing nuclear versus cytosolic translocation of transcriptional factors.

Results: We found that supplementation of glutamine under glucose limitation promotes cell survival in various cancer cells with maximum survival in HepG2 cells which was hampered on SESN2 knockdown. Downregulation of SESN2 decreased levels of intracellular glutamine under glucose deprivation (albeit adequate glutamine is available), concomitant with decline in cancer cell survival. SESN2 knockdown under indicated metabolic condition, resulted in a decline in PGC1-α expression which inhibits mitochondria biogenesis. Our results show that this decline in PGC1-α was due to lesser nuclear translocation of FOXO1. Mechanistically, SESN2 forms a complex with JNK and FOXO1 which promotes FOXO1 nuclear translocation and PGC1-α transactivation.

Conclusions: These findings demonstrate that SESN2 promotes cancer cell survival and PGC1-α mediated mitochondria biogenesis under glucose limitation by facilitating utilization of glutamine. Thus, targeting glutamine metabolism along with glucose could greatly improve the therapeutic potential against cancers.

SS3-3: Cancer

Timeslot: 8:20 – 8:35am

Presenter: Swarnendra Singh
Institution: Cell & Imaging Division, Imperial Life Sciences, Gurugram, India
Co-Author: Atif Zafar[1], Imrana Naseem[1]

[1]Faculty of Life Sciences, Aligarh Muslim University, Aligarh, India

Anticancer mechanism of a soy phytoestrogen against breast cancer

Background: Coumestrol is a phytoestrogen present in soybean products and recognized as potential cancer therapeutic agent against breast cancer. However, the clear molecular mechanism of anticancer-activity of coumestrol in breast carcinoma has not been reported. It is well established that copper levels are elevated in different malignancies. Therefore, the objective of this study was to investigate the copper dependent cytotoxic action of coumestrol in human breast cancer MCF-7 cells.

Methods: Human breast cancer MCF-7 cell line and normal human breast basal epithelial MCF-10A cell line were used. In vitro cell viability assay-IC50 determination was performed by MTT reduction assay. Cellular oxidative environment was assessed using DCFH-DA and DHE probes. Potency of coumestrol to induce apoptosis in breast cancer MCF- 7 cells was quantified by Annexin V-FITC Apoptosis detection. Cell cycle arrest induction by coumestrol was analyzed using PI staining and flow cytometry. Measurement of mitochondrial membrane potential was performed by JC-1 staining. Morphological assessment of cell death was analysed by phase contrast, fluorescence, and electron microscopy. To examine the expression levels of apoptosis related proteins, western blotting analysis was performed.

Results: Results showed that coumestrol inhibited proliferation and induced apoptosis in MCF-7 cells, which was prevented by copper chelator neocuproine and ROS scavengers. Coumestrol treatment induced ROS generation coupled to DNA fragmentation, up-regulation of p53/p21, cell cycle arrest at G1/S phase, mitochondrial membrane depolarization and caspases 9/3 activation. All these effects were suppressed by ROS scavengers and neocuproine. These results suggest that coumestrol targets elevated copper for redox cycling to generate ROS leading to DNA fragmentation. DNA damage leads to p53 up-regulation which directs the cell cycle arrest at G1/S phase and promotes caspase-dependent apoptosis of MCF-7 cells.

Conclusion: Copper targeted ROS-mediated p53-dependent mechanism better explains the cytotoxic action of coumestrol in MCF-7 cells. Thus, targeting elevated copper levels might be a potential therapeutic strategy for selective cytotoxic action against malignant cells.

SS3-4: Cancer

Timeslot: 8:40 – 8:55am

Presenter: Glauco Vitiello
Institution: Londrina State University Department of Pathological Sciences, Londrina, Brazil
Co-Authors: Roberta Guembarovski[2], Bruna Hirata[1], Marla Amarante[1], Carlos Coral de Oliveira[1], Karen Brajão de Oliveira[1], Guilherme Cebinelli[3]; Alda Guembarovski[4], Clodoaldo Campos[5]; Maria Watanabe[1]

[1]Department of Pathological Sciences, Londrina State University, Londrina, Parana, Brazil
[2]Department of General Biology, Londrina State University, Londrina, Parana, Brazil
[3]Department of Biochemistry and Immunology, University of São Paulo, Ribeirão Preto, São Paulo, Brazil
[4]Department of Pathology, Clinical and Toxicological Analysis, Londrina State University, Londrina, Parana, Brazil
[5]Department of Clinical Research, Londrina Cancer Hospital, Londrina, Parana, Brazil

Polymorphisms and haplotype structures from transforming growth factor beta 1 gene (TGFB1) show subtype-specific associations with susceptibility and clinical presentation in women breast cancer

Background: Transforming Growth Factor Beta 1 (TGFβ1) exerts cell- and context-specific functions in breast cancer (BC), inhibiting growth of initial and less aggressive tumors, such as those from Luminal A (LA) subtype, while stimulates the development of advanced or highly invasive cancers, such as triple negative (TN) and HER2+ cancers. However, the effect of TGFB1 gene polymorphisms on susceptibility and clinical presentation of diverse breast cancer subgroups are not described. Therefore, we aimed to investigate the possible influence of four TGFB1 single nucleotide polymorphisms (SNPs), rs1800468 (G-800A) and rs1800469 (C-509T) on its' promoter region, and rs1800470 (C29T or Pro10Leu) and rs1800471 (G74C, Arg25Pro) on its' signal peptide sequence and their haplotype structures on BC subgroups.
Methods: TGFB1 genotypes were assessed through RFLP-PCR and haplotype structure were inferred for 323 BC patients and 405 neoplasia-free women, and case-control analyses were performed by age-adjusted logistic regressions. Clinicopathological parameters (age at diagnosis, tumor size, histopathological grade, lymph node metastasis, proliferation index and disease stage) were tested for correlation with TGFB1 variants. All statistical analyses were two-tailed and had 5% of significance level.
Results: genetic variants related to increased TGFβ1 production (C-509T SNP and GTCG haplotype) were significantly associated with increased susceptibility to HER2+ in dominant model (OR=2.11 and 1.89, respectively) and correlated with worse prognostic parameters (lymph node metastasis, histopathological grade and tumor size) in HER2+ and in TN BCs, but negatively correlated to proliferation index (Ki67) in LA tumors. Conversely, low TGFβ1 production variants (C29T SNP and GCTG haplotype) were protective against HER2+ tumors (OR=0.49 and 0.51, respectively) and indicated better prognostic parameters in HER2+ and TN BCs (decreased tumor size and less frequent lymph node metastasis), while indicated higher proliferation index in LA tumors. Furthermore, GCCG haplotype was associated with decreased susceptibility to LA-tumors (OR=0.52), but positively correlated with proliferation index in this subgroup.
Conclusion: Results indicate that TGFB1 variants have subtype-specific roles in BC and may switch from tumor suppressor to promoter along with tumor development, consistent with TGFβ1 dual role in BC, and suggests these variants as candidate markers in this neoplasia.

SS4-1: Global Health & Biotechnology

Timeslot: 10:10–10:25 am

Presenter: Kumba Seddu[1] and Alison Cook[1]
Institution: Harvard Medical School
Co-Authors: Dr. Diane Mathis[1], Dr. Christophe Benoist[1]

[1]Department of Microbiology and Immunobiology, Harvard Medical School, Boston, USA

The Immunological Genome Project

The Immunological Genome Project (ImmGen) is a global consortium of Immunology and Computational Biology laboratories that aims to determine, on a broad and highly granular scale, the patterns of gene expression and genetic regulatory circuits of immune system cells in the mouse [1]. Each of the participating Immunology laboratories brings deep knowledge about a given cell lineage, and the expertise to frame questions directly pertinent to its function. The unique breadth of ImmGen's data allows for labs to collaboratively reconstruct gene regulatory networks, and define modules of coregulated genes and key regulatory factors predicted to govern their expression [2,3]. In its current endeavors, ImmGen is exploring the immune system's genomic response to diverse challenges, relating gene expression to chromatin organization, and mapping molecular landscapes beyond mRNA. Perhaps most importantly, and consistent with its support from the National Institute of Allergy and Immunological Diseases, ImmGen is conceived as a community resource, whose data are publicly available through a website, custom data browsers, and smartphone apps (www.immgen.org). ImmGen data browsers allow users to interactively explore the vast expanse of ImmGen's data sets from transcriptome to epigenome in over 100 immunological cell populations. We will demonstrate how these data browsers can be leveraged for better understanding populations of interest in your lab as well as discuss opportunities to submit your samples for ImmGen's open calls.

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SS4-2: Global Health & Biotechnology

Timeslot: 10:30– 10:45 am

Presenter: Dr. Ricardo Ramirez[1]
Institution: Harvard Medical School
Co-Authors: Dr. Diane Mathis[1], Dr. Christophe Benoist[1]

[1] Department of Microbiology and Immunobiology, Harvard Medical School, Boston, USA

Mapping the 3D enhancer architecture of T-regulatory cells

Our study explores the 3-Dimensional enhancer architecture distinguishing gene programs of T regulatory (T_{reg}) and Cd4 naïve T cells (T_{conv}) based on H3k27ac chromatin interactions. Despite sharing a similar open chromatin landscape between spleen T_{regs} and T_{conv}, we identify novel and specific H3k27ac mediated chromatin interactome configurations gained and lost for key T_{reg} genes (*Ikzf2, Ctla4*). Utilizing long-range chromatin interaction data, we explore complex graph structures that can be useful in further refining the cis-regulatory control between T cell states.

SS4-3: Global Health & Biotechnology

Timeslot: 10:50 – 11:05am

Presenter: Matthew Langley[1,2,3]
Institution: Institute of Biomaterials and Biomedical Engineering
Co-Authors: Shreya Shukla[1,2,3], Ayako Yachie-Kinoshita[1,2,4] & Peter W. Zandstra[1,2,3,5]

[1] Institute of Biomaterials and Biomedical Engineering, University of Toronto, Toronto, ON, Canada
[2] Terrence Donnelly Centre for Cellular and Biomolecular Research, University of Toronto, Canada
[3] Medicine by Design, A Canada First Research Excellence Program at the University of Toronto, Toronto, ON, Canada
[4] The Systems Biology Institute, Minato, Tokyo, Japan
[5] School of Biomedical Engineering, Faculty of Applied Science and Faculty of Medicine, University of British Columbia, Vancouver, BC, Canada

Boolean network modeling of T cell development predicts heterogeneous single cell transcriptional trajectories

T cells hold great potential as immunotherapeutic agents for cancer and other diseases. In T cell development, blood progenitors are driven toward T lineage commitment using dense networks of genes and proteins that respond to environmental signals. Although existing static models of these networks identify the major players and their pairwise interactions, they provide limited explanatory insight into the multi-stage dynamics of T cell specification. In this study, we use a computational approach based on Boolean networks (BNs) to simulate aspects of the T cell development program *in silico* and explore the dynamic response of progenitor cells under normal and perturbed conditions. A BN representation of the regulation of each gene in the network using AND/OR logic was constructed from microarray data and previous literature. By using asynchronous updates to simulate this BN, we mapped the transcriptional state space that developing T cells can traverse under various combinations of environmental inputs (such as Notch and Interleukin-7 signaling). This state space coincides with single cell qRT-PCR observations, and steady states within the space resemble known stages of T cell development. Notably, the BN model suggests the T cell development program permits multiple independent transcriptional trajectories toward T lineage commitment that involve different transient cell states. Furthermore, our analysis identifies signaling cues and genetic perturbations that may select for particular differentiation trajectories or arrest development at specific stages. BN modeling presents a powerful advance over previous static models for exploring routes through the transcriptional space involved in T cell development and suggests new opportunities for improved *in vitro* T cell differentiation protocols.

SS4-4: Global Health & Biotechnology

Timeslot: 11:30– 11:45 am

Presenter: John Taylor
Institution: Department of Biochemistry and Biotechnology, College of Science, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana.
Co-Authors: Winifred Mensah[1]

[1]Department of Sport and Exercise Science, College of Health Science, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana

Effects of nutritional and dietary supplements on renal function among university bodybuilders in Ghana.

Background: Despite the widespread use of bodybuilding supplement among University bodybuilders, the potential negative health impact that these supplements (creatine, whey, amino acids) can pose on organs, mainly kidney, remains unclear among this population in Ghana. Hence, the study assessed the plasma levels of creatinine, urea and uric acid among male bodybuilders in KNUST, Ghana, as a measure of renal function.

Method: 78 undergraduate students forming three test groups (26 Bodybuilders on supplements for the past 12 months, 25 Bodybuilders not on supplements and 27 non-bodybuilders) were randomly selected for the study. Questionnaires were administered to obtain background information on Bodybuilding, lifestyle, health and on nutritional and dietary management. Also, venous blood samples were analysed for 3 endogenous markers - creatinine, urea and uric acid and compared to normal ranges.

Results: Elevated levels of uric acid were found among all Bodybuilders (supplement users (481.9 ± 71.89µmol/L) and non-supplement users (436.1 ± 69.78µmol/L)) (p<0.001). Though creatinine levels of bodybuilders were within normal range, higher levels were recorded for bodybuilders on supplement (91.93 ± 10.40µmol/L). Frequency of consumption of protein-rich foods were significantly higher among Bodybuilders (p=0.04) and mean urea levels (4.61±0.8µmol/L) were within normal range with no significant difference among all participants (n=78) (p=0.009).

Conclusion: The findings revealed elevated levels of uric acid and creatinine among a sampled population of University bodybuilders in KNUST, Ghana. Though creatinine levels did not imply Kidney malfunction, higher levels were measured among bodybuilders on supplement. This high level of creatinine is detrimental and further increment may result in accumulation of higher levels over time. The study has also shown the possible association between endogenous markers of renal function and unique patterns of dietary intake among this population. Overall, urea levels were kept relatively constant among all study participants. Further study among other Ghanaian university bodybuilders is recommended to validate these findings. The possible effects of varying dosages of supplements consumed should also be studied to assess renal function and to intervene early.

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PRE-RECORDED PRESENTER ABSTRACTS

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Session Topic: Global Health

Presenter: Phillip Chen
Institution: Trinity College Dublin, School of Medicine, Dublin, Ireland

Co-Authors: Tse Chiang Chen, MSc[1]*; Dane Wanniarachige, MA[1]*; Síofra Murphy[1]*; Katie Lockhart[1]*; James O'Mahony, PhD[2]

*Authors share equal contribution to the completion of this manuscript
[1]School of Medicine, Trinity College Dublin, Dublin, Ireland
[2]Centre for Health Policy & Management, Trinity College Dublin, Dublin, Ireland

Surveying the cost-effectiveness of the twenty procedures with the largest public health services waiting lists in Ireland: Implications for Ireland's cost-effectiveness threshold

Objectives: To survey the cost-effectiveness of procedures with the largest waiting lists in the Irish public health system in order to inform a reconsideration of Ireland's current cost-effectiveness threshold of €45,000/quality-adjusted life-year (QALY).

Methods: Waiting list data for inpatient and daycase procedures in the Irish public health system were obtained from the National Treatment Purchase Fund. The twenty interventions with the largest number of individuals waiting for inpatient and day case care were identified. The academic literature was searched to obtain cost-effectiveness estimates from Ireland and other high-income countries. Cost-effectiveness estimates from foreign studies were adjusted for differences in currency, purchasing power parity and inflation.

Results: Of the top 20 waiting list procedures, 17 had incremental cost-effectiveness ratios (ICERs) below €45,000/QALY, 14 fell below €20,000/QALY, and 10 fell below €10,000/QALY. Only one procedure had an ICER above the current threshold. Two procedures had ICERs reported for different patient and indication groups that lay either side of the threshold.

Conclusion: The majority of the procedures assessed had ICERs below the current threshold. This indicates that an evidence-informed revision of the threshold may require a reduction in order to ensure it is consistent with its theoretical basis in the opportunity cost of other interventions foregone. A limitation of this study was the difficulty in matching specific procedures from waiting lists with ICER estimates from the literature. Nevertheless, our study represents a useful demonstration of a novel concept of employing waiting list data to inform cost-effectiveness thresholds.

Session Topic: Global Health

Presenter: Jeffrey Frimpong
Institution: University of Stavanger, Stavanger, Norway

Co-Author: Elvis Antwi Yamoah[1], Faustina O. Mensah[1]

[1]Department of Biochemistry and Biotechnology, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana

The possible effects of creatine and other nutritional supplements on renal function among bodybuilders in KNUST.

Background: Bodybuilding is the use of progressive resistant exercise to control and develop one's musculature and usually indulged in by men. The use of nutritional supplements has become widespread among bodybuilders. Creatine, proteins, amino acids and whey are the commonly used supplements. Over-loading the kidney with these supplements could be detrimental. Creatinine measurement is mostly used in the assessment of kidney function. The study aimed at determining the possible effects of creatine and other nutritional supplements on renal function of bodybuilders.

Methodology: A total of 40 participants were recruited for the study. Of these, 30 were bodybuilders (10 on supplements and 20 not on supplements) and 10 non-bodybuilders. Questionnaires were administered to obtain information on dietary intake. Venous blood samples were taken and analyzed to determine the levels of 3 endogenous markers - creatinine, urea and uric acid. RESULTS: From the results, creatinine, urea and uric acid levels were found to be 82.82 ± 13.82 µmol/L, 4.65 ± 0.93 µmol/L and 409.45 ± 100.25 µmol/L respectively. The creatinine and urea levels were found to be within the normal range in all the 3 test groups. Uric acid levels however, were found to be elevated in 17 (42.5%) participants (6 on supplements, 10 not on supplements and 1 non-bodybuilder).

Conclusion: The findings from this study suggest that creatine and other nutritional supplements have no effect on renal function of bodybuilders.

Session Topic: Global Health

Presenter: Mevis Omollo
Institution: Mount Kenya University, Kenya Medical Research Institute, Nairobi, Kenya

The role of men in maternal and child health services and its influence on prevention of mother to child transmission in Suba Sub County

Background: Maternal and Child Health Services have always been considered 'children and women's affair' in the larger Sub Saharan Africa with minimal Male involvement. Benefits of male involvement have been established and include better access and adherence to clinical services, safe delivery, health literacy, and reduced mortality rate. In high-income countries, Mother to Child Transmission (MTCT) rate < 5% has been achieved in contrast to Kenya's 9 %. Homa-Bay County is worst hit with MTCT rate of 11.7%.

Methods: A cross sectional study on men's knowledge and perception on male involvement on Maternal and Child Health services and its influence on the attendance was conducted in Suba Sub County, Homa Bay County, Western Kenya in February, 2016. Four focus group discussion and six key informant interviews were held with adult men and women, married with at least one child < 5 years and/or pregnant spouse. Analysis involved the use of eQDA for the qualitative data.

Results: The men had vast knowledge on their roles during the Maternal Child Health services which were providing basic needs, transport, relieving of heavy chores: and decision making on health matters including family planning services. Existing barriers to male involvement included HIV testing and counselling at the Ante Natal Clinic, the existing cultures of gender roles and male inferiority complex and or female dominance. These greatly influenced the PMTCT services as it determined access to HIV testing and counselling of the pregnant mother, adherence to care in cases of positive results, prevention's with positives in cases of discordance's and safe hospital deliveries.

Conclusion: There is need to recognize the role of men in Maternal and Child Health Services. Being family heads and major decision makers, the women mostly rely on the men on major decisions pertaining PMTCT therefore the men need to be fully enlightened. The study will help provide insights for locally initiated interventions to increase and strengthen male involvement in maternal and child health services in Suba sub County.

Session Topic: Global Health

Presenter: Vida Agyeman
Institution: Kwame Nkrumah University of Science and Technology, Ghana

Co-Authors: Amanor Ernest[1], Abili Ashley[1], Dr John Asiedu Larbi[1].

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Prevalence of Helicobacter Pylori in a senior high school in Ghana

Background: *Helicobacter pylori* is an infectious agent contracted during childhood, however most people are asymptomatic. Studies have shown that poor sanitary conditions, overcrowding, poor source of drinking water, improper personal hygiene, some religious practices and low socioeconomic standard of living are factors that can promote *H. pylori* colonization. Sanitation in the senior high schools is low, accessing of toilet facility, portable drinking water is very poor. Overcrowding and improper hygienic practices are also on the rise. Research shows that certain foods such as spicy foods, caffeine, fried and oily foods can exacerbate *H. pylori* infections.

Methods:
1. Questionnaires
Questionnaires will be distributed to students to gather information relevant for our study such as name, age, religion, sex, health record and others.
Students will be selected based on the outcome of the questionnaires to provide stool sample for laboratory analysis.
2. *Helicobacter pylori* Stool Antigen Test (HPSA)
HPSA test will be carried on the provided stool samples to detect the presence of *H. pylori* using the HPSA test kit.
3. Data Analysis
Data collected will be computed using a statistical software package.

Results: the general prevalence of *H. pylori* among the students was 80%. Most of the participants were at age 16 years with prevalence of about 42.5%. Majority of the participants were females (52%) of which about 84% tested positive to *H. pylori* Moreover females recorded the highest prevalence of *H. pylori* (55%) compared to their male colleagues without any significant difference. Gender has no association with *H. pylori*. A greater proportion of the participants complained of abdominal pains (about 78%) out of which 74.36% tested positive to *H. pylori* while all participants who had no complains also tested positive for *H. pylori*.

Conclusion: *H. pylori* prevalence is high among the senior high school students of T. I Ahmadiya Senior High School, Kumasi. No significant association was observed between *H. pylori* prevalence and risk factors such as sources of drinking water, hand washing practice, abdominal pain, guardians' educational status, gender and age of students.

Session Topic: Global Health

Presenter: John Acquah Mensah
Institution: Kwame Nkrumah University of Science and Technology, Kumasi, Ghana

Co-Author: Faustina O. Mensah, Henrietta S. Frempong, Grace A. Konduah, Elikem P. Amable, Peter Twumasi

Department of Biochemistry and Biotechnology, Faculty of Biosciences, College of Science, Kwame Nkrumah University of Science and Technology (KNUST), Kumasi, Ghana

Pica practice in Ghanaian pregnant women: Possible role of genes

Background: Pica, an eating disorder characterized by craving and eating of non-nutritional items like clay and ice, has been linked to iron deficiency and has adverse health implications. It is prevalent among pregnant women and children and caused by many factors but the role of genes is yet to be established. The aim of this study was to determine the possible relationship between haematological and genetic markers associated with iron metabolism in the incidence of this disorder among pregnant women in Kumasi, Ghana.

Method: A total of 100 pregnant women and 12 non-pregnant women participated in this study. Questionnaires were distributed to obtain demographic data. Venous blood was taken for full blood count study, sickling and blood group status as well as PCR analysis with primers specific for tmprss6, 'pica' and ceruloplasmin genes.

Results: Overall, 50% of the women sampled practised pica with clay-eating being the most common substance consumed (31.15%). The mean haemoglobin levels for pica and non-pica practising pregnant women were 10.58±1.49g/dl and 10.77±1.01g/dl respectively. Majority (79.46%) had haemoglobin genotype AA; among the pica-practising pregnant women, 11.11%, 1.85% and 1.85% had sickling genotypes AS, AC and CC respectively whereas 17.69%, 4.35%, 10.87% of non-pica practising pregnant women had sickling genotypes AS, SC and AC respectively. Four pica-practising pregnant women (3.57%) were Rhesus negative and the rest were positive. PCR confirmed 'pica' and tmprss6 genes present in all the subjects. Three ceruloplasmin markers (hCp 11,12; hCp 23,24 and hCp 25,26) were completely absent whiles another three (hCp 3,4; hCp 13,14; and hCp 33,34) were present in both pica practicing and pica-non practicing groups (but higher in the former), suggesting that they might play a role in pica practice.

Conclusion: Although the three ceruloplasmin markers (hCp 3,4; hCp 13,14; and hCp 33,34) were present in both pica practicing and pica-non practicing groups, their prevalence were higher in pica practicing group than pica-non practicing groups, suggesting that they might play a role in pica practice.

Session Topic: Global Health

Presenter: Niall Roche[1]
Institution: Trinity College Dublin

1Adjunct Assistant Professor, Centre for Global Health, Trinity College Dublin

Climate Change and Health

Climate change is the biggest global threat to health in the 21st century and the defining challenge of this century. The effects are already being felt with global temperatures already 1°C above average. We know that green-house gas (carbon dioxide, methane and nitrous oxide) levels significantly exceed levels in pre-industrial times and it is human activity that is responsible. Not only do the GHGs contribute to rising temperatures but this in turn contributes to rising sea levels, ocean acidification and the melting of ice caps.

The negative effects on human health are broadly divided into direct and indirect effects. The direct effects include the impact of heatwaves on mortality especially among the elderly and the direct role played by poor air quality, caused by the generation of green-house gases on respiratory health. The largest effect of climate change on health is indirect, for example, through the impact on food security and nutrition plus the rise in infectious diseases such dengue fever and diarrheal diseases.

In 2015 the world agreed in Paris at COP 21 to limit temperature increase to 2°C and aim for 1.5°C, to generate finance to helping developing nations adapt to climate change and help them mitigate their own GHG emissions. Almost all nations agreed to reduce GHG emissions to such a level that global warming can be limited and by 2050 aim for zero emissions.

While political action continues on from Paris at various climate change negotiations we also need to realize that there are tremendous opportunities for health co-benefits from the response to climate change. Much of the benefit arises from improving air quality in the household environment and the ambient environment through pollution reducing measures in the way we cook our food, heat our homes, travel and produce energy. We also have opportunities around food production and consumption particularly in relation to addressing the biggest killers on the planet, heart disease, diabetes and some cancers associated with overnutrition and high fat diets.

In short we need to recognize that what is good for climate is good for health and we all have a duty and responsibility to adhere to SDG 13 and take urgent action to combat climate change and its (health) impacts.

Session Topic: Global Health

Presenter: Ashwinder Bhamra
Institution: Moi University, Eldoret, Kenya

A qualitative approach to the healthcare challenges faced by refugees at the Kakuma Refugee Camp, Kenya – in the words of adolescents living in the camp

Introduction: The Kakuma Refugee Camp is one of the two main refugee camps in Kenya, established to cater for a growing challenge of refugees from the horn of Africa fleeing social, political and economic turmoil. The camp is largely run through national and international aid support that provides access to security, food, shelter, and, healthcare. Significant emphasis is usually placed upon the mental healthcare of refugees, and, at times access to the other elements of healthcare is assumed to be adequate or optimum, given it is being provided by aid agencies through standardized means. However, challenges still do exist, and this study thus aimed to elucidate the challenges faced by refugees at the Kakuma camp.

Methodology: The study was a cross-sectional descriptive study employing collection of qualitative data through focused group discussions. Groups of adolescent students attending the Somali Bantu High School were selected and clustered separately into males and females and further divided into clusters of 10-15 students each. Open ended questions based on a guide were then used to gauge the opinions and views of the participants on the subject.

Results: Commonly encountered healthcare problems are notably those seen by extension of poor public healthcare systems such as malaria and diarrheal diseases, such as typhoid, due to fluctuating water availability. Malnutrition is commonly reported, attributed to poor availability of adequate and balanced nutritional handouts. Most respondents also report having not received childhood immunizations, not being administered while in their native nations as well as on arrival in the nations. Respondents reported rampant delays in services and lack of basic medication, lack of adequate support staff at facilities, and, overt neglect and overall poor service delivery unless clients use ulterior means. Most clients admit to seeking options of self-treatment, although others report going directly to the hospital or clinics. Others, fatigued by gross inefficiencies in the healthcare system, admit to seeking alternative healthcare options such as traditional healers and even witchcraft as part of the health seeking behavior.

Conclusion: While strides are made by support agencies to establish and provide access to healthcare to refugees hosted in the camps, challenges are still rampant in the system and overall faith and satisfaction that the refugees who are end-users of these services is poor.

Session Topic: Global Health

Presenter: Ashwinder Bhamra
Institution: Moi University, Eldoret, Kenya

The prevalence of and caregiver perceptions towards adherence to Highly Active Antiretroviral Therapy (HAART) on children under ten years receiving care at Ampath Centre, Eldoret

Introduction: In as much as the burden of HIV and AIDS globally is still high, it is important to note that there are equally significant improvements in terms of access to antiretroviral therapy. Therapy for children shows heavy reliance upon the care-giver, thus the need to take in to consideration all those factors associated with both the care-giver and the child that influence adherence. Thoughts and ideas towards the therapy can be incorporated into adherence and compliance programmes to improve retention.

Methodology: The study was a cross-sectional descriptive study, utilising a mixed methods approach, involving both qualitative and quantitative data collection. The study was conducted at the AMPATH Centre at Eldoret, targeting all HIV positive children aged between 6 weeks and 10 years of age, enrolled for HAART services at AMPATH. Purposive sampling techniques involving interviewing 200 care-givers accompanying the children to the clinic were used; qualitative data was derived purely from the interviews using a specific data-collection tool, whereas quantitative data pertaining to the adherence shown was derived from patient records.

Results: Overall, adherence to HAART in the pediatric population group remains relatively lower as compared to adherence statistics for adolescent and adult population groups in the same setup. Caregiver factors include poor social status, single parenthood, social stigma and isolation surrounding HIV and HAART that caregivers need to face. Of the facility related factors that would influence adherence, the most significant that emerged was the proximity to the facility, with patients having to travel as much as 3-4 hours for their appointments. Drug-related factors were significant for this population with caregivers reporting challenges due to the frequent dosing of medications, bitter tastes and unpalatable shape/size of pills.

Conclusion: While AMPATH and other similar programs have made much progress in the identification and follow up of infected individuals, overall success is still largely dependent upon adherence to these medications as a critical variable, which is currently difficult to assess objectively. It is of note that in the pediatric population, adherence is largely dependent upon the caregiver, and thus, efforts to improve adherence need to be two-fold: targeting all those factors that affect both the caregiver as well as those that affect the patient – as identified in the study.

Session Topic: Global Health

Presenter: Everlyne Achieng
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Development of Radiotherapy in Kenya

Introduction: According to the Ministry of Health, there are 40,000 new cases of cancer reported annually; another 27,000 succumb to the disease. From 2011-2014, cancer death rose by 23%, up from 17% in 2017. Over the past years, a majority of Kenyans have been dependent on the radiotherapy machine available at Kenyatta National Hospital, the largest referral hospital in East & Central Africa. The hospital in Nairobi cannot meet the country's growing cancer care needs. Patients can wait for 4months to receive treatment. Each year 10,000 Kenyans are treated overseas mainly in India and S. Africa both have advanced medical facilities. The patients spend about $108 million on treatment abroad (Cancer burden in the country, 2010).

Objectives: To assess the development of Radiotherapy Technology in Kenya
To establish the impact of Radiotherapy on management of cancer

Methods: Cross-sectional study

Results: Kenya has showed significant improvement in provision of radiotherapy services to its citizens. In 2017, we have 4 Hospitals that offer Radiation services compared to only one in 2010. They are all functional providing quality screening, diagnostic and cancer treatment including radiotherapy.
The radiation costs ranges from $5-$20, which is affordable to a majority of Kenyans considering that 60% of citizens are enrolled in NHIF program that enables access to health services freely. Until 2010, there was only one (public) radiotherapy facility using the Co-60. Currently, four facilities using linear accelerators have also set up.
The latest radiotherapy machine is the first facility in Western Kenya with a linear accelerator. The department also offers high-dose rate brachytherapy. The newest radiation machine attends to about 60 patients per day totaling to a maximum number of 1800 patients who are attended to per month. This has reduced the number of patients leaving the country to seek for treatment overseas.

Conclusion: The number of radiotherapy machines have increased from a single Co-60 Tele-therapy to a 10-Linear Accelerator, outside the environs of Nairobi. In 2010 only 10-20 patients could receive radiotherapy, today an average of 60 patients can undergo radiotherapy daily with proximity to their homes.

Session Topic: Global Health

Presenter: Abdulahi Opeyemi Falade[1]
Institution: University of Ibadan, Nigeria.

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Mathematical modelling of within-host dynamics of Cholera: bacterial-viral interaction

In this paper work, we modified non-linear deterministic model system proposed in [WW16b] by defining a specific function for intrinsic growth of human vibrios and the virus for better understanding of within host dynamics of cholera: bacterial-viral interaction. We determine the positivity of the solutions and invariant region where the solutions are biologically meaningful and mathematically well-posed. The basic reproduction number R_0 is computed and established as a sharp threshold for disease dynamics: when $R_0 < 1$, the highly infectious vibrios will not grow within the human host and the environmental vibrios ingested will not cause cholera infection: when $R_0 > 1$, the human vibrios will grow and persist, leading to human cholera. With the derived basic reproduction number R_0, the infection free and unique endemic equilibrium is found to be globally asymptotically stable. Analytically, most sensitive parameter is intrinsic growth rate of the human vibrios. Numerical simulation results are used to validate our analytical prediction. Additionally, we obtained result for periodic ingested rate of environmental vibrios at $R_0 < 1$ only.

Session Topic: Global Health

Presenter: John Taylor
Institution: Kwame Nkrumah University of Science and Technology, Kumasi, Ghana

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Scientific Basis of the Combination of Coca-Cola drink and Tomato paste in the Management of Anaemia.

Background: Anaemia is a global health problem affecting people of all works of life. Anaemia has a lot of adverse effects hence the need for a cost-effective and better treatment strategy. Ethnopharmacological information indicates the use of the combination of Coca-Cola drink and tomato paste to manage anaemia in Ghana. The study investigated the effect of the combination of Coca-Cola drink and tomato paste on haemoglobin levels using animal models.

Method: 20 male Wistar rats were grouped as normal, 2,4-DNPH only, Coca-Cola drink only (0.5 ml Coca-Cola drink/100 gm b. wt./day), tomato paste only (20 mg tomato paste/100 gm b. wt./day) and combination of Coca-Cola drink and tomato paste (0.5 ml Coca-Cola drink/100 gm b. wt./day and 20 mg tomato paste/100 gm b. wt./day) with 4 animals in each group. Animals in other groups apart from the normal group were injected with 2,4-DNPH consecutively for 7 days (2 mg/100 gm w.bt/day i.p,). Animals in 2,4-DNPH only group were sacrificed on the 8th day. All animals in the remaining groups were maintained till the 21st day.

Results: Body weight was significantly reduced ($p<0.05$) in all groups with 2,4-DNPH injection in the first 7 days. From the 8th-21st day, body weight was significantly gained ($p<0.05$) in the combination of Coca-Cola drink and tomato paste group. Haemoglobin concentration, red blood cell count and packed cell volume were not significantly reduced in the 2,4-DNPH only group. However, haemoglobin concentration, red blood cell count and packed cell volume were significantly increased ($p<0.05$) in the tomato paste only group and in the combination of Coca-Cola drink and tomato paste group.

Conclusion: A combination of Coca-Cola drink and tomato paste had a significant increase on the haemoglobin levels indicating some haematinic and anti-anaemic potential.

Session Topic: Global Health

Presenter: Zheen Ibrahim
Institution: University of Sulaimani, Sulaymaniyah, Iraq

Co-Authors: Bushra Ali[1], Ranj Sabir[2], Rahel Rashid[2], Mohammed Ahmed[2], Hallo Kareem[2]

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Effect of classroom discussion on students' retention of knowledge

Background: Students are left behind by an educational system that some people believe is in crisis. Active recall methods, including discussion, have been suggested to fix this. Discussion has elements of retrieval practice and deep learning. Objectives are to measure the students' overall satisfaction of the discussion, detect any association between gender and satisfaction of the discussion experience, and measure the effect of classroom discussion on students' retention of knowledge.

Methods: The study was a controlled experiment, done on University of Sulaimani's college of medicine, on the students of second and fourth stage on 25th and 30th April, respectively. Sample size was 287. Each stage was separated into two classes; experimental and control, based on a randomizing program. Data was collected by self-administered collection, and was analyzed using chi-square, t-test, and Fischer's exact test via IBM SPSS v.23. *P*-values less than or equal to 0.05 were considered statistically significant.

Results: Majority of the participants (60%) were satisfied with the discussion experience. 34.4% of the case females rated the discussion as very satisfactory, as opposed to only 15.9% of the males (p=0.013). There was no significant association between the place of residence or stage of the case participants and their level of satisfaction (p=0.751 and 0.317, respectively). There was no significant difference of scores on the test questions between cases and controls of the second stage (p=0.59). Cases scored 14% higher than control in 4th stage's post-discussion quiz (p = 0.001).

Conclusions: The majority of the cases were satisfied with the discussion. Most of the females were satisfied with the discussion. There was a significant association between the female gender and satisfaction. A highly significant association was found between performing discussion and retention of the lecture material among the students of the 4th stage.

Session Topic: Global Health

Presenter: Samuel Terkper Ahuno
Institution: Kwame Nkrumah University of Science and Technology, Kumasi, Ghana

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Blood collection tubes significantly impact expression of activated CD4+ and CD8+ T cells in human whole blood assay

Background: T-lymphocyte subsets CD4 and CD8 play important roles in host immune response. However, little attention has been given to the impact of blood collection tubes and time lapse between sample collection and preparation on the frequency and activation status of CD4+ and CD8+ T cells. To this end, we investigated the impact of time prior sample preparation (<1 hr and 4 hrs) and collection tubes (EDTA and heparin) on the frequency and activation status of CD4+ and CD8+ T cells among healthy Ghanaian individuals.

Methods: A cohort of healthy individuals (n=9) were enrolled to investigate the frequency of CD4+ and CD8+ T cells at various time points (<1 hr and 4 hrs) before sample preparation. The proportion of activation of these immune markers were profiled using flow cytometer.

Results/Discussion: We observed that the type of collection tube (EDTA or heparin) has no effect on the frequency of CD4+ and CD8+ T cells ex vivo. However, frequencies of activated CD4+ and CD8+ T cells in EDTA and heparin tubes differed significantly in samples processed in < 1 hr but not at 4 hrs. Notably, CD8+ T cell activation frequency was consistently higher than that of CD4+ T cell at the various study time points and in the collection tubes used.

Conclusion: Time lapse and the type of blood collection tubes are key factors to consider in phenotypic characterization of activated immune markers.

Session Topic: Global Health

Presenter: Chau Huynh
Institution: Faculty of Medicine, University of Ottawa, Ottawa, Canada

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The global burden of surgical disease: An analysis on inaccessible surgical care in low and middle income countries

Worldwide, 4.8 billion people do not have access to safe, adequate surgical care and anaesthetic management. Surgical care has been deemed “the neglected child of global health,” a startling reminder of the disparities in health services. The provision of surgical interventions can avert 11% of the global burden of diseases and 1.5 million deaths each year. Many obstacles exist for low-income and middle-income countries (LMIC) to progress towards accessible surgical care.

The first challenge is delivering cost-effective surgical care despite financial constraints and political turmoil. Foreign aid was established to alleviate the financial burden and its contributions have been pivotal. However, based on the political climate in certain countries, funds are siphoned to government sectors other than healthcare. Moreover, the lack of infrastructure, equipment, and personnel in LMIC compound the issue. The other challenge is determining if surgery is as feasible and effective in comparison to non-surgical health interventions.

Surgical care is crucial, and this paper aims to understand the challenges that limit its stature in global health discussions. The presentation will address the influence of financing, infrastructure, workforce, service delivery, and information management on surgical care, and the current resolutions, such as humanitarian aid missions.

Session Topic: Global Health

Presenter: Atiyya Tul Munim[1], Pavanraj Singh Chana[1]
Institution: Moi University College of Health Sciences, Eldoret, Kenya
[1] Moi University College of Health Sciences, Eldoret, Kenya

Challenges and livelihood strategies of high school students living in Kakuma Refugee Camp, Kenya

Background: Leaving a life back in your home country and beginning another elsewhere, notably in a refugee camp, with different restrictions, laws, languages, cultural expectations, education and health systems is especially difficult for the numerous children and young adults seeking asylum. Apart from these hardships, they are likely to face the convoluted dilemmas of identity, unanticipated independence, changing family responsibilities, physical and psychological effects of trauma, and literacy difficulties due to disrupted/limited education. This study investigates the challenges high school refugee students in Kakuma camp experience, their intra- and inter relationships, and livelihood strategies they adopt to cope.

Methods: The study site was Kakuma Refugee Camp, located in the North-western region of Kenya. It serves close to 200,000 refugees from East Africa and its neighbouring countries. A descriptive cross-sectional strategy using stratified random sampling was used to select 30 respondents; 10 from each of the three secondary schools in the camp. Data was collected using an adopted interviewer-based questionnaire with closed and open-ended questions to obtain quantitative and qualitative data respectively. Quantitative data was analysed using descriptive statistics, tabulated and diagrammatically processed using a univariate and multivariate approach. Permission was obtained from the Institutional Research and Ethics Committee in Moi University, nongovernmental organizations and school administrators to conduct the study in the area in question.

Results: 75% of the students reported that their prime problem was insecurity. Amongst other issues were inadequate food rations, living desolate lives from their separated families, discrimination, lack of financial support, limited learning resources, long walking distances to schools, and poor healthcare. Most respondents modified their residents, limit night time movement to confront insecurity and work part time to confront income deficits.

Conclusions: Amidst all the circumstantial terror and persecution that forced these students to flee comes secondary challenges encountered in camps that are often go unrecognized. It is hoped that these findings will engage the government, aid agencies and donors at large to construct evolved management schemes so that improved and sustainable upbringing for the students within the camp is provided for.

Session Topic: Global Health

Presenter: Behrouz Moemeni
Institution: SortSmart Candidate Selection Inc., Toronto, Canada

Medical school admissions practices more likely to select applicants motivated by status, financial gains, and familial pressure to pursue medicine and may result in bias against applicants from lower income levels.

Background: One of the main challenges facing university admissions is selecting the most suitable applicants, especially for high stake roles such as medicine and law. Several methodologies have been utilized in this regard, including personal statements, resumes, personality tests, situational judgment tests, and interviews with limited success to predict future performance. For example, over 90% of complaints about medical doctors are attributed to their professional misconduct rather than their scientific acumen. We hypothesized that this is due to inability of the current selection tools to discern applicants based on intrinsic motivation, which is a fundamental predictor of future on-the-job behavior.

Methods: 469 current medical students and medical residents were randomly selected to participate in a survey study. The participants were asked to answer a series of multiple-choice questions, with randomized questions order and answer choice order to eliminate response bias.

Results: 75% of participants indicated that their primary reason for pursuing a career in medicine were due to extrinsic motivators such as wealth, status, or presence of doctors in the family. 57% of participants reported to be from families with annual family income of over $80,000, with 30% coming from households with income in excess of $120,000/year. 54% of overall respondents reported to be Caucasian a number that rose to 69% of those coming from families earning over $120K/year and decreased to 31% for those coming from families earning less than $80K/year. There were no correlations found between intrinsic motivation and wealth, or racial background.

Conclusions: The findings suggest that current medical school admissions tools are not able to select applicants based on intrinsic motivation, a predictor of future on-the-job performance. Importantly, a second consequence of using current admissions practices is the apparent bias against those from lower socioeconomic status (SEC). This highlights the need for creating a candidate selection tool that reliably measures each applicant's level of intrinsic motivation, a factor uncorrelated to SEC. Such a tool will not only make the selection process more democratic, fair, and equitable but will result in selection of better-suited applicants with implication in university admissions and employee selection.

Session Topic: Global Health

Presenter: Yekaterina Blok
Institution: Karaganda State medical university, Department of Histology, Karaganda, Kazakhstan

Morphological changes of the liver cells of the bodybuilders in muscle building

Abstract: Anabolic steroids are used in muscle building. But cholestatic liver injury may be the consequence of uncontrolled usage of anabolic steroids. Besides liver tumors like hepatocellular carcinoma and hepatic adenoma are connected with the long-term consumption of these supplements. That is why, the aim of this research paper is to answer what morphological changes of liver cells in sportsmen are occurring in the result of muscle building with anabolic steroids.

Materials and method: Literature reviews.

Results and discussions: The severity of liver injury due to anabolic steroids ranges from minor, transient serum enzyme elevations to profound and prolonged cholestasis, as well as hepatic peliosis and benign and malignant liver tumors. Injury of liver is directly related to dosing and time of prescription, as well as to the type of these supplements.
But in all cases different forms of liver necrosis may be observed on photomicroscopy.
• In the group 1 sharply demarcated centrilobular necrosis with loss of hepatocyte cytologic detail were present.
• Another type of necrosis is coagulation necrosis with early infiltration of inflammatory cells.
• In the third group, focal necrosis was associated with fatty change. The Patches of necrosis are hypereosinophilic, and the fatty change is centrilobular with extension well into midlobular areas.
• Diagnosis of hepatocyte necrosis accompanied by hepatocyte degeneration, microvascular fatty change, nuclear pyknosis, and inflammation.
As a result, there are four distinct forms of liver injury associated with anabolic steroids: transient serum enzyme elevations, an acute cholestatic syndrome, chronic vascular injury of the liver and hepatic tumors including adenomas and hepatocellular carcinoma.

Conclusion: For all groups, a percutaneous liver biopsy was showing histopathological changes consistent with drug-induced cholestasis of the canalicular type. Because of the temporal relationship between steroids supplements use and the clinical abnormalities, and of these biopsy findings, it was concluded that liver toxicity was being caused by the use of androgenic anabolic steroids. Consequently, studies of the effect should be continued in order to exclude another hepatotoxic factor, also the possibility of spontaneous tumor regression must also be taken in account. In conclusion, sportsmen taking these supplements should be considered as a group at risk of developing hepatic tumors.

Session Topic: Global Health

Presenter: Esther Anyango
Institution: University of Nairobi, School of Pharmacy, Nairobi, Kenya
Co-author: Ruth Atiento

Quality of Maternal and Neonatal Care in Primary Health Care Facilities in Homa Bay County, Kenya

Introduction: Approximately 300,000 women die each year of pregnancy-related causes worldwide; 99% of which occur in low-income countries. In addition, nearly 45% of preventable under-5 deaths occur within the first days of life mainly due to unskilled, poor quality of care during delivery. Kenya is yet to achieve the Millennium Development Goals (MDG'S) for maternal and neonatal health. Evidence shows that improving the quality of obstetric care in health facilities is an essential yet neglected approach to reducing maternal deaths. The period surrounding labor is the most hazardous, yet most critical for saving mothers and neonates. Therefore, provision of quality obstetric care including the ability to identify and effectively manage delivery-related complications would improve the health outcomes of mothers and newborns.

Objective To evaluate the quality of maternal and neonatal care in primary healthcare facilities in Homa Bay County.

Methods:
Five primary health care facilities were included in the assessment; Ojunge, Okita, Litari, Mfangano and Gaena. The second edition World Health Organization (WHO) Hospital care for mothers and newborn tool was used by three experienced assessors to collect data over a six week period. A feedback session was done at the end of the collection period with the Afya Research Africa management and all facility heads. Results were grouped into themes and discussed.

Results:
Overall, all facilities fell short of standard quality care to mothers and newborns. The worst performing areas were infection prevention, guidelines, access to hospital and continuity of care. Weaknesses that could affect maternal and neonatal outcomes include lack of explicit guidelines in case management, weak infection control policies and lack of use of partographs during labor.

Conclusion:
Guidelines and audit, infection prevention, and hospital referral systems are areas that may warrant quality improvement initiatives.

Implications:
Changes that can be effected at a facility level include: trainings on the use of clinical protocols, conducting of periodic audit and case reviews, improved infection control and ensuring the use of partographs. Changes can also be effected at a higher level, in coordination with the Ministry of Health (MoH) and County government for the improvement of quality.

Session Topic: Global Health

Presenter: Rhoda Afutu
Institution: African Institute for mathematical Sciences (MSc) and Kwame Nkrumah University of Science and Technology (Mphil)), Ghana

Co-Authors: I. Kwame. Dontwi[1], Farai Nyabadza[2]

[1]Kwame Nkrumah University of Science and Technology, Mathematics department
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An SITR optimal control model of diarrhea transmission in Ghana.

Background: Diarrheal is a threat in many developing countries in the world even in spite of the fact that efforts have been made over the previous years in its aversion and treatment. Every year, many other developing countries are faced with major epidemics despite the availability of drugs to treat diarrhea and it simple preparation at home.
This is may be due to the fact that there has not been enough awareness of the disease. Currently, a cholera outbreak, the symptom of which is diarrhea,has killed at least 859 in war-torn Yemen since late April 2017 (WHO). With growing cases and yet we do not have comparable models to match the growing complexity; therefore, there is a gap in developing robust strategies in other help to reduce the mortality rate due to diarrhea infection.

Method: A compartmental model method is employed to helps us to understand the detailed dynamics of the disease. A SITR model will be considered. We will incorporate a treatment class into the SIR model, find the best control strategies for reducing diarrhea infection using Ghana as a case study for any developing country. A diarrhea incidence date from 2008 to 2015 by (MOH-Ghana) was fitted to validate the model. We incorporate time-dependent controls (apart from incorporating treatment class into the model such as minimizing the setbacks in administering both vaccines and ORT and public health education) to find out the effect on the dynamical spread of the disease.

Results: The analysis revealed that the model is globally and locally stable and the endemic equilibrium exists when the basic reproductive number (R 0) is greater than one. The data fitted well to the diarrhea model. Numerical outcomes obtained from the application of the optimal control depicts synergistic behavior in the control strategies. Hence the merger of all the control strategies offers an efficient and practical way of lowering the number of diarrhea infection cases in the population.

Conclusions: Since diarrhea, epidemics have been occurring many years in Ghana and many developing countries: individuals, communities and the policy makers have to be enlightened on the research outcomes.

Session Topic: Global Health

Presenter: Maria Yusuf
Institution: Faculty of Allied Health Science, Radford University College, Radford, Ghana

Miscarriage in Accra: A growing threat to motherhood

Miscarriage is one of the commonest conditions after abortion as 1 in 6 women have been diagnosed of miscarriage at one point in their life despite the erroneous belief that miscarriages are rare. Miscarriages are scarcely discussed due to the stigma the society has placed on it. Therefore, there was the need to find out the effect miscarriages posed on potential mothers. The study followed a cross-sectional pattern and involved two-hundred and twenty-three (223) women within the child-bearing age of 15-49 years who had experienced miscarriage. Stratified random sampling technique was adopted to select participants and a well-structured closed-ended questionnaire was administered. The study revealed that a high proportion of women (81.2%) suffered emotional trauma after miscarriage. These women faced an emotional phase where they questioned themselves as women, wives and even mothers, because of the grief, guilt and depression they experienced after their miscarriage.

Session Topic: Global Health

Presenter: Leedan Cohen[1,2]
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Co-Authors: Noah Schwartz[3], Audrey Guth[4], Alex Kiss[5], Ellen Warner[2]

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[1]McMaster University, Hamilton, Canada

User survey of Nanny Angel Network, a free childcare service for mothers with cancer

BACKGROUND: When mothers with young children undergo cancer treatment, they often struggle with finding childcare that will allow them to attend medical appointments or to recover from surgery, chemotherapy, and radiation toxicities. Many mothers, especially those who are single parents or have a limited income, encounter immense stress in trying to find dependable care for their children. The aims of the present study are to a) determine whether the provision of free childcare increases mothers' adherence to treatment and medical appointments and b) to evaluate user satisfaction with Nanny Angel Network (NAN), which provides free childcare services for mothers with cancer.

METHODS: All 243 living mothers who had used NAN childcare services were invited by telephone to participate in an online research survey; 197 mothers (81%) consented to participate. The survey, sent by e-mail, consisted of 39 items divided into these categories: demographics, supports, use, satisfaction, and general comments. Quantitative results were analyzed in SPSS and qualitative feedback was coded using thematic analysis.

RESULTS: Of the 197 mothers who consented to receive the e-mailed survey, 104 (53%) completed it. More than 90% of the mothers were very satisfied with the help and support from their Nanny Angel. Many mothers mentioned that the Nanny Angel was most helpful during treatment and medical appointments, with 75% also mentioning that their Nanny Angel helped them to adhere to their scheduled medical appointments. However, 64% felt that they were in need of more visits from their Nanny Angel.

CONCLUSIONS: Overall satisfaction with the NAN childcare provider was high, but mothers wished the service had been available to them more often. Our study highlights the importance of providing childcare to mothers with inadequate support systems, so as to allow for greater adherence to cancer treatment and medical appointments, and for more time to recover. It could well be argued that provision of childcare to parents dealing with cancer treatment and recovery should be considered part of the standard of care for patients without alternative supports. That recommendation could well extend to other significant illnesses—such as trauma, mental illness, or organ transplantation—affecting young parents.

Session Topic: Global Health

Presenter: Chud-Oji Ifeoma
Institution: Department of Medical Laboratory Technology, Radford University College, Accra, Ghana

Survival of *Salmonella typhi* in brewed pito retailed in Accra, Ghana

Background: Typhoid fever, caused by *Salmonella typhi*, is very common in developing countries like Ghana. *S. typhi* is transmitted by food or water that has been contaminated by faeces or urine from people that are infected. Pito is a local drink produced in Ghana which could be a means of *S. typhi* transmission especially in places with low sanitation. This study was aimed at ascertaining the survival ability of *Salmonella typhi* in both fermented and unfermented pito.

Methods: Fermented and unfermented pito drinks were used for this study, 5 containers for each. *Salmonella typhi* was inoculated into pito samples and subcultured unto Salmonella-Shigella agar (SSA) for 24 hours for 3 consecutive days. *S. typhi* without pito was also inoculated into SSA and pito without *S. typhi* was inoculated into SSA, both for 24 hours. These served as control samples. Antimicrobial susceptibility testing of pito was also performed using Kirby Bauer method to test the potency of pito as a herbal medicine.

Results: Culture containing both *S. typhi* and pito and pito only culture yielded no bacterial growth all through the days of incubation. Only the *S. typhi* only culture yielded growth and antimicrobial susceptibility testing of pito had no significant effect on the *S. typhi* isolate.

Conclusions: The study therefore concluded that the alcoholic (fermented) and non-alcoholic (unfermented) forms of pito could not be a route of transmission of *S. typhi*. Also, antimicrobial susceptibility test showed that pito was not effective as a herbal medicine against *S. typhi*. Therefore, it is recommended that the phytochemical compositions in sorghum be extracted and its antimicrobial properties especially against *S. typhi* be investigated.

Session Topic: Chronic Diseases

Presenter: Nelly Nyaga
Institution: School of Pharmacy, University of Nairobi, Nairobi,Kenya

Co-Authors: Mwangi Peter[1], Bukachi Fredrick[1]

[1]Department of Medical Physiology, University of Nairobi

Cardioprotective effects of *Salvia coccinea* against ischemia reperfusion injury

Background: Coronary heart disease (CHD) is among the leading causes of death and disability in the modern world, including Africa. Myocardial infarction induced by Ischaemia/reperfusion (I/R) injury is the most severe manifestation of CHD, which makes its attenuation critical. Despite the great burden of ischaemic heart disease, there is still no effective therapy against Ischaemia/reperfusion injury.

Objective: We hypothesized that the freeze-dried extract of *Salvia coccinea* are cardioprotective against ischaemia reperfusion injury in a global ischemia model

Materials and Methods: Thirty (30) adult male rats weighing 300-400 g were used in the study. The rats were anesthetized with 6% Sodium Pentobarbitone and heparinized (2 ml of 50 i.u.) intraperitonially. All animal hearts were isolated and perfused with Krebs Henseleit (KH) solution on the Langendorff system.
The hearts were reperfused as follows: Control group, plain KH buffer; positive control group, KH buffer containing glucosamine; test groups 1, 2 and 3, KH buffer containing 50 mg, 100 mg and 200 mg of Salvia coccinea, respectively.
The measurements of left ventricular developed pressure (LVDP) and its derivatives; maximum rate of contraction (dp/dt max), maximum rate of relaxation (-dp/dt min) and the heart rate were made through a pressure transducer attached to a polyvinyl balloon inserted in the left ventricle.

Results: The hearts treated with *S. coccinea* showed a significant post-ischaemic contractile function recovery in the early and late reperfusion. The dose response curve for the cardioprotective effects of *S. coccinea* had a biphasic U-shaped pattern with low dose stimulation of cardioprotection and high dose inhibition of cardioprotection. The histological examination of the *Salvia coccinea* treated hearts revealed preservation of cardiac structure, prevention of macrophage infiltration and fibrosis.

Conclusion: The freeze-dried extracts of *Salvia coccinea* possess cardioprotective effects against I/R injury with the 50mg dose being the most potent. In addition, the opioid pathway mediates the cardioprotection provided by the freeze-dried aqueous extracts of *S. coccinea* aqueous extracts.

Session Topic: Chronic Diseases

Presenter: Bright Oppong Afranie
Institution: Kwame Nkrumah University of Science and Technology, Kuamsi, Ghana

Co-Authors: Faustina O. Mensah[1]
[1]Kuamsi, Ghana, KNUST, Kumasi, Ghana.

Prevalence of pre-diabetes/diabetes and associated risk factors among university students in Ghana

Background: Diabetes is one of the most common chronic diseases globally and its complications include retinopathy, nephropathy and neuropathy. Early detection and management of pre-diabetes/diabetes can however reduce the risk of developing diabetes-related complications. This study was undertaken to prevalence of pre-diabetes and diabetes and associated risks factors among undergraduate students at KNUST.

Method: Questionnaires were administered to 500 participants (45% males and 55% females) to obtain demographic and anthropometric data, information on physical activity, and knowledge on diabetes. About 5ml of venous blood was taken from participants after an overnight fast and biochemical assays done to determine fasting plasma glucose (FPG) and lipid profile.

Results: The mean age of participants were 21±2.40 years and 19.24±2.42 years for male and female respectively. The mean blood glucose levels were 4.9±0.55 mmol/L and 4.8±0.54 mmol/L for males and females respectively. Prevalence of pre-diabetes was 5 % and none was recorded for diabetes. The means for the total population for the following parameters; lipid profile such as HDL, LDL, Total cholesterol and triglycerides were 1.68 mmol/L, 2.89mmol/L, 4.90mmol/L and 0.89mmol/L respectively. There was a significant difference between the systole of participants according to gender (*p-value*= 0.0005). There was no positive significant correlation between blood glucose level and the risk factors among participants, prevalence of diabetes was 5% and about 16% of participants had no knowledge about diabetes.

Conclusion: Education about the disease as well as appropriate modification of lifestyle can help reduce the incidence of diabetes and its associated risk factors.

Session Topic: Chronic Diseases

Presenter: Freda Osei Akoto
Institution: Kwame Nkrumah University of Science and Technology, Kumasi, Ghana

Co-Authors: Patricia Brown[1], Michael K. Commeh[1]

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Impact of wood smoke exposure on risk of developing cardiovascular and respiratory diseases among palm kernel oil extraction workers in Ghana

Background: Exposure to wood smoke is widely associated with many non-communicable diseases including acute myocardical infarction, hypertension, chronic atherosclerosis, pneumonia, lung cancers and ovarian insufficiency in women.

Objectives: This study aimed to assess the risk of developing cardiovascular diseases and respiratory diseases by measuring some inflammatory markers haematological indices, C-Reactive protein and lung function.

Methods: A cross sectional pilot study was conducted to collect baseline data from 25 out of 35 palm kernel oil extraction workers, all females, at Bekwai. After demographic data was collected, blood samples were collected and analysed.

Results: The means for total red blood cell count was 4.57x 106/µl, total white blood cell count 6.07 x103/µl, haemoglobin 12.55 g/Dl, haemocrit 38.9 % and total platelet count 232.97 x103Ul. All the haematological indices fell within the normal ranges of 3.9-5.03x106/µl, 3.5-10.5x103/µl, 12.0-15.5g/Dl, 34.9-44.5% and 150-450x103Ul for red blood count, white blood cell, haemoglobin, haemocrit and platelet count respectively. No differences were noted for the participants compared with the normal healthy ranges of the various indices. However, the mean C-Reactive protein value was 5.70 mg/l, about 2.70 mg/l above the normal range of 0.1-3 mg/l. 24.0% of the participant had very high C-reactive protein levels > 3 mg/l.

Conclusion: This implied that this percentage of the participants is at a risk of developing cardiovascular diseases. Further studies to investigate lung function are recommended.

Session Topic: Chronic Diseases

Presenter: Gifty Otoo
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The hepatocellular and cardiopathological protection of essential oil of unripe citrus *aurantifolia* (lime) in diabetes mellitus in Sprague- Dawley rats

Background: Diabetes mellitus is a syndrome of disordered metabolism characterized by hyperglycemia and is associated with a lot of medical conditions of the heart and liver. The aim of the present study was to evaluate the hepatocellular and cardio protective efficacy of the lime essential oil in managing type 2 diabetes mellitus in sprague-dawley rats.

Methods: Thirty Sprague-Dawley rats (n= 30) were taken for this study. The animals were divided into 6 groups; normal control group (n= 5), negative control group (n= 5), positive control group (300 mg/kg metformin) and diabetic rats treated with the essential oil of Citrus aurantifolia (n= 15). Five each in the low (30 mg/kg), medium (100 mg/kg) and high dose (300 mg/kg) groups. Diabetes was experimentally induced in the rats through intraperitoneal injection with streptozotocin (60 mg/kg body weight). The essential oil of Citrus aurantifolia was administered orally to the treated diabetic rats 12 days following induction. The liver and heart tissues were collected after 28 days following treatment and the histological study was performed using haematoxylin and eosin (H&E). Blood samples were collected for the liver function test (LFT).

Results and Discussion: histopathological studies of the liver and the heart (left ventricle) of the diabetic rats showed features of inflammation such as dilatation and polymorphonuclear cells infiltration. Abnormalities such as large intercellular spaces, Pyknosis, karyorrhexis and dearrangement of muscle fiber architecture. Liver and heart abnormalities in the diabetic animals treated with unriped lime essential oil showed improved histology which can be compared to normal. The LFT was normal in both diabetic and undiabetic rats but demonstrated improved liver function when treated with the essential oil of lime.

Conclusion: The essential oil of lime due to its antioxidant and anti- inflammatory may be helpful responsible in reversing the changes in the liver and heart in diabetes mellitus after treatment.

Session Topic: Bioinformatics and Biotechnology

Presenter: Albert Doughan
Institution: Kwame Nkrumah University of Science and Technology, Kumasi, Ghana

Co-Authors: Victoria Dzogbefia[1]

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Comparative bioconversion of yam peels by *Aspergillus niger* and *Pleurotus ostreatus* into improved animal feed

Background: Yam (*Dioscorea rotundata*) is amongst the most cultivated tuber crops in Ghana. In many Ghanaian communities, the main aim of yam production is for direct human consumption while in other developing and developed countries, yam is used as a raw material in the processing industries to produce food products like yam flour, poultry and livestock feed. Yam peels contain high amounts of lignocellulosic materials which include cellulose, hemicellulose, lignin and other anti-nutritional factors such as tannins. Monogastrics do not have the necessary enzymes for its digestion, hence, there is underutilization of the yam peels by the animals. This underutilization problem can be curbed by subjecting the yam peels to fungi (e.g. *Aspergillus niger* and *Pleurotus ostreatus*) through a process of solid state fermentation. This process converts the lignocellulosic materials (cellulose, hemicellulose and lignin), in the absence of free-flowing aqueous phase, into products that can be easily absorbed by the animal.

Method: Substrates pretreatment- The yam peels were washed, cut into pieces, dried and pounded in a mortar to decrease the particle size.
Composting- Here, distilled water was sprinkled on the yam peels to a moisture content of about 30-50%.
Sterilization- The samples were wrapped in aluminium foils and placed in a sterilisation chamber set at 121°C for 15 minutes. The heat from the boiling water killed the indigenous microorganisms present in the substrates.
Inoculation- The yam peels were inoculated with *Aspergillus niger* and *Pleurotus ostreatus* and incubated for eight weeks. Proximate analysis was then performed.

Results: The *A. niger* and *P. ostreatus* treated yam peels showed a significant increase ($p<0.05$) in moisture content throughout the fermentation period relative to the control. Fermentation also produced a marginal increase in protein, carbohydrates and ash contents, while decreasing the fiber.
In this research, the crude fiber content of the *Pleurotus ostreatus* and *Aspergillus niger* treated samples decreased significantly ($p < 0.05$) from 22.3% to 10.3% and 22.3% to 9.17% respectively at the end of the fermentation period.

Conclusion: *Pleurotus ostreatus* and *Aspergillus niger* solid state fermentation of yam peels enhanced the biomass protein, mineral contents and carbohydrates, while significantly reducing the levels of fiber and tannins.

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Session Topic: Global Health

Presenter: Larissa Souza Amaral
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Determination of the membrane integrity after photoinactivation of methicillin resistant *S. aureus* biofilm using new chlorins as photosensitizers

Background: Due to the increase in bacterial resistance to antibiotics, the development of new drugs and/or technologies for the eradication of microorganisms is a priority. Antimicrobial Photodynamic Therapy (a-PDT) may be a promising alternative for microbial infections since its action occurs by multiple targets, which hinders the development of resistance. The objectives of this study were to photoinactivate Methicillin Resistant *S. aureus* (MRSA) biofilm by a-PDT using new chlorins derivatives sterically prevent from self-aggregation (CHL-OH-A and CHL-PH-A) as a photosensitizer, and to analyze the membrane integrity by Live/Dead kit and Scanning Electron Microscopy (SEM).

Methods: The three parameters used to the photoinactivation were photosensitizer concentration (Cps: 5; 7.5 and 10 µmol L-1) incubation time (IT: 20; 30 and 40 min), and light dose (LD: 15; 22 ad 30 J cm-2). For the analysis of the integrity of the membrane by SEM, the biofilm was cultivated, fixed, dehydrated, metallized and visualized. The analysis using the Live/Dead kit was performed with biofilm before and after photoinactivation. Biofilm was cultivated in microscopy slides and submitted to a mixture of SYTO®9 and Propidium Iodide (PI) being finally analyzed by fluorescence microscopy with 460-490/520 nm of excitation/emission.

Results: The inactivation obtained using CHL-PH-A and CHL-OH-A was 53.16% and 47.35% presenting a variation of the survival index (Δlog10) of 5.13 and 5.08 respectively. The best parameters were concentration of 10 µmol L-1, IT of 40 min, and 30 J cm-2 of LD. SEM and Live/Dead kit confirmed membrane damage after inactivation. SEM allowed the observation of the intact bacterial structure before the PDT while after presented a disruption of the membrane and cell wall due to the photoxidation of cellular components. Live/Dead kit allow the observation by fluorescence microscopy of the bacterial metabolism differentiating between live and dead bacteria. The SYTO®9 penetrates the intact or damaged membrane presenting green coloration while PI penetrates only damaged membranes showing red coloration.

Conclusions: These findings demonstrate that CHL-PH-A and CHL-OH-A present great potential for photoinactivation of MRSA biofilms because they provide reduction above 5 log CFU mL-1 on the survival index. SEM and Live/Dead kit showed the unstructured membrane, which allowed to suggest cell death by photoxidation of membrane components after a-PDT.

Session Topic: Global Health

Presenter: Ariane Tiemy Tizura
Institution: Departamento de Parasitologia, Universidade Estadual de Londrina, Brasil
Co-Authors: Mayara Tiemy Enokida[1], Beatriz Arceni[1], Walter Abou Murad[1]
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Epidemiological study of *mansonic schistosomosis* and intestinal parasites in the urban population of Londrina City

Backgound: According to the World Health Organization, some intestinal parasites and *mansonic schistosomosis* are considered neglected diseases. They are a serious public health problem, especially in developing countries, due to their high morbidity rates and causing problems in physical and intellectual development. They are endemic throughout Brazil, and its prevalence varies in regions with different states of economic and social development. Understanding the different patterns of transmission of these diseases is necessary for adoption of control strategy measures. Thus, this project aims to monitor the occurrence of mansonic schistosomosis and intestinal parasites in the population of peripheral districts of Londrina city. Positive patients will be referred to the health clinics for treatment and the results obtained may be used to plan municipal actions in order to define prevention and control strategies.

Methods: A total of 1482 faecal samples were collected from December 2016 to September 2017. They were analyzed using the methods of Hoffmann, Pons and Janer, which is based on the spontaneous sedimentation of helminth eggs and some protozoan cysts in a faecal water solution; Faust et al., that relies on centrifugation-flotation in a zinc sulphate solution, in which protozoal cysts and eggs of some helminths are diagnosed; and the Kato methodology, modified by Katz, that demonstrates the parasitic load of helminth eggs in a small faecal portion.

Results: Of the 1482 faecal samples examined, 408 were positive for intestinal parasites and 1074 were negative. Among the pathogenic parasites were *Schistosoma mansoni* (0.2%), *Entamoeba histolytica* (10.3%), *Giardia lamblia* (5.4%), *Ascaris lumbricoides* (1,5%), *Enterobius vermicularis* (0,8%), *Strongyloides stercoralis* (0.2%), *Ancylostoma duodenale* (2.7%) and *Hymenoleps nana* (0.2%). The commensal parasites present in the samples were *Endolimax nana* (60.8%), *Entamoeba coli* (16.7%) and *Iodamoeba butschilii* (1.2%).

Conclusion: Even though the most common parasites in the samples were commensal, we cannot rule out the importance of this study as it demonstrates the lack of adequate sanitary education and basic sanitation in the population, emphasizing the importance of a greater investment in basic sanitation policies and health education.

Session Topic: Global Health

Presenter: Roohie Parmar and Jelena Poleksic*
Institution: McMaster University, Hamilton, Canada

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*both authors contributed equally to the study.

Placing the fentanyl crisis on the national agenda: A multiple streams analysis

Introduction: Canada is in the midst of a national public health emergency due to a significant increase in fentanyl overdoses.

Objectives: To explore how Bill S-225, an act to regulate the importation of foreign fentanyl precursors, was placed on the federal agenda.

Methods: Kingdon's multiple streams framework was applied to identify the factors which facilitated the introduction of Bill S-225. Media sources and grey literature were reviewed to complete the analysis.

Results: The role of the media in placing fentanyl overdoses in the public consciousness, policy legacies of oxycodone management, previous applications of federal precursor regulations and changes in political leadership are the principal drivers behind the consideration of Bill S-225 on the national agenda.

Conclusion: Understanding the forces behind the fentanyl epidemic and implementation of Bill S-225 could assist healthcare leaders and policymakers advance future healthcare policies onto the agendas of governments, hospitals and educational institutions.

Session Topic: Chronic Diseases

Presenter: Silvio Almeida Jr
Institution: Department of education in Pharmacy and Clinical Laboratory, São Paulo, Brazil
Co-Authors: Marcia Cristina de Oliveira[1], Alex Alves Rodrigues[2], Silvio de Almeida Junior [3]

Student Pharmacy and laboratory [1]-Euro Anglo vocational courses; Student veterinary medicine [2]-Faculdades Metropolitanas Unidas, São Paulo-SP; [3] Department of education in Pharmacy and Clinical Laboratory, Euro Anglo, São Paulo, Brazil

Anatomical aspects of the patient with Systemic Lupus Erythematosus (SLE)

Background: Systemic Lupus Erythematosus (SLE) is an inflammatory disease of autoimmune origin in which an immune response fails and identifies the body's own tissues as foreign and produces antibodies against them. The objective of this study is to elucidate doubts about how SLE and how environmental factors alter the morphological nature of patients with the disease.

Methods: Bibliographical survey in scientific articles with up to five years counting of this date.

Results: In the anatomical aspect, lupus is known to present cutaneous expression, in which lupus manifests only with spots on the skin (usually red or erythematous), occurring mainly in areas that are exposed to sunlight (faces, ears, neck and arms) and systemic expression in which organs such as the lungs, heart. Joints, nervous system are affected presenting a series of chest pain symptoms the shortness of breath. Because it is a disease of the immune system, whose main function is the production of antibodies and organization of the mechanisms of inflammation in all organs when a person has lupus, it can present several types of symptoms at various places throughout the body. Although the cause of SLE is not well known, it is known that genetic, hormonal and environmental factors participate in its development. The major alteration is the imbalance in the production of antibodies that react with proteins of the organism itself and start to cause inflammation in various organs such as skin, mucosa, pleura and lungs, joints, kidneys and so on

Conclusions: It is understood that the type of symptom that the person develops, depends on the type of auto antibody that the person carries and how the development of each antibody is related to the genetic characteristics of each person, each person carrying SLE tends to have clinical manifestations specific and particular.

Session Topic: Chronic Diseases

Presenter: Silvio Almeida Jr
Institution: Department of education in Pharmacy and Clinical Laboratory, Franca, São Paulo, Brazil

Alterations in oncological patients with nutritional deficiency

Background: The cancer (uncontrolled local proliferation of cells) has been in last times one of the chronic illnesses with bigger growth between the populations. Patients who make oncological treatments can present a malnutrition picture what she causes the loss of nutrients and muscular mass. The work has objective to analyze the causes that make that the loss of muscular mass occurs causing the malnutrition, depletion, anorexia and cachexia in patient in oncologic treatment.

Methods: Bibliographical survey in scientific articles with up to five years counting of this date.

Results: With prospectivas descriptive databases and qualitative carriers of cancer in the intestine cólon, rectum, lung, suck, uterus, ovary, kidney, bladder sample that in relation to the symptoms the majority in accordance with presents a malnutrition degree the anthropometric measures evidencing low index of corporal mass (IMC). The loss of frequent weight causes to generalized, anemia weakness and weight loss being able to arrive at the state of cancerous cachexia and loss of lean mass. It is characterized by the appetite lack, immunological dysfunction this if it characterizes for changes in the ingestion and harm absorption of nutrients, metabolic alterations mainly when fasting occurs one drawn out affecting all the metabolic ways. The protein depletions are perceived by the atrophy of the muscle and visceral agencies placing the patient at risk increasing the infections diminishing the functional capacity.

Conclusions: Therefore the loss of muscular mass mainly has the association with the anorexy that is the spontaneous loss of weight because of the symptoms that the main oncologic treatments cause in the patients modifying the palate, weakness and muscular atrophy.

Session Topic: Chronic Diseases

Presenter: Silvio Almeida Jr
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Characterization of the syndrome of the dysfunction reversible apical - Syndrome of Takotsubo

Background: Initially described for a group Japanese, at the beginning of the decade of 1990, it preferential showed that patient women of half age, after intense degree of stresses presented similar clinical picture to heart attack acute of the myocardium (pain precordial, alterations in cardiac enzymes (CK-MB mass and Troponin), segmentary comprometimento of the left ventricle), however with coronary the normal ones. The name to this syndrome of syndrome of the broken heart was given had morphology seen in examinations of images or Syndrome of Takotsubo (trap used in Japan to catch octopus). Based in the similarity with the acute picture of heart attack of the myocardium, this study it has as intention to alert on its similarities for one better I diagnosis.

Methods: Bibliographical survey in scientific articles with up to five years counting of this date.

Results: Through the findings in scientific literature it is possible to observe cardiac alterations in patients with Syndrome of Takotsubo, since in enzymatic curves they had shown rise of cardiac enzymes: CK-MB mass and troponin. In image examinations, the left ventriculografia evidenced apical balonamento with hipercinesia. It still presented, in systole ventricular another variant format of the transitory left ventricular balonamento in which only the average affected ventricle and, with hipercontratilidade of the segments basal and apical. Although it is little definite etiology, the exaggerated likeable stimulation has been proposal as central factor in its physiopathology. Patients with this syndrome have greater catecholamine levels that patient with heart attack of the myocardium with the same Killip-Kimball classroom. Despite its real prevalence has not been defined, retrospective surveys suggest that 2% of the taken care of cases as acute coronary syndrome is of syndrome of takotsubo.

Conclusions: The etiologies of the clinical characteristics of this syndrome not yet total are clarified. Multifactorial characteristics had been found in literature as possible desencadeantes: psychological, neurological, pulmonary, gastrointestinal, kidney problems, illnesses and other nonspecific factors. It fits to the clinical body the correct identification of the heart attack and the syndrome of takotsubo.

Session Topic: Cancer

Presenter: Robin Kumar
Institution: National Institute of Immunology, New Delhi, India
Co-Authors: Ankit Saneja[1,2], Prem N. Gupta[2] and Amulya K. Panda[1]

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Antitumor efficacy of long circulatory polymeric nanoparticles of betulinic acid

Background: The clinical application of betulinic acid (BA), a naturally occurring pentacyclic lupine-type triterpene, with promising antitumor activity, is limited due to its extremely poor aqueous solubility and relatively short in vivo half-life. To solve these problems, we have developed BA loaded polylactide-co-glycolide-monomethoxy polyethylene glycol (PLGA-mPEG) nanoparticles.

Methods: The PLGA-mPEG co-polymer was prepared using standard carbodiimide chemistry. BA loaded PLGA-mPEG nanoparticles were prepared using emulsion-solvent evaporation method. The developed BA loaded PLGA-mPEG NPs were characterized for their mean particle size, polydispersity, zeta potential, loading efficiency and X-ray diffractometry (XRD). The morphological characteristics of BA NPs were observed using transmission electron microscopy (TEM) and scanning electron microscopy (SEM). In vitro cytotoxicity studies against MCF-7 and PANC-1 cells were measured using an MTT assay. The molecular pathway was established through different study such as apoptosis assay, mitochondrial potential disruption assay, reactive oxygen species (ROS) generation and cell cycle arrest. Further, intravenous pharmacokinetics study and in vivo anti-proliferative activities were performed in Ehrlich tumor (solid) model.

Results: The developed nanoparticles had a desirable particle size (~147 nm) and exhibited uniform spherical shape under TEM and SEM. In vitro cytotoxicity in MCF-7 and PANC-1 cells demonstrated enhanced cytotoxicity of BA NPs as compared to free BA. The enhanced cytotoxicity of BA NPs was also supported by increased cellular apoptosis, mitochondrial membrane potential loss, generation of high ROS and cell cycle arrest. The pharmacokinetics study revealed that BA NPs could prolong the circulation of BA and remarkably enhance half-life by ~7.21 folds. Consequently, in vivo studies demonstrated superior antitumor efficacy of BA NPs as compared to native BA. Moreover, treated Ehrlich tumor mice demonstrated no biochemical, hematological and histological toxicities.

Conclusions: The results obtained in this study collectively indicated that the developed BA NPs may serve as promising drug delivery system for improving the antitumor efficacy of BA.

Session Topic: Biotechnology

Presenter: Adrine de Souza
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Co-Authors: Mariana Souza Sonego[1], Andrés Delgado Cañedo[2]

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In silico and *in vitro* analyses revealed the presence of PSG5 in immunomodulation by human mesenchymal stem cells.

Background: Mesenchymal stem cells (MSCs), derived from stroma tissue have significant cell therapy potential, due to great plasticity and immunomodulatory activity, with little or no ethical problem if extracted from liposuction residue. Different studies demonstrate that MSC regulates immune response throughout the homing process and the expression of histocompatibility molecules, shifting from the Th1 to the Th2 signaling pathway, promoting antigen presentation and specific antibody production. Those characteristics of MSCs provides great perspective for therapeutic use in acute graft versus host disease (aGVHD), transplant rejection and tissue injuries. Thus far, some studies have shown that the placenta-specific glycoprotein (PSG), from the immunoglobulin (Ig) and carcinoembryonic antigen (CEA) families, could be expressed in adult stem cells, even though those studies were not focus in the immunomodulation activity. The present study aimed to evaluate in vitro and in silico whether the expression of CEA family genes was present in human MSCs obtained from adipose tissue and placenta. In addition, we reviewed data from Bieback et al. to evaluate if primers used were specific for the PSG1 gene.

Methods: Methods: The expression of CEACAM1 and PSG1 proteins in adipose-derived stem cells were accessed by flow cytometry. In silico microarray analysis of CEA genes involved in immunomodulation and primers were analyzed. PCR of placenta and MSC was performed with PSG5 specific primers.

Results: Our data suggest possible analysis errors in the microarray data validation of PSG1 probes in the study of Bieback et al., 2010, primers were unspecific for the PSG1 gene transcript, identifying PSG3, PSG4, PSG5 and PSG6 as the potential genes involved in MSC immunomodulatory activity. PCR performed identified PSG5 in MSC and placenta.

Conclusions: In silico and in vitro analyses demonstrated that there are more immunomodulatory molecules produced by MSCs than previously described. As well as the PSG5 protein, characterizing a possible therapeutic target in autoimmune diseases. Furthermore, immunosuppressive activity of MSC could contribute to the treatment of aGVHD.

Session Topic: Biotechnology

Presenter: Neelakshi Mungra
Institution: University of Cape Town, Cape Town, South Africa
Co-Authors: Sandra Jordaan[1], Shivan Chetty[1], and Stefan Barth[1]

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Using synthetic adapters to improve the targeted elimination of CSPG4-positive triple-negative breast cancer cells

Background: Targeted therapy for breast cancer represents the most promising state-of-the-art technology in the field of oncology. Through the use of receptor-specific monoclonal antibodies conjugated to potent cytotoxic agents, this approach favours the selective killing of tumor cells, while causing minimal damage to healthy tissues. Targeting breast cancer cells expressing the estrogen, progesterone and human epidermal growth factor 2 (HER2) receptors, has been shown to be effective in clinical settings, with notable improvement in overall patient survival. However, lacking expression of the above-mentioned receptors, triple-negative breast cancer (TNBC) patients cannot benefit from current targeted therapies. Fortunately, chondroitin sulfate proteoglycan 4 (CSPG4) has been identified as a potential biomarker of TNBC. Combining a CSPG4-specific single-chain antibody fragment (scFv) with a modified form of the microtubule-associated protein tau (MAP tau) promotes cell cycle arrest and apoptosis, thereby exhibiting potential clinical value for TNBCs. Nonetheless, the anti-cancer activity of such fusion protein needs to be improved. There is a lack of intrinsic components that can promote the translocation of the cytotoxic moiety into the cytosol of the cell. To this end, we aim to generate novel cleavable adapters inbetween the scFv and the effector molecule, to promote sufficient endosomal escape of the fusion protein, while reducing the rate of lysosomal degradation.

Method: Using standardized molecular cloning techniques, novel humanized CSPG4-targeting MAP tau-based fusion proteins were generated within mammalian expression vectors. These plasmids were then transfected in HEK293T cells, for the expression of the putative fusion proteins. At present, we are involved with the establishment of the purification processes that would allow further evaluation of the recombinant proteins by confocal microscopy and flow cytometry.

Results: Intracellular green fluorescent protein expression was observed in mammalian cells (3 days after transfection) indicating in cis expression of the fusion protein in the cell culture supernatant.

Conclusion: Small cleavable adapters can be used to maximize efficient delivery of MAP tau to the cytosol of TNBC cells, thereby increasing the anticancer activity. This needs to be confirmed for CSPG4(scFv)-MAP fusion proteins through in vitro and in vivo studies.

Session Topic: Biotechnology

Presenter: Peggy Arthur
Institution: Kwame Nkrumah University of Science and Technology, Kumasi,Ghana
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Assessment of the wound healing property of ash from *Achatina achatina* shells

Background: Despite the fact that ash from the shells of *Achatina achatina* snail species has been used traditionally in Ghana to treat wounds especially burns, little or no scientific data is available on the wound healing properties of this ash. The aim of the study was to assess the wound healing properties of ash of the shells of *Achatina achatina* species using rat excision models.

Methods: Forty five Sprague-Dawley rats were divided into nine groups and subjected to the following treatments; 1% w/w silver sulphurdiazine (reference drug), no treatment (negative control), aqueous cream only, different concentrations of the ash infused into aqueous cream and the powdered ash only. The treatments were topically applied to 20 mm wounds on the dorsal side of the rats 24 hourly for 14 days and the rate of wound contraction was measured. The histology of the healed tissues subjected to various treatments was compared with that of tissue of an unwounded rat.

Results: The powdered ash had a negligible difference (p >0.05) in wound closure rate when compared to the positive control and different concentrations of ash in aqueous cream. There was a significant difference (p = 0.0001) between the rate of wound closure of all other treatments and that of the untreated. From the histological studies, wounds treated with the powdered ash only, showed complete healing and restoration of the tissue with minimal inflammation as compared to the other treatments.

Conclusion: These findings demonstrate that the ash of *Achatina achatina* shells is effective for wound treatment. Further studies on the toxicity and active components of the ash of *Achatina achatina* should be carried out as it could be a potential wound healing drug.

Session Topic: Biotechnology

Presenter: Sabrina Moreira Paes
Institution: Federal University of Parana, Curitiba, Brazil
Co-Authors: Jean Teruo Hamasaki., Sammie-Joe Melanie Davis[1] and Yasmine Mendes Pupo[1]

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Cryopreservation protocol of dental pulp stem cells: A systematic review

Background: Dental pulp stem cells have long been studied due to their excellent differentiation capacity. However, their use is often difficult by limitations of cryopreservation, a process which, still, is not well established. Consequently, the aim of this study was to conduct a survey based on the literature concerning cryopreservation methods of dental pulp stem cells, proposing a standardized protocol through crossing of results found.

Methods: For this systematic review, primarily, there was a definition of search terms: dental pulp stem cells, cryopreservation stem cells, dental pulp cryopreservation and stem cells cryopreservation method, adopting the Boolean operators "AND" and "OR" to get a larger sample. The inclusion criteria involved comparative studies after 2010 with dental pulp stem cells of deciduous as permanent human teeth, involving three or less authors. The databases selected for this search include MEDLINE/PubMed, LILACS, Scielo, CAPES Journal Portal and USP thesis bank.

Results: A total of 6272 studies were found using initial terms of search. After removal of duplicates and application of inclusion and exclusion criteria, 1546 studies remained. However, of these studies, only 42 fit the research scope, 15 of which involved qualitative search. Based on these studies, a protocol was elaborated of cryopreservation methods which showed consistent and confiable results.

Conclusions: Based on the findings of this review, a proposition of standardized cryopreservation protocol of dental pulp stem cells is possible. Initially, there is disinfection of pulp tissue with iodopolvidone and sterile saline phosphate buffer baths followed by immersion in antibiotics. Thus, enzymatic digestion occurs with immersion in 3mg/mL of Collagenase type I and 4mg/mL of Dispase, at 37°C, for one hour. Sequentially, cells proliferation should realize with transfer of sample to middle alfa-MEM modified Dulbecco at 37°C and with 5% CO2. For cryopreservation, the sample should be immersed in a 10% Dimethylsulfoxide and 90% fetal bovine serum at 4°C. The freezing should be gradual with a cooling rate of -1°C/min, until a temperature of -85°C is reached followed by transfer to liquid nitrogen where the cells are maintained.

Session Topic: Biotechnology

Presenter: Akansha Singh
Institution: National Institute of Immunology, New Delhi, India
Co-Authors: Prasad Admane, Robin Singh and Dr. Amulya K. Panda

Design and evaluation of self-assembled scaffolds using biodegradable polymer particles

Background: Local application of many antibiotics even though very effective but are impractical in many surgical situations. Currently gentamicin and neomycin are used and their application method involves perfusion, injection, or powder spreading over the wound. These methods are labor intensive and demand specialized expertise for application and Monitoring. However, prolonged systemic application causes nephrotoxicity and ototoxicity. With efforts to find solution to these problems, local delivery of gentamicin has been established clinically and the use of biodegradable scaffolds can improve antibiotic efficiency.

Methods: Polymeric particles entrapping antibiotics like gentamicin and neomycin are prepared using Double emulsion (W-O-W)/solvent evaporation technique. Particle characteristics like size and surface potential estimation (by Zetasizer), antibiotic entrapment efficiency calculation (by OPA method), particle surface characterization (by SEM) were done. Particle were fused to form scaffold with the treatment of alcohol. Scaffold was further characterized for its surface features, biocompatibility and cell attachment efficiency.

Results: Highly porous particles were obtained with the size ranging between 3-22 um. These microparticles were successfully fused and a scaffold was prepared with porosity value of approximately 81%. Highly porous scaffold ensures its uniform degradation and efficient delivery of entrapped antibiotics. The tensile modulus was around 73 MPa that can be changed by altering the particle size. Analysis like FTIR studies, DSC, Franz diffusion cell analysis and Disc diffusion assay confirmed the presence and proper release of entrapped antibiotics from the particles. Efficient attachment and proliferation of NIH3T3 cells: high and uniform infiltration of mice cells after subcutaneously implanting the scaffold confirmed the biocompatibility and proved the safety of using the scaffold.

Conclusion: In this study a highly porous antibiotic releasing membrane was prepared successfully using a simple scaffold fabrication method at room temperature. Further the in-vivo implantation studies demonstrated the uniform resorption and vascularization in the scaffold. This unique technique of scaffold fabrication can easily provide us scaffolds of different shapes and dimensions that can entrap even highly labile biostimulatory molecules in higher quantity. All these qualities make these scaffolds suitable for clinical applications.

Session Topic: Bioinformatics

Presenter: Moisés Inácio
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Co-Authors: [1]Célia Maria Soares de Almeida.; [2]Evandro Novaes.; [3,4]Pedro Vitor Lemos Cravo.; [1]Juliano Domiraci Paccez.

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Immunomics and reverse vaccinology applied in a new vaccine against *Toxoplasma gondii*: in silico approach

Backgraund: *Toxoplasma gondii* is the causative agent of congenital toxoplasmosis, which manifests as mild chorioretinitis, miscarriage, mental retardation, microcephaly, hydrocephalus, and seizures. Treatment of this disease is limited and a new vaccine represents the best strategy against the infection. In the present study, we applied reverse vaccinology combined with immunomics for the development of a vaccine against *T. gondii*.

Methods: Using an *in silic*o approach, we identified *T. gondii*'s proteins that contain signal peptide and transmembrane domain using the ToxoDB® database. We evaluated the homology of these proteins with the human proteome and predicted their epitopes using Blastp, NetMHCpan 3.0 and NetMHCIIpan 3.1 tools. Class I and II HLA alleles with a frequency greater than 1% in the population of South America, North America, and Europe were obtained using the dbMHC database. Processing of the MHC class I epitopes were evaluated by MHC I Processing on the IEDB® database and the B lymphocyte epitopes were obtained through the Bcpred and BCTOPE servers. Finally, the antigenicity of the potential targets was analyzed by the VAxiJen server.

Results: A total of 1228 proteins were obtained, from which 349 showed no homology with human proteins. For the South American population, among the proteins identified with promiscuous epitopes, we observed proteins that are part of the virulence arsenal of the pathogen such as ROP8, ROP7, ROM4, Cathepsin C / B, rhoptry neck protein and LMBR1 family region protein. In the North American and European populations, we identified common proteins to both populations, such as MIC15, ROP7, HECT-domain protein and rhoptry neck protein. ROP31 and subtilisin SUB2 are exclusive to the North American population. These proteins are involved in the invasion process and were shown to be positive in all the parameters adopted in this study. Regarding B lymphocyte epitopes, proteins such as ROP7, ROP8, ROM4, MIC15, HECT were identified. These proteins also presented promiscuous epitopes to class I and II HLAs from the analyzed populations.

Conclusions: Thus, our results demonstrate that immunomics and reverse vaccinology were affective in identifying potential vaccine candidates against pathogens with complex life cycles.

Session Topic: Bioinformatics

Presenter: Dr. Alos Diallo[1]
Institution: Harvard Medical School, Boston, USA

[1]Bioinformatician and Teaching Fellow, Division of Immunology, Harvard Medical School, Boston, USA

Introduction to R for Biologists

Backgraund: R is a free programming language and software environment which has proved a powerful tool for data analysis and representation. The presentation here was developed to help biologists learn basic R syntax and practice plotting and manipulating data using an example relevant to biological research.

Saturday, Jan 27, 2018

Timeslot: 9:15 – 9:30 pm

Presenter: James Thuch Madhier
Institution: University of Toronto, Toronto, Canada

The potential of solar-powered water infrastructure in South Sudan

"3.2 million people in South Sudan - a staggering 31% of the nation's population - live in constant and severe food insecurity. This number swells to nearly 6 million during the lean season, when food production decreases due to extreme dry conditions. By mid-2017, conflict had left over 6 million people severely food insecure, the highest number in South Sudan's history. In South Sudan, food insecurity is a chronic condition.

A primary cause is lack of reliable water supply. With a lack of water infrastructure, food production is almost entirely dependent on rain, bringing annual shortages during the six-month dry season. In recent years, rains have been increasingly erratic, leaving some parts of the country without rain for two years at a time. Under these conditions, agriculture comes to a halt. Staple crops that South Sudanese rely on - like sorghum, millet, and peanuts - fall short of requirements, and food prices skyrocket. According to a research by WFP, a basic meal of rice and beans costs 155% of an individual basic income, an equivalent of $320 a meal for a New Yorker. According to UNICEF estimates, more than 15 per cent of the population is malnourished. Climate change has left South Sudan among the world's five most vulnerable countries on the 2017 Climate Change Vulnerability Index. It is also among the least equipped to fight back.

For South Sudan's agro-pastoralist population, conflict has resulted in building livelihoods being nearly impossible. A major form of conflict affecting the population is protracted inter-communal or ethnic conflict. According to OXFAM, most violent conflicts continue to be linked to cattle, with the prime cause as limited access to resources. Clashes occur mainly during dry periods, when pastoralists migrate in search of water and grazing lands.

Rainmaker Enterprise envisions addressing these pressing and interconnected challenges with a dynamic and durable solution; install solar-powered water pumps and introduce year-round drip irrigation systems to boost nutritious food production and supply clean drinking water for communities and their livestock."

Saturday, Jan 27, 2018

Timeslot: 12:05 – 12:20 pm

Presenter: Esther Anyango
Institution: School of Pharmacy, University of Nairobi, Nairobi, Kenya

BSI Nairobi: Knowledge, attitude and practice of drugs and substance abuse among teenagers at the Kabete Rehabilitation School

Background: Findings indicate that the median age at first use of all drugs in Kenya has dropped to as low as 10 years. Cases of minors abusing drugs have recently hit a considerable high. Evidence shows that there is a correlation between early exposure and later dependence and addiction to drugs and other psychoactive substances. The teenage years are vital and exposure to these harmful substances could increase vulnerability to multiple substance use disorders. It is therefore necessary for all efforts to be employed to mitigate this trend.
An assessment of drugs and substance use was carried out at Kabete Rehabilitation School as part of a mentorship program by BSI Nairobi. This school admits boys aged between 11-18 years who have been in conflict with the law in one way or the other. This assessment sought to establish the knowledge, attitude and general practice of drugs and substance abuse among teenagers in Kabete. Ultimately, the aim was to propose strategies to mitigate the lowering in age of first use of all drugs.

Objective: To carry out an assessment of drugs and substance abuse among children in Kabete Rehabilitation School.

Method: Data was collected from Standard 5-7 pupils at Kabete Rehabilitation School using in-depth interviews and focus group discussions. The information assessed included: current age, commonly abused drugs, age at first abuse, reasons for drug abuse for the first time, common times and locations of abuse, common routes of drug abuse and knowledge of the effects of drug abuse.

Findings: The mean age at first abuse was 13 years. Bhang, tobacco and alcohol are commonly abused. Reasons for first trial included: negative peer pressure, curiosity, stresses from home, deception from older folk, ignorance about the harmful effects and the perceived “lucrative” nature and stimulation associated with drugs. Common times of abuse and locations varied among the respondents. Generally, there was scanty knowledge about drugs.

Conclusion: Various recommendations have been proposed to curb the increase in children abusing drugs and other psychoactive substances.

Sunday, Jan 28, 2018

Timeslot: 9:00 – 9:15 pm

Presenter: Bhamra, Ashwinder
Institution: Moi University, Eldoret, Kenya
Co-Authors: Ruth Anyango[1]
[1]Medical Students, Moi University, Eldoret, Kenya

Moi University, School of Medicine, Eldoret, Kenya

BSI Goes to Kakuma!

Introduction: The Kakuma Refugee Camp is one of the two main refugee camps in Kenya, established to provide a safe environment for victims of social, political and economic turmoil from the horn of Africa. The BSI-Moi team envisioned a outreach project that involves members of the team travelling to Kakuma engaging with the residents of the camp.

Methods: The target population being focused in the outreach is mainly the youth of the Kakuma Refugee Camp, represented by all those young men and women attending the various aid-run schools and other institutions of learning within the camp. A mixed boys' and girls' high school was chosen, and a mixture of various students in high school were chosen and a sample size of approximately 60 were selected randomly. Experiences, thoughts, and insights into the lives of the participants were collected through recorded interviews with participants being given the freedom to share whatever they felt significant in their opinion to share what they would want the world to know about life in a refugee camp.

Results: The participants shared their ecstatic views on the impact that visitors from outside the camp have on them as well as what they look forward to on these visits. BSI members were also able to share the massive impact such engagements with marginalised and troubled social groups has on their own individual development.

Conclusion: Ultimately, the outreach provides an ample opportunity to help promote the interaction of individuals from differing social and cultural backgrounds, promoting the development of cross-community networks that eventually facilitate the generation and exchange of ideas, knowledge and thought processes, all for the better meant of the community around us.
While an opportunity to be able to spend a greater period of time with the youth of the camp, as well as greater numbers of individuals representing greater diversity would be more beneficial, bringing in more broader perspectives and takes on the various elements being addressed in these interactions, the impact that such short interactions have are equally influential, not only on the lives of the youth within the camp, but also on the BSI team members sharing these experiences.

Sunday, Jan 28, 2018

Timeslot: 11:30 – 11:45 am

Presenter: Pavanraj Chana
Institution: School of Medicine, College of Health Sciences, Moi University, Eldoret, Kenya
Co-Authors: Atiyya Tul Munim[1]

[1]School of Medicine, College of Health Sciences, Moi University, Eldoret, Kenya

Life after female genital mutilation: A case report

Background: Female genital mutilation (FGM) involves partial/total removal of external female genitalia for non-therapeutic reasons. It is estimated that 200 million women worldwide are affected. World Health Organization figures suggest it is performed in two million women and children every year, with risk of rising due to increased migration. It is practiced in several cultures, most frequently in African countries, as cultural rites of passage into adolescence and beliefs of proper sexual behavior for women. The practice is however widely acknowledged as a violation of child and women's rights, and has the potential to cause serious medical complications.

Methods: The case report explores the perspective of FGM for a 20-year old high school Somali girl, living in Kakuma Refugee Camp, Kenya. The case study used mixed methods to explore personal, social and health consequences of FGM: An interview with open-ended questions, was carried out to obtain qualitative data of her experience, challenges, knowledge and attitude towards FGM. The Harvard Trauma Questionnaire was administered to assess level of trauma experience. An Obstetrician was also interviewed about her case and the subject at hand. Consent was obtained from both parties.

Results: The victim not only reported excruciating pain at the time of the procedure but continues to suffer from such monthly during her menses. She fears the complications she will have to bear with delivering a child due to anatomical disproportions. She strongly advocated against FGM and does not wish the same upon others.
Males in her culture continue to support the practice and claim conformity with their religious beliefs when evidence from cited sections of the Quran suggest otherwise.
An obstetrician reported that the procedure entailed use of non-sterile blades without anaesthesia that predispose girls to psychological trauma, infections, infertility. From personal observations they also cause obstructed labour, neonatal complications and perinatal death.

Conclusion: Kenya and other countries have made the practice illegal but women and child protection responses are needed towards cross-cultures and education. Social activists combating FGM also need to advocate global policies in the aims of achieving Sustainable Developmental Goals targeted at health and gender equality.

Acknowledgements

The BSI International Remote Conference: Science and Society is made possible through the efforts of the following groups and individuals:

BSI Conference and Tech Committee:
Anastasiya Muntyanu (University of Ottawa, Canada), Prof. Eleanor Fish, Ashton Trotman-Grant, Mark Barszczyk, Justin Lau, Jastaran Singh, Elizabeth Roberts, Stefan Divic, Conor Vedova, Jelena Tanic (University of Toronto, Canada), Phillip Chen (Trinity College Dublin, Ireland), Ruth Anyango, Ashwinder Bhamra, Pavanraj Chana, Dr. Nicholas Kisilu (Moi School of Medicine, Kenya), Emilia Surzyn (Poznan School of Medicine, Poland), Samuel Ahuno (KNUST, Ghana) Dr. Suraj Varkhande (University of Salzburg, Austria), Milica Tanic (McMaster University, Canada), Anh Cao, Dr. Payam Zarin (Harvard Medical School, USA)

BSI Ghana:
Samuel Ahuno, Dr. Alexander Kwarteng, John Mensah Aquah, Prince Ansah, Silas Asiamah, Eben Mante Asante (KNUST University, Ghana)

BSI at Moi:
Ruth Anyango, Ashwinder Bhamra, Pavanraj Chana, Ahmed Ali Dawood, Bahati Ernestine, Deborah Jakait, Daniel Amara, Laventa Obare, Dr. Bernard Ochieng, Dr. Kirtika Patel (Moi School of Medicine, Kenya) and Dr. Nicholas Kisilu (Chandaria Cancer Center, Moi Teaching and Referral Hospital).

BSI Nairobi:
Esther Anyango, Adrianne Ochanyo, Rosemary Njogu, Grace Mwarage, John Njenga (University of Nairobi, Kenya)

BSI ICB/USP Organizing Committee:
CCEx-ICB: Dr. Maria Inês Nogueira (President), Dr. Gustavo P. Amarante-Mendes (USP, Brazil)

BSI at National Institute of Immunology (NII):
Shubhendu Trivedi, Robin Kumar, Akansha Singh, Deepak Yadav, Alka Gupta, Vijay Bajwa, Sayan Chakraborty, Avinash Kumar Singh (Nantional Institute of Immunology, India), Dr. Swarnendra Singh (Imperial Life Sciences, India)

We also acknowledge the support and efforts of the following groups and individuals:

Kristin Hendricks, (McGill University, Canada), Dr. Behrouz Moemeni, Dr. Nana Lee, Dr. Richard McAloney, Sergey Yegerov, Dr. Saman Zarghom (University of Toronto, Canada) Simran Ghoman (University of Alberta, Canada), Daniel Udenwobele, Brett Vahkal (University of Winnipeg, Canada), Farzan Pavri (Schulich School of Medicine,Canada), Dr. Clive Gray (Immunopaedia.org.za), Alicja Surzyn (ASF, Mexico), African Academy of Sciences, Medical Student Association of Kenya (Kenya), Dr. Bruno Silva-Santos (Instituto de Medicina Molecular Lisboa, Portugal), Dr. Yury Rubtsov (Lomonosov Moscow State University, Russia), Navid Nouri (Northwestern University, USA), Farzin Shamloo (Perdue University, USA), Shannon Marie Haas, Seamus Boshell, Dr. Sims Kochi, Dr. Sara Suliman (Dept. of Microbiology and Immunobiology, Harvard Medical School), Dr. Deepali Raval, Dr. Catherine Koofhethile (Harvard Infectious Diseases Consortium)

BSI is also grateful for financial support from the Department of Immunology and Trinity College at the University of Toronto (Special thanks to Prof. Mayo Moran, Prof. Michael Ratcliffe, Prof. Juan-Carlos

Zúñiga-Pflücker), Janice Wright, BeMo Academic Consulting for Conference Marketing, and BioLegend for generously sponsoring the Awards Program.