Beyond Sciences Initiative

2nd International Remote Conference: Science & Society

January 28 & 29, 2017.

PARTICIPANT BOOKLET

CANCER

CHRONIC DISEASES

GLOBAL HEALTH

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Beyond Sciences Initiative

Contents

Welcome Address

Dear Colleagues and Friends,

It is with pleasure we extend a warm welcome to all participants of the 2nd 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 32 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.

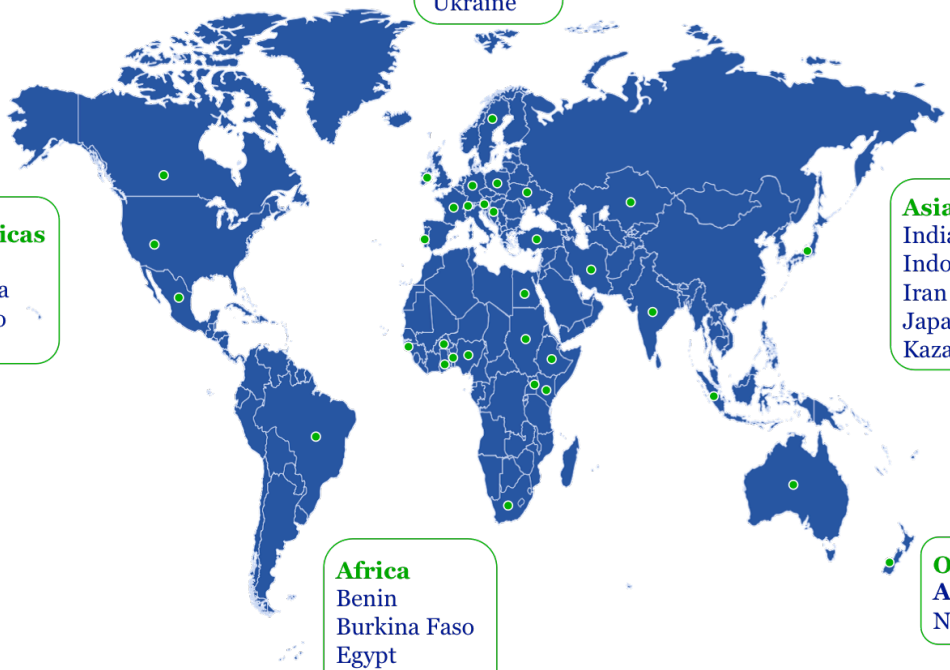
Our scientific program is once again exceptionally rich, with specific foci on global health, cancer and chronic diseases. Our goal is to enable high caliber discussions surrounding research and community activities in order to foster international collaboration.

On behalf of members of Organizing Committees from BSI chapters around the globe, we thank you for your participation in our 2nd 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
Croatia
France
Germany
Ireland
Poland
Portugal
Sweden
Switzerland
Turkey
Ukraine



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South Africa
Sudan
Uganda

Oceania
Australia
New Zealand

Keynote Speakers

Dr. Katie Flanagan, BA(Hons) MBBS DTM&H MA PhD CCST FRCP FRACP, leads the Infectious Diseases Service at Launceston General Hospital in Tasmania, and is a clinical Associate Professor at the University of Tasmania, Australia. She obtained a degree in Physiological Sciences from Oxford University, followed by her MBBS from the University of London. She is a UK and Australia accredited Infectious Diseases Physician. Katie obtained her PhD in malaria immunology at Oxford University. She was previously Head of Infant Immunology Research at the MRC Laboratories in The Gambia from 2005-11.

Dr. Thumbi Ndung'u, BVM, PhD, is the Scientific Director of the HIV Pathogenesis Programme at the University of KwaZulu Natal in South Africa. He is a virologist with a PhD from Harvard University, Boston, USA. His main research interests are in host-virus interactions and immune responses in HIV-1 infection. He is also interested in the development of biomedical interventions that can be used in resource-limited settings to prevent or treat HIV/AIDS. He is an Associate Professor in HIV/AIDS Research at the the Doris Duke Medical Research Institute, Nelson R Mandela School of Medicine, University of KwaZulu-Natal. He holds the South African Department of Science and Technology/National Research Foundation (DST/NRF) Research Chair in Systems Biology of HIV/AIDS.

Dr. Josef Penninger BA, MD, is Scientific Director of the Institute of Molecular Biotechnology of the Austrian Academy of Sciences, Vienna, Austria. He is Professor in the Departments of Immunology and Medical Biophysics at the University of Toronto, Canada, Professor of Genetics, University of Vienna, Austria, Honorary Professor of Peking Union Medical College/Chinese Academy of Medical Sciences, Beijing, China, Affiliate Scientist, Keenan Research Centre, Li Ka Shing Knowledge Institute of St. Michael's Hospital, Toronto, Guest Professor of the Medical University Vienna, Austria and Vice-President of ERI-ICP (European Research Institute on Intracellular Pathology), Paris. Dr. Penninger is a member of the European Academy of Sciences and Arts.

Dr. Jennifer Towne, Bsc, PhD, is Senior Scientific Director and IBD discovery lead in the Immunology Therapeutic Area with the Janssen Pharmaceutical Companies of Johnson & Johnson. Following her BSc at Whitworth University, Washington, she received a PhD in molecular genetics, biochemistry and microbiology from the University of Cincinnati College of Medicine, undertook a postdoctoral fellowship with Immunex, then became a Principal Scientist with Amgen, before moving to her current position in 2014.

Conference Program: Day 1

Saturday, January 28, 2017

Time (EST)	Topic	Speaker
7:00 – 7:15am	**Opening Ceremony – Introduction and Welcome from BSI**	**Dr. Eleanor Fish** Toronto, Canada
Scientific Session 1: Global Health		
7:15 – 7:50am	**Keynote – Antiretroviral Treatment of Acute HIV Infection and Prospects for a Functional Cure**	**Dr. Thumbi Ndung'u** University of KwaZulu-Natal, Durban, South Africa
7:55 – 8:10am	**Unusually Late Diagnosis of Sickle Cell Anaemia: the Ramifications of Sustained Inaction in Kenya**	**Christopher Owino** Eldoret, Kenya
8:15 – 8:30am	**Choosing Wisely – A Global Initiative Addressing Resource Stewardship in Medicine**	**Anastasiya Muntyanu** Ottawa, Canada
8:35 – 8:50am	**Microbial Contaminants Isolated from Items and Work Surfaces in the Post-Operative Ward at Kawolo General Hospital, Uganda**	**Ivan Sserwadda** Kampala, Uganda
8:55 – 9:10am	**Reforms of the Tunisian Healthcare System: Examples From the Field in Primary Care**	**Jessica Spagnolo & Marie-Claire Ishimo** Montreal, Canada
9:15 – 9:30am	**HotDoc: Mentoring The Youth of Tomorrow**	**Ashwinder Bhamra** Eldoret, Kenya
9:30 – 9:45am	**Break**	
Scientific Session 2: Global Health		
9:45– 10:20am	**Keynote – The Global Challenges of Vaccination**	**Dr. Katie Flanagan** University of Tasmania, Tasmania, Australia
10:25 – 10:40am	**The Expression Analysis of N-Myristoyltansferase (NMT) Isozymes in the Pumwani Commercial Sex Worker Cohort, Nairobi, Kenya**	**Daniel Udenwobele** Winnipeg, Canada
10:45–11:00am	**Risk Factors of Periventricular Leukomalacia in Singleton Infants Born from 23 to 26 Weeks' Gestation**	**Emilia Surzyn** Poznan, Poland
11:05–11:20am	**Intrinsic 4-1BB Signals are Indispensable for the Establishment of an Influenza-Specific Tissue-Resident Memory CD8 T Cell Population in the Lung**	**Angela Zhou** Toronto, Canada
11:25–11:40am	**Assessment of Antibodies Response Against Malaria Infection After Treatment with ACT in Children and Adults Living in Malaria Hyperendemic Area of Burkina Faso**	**Fatima Thiombiano** Ouagadougou, Burkina Faso
11:45–12:00pm	**HotDoc: Knowledge of HIV/AIDS and Family Planning in Secondary Schools in Kakuma**	**Ruth Anyango** Eldoret, Kenya
12:00-12:15pm	**Day 1 Closing Comments**	

Conference Program: Day 2

Sunday, January 29, 2017

Time (EST)	Topic	Speaker
Scientific Session 3: Cancer		
7:00 – 7:35am	**Keynote – From Bone Loss to Breast Cancer**	**Dr. Josef Penninger** Institute of Molecular Biotechnology, Vienna, Austria
7:40 – 7:55am	**Mechanism of Transport and Intracellular Target of Gliostem: Novel Technology for Near-Immediate Detection of Glioblastoma-Derived Stem Cell-Like Cells**	**Aileen Gracias** Stockholm, Sweden
8:00 – 8:15am	**Targeted Photodynamic Pre-Treatment as a Novel Strategy to Enhance Tumour Nanoparticle Accumulation**	**Marta Overchuk** Toronto, Canada
8:20 – 8:35am	**Anticancer Mechanism of a Soybean Derived Phytoestrogen Revealed by Development of an Innovative Study Model**	**Swarnendra Singh** New Delhi, India
8:40 – 8:55am	**IKKbeta Kinase as a Therapeutic Target for Lung Tumour-Initiating Cells Induced by the KRAS Oncogene**	**Felipe Silva Rodrigues** Sao Paulo, Brazil
9:00 – 9:15am	**Stakeholder Perspectives on the Use of Telehealth to Improve Ambulatory Care for Chemotherapy Patients in a Large Urban Cancer Centre**	**Jeremy Chad & Samik Doshi** Toronto, Canada
9:20 – 9:35am	**HotDoc: National Institute of Immunology**	**Shubhendu Trivedi** New Delhi, India
9:35 – 9:50am	**Break**	
Scientific Session 4: Chronic Diseases		
9:50 – 10:25am	**Keynote – Discovery Research in Biotech. and Pharma.**	**Dr. Jennifer Towne** Janssen Pharmaceutical, San Diego, USA
10:30–10:45 am	**Assessing Community Health in Sugoi, Kenya: A Community Based Education/Services Descriptive Study**	**Pavanraj Chana** Eldoret, Kenya
10:50– 11:05 am	**Explaining the Unexplained: Neuronal Endogenous Retrovirus-K Protein Deposition in ALS**	**Mamneet Manghera** Winnipeg, Canada
11:10 – 11:25am	**INSL5 and RXFP4 in the Immune System**	**Brett Vahkal** Winnipeg, Canada
11:30 – 11:45am	**Case Study: Finding Out the Effect of Anti-Retroviral Therapy on Hematological Indices Affecting HIV Adults Attending Immunosuppression Clinic in Entebbe**	**Gloria Ingabire** Entebbe, Uganda
11:50 – 12:05pm	**HotDoc BSI Toronto: From Science to Social Outreach**	**Emanuel Mastrangelo** Toronto, Canada
12:05-12:20pm	**Closing Ceremony –** Awards and Acknowledgements	

Instructions for Conference Participants

Quick Instructions

1. Register to join the conference: http://www.beyondsciences.org/conference2017/ .
2. All registrants (**participants & presenters**) will receive an invitation via e-mail by **Sunday January 22nd, 2017** 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

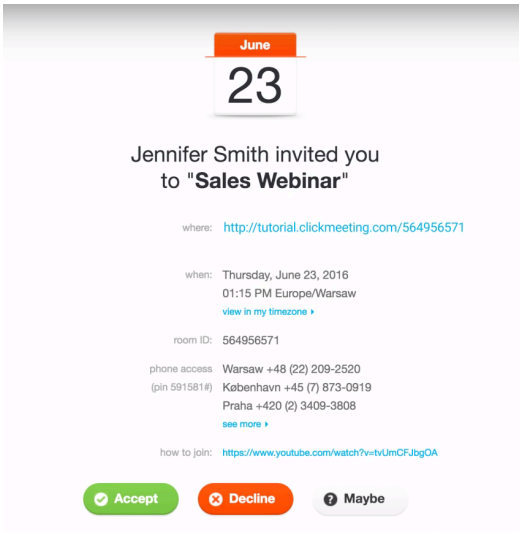
Before the Conference

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 by **Saturday January 21st, 2017** 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.

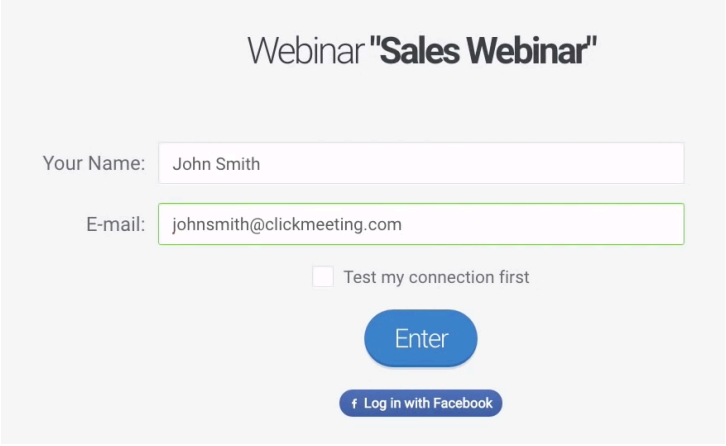
Joining the Conference

1. All registrants (**participants & presenters**) will receive an invitation via e-mail by **Saturday January 21st, 2017** 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.

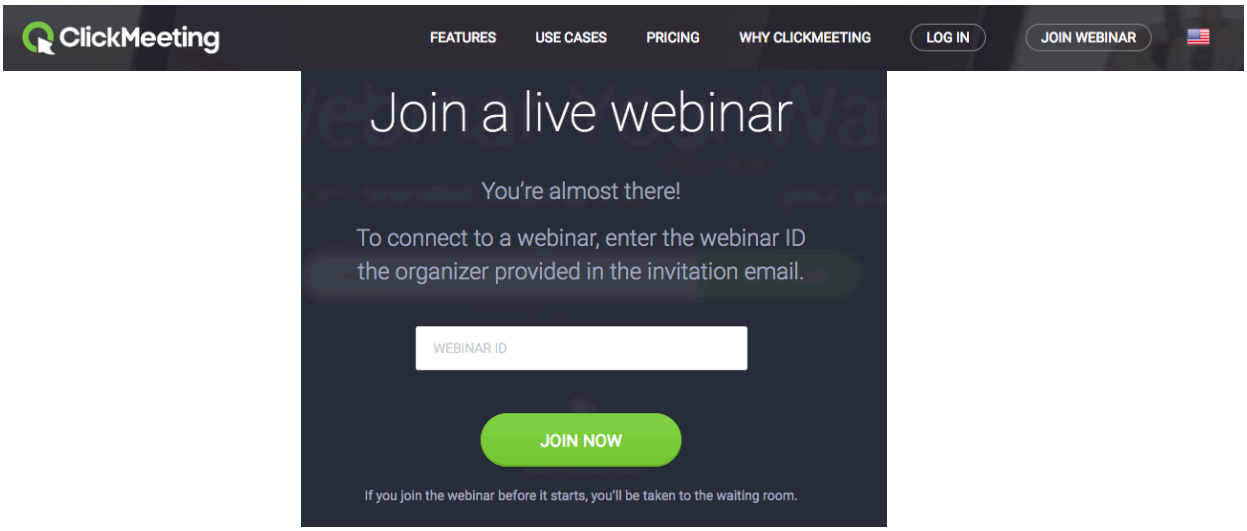


4. Alternatively, you may choose to login via your Facebook account.

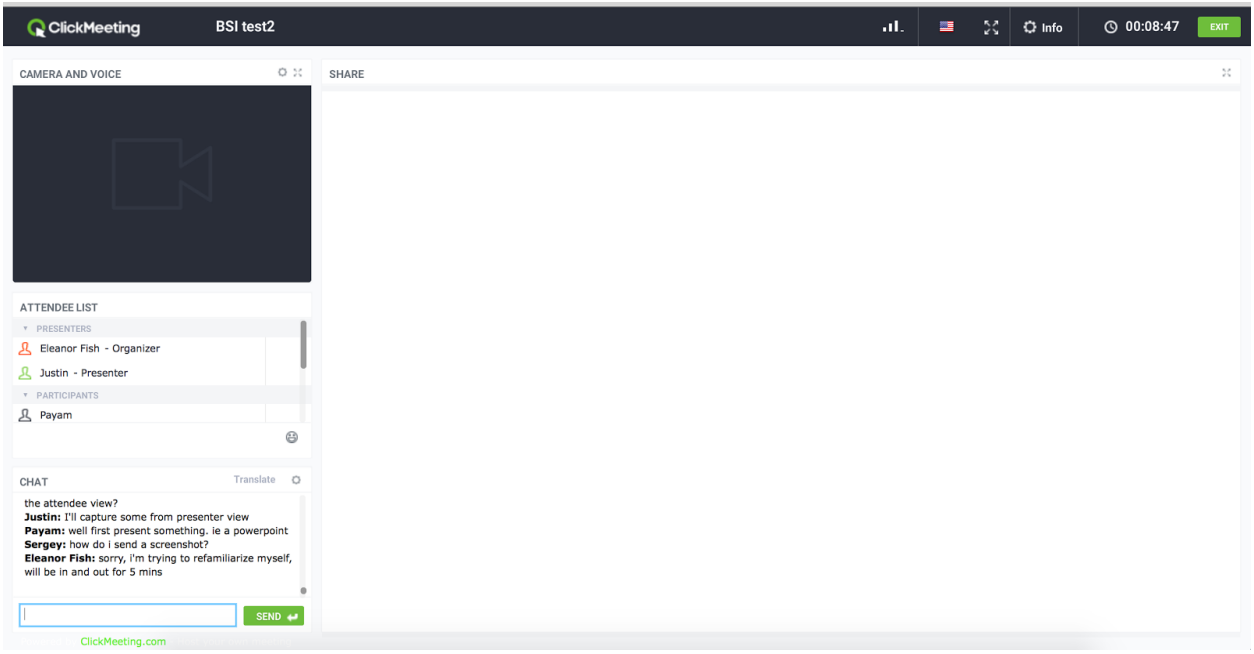
5. For further clarification on the previous three steps, please view the following Youtube video that illustrates the login procedure: https://www.youtube.com/watch?v=N5fp1G4BuZ4

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:

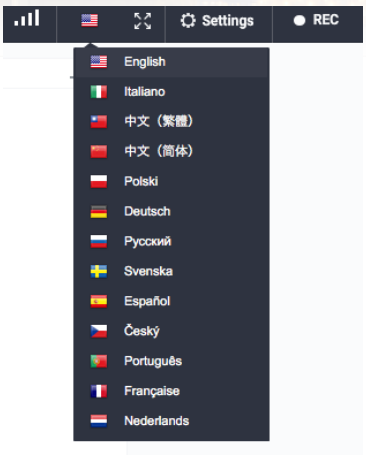


Instructions for Conference Participants

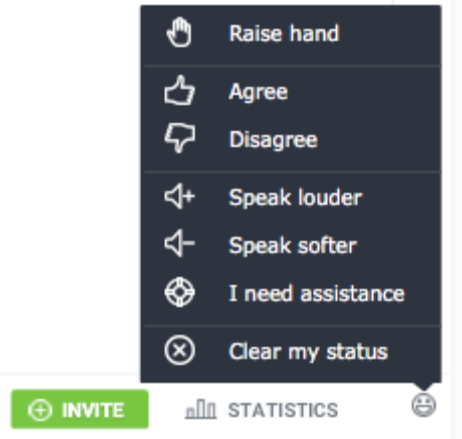
During the Conference

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.

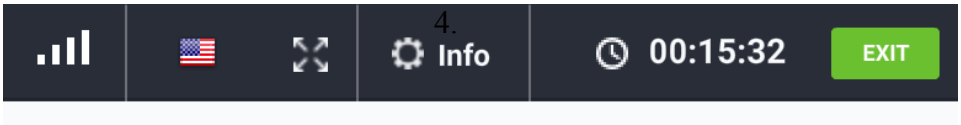
2. The interface language may be toggled by clicking the *flag icon* and choosing a language from the resultant drop-down menu. Note, however, that English will be the primary conversational language in the chat and of the presentations.



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

2ND INTERNATIONAL REMOTE CONFERENCE: SCIENCE & SOCIETY

PRESENTER ABSTRACTS

SS1-1: Global Health

Timeslot: 7:55 – 8:10am

Presenter: Christopher Owino
Institution: Moi University, School of Medicine, Kenya.
Co-Authors: Teresia Lotodo, Moi University & Department of Hematology, School of Medicine, Kenya.

Unusually Late Diagnosis Of Sickle Cell Anaemia: The Ramifications Of Sustained Inaction In Kenya

It is approximated that over 80% of Sickle cell births per year are in low and middle income countries with sub-Saharan Africa bearing the most burden as it accounts for over 75% of these yearly. Even within countries such as Kenya, the poorest in the population bear the greatest burden of the disease due to lack of access to early diagnostic services and active follow up including prophylactic treatment which has been shown to reduce morbidity and mortality significantly. Local tribes in Western Kenya have been shown to have the highest prevalence of sickle cell anemia. Anecdotal evidence reveals that laboratory services necessary for definitive diagnosis of sickle cell anemia are few and far between in the public hospitals with newborn screening programs not available outside limited research settings. Even though childhood mortality is declining, sickle cell disease remains a significant cause of childhood deaths contributing to up to 6% of childhood deaths in some parts of Kenya. A case of a 24 year old Kenyan, Luhyia male who presented with acute chest syndrome and cholelithiasis is described. He is reported to have been receiving symptomatic treatment for the last 17 years without a diagnosis of sickle cell anemia ever being made. This case highlights the unforgiving consequences of late diagnosis of sickle cell anemia in low resource settings. Literature is reviewed to support the call for action to prioritize new born screening and active follow up of sickle cell disease in high disease burden areas in Kenya.

SS1-2: Global Health

Timeslot: 8:15 – 8:30am

Presenter: Anastasiya Muntyanu
Institution: University of Ottawa School of Medicine, Ottawa, Canada.
Co-Authors: Danusha Jebanesan, Peter Kuling

University of Ottawa
[1]National Laboratory for HIV Immunology, National Microbiology Laboratory, Winnipeg, MB, Canada.
[2]Department of Biology, University of Winnipeg, MB, Canada.

Choosing Wisely - A global initiative addressing resource stewardship inn medicine

Background/Aim: Resource stewardship plays a vital role in delivering high-quality and cost-effective medical care. Unnecessary testing is not only detrimental to the healthcare system, but could also cause significant harm to patients. Currently, there more and more countries joining the international campaign in order to address the issue of overuse in healthcare. Studies have shown that a third of the medical care accounts for unnecessary testing that removes resources from the system and can cause harm to the patients. The Choosing Wisely Campaign was launched in 2012 in the United States to focus on shifting the "more is better" culture of medicine by creating lists and tools available to doctors in different specialties. Many countries globally including Netherlands, England, Japan, Australia, New Zealand, Germany, Italy, Switzerland, Wales and Denmark have since joined the movement. The campaign was divided into three groups including the patients, physicians, and medical students to address the three key stakeholders in healthcare. By encouraging medical students to start thinking critically about ordering tests and treatments early on in their education, they will then be better equipped to address these issues as practicing physicians in the future. Currently, there is limited teaching in the undergraduate curriculum in Canadian medical schools addressing resource stewardship. The objective of this study was to assess the current baseline knowledge among pre-clerkship students at the one of the Canadian Medical Schools, University of Ottawa, to get an insight on what is currently being taught and what strategies would be most effective in addressing these concepts. The experiences outlined here can then be applied to other schools looking to implement change in the curriculum.

Methods: A needs-based assessment survey was conducted among pre-clerkship medical students (first and second year). The survey consisted of 35 questions spread over the following categories: attitude regarding costs of care and decision-making based on cost and patient safety, medical charges in Ontario, patient safety in Ontario, and medical school curriculum. Students were asked not to consult any external resources in order to assess their current level.

Results: Among the 115 medical students that completed the survey, 46.2% indicated that they had no exposure to costs-of-care teaching at any point in their education. In terms of attitudes regarding cost-conscious and patient-safety decision-making, over 80% of students agreed that all physicians, residents, and medical students should be familiar with the concepts. Interestingly, 81.3% reported that they are not prepared to engage in cost-conscious decision-making conversation with patients. When provided with scenarios on ordering specific tests, the answers indicated a severe lack of knowledge in the current guidelines. Despite this, 93.7% agreed that it is important to learn about cost-conscious decision-making in medical school.

Conclusion: In this study students identified limitations in their knowledge and the need for teaching in the curriculum to promote critical thinking about tests/treatments early on in their careers whereby reducing unnecessary testing and promoting patient safety. As a result, the Faculty will focus on incorporating further discussion through Case-Based-Learning.

SS1-3: Global Health

Timeslot: 8:35 – 8:50am

Presenter: Ivan Sserwadda
Institution: Department of Medical Microbiology, International Health Sciences University, Kampala, Uganda.
Co-Authors: Mathew Lukenge[1], Bashir Mwambi[1], Gerald Mboowa[2], Apollo Walusimbi[1] and Farouk Segujja[1,3]

[1]Department of Medical Microbiology, International Health Sciences University, P.O.Box 7782, Kampala, Uganda
[2]Department of Medical Microbiology, College of Health Sciences, Makerere University P.O.Box 7072, Kampala, Uganda
[3]Department of Bimolecular Resources, College of Veterinary Medicine, Animal Resources and Biosecurity, Makerere University P.O.Box 7062, Kampala, Uganda

Microbial Contaminants Isolated From Items And Work Surfaces In The Post-Operative Ward At Kawolo General Hospital, Uganda

Aims: The study was conducted to assess the common microbial organisms present on the medical fomites and their respective antimicrobial susceptibility patterns Study design: Cross-sectional and laboratory based. Place and Duration of Study: The post-operative surgical ward at Kawolo General Hospital was the site of the study performed between June – December, 2015. Methodology: A total 138 samples were collected during the study from Kawolo hospital. Swab samples were collected from various work surfaces and fomites which consisted of; beds, sink taps, infusion stands, switches, work tables and scissors. Cultures were done and the susceptibility patterns of the isolates were determined using Kirby Bauer disc diffusion method. Data was analyzed using Stata 13 and Microsoft Excel 2013 packages.

Results: A total of 44.2 % (61/138) of the collected swab specimens represented the overall bacterial contamination of the sampled articles. Staphylococcus aureus and Klebsiella pneumoniae accounted for the highest bacterial contaminants constituting of 75.4% (46/61) and 11.5% (7/61) respectively. Infusion stands and patient beds were found to have the highest bacterial contamination levels both constituting 19.67% (12/61). The highest degree of transmission of organisms to patients was found to be statistically significant for patient beds with OR: 20.1 and P-value $8X10^{-4}$. Vancomycin, ceftriaxone and ciprofloxacin were the most effective antibiotics with 100%, 80% and 80% sensitivity patterns among the isolates respectively. Multi-drug resistant (MDR) Staphylococcus aureus accounted for 52% (24/46) with 4% (1/24) classified as a possible extensively drug resistant (XDR) whereas Gram negative isolates had 27% (4/15) MDR strains out of which 50 %(2/4) were classified as possible pan-drug resistant (PDR).

Conclusion: The high prevalence of bacterial contaminants in the hospital work environment, is an indicator of poor or ineffective decontamination. The study findings reiterate the necessity to formulate drug usage policies and re-examine effectiveness of decontamination and sterilization practices within Kawolo Hospital. We also recommend installation of a sound Microbiology unit at the hospital to take on susceptibility testing to check on the empirical use of antibiotics as a way of reducing the rampant elevations in drug resistances.

SS1-4: Global Health

Timeslot: 8:55 – 9:10am

Presenter: Jessica Maria-Violanda Spagnolo & Marie-Claire Ishimo (co-presenters)
Institution: School of Public Health, IRSPUM, University of Montreal, Quebec, Canada
Co-Authors: François Champagne[1], Nicole Leduc[1], Lambert Farand[1], Myra Piat[2], Marc Laporta[3], Ann-Lise Guisset[4], Wahid Melki[5], Fatma Charfi[6]

[1]School of Public Health, IRSPUM, University of Montreal, Quebec, Canada; [2]Douglas Mental Health University Institute; McGill University, Montreal, Quebec, Canada; [3]McGill University; Montreal WHO-PAHO Collaborating Center for Research and Training in Mental Health, Montreal, Quebec, Canada.[4]World Health Organization, Geneva, Switzerland; [5]Razi Hospital; Faculty of Medicine, University of Tunis El-Manar, Tunis, Tunisia; [6]Mongi-Slim Hospital, La Marsa, Tunisia; Faculty of Medicine, University of Tunis El-Manar, Tunis, Tunisia.

Reforms Of The Tunisian Healthcare System: Examples From The Field In Primary Care

Background: Tunisia, a middle-income country of northern Africa, has undergone efforts to reform the primary healthcare system. The goals of these reforms are to provide effective and proximity healthcare services, despite the limited resources in the country.
Aims: This discussion aims to describe 2 primary healthcare system reform projects. The first, presented by Ms. Jessica Spagnolo and colleagues (project A), seeks to describe the implementation process of a mental health training offered to general practitioners (GPs) working at the level of primary care, as well as preliminary results on its effectiveness. The second, presented by Ms. Marie-Claire Ishimo and colleagues (project B), seeks to identify factors that have contributed to the successes and challenges of implementing, scaling-up, and sustaining the Development Program of Health Districts (DPHD). This program aims to develop health districts in Tunisia, in order to aid in the management of population health, as well as ensure coordination within and between all levels of the healthcare system.

Methods: Project A relied on a randomized controlled trial to evaluate the implemented mental health training. In total, 132 GPs were randomized to either the intervention (i.e., exposed to a training based on the Mental Health Gap Action Programme Intervention Guide) or the control (i.e., exposed to the training post-research) groups. These groups were administered pre-and post-training questionnaires targeting clinical practice. In addition, trained GPs were interviewed in order to identify successes and challenges to the implementation of the training, and knowledge uptake. Quantitative data was analysed using SPSS (version 24), and qualitative data was analyzed using thematic analysis in QDA-Miner software (version 4.1.27). Project B relied on a case study design with 4 levels of analysis (contextual, organizational, individual and type of change introduced). Data was collected by interviews, observations, and review of the gray literature/field notes. In total, 15 interviews were conducted, followed by a 10-day observation period. Interviews were analyzed using thematic analysis in QDA-Miner software (4.1.27 version). Observations were analyzed using the observation guide designed for the study.

Results: Project A found that the training was effective in improving GPs' clinical practice. However, preliminary results from the interviews suggest that these improvements may not be sustained due to organizational and systemic deficits (i.e., lack and uneven distribution of psychotropic medication; lack of supervision; limited time to dedicate to mental illness in practice). Project B uncovered successes (i.e., relevance of the project, historical and legal context, skills of support teams) and challenges (political environment, changing context, bureaucracy, low operational management and communication, insufficient resources, lack of training in primary healthcare, low motivation of stakeholders) when assessing the implementation, scale-up and sustainability of the DPHD.

Conclusions and Future Implications: Projects A and B highlight the importance of context and adaptability in implementing and sustaining reforms targeting primary healthcare in Tunisia. Given that reforms within the Tunisian healthcare system are widespread, especially at the level of primary care, results generated from these 2 examples can be used to understand the successes and challenges of past, current, and future reform projects.

SS2-1: Global Health

Timeslot: 10:25 – 10:40am
Presenter: Daniel Udenwobele
Institution: University of Winnipeg, Department of Biology, Winnipeg, Canada.
Co-Authors: Ruey-Chyi Su[1], Anuraag Shrivastav[2]

[1]National Laboratory for HIV Immunology, National Microbiology Laboratory, Winnipeg, MB, Canada.
[2]Department of Biology, University of Winnipeg, MB, Canada.

The Expression Analysis of N-Myristoyltransferase (NMT) Isozymes in the Pumwani Commercial Sex Worker Cohort, Nairobi, Kenya

Background and Aim: Protein N-myristoylation refers to the covalent attachment of myristate, a 14 carbon saturated fatty acid, to the N-terminal glycine residue of various mammalian and viral proteins catalyzed by N-myristoyltransferase (NMT). A single gene encodes NMT in lower eukaryotes whereas in humans NMT is encoded by two genes: NMT1 and NMT2. N-myristoylation ensures that signaling molecules co-localizes with its effector molecules. For example, during T cell receptor signaling (TCR), NMT targets Lck to the cytoplasmic tail of CD4 surface receptor. Also, during HIV pathogenesis, NMT localizes HIV virulent factors: gag and nef to the plasma membrane to facilitate virion assembly and infectivity. Since, HIV infects predominantly activated T cells with a consequent impaired immune response; we examined the expression of NMT isozymes in HIV infected patients to test the hypothesis that HIV impairs T cell activation by reducing the levels of NMT isozymes.

Methods: The study population was randomly selected from the Pumwani Sex Worker Cohort, Nairobi Kenya. Protein expression was analyzed by western blot. Statistical analysis was performed using Mann-Whitney U Test. Differences were considered to be significant if $P<0.05$.

Results: We observed down regulation of NMT1 ($P<0.0001$) and NMT2 ($P=0.0069$) in the ex vivo unstimulated PBMCs of HIV infected patients (n=39) relative to age matched HIV uninfected individuals (n=15). There was also considerable downregulation of p-Akt (Thr308) ($P=0.0036$), p-Akt (Ser473) ($P=0.0119$) and p-ScY527 ($P<0.001$) in HIV infected patients compared to HIV uninfected individuals. Also, when CD3+ T cells were stimulated with anti CD3/CD28 monoclonal antibody, NMT1 but not NMT2 was found to be the important NMT during TCR signaling.

Conclusion and Possible Implication: We report here for the first time alteration in NMT1 expression during T cell activation and down-regulation of NMT isozymes in PBMC of HIV infected individuals; this suggests a possible mechanism used by either the host or HIV to reduce active HIV infection to a latent HIV infection. Our data demonstrate differential expression of NMT isozymes during T cell activation. This differential expression can be exploited in the design of NMT specific inhibitors as part of antiretroviral therapy.

SS2-2: Global Health

Timeslot: 10:45–11:00am

Presenter: Emilia Surzyn
Institution: Poznan University of Medical Sciences, Poznan, Poland
Co-Authors: Dawid Szpecht, Katarzyna Wiak, Anna Braszak, Marta Szymankiewicz, Janusz Gadzinowski

Neonatal Intensive Care Unit in the Department of Neonatology University of Medical Sciences, Poznan, Poland

Risk Factors Of Periventricular Leukomalacia In Singleton Infants Born From 23 To 26 Weeks' Gestation

Introduction: Periventricular leukomalacia (PVL) is one of the most common hypoxic-ischemic pathologies among preterm newborns. The bracket most vulnerable to PVL is newborns born before 34 weeks' gestation, especially those with very low and extremely low birth weights. In a population of very low birth weight newborns, the frequency of periventricular white matter injury (PWMI) including PVL is 5-15%. Currently, there are not enough studies that have determined the risk factors or procedures to prevent the occurrence of this pathology. The aim of our study was to verify the potential risk factors of the occurrence of PVL among infants born between 23-26 weeks' gestation.

Methods: The retrospective study included a group of 115 unrelated infants born between 23 and 26 week's gestation, hospitalized in the Neonatal Intensive Care in the Department of Neonatology University of Medical Sciences in 2010-2014, born in the clinic or transported to it after birth in the hospital of lower references. The diagnosis of PVL was based on transcranial ultrasound.

Results: PVL was diagnosed in 5 (29.4%) infants born from 23 to 24 weeks' gestation and 12 (70.6%) born from 25 to 26 weeks gestation. Higher incidence of PVL was found among infants born outside tertiary hospital and newborns diagnosed with III and IV intraventricular hemorrhage (IVH)

Conclusions: Delivery in the third-level hospital as well as IVH prevention significantly reduces the risk of PVL. Well-developed prenatal care, fetus transport in utero and delivery in the third-level hospital seem to be crucial in the prevention of this pathology.

SS2-3: Global Health

Timeslot: 11:05–11:20am

Presenter: Angela Zhou
Institution: University of Toronto, Department of Immunology, Toronto, Canada.
Co-Authors: Lisa E. Wagar, Michael E. Wortzman, and Tania H. Watts

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Intrinsic 4-1bb Signals Are Indispensable For The Establishment Of An Influenza-Specific Tissue-Resident Memory Cd8 T Cell Population In The Lung

The induction of long-lived heterotypic T cell protection against influenza virus remains elusive, despite the conservation of T cell epitopes. T cell protection against influenza is critically dependent on lung-resident memory T cells (Trm). Here we show that intranasal administration of 4-1BBL along with influenza nucleoprotein (NP) in a replication-defective adenovirus vector to influenza pre-immune mice induces a remarkably stable circulating effector memory (Tem) CD8 T cell population characterized by higher IL-7Rα expression than control-boosted T cells, as well as a substantial lung parenchymal CD69+ CD8 Trm population including both CD103+ and CD103- cells. These T cell responses persist to greater than 200 days post-boost and protect against lethal influenza challenge in aged (year old) mice. The expansion of the NP-specific CD8 Trm population during boosting involves recruitment of circulating antigen-specific cells and is critically dependent on local rather than systemic administration of 4-1BBL as well as on 4-1BB on the CD8 T cells. Moreover, during primary influenza infection of mixed bone marrow chimeras, 4-1BB-deficient T cells fail to contribute to ¬the lung-resident Trm population. These findings establish both endogenous and supraphysiological 4-1BBL as a critical regulator of lung-resident memory CD8 T cells during influenza infection.

SS2-4: Global Health

Timeslot: 11:25–11:40am

Presenter: Fatima Thiombiano
Institution: Centre National de Recherche et de Formation sur le Paludisme,Laboratoire d'Immuno-Parasitologie,Ouagadougou, Burkina Faso.
Co-Authors: Guillaume Sanou, Mireille Ouedraogo, Aboubacar Coulibaly, Moise Kabore, Maurice Ouattara, Amidou Diarra, Yves Traoré, Sodiomon B Sirima, Issa Nébié

Centre National de Recherche et de Formation sur le Paludisme

Assessment of Antibodies Response Against Malaria Infection After Treatment with ACT in Children and Adults Living in Malaria Hyperendemic Area of Burkina Faso

Introduction: Artemisinin-based Combination Therapies (ACTs) are the first line drug for the treatment of uncomplicated malaria in most malaria endemic countries. They quickly clear the parasitaemia and reduce fever. In animal model, it has been found that artemisinin derivatives have an immunosuppressive effect.

Aim: In the present study we assessed the effect of ACTs on malaria antigens specific antibodies production in a population living in malaria hyperendemic area.

Methods: In 2012, patients aged over 6 months and adults, presenting uncomplicated malaria were recruited and allocated to receive ACTs and follow up to 2 years. Antibodies titers against three P.falciparum blood stage antigens (MSP3, GLURP R0, and GLURP R2) were measured by ELISA before treatment and twenty eight days after treatment during the first and subsequent uncomplicated malaria episodes.

Results: In total 471 volunteers were recruited for antibody measurement. Antibody levels were always high Twenty eight days after the initiation of the treatment for all tested antigens but not significant. Further against MSP3, young subject (< 5 years old) produced more antibodies after treatment (P= 0.05). Subsequent malaria episodes seems to increase antibody level when we compare consecutive episodes for GLURP-R0 antigen (0.001< P<0.0000003)

Conclusion: In human population naturally exposed to malaria with initiated and boosted immunological responses, the Artemisinin-based Combination Therapies have no immunosuppressive effect.

Implications: ACTs seem not to have immunosuppressive effect.

SS3-1: Cancer

Timeslot: 7:40 – 7:55am

Presenter: Aileen Gracias
Institution: Karolinska Institute, Sweden
Co-Author: Bianca Migliori[1], Edel Kavanagh[1], Marcus Bäck[2], Peter Nilsson[2], Bertrand Joseph[1] and Ola Hermason[1]

[1]Karolinska Institute, Department of Neuroscience, Stockholm, Sweden
[2]Linköping University, Linköping, Sweden

Mechanism of Transport and Intracellular Target of Gliostem: Novel Technology for Near-Immediate Detection of Glioblastoma-Derived Stem Cell-Like Cells

Glioblastoma multiforme (GBM) is one of the most aggressive brain tumor types. Despite being one of the most well studied nervous system tumors, the median survival has not increased significantly and is 14.8 months with the best possible treatment including surgery, chemotherapy and radiation. One of the reasons for this poor prognosis is believed to be the existence of cancer stem cells. The GBM-derived stem cell-like cells (GSCs) have features of tumor-initiating cells (TICS) and can self-renew, leading to tumor formation. Previous studies from our lab have introduced a luminescent conjugated oligothiophene (LCO) named p-HTMI that specifically detects rat embryonic neural stem cells and GSCs, but not adult neural stem cells, differentiated cells of any kind, or other stem or cancer cells. By mere application to the cell culture dish, p-HTMI labels in green more than 70% of the cells in populations of GSCs derived from three patients, within 10 minutes, a higher number when compared to CD133, a stem cell marker. The pHTMI labeled cells overlapped with the more promiscuous marker CD271 (NGF receptor). The detection of human GSCs with p-HTMI occurred without triggering apoptosis or necrosis. p-HTMI labeling was mostly cytoplasmic in embryonic neural stem cells as well as GSCs. Preliminary studies indicate an ER target of pHTMI. The side chain moiety is essential for its functionalization, and additional LCOs have been generated producing red fluorescence that currently is under verification for specificity and function. With regards to mechanism of uptake, our results indicated a passive uptake of p-HTMI that required an intact cell membrane, verified using different permeabilization techniques. Its specificity, sensitivity, ease of use and detection by fluorescence microscopy and FACS suggests its potential clinical use in surgery. We are currently performing in vivo studies to verify p-HTMI selectivity in GSCs when injected into NOD/SCID mice.

SS3-2: Cancer

Timeslot: 8:00 – 8:15am

Presenter: Marta Overchuk
Institution: University of Toronto, Institute of Biomaterials and Biomedical Engineering, Canada
Co-Author: Kara Harmatys[1], Juan Chen[1], Martin Pomper[2] and Gang Zheng[1]

[1]Princess Margaret Cancer Centre and Techna Institute, University Health Network, Toronto, ON
[2]Johns Hopkins School of Medicine, Baltimore, Maryland

Targeted Photodynamic Pre-Treatment as a Novel Strategy to Enhance Tumor Nanoparticle Accumulation

Purpose: Despite the initial promise, introduction of nanomedicines into clinical practice did not lead to the significantly improved treatment outcomes. Multiple studies demonstrate that only a small percentage of the nanoparticle injected dose is able to reach the tumor. High interstitial fluid pressure, poor blood perfusion and high cell packing density collectively impede nanoparticle extravasation and interstitial diffusion, negatively impacting their therapeutic potential. Therefore, a novel strategy that can locally alter tumor microenvironment and enhance nanoparticle delivery is in high demand.

Methods/Results: In the current work we are exploring the potential of targeted light-activated photosensitizers and laser pre-treatment to enhance nanoparticle delivery to the tumor. For this purpose, we selected two targeting strategies, directed against widely studied cancer biomarkers - folate receptor and prostate specific membrane antigen. Up to date, we demonstrated through fluorescence and photoacoustic in vivo imaging, that prostate-specific membrane antigen targeted photodynamic pre-treatment leads to faster (within 1h post injection) and more efficient accumulation of differently sized organic nanoparticles (20 and 100 nm), if compared to the untreated tumor. We are currently investigating the feasibility of folate receptor targeted photodynamic pre-treatment for the enhanced nanoparticle delivery.

Conclusions: Overall, state-of-the-art light delivery technologies enable access to a variety of solid tumors, while simple chemistry of the investigated photosensitizers make them appealing for clinical translation. Targeted photodynamic pre-treatment holds the potential to become a versatile and relatively simple tool for the enhancement of cancer nanochemotherapy.

SS3-3: Cancer

Timeslot: 8:20 – 8:35am

Presenter: Swarnendra Singh
Institution: All India Institute of Medical Sciences, New Delhi, India
Co-Author: Atif Zafar
Department of Biochemistry, Faculty of Life Sciences, Aligarh Muslim University, Uttar Pradesh, India

Anticancer Mechanism of a Soybean Derived Phytoestrogen Revealed by Development of an Innovative Study Model

Background: Phytoestrogens have attracted considerable interest as natural alternatives to hormone replacement therapy and are emerging as potential leads for cancer therapeutic agents. Among phytoestrogens; coumestrol, a phytoestrogen, derived from soybean, legumes, Brussels sprouts, and spinach, has shown has shown multiple pharmacological properties such as anti-inflammatory, neuroprotective, osteoblastic differentiation and anticancer. Though several studies have described anticancer effects of coumestrol, a clear underlying molecular mechanism has not been elucidated. Unlike normal cells, cancer cells contain elevated copper levels that play an integral role in angiogenesis. Copper is an important metal ion associated with the chromatin DNA, particularly with guanine. Thus, targeting copper in cancer cells can serve as effective anticancer strategy.
Aim: To explain the anticancer cytotoxic mechanism of coumestrol, with a controlled disturbance from numerous cancer contributing factors present in malignant cells.
Methods: We used normal cells and overloaded them with copper to mimic cancer cells having only this malignant property. Absorption and emission spectra of coumestrol were recorded using UV-VIS spectrophotometer and spectrofluorometer respectively. Thermodynamic parameters were measured using VP-ITC titration microcalorimeter. Lymphocytes were isolated using histopaque from heparinised blood samples of healthy donors. Lipid peroxidation and protein carbonylation studies were performed. Intracellular ROS generation were assessed using DCFH-DA and DHE probes and recorded by fluorescence microscopy. Cell viability was estimated by MTT assay. Comet assay was performed to quantify DNA damage and morphological changes were examined by scanning electron microscopy. Nuclear changes were captured and analyzed using fluorescent dye DAPI. Phosphatidyl serine externalization as a marker of apoptosis was quantified by FACS analysis of Annexin V-FITC/PI stained cells.
Results: UV-VIS spectroscopy results demonstrate a dose-dependent interaction of coumestrol with Cu(II) in the formed complex. The fluorescence quenching confirms the formation of a non-fluorescent complex between coumestrol and copper ions. Calculated negative Gibbs free energy of binding for coumestrol-Cu(II) complex indicates that the interaction of Cu(II) ions to coumestrol proceeds spontaneously. Further findings also demonstrate that coumestrol induced lipid peroxidation in the cell is mediated by interaction with intracellular copper and formation of reactive oxygen species. Quantitative ROS measurement confirmed the role of Cu(II) ions in the pro-oxidant action of coumestrol. Cell viability was suppressed significantly in coumestrol-Cu(II) treated cells. Comet assay demonstrated that coumestrol have induced cellular DNA damage in presence of Cu(II). Distinct morphological changes such as cell shrinkage, membrane blebbing and formation of “apoptotic bodies” were revealed by SEM photomicrographs. DAPI staining showed clear nuclear changes in lymphocytes by coumestrol-Cu(II) system. FACS analysis revealed that the exposure of lymphocytes to coumestrol in the presence of Cu(II) ions resulted in apoptotic cell death.
Conclusion: We propose an alternative copper-dependent and ROS-mediated mechanism for the cytotoxic action of coumestrol in cancer cells. In conclusion, this is the first report showing that coumestrol targets cellular copper to induce pro-oxidant death in malignant cells.
Implication: We believe that such a pro-oxidant cytotoxic mechanism better explains the anticancer activity of coumestrol. These findings would be useful to identify or synthesize new anticancer drugs with significant copper-chelating and pro-oxidant properties.

SS3-4: Cancer

Timeslot: 8:40 – 8:55am

Presenter: Felipe Silva Rodrigues
Institution: University of São Paulo, Brazil
Co-Author: Daniela Sanchez Bassères[1], Luiza Scalabrini[1] and Albert Baldwin[2]

[1]University of São Paulo, Department of Biochemistry, São Paulo, Brazil
[2]University of North Carolina at Chapel Hill.

IKKbeta Kinase as a Therapeutic Target for Lung Tumour-Initiating Cells Induced by the KRAS Oncogene

Lung cancer induced by oncogenic mutations of the KRAS GTPase is a very frequent disease, for which there are currently no effective therapies. Although these mutations are closely linked to oncogenesis, different approaches to inhibit RAS proteins directly have previously failed. Therefore, for better therapeutic targets for lung cancer to become available, it is necessary to identify the downstream pathways activated by KRAS, which are directly involved in the acquisition of important malignant properties. One of the most significant characteristics of malignant behavior is the acquisition of a cancer stem-like phenotype by tumour-initiating cells (TIC). TICs are defined as a subpopulation of self-renewing tumor cells able to initiate tumor formation and sustain tumour growth. They are also resistant to chemo- and radiotherapy and it is believed that they are responsible for tumour recurrence and metastatic dissemination. The development of new therapeutic approaches targeting these cells is essential for improving the efficacy of current antitumour therapies. Since KRAS is associated with the expansion and maintenance of a cancer stem cell phenotype, the aim of this project is to identify new therapeutic targets that contribute to the KRAS-induced cancer stem-like phenotype in the lung epithelium. We postulate that (1) IKKβ kinase promotes the cancer stem-like phenotype; and that (2) targeting IKKβ in KRAS-positive lung cell lines will reduce the number of TICs. This hypothesis was formulated on the basis of recent studies indicating that pharmacological inhibition of IKKβ reduces the number of mammary and prostate TICs, and that pharmacological inhibition of IKKβ activity in an animal model of KRAS-induced lung cancer decreased tumour growth, as well as prevented tumour progression to more advanced histological grades. To test these hypotheses we will use pharmacological and genetic approaches to inhibit IKKβ, and assess how IKKβ inhibition affects the number of TICs, the expression of cancer stem cell markers and the ability of purified TICs to form tumourspheres and to selfrenew in vitro. The rationale that drives this research project is that it is expected to elucidate the molecular mechanisms involved in the KRAS-induced maintenance and expansion of lung TICs, which are, in turn, important for tumour recurrence and metastatic spread. It is also expected that this project will contribute to the development of new therapeutic strategies for KRAS-induced lung cancer, as well as other KRAS-induced malignancies.

SS3-5: Cancer

Timeslot: 9:00 – 9:15am

Presenter: Jeremy Chad* & Samik Doshi*
Institution: University of Toronto, Faculty of Medicine and IHPME, Toronto, Canada.
Co-Authors: Karin Archer-Myles[2], Monika Krzyzanowska[2]

*Co-first authors
[1]Faculty of Medicine and IHPME, University of Toronto, Toronto, Canada
[2]Princess Margaret Cancer Centre, Toronto, Canada

Stakeholder Perspectives On The Use Of Telehealth To Improve Ambulatory Care For Chemotherapy Patients In A Large Urban Cancer Centre

Background: Chemotherapy outpatients are often left in vulnerable positions without direct access to their providers between appointments, which can lead to Emergency Department (ED) visits to address side effects. Improved use of telehealth has been postulated in the literature as a potential low-cost tool to manage this problem.

Aim: Our objective was to explore, as a case study, how telehealth can be optimized to provide better care to ambulatory chemotherapy patients.

Methods: This study was done at Princess Margaret Cancer Centre in Toronto. Semi-structured interviews (n = 21) were conducted to elicit a broad set of perspectives on the feasibility and constraints of implementing new telehealth measures in the breast cancer (BC) clinic. Interviewees included hospital administrators (n = 3), nurse managers (n = 4), BC nurses (n = 3), BC physicians (n = 2), one non-BC nurse, one pharmacist, BC patients (n = 4), and telehealth and technology experts (n = 3). Transcripts were reviewed separately by each author and themes were extracted using content analysis. Key learnings were established based on stakeholder agreement and theme novelty.

Results: Provider-initiated proactive calling of chemotherapy patients was felt to be the most valuable and feasible potential change according to all stakeholders. A number of key considerations emerged regarding the creation of a successful proactive calling system: 1) calls should address symptoms that are predictable, regimen-specific, and most likely to result in ED visits; 2) patients most likely to benefit are those beginning chemotherapy, starting new drugs, or fitting certain high-needs criteria; 3) structured call questionnaires can be valuable, but must be flexible to best meet patient needs; 4) the caller's expertise is more important than his or her familiarity with the patient; and 5) basic IT support systems are necessary for operationalization.

Conclusion: Simple telehealth initiatives such as proactive calls can improve outpatient care for chemotherapy patients, and may reduce ED burden. This study provides key principles that should guide development and implementation of proactive calling programs at cancer care institutions.

Implications: Numerous studies have demonstrated patient care benefits from the implementation of telehealth initiatives for chemotherapy patients. This study can be used by Cancer Centre Management Teams as a guide for developing proactive calling programs in their own institutions. It focuses on the fundamental principles that must be considered by any cancer care institution interested in setting up a proactive calling system, regardless of patient volume, geographic distribution, and human resources. Though specific implementation decisions will vary, the guiding principles will remain constant.

SS4-1: Chronic Diseases

Timeslot: 10:30–10:45 am

Presenter: Harriet Oshokoya
Institution: Obafemi Awolowo University, Department of Microbiolology, Ile-Ife, Osun State, Nigeria.
Co-Authors: O. Oluduro[1], O. O. Adewole[2]
[1]Department of Microbiology, Obafemi Awolowo University Ile-Ife, Osun State, Nigeria.
[2]Department of Medicine, Obafemi Awolowo University, Ile Ife, Osun State, Nigeria.

Interferon Gamma Response In Pulmonary Patients In Ile-Ife, Osun State, Nigeria

Background: Interferon gamma a key cytokine produced by a variety of cells is involved in the immune response against Mycobacterium tuberculosis (MTB). The prevalence and incidence of TB worldwide remains high. There is paucity of information on the levels of IFN-γ in patients with active TB and changes with treatment in our environment.
Objectives:
1. To determine serum level of IFN-γ in pulmonary TB patients as compared with apparently healthy individuals.
2. To determine the variations in IFN-γ levels with treatment, association between TB severity, sputum smear and IFN-γ
Methods: One hundred subjects were selected which included 50 active PTB patients and 50 matched controls. The patients were followed up for 4 months during treatment with anti-TB drugs. Levels of IFN-γ produced on stimulation with TB antigens were determined using ELISA at zero month and was repeated after 2 and 4 months of treatment. Results were analyzed using SPSS version 18. Level of significance was set at $p<0.05$. Regression analysis was used to determine predictive factors of baseline IFN-γ and its predictive role in determining treatment outcome.
Results: The result showed that the mean level of IFN-γ induced by TB antigens in patients was 1.45±1.02 IU/ml. Actual mean level of IFN-γ in TB patients was 1.41±1.02 IU/ml compared with 0.34±0.39 IU/ml in the control group ($p=0.001$). The mean level of IFN-γ decreased significantly from 1.41±1.02 IU/ml at baseline to 0.21±0.33 IU/ml at the fourth month of treatment ($p=0.001$). The baseline mean level of IFN-γ was lower in patients that converted to smear negative at 2 months of treatment (1.17±0.87 IU/ml) than in patients that failed to convert (2.08±1.15 IU/ml) ($p=0.0005$). A similar trend was observed after 4 months and in patients with high sputum grade. Positive correlation was observed between mean of baseline IFN-γ and sputum smear, sputum smear grade and TB severity. Baseline IFN-γ could not predict treatment outcome.
Conclusion: The study concluded that IFN-γ level was higher in TB patients than in the control group. There was a significant decline in IFN-γ level with anti-TB treatment. TB patients with higher level of stimulated IFN-γ had severe form of TB. It is established that significant higher amount of cytokine is released in the blood when stimulated. This has therefore justified the efficacy of the TB antigens in stimulation of IFN-γ.
Implications: Baseline IFN-γ level was predicted by HIV and smoking status of the patients but could not predict treatment outcome. The association between effector T-cell response and the antigen load suggests an association between the produced IFN-γ and the bacterial load in host. This might be useful in the evaluation of new anti-TB drugs, vaccines. The decrease in IFN-γ with treatment may be a useful marker to monitor response to treatment and effectiveness of anti-TB medications.

SS4-2: Chronic Diseases

Timeslot: 10:50– 11:05 am

Presenter: Mamneet (Sheena) Manghera
Institution: University of Manitoba, Department of Immunology, Winnipeg, Canada.
Co-Authors: Jennifer Ferguson-Parry[1], Rongtuan Lin[2], Renée N. Douville[1,3]

[1]Department of Biology, University of Winnipeg, Winnipeg, Manitoba, Canada
[2]Department of Medicine, Division of Experimental Medicine, McGill University, Montréal, Québec, Canada
[3]Department of Immunology, University of Manitoba, Winnipeg, Manitoba, Canada

Explaining the Unexplained: Neuronal Endogenous Retrovirus-K protein deposition in ALS

Background: Retroviral sequences, such as human endogenous retrovirus-K (ERVK), comprise over 8% of our DNA. Enhanced expression of ERVK proteins has been implicated in neuronal damage in Amyotrophic Lateral Sclerosis (ALS). However, mechanisms underlying ERVK protein deposition in ALS remain to be fully elucidated. We have recently shown that inflammatory stimuli, such as TNFα, can enhance neuronal ERVK protein levels, notably the reverse transcriptase (RT) enzyme, in patients with ALS. Nonetheless, neurons can degrade cellular and viral proteins via autophagy; since autophagy is disrupted in ALS, this may lead to chronic persistence of ERVK proteins in neurons. Autophagy dysfunction can also lead to neuronal accumulation of other proteins, notably TDP-43, in ALS. TDP-43 has been shown to enhance ERVK expression, but the effect of ALS-associated TDP-43 variants on ERVK protein deposition remains unclear.
Aims: First, we sought to determine whether autophagy is a homeostatic mechanism to clear ERVK proteins in vitro. Secondly, to validate our in vitro findings, we assessed the extent of autophagy and ERVK RT deposition in ex vivo autopsy brain tissue samples from patients with ALS and neuronormal controls. Lastly, we addressed whether accumulation of ALS-associated TDP-43 variants further modulates ERVK proteostasis in neurons.
Methods: Human astrocytic SVGA cells and ReNcell CX-derived human neurons were treated with TNFα and/or MG132, a proteasomal inhibitor and an autophagy enhancer. Western blot was used to assess ERVK RT and TDP-43 levels, as well as autophagic flux as indicated by cleavage of the autophagic marker LC3B I into LC3B II. Immunohistochemistry was performed on autopsy cortical brain tissue from neuronormal controls and individuals with ALS; confocal microscopy was used to assess the expression and cellular localization of ERVK RT and LC3B. SVGAs and neurons were also transfected with plasmids encoding wild-type and mutant TDP-43; western blot and confocal microscopy were used to evaluate the expression and cellular localization of ERVK RT and TDP-43
Results: We show that human astrocytes, but not neurons, degrade ERVK RT and TDP-43 deposits with TNFα and MG132 dual treatment. This correlates with an ongoing autophagic response indicated by cleavage of LC3B. Confocal microscopy of autopsy cortical brain tissue from individuals with ALS and controls revealed that ERVK-positive ALS neurons exhibit an ongoing but unsuccessful autophagic response. This is indicated by enhanced LC3B levels without complete formation of autophagic vesicles around ERVK RT foci. Further, we show that overexpression of ALS-associated mutant TDP-43 markedly enhances ERVK RT levels and aggregation in astrocytes and neurons.

Conclusion: Overall, autophagic dysfunction and TDP-43 misregulation in ALS can further exacerbate inflammation-driven neuronal ERVK protein deposition.

Implications: ALS therapeutics may benefit from anti-retroviral, immunomodulatory, or autophagy enhancing regimens to mitigate ERVK-mediated neuropathology.

SS4-3: Chronic Diseases

Timeslot: 11:10 – 11:25am

Presenter: Brett Vahkal
Institution: University of Winnipeg, Department of Biology, Winnipeg, Canada.
Co-Authors: Dr. Sara Good, University of Winnipeg, Department of Biology, Winnipeg, Canada.

INSL5 and RXFP4 In The Immune System

Background: INSL5 is a peptide hormone with primary sites of expression in human in the distal colon and hypothalamus, and secondary sites of expression in the thymus and reproductive organs (testis and ovary). Its cognate receptor, relaxin family peptide receptor 4 (RXFP4), is a G-protein coupled receptor (GPCR) closely related to other small-peptide hormone receptors involved in neuroendocrine functions. A variety of recent studies show that INSL5 influences glucose homeostasis and may play roles in appetite, satiety, glucose metabolism and/or hepatic gluconeogenesis, but the mechanisms of its action are currently debated. We hypothesize that INSL5 affects survival and/or development of T-cells in the thymus, by signaling through RXFP4. Moreover, since plasma levels of INSL5 have been shown to increase in the colon under conditions of low energy status, we hypothesize that INSL5 is involved in gut-immune axis signaling, via RXFP4, in response to energy status.

Methodology: INSL5 and RXFP4 RNA expression and protein presence in immune system tissues were measured in a cohort of C57BL/6 mice. Localization of INSL5 was confirmed in colon by immunohistochemistry. In vitro, whole spleen cell suspension was treated with variable concentrations of INSL5 to assess the effect on cell survival; and flow cytometry used to assess the proportion of T-cells expressing RXFP4 in response to treatment. To assess effects of INSL5 in vivo, nine C57BL/6 mice were intraperitoneally injected with 30ug/kg of INSL5 following fasting and levels of pro- and anti-inflammatory cytokines and metabolic peptides measured. The effect of INSL5 challenge on global expression of genes in thymus, spleen and colon was assayed using a microarray panel.

Results: INSL5 is expressed at low levels in thymus, spleen and bone marrow, but high levels in the colon. RXFP4 is highly expressed in thymus, spleen and bone marrow, but lower levels in colon. Western blotting exhibited a similar pattern of protein presence. Immunohistochemistry confirmed INSL5 presence in epithelial cells (L-cells) in the colon. Cell culture experiments on the effect of INSL5 on whole spleen cell survival are ongoing, and further analyses on RXFP4 presence are in progress.

Conclusions and future directions: The identification of INSL5 and RXFP4 in thymus suggests that this neuroendocrine hormone may play a role in T-cell development in the thymus, a finding supported by bioinformatic data mining that finds higher expression of INSL5 in double positive T-cells. Additionally, the ongoing in vivo experiment could elucidate whether INSL5 exerts a systemic pro- or anti-inflammatory effect on the immune system. Pending the data from in vitro and in vivo experiments, this research could uncover a novel feedback pathway in the gut-immune axis relating to feeding and immune system status. This could have implications for research of various chronic diseases, such as diabetes and inflammatory bowel disease.

SS4-4: Chronic Diseases

Timeslot: 11:30 – 11:45am

Presenter: Gloria Ingabire
Institution: Entebbe General Hospital, Uganda.
Co-Authors: Mpaka Peter, Entebbe General Hospital, Uganda

Case Study: of finding out The Effect of Anti-retroviral Therapy on Hematological Indices Affecting HIV Adults Attending Immunosuppression Clinic in Entebbe

Background: Cytopenias are the most common haematological abnormalities among HIV positive patients, a predictor from HIV infection to AIDS. Cytopenias have become more common with the advent of antiretroviral therapy and related treatments for HIV associated infections and malignancies. The use of antiretroviral therapy (ART) for management of patients infected with HIV has had a positive impact on growth, survival, and general wellbeing of children and adults in both resource-rich and resource-poor settings. Data from limited settings like Uganda about the effects of ART on haematological parameters are limited or non-existent in some health settings.

Objective: To assess the effects of different ART regimens on hematological indices among adult HIV positive patients attending ISS clinic at Entebbe General Hospital.

Methodology: This was a case control study conducted at the ISS clinic at Entebbe General Hospital. HIV positive adult patients on different ART regimens and on Septrin prophylaxis were randomly selected, had their blood samples collected for haematological tests. Descriptive statistics using SPSS version 19 were used.

Results: A total of 307 HIV positive adults were enrolled in the study. The mean age of the participants was 33 years with a median age of 31 years. 53.1%(163/307) were married and 46.9%(144/307) single. 37.8%(116/307) were on Septrin prophylaxis while 62.2%(191/307) were on different ART regimens. Cytopenia was common among ART users than Septrin users with granulocytopenia being the most common form at 64.5%(198/307) especially among those on CBV/NVP regimen (37.9%). Thrombocytopenia was 7.5%(23/307) and common among participants on Septrin and CBV/NVP (47.8%) regimen, anaemia was 20.8%(64/307) and common among those on Septrin (33.3%) while 53.1%(163/307) had CD4 counts below 500cells/ml.

Conclusion: Cytopenias were common in the study and highly associated with CBV/NVP regimen, which indicated that the regimen was one factor for cytopenia. Therefore constant monitoring of cytopenia and early intervention may decrease the prevalence of cytopenias among HIV positive patients.

PRE-RECORDED PRESENTER ABSTRACTS

To Access: http://www.beyondsciences.org/video/

Session Topic: Global Health

Presenter: Nataliia Glibovytska
Institution: National Technical University of Oil and Gas, Ivano-Frankivsk, Ukraine

Emotional State of Students in Various Courses of Study

Background: Social and economic development of any country is primarily dependent on the health of the nation, especially mental. In terms of global urbanization, increased stress levels, environmental problems our attention is attracted to the issue of emotional state of students as an engine of social progress. The main stressors of modern youth life are physical and mental overloading, too high teacher's demands and low motivation to learning, fatigue and adverse lifestyle.

Methods: To investigate the mental health of students 644 people of 1-4 education courses were involved in Hans Eysenck Emotional Stability testing and Taylor Manifest Anxiety Scale test. There is a connection between stress level and under conditions of strong overloading on person's emotional sphere, for example during exams, speeches, when applying for a job. Thus our study was conducted in the middle of the semester, when there weren't exams and connected with them additional emotional pressure.

Results: The reducing of student's anxiety and neuroticism from 1 to 3 courses was discovered. Emotional stability was fixed at 50% of students of the first course, 79% - of the second course, 86% - of the third course. In the fourth year of study emotional stability is observed only in 36% of the students. There is a correlation between indicators of anxiety and emotional stability. The high level of anxiety was observed in 46% of first-year students, 21% of the second year students, 18% the third year students and 73% of the fourth year students.

Conclusions: High anxiety level of the first year students is associated with adaptation to new life conditions, and the fourth year students - with a choice between continuation of education and employment. High anxiety levels complicate cognitive activity, reduce efficiency, causing excessive emotional stress and contribute to low self-esteem of students. So to overcome this problem it is advisable to observe the following recommendations: to promote a comfortable emotional climate in the student group, not to disregard any student but form individual approach to him/her, to develop positive qualities of each student, raise self-esteem. Only in this case students can fully discover their talents, realize their potential and contribute to the development of certain public life spheres.

Session Topic: Global Health

Presenter: Sergey Yegorov
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Over-Diagnosis of Malaria: A Pilot Study from the Central Region of Uganda

Background: The malaria burden in sub-Saharan Africa (SSA) has fallen substantially. Nevertheless, malaria remains a serious health concern, and Uganda ranks third in SSA in total malaria burden. Epidemiological studies of adult malaria in Uganda are scarce and little is known about rates of malaria in non-pregnant adult women.

Aim: This pilot study assessed malaria prevalence among adult women from Wakiso district, historically a highly malaria endemic region.

Methods: Adult women using public health services were screened for malaria, HIV and pregnancy. A physician-selected subset of women presenting to the Outpatient Department of Entebbe General Hospital (EGH) with current fever (axillary temperature ≥37.5C) or self-reporting fever during the previous 24 hours, and a positive thick smear for malaria in the EGH laboratory were enrolled (n=86). Women who self-identified as pregnant or HIV-positive were excluded from screening. Malaria infection was then assessed using HRP2/pLDH rapid diagnostic tests (RDTs) in all participants. Repeat microscopy and PCR were performed at a research laboratory for a subset of participants. In addition, 104 women without a history of fever were assessed for asymptomatic parasitemia using RDT, and a subset of these women screened for parasitemia using microscopy (40 women) and PCR (40 women).

Results: Of 86 women diagnosed with malaria by EGH, only two (2.3%) had malaria confirmed using RDT, subsequently identified as a Plasmodium falciparum infection by research microscopy and PCR. Subset analysis of hospital diagnosed RDT-negative participants detected one sub-microscopic infection with Plasmodium ovale. Compared to RDT, sensitivity, specificity and PPV of hospital LM were 100% (CI 19.8-100), 0 (CI 0-5.32) and 2.33 (CI 0.403-8.94) respectively. Compared to PCR, sensitivity, specificity and PPV of hospital LM were 100% (CI 31.0-100), 0 (CI 0-34.5) and 23.1 (CI 6.16-54.0), respectively. No malaria was detected among asymptomatic women using RDT, research microscopy or PCR.

Conclusion and Implications: Malaria prevalence among adult women appears to be low in Wakiso, but is masked by high rates of malaria overdiagnosis. More accurate malaria testing is urgently needed in public hospitals in this region to identify true causes of febrile illness and reduce unnecessary provision of anti-malarial therapy.

Session Topic: Global Health

Presenter: Pavanraj Chana
Institution: Moi University, Kenya
Co-Author: Atiyya Tul Munim, Lameck Orondo and Hamza Faruk

Moi University, College of Health Sciences, School of Medicine, Eldoret, Kenya

Injury-Related Mortality in Moi Teaching and Referral Hospital, Eldoret, Kenya: A Retrospective Descriptive Study

Background: Health is central within the 2030 Sustainable Development Goals (SDG) Agenda, with its nature highlighted in SDG 3. There are 13 targets believed to be critical in improving universal health coverage in this goal and injuries are among these targets. Injuries are a serious cause of morbidity, disability and mortality qualifying it as a public health problem. Injuries are the sixth leading cause of death and represent nine percent of global mortality- 1.7 times more than HIV/AIDS, tuberculosis and malaria combined. Injury-related mortality includes deaths from burns, road traffic injuries, violence, falls, poisoning, drowning. Deaths caused impact the economy and families of victims. Despite evidence of problem attention remains disproportionately low compared to infectious diseases.

Injuries are not evenly distributed– some people are just more vulnerable. Ninety percent of injury-related mortality occur in low and middle-income countries where health-care systems are least prepared and are overwhelmed by diseases. Kenya's development, accompanied with change in transport, housing and lifestyle, has been seen to influence exposure to injury. The current minimum health care package for Kenya has a component on injury care but suggestions on where interventions should be implemented requires adequate research.

Aims: To determine the burden, demographic characteristics and common causes of injury-related mortality in hospital catchment area.

Method: The study site will be Moi Teaching and Referral Hospital morgue: The hospital receives patients widely from the country and neighbouring regions. A retrospective descriptive cross-sectional strategy using systematic random sampling will be used to analyse data from 2014-2015 in the registry. Three hundred and eighty-four forensic cases will be assessed where every fifth record will be analysed.
A designed checklist will record desired variables. Causes of death will be classified accordingly to ICD-10 and data will be quantitatively analysed, tabulated and diagrammatically processed using a univariate and multivariate approach with Microsoft Excel.
A 100% accuracy rate is possible as trauma deaths must be subjected to postmortem examination.

Conclusion: By defining and understanding risk factors, perception and burden of injury it is hoped policymakers can construct evolved and appropriate strategies for effective management. The research could serve as a baseline for comparison and interventions. If the study is successful it could also act as a pilot study nationally and/or globally.

Implications: Better treatment of injuries could help achieve some of SDG3 targets and their linked goals. It could also help complete four goals in the concluded UN Millennium Development Goals, namely reduction of child mortality; gender equality with respect to health-care access; environmental sustainability by aiding country policies; and develop global partnership for development.
Public Health, Global Health, Pathology, Trauma, Injury, Research Proposal

Session Topic: Global Health

Presenter: Angalee Nadesalingam
Institution: University of Toronto, Trinity College, Toronto, Canada.
Co-Author: Edwin R. Chilvers

University of Cambridge, United Kingdom.

Neutrophil Extracellular Trap (NET) Degradation: the DNase Activity of *m. pneumoniae* and the Role of NET Fragments in Bacterial Killing

Neutrophils act as the body's first line of defense against pathogens invading tissues such as the lungs. Neutrophils utilize an arsenal of various potent defense mechanisms, including phagocytosis, reactive oxygen species (ROS) production and neutrophil extracellular trap (NET) formation (NETosis). NETs are networks of de-condensed chromatin released into the extracellular environment by activated neutrophils. Since the discovery of NETosis in 2004, research groups have been attempting to decipher the mechanisms of NETosis and the various functions of NETs. The current understanding is that the neutrophils release DNA-based NETs coated with granular proteins, which help trap and kill bacteria extracellularly. Despite the defensive immune role played by NETs, the extracellular DNA and cytotoxic granular proteins can also cause tissue and organ damage.

Mycoplasma are a genus of small bacteria (~0.1 μm length) that lack a cell wall and survive on vertebrate hosts. Mycoplasmas cannot produce their own purine or pyrimidine bases. Thus, they interfere with and degrade the DNA of their host in order to obtain these nucleotides that are essential for their DNA and RNA synthesis. Mycoplasmas are relevant bacteria in both healthcare and research settings. Mycoplasma pneumoniae is a critical strain that causes as many as 1 in 5 cases of community-acquired pneumonia.

Though mycoplasma biology has been studied for many decades, the relationships between NETs and mycoplasma are just beginning to be researched. The aim of my project was to elucidate the interaction between NETs and m. pneumoniae and m. orale. Further, I intended to characterize the role of NET fragments in killing bacteria.

The kinetics of the NET degradation were observed using UV-killed M. pneumoniae and M. orale over a 9-hour time period. The NET formation and degradation were observed through a fluorescence plate reader every hour using DNA intercalators Sytox Green and Picogreen. This time-course provides an understanding of the relevant multiplicity of infection (MOI) for increased NET formation and eventual degradation. The cells were fixed after 9 hours and imaged using confocal microscopy. In order to demonstrate the role of NET fragments in killing bacteria, colony counting was performed on agar plates.

These experiments revealed that NETs have a dual role to play in situations of infection. Kinetics and confocal images demonstrate that m. pneumoniae, but not m. orale, successfully degrades NETs over a course of 9 hours. However, at low MOIs neither are capable of inducing NET formation. In further experiments, I elucidated that small NET fragments cannot significantly kill bacteria such as e. coli. However, larger fragments or full size NETs can trap and kill e. coli. This is significant because it indicates that the tertiary structure, not just the NET-associated microbial proteins, of the NETs play a key role in bacterial killing.

In conclusion, this emerging field of NET research underlines the species-specific interactions between NETs and bacteria. The three bacteria, m. pneumoniae, m. orale, and e. coli interact differently with NETs. Thus, further research in this field can help understand these infections and their strategic interactions with neutrophils.

Session Topic: Global Health

Presenter: Pavanraj Chana
Institution: Moi University, Kenya
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Moi University, College of Health Sciences, School of Medicine, Eldoret, Kenya

Assessing Community Health in Sugoi, Kenya: A Community Based Education and Services Descriptive Study

Background: There is a growing concern about providing health care to communities in rural areas especially in Kenya where a majority are. Moi University College of Health Science's has responded to this challenge by developing an innovative programme called Community Based Education and Service (COBES), where a multidisciplinary group of students strive to evaluate the health needs of a community; identify their health seeking behaviour; learn appropriate disease prevention and control measures; and provide pertinent health services and education. This is all achieved by using a surrounding health centre as the entry point. COBES has given a hand to collaborate with local primary health care (PHC) programs by engaging four parties: institution, health care facilities, students and community. The institution is responsible for establishing objectives and sites for learning and participation; the health facilities liaise students with the community and provide resources for aid and learning; the students relate with program staff, participate in health centres, organize outreach activities to serve the community and write reports which are shared with local administration; and the community provide the environment, plans and participate in health program implementation. There are 20 stations students are allocated to in Western Kenya and this study is based on one.
Aim: To determine the burden, epidemiology and factors contributing to disease in the community. By defining these aspects, it is hoped policymakers can construct evolved strategies for management. Students are expected to practically study PHC and administrative structures of health centres before embarking to county and national hospitals.
Method: The research was conducted in Sugoi, Turbo sub-county and lasted 6 weeks. A descriptive cross-sectional design was used and the study was carried out in two sections: Community Entry and Community Diagnosis. Community Entry involved conducting interviews with chiefs and elders of proximal and recently inhabited villages, and focus group discussions using quota sampling of men, women and youth. Community Entry would help obtain unhindered qualitative information that would supplement community diagnosis.
Using probabilistic stratified sampling community diagnosis employed interviewer-based questionnaires, with parameters of PHC elements, to be filled by household heads so that quantitative data would also be obtained. A univariate data analysis approach was used. WHO-Anthro® was used to assess anthropometric data respectively.
Results: Malaria, water borne diseases, upper respiratory diseases and pneumonia were prevalent diseases reported by the community. Some of these could be linked to poverty, poor water protection, vector prevention and health seeking behaviour evidence discovered. HIV/AIDS awareness was favourable, possibly due to regular outreach, testing and counselling activities, but awareness on non-communicable diseases such as mental health and cancer was sorely poor.
Nutrition among children was fair: The tie-breaking weight-for-age index could rule malnutrition. There are several private and public dispensaries around but the health centre was preferred.
Conclusion: Health was seen to be improving in reference to 2014 county data. Disease diagnosis, immunization and sanitation advancement possibly accredited to county and country development.
Implication: COBES program managed to incorporate theoretical, clinical and field activities and suggested beneficial for the studied community.

Session Topic: Global Health

Presenter: Vatika Gupta
Institution: Jawaharlal Nehru University, India
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Functional Characterization of Two-Component System, BAS2108-BAS2109, of B. anthracis

Background: Bacillus anthracis (BA) is etiological agent of anthrax, a zoonotic disease which may be fatal for animals and humans. In the recent past, spores of BA was employed for bioterrorism, which makes it essential to understand the regulation of its pathogenic mechanisms. Pathogenesis of BA is generally attributed to the tripartite toxin and anti-phagocytic capsule. However, several other virulence factors like secretory proteases, membrane active molecules and nutrient acquisition molecules are also implicated in establishment and disease manifestation inside the host. The regulatory mechanisms governing the expression of these virulence factors in BA are not fully deciphered. In prokaryotes, two-component signal transduction systems (TCS) are part of the complex regulatory mechanisms governing gene expression. A TCS comprises of a sensor histidine kinase which responds to the environmental stimulus and its cognate response regulator which is generally a transcriptional regulator. An understanding of these mechanisms will provide a rational approach for the development of advanced therapeutic measures against anthrax.

Methods and Results: In the present study, BAS2108 (sensor kinase)-BAS2109 (response regulator), TCS from BA was functionally characterized. Their expression was found to be constitutive across all growth phases. qRT-PCR showed elevated expression under 5% carbon dioxide and nutrient limiting conditions and biofilm formation, suggesting its expression during conditions which mimic host milieu. Like most TCS, BAS2108-BAS2109 exist in an operon as observed in vitro by co-transcription analysis and their promoter region was mapped within 200bp upstream BAS2108 gene by 5`RACE. They exhibit conventional properties of TCS which is reflected by in vitro auto-phosphorylation of BAS2108 and subsequent phosphotransfer to BAS2109. Further, gel shift assay revealed binding of purified BAS2109 protein with promoter regions of different protease genes like neutral proteases, alkaline serine proteases of B. anthracis implicating role of this TCS pair in the regulation of proteases in BA.

Conclusion: Therefore, the results from the present investigation suggests a putative role of BAS2109 in regulating the expression of virulence factors especially the proteases of B. anthracis.
Infectious Disease Biology, Bio-threat destabilization

Session Topic: Global Health

Presenter: Padmanabhan Ramanujam
Institution: University of Toronto, Department of Immunology, Toronto, Canada
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Does Diphtheria-Tetanus-Acellular Pertussis Vaccination Affect Influenza Vaccine Immunogenicity in Elderly?

With the rise in aging population around the world, it is a greater priority in public health in maintaining healthy aging. However, increasing age leads to decline in the immune system that also contributes to inadequate vaccine responses and increased vulnerability to infectious diseases. It has been well studied in children that childhood vaccines have heterologous immunomodulatory non-specific effects in children beyond conferring vaccine-specific immunity. It has been previously reported that diphtheria-tetanus-whole-cell pertussis (DTwP) vaccination causes sex-specific suppression of innate and T cell responses in infants. However, such non-targeted heterologous effects of vaccines and their effects on the immune system have rarely been studied in elderly, but are of greater importance with the rise in aging population around the world. Using modern immunological tools, the current study will investigate the association between immune responses to diphtheria-tetanus-acellular pertussis (DTaP) and season influenza vaccine in the elderly in Australia. Findings from this current will lend information about how these vaccines interact and modulate immune responses in the elderly that can perhaps, aid in improving vaccine responses in the elderly with the ultimate goal of enhancing global health.

Session Topic: Global Health

Presenter: Jasty Singh
Institution: University of Toronto, Department of Immunology, Canada
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Evaluation of a Gene Therapy Strategy Based on Secreted Anti-HIV Proteins in Humanized Mice

Gene therapy for HIV infection serves as an alternative to antiretroviral drugs as it has the potential to provide long-term control of HIV replication via a single treatment. Current strategies render HIV target cells non-permissive for viral replication but clinical success is often limited due to low accumulation of gene-modified target cells in the patient. Modifying cells to secrete anti-HIV proteins that neutralize viral particles may not only protect gene-modified HIV target cells, but also unmodified target cells. Modeling of these therapies using humanized mice capable of recapitulating key aspects of the human immune system is therefore critical to the development and implementation of this approach. We have designed a lentiviral vector capable of secreting the anti-HIV protein soluble CD4 (sCD4), which binds to the HIV envelope and inhibits viral entry. Human CD34+ hematopoietic progenitor cells (HPCs) were transduced with sCD4-expressing or control lentiviral particles. Transduction of HPCs resulted in high levels of gene marking (25-30%). To investigate the in vivo potential of our approach, gene-modified and unmodified HPCs were injected into NOD/SCID/γcnull (NSG) mice. Preliminary findings showed that NSG hosts were capable of supporting multi-lineage differentiation from human gene-modified and unmodified CD34+ HPCs. Importantly, no major differences between lineage reconstitution by gene-modified and unmodified cells were apparent. Upon challenge with HIV-1 humanized mice capable of secreting sCD4 demonstrated maintenance and eventual reduction of HIV-1 viral load compared to control humanized mice. Our work provides support for continuous delivery of secreted anti-HIV proteins via gene therapy as a therapeutic alternative to antiretroviral drugs. We will further investigate the potential of covalently linked bi-or tri-functional fusion proteins that target the multiple steps of HIV entry.

Session Topic: Global Health

Presenter: Samuel Terkper Ahuno
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Killing Filarial Nematode Parasites: Role of Treatment Options and Host Immune Response

Background: There is compelling evidence that not only do anti-filarials significantly reduce larval forms, but that host immune responses also contribute to the clearance of filarial parasites; however, the underlying mechanisms have not been fully elucidated.

Main text: Filarial infections caused by Wuchereria bancrofti and Brugia species (lymphatic filariasis) and Onchocerca volvulus (onchocerciasis) affect almost 200 million individuals worldwide and pose major public health challenges in endemic regions. Indeed, the collective disability-adjusted life years for both infections is 3.3 million.

Infections with these thread-like nematodes are chronic and, although most individuals develop a regulated state, a portion develop severe forms of pathology. Mass drug administration (MDA) programmes on endemic populations focus on reducing prevalence of people with microfilariae, the worm's offspring in the blood, to less than 1 %. Although this has been successful in some areas, studies show that MDA will be required for longer than initially conceived.

Both cellular and humoral immune response are induced against filarial infections. IL-4, IL-5 and IgE production and eosinophilia in Th 2 response aids in fighting infections but some individuals develop chronic conditions (Sowda) in Oncho. NK cells and granulocytes such as neutrophils, eosinophils and basophils are believed to either promote protective immunity or even facilitate parasite establishment. Peripheral eosinophils counts may reach up to 75 % during filarial infections and can induce tropical pulmonary eosinophil (TPE) in W. bancrofti- and B. malayi-infected individuals. Alternatively activated macrophage (AAM) secrete cytokines, which regulate immune responses and facilitate tissue repair as well as support survival of filarial nematodes in the host via the release of IL-10 and transforming growth factor (TGF)-β consequently leading to immunosuppression.

Recent, studies in onchocerciasis showed a strong association of Th2 and Th17 responses in individuals presenting hyper-reactive onchocerciasis (HO) where such individuals were found to be presenting a reduced regulatory phenotype.

Conclusion: This paper highlights the mode of action of the various antifilarial treatment strategies and role of host immune response.

Session Topic: Global Health

Presenter: Alejandro Gomez
Institution: American School Foundation of Guadalajara A.C. Guadalajara, Mexico
Supervisor: Dr. Michael Hogan

American School Foundation of Guadalajara A.C. Guadalajara, Mexico

Mexico's Internationally Acclaimed Vaccination Program and its Major Flaws

Currently Mexico has one of the most effective vaccinations program worldwide. A recent case study conducted in Mexico with the purpose of determining the impact of the Universal Vaccination Program of the IMSS, Mexican Social Security Institute, between the years 2000-2012, resulted in the discovery that coverage rates for many vaccines exceed 95 percent. However, being close with some doctors and specialists in the the area of immunization, there seems to be a general consensus that such acclaimed immunization program in Mexico, especially in my hometown town of Guadalajara, is not necessarily covering all social classes equally. Therefore this paper sets to prove how government corruption, ineffective bureaucracy, geographical inaccessibility, and vaccine misinformation are some of the main causes that are obstructing accessibility to vaccines for Mexico's lower social classes. This paper also sets a complete overview of Mexico's current fractured health care system and how it is implicitly affecting the country's vaccination program. The goal of this research is to offer new insight about Mexico's vaccination system. The Mexican population should be aware that major inequality is still present and a lot of people are still struggling to get basic healthcare such as vaccines. Mexico has in fact an internationally acclaimed immunization program that has saved countless of lives, but I still believe that we can extend such success even more by finding new ways in making the program more accessible.
Most of the results and the conclusions made will be based from new data collected from interviews and surveys. All of the doctors that will be interviewed are certified doctors that are specialized or have some sort of connection to the immunization field and either work for Mexico's private or public healthcare sector.
Delimitations- Due to the nature of the topic and possible ethical boundaries, some questions might remain unanswered. All the information gathered will most likely be locally based, meaning that some might argue that claims made in this paper won't necessarily apply to other Mexican states. Still, questions asked will maintain a focus on general trends that can be more applicable to the whole country.

Session Topic: Global Health

Presenter: Anne Andermann
Institution: Department of Family Medicine, McGill University, Montreal, Canada

How Health Workers Can Take Action on Social Determinants of Health

BACKGROUND: Training health workers to address the social determinants of health is considered one of the key strategies for promoting more equitable health outcomes for patients, families and communities.

OBJECTIVE: To create a user-friendly, evidence-informed and easily adaptable clinical decision aid to help health workers address the social determinants of health in day-to-day practice.

METHODS: We used a mixed methods approach involving a realist review of the scientific literature and qualitative research with marginalized patients, health workers and community stakeholders to identify key domains for taking action on social determinants in clinical practice. Key informant interviews and a series of pilot studies were used to further refine earlier versions of the clinical decision aid, and to better understand barriers and facilitators for enhancing local adaptation and use in a wide variety of clinical settings.

RESULTS: The CLEAR toolkit helps health workers to: 1) Treat the presenting health problem, 2) Ask about underlying social challenges, 3) Refer to local support resources, and 4) Advocate for more supportive environments for health. Local adaptation is required to identify culturally appropriate ways of asking about potentially sensitive social issues, as well as creating a list of key referral resources available in the local setting. The local adaptation process fosters and strengthens partnerships between health workers and community-based support groups to improve patient care and promote intersectoral action among community leaders.

CONCLUSIONS: Health professionals can play an important role in supporting marginalized patients faced with complex health and social challenges, as well as being a catalyst for wider social change. The CLEAR toolkit is available free-of-charge in over a dozen languages (www.mcgill.ca/clear/download) and provides practical guidance for supporting frontline health workers in adopting a social determinants approach in routine clinical practice.

IMPLICATIONS: For more information, please visit:
http://www.cmaj.ca/content/early/2016/08/08/cmaj.160177/suppl/DC2

Session Topic: Global Health

Presenter: Avinash Kumar Singh
Institution: National Institute of Immunology, Cell Biology Lab-2, New Delhi, India
Co-Author: Dr. Rajendra Prasad Roy

National Institute of Immunology, New Delhi, India

Role of Sortases in Pathogenesis of Gram Positive Bacteria

Bacteria have complex cell envelopes that perform a wide range of functions. The cell surface proteins and pili are crucial for bacterial pathogenesis as they provide specific receptor-ligand interactions with the host tissue factors. In gram-positive bacteria anchoring of surface proteins to its cell wall is a common and conserved mechanism mediated by Sortase family of enzymes. Sortases are cysteine transpeptidases that catalyze the surface display and cell wall anchoring of proteins with Cell Wall Sorting Signal (CWSS) at their C-terminus. The CWSS consists of a consensus LPXTG type of pentapeptide recognition motif, a hydrophobic domain of 20 amino acids and a tail of positively charged amino acids. Sortase substrates function as adhesins, internalins, blood clotting and immune evasion factors, and transporters for nutrients across the microbial cell wall envelope; without them, most pathogens cannot sustain an infection. Sortase knockout mutants fail to display surface proteins and are defective in the establishment of infections without affecting microbial viability. Because of their key role in adhesion and exposure on the cell surface, targeting the Sortases is now being seen as a promising alternative approach for preventing and treating bacterial infections, one that may overcome their ever-increasing repertoires of resistance mechanisms. Sortases, because of their ability to generate C-C, C-N and N-N bonds, are also used as a tool to construct bioconjugates. Sortases have also shown a range of industrial applications such as peptide and protein labeling, protein-protein fusion, modification of antibodies, peptide and protein cyclization, protein immobilization, living cells labeling, protein purification, and many more. Enzymatic studies and characterization of very few sortases has been done. So we need to expand the available toolkit of sortases and enhance their potential applications.

Session Topic: Global Health

Presenter: Walusimbi Apollo
Institution: Kawolo General Hospital, Uganda
Co-Author: Mr. Mwambi Bashir

Kawolo General Hospital, Uganda

Methicillin Resistant Staphylococcus Aureus among patients on general wards at Kawolo General Hospital,Uganda

Aims: This study aimed at establishing the prevalence of Methicillin Resistant S. aureus among patients admitted in the general wards at Kawolo general hospital, Uganda.

Study design: A cross sectional, experimental laboratory based study was used.

Place and Duration of Study: The study was carried out at the department of microbiology of International Health Sciences University between March 2015 and April 2015.

Methodology: Samples were cultured on BA and MacConkey. Samples of interest were only those that grew S. aureus identified by a positive: gram reaction, catalase, coagulase, Dnase and fermentation of mannitol. Cefoxitin was used for identification of MRSA by disk diffusion method on MHA and drug sensitivities were done by Kirby Bauer method using organisms' suspension equivalent to 0.5 McFarland standard. Drugs set and their susceptibility were based on CLSI guidelines (2014) for S. aureus. Susceptibility results aided to define isolates as multidrug-resistant and extensively drug-resistant S. aureus using guidelines given by European centre for disease control.

Results: A total of 204 samples were collected. Samples that grew organisms were 182 (89.2%). Among growths, 102/182 (56.04%) were S. aureus among which 44/102 (43.14%) were MRSA while 58/102 (56.86%) were MSSA. Samples from the female, male, and the paediatric wards showed that 8/26 (30.77%), 26/50 (52%), 10/26 (38.46%) participants had MRSA respectively. Susceptibility testing showed S. aureus more susceptible to Vancomycin > Gentamycin > Clindamycin > Erythromycin > Penicillin G > Trimethoprim sulfamethoxazole. Against MRSA Vancomycin showed excellent performance with 100% sensitivity followed by gentamycin with a sensitivity of 24/44 (54.55%) but MRSA was a big predictor of gentamycin resistance (OR: 11.25, P-Value < 0.0001). A total of 92 (90.2%) S. aureus isolates were resistant to at least one antibiotic among which 46/92 (45.10%) isolates were MDR, while 14/92 (13.73%) isolates were possible XDR.

Conclusion: There is a high prevalence of MRSA in Kawolo general hospital. Vancomycin should be the drug of choice in empirical treatment of MRSA infections. Trimethoprim sulfamethoxazole and Penicillins should not be used in any presumed MRSA infection.

Session Topic: Chronic Diseases

Presenter: James Kiganda Lutaaya
Institution: International Health Sciences University, Kampala, Uganda
Co-Authors: Gloria Ingabire[1]; Oyet Caesar[2]

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Determination of Local Reference Values for Random Blood Glucose Levels in Young Adults at Victoria Medical Centre, Kampala, Uganda

Background: Clinical chemistry reference ranges vary due to factors such as sex, ethnicity, diet, climate, genetics, geographical location, analytical methods, sample type and analytical instruments. The aim of this study was to determine reference ranges for random glucose for healthy adults in Uganda. This was important in the diagnosis and treatment of diabetes and also provided more scientific knowledge on our local glucose reference ranges for further use by other scientists. The local glucose reference ranges were important to be established in our society as stated by the (IFCC, 2000) because this would help with the interpretation of locally obtained results.

Methodology: The study was cross sectional, blood samples were collected from healthy non fasting young adults aged 18 up to 39 years. Capillary blood samples were collected and analyzed using a glucometer. Urine samples collected to detect for glycosuria as exclusion criteria. Data was analyzed using STATA version 11 software and the Chi square test to study the significance.

Results: A total of 288 participants were enrolled in the study. The mean age of the participants was 29 years with a median age of 32 years. Of the male participants (62/142; 43.66%) had RBS in the range of 3.0 – 4.9 mmol/L, (66/142; 46.48%) had RBS in the range of 5.0 – 6.9 mmol/L and the rest had RBS of 7.0 – 8.9 mmol/L. Up to (84/146; 57.53%) of the female participants had their RBS ranging from 3.0 – 4.9 mmol/L, (36/146; 24.66%) had RBS from 5.0 – 6.9 mmol/L and the rest of the females had RBS ranging from 7.0 – 8.9 mmol/L. (1/74; 1.35%) of participants aged between 35 – 39 years had their RBS between 3.0 – 4.9mmol/L, (33/74; 44.59%) had their RBS between 5.0 – 6.9mmol/L and (40/74; 54.05%) had their RBS between 7.0 – 8.9mmol/L. This difference is statistically significant at p value < 0.05 (p value 0.0001).

Conclusion: The reference range obtained in the study was different from that quoted by WHO. This means our study population where characteristically different and required different reference range for glucose.

Session Topic: Chronic Diseases

Presenter: Kirtika Patel
Institution: Moi University, College of Health Sciences, Department of Immunology, Eldoret, Kenya.

The Diagnosis and Management of Oral Allergy Syndrome in a Resource Limited Setting

Background: This review emphasizes that in a resource limited setting, where there is unavailability of experts and allergy clinics in the primary setting, Oral allergy syndrome (OAS) or pollen food syndrome of an adult woman suffering from hay fever with raw melon allergy can be diagnosed using a three-stage structured tool by any health personal.

Aim: Provide a case driven presentation of the presenting features and diagnostic and management of Oral allergy syndrome (OAS) of an adult woman suffering from hay fever with raw melon allergy.

Method (Data sources): OvidSP Database was used to search for literature using the keywords oral allergy syndrome, OAS and oral pollen syndrome and EAACI.

Results: The diagnosis of OAS is often delayed due to its ubiquitous presentation. Symptoms include tingling, itching and swelling of the lips, tongue and throat as soon as the offending food is eaten in patients with allergic rhinitis. Diagnosis is made by history taking, skin prick, component testing and oral food challenge. Management involves removing the offending raw food from diet. Severe symptoms to be managed by adrenaline and immunotherapy.

Conclusion: OAS is an immediate IgE mediated food allergy syndrome and can be diagnosed by detailed history taking using the EACCI structured detailed questionnaire by any health personal. Awareness and knowledge of this condition is required to prevent misdiagnosis and repeated episodes.

Implication: Early diagnosis using the structured questionnaire and removal of the culprit raw food protein improves the outcome.
Immunology, Hypersensitivity, Hypersensitivity, Allergy.

Session Topic: Chronic Diseases

Presenter: Sanca Lilica Hulile
Institution: Bandin Health Project, Bissau, Guinea-Bissau
Co-Authors: Christian Golding[1], Christina Benn[1], Tobias R Kollmann[2] Nelly Amenyogbe[2],

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Impact of Birth Immunization on Immature-to-Total (I/T) Neutrophil Ratio on the First Day of Life

Background: The Immature-to-total (I/T) neutrophil ratio is used as an aid to help identify newborns with early-onset sepsis (EOS). The I/T ratio can be determined by using a Romanowsky stain and microscopic evaluation of blood films – a procedure requiring minimal equipment that can be easily employed in low-resource settings where more advanced diagnostic tests and blood culture are not readily available. While a high I/T ratio has sensitivities of over 80% for identifying EOS, specificity is poor (< 50%). It has not been evaluated whether birth immunization affects the I/T ratio. This could contribute to the low specificity of the test.
Objective: To determine if birth immunization with the BCG and OPV vaccines is associated with an altered I/T ratio in the newborn.
Design: This sub-study is part of a randomized-controlled trial evaluating the effect of immunizing with BCG and OPV vaccines at birth or hospital discharge on in-hospital mortality. The study is enrolling newborns admitted to the Nursery at Hospital National Simão Mendes (HNSM) in Bissau, Guinea-Bissau. One day after randomization (when only half of participants have received the vaccines), a blood sample is taken from each newborn to assess immune changes due to BCG and OPV immunization.
Methods: The I/T ratio will be available from newborns successively-sampled. Blood samples are collected from each newborn via capillary blood draw. A thin blood film is immediately prepared and the I/T ratio is determined using the May-Grunwald-Giemsa stain and microscopic analysis performed by a trained technician. The effect of BCG/OPV immunization on both I/T ratio determined by microscopy and absolute counts determined by flow cytometry will be evaluated using STATA statistical software and R software for statistical computing.
Results: From 10th April to 6th August, 2016 we collected 124 samples: 62 from newborns randomized to the vaccinated and 62 to the unvaccinated group. The baseline characteristics were similar in terms of sex, mother´s age, however we observed a tendency for more twins (11 versus 4, p=0.05) and lower birth weight (2,806 versus 3,029 gr; p=0.09) in the vaccinated group.
The mean number of immature neutrophils (Band cells + precursors) was 8.2 (standard deviation (sd)=5.3) and total neutrophils was 55.9 (sd=10.3) in the vaccinated group, and 8.1 (sd=4.9) and 55.9 (sd=11.4) respectively in the unvaccinated group. The mean I / T ratio of neutrophil count was 0.146 (sd=0.088) in the vaccinated and 0.15 (sd=0.094) in the unvaccinated group, and did not differ between the two groups (p= 0.76).
Conclusion: In our cohort of newborn infants, the Immature – to – total neutrophil ratio was not affected by birth vaccination with BCG. Thus, BCG vaccination does not affect the specificity of the I/T ratio as an indicator of early-onset neonatal sepsis.
I**mplications:** While the I/T ratio is an excellent test to identify infection, the specificity of this test is poor and they underlying reasons are not known. Our study revealed that while vaccination with a live vaccine can behave like a live infection, BCG vaccination does not affect the I/T ratio 24 hours after randomization.

Session Topic: Cancer

Presenter: Felipe Campos-de-Almeida
Institution: University of São Paulo, São Paulo, Brazil
Co-Authors: Henry Alonso Paico Montero[1], Melanie Maryanne[1], Daniel D. de Carvalho[2] Gustavo P. Amarante-Mendes[1]

[1] University of São Paulo, São Paulo, Brazil
[2] Princess Margaret Cancer Centre, University Health Network, and Department of Medical Biophysics, University of Toronto, Toronto, Canada

Evaluation of the *in vivo* Treatment With DNA Demethylating Agents on the Development and Effector Function of CD8 T Cells

Introduction: Cancer is a disease that begins when an altered cell starts to divide uncontrollably, invading tissues and impairing the function of a given system in the body. Importantly, cancer is the second leading cause of death worldwide. Thus, much attention has been given to better understand this disease and mainly to the immune response to cancer cells, leading to the development of new ways to treat patients. One of the most promising and novel targets refers to the epigenetic changes observed in cancer cells. The current belief is that DNA demethylating agents act by re-inducing the transcription of tumor suppressor genes otherwise silenced by epigenetic modifications. However, it has been recently demonstrated that DNA demethylation also induces the expression of endogenous dsRNA and the activation of antiviral pathways, a process named "viral mimicry". This process contributes to the activation of a long-lasting anti-tumor immune response. However, the impact of *in vivo* administration of DNA demethylation agents on CD8 T cell expansion, differentiation and function is still poorly understood.

Objective: Therefore, we aimed to investigate the effect of *in vivo* administration of DNA demethylating agents on the development and function of the effector CD8 T cells.

Methods: Mice were immunized with recombinant adenoviral vectors, capable of mounting a strong CD8 T cell response, and treated or not with 5-Azacytidine (0.2 mg/kg) in PBS, i.p. during 5-7 days after immunization. After different periods of time, we evaluated the frequency (ELISPOT) and function (*in vivo* cytotoxic assay) of antigen-specific CD8 T cells.

Results: We did not observe a significant difference between the experimental groups regarding the *in vivo* killing of targets by antigen-specific CD8 T cells. On the other hand, we found an increased frequency of the INFγ-producing antigen-specific CD8 T cells in the 5-AZA-treated group compared with the untreated animals ($P<0.01$).

Conclusion: The treatment with 5-Azacytidine seems to improve the expansion of antigen-specific CD8 T cells but this does not result in significantly enhancement of *in vivo* target cell elimination.

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Session Topic: Global Health

Presenter: North de Pencier
Institution: Western University, Schulich School of Medicine and Dentistry, London, Canada
Co-Author: Gerald McKinley,

Department of Pathology and Laboratory Medicine, department of Anthropology, Schulich Interfaculty Program in Public Health, Schulich School of Medicine and Dentistry, Western University, London, Canada

"The Usual Psychoses": Overdiagnosis of Mental Illness and Learning Disabilities at the Sioux Lookout Zone Hospital, 1969-1996

From 1969--1996, the University of Toronto ran a health program for the indigenous inhabitants of Sioux Lookout, Ontario. The Zone Hospital serviced 26 separate remote communities in Northwestern Ontario. Many of these communities continue to experience significant over--representations of developmental delays and challenges for youth. Physicians, psychologists and other health care providers travelled in shifts from Toronto to provide healthcare in this remote part of the province. This University of Toronto health program left a rich archive of primary sources that will be provide the subject matter for this research project.

The University of Toronto health program ran in years that Sioux Lookout was experiencing significant change. Indigenous people were within one or two generations of leaving their trap lines and moving on to reserves, while more children left home to attend high school in Southern Ontario. In the archive, physicians and psychologists write about the behavioural problems and language barriers that children face in school, and the challenge in this context of differentiating pathology from cultural difference. The physicians speculate about the causes of the high rates of developmental disabilities in the children of Sioux Lookout.

In 1971, Dr. W. G. Goldthorpe, the director of medical services in Sioux Lookout, wrote to a pediatrician colleague at Sick Kids Hospital in Toronto. He lamented, “I feel that we are not yet meeting a large reservoir of need for mental health service in the Zone [of Sioux Lookout]. My impression is that there is a large prevalence of depression (probably related to limited recreational, social, and work opportunities in the communities) as well as environmentally--induced retardation, alcohol abuse, and the usual psychoses.”(1)

I aim to analyze the healthcare providers’ responses to developmental disabilities in the children of Sioux Lookout, through the lens of the Social Determinants of Health. I will analyze how the rates and types of developmental disabilities that the providers see in the community changes across the span of the health intervention, and look for the causes that the physicians and psychologists cite. Through close reading of letters, notes from patient encounters and reports in the archive, I will make connections between language that the physicians use to describe developmental disabilities to the seismic changes in the indigenous communities of Sioux Lookout, using the template of the social determinants of health.

References

1. Goldthorpe W. G. Psychology Assessment Kasabonika. Toronto; 1971. Indigenous Health, Mental Health

Session Topic: Chronic Diseases

Presenter: Payam Zarin
Institution: University of Toronto and SRI, Department of Immunology, Toronto, Canada
Co-Authors: Payam Zarin[1], Edward Chen[1], Tracy S.H. In[1], Gladys W. Wong[1], Michele Anderson[1], Juan-Carlos Zúñiga-Pflücker[1], David Wiest[2]

[1] Department of Immunology, University of Toronto and Sunnybrook Research Institute, Toronto, ON, Canada
[2] Blood Cell Development and Cancer Keystone, Immune Cell Development and Host Defense Program, Fox Chase Cancer Center, Philadelphia, PA, USA

γδ T Cell Functional Programming by Environmental Cues

The thymic landscape provides an array of spatially and temporally controlled cues that guide the development of functionally distinct effector immune cells. Despite remaining an active area of research, the signals that give rise to different γδ T cell functional subtypes remain undefined. Given the ability of these cells to perform a wide range of tissue and disease specific functions, we set out to describe the signals necessary for the development of functional γδ T cell subsets as defined by differential cytokine production. To this end, Rag2-/- DN3 progenitors were transduced to with a transgenic KN6 γδ T-cell receptor (TCR), and co-cultured on various stromal cells engineered to express Notch, TCR ligands and supplemented with combinations of cytokines, such as IL-1β, IL-7, and IL-23. Our results showed that specific combinations of these signals are required to program IFN-γ, IL-4, IL-17, and IL-22 producing KN6 gd T cell subsets. More specifically, we establish that weak but not absent TCR-ligand interactions are required for γδ17 development, and Notch enables the survival of γδ T cells in an inflammatory milieu. This work provides a framework for the integration of signals downstream of the Notch, TCR, and cytokine receptors as they lead to the development of γδ T cell functional subsets that can play a fundamental role in regulating health and disease.

Session Topic: Cancer

Presenter: Phillip Chen
Institution: Trinity College Dublin, University of Toronto
Co-Author: Philip J Beatty

University of Toronto

Design of a Spatially Varying Saturation Pulse (SVSP) for Fat Suppression in Breast MRI

Breast magnetic resonance imaging (MRI) is faced with the difficult task of creating consistently high quality images in a challenging imaging environment that can include relatively low signal-to-noise, motion, and changes in magnetic susceptibility across air-tissue boundaries. The abundance of fatty tissue in the breast can result in strong fat signals that may mask tumor signals, making it difficult for radiologists to identify tumors. Fat suppression is an integral part of breast MRI as it improves radiologists' ability to detect tumors by removing the abundant fat signal that may obscure the reading of images, thus improving the radiologists' efficiency [1]. However, achieving reliable fat suppression with high water signal in a clinically acceptable scan time remains a challenge for currently available methods.
To improve fat saturation in the presence of field inhomogeneity, a spatially-varying saturation pulse (SVSP) is proposed. This work introduces a design methodology for creating SVSPs and describes a practical implementation on a clinical whole body 1.5T MRI scanner. Both simulation experiment with a virtual breast phantom and 1.5T imaging experiment using a phantom test object containing oil and water were used to demonstrate the feasibility of the proposed method. Initial results indicate that the proposed SVSP method can improve the reliability of fat suppression compared to Spectral Fat Saturation, while using similar pulse durations and acquiring similar levels of water signal. SVSP shows promise in terms of its applicability to the clinical setting.

Session Topic: Cancer

Presenter: Mark Barszczyk
Institution: University of Toronto, Canada
Co-Author: Mark Barszczyk[1,2], Pawel Buczkowicz[1,2,3], Pedro Castelo-Branco[1,4], Stephen C. Mack[1,2], Vijay Ramaswamy[1,2], Joshua Mangerel[1], Sameer Agnihotri[1], Marc Remke[1,2], Brian Golbourn[1,2], Sanja Pajovic[1], Cynthia Elizabeth[1], Man Yu[1], Betty Luu[1], Andrew Morrison[1], Jennifer Adamski[5], Kathleen Nethery-Brokx[1], Xiao-Nan Li[6], Timothy Van Meter[7], Peter B. Dirks[1,8], James T. Rutka[1,2,8], Michael D. Taylor[1,2,8], Uri Tabori[1,5] and Cynthia Hawkins[1,2,3]

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Telomerase Inhibition Abolishes the Tumorigenicity of Pediatric Ependymoma Tumor Initiating Cells

Pediatric ependymomas are highly recurrent tumors resistant to conventional chemotherapy. Telomerase, a ribonucleoprotein critical in permitting limitless replication, has been found to be critically important for the maintenance of tumor initiating cells (TICs). These TICs are chemo-resistant, repopulate the tumor from which they are identified, and are drivers of recurrence in numerous cancers. In this study, telomerase enzymatic activity was directly measured and inhibited to assess the therapeutic potential of targeting telomerase. Telomerase repeat amplification protocol (TRAP) (n=36) and C-circle assay/telomere-FISH/ATRX staining (n=76) were performed on primary ependymomas to determine the prevalence and prognostic potential of telomerase activity or alternative lengthening of telomeres (ALT) as telomere maintenance mechanisms, respectively. Imetelstat, a phase 2 telomerase inhibitor, was used to elucidate the effect of telomerase inhibition on proliferation and tumorigenicity in established cell lines (BXD-1425EPN, R254), a primary TIC line (E520) and xenograft models of pediatric ependymoma. Over 60% of pediatric ependymomas were found to rely on telomerase activity to maintain telomeres while no ependymomas showed evidence of ALT. Children with telomerase-active tumors had reduced five-year progression-free survival (29±11% vs 64±18%; p=0.03) and overall survival (58±12% vs 83±15%; p=0.05) rates compared to those with tumors lacking telomerase activity. Imetelstat inhibited proliferation and self-renewal by shortening telomeres and inducing senescence in vitro. In vivo, Imetelstat significantly reduced subcutaneous xenograft growth by 40% (p=0.03) and completely abolished the tumorigenicity of pediatric ependymoma TICs in an orthotopic xenograft model. Telomerase inhibition represents a promising therapeutic approach for telomerase-active pediatric ependymomas found to characterize high-risk ependymomas.

Session Topic: Cancer

Presenter: Justin Lau
Institution: Department of Medical Biophysics, University of Toronto, Toronto, Canada
Co-Authors: Albert P Chen[1], Benjamin J Geraghty[2], Charles H Cunningham[2]

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Metabolic Imaging of Solid Tumours Using Hyperpolarized 13C Pyruvate

With routine screening of men over 50, prostate cancers are now detected at earlier stages when treatment is more effective. However, with the medical imaging technologies currently available in the clinic, it is difficult to gauge the aggressiveness of an early-stage tumour. Some tumours will grow quickly and require immediate treatment. Other tumours will grow very slowly and may never cause any symptoms within a patient's lifetime. Without a reliable method to distinguish between aggressive and indolent cancers, both types of tumours are conventionally treated in the same way, often with surgical resection. Unfortunately, the side effects associated with treatment often outweigh the benefits for patients with slow-growing tumours. In Toronto, we have a new technology that enables us to non-invasively observe metabolic activity in real time using magnetic resonance imaging (MRI). By looking at which metabolic pathways are active in a patient's tumour, we may be able to predict much sooner its potential to develop into aggressive disease. The substrate of interest is 13C pyruvate, which is converted to lactate in aggressive cancers. A technique known as dynamic nuclear polarization, whereby microwaves are used to transfer spin alignment from highly polarized electrons to 13C nuclei, confers a temporary signal enhancement of more than four orders of magnitude. After intravenous injection of 13C pyruvate, a rapid imaging sequence is applied to sample the 13C signal as a function of time such that metabolic conversion can be monitored within the short lifetime of the signal enhancement. Preliminary results demonstrating the feasibility of time-resolved metabolic imaging in prostate cancer patients will be presented. This technique allows up to four metabolic pathways to be probed simultaneously in real-time in vivo. This metabolic profile may help both patients and oncologists in developing a treatment plan based on the principles of personalized medicine. Furthermore, this non-invasive radiation-free imaging technique may be useful for monitoring patients on watchful waiting so that treatment can be started at the first sign of changes in tumour metabolism, which can signify a switch from latent to aggressive disease.

Session Topic: Chronic Diseases

Presenter: Shubhendu Trivedi
Institution: National Institute of Immunology, Virology Lab II, New Delhi, India
Co-Author: Rupert Kaul

University of Toronto, Department of Immunology, Toronto, Canada.

Impact of Menstrual Cycle on HIV Susceptibility

Background: Globally, there were 2.1 million new HIV infections in 2015, and 1.4 million were in sub-Saharan Africa (SSA). While heterosexual transmission is the most common way of acquiring HIV, the probability of acquiring HIV through receptive vaginal sex is very low. This probability can be increased by various genital factors including sexually transmitted infections (STIs), use of the hormonal contraceptive Depo-provera. Some studies have shown that the luteal phase of the menstrual cycle which has increased levels of progesterone may be associated with increased HIV susceptibility. However, the impact of the phase of the menstrual cycle on genital immunology and HIV susceptibility is not well defined in longitudinal cohort studies in humans.
Aims: To address this gap, we conducted a prospective observational cohort study in HIV/BV-negative women in Nairobi, Kenya. Blood and mucosal sampling were performed at the baseline visit, which was either in the follicular or the luteal phase of the menstrual cycle and follow-up was performed in the subsequent phase. The primary study endpoints were the frequency and number of endocervical HIV susceptible CD4+ T cells. Secondary endpoints included an assessment of T cell parameters including the proportion of CCR5+ or CD69+ CD4+ T cells and genital levels of various cytokines and chemokines previously associated with HIV acquisition.

Methods: Nineteen participants completed the study. An ex vivo infection assay was performed to assess virus entry in endocervical cells. Proportions of T cell subsets (CCR5+ or CD69+ CD4+ cells) were assessed using flow cytometry and cytokines in genital samples were measured by ELISA.

Results: Virus entry in the follicular phase (median 7.3%, IQR (3.2% – 15.0%)) did not differ from that in luteal phase (median 9.5%, IQR (3.6% - 15.0%), p = 0.9). A moderate increase in the number of CD4+ T cells was observed in the luteal phase (median 106, IQR (47 – 300) compared to follicular phase (median 71, IQR (36 – 105), p = 0.02). No significant changes were observed in other T cell subsets (CCR5+ or CD69+ CD4+ T cells; p>0.4 for both). The menstrual cycle was not associated with changes in the majority of cytokines that were assessed (GM-CSF, IFNγ, IL1α, IL1β, MIG, MIP1α, MIP1β, MIP3α, RANTES, IL6, IL8, IL10, IL17, TNFα; p>0.13 for all). There was a moderate (4 fold) increase in the level of MCP-1 and a two-fold increase in IP-10 in follicular phase of the menstrual cycle.

Conclusion: Although a modest increase in the number of endocervical CD4+ cells was associated with the luteal phase, the menstrual cycle was not associated with changes in other T cell parameters including T cell HIV susceptibility, suggesting that the luteal phase of the menstrual cycle may not increase HIV susceptibility.

HOT DOCS

Timeslot: 11:50 – 12:05pm

Presenter: Ruth Anyango
Institution: Moi University, Kenya

Moi University, College of Health Sciences, Eldoret, Kenya

Knowledge of HIV/AIDS and Family Planning in Secondary Schools in Kakuma.

Introduction
Kakuma Refugee camp is located in Turkana County, Northwestern Kenya. The camp falls under the jurisdiction of the Kenyan government together with humanitarian agencies like the UNHCR assisted by a wide range of organizations. It hosts 190,833 (31%) of total refugee and asylum seekers in Kenya. The camp is predominantly South Sudanese (49.2%) and Somali (31%). The camp has a total of five secondary schools which are overseen by Windle Trust Kenya. Majority of the students in the schools are from politically disadvantaged countries. As such, there are multiple complex barriers to health and education faced by the students. In spite of efforts to alleviate the situation in the schools, the students still face many constraints. This makes it hard for many students to attain a secondary school education.

The BSI Moi University Chapter undertook a project in partnership with Windle Trust Kenya. The aim of the project was to initiate a mentorship programme in secondary school students within the camp. In addition, we sought to assess the knowledge/perceptions of HIV/AIDS and family planning among students in the camp. Students' knowledge of HIV/AIDS and family planning form a fundamental component of their health. HIV/AIDS is still considered a pandemic in Kenya and in the absence of appropriate interventions, the students in the camp are placed at an increased risk HIV/AIDS transmission and unwanted pregnancies.

Broad objectives:
I. To initiate a mentorship program me in Secondary schools within Kakuma Refugee camp.
Specific objectives:
II. To assess the knowledge of HIV/AIDS and family planning among students at the Kakuma Refugee camp.

Methods:
Data was collected through audio recorded in-depth interviews, focused group discussions and observations. The student's responses were categorized into themes and interpreted.

Results:
A total of 16 students were interviewed. The themes from the student's responses were "HIV Stigma", "HIV prevention" and "Antiretroviral Therapy (ARV'S)", and "Family planning methods". On observation, the students were keen to answer questions on HIV/AIDS and Family planning. There is marked stigma associated with HIV in the camp. This hinders HIV testing and treatment among the students. The students did not fully understand the role of ARV's and were not aware of the different modes of HIV transmission. Most of the students knew of "pills" and "Depo" as the only methods of family planning.

Conclusion:
There is a knowledge gap on HIV/AIDS and Family planning among students in the camp.

Implications:
Increased efforts to promote awareness and education on HIV/AIDS and Family planning within the camp.

Timeslot:

Presenter: Esther Anyango
Institution: University of Nairobi, Nairobi

University of Nairobi, School of Pharmacy

Assessment of Barriers to Girl Secondary Education in Kakuma Refugee Camp

INTRODUCTION:
Kakuma Refugee camp is located in Turkana County, Northwestern Kenya. The camp is under the jurisdiction of the Kenyan government together with humanitarian agencies like the UNHCR assisted by a wide range of organizations.
Kakuma Refugee camp has a total of five secondary schools with a total enrollment of 5,302. Out of this population only 950 are girls (17.1%) compared to 4,351 (82.9%), boys. There is only one girl boarding school in the camp which has a total number of 342 students. Girl child secondary education faces a myriad of challenges and many girls in the camp are unable to attend and complete their secondary school education.
The Beyond Sciences Initiative undertook a project in the camp in partnership with the United Nations Human Commission for Refugees (UNHCR) - Kenya. The aim of the project was to initiate a mentorship programme for girls within the camp. In addition, we sought to identify the challenges faced by the girl child in secondary schools in the camp. A mentorship programme appeals to be the most appropriate strategy to help overcome some of the challenges faced by girls without use of more demanding resources not available at hand.

Methods:
Data was collected from girls attending the school through observations, and in-depth interviews. The responses from the girls were categorized into various themes and discussed as such.

Results:
A total of twelve girls interviewed ranging from 17-22 years, predominantly South Sudanese in nationality. The girls were mostly Christian and not married. The major themes were cultural barriers, insecurity, human resource and infrastructural barriers and girl welfare.

Conclusion:
The girl child in Kakuma Refugee camp faces complex and related challenges.

Implications:
The barriers faced by the girl child hinders them from completing their secondary school education.

Timeslot: 9:15-9:30am
Presenter: Bhamra, Ashwinder
Institution: Moi University, Kenya
Co-Author: Valeria Osiemo

Moi University, School of Medicine, Eldoret, Kenya

Mentoring the Youth of Tomorrow

BACKGROUND
The BSI at Moi team recently partnered with the Tumaini Children's Innovation Centre in Eldoret, Kenya to develop a sustainable mentorship programme that promotes the holistic development of youth derived from troubled social and economic backgrounds.
Tumaini is a children's centre currently composed of 13 boys of different social and economic backgrounds and experiences, who were formerly street-children. The Tumaini model currently provides access to basic rehabilitation and health care to the youth meeting their immediate basic needs, while at the same time running parallel programmes that pass on basic literacy and social development skills to the children that can help support them to become self-sufficient individuals in society.

AIMS
We believed that establishing a mentorship programme in this setup provides an avenue for the children to engage with individuals in society who show a genuine concern for their well-being and social development, while developing the sense of confidence and trust towards the society around them, which they have thus far been hesitant towards due to past experiences of social stigmatisation and neglect.
At the same time, we believe the mentorship programme would allow the children to be able to realize their true goals and potentials with the support and guidance individuals whom they can confide in as one of their peers and not necessarily figures of authority.
The goals of the programme have therefore been to

- •Promote interaction between the socially neglected and stigmatized youth with individuals who bring in a changed perspective towards the society around them
- •Promote personal development at both the mentor and mentee level, through interaction with individuals of varying social and cultural backgrounds
- •Conceptualize how marginalized youths in other settings can be approached and interacted with, thus perceiving this particular project to be a stepping-stone for much diverse mentorship programmes ahead
- •And finally, to promote sharing of knowledge, attitudes, thought processes and ideas between individuals with varying backgrounds of experience in order to generate solutions for the common problems being faced at the community level around us

THE MODEL
The mentorship model that is being reviewed for implementation comprises four basic elements:
Mentor Recruitment. Which would involve bringing in individuals who display dedication, motivation and the skill set and ability to provide mentorship to the youth. This would be a highly scrutinized process as the prospective mentees in the programme are individuals facing troubled emotional backgrounds, and thus mentors wishing to enroll in the programme would need to be considerate of the same.
Training and Standardisation. Pre-service training to all mentors enrolling in the programme will be conducted to ensure a common ground on the goals and objectives that the centre and the mentorship programme hope to achieve are shared equally. This will involve input from local experts with backgrounds in working with marginalized youth, as well as training based on case scenarios reflecting real-life situations that a mentor would be exposed to as part of their mentorship.
Building Relationships. This remains one of the most critical components of the mentorship programme, as the success of the entire programme lies solely upon the integrity of the relationship that is established between the mentor and the mentee. So far, an effective means in promoting the building of relationships

which deserves a degree of patience, has been in participating in various activities with the children, such as playing soccer and engaging in group discussions.
Goal Setting. Which entails an outline of the goals that need to be accomplished over a period both in short term and in long term for the mentee, periodic assessments of the progress made in realization of these goals and finally, the celebration on having helped the mentee realize their goals in the end.
Along each step of the programme, effective monitoring and evaluation will be conducted to ensure appropriate analysis of the progress being made by the programme, and to help overcome any challenges and setbacks that arise. Means of evaluation would include group discussions, pre- and post-assessments, as well as self and peer evaluations.

CONCLUSION

Ultimately, it is thus believed that a mentorship programme thus provides the perfect opportunity to promote community development and promotion through establishment of cross-community networks, ultimately leading to generation and sharing of new and innovative thoughts and ideas, for the better meant of the community around us.

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