9th SFRR Africa and 4th IAMBR International Conference

Translational Science & Drug Discovery –

Impact on Health, Wellness, Environment and Economics

BOOK OF ABSTRACTS

Edited and Designed by
Prof. Arun Kumar Agnihotri

Review Board

Prof. Smriti Agnihotri
SSR Medical College, Mauritius

Dr. Deena Ramful-Baboolall
University of Mauritius, Mauritius

Dr. Ranjeet Bhagooli
University of Mauritius, Mauritius

July 27 – 29, 2015

Table of Contents

About SFRR - Africa

The Society for Free Radical Research- Africa (SFRR-AFRICA) is a constituent member of the International Society for Free Radical Research (SFRRI), a body dedicated to the study of free radicals and anti-oxidants in biochemistry, biology, immunology, medicine, food technology, biotechnology, pharmacology and bio-physics. It has a membership of more than 2000 scientists, a number, which is growing constantly.

Since its existence the SFRR-Africa has maintained a policy of organizing international conferences on a regular basis. The first was held in South Africa (Kruger Park, July 2000), the second in Mauritius (Réduit, July 2001), the third in South Africa (Cape Town, 2002), the fourth in Zimbabwe (Bulawayo, October 2003) and the fifth in St Lucia (Rodney Bay, July 2004). The Sixth SFRR-AFRICA International Conference has been held in September 2005 in Morocco at the University Abdelmalek Essabdi, Tetouan and the Seventh was organized in 2008 in Mauritius in collaboration with the African Forum for Health Sciences and the African Rotavirus Network. We had the 8th Conference in East London (South Africa) in 2011 in partnership with WSU.

The Secretariat of SFRR-Africa is based in Mauritius and the office bearers are currently:

SFRR-Africa Elected Officials

President: *Prof. Theeshan Bahorun, G.O.S.K (Mauritius)*

Vice President: *Prof. Olatunde Farombi (Nigeria)*

SFRR-Africa Secretariat

Executive Chairman: *Prof. Okezie I. Aruoma (USA)*

Executive Vice Chairman: *Prof. Kensese Mossanda (South Africa)*

Secretary General: *Dr. Vidushi S Neergheen-Bhujun (Mauritius)*

Executive Secretary: *Ms. Yasmine Cotabally (Mauritius)*

About IAMBR

The International Association of Medical and Biomedical Researchers (IAMBR) was founded in December 2010 with the objective to motivate and sensitize the people of medical and related professions to participate in medical and biomedical research through scientific meetings, which facilitate the interaction between scientific workers. The prime mover (who is regarded as founder) was Arun Kumar Agnihotri, a Professor of Forensic Medicine at SSR Medical College following a suggestion by Sushil Dawka, a Professor of Surgery at SSR Medical College and Theeshan Bahorun, a Professor of the Department of Biosciences at the University of Mauritius, who are also considered to be founding members. IAMBR has conducted three international meetings in Mauritius – two at SSR Medical College (2012 and 2013) and one at Apollo Bramwell Hospital (2014).

The members who are holding the office of IAMBR are:

President - *Prof. Arun Kumar Agnihotri*

Vice-President - *Prof. Theeshan Bahorun*

Secretary - *Prof. Smriti Agnihotri*

Assistant Secretary - *Prof. Rimli Barthakur*

Treasurer - *Prof. Ashok P Singh*

Assistant Treasurer - *Prof. Savita Bundhoo*;

Members - *Prof. Nilima Jeebun, Prof. Namrata Chhabra, Dr. Sushil Dawka and Dr. Nandish Mital*

Auditors - *Dr. Vandna Jowaheer and Dr. Yannick Tangman*

The IAMBR is an international organization and multidisciplinary in nature including the members of basic science and clinical medical faculty as well as members from allied sciences. The Association (IAMBR) was registered on February 16, 2011.

Message

On behalf of the organizing committee, I extend a warm welcome to our delegates who have come from all corners of the continents to attend the *9th International Conference of Society of Free Radical Research-Africa* and the *4th International Conference of International Association of Medical & Biomedical Researchers*. The conference theme *Translational Science and Drug Discovery: Impact on Health, Wellness, Environment and Economics,* is of major importance in the trend to engage stakeholders in the health and welfare of consumers. Facilitating capacity development to meet requirements for health and wellness can be contextualized by evaluation of sustainable technology, supply and access of food (sustainable nutrition), ensuring the availability of trained personnel, engendering greater communication among scientists, empowering education outreach for the management of communicable and non-communicable diseases, supply and access of medicines and medical devices. There is need to bridge competency transfer in the USA, Europe, China, Africa, Caribbean and the Pacific Island Countries and foster international development, capacity building, cooperation in scientific education and research. This will work towards rebuilding the image of African science by encouraging biomedical, biotechnology, environmental and agricultural research. Increased biotechnology research and development would inextricably contribute to stemming the increasing prevalence of diseases and infections in the global community as well as the management of livestocks and food security.

This nicely leads to the following aspects that have been deliberately reproduced due to their importance for our purpose: The excerpts of the outcome document of the United Nations Conference on Sustainable Development (Rio+20), "*The future we want*", reads "*We recognize that people are at the center of sustainable development and, in this regard, we strive for a world that is just, equitable and inclusive, and we commit to work together to promote sustained and inclusive economic growth, social development and environmental protection and thereby to benefit all.*" The *United Nations 2015 Sustainable Development Goals* include Goal 1, end poverty in all its forms everywhere; Goal 2, end hunger, achieve food security and improved nutrition, and promote sustainable agriculture; Goal 3, ensure healthy lives and promote wellbeing for all at all ages; Goal 4, ensure inclusive and equitable quality education and promote lifelong learning opportunities for all; Goal 5, Achieve gender equality and empower all women and girls; Goal 6, ensure availability and sustainable management of water and sanitation for all; Goal 7, ensure access to affordable, reliable, sustainable, and modern energy for all; Goal 8, promote sustained, inclusive, and sustainable economic growth, full and productive employment, and decent work for all; Goal 9, build resilient infrastructure, promote inclusive and sustainable industrialization, and foster innovation; Goal 10, reduce inequality within and among countries; Goal 11, make cities and human settlements inclusive, safe, resilient, and sustainable; Goal 12, ensure sustainable consumption and production patterns; Goal 13, take urgent action to combat climate change and its impacts; Goal 14, conserve and sustainably use the oceans, seas, and marine resources for sustainable development; Goal 15, protect, restore, and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss; Goal 16, promote peaceful and inclusive societies for sustainable development, provide access to justice for all, and build effective, accountable, and inclusive institutions at all levels; and Goal 17, strengthen the means of implementation and revitalize the global partnership for sustainable development.

While there is prominence for health in the new goals agenda, embracing a strategy for their implementation must not lose sight of revitalizing the awareness of global natural food resources and, advancing their utilization in global communities to ensure poverty alleviation through sustainable agricultural practice, disease control, enriched lifestyle and wellness. Sustainable world unity can be the best driver to realizing the *UN's 2015 Sustainable Development Goals.* One of the goals above, just like our conference theme, speaks of ensuring healthy lives and promoting wellbeing for all at all ages.

Prof. Okezie I Aruoma, *MBA, PhD, DSc CChem FRSC MIoD*
Professor of Pharmaceutical and Biomedical Sciences
American University of Health Sciences, Signal Hill, CA, USA
C**HAIRMAN** SFRR A**FRICA**

Message

May I on behalf of myself, the Society for Free Radical Research-Africa (SFRR-Africa) and the International Association of Medical and Biomedical Researchers (IAMBR) welcome you all to this International conference in the heavenly "décor" of Mauritius. This makes me quote what Mark Twain said in 1896 "God first made Mauritius and from it, he created Paradise". I hope that over and above this conference, the international delegates will have the opportunity to make the most of the island.

SFRR-Africa represents Africa within the International Society for Free Radical Research and it has during the past years made great efforts to integrate and transfer competency in advanced scientific and medical research. It has so far organized 8 international conferences, the last two being in collaboration with the African Forum for Health Sciences/African Rotavirus Network (2008) and Walter Sisulu University (2011). This year, SFRR-Africa is pairing with IAMBR, which has held 3 international meetings on medical research from 2012-2014. These joint collaborations have proved to be most effective and successful in the context of limited financial resources. They indeed pave the way for other collaborative ventures.

This year, the main conference theme is "Translational Science and Drug discovery" which is geared towards innovation in health-related research with a broad range of topics. Some 96 papers, depicting novel research, have been reviewed for oral and poster presentations and this number is self-evident of the determination to strengthen research capacity within Africa and Island states and fostering international development, capacity building, scientific networking and cooperation in scientific education and research. Africa needs a consistent strategic vision for research and capacity building that would help the setting up of sustainable infrastructure and benefit its emerging scientists. To this end, I reiterate that intense constructive lobbying exercises should be maintained to convince policy makers of the importance of research investments and the potential of the young generation of scientists.

Despite our limited resources SFRR-Africa and IAMBR have spared no efforts to encourage and support the participation of students by waiving or reducing registration fees and providing accommodation. This initiative, consistent with the objectives of both societies, has surely been of help to our emerging scientists to gain necessary exposure for their scientific outputs. I will here seize the opportunity to thank all our national and international sponsors without whom this event would not have been possible to organize.

My final words go to my organizing committee who has been working relentlessly for months now to make this conference happen.

Prof Theeshan Bahorun, PhD, G.O.S.K
Professor of Applied Biochemistry
President SFRR-Africa,
Vice President IAMBR
ANDI Centre of Excellence for Biomedical and Biomaterials Research
University of Mauritius, Mauritius
CONFERENCE CHAIR

Message

The International Association of Medical and Biomedical Researchers (IAMBR) has continued to move on in its mandate to foster medical and biomedical research through scientific meetings. IAMBR has been involved in organizing international conferences since 2012. This year, IAMBR is tagged with the Society for Free Radical Research-Africa (SFRR-Africa) to organize this international conference on '*Translational Science and Drug Discovery - Impact on Health, Wellness, Environment and Economics*'. The members of the two associations, friends and partners from within Africa and around the world will share their experience, knowledge and practical aspects in health related medical and biomedical research with a broad range of topics.

Our panel of invited speakers including international authorities from 4 continents and 10 countries will enlighten us with their great experience around the themes of this conference. It is a golden opportunity for us to mingle and interact with them. The organizing committee has put up a conference program in 6 plenary sessions on 'oxidative stress, natural products, traditional medicine, cancer, molecular nutrition and drug development' including 57 oral presentations, one special session on 'Non-human Primate Contributions to Biomedicine' hosted by *Bioculture Ltd* and a poster session of 39 presentations.

We welcome all the delegates and greatly acknowledge their overwhelming response to this international conference, and wish our international delegates to have a nice stay in Mauritius. I am sure that this conference would provide a conducive forum for healthy deliberations and interactions between diverse scientific and clinical disciplines, and that the international participants will be charmed by the warm and enthusiastic Mauritian hospitality.

My sincere gratitude goes to Prof Okezie I Aruoma, Chairman of SFRR Africa and Prof Theeshan Bahorun, President of SFRR Africa for their continued support and guidance.

Finally, I would like to also thank all the members of my organizing committee, who have put all their efforts for the success of this conference.

Enjoy the congress!

Prof. Arun Kumar Agnihotri, MD
Professor of Forensic Medicine,
President IAMBR
SSR Medical College,
Belle Rive, Mauritius
ORGANIZING SECRETARY

Welcome Address

On behalf of the organising committee, I am delighted to welcome delegates from all over the world to the 9th International Conference of Society of Free Radical Research-Africa organized jointly with the International Association of Medical & Biomedical Researchers. This conference is entirely dedicated to recent developments in Translational Science and Drug Discovery and I am confident that it will prove to be an exciting forum.

This year again, the primary focus of the conference is very much in line with its aims and objectives of addressing research endeavors with a view to improving health in Africa while fostering international collaboration for capacity building in scientific medical and biomedical research. The theme of this conference will address the impact of translational science and drug discovery on health, wellness, environment and economics. The increased attention to translational science is opportune for Africa given the numerous health challenges it has had to face recently. Thus, it is expected that this conference will spearhead the discussion on translational approaches that may, amongst others, greatly accelerate the process of transforming laboratory discoveries into potential treatments.

The organising committee received a large number of abstracts for oral and poster presentations, many of which were of a very high quality. As the Secretary of the organizing committee, I would like to thank all the authors for their enthusiasm and wish to express my gratitude to the scientific committee for their painstaking work and the time devoted to the evaluation process. This year, we are giving the opportunity to young investigators not only to present their original research but also to win the Young Investigators Award, sponsored by the journal Archives of Biochemistry and Biophysics.

The conference committee has put together a truly unique program that addresses the cutting edge research in translational science and drug discovery. In this respect, I urge you all to make maximum use of the platform being provided to you by this conference to share and discuss your research.

I hope that the conference will prove to be an inspiring and truly transformative experience for you.

On behalf of SFRR-Africa, I extend my hand of friendship and welcome you to Mauritius.

Dr. Vidushi S Neergheen-Bhujun
Senior Lecturer
Secretary SFRR-Africa,
ANDI Centre of Excellence for Biomedical and Biomaterials Research
University of Mauritius, Mauritius
ORGANIZING SECRETARY

Organizing Committee

Conference Scientific Committee

SFRR-Africa Chairman	Prof. Okezie I Aruoma, PhD Dean, American University of Health Sciences, CA 90755, USA
SFRR-Africa President	Prof. T Bahorun, PhD National Research Chair, MRC, ANDI Centre of Excellence for Biomedical & Biomaterial Research, UOM, Mauritius
IAMBR President	Prof. Arun K Agnihotri, MD Department of Forensic Medicine & Toxicology, SSR Medical College, Mauritius
SFRR-Africa Secretary	Dr. Vidushi S Neergheen-Bhujun, PhD ANDI Centre of Excellence for Biomedical and Biomaterials Research, UOM, Mauritius
SFRR-Africa Vice President	Prof. Olatunde Farombi, PhD College of Medicine, University of Ibadan, Nigeria
SFRR-Africa Vice Chairman	Prof. Kensese Mossanda, PhD Walter Sisulu University, Eastern Cape-South Africa

Local Organizing Committee

IAMBR Secretary	Prof. Smriti Agnihotri, MD Pathology Department, SSR Medical College Mauritius
SFRR-Africa Treasurer	Ms. Yasmine Cotobally University of Mauritius Mauritius
IAMBR Ass. Treasurer	Dr. Savita Bundhoo, MD Ministry of Health and Quality of Life, Mauritius
SFRR-Africa Member	Dr. Deena R-Baboolall, PhD University of Mauritius Mauritius
IAMBR Treasurer	Prof. Ashok P Singh, MS Department of Anatomy, SSR Medical College Mauritius
SFRR-Africa Member	Ms. Darshini Narrain ANDI Centre of Excellence for Biomedical & Biomaterial Research, UOM, Mauritius
IAMBR Member	Dr. Ranjeet Bhagooli, PhD University of Mauritius Mauritius

Introduction to Keynote Speakers

Okezie I Aruoma (USA)

Prof. Aruoma is Professor of Pharmaceutical and Biomedical Sciences and Associate Dean, Research and Global Affairs. Dr Aruoma serves as the Chair of the Institution Review Board at the American University of Health Sciences. Dr Aruoma's novel research and teaching endeavors is focused on promoting public health nutrition and management of diseases of overt inflammation and translational science embracing pharmacogenomics & personalized medicine. Dr Aruoma has authored numerous books including Molecular Biology of Free Radical in Human Diseases, DNA & Free Radicals: Techniques, Mechanisms and Applications and Free Radicals in Tropical Diseases and has had more than 150 papers published in high ranking scientific peer-reviewed journals. Dr Aruoma received the 2012 Research and Publication Achievement Award from the Association of Black Health-Systems Pharmacists and is one of the receipients of the 2012 Fellows status in the American Association of Pharmaceutical Scientists.

Helmut Sies (Germany)

Prof. Sies was Chairman at the Institute of Biochemistry and Molecular Biology and at Heinrich-Heine-University Düsseldorf, Germany, where he is now a Research Professor and Member of the German National Academy of Sciences (Leopoldina). He was President of the Society for Free Radical Research International and of the Oxygen Club of California. His research interests include Oxidative Stress, Oxidants and Antioxidants, Hydroperoxide Metabolism, Glutathione, Micronutrients (Polyphenols, Selenium, Carotenoids), and Nutritional Biochemistry. Dr. Sies is recognized as a Redox Pioneer, because he authored five articles on oxidative stress, lycopene, and glutathione, each of which has been cited more than 1000 times, and coauthored an article on hydroperoxide metabolism in mammalian systems cited more than 5000 times (Google Scholar). He has published more than 600 articles, 134 of which are cited at least 100 times, and edited 28 books. During the last quarter of the 20th century and well into the 21st, he has served as a scout, trailblazer, and pioneer in redox biology.

Roy A Jensen (USA)

Prof. Jensen is Director of The University of Kansas Cancer Center, the Director of the Kansas Masonic Cancer Research Institute, Professor of Pathology and Laboratory Medicine, and Professor of Anatomy and Cell Biology at the University of Kansas Medical Center. He also holds appointments as a Professor in the Department of Molecular Biosciences at the University of Kansas-Lawrence and as Professor in Cancer Biology at The University of Kansas Medical Center. He currently has over 150 scientific publications and has lectured widely on the clinical and molecular aspects of breast cancer pathology. Dr. Jensen's research interests are focused on understanding the function of BRCA1 and BRCA2 and their role in breast and ovarian neoplasia; and in the characterization of premalignant breast disease both at the morphologic and molecular levels. His laboratory was instrumental in demonstrating the role of BRCA1 in the growth control of normal and malignant cells and in how loss of functional BRCA1 contributes to the development of breast cancer.

Introduction to Invited Speakers

M. Faadiel Essop (South Africa)

Dr. Essop is currently a professor and chairperson of the Department of Physiological Sciences at Stellenbosch University, South Africa. His research group is focusing on the so-called 'dual burden of disease' (HIV-AIDS and non-communicable diseases) that is threatening developing countries. Specifically, the focus is two-fold: a) the link between diabetes and cardiovascular diseases – concentrating on the damaging effects of high glucose availability, and b) the mechanisms whereby HIV and/or highly active anti-retroviral treatment can trigger cardio-metabolic diseases. He is currently an elected council member of the African Association of Physiological Sciences and president of the Physiological Society of Southern Africa.

MP Gonthier, Réunion (France)

Dr. Gonthier is full Professor of Biochemistry and Nutrition at the Medicine School of the University of La Réunion. She contributed to the understanding of the effects of endocannabinoids derived from dietary lipids on adipose tissue biology, and reported the overproduction of endocannabinoids from human adipocytes and pancreatic beta cells during obesity and type 2 diabetes. From 2007-2013, the University of La Réunion hired her as assistant professor at the Institute of Food Science and Technology. Since 2013, she is full Professor of Biochemistry and Nutrition at the Medicine School of the University of La Réunion. Her research work aims to explore the molecular mechanisms involved in the dysregulation of the metabolic function of adipose cells during obesity, and to evaluate the antioxidant and anti-inflammatory properties of polyphenol-rich plant extracts (from tropical fruits and medicinal plants) as new nutritional and phytopharmacological strategies which could help to reduce obesity-related disorders such insulin resistance and vascular damages.

KS Mossanda (South Africa)

Prof. Mossanda is presently acting as Research Coordinator at the Walter Sisulu University (South Africa), supervisor of postgraduate students and external examiner of Masters and PhD dissertations from various South African Institutions and abroad. His research expertise includes: Biochemistry, Toxicology, Carcinogenesis, Mutagenesis, Traditional Medicine, Chemoprevention and Anti-inflammatory activities of medicinal plants. He is member of various scientific and professional societies and reviewer of more than 10 African and international journals. His is also serving as Executive Director of PROMETRA-South Africa (an organization for the Promotion of Traditional Medicines) and member of South African platform on Bioprospecting and Product Development. His research expertise include: Biochemistry, Toxicology, Carcinogenesis, Mutagenesis, Traditional Medicine, Chemoprevention and Anti-inflammatory activities of medicinal plants, He has published 75 papers in peer-reviewed journals and refereed/peer-reviewed conference proceedings, 3 chapters in book

Introduction to Invited Speakers

Joseph Indelicato (USA)

Prof. Indelicato is a clinical social, and a research psychologist. Dr. Indelicato's current research interests include research methodology, patient compliance, pain management, bariatrics, statistics in biomedical research, use of Fermented Papaya Preparation and Mauritian tea to slow the progress of cognitive impairment diabetes as well as the study of the baseline metabolism of subjects and its effects on weight, both before and after bariatric surgery. Dr Indelicato is a forensic psychologist and has testified in over a hundred court cases, on issues as varied as child custody to neurological damage. Dr Indelicato has worked with a number of pharmaceutical companies in designing and evaluating research projects, including Xeloda, Depakote, and Pegylated interferon. He has over 30 years of clinical experience providing assessment and treatment services to adults and children. He is also licensed as both a psychologist and a social worker.

Young-Joon Surh (South Korea)

Dr. Surh is a Professor of Biochemistry at the College of Pharmacy, Seoul National University, South Korea. He currently serves as Director of Tumor Microenvironment Global Core Research Center Research Center, which is supported by the National Research Foundation, Ministry of Education, Science and Technology. Prof. Surh has published more than 250 papers in peer-reviewed international journals and more than 60 invited editorials, reviews and book chapters. The total number of citations of his publications is more than 12,000 (excluding self-citations). The H-Index reported by Thomson Reuter of Web Knowledge is 60. He received numerous awards including Elizabeth C. Miller and James A. Miller Distinguished Scholar Award from Rutgers University (2011), McCormic Science Institute Award from American Society for Nutrition (2009), the Merit Award from the International Society of Nutraceuticals and Functional Foods (2010), the Scientist of the Year Award from the Korea Science Reporters Association (2008) and more recently an outstanding scientist award by President of South Korea. He published a seminal review article, titled cancer chemoprevention with dietary phytochemicals, in Nature Reviews Cancer, which has been highly cited (more than 1,200 times).

Shrikant Anant (USA)

Dr. Anant is a Professor of Cancer Research & RNA biologist with interest in understanding the mechanisms that regulate gene expression at post-transcriptional levels of mRNA stability & translation during tumorigenesis. His lab understands the role of two genes in colon cancer – tumor suppressor and cancer causing gene. Dr. Anant's group has been in the forefront in understanding how dietary prevention agents regulate gene expression. This group has identified a new compound that can be used as a preventive agent for colon cancer and more recently have been working on bitter melon as a dietary agent against colon cancer. He has received many awards including the American Gastroenterology Association Research Scholars Award and the University of Oklahoma Senior Research Scholar award. He was recently invited by NIH to serve in an expert panel to consider the current landscape of natural products and botanical research relevant to the NIH office dietary supplements.

Introduction to Invited Speakers

Karl-Heinz Wagner (Austria)

Dr Wagner is Full Professor at University of Vienna, Faculty of Life Sciences and co-leading the faculty focus "Nutrition associated molecular mechanisms of ageing" and leading the Emerging Field "Oxidative Stress and DNA Stability". The latter field is now the main research focus, which is explored in several international human intervention studies trying to predict the risk of chronic diseases such as cancer and CVD on systemic, cellular and molecular level. Since 2010 he is Adjunct Professor at School of Public Health at Griffith University in Australia and in this year he also received the leadership of the University Research Platform "Active Ageing". His research is mainly biomarker driven and following a translational approach from cell to organism. He has more than 115 papers published in ISI journals and is author of more than 20 book chapter. He also served as guest editor for numerous special issues in peer-reviewed scientific journals and edited 2 books.

Debasis Bagchi (USA)

Prof. Bagchi is an Adjunct Faculty in Texas Southern University, Houston, Texas. He served as the Senior Vice President of Research and Development of InterHealth Nutraceuticals Inc, Benicia, California, from 1998 till Feb 2011, and then as Director of Innovation and Clinical Affairs, of Iovate Health Sciences, Oakville, Ontario, till June 2013. Dr. Bagchi received the Master of American College of Nutrition Award in October 2010. He is currently the Chairman of International Society of Nutraceuticals and Functional Foods (ISNFF), Immediate Past President of American College of Nutrition, Clearwater, FL, and Past Chair of the Nutraceuticals and Functional Foods Division of Institute of Food Technologists (IFT), Chicago, IL. He is serving as a Distinguished Advisor at the Japanese Institute for Health Food Standards (JIHFS), Tokyo, Japan. Dr. Bagchi is a Member of the Study Section and Peer Review Committee of the National Institutes of Health (NIH), Bethesda, MD. Dr. Bagchi has 302 papers in peer-reviewed journals, 25 books and numerous patents.

E Bourdon (Réunion - France)

Dr. Bourdon is Professor of Biochemistry at the "Groupe de Recherche sur l'Inflammation Chronique et l'Obésité, Université de la Réunion, La Réunion, France. Dr Bourdon academic and research interests are focused on the metabolism of human lipoproteins, impact of hypoglycemia and oxidative stress in human adipocytes and their molecular mechanisms in obesity and metabolic diseases including type 2 diabetes. He is the author/co-author of more than 40 peer-reviewed publications in that field of research. Also, five students have supported a doctoral thesis under his direction and four are under progress. Dr Bourdon is a member of the French Society of Biochemistry and Molecular Biology (SFBBM) and the French Society of Diabetology (SFD). He is a regular reviewer for the evaluation of scientific articles subjected to review by a peer. He has developed productive local and international collaborations especially with the local hospital (CHU, La Réunion) and with the groups of Prof. Faadiel Essop (Stellenbosch, South Africa) and Prof. Theeshan Bahorun (CBBR, Mauritius).

Introduction to Invited Speakers

Sashwati Roy (USA)

Dr. Roy is an Associate Professor of Surgery and Director of laser capture Molecular Analysis facility at the Ohio State University Columbus Ohio. She received her PhD in 1994 in Physiology and Environmental Sciences. She completed her postdoctoral training from University of California, Berkeley. Her research interest include wound inflammation, mechanisms of resolution of diabetic wound inflammation, role of miRNA in tissue repair and regeneration processes. Dr. Roy has over 180 peer review publications. She is an expert in significance of macrophage and inflammation in chronic wounds. Dr. Roy's research is funded by National Institute of Health to investigate on the role of inflammation in diabetic wounds.

Frank Antonicelli (France)

Prof. Antonicelli is head of the dermatology unit at the University of Reims, France. Pr Antonicelli obtained his PhD in 1989 on inflammation and cancer. During his post-doctoral fellowship at the ELEGI Lab from the University of Scotland Edinburgh, he met Dr Rahman with whom he developed a fruitful and long collaboration on the role of oxidative process in the inflammatory responses associated to immune-pathogenesis. In 2000, Pr Antonicelli returned to France, joined the laboratory of dermatology in 2002 where he studied the impact of extracellular matrix remodeling in inflammation associated to skin diseases, before becoming head of the Immuno-Dermatology, Cytokine and Cancer Unit in 2014. Since 2010, Pr Antonicelli has focused his work on the understanding of the physiopathological processes associated to bullous pemphigoid, one of the most striking skin autoimmune diseases, involving elderly patients. Very recently, Pr Antonicelli explored the role of oxidative stress in the inflammatory response in this disease.

Manashi Bagchi (USA)

Dr. Manashi is the Chief Scientific Officer of Dr. Herbs LLC, Concord, CA. Dr. Bagchi is a Member of the Study Section and Peer Review Committee of the National Institute of Health (NIH), Bethesda, MD. Her research interests include free radicals, human diseases, carcinogenesis, anti-ageing and anti-inflammatory pathophysiology, mechanistic aspects of cytoprotection by antioxidants and chemoprotectants, regulatory pathways in obesity and gene expression. She is a Member of Society of Toxicology (Reston, VA), New York Academy of Sciences (New York, NY) and Institute of Food Technologists (Chicago, IL). She is a Fellow and currently Board Member of the American College of Nutrition (Clearwater, FL). Dr. Bagchi has 210 papers in peer-reviewed journals and 2 books. She has delivered invited lectures in various national and international scientific conferences, organized workshops, and group discussion sessions. Dr. Bagchi is a Member of the Board of Directors of American College of Nutrition, Clearwater, FL. Dr. Bagchi is serving as Editorial Board Member of the *Journal of the American College of Nutrition*. Dr. Bagchi received funding from various institutions and agencies including the U.S. Air Force Office of Scientific Research, Nebraska State Department of Health, and Cancer Society of Nebraska.

Introduction to Invited Speakers

E Olatunde Farombi (Nigeria)

Dr Farombi is Professor of Biochemistry and Molecular Toxicology, Director Drug Metabolism and Toxicology Research Laboratories, former Head of Biochemistry Department and currently the Dean Faculty of Basic Medical Sciences, College of Medicine, University of Ibadan, Nigeria. Dr Farombi's research interests are on cellular and molecular toxicology, chemical carcinogenesis, gastrointestinal pathology, antioxidant redox biochemistry, nutraceuticals and chemopreventive phytochemicals as prophylactic agents, nutrigenomics as well as natural product biotechnology. Dr Farombi is currently the Vice-President of the Society for Free Radical Research Africa, Editor-in-chief of Toxicology Report (official journal of West African Society of Toxicology), Chairman Editorial board, Archives of Basic and Applied Medicine. Dr Farombi is the Editor of the book titled "Nutritional Antioxidants in Cancer and Degenerative Diseases. He is a Fellow of the Royal Society of Chemistry (UK).

Sandile P Songca (S Africa)

Prof. Songca is a medicinal chemist with vast research experience spanning over three decades. His main research interest include spectroscopic analytical techniques, the use of laboratory in the teaching of science, synthesis and evaluation of amphiphilic porphyrins with potential for use in photodynamic therapy, synthesis, fictionalization, and characterization of magnetic iron oxide-gold core-shell nano-particles, nanotechnology and demographic and biochemical aspects of human geophagia. Prof. Songca has 30 years of experience in lecturing in HEIs. He has held several positions of responsibility HOD, Vice Dean of Science, Director of School, Executive Dean and is currently coordinator of the Turn-around Framework at Walter Sisulu University and now deputy vice chancellor responsible for academic affairs and reseach. Prof. Songca belongs to several Professional bodies among which are the South African Chemical Institute, The Royal Society of Chemistry, International Society of Optical Engineering, and Society of Porphyrins and Phthalocyanines. He is evaluator of research proposals for NRF and MRC. He is also a reviewer for many journals. Prof. Songca is the Country Co-ordinator for South Africa responsible for Physical Sciences in the project on Geophagia in South Africa, Botswana and Swaziland.

Savita Bundhoo (Mauritius)

Dr. Bundhoo did her MBBS in 1983 and acquired her postgraduate degree in preventive and social medicine in 1987 from Rajasthan University in India. She has more than two decades experience at the Ministry of Health and Quality of Life in Mauritius. She has shouldered various responsibilities, starting as a Medical and Health Officer in 1989 and occupying the posts of Community Physician, N.C.D. Coordinator and Acting Health Director of a 177-bedded hospital and Acting Regional public health superintendent. She is also a pioneer in teaching Preventive and Social Medicine at the SSR Medical College in Mauritius since its inception in 1999. She has been constantly involved in the training of social bodies on various public health issues. She has been member of several committees and workshops, and active socially. She is Assistant secretary of NGO Link to life cancer support group and is involved in social work through it. She is life member of IAMBR, AICBA and other medical associations.

Introduction to Invited Speakers

Ajit Gangawane (India)

Dr Gangawane is Deputy Registrar (Academic and Research) at Sumandeep Vidyapeeth, Vadodara, Gujarat. He was working as Associate professor in MGMIHS in School of Biomedical Sciences, Navi Mumbai and Assistant Professor in DYPU, Department of Biotechnology and Bioinformatics, Navi Mumbai. He has more than 35 publications to his credit and attended about 35 conferences as invited speaker. He has authored 3 textbooks in subject like cell biology, Bioinformatics & Bio information and Plant mitochondria and gene expression. He has guided 2 PhD scholars, 17 PG Students and 5 UG Students. He is editorial board member for reputed international journals. His research interests include plant mitochondria, molecular biology and free radicals research.

Archana Bhaw-Luximon (Mauritius)

Dr Bhaw-Luximon has a PhD in Polymer Chemistry from the University of Mauritius (UoM, 2001). She joined the Dept of Chemistry, UoM in 2003 and is currently Associate Professor. She has been appointed Head of the Department of Chemistry in 2014. Her research work is based at the Centre for Biomedical and Biomaterials Research (CBBR) and her interests are in the development of advanced polymer materials, biomaterials and nano-drug delivery as well as development of value-added products from indigenous land and marine resources. Her work is focused on advanced materials for (i) elaboration of nano self-assembled synthetic and natural polymers in the pharmaceutical area as controlled drug delivery devices targeting cancer and infectious diseases (TB, malaria) (ii) polymer-based scaffolds for tissue engineering.

Vidushi S N-Bhujun (Mauritius)

Dr Neergheen-Bhujun, senior lecturer in the Department of Health Sciences and African Network for Drugs and Diagnostics Innovation (ANDI) Centre for Biomedical and Biomaterials Research, University of Mauritius holds a PhD in Biosciences and is currently engaged in research in applied biochemistry and pharmacognosy. Her research interests include oxidative stress and antioxidants in biology and medicine; biofactors from traditional herbal medicine and endemic medicinal plants and from the locally consumed food components; cancer biology and the molecular mechanisms and preclinical potential of natural products and dietary agents against cancer. She is the author of a number of published peer reviewed papers (24), chapters in books (8), peer reviewed conference proceedings (2), conference abstracts and posters (24). In addition, she is on the editorial board of Free Radicals and Antioxidant journal, Internet Journal of Medical Update and Archives of Medical and Biomedical Research.

Introduction to Invited Speakers

OS Oluwafemi (South Africa)

Prof Oluwafemi is a National Research Foundation (NRF), South Africa rated researcher. He is a professor of Inorganic chemistry at the department of Applied Chemistry, University of Johannesburg. His research is in the broad area of nanotechnology and includes green synthesis of semiconductor and metal nanomaterials for different applications. He has authored and co-authored many journals publications, book chapters and books. He is a reviewer for many international journals in the field of nanotechnology and has won many accolades both locally and internationally including the CV Raman Fellowship for African Researchers, distinguished Erudite professorship by the government of Kerala, India, Inclusion in the Marquis Who's Who in the World 28th Edition 2011, American publication.

JL Marnewick (South Africa)

Prof Marnewick is a Research Professor of Biochemistry in the Faculty of Health and Wellness Sciences, Cape Peninsula University of Technology, Cape Town, South Africa and member of various Institutional committees of the university. Her main research focus for the past 17 years has been the health promoting properties of rooibos and honeybush, two indigenous herbal teas, with specific focus on chemoprevention. The studies Prof Marnewick has conducted made novel contributions to the field and resulted in the first scientific evidence on the cancer & oxidative stress-modulating properties of rooibos and honeybush. She has authored/co-authored a number of peer reviewed journal publications, book chapters, international and national conference presentations and several lay publications. She has also successfully supervised/co-supervised nine masters and eight doctoral candidates enrolled not only at CPUT, but also at neighbouring universities. Currently she serves as editorial board member for two international journals and as reviewer for thirteen such journals.

Scientific Program

Monday, July 27

8:15 – 9:00 hours	Registration
9:00 – 9:45 hours	Inauguration and Welcome addresses
9:45 – 10:00 hours	Tea break
10:00 – 13:30 hours	Session 1 - Plenary Session: Oxidative Stress and Health *Chair – Prof Okezie I Aruoma (USA) & Prof* ***Roy A Jensen (USA)***
10:05 – 10:45 hours	Keynote address: The concept of oxidative stress in biology and Medicine - *Helmut Sies, Germany*
10:45 – 11:10 hours	Local and systemic oxidative stress control inflammation in bullous pemphigoid, a skin auto-immune disease - *Frank Antonicelli, France*
11:10 – 11:35 hours	Oxidative Stress in type 2 diabetes – Focus on the Role of AGEs - *Emmanuel Bourdon, Réunion, France*
11:35 – 12:00 hours	Antioxidant and anti-inflammatory benefits of plant polyphenols on adipose cells exposed to oxidative stress during obesity - *Marie-Paule Gonthier, Réunion, France*
12:00 – 12:25 hours	miRNA in resolution of inflammation: Small players with big role - *Sashwati Roy, USA*
12:25 – 12:50 hours	Redefining traditional profiles in chemical pathology: Incorporating the antioxidant hypothesis - *John Anetor, Nigeria*
12:50 – 13:05 hours	Questions, discussion and conclusion
13:05 – 13:50 hours	*Lunch*
13:50 – 18:05 hours	Session 2 - Plenary Session: Natural products and Traditional medicine *Chair – Prof Helmut Sies (Germany) & Prof Theeshan Bahorun (Mauritius)*
13:50 – 14:15 hours	Safety and Efficacy of a Novel, Patented *Trigonella foenum-gracium* seed extract (Furocyst) in Polycystic Ovary Syndrome in female subjects - *Debasis Bagchi, USA*
14:15 – 14:40 hours	Rooibos: the human perspective - *Jeanine Marnewick, South Africa*
14:40 – 15:05 hours	Bioefficacy of non-edible parts of *Punica granatum*: From antioxidant, antibacterial to apoptotic inducing effects - *Vidushi S Neergheen-Bhujun, Mauritius*

Scientific Program

15:05 – 15:30 hours	New Targets for therapeutics in osteoarthritis: Marine compounds and Gla rich proteins - *Dina Simes, Portugal*
15:30 – 15:45 hours	Tea break
15:45 – 16:10 hours	African traditional medicinal plants and the management of chronic diseases - *Olatunde Farombi, Nigeria*
16:10 – 16:35 hours	DNA damage induced by oxidative stress in hepatic iron overload disease, esophageal and prostate cancers - *Kensese Mossanda, South Africa*
16:35 – 17:00 hours	Efficacy of a Novel Pygeum Extract (CR002) on testosterone-induced Benign Prostatic Hyperplasia (BPH) in male Wistar rats - *Manashi Bagchi, USA*
17:00 – 17:25 hours	Neem seed kernel synthesized silver nanoparticles against *Anopheles stephensi* and *Plasmodium falciparum* - *Kadarkarai Murugan, India*
17:25 – 17:50 hours	Questions, discussion and conclusion

Tuesday, July 28

8:30 – 10:15 hours	**Special Session - *Hosted by Bioculture Ltd*: Non-Human Primate Contributions to Biomedicine: Past, Present and Future** ***Chair: Dr Vidushi Neergheen Bhujun (Mauritius)***
8:30 – 8:50 hours	A brief history of primate research: Global health improvements and ethical challenges - *Paul Honess, Mauritius*
8:50 – 9:10 hours	Free radical biology in the service of animal welfare - *Paul Honess, Mauritius*
9:10 – 9:35 hours	The biodiversity of Mauritius and impact resulting from anthropogenic activities including introduction of alien pest species such as the long-tailed macaque, *Macaca fascicularis* - *Vincent Florens, Mauritius*
9:35 – 10:00 hours	The high value of long-tailed macaques (*Macaca fascicularis*) of Mauritian origin in biomedical research - *Nada Padayatchy, Mauritius*
10:00 – 10:15 hours	Questions, discussion and conclusion
10:15 – 10:30 hours	Tea Break
10:30 – 13:30 hours	**Session 3 - Plenary Session: Cancer – risk factors and management** ***Chair –Prof Faadiel Essop (South Africa) & Prof Debasis Bagchi (USA)***
10:30 – 11:10 hours	**Keynote address: Cancer - The emerging global threat - *Roy Jensen, USA***
11:10 – 11:35 hours	Targeting prolactin receptor: New anti-psychotic approach to suppress cancer stem cells - *Shrikant Anant, USA*
11:35 – 12:00 hours	Anti-inflammatory, Proresolving, and Cancer Chemopreventive Effects of Docosahexaenoic Acid - *Young-Joon Surh, South Korea*
12:00 – 12:25 hours	Reach to recovery- An outreach program for cancer patients by cancer survivor patients - *Savita Bundhoo, Mauritius*

Scientific Program

12:25 – 12:50 hours	Biomarker testing for ER/PR/HER-2 receptor status in female breast cancer cases in the Republic of Mauritius- *Shyam Manraj, Mauritius*
12:50 – 13:15 hours	Questions, discussion and conclusion
13:15 – 14:15 hours	*Lunch*
14:15 - 16:15 hours (Hall 1)	***Session 4: Parallel Session A - Molecular nutrition, Molecular Biology, Methodology approaches and Environmental Health** *Chair - **Prof Karl Heinz Wagner (Austria) & Prof Jeanine Marnewick (South Africa)***
14:15 – 14:30 hours	Kolaviron resolves influenza virus-induced pulmonary and splenic cytopathic /pathologic assault by restoring inflammation and redox perturbation – *Ifeoluna Awogbindin, Nigeria*
14:30 – 14:45 hours	Marine natural products research at UCT: Exploring the chemical diversity and biomedicinal potential of Southern African marine invertebrates - *Suthananda Sunassee, South Africa*
14:45 – 15:00 hours	Benzo(a)Pyrene triggers key players of early cellular and molecular events of colon carcinogenesis in mice – *Babajide Ajayi , Nigeria*
15:00 – 15:15 hours	Is nutrition education effective in promoting dietary quality & fruit and vegetable intake among Mauritian adults? - *Yashvee Dunneram, Mauritius*
15:15 – 15:30 hours	Synthesis of carbon nanotubes and its application – *Unmesha Ray, India*
15:30 – 15:45 hours	Validation of a manual oxygen radical absorbance capacity assay in accordance with ISO 17025 technical requirements – *Olivia Parbhunath, South Africa*
15:45– 16:00 hours	Exposure to low doses of silver nanoparticle causes renal damage in adult zebrafish Daniorerio – *Emily Grace Okuthe, South Africa*
16:00 – 16:15 hours	Questions, discussion and conclusion
16:15 – 17:30 hours	*Tea break, Poster Viewing and Evaluation*
19h30- 22h30	***Gala Dinner at Le Suffren***
14:15 - 16:15hours (Hall 2)	***Session 4: Parallel Session B - Molecular Nutrition, Molecular Biology, Methodology Approaches and Environmental Health** *Chair - **Prof Olatunde Farombi (Nigeria) & Prof Kensese Mossanda (South Africa)***
14:15 – 14:30 hours	A fuzzy mathematical framework to medical diagnosis - *Yannick Désiré Tangman, Mauritius*
14:30 – 14:45 hours	Bio-mining the medicinal treasures of the Mauritian sea: An unexplored reservoir of anti-bacterial, anti-oxidative and anti-proliferative agents from four shallow water Mauritian sponge species – *Rima Beesoo, Mauritius*
14:45 – 15:00 hours	Rooibos (*Aspalathus linearis*) offers protection against ischaemia/reperfusion injury in isolated perfused rat hearts – *Dirk Bester, South Africa*

Scientific Program

15:00 – 15:15 hours	The effects of *Tulbaghia violacea* Harv on blood glucose and antioxidant status in streptozotocin induced diabetic rats – *Kimane Joseph, South Africa*
15:15 – 15:30 hours	The antioxidant capacity and bioavailability of rooibos (*Aspalathus linearis*) flavonoids in human plasma following an acute dose of a fermented rooibos supplement – *Liana van der Westhuizen, South Africa*
15:30 – 15:45 hours	Phytochemical analysis and *in vitro* bioactivity of Aloe species endemic to South West Indian Ocean Islands – *Laura Lallemand, Réunion, France*
15:45– 16:00 hours	Influence of glycation of albumin on its binding properties to Liraglutide and Detemir, two drugs classically used in the treatment of diabetes – *Joël Couprie, Réunion, France*
16:00 – 16:15 hours	Phytochemical analysis and antibacterial evaluation of aqueous and organic solvent-extracts of *Bidens pilosa* L. (Asteraceae) – *Collins Njume, Réunion, South Africa*
16:15– 16:30 hours	Questions, discussion and conclusion
16:30 – 17:30 hours	*Tea break, Poster Viewing and Evaluation*
19:30 - 22:30 hours	*Gala Dinner at Le Suffren*

Wednesday, July 29

9:00 – 10:30 hours HALL 1	*Session 5: Parallel Session A - Molecular Nutrition, Molecular Biology, Methodology Approaches and Environmental Health *Chair: Prof Young-Joon Surh (South Korea) & Prof Sashwati Roy (USA)*
9:00 – 9:15 hours	*Morinda citrifolia* fruit extracts modulates H_2O_2- induced oxidative stress in human liposarcoma SW872 cells – *Zaina Ruhomally, Mauritius*
9:15 – 9:30 hours	The effects of multivitamin-multimineral supplementation in the spontaneously hypertensive rat model - *Rosemarie Höfler, South Africa*
9:30 – 9:45 hours	Mushrooms in the fight against cancer: Biochemical and molecular evidence - *Srishti Ramsaha, Mauritius*
9:45 – 10:00 hours	An elicitation study of the condom use behaviour and intentions of migrants youth in south Africa - *Johannes John-Langba, South Africa*
10:00 – 10:15 hours	A fuzzified quantitative methodological approach for environmental health Assessment – *Chandradeo Bokhoree, Mauritius*
10:15 – 10:30 hours	Questions, discussion and conclusion
10:30 – 10:45 hours	Tea Break
9:00 – 10:30 hours HALL 1	*Session 5: Parallel Session B - Molecular Nutrition, Molecular Biology, Methodology Approaches and Environmental Health *Chair: Prof John Anetor (Nigeria) & Prof Emmanuel Bourdon (Réunion, France)*
9:00 – 9:15 hours	Simple green synthesis of water soluble type II CdTe/CdSe nanoparticles and their use in cellular imaging – *Vuyelwa Ncapayi, South Africa*
9:15 – 9:30 hours	High-density lipoproteins: more than cholesterol transporters – *Olivier Meilhac, Réunion, France*

Scientific Program

9:30 – 9:45 hours	Kolaviron, a biflavonoid of *Garcinia kola* seed mitigates ischaemic/reperfusion injury by up-regulation of pro-survival and down-regulation of apoptotic signaling pathways – *Ademola Oyagbemi, Nigeria*
9:45 – 10:00 hours	Photo-physiological and biochemical basis of thermo-tolerance in four scleractinian corals exhibiting differential bleaching susceptibility from Okinawa, Japan – *Ranjeet Bhagooli, Mauritius*
10:00 – 10:15 hours	Seropositivity and associated differences in infecting strains and biomolecular risk markers suggest for a role for *Helicobacter pylori* in non-communicable diseases in Mauritius – *Susheela Biranjia-Hurdoyal, Mauritius*
10:15 – 10:30 hours	Questions, discussion and conclusion
10:30 – 10:45 hours	Tea Break
10:45 – 13:20 hours	Session 6 - Plenary Session: Nutrition, Wellness and drug development *Chair – Prof* ***John Anetor (Nigeria)*** *& Prof Sandile Songca (South Africa)*
10:45– 11:25 hours	Keynote Address: Nutrition, Genomics and Human Health: A complex mechanism for wellness - *Okezie I Aruoma, USA*
11:25 – 11:50 hours	Bilirubin metabolism in the development and prevention of chronic diseases: antioxidative effects and beyond - *Karl Heinz Wagner, Austria*
11:50 – 12: 15 hours	Treating the Cognitive and Social Dysfunction Effects of Type 2 Diabetes - *Joseph Indelicato, USA*
12:15 – 12:40 hours	Sugar and hearts and all things not so nice - *Faadiel Essop, South Africa*
12:40 – 13:05 hours	Screening and detection of mutations in exon1 and exon6 region of ext1 gene of a multiple hereditary exostoses affected proband - *Ajit Gangawane, India*
13:05-13:20 hours	Discussion and Break off for lunch
13:20-14:05 hours	*Lunch*
Plenary Session 6: (Continued)	*Chair – Dr Ranjeet Bhagooli (Mauritius) & Prof* ***Kadarkarai Murugan (India)***
14:05 – 14:30 hours	Nano-drug formulations and combinations with bioactive compounds/phytochemicals - *Archana Bhaw-Luximon, Mauritius*
14:30 – 14: 55 hours	Photodynamic Therapy, past present and future - *Sandile Songca, South Africa*
14:55 – 15: 20 hours	Membrane progestin receptor (mPR) a possible target for new drugs- *Toshinobu Tokumoto, Japan*
15:20 – 15:45 hours	Green synthesis, characterization and application of semiconductor and silver nanostructures - *Oluwatobi S. Oluwafemi, South Africa*
15:45 – 16:00hours	Questions, discussion and conclusion
16: 00– 16:45 hours	Closing: *Conference closure, announcement of winners for Young Investigators Award (Poster and Oral presentations)*

Abstracts for Oral presentations

Session 1: Oxidative Stress and Health

KEYNOTE ADDRESS

The concept of oxidative stress in biology and medicine

Helmut Sies, Institute of Biochemistry and Molecular Biology, and Leibniz Research Institute of Environmental Medicine, Heinrich-Heine-University Düsseldorf, Düsseldorf, Germany

The concept of oxidative stress has been introduced in 1985, now 30 years ago, and a recent commentary dealt with the merits and pitfalls of this concept[1]. There are merits and pitfalls. Among the merits is the notion which is elicited by the two terms, namely (1) that aerobic metabolism is a steady-state characterized by a redox balance, as denoted by the term 'oxidative' (and implicitly, reductive), and (2) that associated strains in the balance can occur, as denoted by the term 'stress'. The latter evokes the occurrence of biological stress responses. Current stress response research is in full bloom, concerning the functioning of central master switches, for example NF-kappaB or Nrf2/Keap1, or OxyR in prokaryotes. Much of redox signaling occurs through molecular redox switches, with significance of particularly reactive cysteines in specialized proteins. Hydrogen peroxide has been known as a normal metabolite under aerobic conditions in living cells[2], occurring at about 10 nM intracellular concentrations. A major contributor is the mitochondrial respiratory chain, notably Complexes I and III. In liver, H2O2 is produced at 50 nmol/min/g of tissue, which is about 2% of total oxygen uptake at steady state. Metabolically generated H_2O_2 emerged from recent research as a central hub in redox signaling and oxidative stress[3]. Regarding pitfalls, 'oxidative stress' has been "over-stressed", both in the public perception and in research circles. In research, simply to talk of 'exposing cells or organs to oxidative stress' should be discouraged; instead, the exact molecular conditions need to be identified. Even more important, in transposing redox considerations into medicine, concrete molecular oxidation-reduction descriptions are to be preferred. A related pitfall is the use of ROS, which stands for reactive oxygen species, where again the chemical involved should be focused on whenever possible[1]. It is worth pointing out that the major burden of antioxidant defense is carried by antioxidant enzymes, not by small-molecular-weight compounds such as antioxidant vitamins[4]. Thus, the patterns of antioxidant enzymes governed by redox sensing and redox signaling deserve more attention. There are important implications for redox medicine, e.g. relating to aging, cell proliferation and cancer, intermediary metabolism (diabetes), nutrition, cardiovascular research, and the circadian rhythm.

[1]Sies H. Oxidative stress: a concept in redox biology and medicine. *Redox biology*. 2015;4:180-3.
[2]Sies H, Chance B. The steady state level of catalase Compound I in isolated hemoglobin-free perfused rat liver. *FEBS Lett*. 1970;11:172-6.
[3]Sies H. Role of metabolic H^2O^2 generation. Redox signaling and oxidative stress. *J Biol Chem*. 2014; 289:8735-41.
[4]Sies H. Strategies of antioxidant defense. *Eur J Biochem*. 1993;215:213-9.

Local and systemic oxidative stress control inflammation in bullous pemphigoid, a skin autoimmune disease

Frank Antonicelli, Department of Dermatology, University of Reims, France

Bullous pemphigoid (BP) is an *autoimmune blistering disease* typically affecting the elderly. BP is not only the most common disorder within the pemphigoid group but also represents the most frequent autoimmune blistering disease in general. The incidence of BP has been estimated around 22 cases per million persons per year in France. This disorder is characterized by an autoantibody response toward *BP180* and *BP230,* two components of the hemidesmosome structure, resulting in subepidermal blistering. The disease usually begins with a nonbullous phase in which the manifestations are nonspecific, with pruritus of variable severity accompanied or not by excoriated, eczematous, lesions. Thus BP features may almost mimic the entire spectrum of the cutaneous inflammatory conditions. Histologic examination of a skin biopsy specimen reveals a subepidermal blister with superficial dermal inflammation consisting of lymphocytes, macrophages, neutrophils and eosinophils. Most of infiltrating cells line up along the basal membrane, and result in the release of several effector molecules, including ROS and proteolytic enzymes, leading to the disruption of the dermal-epidermal junction. Among the several proteases involved in the pathological process, the *matrix metalloproteinase MMP-9* is believed to proteolytically inactivate the α1-proteinase inhibitor, a physiologic inhibitor of neutrophil elastase (NE), therefore allowing unrestrained activity of NE. During the inflammatory phase, both MMP-9 and NE are thought to degrade various extracellular matrix proteins, including the extracellular domain of BP180, potentially releasing or decrypting antigenic peptides and therefore enhancing the extent and severity of the lesions through the generation of an autoimmune feedback loops thereof. Although inflammatory molecules are the endpoint effectors of the physiopathological mechanisms leading to blister formation, most nonsteroidal anti-inflammatory drugs are not used to treat BP patients as they can facilitate the onset of the disease. Consequently, corticosteroids are routinely used albeit their well-known undesired side effects. Glucocorticoid receptors stimulation affects gene expression either through direct DNA binding, mechanism mostly responsible for the undesired side effects, or through cross talk with other transcription factors, such as NF-B and AP-1. This latter mechanism known as glucocorticoids transrepression mechanism is considered to be responsible for the anti-inflammatory effects. Of interest, Compound A (CpdA) was recently characterized as a fully dissociated nonsteroidal anti-inflammatory agent, acting as a monomer via activation of the glucocorticoid receptor, down-regulating NF-κB-mediated transactivation without supporting glucocorticoid-driven side effects. We will see here how CpdA can down-regulate MMP-9 activity elicited via different stimuli, and therefore how beneficial such treatment could be for BP patients.

Oxidative Stress in type 2 diabetes - Focus on the role of Advanced Glycation Endproducts (AGEs)

Emmanuel Bourdon, UMR DéTROI – Inserm U1188, Diabète athérothrombose Thérapies Réunion Océan Indien, Université de La Réunion, La Réunion - France

Diabetes is a major health problem that is usually associated with obesity, together with hyperglycemia and increased advanced glycation end product (AGEs) formation. Elevated AGEs elicit severe downstream consequences following to receptors of AGEs (RAGE). This includes oxidative stress and oxidative modifications of biological compounds together with increased inflammation. Albumin (a major circulating protein) undergoes increased glycoxidation in diabetes and may represent an important biomarker for monitoring diabetic pathophysiology. The objectives of our work are to elucidate the impact of glycoxydation on albumin structure and functional properties such as antioxidant activities and drug binding capacities. Interaction of glycoxidized albumin-derived AGEs on cellular and tissue pathophysiology are also investigated in terms of oxidative damages induced. Our studies reveal structural damages induced by the glycation of commercial Bovine Serum albumin (BSA) or blood-purified Human Serum albumin (HSA). Occurrence of oxidative modifications was found to be enhanced in glycated BSA and HSA, after determining of their free thiol groups content, electrophoretic migration, and the carbonyl content of the proteins and on their antioxidant activities as well. In addition, we evidenced the impact of *in vitro* and *in vivo* glycation on albumin drug binding capacities. For this, we compared structural and functional properties of albumin purified from diabetic patients with *in vitro* glycated albumin models. Glycation-induced modifications on HSA, including redox state and ketoamine contents, were investigated in parallel with HSA binding to Warfarin and Ketoprofen. High-performance liquid chromatography was used to determine the free drug concentrations and dissociation constants according to the *Scatchard method*. Oxidation and glycation levels were found to be enhanced in albumin purified from diabetic patients or glycated with glucose or methylglyoxal, after determination of their ketoamine, free thiol, amino group and carbonyl contents. In parallel, significant impairments in the binding affinity of in vitro and in vivo glycated albumin were observed, as indicated by the higher dissociation constant values and confirmed by higher free drug fractions. Also some deleterious pathophysiological effects of glycated albumin on primary cultures of human adipose cells and human adipocytes, liver and monocytes cell lines as well were identified. Links between albumin modifications with the oxidative impact on the protein structures and on cell pathophysiology were clearly established. Furthermore, an overgeneration of intracellular reactive oxygen species, impairments in proteasomal activities, enhanced RAGE expression and an accumulation of carbonylated proteins in glycated-albumins treated cells were observed. Such damaging effects were shown to be blunted with the co-treatment of nutritional antioxidants thereby further implicating oxidative stress in this process. Recent data obtained in our laboratory showed enhanced oxidative damages in the liver and adipose tissues isolated from transgenic diabetic mice (Db/Db strain). These damages were correlated with a higher formation of albumin-derived AGEs in the Db/Db mice. Taken together, these data bring new evidences for an association between albumin glycoxidative damage with the progression of diabetes disorders at the adipocytes and hepatocytes levels. Even if our work needs further investigation, we propose that *albumin redox state* could represent a very useful biomarker for monitoring diabetic physiopathology.

Antioxidant and anti-inflammatory benefits of plant polyphenols on adipose cells exposed to oxidative stress during obesity

Sage FL, Marimoutou M, Septembre-Malaterre A, Hatia S, Robert-Da Silva C, Meilhac O, Gonthier MP

Diabetes, Atherothrombosis and Therapies from Réunion & Indian Ocean Group - INSERM U1188, University of La Réunion, France

(Presenting Author: Marie-Paule Gonthier)

Obesity is defined as a chronic disease characterized by an abnormal excessive fat accumulation within the white adipose tissue. It may contribute to an increase in the production of reactive oxygen species (ROS) and a decrease in the endogenous antioxidant defense system in adipose cells. Obesity-related oxidative stress deregulates the adipose tissue function by damaging the secretion of leptin and adiponectin, known as major adipokines involved in insulin sensitivity. Adipose tissue development based on preadipocyte proliferation and differentiation into adipocyte responsible for fat storage, can also be profoundly altered by the abnormal production of ROS. While ROS like H_2O_2 could be essential to initiate signaling cascades involving insulin and peroxisome proliferator-activated receptor gamma (PPARγ) transcription factor for glucose and fatty acid metabolism during adipogenesis, an excessive and inappropriate redox balance may exert an anti-adipogenic action. Moreover, prolonged oxidative stress activates nuclear factor κappa B (NFκB) signaling pathway and elevates the secretion of pro-inflammatory molecules such as tumor necrosis factor alpha (TNFα), interleukin-6 (IL-6) and monocyte chemoattractant protein-1 (MCP-1), leading to insulin resistance and type 2 diabetes. Recent studies indicate that pro-inflammatory adipokines' over-production could also result from the immune response of adipose tissue to an increased level of the lipopolysaccharide (LPS) endotoxin from bacteria. Thus, the biological effect of natural compounds like plant polyphenols able to increase the antioxidant and anti-inflammatory capacities of the body is of high interest. Polyphenols constitute the most abundant antioxidant micronutrients provided by fruits and vegetables. There is more and more evidence that the consumption of medicinal plants could contribute to increase polyphenol intake and improve obesity-related insulin resistance and type 2 diabetes. Our work aimed to evaluate for the first time the effect of polyphenols from medicinal plants of Réunion Island on adipose cells exposed to H_2O_2 or LPS from *E. coli* or *P. gingivalis* bacteria. We found that medicinal plants including *Antirhea borbonica*, *Doratoxylon apetalum* and *Curcuma longa* contained high levels of polyphenols identified as chlorogenic acid, catechin, epicatechin, quercetin, kaempferol or curcuminoids, and exhibited free radical-scavenging capacities. Polyphenol-rich plant extracts protected adipose cells against H_2O_2 or LPS-induced ROS production. They improved insulin-mediated lipid accumulation and adipocyte differentiation through an up-regulation of leptin and adiponectin release. Plant polyphenols also attenuated H_2O_2 or LPS-mediated secretion of TNFα, IL-6 and MCP-1 pro-inflammatory adipokines. Such effects were associated with an enhanced production of PPARγ and antioxidant enzymes comprising superoxide dismutase and catalase. Moreover, plant polyphenols protected against the elevated expression of genes coding for NFκB and toll like receptors (TLRs) 2/4 involved in pro-inflammatory signaling pathways. Altogether, our data highlight that plant polyphenols may improve oxidative stress and inflammation in adipose cells, and thus exert beneficial effects against obesity and related disorders such as insulin resistance.

miRNA in resolution of inflammation: small players with big role

Sashwati Roy, Departments of Surgery, Center for Regenerative Medicine and Cell Based Therapies and Comprehensive Wound Center, Davis Heart and Lung Research Institute, The Ohio State University Wexner Medical Center, Columbus, Ohio 43210, USA

Inflammation is a protective response of the body to infection or injury. Given that miRNAs are fundamental to the post-transcriptional control of gene expression, it is not surprising that role of specific miRNAs in the immune and inflammatory response has been discovered. The best-characterized miRNA for inflammation are miR-146, miR-21 and miR-155, all of these have been shown to be strongly induced in multiple cell types by proinflammatory stimuli following tissue injury. At an injury-site, efficient clearance of apoptotic cells by wound macrophages or efferocytosis is a pre-requisite for the timely resolution of inflammation. Emerging evidence indicates that miR-21 may regulate the inflammatory response. The significance and mechanisms of miR-21 in the regulation of efferocytosis mediated suppression of innate immune response; a key process implicated in resolving inflammation following injury will be elucidated.

The research in the authors' laboratory is funded by NIDDK R01 DK076566 to SR.

Redefining traditional profiles in chemical pathology: incorporating the antioxidant hypothesis

John I. Anetor, Toxicology & Micronutrient Metabolism Unit, Department of Chemical Pathology, College of Medicine, University of Ibadan, Ibadan, Nigeria

Chemical pathology (clinical chemistry) is the discipline of laboratory medicine responsible for the detection of alterations in the chemical constitution and biochemical mechanisms, which ensure health, reflecting disease. Disease itself is a pattern of responses to some insult or injury resulting in disturbed function or structure. It is difficult to indicate precisely the point of transition from health to disease state. Pathological changes including metabolic and molecular perturbations with potential to cause disease are present in healthy populations. Reactive oxygen species (ROS) such as hydroxyl radicals can damage DNA. If nucleotide bases are altered or destroyed mutation can ensue, and if some genes are mutated cancer or other degenerative disease can set in. Biochemical profiles or panels such as liver function tests (LFTs), bone profile, lipid profile etc., have served as biomarkers, biochemical or genetic features that can be used to measure the progress of disease or the effect of treatment. The antioxidant hypothesis, which posits that oxidative damage by ROS can have long-term implications, at least in part fulfills the definition of a biochemical panel. Antioxidants refer to substances capable of protecting biomolecules from the damaging effects of reactive species. Oxidative stress, imbalance between bioavailable antioxidants and reactive species is widely recognized as an accompanying component of almost all pathological states. It is therefore surprising that while the practice of using biochemical panels has been traditionally employed to identify onset or presence of disease, the role of the antioxidant system has been neglected. Total antioxidant status determination along with the biochemical profiles may be useful. It may be beneficial in identification of patients with pre-pathologic (occult pathologic) state. Alternatively, key components of the antioxidant system; glutathione (GSH), zinc, uric acid, ascorbic acid, α-tocopherol may be selected for incorporation. Glutathione is particularly important. It acts as a scavenger for damaging oxidative metabolites in the cell. Very importantly, incorporating GSH promises to be a good predictor of disease progression and severity. The antioxidant status may indeed be at least in part the explanation for the variable presentations of patients with the same disease, aside from the genetic component. By efficiently scavenging free radicals, antioxidants prevent, damage to DNA, lipids and proteins including antibodies with far reaching implications, including immunocompetence and quicker recovery from disease. Many biochemical profiles are normal, but may not necessarily exclude disease. Incorporating the antioxidant component to traditional biochemical profiles may help the physician to more confidently rule out disease, indicate further investigations and or reassure the patient.

Session 2: Natural products and traditional medicine

Safety and Efficacy of a Novel, Patented *Trigonella foenum-gracium* seed extract (Furocyst) in Polycystic Ovary Syndrome in female subjects

Bagchi D[1,2], Swaroop A[2], Kumar P[3], Bagchi M[2]

[1]Pharmacological & Pharmaceutical Sciences, University of Houston College of Pharmacy, Houston, TX, USA

[2]Research and Development, Cepham Research Center, Piscataway, NJ, USA

[3]Research and Development, Chemical Resources, Panchkula, Haryana, India

(Presenting Author: Debasis Bagchi)

Polycystic ovary syndrome (PCOS) is the most prevalent hormonal disorder among women of reproductive age causing irregular menstrual cycles, excessive body or facial hair, miscarriage and infertility. Infertility is one of most common PCOS symptoms. Because the symptoms of PCOS are seemingly unrelated to one another, the condition is often overlooked and undiagnosed. We conducted an open label, one-arm, non-randomized, post-marketing surveillance study in 50 premenopausal women (18-45 years, BMI<42) diagnosed with PCOS using a novel *fenugreek seed extract* (Furocyst, 2 capsules of 500 mg each/day) over a period of 90 consecutive days to determine its efficacy on the reduction of ovarian volume and the number of ovarian cysts. Ethical committee approval was obtained for this study. *Furocyst* caused significant reduction in ovary volume. Approximately 46% of study population showed reduction in cyst size, while 36% of subjects showed complete dissolution of cyst. It is important to mention that 71% of subjects reported regular menstrual cycle on completion of the treatment and 12% of subjects got pregnant. Overall, 94% of patients were benefitted from this study. Significant increases in luteinizing hormone (LH) and follicular stimulating hormone (FSH) levels were observed compared to the baseline values. Extensive blood chemistry, hematological and biochemical assays demonstrated the broad-spectrum safety. *Furocyst* caused significant decrease in both ovarian volume and the number of ovarian cysts. In summary, Furocyst was efficacious in ameliorating PCOS.

Rooibos: the human perspective

Jeanine Marnewick, Institute of Biomedical and Microbial Biotechnology, Cape Peninsula University of Technology, PO Box 1906, 7538, Bellville, South Africa

Rooibos, also known as "redbush" or "redtea", is a herbal tisane brewed from the South African fynbos plant *Aspalathus linearis* (Brum. f) Dahlg. In South Africa this beverage has a long history of use (since the 1700s) and is fast gaining worldwide popularity as a health beverage. Rooibos herbal tea contains a unique polyphenolic blend; it is naturally caffeine free; and low in tannins when compared to Ceylon teas. The past 15 years have yielded a plethora of published research in which *in vitro, ex vivo* and experimental animal models have been used to elucidate the bioactivities. Recent years have seen the publication of a few human intervention studies as well, mostly focusing on the bioavailability/biotransformation of the main rooibos flavonoids. These studies have reported on a number of metabolites being formed after ingestion, specifically metabolites of the main rooibos flavonoid components, as well as a low bioavailability. Despite this low bioavailability, the initiation of other mechanisms that may contribute to the bioactivity of the rooibos constituents should definitely be considered. It is therefore not surprising that many studies have proposed the use of rooibos as a "preventive strategy" for non-communicable diseases such as heart disease, diabetes and certain cancers. Although only a handful of human studies have been reported in the literature to date, all of the studies involving oxidative stress have supporting data specifically showing the significant decrease of oxidative lipid damage and increase of the redox status of glutathione in cohorts of people with increased risk factors for disease development and who have been consuming the traditional rooibos herbal tea for 6-8 weeks. In addition, a favorable modulation of the lipid profile of the participants was also shown in two of these studies, with both chronic consumption as well as a single oral dose of traditional/fermented rooibos herbal tea. When considering other mechanisms of protection/prevention, one study showed a single dose of traditional rooibos herbal tea to inhibit the angiotensin converting enzyme (ACE) activity in healthy volunteers after 30 and 60 minutes of ingesting the beverage, with no effect on nitric oxide levels, blood pressure or heart rate. These studies will be discussed in greater detail in the presentation. Many questions remain to be answered, but although still small in numbers, results from human intervention studies are hopeful and supports the popular use of this endemic herbal tea, rooibos. Future investigations are encouraged to further elucidate the role of rooibos in health promotion.

Bioefficacy of non-edible parts of *Punica granatum*: From antioxidant, antibacterial to apoptotic inducing effects

Neergheen-Bhujun VS[1], Rummun N[1], Somanah J[2], Ramsaha S[1], Bahorun T[2], Kiraz Y[3], Baran Y[3]

[1]Department of Health Sciences, Faculty of Science and ANDI Centre of Excellence for Biomedical and Biomaterials Research, University of Mauritius, Réduit, Mauritius

[2]ANDI Centre of Excellence for Biomedical and Biomaterials Research, University of Mauritius, Réduit, Mauritius

[3]Izmir Institute of Technology, Department of Molecular Biology and Genetics, Urla, Izmir, Turkey

(Presenting Author: Vidushi S Neergheen-Bhujun)

Punica granatum L. has a long-standing culinary and medicinal traditional use in Mauritius. However, the non-edible parts of the plant were of interest in this study partly because a number of these are food-processing waste. This prompted a comparative study to determine the bioefficacy of the flower, peel, leaf, stem, and seed extracts of the Mauritian *P. granatum*. The *in vitro* antioxidant and antibacterial effect against *Streptococcus mutans*, *Streptococcus mitis*, and *Lactobacillus acidophilus* were determined. In addition, anti-proliferative and apoptotic inducing effects of the extracts against U266 multiple myeloma cells were evaluated. The cytotoxic effects of *P. granatum* leaves, stem and flower extracts on U266 cells were conducted via MTT cell proliferation assay. The apoptotic effects were tested by loss of mitochondrial membrane potential and location of phosphotidylserine by using JC-1 mitochondrial membrane potential detection kit and Annexin V-FITC kit, respectively. Cell cycle analyses were conducted by flow cytometry. The peel and flower extracts resulting from organic solvent extraction exhibited the most potent scavenging capacity against hypochlorous acid (0.004 and 0.012 mg air dry weight/mL respectively), hydroxyl radicals scavenging (0.111- 0.220 mg air dry weight/mL repectively), nitric oxide (0.668- 0.396 mg air dry weight/mL respectively). These extracts were also strong Fe(II) ions chelators. Peel extracts also significantly inhibited *S. mutans* ($P < 0.001$), *Streptococcus mitis* ($P < 0.001$), and *Lactobacillus acidophilus* ($P < 0.05$) growth compared to ciprofloxacin. There were dose-dependent decreases in proliferation of U266 cells in response to *P. granatum* extracts. Exposure to the extracts triggered apoptosis with significant increases in loss of mitochondrial membrane potential in U266 cells exposed to the leaves and stem extracts while the flower extract resulted in slight increases in loss of MMP. These results were confirmed by Annexin-V analysis. Flow cytometric analyses also showed that the latter at a concentration of 100 µg/ml increased cell cycle arrest at the S and G2/M phases. This study showed that nonedible parts of cultivated pomegranate that are generally discarded, are bioactive in multiassay systems thereby suggesting their potential use as natural prophylactics. Alternative therapeutic approaches are mandatory and the use of plant extracts are considered interesting against multiple myeloma since existing therapies are unable to cure this clinical condition. The data suggests that the extracts can be envisaged in cancer chemoprevention and calls for further exploration into the potential application of these plant parts.

New Targets for therapeutics in osteoarthritis: Marine compounds and Gla rich proteins

Simes DC[1], Cavaco S[1], Viegas CSB[1], Costa R[1], Rafael MS[1], Laires R[2], Marques V[2], Coelho AV[2], De los Reyes C[3], Zubía E[3]

[1]Centre of Marine Sciences, University of Algarve, Faro, Portugal

[2]Instituto de Tecnologia Química e Biológica António Xavier, Universidade Nova de Lisboa, Portugal

[3]Department of Organic Chemistry, Faculty of Marine and Environmental Sciences, University of Cadiz, Spain

(Presenting Author: Dina Costa Simes)

Osteoarthritis (OA) is a highly prevalent disease in the middle aged and elderly population worldwide. Its pathogenesis is not completely understood, and while disease effective modifying or preventing treatments are not available, therapeutics consists in the administration of anti-inflammatory drugs with several side effects. Osteoarthritis is a whole-joint disease mostly characterized by articular cartilage loss, tissue inflammation, abnormal bone formation and ECM mineralization that can result from basic calcium phosphate crystals deposition and loss of calcification inhibitors contributing for disease progression. Gla-rich Protein (GRP) is a vitamin K-dependent protein suggested to act as a negative regulator of osteogenic differentiation, a modulator of calcium availability in the ECM and a potential inhibitor of soft tissue calcification in connective tissues. Comparative analysis of γ-carboxylation status revealed the prevalence of γ-carboxylated GRP form in healthy control samples, both in cartilage and synovial membrane in contrast to OA-affected tissues suggesting GRP as an additional vitamin K target in OA. Furthermore, in inflamed synovial membranes, GRP accumulation is not restricted to sites of ectopic calcification, suggesting additional roles in osteoarthritic tissue. Our *in vitro* model mimicking the interplay between inflammation and mineralization occurring in OA affected tissues has further unveiled, at a molecular level, the role of Gla-rich protein in OA. Since there is still a urgent need to explore alternative OA therapies, more effective drugs and unconventional anti-inflammatory drugs, marine bioactive compounds represent strong alternative candidates. These compounds, derived from diverse marine organisms, are usually cost-effective, have minimal side effects and are a growing field for the identification of new therapeutical drugs. Marine brown algae compounds, namely secondary metabolites like meroterpenoids, have been described to have significant activity as anti-inflammatory agents. Also, an extract from the algae *Sargassum horneri* seems to have a potential as an osteogenic modulator *in vitro*. Moreover, steroidal glycosides (saponins), abundant in plants, are suggested to exert a pharmacological effect against degeneration of cartilage in OA due to their anti-inflammatory and anti-apoptotic properties in human chondrocytes. More recently, this class of compounds was also found in marine organisms, namely asterosaponins from *Asteroidea* (starfishes), and shown to exhibit a potent anti-inflammatory activity. Based on this information, we have tested selected marine bioactive compounds as anti-inflammatory agents in our i*n vitro* OA, namely 1) selected meroterpenoids from the brown algae *Cystoseira sp.* and well characterized extracts of asterosaponins from the starfish *Marthasterias glacilais* 2) performed an initial screening for anti-inflammatory activity in THP-1 cells 3) pre-treated the culture models with the selected compounds/extracts and evaluate the inflammatory responses following stimulation with Interleukin 1ß (IL-1ß); dexamethasone was used as a positive control Our *in vitro* results confirmed the anti-inflammatory activity of meroterpenoids from a brown algae further supporting its potential use as a new disease modifying OA drug. We are currently performing further experiments to determine the molecular pathways involving GRP in OA and unveiling the targets for these novel disease modifying osteoarthritic marine compounds.

African traditional medicinal plants and the management of chronic diseases

E Olatunde Farombi, Molecular Drug Metabolism and Toxicology Research Laboratories, Department of Biochemistry, College of Medicine, University of Ibadan, Nigeria

Compelling and abounding evidences arising from both pre-clinical and clinical investigations indicate that plant-based diet rich in a wide variety of fruits and vegetables are effective in preventing or reversing premalignant lesions. Thus the search for novel chemopreventive agents of physiological relevance acting on specific and/or multiple molecular and cellular targets hold promise as a rational strategy for the control of health threatening diseases. Antioxidants are considered to bring about their effects by attenuating oxidative events that contribute to the pathophysiology of these diseases. Some phytochemicals, namely, curcumin, genistein, gingerols, lycopene, edotides and shogaols have been largely studied as chemopreventive agents and with potential clinical applications. Epivernodalol characterized from *Vernonia amygdalina (bitter leaf)* exhibited significant antioxidant properties in various model systems, induced phase 2 antioxidant enzymes and was active against skin cancer as demonstrated by its efficacy in HT-144 skin melanoma cell line. Kolaviron, a natural antioxidant biflavonoid isolated from the seeds of *Garcinia kola* (Guttiferae) elicited striking inhibitory effects on diverse biochemical and molecular events associated with the multistage process of carcinogenesis. Specifically, kolaviron up-regulated antioxidant defense capacity, modulated gene expression, signal transduction mechanisms and reduced *in vivo* markers of oxidative damage to lipids, proteins and DNA. Furthermore, kolaviron suppressed Dimethylnitrosamine-induced oxidative damage and expression of cyclooxygenase-2 (COX-2) and inducible nitric oxide synthase (iNOS) by inhibiting nuclear factor kappa B (NF-kB) and activator protein-1 (AP-1) in rat liver. Kolaviron elicited antiproliferative properties by inhibiting the growth and survival of both colon adenoma (LT97) and carcinoma cells (HT29). Kolaviron inhibited the induction of stress-inducible proteins clusterin and heat shock proteins, apoptosis-related proteins, caspase-3 and caspase-9, Fas and Fas-L induced by ethylene glycol monoethyl ether in rat's testes. Moreover, Garcinia kola elicited clinically analgesic/antiinflammatory effects in knee osteaoarthritis patients. These anti-oxidative compounds exert chemopreventive effects by modulating intracellular signaling cascades, stress response and apoptotic proteins and are therefore promising candidates as prophylactic agents in chemoprevention and clinical applications.

DNA damage induced by oxidative stress in hepatic iron overload disease, esophageal and prostate cancers

Mossanda KS[1], Maseko OF[2], Asare GA[3], Gaudji GR[4], Joubert HF[2], Kew MC[4], Segone AM[5]
[1]Directorate of Research Development, Walter Sisulu University, South Africa
[2]Chemical Pathology Department, University of Limpopo-Medunsa Campus, Pretoria, South Africa;
[3]School of Allied Health Sciences, College of Health Sciences, University of Ghana
[4]Urology Department, University of Limpopo-Medunsa Campus, Pretoria, South Africa.
[5]Hepato-Pathology Unit, Faculty of Health Sciences, University of Cape Town

(Presenting Author: Kensese Mossanda)

DNA damage has been associated with oxidative stress induced by some chemicals acting through free radicals after being metabolically activated. During chronic inflammatory hepatic disease or infection, activated macrophages and leucocytes release reactive oxygen and nitrogen species (ROS/RNS), which damage DNA[1], despite a complex mechanism of histone modifications that have evolved to protect DNA from spontaneous breakages[2]. The role of free radicals as primary species causing damage to DNA in the mechanism of carcinogenesis has been confirmed[3]. While we do understand now how overproduction of the reactive 8,9-epoxide of AFB_1, intercalating into DNA strand breaks induced by free radicals assault generated from HBV/HCV, can exacerbate the oxidative stress, which will finally inactivate the p53 tumor suppressor gene in the onset and progression of hepatocellular carcinoma (HCC), the etiology and the molecular mechanism of other types of cancer such as squamous cell carcinoma of the esophagus (SCCE), prostate cancer (PC) are still to be elucidated. In this presentation, we would like to demonstrate the implication of oxidative stress in the extent of DNA damage during the onset and progression of these types of cancers - SCCE due to the *Helicobacter pylori* infection and other non elucidated factors has become the most common cancer in black Southern African men (incidence: 14.5%), PC a multifactorial disease which is the second leading type of cancer causing death in men in Western countries. Its prevalence is also increased in Africa, and HCC (incidence: 23-26%) due to excessive intake of dietary iron as a result of drinking home-brewed in iron pots constitutes a health problem in African countries. It is also due to the ingestion of aflatoxin-contaminated food in conjunction with hepatitis B and/or C. A range of biomarkers of oxidative stress have been evaluated and correlated with the level of 8-hydroxy-2'-deoxy-guanosine (8-OH-dG) measuring the extent of DNA damage and that of 4-Hdroxy-2'-nonenol (4-HNE) measuring the extent of the lipid-peroxidation. Consistent correlation has been observed between DNA damage by the presence in situ (biopsies) of 8-OH-dG, its level in serum/plasma and the extent of other oxidative stress biomarkers (4-HNE, Superoxide dismutase, Glutathione peroxidise) in SCCE, HCC and PC. Despite our progress in earlier detection of these types of cancer, their aetiology still remains not very well understood resulting in a partial efficiency of their prevention. The capacity of Free radicals to damage DNA molecule and to overexpress some oncogenes suggests their implication in the aetiology of these types of cancer and justifies the use of anti-oxidant compounds modulating the expression of these genes for their prevention.

[1]Machida K, Cheng KT, Sung VM, Lee KJ, Levine AM, Lai MM. Hepatitis C virus infection activates the immunologic (type II) isoform of nitric oxide synthase and thereby enhances DNA damage and mutations of cellular genes. *J Virol*. 2004;78:8835-43.
[2]Levin MK, Patel SS. Helicases as Molecular Motors. In: Schliwa M, editor. Molecular Motors Weinheim: Wiley-VCH-Verlag GMbH. 2003;179-98.
[3]Valko M, Izakovic M, Mazur M, Rhodes CJ, Telser J. Role of oxygen radicals in DNA damage and cancer incidence. *Mol Cell Biochem*. 2004;266:37-56.

Efficacy of a Novel Pygeum Extract (CR002) on testosterone-induced Benign Prostatic Hyperplasia (BPH) in male Wistar rats

Bagchi M[1], Swaroop A[1], Kumar P[2], Bagchi D[1,3]
[1]Research & Development, Cepham Research Center, Piscataway, NJ, USA
[2]Research & Development, Chemical Resources, Panchkula, Haryana, India
[3]Pharmacological & Pharmaceutical Sciences, University of Houston College of Pharmacy, Houston, TX, USA

(Presenting Author: Manashi Bagchi)

The efficacy of a novel *Prunus domestica* extract (pygeum extract, CR002) was investigated on testosterone propionate (TP)-induced BPH in male Wistar rats. BPH was induced by subcutaneous administration of TP (3.0 g/kg) over a period of 15 days (interim sacrifice group) and for 21 days (terminal sacrifice group). We evaluated the dose-dependent efficacy (0, 50, 100 and 200 mg/kg body weight/day) of novel *Prunus domestica* extract (CR002) and a control group against BPH, and compared with a reference standard *Prunus Africana* extract (CR001). Extensive clinical examinations were carried out on days 1, 7, 14, 21, 28 and 35 of treatment period to determine the onset, duration and severity of clinical signs. Clinical pathology, hematology, biochemistry and histopathology were performed on days 15 and 35, prior to necropsy. Animals were fasted overnight prior to blood collection. Prostate glands and tissues were examined. On day 36, histopathology of ventral prostrate of control rats demonstrates single layer of columnar mucin secreting epithelial cells and lumen was occupied with eosinophilic secretion. In contrast, CR002 and CR001 groups (100 and 200 mg/kg/day) exhibited no hyperplasia and proliferation of epithelial cells. Prostate histopathology of these treated groups was comparable with control rats. The hyperplasia and hypertrophy of prostrate was reduced to single layered cell indicating the efficacy of CR002 and CR001. Overall, results demonstrate that CR002 exhibits therapeutic efficacy/activity in TP-induced BPH in rats, which is comparable to CR001.

Neem seed kernel synthesized silver nanoparticles against *Anopheles stephensi* and *Plasmodium falciparum*

Murugan K, Panneerselvam C, Amerasan D, Priya A
Division of Entomology, Department of Zoology, School of Life Sciences, Bharathiar University, Coimbatore - 641 046, Tamil Nadu, India

(Presenting Author: Kadarkarai Murugan)

Malaria is a life-threatening disease caused by parasites transmitted to people through the bites of infected mosquitoes. Recently, transmission has strongly increased in urban and semiurban areas, becoming a major international public health concern. In 2013, malaria caused an estimated 584000 deaths, mostly among African children. Malaria is transmitted exclusively through the bites of *Anopheles* mosquitoes. The main control tool against *Anopheles* larvae is represented by treatments with organophosphates and insect growth regulators, with negative effects on human health and the environment. In this scenario, green control tools are a priority. Recently, green-synthesized nanoparticles have been proposed as highly effective larvicidals against mosquito vectors. In this research, we synthesized silver nanoparticles (AgN) using Neem seed kernel (NSKE) as reducing and stabilizing agent. The UV–vis spectrum of the aqueous medium containing silver nanostructures showed a peak at 420 nm corresponding to the surface Plasmon resonance band of nanoparticles. SEM analyses of the synthesized nanoparticles were clearly distinguishable measured 20–35 nm in size. The EDS spectra showed the purity of the material and the complete chemical composition of the synthesized nanoparticles. XRD highlighted that the nanoparticles are crystalline in nature with face centered cubic geometry. The FTIR spectra of AgNPs exhibited prominent peaks at 463.90 cm−1 (C–H bend alkenes), 596.97 cm^{-1} (C–O stretch alcohols), 657.36 cm^{-1} (N–H bend amines), 1,638.68 and 2,120.98cm^{-1} (O–H stretch carboxylic acids), and 3347.53cm^{-1} (N–H stretching due to amines group). In laboratory conditions, the Neem seed kernel extract was toxic against *A. stephensi* larvae and pupae, even at low dosages. LC_{50} were 49.419 ppm (I instar), 74.173 ppm (II instar), 115.974 ppm (III instar), 171.368 ppm (IV instar), and 274.298 ppm (pupae). Green-synthesized silver nanoparticles were highly toxic against *A. stephensi* and LC_{50} were 2.973 ppm (I instar), 4.769 ppm (II instar), 6.785 ppm (III instar), 8.721 ppm (IV instar), and 12.830 ppm (pupae). In addition, we evaluated the anti-plasmodial activity of synthesized silver nanoparticles using Neem seed kernel with the (IC_{50}) values of 27.34 ± 1.24% at 25µg/ml, respectively. Overall, this study adds knowledge about the use of green synthesis of nanoparticles in medical entomology and parasitology, allowing us to propose Neem seed kernel-synthesized for malaria control program seems promising, since they are effective at low doses, and may constitute an advantageous alternative to build newer and safer malaria control tools.

BIOCULTURE
CARING FOR LIFE

Special Session: Non-Human Primate Contributions to Biomedicine: Past, Present and Future

A brief history of primate research: Global health improvements and ethical challenges

Paul Honess, Bioculture Group, Riviere des Anguilles, Mauritius

A brief history of primate research: Global health improvements and ethical challenges
Paul Honess, Bioculture Group, Riviere des Anguilles, Mauritius
Humans have benefitted from close relationships with animals for hundreds of thousands of years. However it has only been in relatively recent times that they have made use of the scientific investigation of animals; their anatomy, physiology and response to disease in attempts to alleviate human suffering. Scientists rapidly realised the value of primates as research models – their evolutionary proximity to humans making them better predictors, or models, of human biology. Systematic studies using primates began in the last century and massive demand for research subject almost caused the extinction of some important wild populations. This resulted in initially ex situ and then latterly in situ breeding centres purpose-breeding animals for biomedical research. Primate research typically follows that using less sentient animals (generally rodents) in which mechanism and proof of principle are established before examining effect and safety in primates. The quality of life of millions of people has rested on progress from primate research. About 50 years ago broader society became more concerned with how we treat animals and research use of animals came under particular scrutiny. The actions of extremists have threatened not only the continued use of primates in research but have also threatened the property, welfare and occasionally lives of those that have committed their careers tostudying primates to aid humanity. This presentation examines the history of primate research and describes key advances. It points to important lessons learnt about the ethics surrounding the use of primates in research.

Free radical biology in the service of animal welfare

Paul Honess, Bioculture Group, Riviere des Anguilles, Mauritius

There is an on-going search for the 'Holy Grail' of techniques to cheaply, quickly, accurately and objectively assess stress and hence animal welfare. Decades of problems over the interpretation of stress hormone data, particularly cortisol metabolites in faeces and urine, have left animal welfare scientists searching for physiological indicators of stress status less ambiguous than hormone assays or simple cell counts. It has long been appreciated that a significant consequence of elevated stress is a decrease in immune competence. One of the new techniques applied to examining this area in respect of stress biology has been the assessment of neutrophil activity, specifically the emission of oxygen free radicals. Experimentally, *in vitro*, exhausting the neutrophils in animals that have been stress or not will result in higher levels of free radical emission in unstressed animals compared to stressed ones due to the presence of more unactivated neutrophils in unstressed subjects; probing Leukocyte Coping Capacity (LCC). This presentation reviews the areas where the LCC assay has illuminated issues relating to animal welfare and in particular will focus on its application to the assessment of primate welfare in captivity. Two studies are examined in detail: the contrast of housing monkeys in cages versus open rooms; and the impact of translocation on a rhesus macaque-breeding colony. The results of these studies include validation of the LCC assay against traditional behavioural and physiological measures of stress and also highlight areas in which the LCC assay presents challenges for common use in animal welfare science.

The biodiversity of Mauritius and impact resulting from anthropogenic activities including introduction of alien pest species such as the long-tailed macaque, *Macaca fascicularis*

Vincent Florens, Department of Biosciences, University of Mauritius, Mauritius

The pristine biodiversity of Mauritius was typical of tropical high oceanic islands–a relatively low diversity but disproportionately important worldwide owing to high levels of endemism. For example, 40 % of the nearly 700 native flowering plant species recorded so far on Mauritius are or were endemic. Although Mauritius was among the last places to be reached by humans, rapid habitat destruction and fragmentation ensued. More than 95 % of the island`s natural habitats was destroyed in less than four centuries of human presence. This situation has largely contributed towards Mauritius having some of the highest rates of extinction in the world. Current habitat destruction, which is often illegal, continues but on a small scale and has even been impacting areas that are protected. However, the main threats to biodiversity are now recognized to come from the impact of various invasive alien species, including plants and animals. The combined effects of all threats to biodiversity has resulted in Mauritius having today one of the most threatened biota in the world; for example about 80 % of its flowering plants would qualify as threatened with extinction, along with all of its surviving endemic bird species. Invasive alien species are particularly problematic for islands like Mauritius because the biota of the island has evolved in the absence of impacts resembling that of these invasive alien species. For example, there were no native mammals apart from bats in Mauritius, and consequently the native biota is poorly adapted to resist impacts caused by deer, rats, monkeys etc. The control or eradication of various invasive species has been shown to be highly beneficial to biodiversity and is a powerful conservation tool. For example, the eradication of rats and rabbits from certain nature reserves has promoted excellent recovery of endemic plants and allowed re-introduction of reptiles previously driven locally extinct. The long-tailed macaque, *Macaca fascicularis*, is one of the invasive alien species that causes substantial damage to the native biodiversity. From a small founder population introduced in the early 17th century, the long-tailed macaque population grew rapidly, exploiting a variety of habitat types on the island. They deliver a variety of direct impacts on several species. For example, monkeys raid nests of endangered endemic birds, feeding on their eggs and chicks. They rip and chew on certain plants, like the larger epiphytic or ground orchids, some of which now only survive out of the reach of monkeys. Monkeys also destroy unripe fruits, flowers and branches of many native plants to the point of virtually halting their natural regeneration. For example, in excess of 95 % of the fruits of the large endemic Tambalacoque tree are destroyed by monkeys before they can ripen. Such impacts sustained during centuries is likely to have contributed much in the observed rarefaction of large trees in the Mauritian forest, which in turn, owing to the role of ecosystem engineer that such large trees have, must have been changing the forest`s conditions resulting in cascading negative impacts on the whole ecosystem.

The high value of long-tailed macaques (*Macaca fascicularis*) of Mauritian origin in biomedical research

Nada Padayatchy, Bioculture Group, Riviere des Anguilles, Mauritius

Long-tailed macaques (Macaca fascicularis) have a wide geographical distribution and extensively overlap with human societies across their natural ranges as well as in the areas where they have colonized through ethnophoresy – the dispersal of animals by humans. The devastating ecological impact of these macaques on the biodiversity of the areas where they have been introduced has long been recognised as well as their pest status as crop-raiders due to their close association with humans in inhabited zones. This species, introduced to Mauritius from Java, more than 400 years ago thrived and quickly reached pest proportions. In 1985, Bioculture (Mauritius) Ltd (BCM) was established to breed and supply the biomedical research world with these non-human primates, already a highly sought after animal for its use as a research model in the bio-medical sciences. The Mauritian population, in addition, presented many advantages over its South-Asian counterpart, first of all, it being a pest population out of its natural range, but also in terms of the health status of the animal, its genetic makeup as well as the gold standard of breeding conditions as pioneered by BCM. The private company is also involved both directly and indirectly in conservation programs within the Madagascar/Mascarene islands Biodiversity hotspot. With a philosophy based on the welfare of the animals and caring for life, BCM has supplied the biomedical research industry with high quality non-human primates that have had a crucial role in the development of treatments against a wide variety of diseases.

Session 3: Cancer – risk factors and management

KEYNOTE ADDRESS

Cancer - The emerging global threat

Roy A Jensen, The University of Kansas Cancer Center, Kansas City, Kansas, USA

Cancer is expected to become the number one cause of death in the 21st Century. This will result from a number of converging factors including decreasing overall mortality due to improved living standards, vaccination for a wide variety of childhood infectious diseases and increasing cancer incidence. In addition, tobacco abuse continues to increase unabated in many parts of the developing and recently developed world with some studies estimating over one billion cases of lung cancer in China alone during this time. While smoking is slowly declining in the US and other western nations, steadily raising obesity rates threaten to overtake tobacco abuse as the biggest cause of cancer in these regions. Thus, cancer prevention and control efforts must be tailored to specific regions to achieve the biggest world-wide impact and need to be cognizant of shifting demographics, social conventions, economic reality, and newly developed potential interventions. As an example, the hepatitis B vaccine and the HPV vaccines are significantly under-utilized in many parts of both the developed and developing world. With implementation of best vaccine practices, we could quite literally save hundreds of thousands, if not millions of lives from hepatocellular carcinoma, cervical carcinoma, and squamous cell carcinoma of the head and neck. The scope of this lost opportunity is truly stunning in nature and has many contributing factors, but certainly ignorance, crippling poverty throughout much of the world, and a failure of many governments to prioritize proven public health interventions are major causes of this unfortunate situation. The good news is that there are ways to address all of these issues, so with education, adequate resources, and political will, we can make significant progress in the 21st century on decreasing the morbidity and mortality from cancer by just doing what we know how to do right now.

Targeting Prolactin Receptor: New Anti-Psychotic approach to suppress Cancer Stem Cells

Shrikant Anant, University of Kansas Cancer Center, USA

Pancreatic cancer is very difficult to identify and by the time someone is diagnosed it is generally too late, resulting in poor prognosis. Current therapy is not very effective, with Gemcitabine, a nucleoside analog being the mainstay drug of choice; however, efficacy is poor, and at best increases survival by a few weeks. Hence, there is a dire need to identify novel factors or pathways that play a critical role in pancreatic cancer progression and metastasis for future drug development. We have recently determined that prolactin receptors are overexpressed in pancreatic cancers, and in pancreatic cancer cell lines. Prolactin (PRL), a stress-related hormone is increased in patients with pancreatic cancer compared to normal healthy volunteers (4). Acting through its cognate receptor (PRLR), PRL modulates various downstream events via the Jak-STAT and ERK MAPK pathways. PRL treatment of pancreatic cancer cells induced JAK2, STAT3, and ERK1/2 phosphorylation and increased expression of cancer stem cell (CSC) marker genes [DCLK1 (doublecortin calmodulin like kinase 1) and CD44]. In addition, PRL treatment increased the size and number of pancospheres, a surrogate marker for stemness further suggesting that PRL affects stem cells. Taken together, these data demonstrate that cytokine signaling induced by PRL is active in pancreatic cancers and hence provides a new target for therapeutic intervention. To identify compounds that might affect PRLR function, we performed homology modeling and did binding site predictions and structure based biological function predictions. In our screen, we have identified a novel a Federal Drug Administration approved first generation diphenylbutylpiperidine antipsychotic drug that would inhibit PRLR function. It has a long elimination half-life and its effects last for many days after single oral dose. The compound is used in the treatment of chronic schizophrenia and similar psychotic disorders. What is also interesting is that the compound has been recently used as a therapeutic agent against various cancers including breast and pancreatic cancer. My talk will further focus on the effects of this inhibitor on stemness and pancreatic cancer cell growth.

Anti-inflammatory, Proresolving and Chemopreventive Effects of Docosahexaenoic acid

Young-Joon Surh, Tumor Microenvironment Global Core Research Center, College of Pharmacy, Seoul National University, 1 Gwanak-ro, Gwanak-gu, Seoul, South Korea

Docosahexaenoic acid (DHA), a representative ω-3 polyunsaturated fatty acid, has been reported to possess anti-inflammatory and chemopreventive properties. We have previously reported that topical application of DHA prior to UVB irradiation attenuated the expression of cyclooxygenase-2 and NAD(P)H:oxidase-4 in hairless mouse skin. DHA pretreatment also attenuated UVB-induced DNA binding of nuclear factor-kappaB (NF-κB) through inhibition of phosphorylation of IκB kinase-α/ß, phosphorylation and degradation of IκBα and phosphorylation and nuclear translocation of p65, a functionally active subunit of NF-κB. When topically applied to mouse skin or treated to mouse epidermal cells, DHA induced the activation of Nrf2 that plays a pivotal role in cellular defense against oxidative stress and inflammatory damage. DHA also inhibited experimentally induced colitis in mice. Timely resolution of inflammation at the early stage is important in preventing further progression to chronic inflammation and related disorders including cancer. Resolution of inflammation is an active coordinated process regulated by distinct endogenous lipid mediators, such as resolvins and lipoxins that have anti-inflammatory and pro-resolving effects. Our recent studies have revealed that DHA enhances the efferocytic activity of macrophage, an essential event in resolution of inflammation. Moreover, DHA induced M2 macrophage polarization through peroxisome proliferator-activated receptor γ activation.

[1]Rahman M, Kundu JK, Shin JW, Na HK, Surh YJ. Docosahexaenoic acid inhibits UVB-induced activation of NF-κB and expression of COX-2 and NOX-4 in HR-1 hairless mouse skin by blocking MSK1 signaling. *PLoS One*. 2011;6:e28065.
[2]Song NY, Na HK, Baek JH, Surh YJ. Docosahexaenoic acid inhibits insulin-induced activation of sterol regulatory-element binding protein 1 and cyclooxygenase-2 expression through upregulation of SIRT1 in human colon epithelial cells. *Biochem Pharmacol*. 2014;92:142-8.
[3]Chang HY, Lee HN, Kim W, Surh YJ. Docosahexaenoic acid induces M2 macrophage polarization through peroxisome proliferator-activated receptor γ activation. *Life Sci*. 2014;120C:39-47.

Reach to recovery - An outreach program for cancer patients by cancer survivor patients

Savita Bundhoo, Ministry of health and Quality of Life, Mauritius

The Reach for Recovery Program was started by a breast cancer survivor Terese Lasser of New York in 1952, at a time when there was a tendency to discourage patients from discussing their operations with other patients. A survivor is defined as a person who endures, carries on and stays alive, grappling to learn to accept take charge of a new self. Cancer is more than just treating the tumor; there are often emotional and social challenges to overcome as well. Aim of such program is enabling a woman to be rounded, complete and achieve competent physical, psychological, and social functioning after cancer. Reach to Recovery International (RRI) is a global network of individuals, groups and organizations committed to improving the quality of life for survivors. RRI works towards attainment of the World Cancer Declaration, encompassing capacity building, education and awareness, prevention and early detection, and activism. Through the efforts of the American Cancer Society, RRI has become one of the world's most active community based breast cancer support movements in >100 countries affiliated to the International Union Against Cancer. RRI's mission and objectives includes peer support, advocacy, and consumer engagement in research. As a landmark, Institute of Medicine report detailed in 2006 that these individuals are often "lost in transition" between different parts of the health care system. Bridging this gap requires a way to address the complex litany of side effects, toxicities and long-term symptoms. RRI has comprehensive, customized documents that typically contain a medical treatment summary (surgical, treatment, therapeutic and medication history), directions for ongoing care, as well as possible side effects, late effects, or other complications for patients and health care teams to consider. While there is a need for more comprehensive research into the effectiveness and long-term outcomes of such care plans, support is growing. Recently, the American Society of Clinical Oncology included care plans as part of a comprehensive set of research-based recommendations for high quality survivorship care. Cancer survivors are a medically complex, heterogeneous patient population, with increased risks for co-morbidities and side effects. As a result there is not a comprehensive one-size-fits-all model of survivorship care that can simply be implemented in all treatment facilities. Broader awareness about cancer survivorship has yet to take root. Completion of a treatment plan does not count against any existing quality improvement program metrics or incentive programs. Addressing these myriad challenges will require both specific action and general education. The Cancer Experience Registry is a first-of-its-kind initiative collecting the experiences of people sharing their cancer journey. LINK TO LIFE has again pioneered and REACH TO RECOVERY MAURITIUS has been launched. RRI immediate Past President Ann Steyn, who is the National Coordinator of South Africa, trained its first group of 20 Reach volunteers. Volunteer does not interfere in any way with the patient's relationship with her physician and other health care professionals rather foster an open and productive relationship between patients, family and members of the medical and allied professions. The Volunteer does not give medical advice nor is she a counselor.

Biomarker testing for ER/PR/HER-2 receptor status in female breast cancer cases in the Republic of Mauritius

Manraj SS[1], Fauzee NJS[1], Ramsamy U[2], Manraj M[2], Mohith A[3]
Central Health Laboratory, Victoria Hospital, Candos, Mauritius
Department of Medicine, Faculty of Science, University of Mauritius, Mauritius.
Radiotherapy Centre, Victoria Hospital, Candos, Republic of Mauritius

(Presenting Author: SS Manraj)

Breast cancer is, by far, the commonest site of cancer in females representing 37.5% of new cases registered with an age-standardised incidence rate ASR (W) of $50.2/10^5$. One important aspect of pathological evaluation of breast cancer is biomarker testing, specifically the accurate assessment of the estrogen receptor (ER), progesterone receptor (PR)[1], and HER2 status. Biomarkers can be prognostic, predictive, or both. Prognostic biomarkers (HER2)[2] are independent measures of prognosis associated with a patient's overall clinical outcome (i.e., risk of recurrence and mortality). Predictive biomarkers (ER/PR), in contrast, predict whether or not a patient will respond to a given therapy. Hence, a first time ever studies done on female breast cancer patients (FBC), correlating their biomarkers' status. A retrospective study was conducted in 2014 at the Central Health Laboratory, Candos that is the unique center for histopathology services for all hospitals. Paraffin blocks from 90 consecutive FBC cases diagnosed were subjected to ER/ PR testing by immunohistochemistry (IHC) on-site and for HER-2 testing, the respective paraffin blocks were sent to Lancet laboratories, South Africa. In this study, the mean age of patients was 52.7 years ranging from 26 to 80 years, 30 patients (33.3%) were below 50 years of age and 13 (14.4%) were over 65 years. In this study only 69 had defined menopausal status, 19 were premenopausal (27.5%) and 50 were postmenopausal (72.5%). Concerning histological types, infiltrating ductal carcinoma (NOS) was the commonest 66/90 (73.3%) and other variants were 24/90 (26.7%). The overall immunoexpression of ER/PR/HER-2 were 72.2%, 63.3%, 28.8% and HER-2 overexpression (3+) was in 22.2% of cases, while triple negative cases accounted for 16.0%. It has been noted that the high rates of positive expressions of ER/PR/HER-2/neu among the female Mauritian population having breast carcinoma correlate well with corresponding studies3-5. Moreover, these results have proven useful in the proper management of patients with the introduction of targeted therapy in Mauritius. Besides, priority is to be given for the development of IHC service locally to help to improve overall survival for breast cancer.

[1]Teoh et al. An analysis of predictive biomarkers in routine histopathological reporting of infiltrating ductal breast carcinoma in a tertiary hospital in Malaysia with a focus on limitations and directions for future development. *Malays J Pathol*. 2011;33:35-42.
[2]Carney et al. Circulating HER2 Extracellular Domain: A Specific and Quantitative Biomarker of Prognostic Value in all Breast Cancer Patients? *Biomark Cancer*. 2013;5:31–9.

Kolaviron resolves influenza virus-induced pulmonary and splenic cytopathic/pathologic assault by restoring inflammation and redox perturbation

Awogbindin IO[1,2], Olaleye DO[2], Farombi EO[1]

[1]Department of Biochemistry, [2]Department of Virology, University of Ibadan, Ibadan Nigeria

(Presenting author: Ifeoluna Awogbindin)

The pathology of Influenza A virus is consistently characterized by complex biological phenomena including unabated production of pro-inflammatory cyto(chemo)kines resulting in predominant pulmonary hyperemia, progressive pneumonia, pulmonary cell death and loss of function. In this study, mitigating role of kolaviron (KV), a natural antioxidant and anti-inflammatory biflavonoid complex from *Garcinia kola,* was evaluated in murine model of influenza virus A/Perth/H3N2/16/09 (Pr/H3N2)-induced redo-immunopathology. KV at 400mg/kg was administered orally to groups of BALB/c mice for 3 days (KV-1) prior to infection via intranasal instillation with 2 or 3 LD_{50} Pr/H3N2. The 3-day regimen was continued 2 days post infection (KV-2) in another group of mice. Lungs and spleen were excised 6 days post infection and the level of $CD4^+$ T helper cells was measured in the whole blood with Cyflow®. Pr/H3N2 multiplication and expression of molecular moderators of immune-mediated pathology in lung tissues were immunohistochemically detected with various antibodies while implicated biomarkers of oxidative stress and inflammation were biochemically assayed in the two organs. Apoptotic characteristics of the pulmonary tissue were also assessed by DNA fragmentation assay. Viral antigen haemaglutinin was detected in the interstice of all the experimental groups though it was sparsely seen in the KV-treated animals. Pr/H3N2 resulted in marked haemorrhagic, edematous pulmonary parenchyma and splenic inflammation. This was characterised by aggressive infiltration of neutrophils and macrophages culminating in overwhelming myeloperoxidase activity, induction of glucose-6-phosphate dehydrogenase (G6PD) activity, suppressed superoxide dismutase (SOD) activity, hydrogren peroxide (H_2O_2) generation and reduced glutathione (GSH) level, as well as elevated levels of nitric oxide and malondialdehyde (MDA). However, total thiol was not affected. KV significantly doused influenza pneumonitis and increased lung aeration. These feats were attributed to reduction of nitric oxide production, down-regulation of myeloperoxidase activity, restoration of cellular redox status via an upturn in GSH and H_2O_2 levels, SOD activity as well as limited production of MDA. CD4 T cells response was also improved, especially in KV-2 group. Immnunohistochemical staining further confirmed that influenza infection induced infiltration and activation of innate cells as signal for iNOS was detected at elevated levels in mice with Pr/H3N2. COX-2 was also extensively expressed. Contrastingly, these were down regulated in mice administered kolaviron. Hyperinduction of acute pro-inflammatory cytokines IL-1ß and RANTES, chemotactic cytokine MCP-1 and their transcription regulator NfκB was prominent on the luminal surface and in alveolar septae of the untreated infected animals. Kolaviron treatment however, was associated with the amelioration of these biomarkers and restoration of NfκB immunoreactivity was clearly evident. However, reactivity to IL-10 was hardly noticeable in all the experimental animals. Cytopathic assault inflicted by Pr/H3N2 culminated in elevated percentage of apoptotic fragmented DNA and this was effectively reversed by both KV regimens. These data provide proof of concept that restraining pulmonary inflammation and redox impairment during influenza virus infection presents a novel approach for attenuating/combatting influenza pneumonitis and this study therefore demonstrates the efficacy of kolaviron in this regard.

Marine natural products research at UCT: Exploring the chemical diversity and biomedicinal potential of Southern African marine invertebrates

Suthananda N. Sunassee[1,2]

[1]*Chemistry Department, University of Cape Town, Rondebosch 7701, South Africa*

[2]*Marine Research (Ma-Re) Institute, University of Cape Town, Private Bag X3, Rondebosch, 7701, South Africa*

A function of marine biodiversity is a unique source of novel natural products, also known as secondary metabolites.[1] Marine organisms (invertebrates, algae and micro-organisms) utilize their secondary metabolites as a form of chemical defence against predators or in a chemically mediated response to inter-species competition for limited resources.[2] Over the last four decades, the collaborative efforts between marine natural product chemists and pharmacologists have yielded numerous lead compounds for the pharmaceutical industry, particularly novel anticancer drugs.[3] Southern Africa's marine biota are a unique reservoir of biomolecular diversity and surprisingly little is known about the natural product chemistry of the plethora of endemic marine species that occur along the 3000 km coastline of southern and east coast of Africa and around the archipelagos of the Southern Ocean.[4,5] This lecture will provide an overview of the current research projects of the marine natural products research group at UCT that are directed towards exploring this unique marine biomolecular diversity of southern Africa's marine invertebrate populations with special emphasis given to the discovery of natural products that show promising activity against infectious diseases (TB, malaria, HIV/AIDS), pathogenic bacteria and non-communicable diseases such as cancer.

[1]Andersen RJ, Williams DE. Pharmaceuticals from the sea. In Chemistry in the Marine Environment, 13th ed. Hester R, Harrison R, Eds. RSC Press: Cambridge. 2000:55-79.

[2]Simmons TL, Andrianasolo E, McPhail K, Flatt, P, Gerwick WH. *Molecular Cancer Ther*. 2005;4:333-42.

[3]Gerwick WH, Moore BS. *Chem Biol*. 2012;19:85-98.

[4]Davies-Coleman MT, Beukes DRS. *Afr J Sci*. 2004;100:539-44.

[5]Davies-Coleman MT, Sunassee SN. Marine Bioprospecting in Southern Africa. In Drug Discovery in Africa. Chibale K, Davies-Coleman M, Masimirembwa C. Eds. Springer Berlin Heidelberg. 2012;193-209.

Benzo(a)Pyrene triggers key players of early cellular and molecular events of colon carcinogenesis in mice

Ajayi BO, Adedara IO, Farombi EO

Molecular Drug Metabolism and Toxicology Research Laboratories, Department of Biochemistry, Faculty of Basic Medical Sciences, College of Medicine, University of Ibadan, Ibadan Nigeria

(Presenting author: Babajide Ajayi)

Oxidative stress, inflammation and altered canonical wnt-signalling are early events that occur in the development of colorectal cancer, a third leading cause of cancer related death that has been epidemiologically linked to the consumption of foods contaminated with benzo(a)pyrene (BaP). This study investigated the early cellular and molecular events of colon carcinogenesis in BaP exposed mice. Twenty-eight male BALB/c mice (ages 6 – 7 weeks) were assigned into four groups of seven animals each. Mice in the control group were orally gavaged with cornoil (2mL/kg) while the remaining three groups were orally gavaged with 62.5mg/kg, 125mg/kg and 250mg/kg of BaP respectively. This regimen lasted for seven days following two weeks of acclimatization. Biomarkers of oxidative stress, inflammation and altered wnt-signalling were assessed in paraffin fixed section and cell homogenates of colon tissues using spectrophotometric, immunohistochemical and histopathological techniques. Oral exposure to BaP induced oxidative stress as exemplified by a dose dependent marked increase in colonic lipid peroxidation and hydrogen peroxide levels with concomitant significant decrease in the activities of superoxide dismutase (SOD), catalase (CAT), glutathione peroxidase (GPx), glutathione-s-transferase (GST) and reduced glutathione (GSH) concentration when compared with the untreated group ($p<0.05$). Hematoxylin and eosin stained sections of colon tissues of BaP treated mice were characterized by atrophy, mucosal ulceration with gland erosion and invasion of lymphoid aggregates with infiltration of mononuclear cells that was confirmed by a significant elevation of myeloperoxidase (MPO) activity. Furthermore, BaP treatment produced an intense expression of nuclear factor kappa B (NF-κB (p65)), it targets pro-inflammatory cytokines (tumor necrosis factor alpha (TNF-α) and interleukin-1ß (IL-1 ß), cyclooxygenase-2 (COX-2) and inducible nitric oxide synthase (iNOS) that elevated nitric oxide level in the mice colon. Altered canonical wnt-signalling was confirmed by strong diaminobenzidine (DAB) staining for ß-catenin expression, absence of adenomatous polyposis coli (APC) expression and mild expression of stress activated protein kinase (SAPK) following BaP administration. Results obtained from this study have provided an insight into the role of BaP in the pathogenesis of colorectal cancer.

Is nutrition education effective in promoting dietary quality & fruit and vegetable intake among Mauritian adults?

Dunneram Y, Pem D, Jeewon R
Department of Health Sciences, Faculty of Science, University of Mauritius

(Presenting author: Yashvee Dunneram)

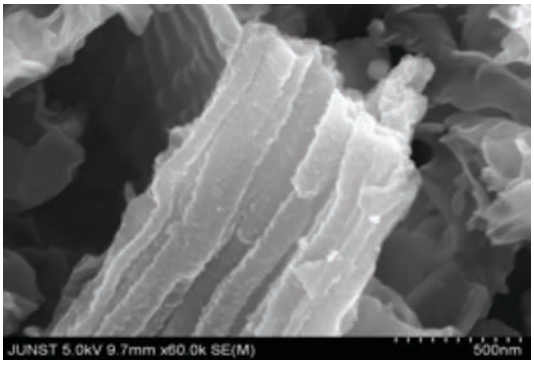
The aims of the study are to (i) assess dietary quality, fruit and vegetable intake (FVI), physical activity level (PAL), nutrition knowledge (NK) and attitudes to healthier eating of adults before and after a nutrition education intervention, (ii) to evaluate the efficacy of the nutrition educational plan. A sample of 353 adult participants (> 18 years) and 330 menopausal women (18 - 44 years) was used. Data on dietary quality, FVI, PAL, NK and attitudes to healthier eating were collected from a questionnaire. After the baseline survey, participants were provided with educational materials and knowledge on recommended dietary and physical activity guidelines using a poster and they were also provided with a pamphlet with additional information. Dietary quality, FVI, PAL, NK, attitudes to healthier eating and other aspects were re-evaluated after 3 months. Statistical Software for Social Sciences (SPSS) (version 17.0) was used for statistical analysis. Among the adult participants, a significant increase in fruits score from 2.83 + 1.66 to 3.79 + 1.85, NK score from 8.89 + 1.97 to 10.19 + 2.13 and attitudes to healthier eating was observed post intervention. A significant decrease in snacks high in sugar and fat score from 2.20 ± 2.06 to 1.56 ± 1.69 was also noted while no intervention effect was found for PAL. Similarly, there was a statistically significant increase in dietary scores post- intervention for menopausal women with a mean difference score of 2.28 ± 2.59 ($P < 0.01$). NK and attitudes to healthier eating also significantly increased post intervention ($P < 0.01$) as compared to PAL ($P > 0.05$) among menopausal women. Participation in the 12-week nutrition education program significantly improved dietary quality, NK and attitudes to healthier eating. The results demonstrate the feasibility of the lifestyle intervention among Mauritian adults.

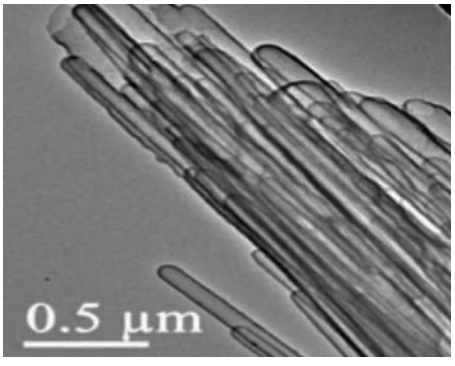
Synthesis of carbon nanotubes and its application

Ray U[1], Sarkar S[2], Ray [3], Ray U[4], Banerjee D[5]
[1]Nanoscience & Nanotechnology, Birla Institute of Technology, Ranchi, India
[2]Siliguri Institute of Technology, Darjeeling, India
[3]Department of Physiology, SSR Medical College Mauritius
[4]Anna Medical College, Solitude, Mauritius
[5]School of Material Science & Nanotechnology, Jadavpur University, Kolkata, India

(Presenting author: Unmesha Ray)

Carbon nanotubes (CNT) are allotropes of carbon. It was discovered by Sumio Iijima in 1991. Carbon nanotube is basically a sheet of graphite rolled into a tube like structure. CNTs are classified into different categories like single wall carbon nanotube (SWCNT) and multi wall carbon nanotube (MWCNT) depending on the number of graphite layers making the nanotube. Depending on the arrangement of the carbon atoms, CNTs are also classified into crystalline CNT and amorphous CNT (a-CNT). In recent times, most of the research is going on the fabrication, characterization and application of crystalline CNTs. But the synthesis techniques to make crystalline CNTs is very complex as it requires catalysts and high temperature and the yield is also very less. Thus, a-CNTs can replace crystalline CNTs in future. The aim of this study is to compare the use of a-CNT we produced with the application of SWCNT and MWCNT in nanotechnology and nanomedicine. Briefly, a-CNTs can be obtained by mixing ammonium chloride and ferrocene in 2:1 weight ratio in a mortar and then heating the mixture in an air furnace maintained at 250 ^{0}C for 30 minutes. The black powder that was obtained was washed consecutively by diluted HCl and de-ionized water to remove the presence of trace amount of iron and filtered. The Field Emission Scanning Electron Microscope (FESEM) and High Resolution Transmission Electron Microscope (HRTEM) image of the a-CNTs are given in figure 1(a,b). CNTs possess various novel properties that make them useful in the field of nanotechnology and nanomedicine. These properties can vary with the kind of nanotube depending on properties such as its diameter, length, ultra-light weight, stiffness, and strength, high electrical and thermal conductivity. Usually CNT are hydrophobic but modification of its surface (i.e., functionalization) makes them hydrophilic, this transforms their biocompatibility. CNT can be conjugated with protein, carbohydrates and nucleic acid to make bioconjugates. Functionalized CNT have found to be rapidly cleared from the tissue. CNTs are explored widely for their possible use in many applications like in electronics circuits, energy storage, field emission devices, and in sensors. a-CNTs are economical, have enhanced charge transfer ability and excellent charge storage. a-CNTs can be used for solar energy harvesting, waste water treatment, as nanogears because of their high mechanical strength and abrasion resistance. They are used in anode material, as electric double-layer capacitor and as an absorber of electromagnetic waves. They can also act as biosensors. They sense changes of pulse, temperature, glucose and hazardous radiations. They help in guided drug delivery. They allow targeted delivery of anticancer drugs and thermal ablation of cancer cells. Oral administration of drugs easily denatured in the stomach can be administered by CNT e.g., Erythropoietin. They can produce artificial joints.





Validation of a manual oxygen radical absorbance capacity assay in accordance with ISO 17025 technical requirements

Parbhunath OL[1], Rautenbach F[1], Davison G[2], Marnewick, JL[1]

[1]Institute of Biomedical and Microbial Biotechnology, Oxidative Stress Research Centre, Cape Peninsula University of Technology, P.O. Box 1906, 7538, Bellville, South Africa.

[2]Department of Biomedical Sciences, Faculty of Health and Wellness Sciences, Cape Peninsula University of Technology, P.O. Box 1906, 7538, Bellville, South Africa.

(Presenting author: Olivia Parbhunath)

The antioxidant field is growing rapidly and has spawned a cumulative demand for antioxidant capacity assays (AOC). In recent years, the oxygen radical absorbance capacity (ORAC) assay has emerged as a widely accepted method for total antioxidant capacity measurement, however, a search in the literature reveals that the validation of the $ORAC_{FL}$ assay is in fact lacking in many areas of the assay. ISO defines validation as "confirmation by examination and provision of objective evidence that the particular requirements of a specified intended use are fulfilled". At present no comprehensive standardized guidelines exist for routine validation of the manually performed $ORAC_{FL}$ assay. This study aimed to a) optimize and validate the manually performed $ORAC_{FL}$ assay for measurement of hydrophilic antioxidants in accordance to ISO/IEC 17025 method performance parameters, and b) provide documented evidence through evaluation of validation results that the requirements for the method's intended purpose has been met. Method performance parameters i.e accuracy, precision, linearity and range, specificity, limits of detection and quantification, sample stability and robustness were applied to the manually performed $ORAC_{FL}$ assay. Samples used in this study consisted of Trolox standards, quality control samples, several commercial fruit juices, organic honeybush tea, fresh fruit and vegetables and several food extracts, which were purchased from retail outlets within the Cape Town metropolitan area (South Africa). Additionally, extraction conditions such as pH, choice of solvent, solvent volume and temperature were evaluated for optimal hydrophilic antioxidant extraction. The effect of temperature on micro-plate well usage was also examined. Depending on the method performance parameters investigated, different samples were used for different parameters tested. As calculated for Trolox, the method precision and accuracy, respectively was <6.0, expressed as coefficient of variation (COV) and 99.8%, expressed as percent recovery. The limits of detection and quantification were equivalent to 1.35 and 4.10 µM Trolox standard solutions. The method performance parameters applied to 12 samples (commercial fruit juices and teas, fresh fruit and vegetables and food extract products) demonstrated good linearity, accuracy, precision, specificity and robustness at varying levels of the Trolox calibration curve of the $ORAC_{FL}$ assay when performed manually. A noteworthy finding was the significantly ($p<0.05$) higher antioxidant yield recovered with ethanol/water and methanol/water extraction solvents compared to acetone/water/acetic acid extraction solvent for all samples tested. Another observation was the improved precision (COV=2.87) and reduction in outliers upon preheating (37 °C) the AAPH buffer and micro-plate for 20 min prior to analysis and exclusion of some of the external plate wells. This work proves both the reliability and applicability of the manually performed $ORAC_{FL}$ assay to various food and beverage samples and its compliance to ISO/IEC 17025 method validation requirements.

Exposure to low doses of silver nanoparticles causes renal damage in adult zebrafish *Danio rerio*

Okuthe GE[1], Siguba B[1], Oluwafemi OS[2], Songca SP[3]

[1]Department of zoology, Walter Sisulu University, Mthatha 5117, South Africa

[2]Department of Applied Chemistry, University of Johannesburg, Doornfontein 2028, Johannesburg, South Africa.

[3]Department of chemistry, Walter Sisulu University, East London 5200, South Africa

(Presenting author: Emily Grace Okuthe)

Although clinical use of silver nanoparticles (Ag-NPs) have gained much popularity owing to their broad spectrum antimicrobial activity and odour-fighting properties. The potential impacts on aquatic organisms has not been well established. Increased use of nanoparticles is likely to result in their release into aquatic environments, posing risk to fish. Information on ecotoxicity of NPs is now emerging. Therefore, there is need to responsively develop nanotechnology with balanced and transparent consideration of benefits and risks associated with manufactured nanomaterials in specific applications that minimize potential adverse environmental health effects. The primary aim of this study was to describe clinical and adverse effects observed in the kidney of adult zebrafish, exposed to Ag-NPs prepared *via* green synthesis. To investigate impacts, adult zebrafish were exposed to Ag-NPs concentrations (0, 5, 10, and 20 µg L^{-1} and control). Particle synthesis was carried out using the green synthesis of maltose reduced Ag-NPs. $AgNO_3$, gelatine and maltose were used as silver precursor, capping, and reducing agents, respectively. The reaction was maintained at 40^{o} C for 24 hrs. Care and maintenance of Zebrafish were done according to Westerfield. Exposure study was done under 24 h static renewal systems for a period of 96 h according to the organization for Economic Development guidelines for testing for chemicals. Control groups received aquarium water. Effects on renal tissues were investigated by light and fluorescent microscopy. A total of 60 adult fish were used in the current study. Resulting histological changes in kidneys were examined at 24, 48 and 96 h. Observed lesions included necrosis in the haematopoietic tissue, individual renal tubules with separation of epithelia. At the lowest concentration (5 µg L^{-1}), injuries to renal tissues were mild at 24, while at 48 h damage to tubular basement membrane were severe. At 96 h, damage was not readily apparent from that seen at 48 h. At the median concentration (10 µg L^{-1}), features of tubular blockage, interstitial oedema and mononuclear inflammatory cells in the interstitial space were common at 24 h of exposure. At 48 h, necrosis of tubular epithelium and severe inflammatory infiltrate were evident. At 96 h, severe oedema of the interstitium and damage to tubular basement membrane and diffuse severe mononuclear inflammatory cells were seen. In the highest concentration (20 µg L^{-1}), severe degeneration of epithelium and vacuolization were common at 48 h. Basophilic clusters were also seen adjacent to renal tubules. At 96 h renal tissues were completely damaged. Common adverse effects of Ag-NPs were noted in this study. The current findings indicate that exposure to Ag-NPs was dose dependent and caused symptoms similar to renal hypertrophy. Duration of exposure appeared to have profound effects on renal tissues. However, larger comparative studies are required to confirm the findings of the current study.

A fuzzy mathematical framework to medical diagnosis

Dookhitram K[1], Tripathi RK[2], Raich V[3], Tangman YD[4], Dalal SK[5]

[1]Department of Applied Mathematical Sciences, School of Innovative Technologies and Engineering, University of Technology, Mauritius

[2]Department of Mathematical Sciences, APS University, Rewa, MP, India

[3]Department of Mathematics, Govt. Holkar Science College, Indore, MP, India

[4]Department of Mathematics, Faculty of Science, University of Mauritius, Mauritius

[5]Ram Sanehi Charitable Trust Hospital, Bhilwara, Rajasthan, India

(Presenting author: Yannick Désiré Tangman)

Medical diagnosis and prognosis problems are often primary illustrations of decision making under uncertainty, due to chaotic in the data acquisition process. The most important problems in medical diagnosis and prognosis are[1] limited observation and subjectivity of the specialist, uncertainties and incompleteness in medical knowledge, and poor time effect in diagnosis. Interval valued fuzzy logic[4] is a common approach in dealing with uncertainties. Most of the medical diagnosis algorithms[2,3] design a decision fuzzy matrix which is based on occurrence and confirmation of the disease. However, the product of two fuzzy matrices under usual matrix multiplication is not a fuzzy matrix. In this paper, an attempt is made to implement a new technique for the multiplication of two fuzzy matrices under which the resulting matrix is fuzzy in nature. The new approach is based on the usual union and intersection defined on crisp sets, instead of the max-min procedure. Assume the set of all diseases to be represented by $D = \{D_i\}$; the crisp set of all symptoms denoted by $S = \{S_j\}$; and $P = \{P_k\}$ to be the set of all patients. The main purpose of medical diagnosis is to come up with decisions about the occurrence of a disease in a patient by observing the symptoms. The occurrence relation R_0 provides information about the frequency of appearance of symptoms when the specific diseases are present, and the conformability relation R_c describes the discriminating power of the symptoms to confirm the presence of the disease. Suppose a fuzzy relation R_s specifies the degree of presence of symptoms for the patients. This relation directs the degree to which the symptoms are present in patient P_k. Using relations R_s, R_0, and R_c, the two indication relations, namely, conformability indication relation and occurrence indication relation are computed as $R_1 = R_s \times R_c$ and $R_2 = R_s \times R_0$, respectively. Let $S = \left\{\bigcup [p_i, q_i] : 0 \le p_i, q_i \le 1\right\}$ be a set of unions of arbitrary fuzzy intervals. Assume the elements aij, bij ϵ S such that the matrices A = (aij)m×n and B = (bjk)n×p are interval valued fuzzy matrices. Here, we define a new function to compute the decision matrix, denoted by D = (dik)m×p, of matrices A and B. Define the function f : S → [0, 1], given by f(cik) = dik , with $c_{ik} = \left(\bigcup_{j=1}^{n} (a_{ij} \cup b_{jk})\right)$ and $d_{ik} = \begin{cases} \sup(c_{ik}), & if\ c_{ik} \neq \phi, \\ 0, & if\ c_{ik} = \phi. \end{cases}$

For illustration purpose, the above propose function is used to predict the stages of the haemorrhoids disease for patients observed from the Ram Sanehi Charitable Trust Hospital, Bhilwara (Rajasthan), where the data has been collected over more than 100 patients. The symptoms and the disease stages are classified in the set $S = \{S_1, S_2, S_3, S_4, S_5, S_6\}$ and the set $D = \{D_1, D_2, D_3, D_4, D_5, D_6\}$, respectively. The set $P = \{P_1, P_2, P_3, P_4\}$ consists of four patients for testing the model. The maximum values of $R_1(P_i, D_i)$ and $R_2(P_i, D_i)$ showed that D_i is a suitable diagnostic for patient P_i. The diagnostic hypothesis for patient P_i having any disease D_i is set to satisfy the criterion $max\ [R_1(P_i, D_i), R_2(P_i, D_i)] < 0.5$. The proposed method is readily applicable to diagnose other diseases.

[1]Adlassnig KP. A fuzzy logical model of computer assisted medical diagnosis. *Meth Inform Med.* 1980;9:141–8.

[2]Elizabeth S, Sujatha L. Medical Diagnosis Based on Interval Valued Fuzzy Number Matrices. *An Pure Appl Math*. 2014;7:91-6.

[3]Sanchez E. Inverse of fuzzy relations. Application to possibility distributions and medical diagnosis. *Fuzzy Sets Syst*. 1979;2:75–86.

[4]Zadeh LA. Fuzzy logic. *Computer*. 1988:21:83–92.

Bio-mining the medicinal treasures of the Mauritian sea: An unexplored reservoir of anti-bacterial, anti-oxidative and anti-proliferative agents from four shallow water Mauritian sponge species

Beesoo R[1,2,3], Neergheen-Bhujun VS[2,3], Bhagooli R[4], Bahorun T[2]
[1]Department of Biosciences, Faculty of Science, University of Mauritius, Réduit, Mauritius
[2]ANDI Centre of Excellence for Biomedical and Biomaterials Research, University of Mauritius, Réduit, Mauritius
[3]Department of Health Sciences, Faculty of Science, University of Mauritius, Réduit, Mauritius
[4]Department of Marine & Ocean Science, Fisheries & Mariculture, Faculty of Ocean Studies, University of Mauritius, Réduit Mauritius

(Presenting author: Rima Beesoo)

The ecological marine niches represent largely an untapped and unexplored resource of structurally diverse and highly bioactive natural products. Since the past two decades, the therapeutic areas of infectious diseases and oncology have benefited from abundant scaffold in marine natural products and many of them have provided a prominent share of the recent clinical lead compounds. Contributing to the global search for novel chemotherapeutic agents, marine sponges have been recently described as a pharmaceutical powerhouse. In this vein, the antimicrobial and anti-oxidative activities of four selected Mauritian marine sponges (*Neopetrosia exigua, Aaptos chromis, Iotrochota birotulata* and *Haliclona* spp) have been studied. In addition, their cytotoxic potentials against human liposarcoma SW872 cells were evaluated. Marine metabolites were initially extracted from the sponges using dichloromethane and methanol and the crude extract (CE) was subsequently partitioned with hexane (HEF), ethyl acetate (EAF) and water (AF) to yield fractions with large variations in polarity. The antimicrobial efficacy of the sponge crude and fractionated extracts was characterized against 8 human pathogenic bacterial strains using a microplate serial dilution method for the determination of minimal inhibitory concentration (MIC) and minimal bactericidal concentration (MBC). Using an array of established *in vitro* models, the sponge extracts were also analyzed for their total phenolics (TPC), flavonoid (TFC) contents, antioxidant propensity, metal chelating and reducing potentials while their anti-proliferative activity on human liposarcoma SW872 cells was measured using the MTT assay. Our data showed that among the tested sponges *N exigua* and *I birotulata* recorded a broad spectrum antibacterial activity whilst the best antibacterial profile comparable to that of the antibiotic Ampicillin was registered by EAF of *N exigua* particularly against *Bacillus cereus* (MIC: 0.078 mg/mL; MBC: 0.156 mg/mL) and *Staphylococcus aureus* (MIC: 0.039 mg/mL; MBC: 0.078 mg/mL). Our results further indicated that significantly higher TPC (37.09±0.74 mg GAE/g FDW) and TFC (12.33±0.61 QE/g FDW) were registered in EAF of *N exigua*. Concomitantly, maximum antioxidant activity was observed in EAF of *N exigua* by virtue of its ability to scavenge ABTS (91.46±1.08 µMol TE/g FDW), superoxide (IC_{50} 0.31±0.004 mg/mL), nitric oxide (IC_{50} 0.44±0.06 mg/mL) and hydroxyl radicals (IC_{50} 0.56±0.053 mg/mL). Peak iron chelating (IC_{50} 0.17±0.02 mg/mL) and reducing activities (36.85±0.84mg Fe(II)/g FDW) were also measured in EAF of *N exigua* ($P<0.05$). Cellular studies demonstrated that the marine extracts exhibited a dose dependent cytotoxic activity on the SW872 cells with EAF of *N exigua* and *A chromis* being the most active. Hence, marine sponges, particularly *N exigua,* represent good sources of bioactive agents, however, further investigation on their molecular mechanism of action is crucial to the evaluation of their potential as prophylactic agents.

Rooibos (*Aspalathus linearis*) offers protection against ischemia/reperfusion injury in isolated perfused rat hearts

Bester DJ[1,2], Pantsi WG[2], Ntsunguzi ZZ[2], Marnewick JL[1,2]

[1]Institute of Biomedical and Microbial Biotechnology, Oxidative Stress Research Centre, Cape Peninsula University of Technology, P.O. Box 1906, 7538, Bellville, South Africa

[2]Department of Biomedical Sciences, Faculty of Health and Wellness Sciences, Cape Peninsula University of Technology, P.O. Box 1906, 7538, Bellville, South Africa

(Presenting author: Dirk Bester)

Many studies have been performed over the last decade, investigating the health benefits of rooibos herbal tea, which has been identified as an antioxidant due to its high polyphenol content. Rooibos has shown potential to be used as a treatment or health supplement against conditions associated with oxidative stress, such as certain types of cancers and diabetes. Little is known regarding the effects of rooibos in a model of ischemia/reperfusion in the heart. Previous studies in our laboratories have shown great potential for antioxidant-rich plant products to be used as dietary supplements in order to protect the heart against the free radical-mediated injury of ischemia and reperfusion. The aim of this study was to evaluate whether dietary supplementation with rooibos could offer myocardial protection against ischemia/reperfusion injury in an *ex-vivo* perfused rat heart model. Teas were prepared by steeping 2g of the tealeaves in 100ml of freshly boiled tap water for 30 minutes, followed by filtration and bottling for use. Male Wistar rats were then randomly divided into four groups (n=6). Group one (control) received water in their drinking bottles, group two received fermented rooibos, group three, unfermented rooibos and group four, green tea (*Camellia sinensis*). After 7 weeks of dietary supplementation, rats were sacrificed and their hearts perfused. Aortic output was taken as a measure of cardiovascular function, before and after a fifteen-minute episode of global normothermic ischaemia and expressed as aortic output recovery as a measure of functional recovery. Hearts were also snap frozen in liquid nitrogen before and after ischemia, in order to perform biochemical analyses. Hearts of rats consuming both the fermented and the unfermented rooibos teas displayed significantly higher ($P<0.05$) aortic output recovery when compared to the control and green tea groups. This improved functional recovery was associated with decreased phosphorylation of Caspase 3 and decreased PARP cleavage. Additionally, there was maintenance of the reduced glutathione *versus* oxidised glutathione ratio (GSH/GSSG) at control levels with rooibos treatment while green tea treatment significantly reduced this ratio. Similar functional findings were observed while using rooibos as an acute treatment added to the perfusion fluid. Rooibos was able to offer significant myocardial protection against ischemia/ reperfusion injury in both chronic supplementation and acute treatment models. Although the antioxidant effects of rooibos cannot be credited alone for this protection, it may play a significant role, as demonstrated by the GSH/GSSG results. Additional studies may be required to further investigate the potential role of anti-apoptotic and anti-inflammatory effects of rooibos in this model.

The effects of *Tulbaghia violacea Harv* on blood glucose and antioxidant status in streptozotocin induced diabetic rats

Joseph KM, Moodley K, Mackraj I
Discipline of Human Physiology, School of Laboratory Medicine and Medical Sciences, College of Health Science, University of KwaZulu-Natal, Durban, South Africa

(Presenting author: Kimane Joseph)

The aim of this study was to investigate the effects of *Tulbaghia violacea Harv.* (TVL) on blood glucose levels, plasma insulin levels, antioxidant status, and histological changes of the pancreas in streptozotocin (STZ)-induced diabetic rats. A dose of 40-mg/kg b.w STZ was administered intraperitoneally (IP) to male Wistar rats to induce diabetes. Thereafter, the rats were treated as follows: (A) non-diabetic control: distilled water, (B) diabetic control: distilled water, (C) diabetic: TVL 60 mg/kg b.w, (D) diabetic TVL120 mg/kg b.w and (E) diabetic: Glibenclamide, once daily for 7 weeks. Fasting blood glucose levels were tested and the rats were placed in metabolic cages on a weekly basis for the collection of urine. At the end of week 6, an OGTT was performed, and at the end of week 7, the rats were sacrificed by halothane overdose. Blood was removed by cardiac puncture, after which serum and plasma were collected separately for biochemical tests and ELISA's. The tissues were harvested and stored in formalin for histopathology or snap frozen and stored at -80°C for further analysis. TVL 120 mg/kg b.w showed a significant decrease in fasting blood glucose levels in the 7^{th} week in comparison to baseline values. Both doses of TVL showed a tendency to decrease fasting blood glucose levels. Results from the OGTT, showed that TVL 120 mg/kg b.w was most effective in decreasing blood glucose levels after a glucose load. TVL120 mg/kg b.w showed a significant decrease in MDA concentration and a significant increase in GPx activity. Histological analysis of pancreatic tissue showed all treated rats to have less damaged islets of Langerhans in comparison to the diabetic control rats. There was an increase in the plasma insulin levels of all treated diabetic rats in comparison to diabetic control rats. This study showed that TVL has the potential to reduce fasting blood glucose levels in STZ-induced diabetic rats, as well as the ability to decrease diabetes-induced oxidative stress. It also demonstrated an increase in plasma insulin levels and it reduced the morphological damage of the pancreas, which is usually observed in diabetes.

The antioxidant capacity and bioavailability of rooibos (*Aspalathus linearis*) flavonoids in human plasma following an acute dose of a fermented rooibos supplement

Westhuizen LV[1], Bester DJ[2], Rautenbach F[2], Davies SEH[3], West S[3], Taliep S[3], Marnewick JL[1,2]

1Institute of Biomedical and Microbial Biotechnology, Cape Peninsula University of Technology, Bellville Campus, PO Box 1906, Bellville 7535, South Africa; 2Oxidative Stress Research Centre, Department of Biomedical Sciences, Faculty of Health and Wellness Sciences, Cape Peninsula University of Technology, PO Box 1906, Bellville 7535, South Africa; 3Department of Sport Management, Faculty of Business, Mowbray Campus, Cape Peninsula University of Technology, PO Box 652, Cape Town 8001, South Africa,

(Presenting author: Liana van der Westhuizen)

The beneficial effects of rooibos (*Aspalathus linearis*) herbal tea have mainly been ascribed to the antioxidant properties of its unique combination of polyphenolic compounds. These claims can be substantiated when the bioavailability of the rooibos flavonoids and their metabolites are known. Presently, only three studies done in humans have published on the bioavailability of aspalathin and other rooibos flavonoids. The aim of this study was to assess the relationship between rooibos flavonoid levels and the antioxidant status in human plasma following acute consumption of a fermented/traditional rooibos supplement. Healthy males (n=30), mean age 22.2 ± 4.3 yrs, consumed three capsules of either a rooibos or a placebo supplement, in a double blind, randomised crossover placebo controlled study. After a period of two weeks washout, fasting blood samples were drawn (baseline) prior to consumption of the capsules and a standardized breakfast as well as 1 and 3 hr thereafter. The capsules were quantified for the main rooibos flavonoids (by HPLC); the antioxidant content was measured in terms of total polyphenol (TP), flavonol and flavanol content and the antioxidant capacity was determined using the oxygen radical absorbance capacity (ORAC), ferric ion reducing antioxidant power (FRAP) and Trolox equivalent antioxidant capacity (TEAC) assays. Plasma samples were analyzed for antioxidant capacity, total polyphenol content and levels of specific rooibos flavonoids, and/or their putative metabolites (by LC-MS). Plasma conjugated dienes (CDs) and thiobarbituric acid reactive substances (TBARS) were determined to assess oxidative lipid damage. The redox status of glutathione (GSH:GSSG) was determined in whole blood. Results: The main flavonoid levels in the rooibos supplement capsules were iso-orientin (4.5 ± 0.2 mg), orientin (2.8 ± 0.2 mg) and vitexin (1.3 ± 0.08 mg). The TP content of 1 capsule (115 ± 7 mg) was equivalent to the TP content of two cups of fermented rooibos. Acute intake of an equivalent of 6 cups of rooibos (three capsules) resulted in a significant increase in plasma ORAC after 1hr (4.6%, $P<0.001$) and after 3hr (4.8%, $P<0.05$) with no changes affected by the placebo treatment. Lipid peroxidation was also significantly decreased by rooibos causing a 3.76% (1hr, $P<0.05$) and a 4.1% (3hr, $P<0.01$) decrease in CD levels when compared to the placebo. No significant changes were observed for the redox status of glutathione. The LC-MS analyses for the plasma rooibos flavonoids and their putative metabolites will be included in the presentation. This study is the first to report that a polyphenolic-rich rooibos supplement increases the antioxidant capacity, providing sufficient protection again postprandial-induced oxidative stress.

Phytochemical analysis and in vitro bioactivity of Aloe species endemic to South West Indian Ocean Islands

Lallemand L[1,2], Rim H[3,4], Stanislas G[1], Gence L[1], Frechina C[1], Narrain D[5], Grondin I[6], Lavergne C[7], Kodja H[8], Bahorun T[5] , Cesari M[1,2]
[1]GIP CYROI (CYclotron Reunion Ocean Indien), La Reunion
[2]Universite de La Reunion, GEICO EA 4516, La Reunion
[3]Homeopharma, Madagascar
[4]Universite d'Antanarivo, Madagascar
[5]ANDI Centre of Excellence for Biomedical and Biomaterials Research, Mauritius
[6]Universite de La Reunion, LCSNSA EA 2212, La Reunion, France
[7]CBNM (Conservatoire Botanique National de Mascarin), La Reunion, France
[8]Universite de la Reunion, UMR PVBMT, La Reunion, France

(Presenting author: Laura Lallemand)

The genus Aloe comprises more than five hundred species, some of which are native to the South West Indian Ocean Islands, Madagascar, Reunion and Mauritius. Since ancient times, the succulent leaves of Aloe species have been exploited for a wide variety of purposes in traditional medicine. Medicinal Aloe preparations made from the strong bitter yellow exudates of Aloe are used for their laxative effects as reported by many pharmacopeias. The colorless gel-like inner parenchyma is also extensively used in medicinal and cosmetic formulations for moisturizing or for wound healing. Previous scientific studies have validated the various pharmacological activities that have been attributed to the most extensively cultivated *Aloe vera* (*Aloe barbadensis* Mill). These include antimicrobial, anti-inflammatory, antidiabetic, anticancer, antiviral and antioxidant activities. More and more studies on *Aloe spp.* Report the occurrence and contribution of a number of polyphenolic compounds, including the characteristic anthraquinone named aloin, and also mannan polysaccharides. Comprehensive molecular studies and biological activity tests are needed to identify the constituents of Aloe spp. Native to Madagascar, Reunion and Mauritius. The aim of this study is to investigate the phytochemical characterization of a selection of *Aloe spp.* Endemic to Madagascar and the Mascarene Islands, and to evaluate their potent biological activity by several *in vitro* assays in order to validate their traditional use. A special emphasis was made on those from the former *Lomatophyllum* genus: *Aloe macra* endemic to Reunion, as well as *Aloe purpurea* and *Aloe tormentorii* endemic to Mauritius Island. Immediately after collection, the whole leaves were freeze-dried and sequentially extracted with solvents of increasing polarity to optimize the extraction yield of secondary metabolites. The phytochemical profile of these Aloe extracts was investigated using colorimetric assays, proton nuclear magnetic resonance (1H NMR, Bruker 600 MHz) spectroscopy, chromatographic methods with UV detection (HPLC-DAD, Dionex) and high-resolution mass spectrometry detection (HRMS, Thermo Scientific). Comparative studies of the antioxidant properties of the polar extracts were performed using several assays, including the stable radical 2,2-diphenyl-1-picryhydrazyl DPPH test (measurement of the reducing capacity), the ORAC assay (Oxygen Radical Absorbance Capacity), and the oxidative hemolysis inhibition assay (protection of human red blood cells against peroxyl radicals). Antimicrobial assays were performed against four different bacterial strains (*Escherichia coli, Staphylococcus aureus, Candida albicans,* and *Pseudomonas aeruginosa*) using the disk diffusion method for preliminary screening. Our data show that Aloe leaves are rich in polar compounds with varying levels of total polyphenol content, and particularly aloin content as measured by HPLC-UV, depending on the species. The extracts have high radical scavenging capacities but moderate inhibitory effects on the four bacterial strains at the concentration tested. Overall, our results suggest that some of the constituents of the Aloe spp. leaves are likely to contribute to the pharmacological properties of these plants. Our findings support many of the traditional uses of these plants and the potential benefit establishing effective culture conditions for endemic *Aloe spp.* from South West Indian Ocean Islands for the production of extracts for medicinal and cosmetic purposes.

Influence of glycation of albumin on its binding properties to Liraglutide and Detemir, two drugs classically used in the treatment of diabetes

Soudahome AG[1], Giraud P[1], Catan A[1], Rondeau P[1], Guérin-Dubourg A[2], Debussche X[3], Couprie J[1]

[1]DéTROI - Inserm U1188 - Université de La Réunion- Diabète athérothrombose Thérapies Réunion Océan Indien - CYROI, 2, rue Maxime Rivière- 97490 Sainte Clotilde - La Réunion - France

[2]Unité fonctionnelle de recherche biochimie, centre hospitalier universitaire de la Réunion (CHU) Félix-Guyon 97405 Saint-Denis Réunion

[3]Service d'endocrinologie, nutrition et diabétologie, centre hospitalier universitaire de la Réunion (CHU) Félix-Guyon 97405 Saint-Denis Réunion

(Presenting author: Joël Couprie)

Diabetes is manifested by chronic hyperglycemia. It is due to either an impaired insulin production or a defective response to insulin stimulation. More and more people are affected by this disease all over the world. The treatment of diabetic patients often involve the use of long acting insulin analogues such as Insulin Detemir[1]. Recently, analogues of the insulinotropic GLP-1 hormone such as Liraglutide have also been introduced[2]. Detemir and Liraglutide are modified forms of respectively Insulin and GLP-1 with a fatty acid chain grafted on a Lysine residue. These fatty acids allow the drugs to bind to human serum albumin (HSA). This property is behind their protracted action. However, HSA can be glycated in some conditions and thus be modified in its structural and functional properties[3]. As HSA glycation ratio is known to be quite higher in diabetic persons than in healthy people, it is important to find out whether this alteration compromise the binding of Detemir and Liraglutide and hence their action, which may explain the lowered efficiency of these drugs observed for some diabetic patients. The binding to drugs of different forms of HSA, either unglycated, glycated with glucose or with methylglyoxal was investigated using ^{19}F-NMR spectroscopy. First, Liraglutide and Detemir were selectively trifluoroacetylated on their N-terminal amine groups. After ion exchange chromatography purification, the integrity and stability of the ^{19}F-labeled drugs were studied by ^{1}H and ^{19}F-NMR. Then, ^{19}F-NMR titration experiments were conducted by adding increasing concentrations of glycated or unglycated HSA to samples containing a fixed concentration of ^{19}F-drug until saturation was reached. Finally, competition experiments were also registered on ^{19}F-drug samples saturated with HSA by adding increasing amounts of the unlabeled drug until equilibrium was reached. Liraglutide and Levemir were successfully ^{19}F-labeled and purified. ^{1}H and ^{19}F NMR showed that the structure of the drugs was not altered by the N-terminal trifluoroacetylation and that the products were stable enough to record ^{19}F NMR titration and competition experiments. Both experiments performed with Liraglutide showed that glycation of HSA alters the binding of the drug. ^{19}F-NMR experiments have shown that glycation of albumin impairs the binding of Liraglutide to HSA. The same experiments will now be conducted on Detemir to determine if a similar effect is observed. Further investigations will include studies on albumin purified from plasma of diabetic patients and competition experiments between drugs and fatty acids for albumin binding. Altogether, these results will help to determine if an impaired albumin binding capacity is responsible of the altered efficiency of these drugs observed for some diabetic patients.

[1]Hollander PA. Insulin detemir for the treatment of obese patients with type 2 diabetes. *Diabetes Metab Syndr Obes*. 2012;5:11-9.

[2]Drucker DJ, Nauck MA. The incretin system: glucagon-like peptide-1 receptor agonists and dipeptidyl peptidase-4 inhibitors in type 2 diabetes. *Lancet*. 2006;368:1696-705.

[3]Rondeau P, Bourdon E. The glycation of albumin: structural and functional impacts. *Biochimie*. 2011;93:645-58.

Phytochemical screening and antibacterial evaluation of aqueous and organic solvent-extracts of *Bidens pilosa* L. (Asteraceae)

Njume C[1], Bomkazi MG[2], Grace G[2], Nomalungelo IG[1]

[1]Centre for Rural Development, Nkululekweni, Walter Sisulu University, Mthatha 5117, South Africa

[2]Department of Medical Biochemistry, Walter Sisulu University, Mthatha 5117, South Africa

(Presenting Author: Collins Njume)

The aims of this study were to investigate the antimicrobial activity of aqueous and organic solvent-extracts of *Bidens pilosa* against some bacteria of medical importance and to determine the chemical and biological principles responsible for its medicinal potential. Whole plants including roots, stems, leaves and flower-parts were harvested from the vicinity of the Walter Sisulu University campus in Mthatha in October 2014. The plants were washed and chopped into smaller pieces, sun dried for one week and extracted in concentrated hexane, acetone, ethanol, methanol and water. Antibacterial activity of the plant crude extracts was evaluated against *Escherichia coli* (25922), *Bacillus subtilis* (ATCC 6051), *Enterococcus faecalis* (51299) *Staphylococcus aureus* (ATCC 29213) and *Pseudomonas aeruginosa* (ATCC127853), using agar-well diffusion and micro broth dilution techniques[1]. Gentamicin was used as a positive control antibiotic in all the experimental runs. The plant crude extracts were macerated in concentrated methanol and tested for tannins, saponins, alkaloids, cardiac glycosides, anthraquinones, steroids and flavonoids using standard procedures[2,3]. Hexane and methanol extracts were the most active with zones of inhibition diameters ranging from 8-17mm and 9-19mm respectively. Acetone, ethanol and aqueous extracts had zones of inhibition diameters ranging from 0-10mm, 0-14mm and 0-11mm respectively. The minimum inhibitory concentration values for 50% susceptibility (MIC_{50}) ranged from 1.25-20mg/mL and 2.5-20mg/mL for hexane and methanol extracts respectively. The positive control antibiotic recorded the highest zones of inhibition diameters (21-36mm) and lowest MIC_{50} values (0.0002-0.0006mg/mL). With the exception of anthraquinones, the plant crude extracts tested positive for tannins, saponins, alkaloids, cardiac glycosides, steroids and flavonoids. These results provide scientific basis for the use of *B. pilosa* in African traditional medicine. The antibacterial activity reported in this study may be attributed to one or more of the 6 secondary metabolites detected in the crude extracts. However, a detailed study to determine the quantity of these metabolites, their respective constituents and safety parameters would shed more light on their therapeutic potential as antibacterial agents.

[1]Njume C, Gqaza BM, George G, Goduka NI. In-vitro antimicrobial evaluation of two indigenous functional food-plants (Chenopodium album and Solanum nigrum) used in the Oliver Reginald (O.R.) Tambo district municipality of South Africa. *Afr J Microbiol Res*. 2014;8(4):3612-16.

[2]Adegboye MF, Akinpelu DA, Okoh AI. The bioactive and phytochemical properties of Garcinia kola (Heckel) seed extract on some pathogens. *Afr J Biotechnol*. 2008;7(21):3934-38.

[3]Maobe MAG, Gatebe E, Gitu L, Rotich H. Preliminary phytochemical screening of eight selected medicinal herbs used for the treatment of diabetes, malaria and pneumonia in Kisii region, Southwest Kenya. *Eur J Applied Sci*. 2013;5(1):1-6.

Morinda citrifolia fruit extracts modulates H_2O_2- induced oxidative stress in human liposarcoma SW872 cells

Ruhomally Z[1], Somanah J[2], Bahorun T[2], Neergheen-Bhujun VS[1,2]*

[1]Department of Health Sciences, Faculty of Science, University of Mauritius, Réduit, Mauritius

[2]ANDI Centre of Excellence for Biomedical and Biomaterials Research, CBBR, Building, MSIRI, University of Mauritius, Réduit, Mauritius

(Presenting author: Zaina Ruhomally)

Morinda citrifolia L, commonly known as noni, is used worldwide by the pharmaceutical and cosmetic industries due to the plethora of pharmacological activities of its metabolites. In Mauritius, the fruits of *M citrifolia* are used in folk medicine against a number of indications. The present study aimed at evaluating the antioxidant activity of ripe and unripe noni fruit at both biochemical and cellular levels. Using an array of established assay systems, the fruit antioxidant propensity was assessed in terms of its radical scavenging, iron reducing and metal chelating potentials. Ascorbic acid, total phenolic and total flavonoid contents of the fruits were also determined. The ascorbic acid content of ripe noni was 76.24 ± 1.13 mg/100 g while total phenols of ripe and unripe fruit extracts were 748.40 ± 8.85 µg and 770.34 ± 2.27 µg GAE g^{-1}FW respectively. The highest amount of flavonoids was in the unripe fruit (228.02 ± 0.37 µg QE g^{-1}FW) compared to 67.67 ± 1.55 µg QE g^{-1}FW in the ripe fruits. Both the ripe and unripe extracts of *M. citrifolia* were potent scavengers of nitric oxide, superoxide and hydroxyl radicals. The ferric reducing capacity ranged from 11.26 ± 0.33 to11.90 ± 0.20 mM Fe^{2+} g^{-1} FW while the IC_{50} values for the iron (II) chelating power were 0.500 ± 0.012 and 1.740 ± 0.006 g FW /mL for the ripe and unripe fruit extracts respectively. Cellular studies additionally demonstrated that noni extracts were able to dose-dependently counteract accumulation of reactive oxygen species (ROS)-induced oxidative stress, a potential obesogenic factor within human liposarcoma SW872 cells as well as significantly restore oxidative stress- induced cell death within the concentration range of 0.106 to 0.813 g/mL. Results reported herein suggest noni as an interesting source of prophylactic antioxidants modulated by its polyphenol composition.

The effects of multivitamin-multimineral supplementation in the spontaneously hypertensive rat model

Höfler RU, Channa ML, Nadar A
School of Laboratory Medicine and Medical Sciences, College of Health Sciences, University of KwaZulu-Natal, Westville Campus, Durban, South Africa

(Presenting author: Rosemarie Höfler)

In recent years there has been a proliferation in the availability and use of both human and animal nutritional supplements. Through high impact marketing strategies, otherwise healthy individuals are encouraged to take Multivitamin-Multimineral (MVMM) supplements to promote growth, and enhance general health and cognitive function. They have also been recommended as a "nutritional insurance" for preventing many lifestyle related conditions like diabetes and hypertension, as well as having anti-oxidant effects[1,2]. Studies in the USA illustrate a gradual overall increase in MVMM supplement use, with women being the greatest consumers[3]. The American National Institute of Health (NIH) as well as the National Animal Supplement Council have reiterated that there is still a need for greater scientific evidence pertaining to the benefits and efficacy of MVMM supplementation [4,5]. The study investigated the effect of MVMM supplementation on hypertension and oxidative stress in the Spontaneously Hypertensive Rat (SHR), a well-established animal model for hypertension. A commercially prepared MVMM supplement using new nano-emulsion technology was administered tri-weekly via oral dosing for 8 weeks to two groups of 8 female SHR and Wistar rats. Two corresponding control groups were dosed with deionised water only. All animals had *ad libitum* access to commercial rat chow food and water. Animal body mass, blood pressure, fasting blood glucose and food and water intake were monitored weekly. At the end of 8 weeks, the animals were sacrificed. Haemoglobin, red blood cell count and total plasma cholesterol was measured for all groups. Plasma C - reactive protein, Angiotensin-converting enzyme, Blood urea nitrogen as well as kidney lipid peroxidation were also assessed. The growth rate for the SHR supplemented group was significantly greater compared the control SHR group. Diastolic blood pressure also showed a significant decrease in both the MVMM supplemented groups when compared to their controls. Blood glucose, Red blood cell parameters and Total plasma cholesterol showed no significant difference between all groups. Kidney function appeared normal and the inflammatory marker was not significantly raised. MVMM supplementation for 8 weeks lowered blood pressure and enhanced the growth rate, with no observable deleterious effects on the general health status of the animals. MVMM supplementation may be useful in delaying the development of hypertension in this model especially during the early growth phase. Further investigations into the underlying mechanisms responsible for decreased blood pressure and enhanced growth are underway.

[1]Rosenberg IH. Challenges and opportunities in the translation of the science of vitamins. *Am J Clin Nutr*. 2007;85:325S-7S.
[2]Rock CL. Multivitamin-multimineral Supplements: Who Uses Them? *Am J Clin Nutr*. 2007;85:277S-9S.
[3]Gahche J, Burt V, Hughes J, Yetley E, Dwyer J, Picciano MF, Mcdowell M, Sempos C. Dietary Supplement Use Among U.S. Adults Has Increased Since NHANES III (1988–1994). NCHS Data Brief. 2011;61:1-8.
[4]Mcginnis JM, DFB, Brannon PM, Carroll RJ, Gibbons RD, Hazzard WR, Kamerow DB, Levin B, Ntambi JM, Paneth N, Rogers D, Vaughan W. NIH State-of-the-Science Conference Statement on Multivitamin/Mineral Supplements and Chronic Disease Prevention. NIH consensus and state-of-the-science statements. 2006;23:1-30.
[5]Grassie LA. Update on Animal Dietary Supplements – FDA Veterinarian. National Animal Supplement Council. 2002.

Mushrooms in the fight against cancer: Biochemical and Molecular Evidence

Ramsaha S[1,7], Neergheen-Bhujun VS[1,7], Verma S[2], Kumar A[3], Bharty RK[2], Chaudhary AK[2], Sharma P[4], Futty-Beejan PH[5], Kyung-Sun K[6], Bahorun T[7]

[1]*Department of Health Sciences, Faculty of Science, University of Mauritius, Réduit, Mauritius*

[2]*Institute of Biosciences and Biotechnology, Chhatrapati Shahuji Maharaj University, Kanpur, Uttar Pradesh, India*

[3]*Deen Dayal Upadhyay Gorakhpur University, Gorakhpur, Uttar Pradesh, India*

[4]*Department of Physics, Banaras Hindu University, Varanasi, Uttar Pradesh, India*

[5]*Mushroom Unit, Food and Agricultural Research and Extension Institute, La Brasserie, Mauritius*

[6]*Department of Veterinary Public Health, College of Veterinary Medicine, Seoul National University, Seoul, South Korea*

[7]*ANDI Centre of Excellence for Biomedical and Biomaterials Research, CBBR, Building, MSIRI, University of Mauritius, Réduit, Mauritius*

(Presenting author: Srishti Ramsaha)

Increasing evidence from both *in vitro* and *in vivo* studies strongly demonstrate that the use of natural antioxidants from dietary sources in cancer chemoprevention can be an effective and rational approach to thwart the initiation, promotion and progression of the disease, particularly by targeting the hallmarks of the cancer cell. Pre-clinical animal models have been extensively used in evaluating the efficacy of chemopreventive agents and a growing number of positive human chemoprevention trials using such agents either alone or in combinations have shown promise. The investigation of modulatory effects of natural antioxidant rich food extracts on the biochemical and molecular markers in these models is instrumental to purport cancer chemopreventive actions. In this vein, the hepatoprotective potential of edible mushrooms of Mauritius, namely *Pleurotus sajor-caju* and *Agaricus bisporus* were evaluated using an MNU-induced hepatocarcinogenesis Balb/c mice model. MNU treated mice showed a significant decrease of 15.2 % in body weight after 22 days ($p<0.05$). The treatment with the mushroom extracts restored normal weight gain over the 3 months supplementation period. Analysis of blood parameters indicated a clear modulation of hemoglobin concentration, leukocyte, platelet, lymphocyte, neutrophil, monocyte and eosinophil counts in MNU-induced mice ($p<0.05$). Extract supplementation without the carcinogen more effectively reduced lipid peroxidation compared to control mice and showed an improved antioxidant status with high FRAP values ($p<0.05$). Furthermore, in MNU-primed mice, supplementation of *P. sajor-caju* and *A. bisporus* extracts effectively reduced oxidative damage which was marked by a significant decrease in the extent of lipid peroxidation ($p<0.05$) and a concomitant increase in the activities of enzymatic antioxidants primarily catalase, superoxide dismutase, glutathione reductase and peroxidase, and FRAP values ($p<0.05$). DNA protective effects of the extracts were confirmed by Raman spectroscopy where, the MNU-DNA interaction as evidenced by an intense peak at 1254 cm^{-1} was normalized. Hematological, biochemical and biophysical data collectively demonstrated hepatoprotective and anti-carcinogenic effects and indicate the use of mushrooms as potential dietary modulators in cancer chemoprevention.

An elicitation study of the condom use behavior and intentions of migrant youth in South Africa

John-Langba J, Tantoh A
Department of Social Development, University of Cape Town, South Africa

(Presenting author: Johannes John-Langba)

The social and behavioural determinants of health and disease cannot be underestimated in fight against the spread of HIV in Africa. Cross border migration is an ordeal that forces migrants in vulnerable situations to compromise their abilities to make informed choices and decisions related to sexual and reproductive health. This study utilized the theories of planned behaviour and acculturation to explore the condom use intentions and behaviour of cross-border migrant youth in South Africa. A qualitative research approach based on a social constructionist epistemology was employed to explore the influences of attitudes, subjective norms and perceived behavioural control on condom use intentions and behaviours. In-depth interviews were conducted with 20 participants aged 18-34 years in Cape Town. Purposive and snowball sampling techniques were utilised to recruit participants. Findings indicate a positive attitude towards condom use by migrant youth that was attributed to an increased level of knowledge of HIV/AIDS prevention. Although the vast majority of the participants did not find condoms pleasurable or stimulating during sexual intercourse, they reported its correct and consistent use for HIV prevention. Parental norms related to condom use were reportedly the most important subjective norm influencing condom use decision-making irrespective of marital status and years of residence in South Africa. Married participants, particularly women reported that the decision to use condom during sexual intercourse was not entirely under their volition notwithstanding levels of acculturation into the South African society. The findings in this study highlight the need for targeted HIV prevention interventions for migrant youth in host countries in Africa.

A Fuzzified Quantitative Methodological Approach for Environmental Health Assessment

Bokhoree C, Olivier St F

Centre for Applied Research in Sustainable Development, University of Technology, Mauritius, La Tour Koenig 11109, Mauritius

(Presenting author: Chandradeo Bokhoree)

In recent years, sustainable development has been a key challenging activity for most developing countries. Sustainability issues and practices have increasingly been exploited using various existing approaches in many significant fields of interest, including environmental and human health. There is a strong relationship between environmental issues and public health, which is fundamental in improving sustainability performance of a country. Artificial intelligence method is one of those techniques that were found to be extensively applied for treatment in health-related environment. Objectively, this paper presents a fuzzified model for assessing environmental health at local, regional and country level. It helps to identify the health performance metrics for obtaining comprehensive data layout in evaluating the environmental health status across different levels in an integrated manner.

Simple green synthesis of water-soluble type II CdTe/CdSe nanoparticles and their use in cellular imaging

Ncapayi V[1], Oluwafemi OS[2], Songca SP[3], Kodama T[4]

[1]Department of Chemistry, Cape Peninsula University of Technology, Cape Town, South Africa

[2]Department of Applied Chemistry, University of Johannesburg, Johannesburg, South Africa

[3]Department of Chemistry and Chemical Technology, Walter Sisulu University, Mthatha, 5117, Eastern Cape, South Africa

[4]Graduate school of biomedical engineering, Tohoku University, Aoba Sendai, Japan

(Presenting author: Vuyelwa Ncapayi)

The aim of this study was to synthesise highly luminescent water-soluble type II CdTe/CdSe core shell nanoparticles (NPs) with reduced cytotoxicity for cellular imaging. The synthesis of the CdTe/CdSe NPs was carried out via a simple, one pot and economical route, involving the use of greener materials under ambient environment in the absence of an inert atmosphere. The temporal evolution of the size and optical properties of the nanomaterials was investigated by varying the refluxing time and stability of the as-synthesised material at pH 12. The as-synthesised nanomaterials were characterised using UV-vis absorption and photoluminescence (PL) spectroscopy, transmission electron microscopy (TEM) and high-resolution transmission electron microscopy (HRTEM). The nanoparticles obtained were of high quality with high absorption and emission features. Addition of Se precursor to produce CdSe layer on the CdTe NPs core surface resulted in significant red shirt of both the absorption and emission maxima. The stability study showed that the emission maximum peak positions and FWHM remain the same with increase in emission intensity for all the NPs during the aging period. The cytotoxicity assay investigated on KM-Luc/GFP cell line showed very high cell viability for the CdTe/CdSe NPs produced at 7 h (85%) compared with those produced at 30 mins as the concentration increased from 0.1 to 60 ug/ml. The confocal imaging analyses showed the CdTe/CdSe NPs as a promising probe for cellular imaging and biolabelling. A simple environmentally benign green method for the synthesised of highly luminescent type II CdTe/CdSe NPs with reduced cytotoxicity for cellular imaging have been reported. The lower cytotoxicity at the higher reaction time was attributed to the higher stability of the material due to strong surface passivation and hence lower release of Cd^{2+}.

High-density lipoproteins: more than cholesterol transporters

Olivier Meilhac[1,2]

[1]*Diabetes-atherothrombosis Therapies from Réunion and Indian Ocean Inserm U1188/ Université de La Réunion, La Réunion, France*

[2]*Plateforme CYROI, 2 rue Maxime Rivière, 97490 Sainte-Clotilde, La Réunion, France*

High-density lipoproteins (HDLs), in addition to their most investigated role in reverse transport of cholesterol from peripheral tissues back to the liver, display pleiotropic effects. In particular, HDL particles may exhibit antioxidant, anti-inflammatory, anti-apoptotic, anti-thrombotic and anti-protease effects[1]. We have reported that HDLs are dysfunctional in different pathological situation such as in patients with abdominal aortic aneurysm (AAA)[2], during sepsis or at the acute phase of stroke. These findings led us to test the hypothesis that intravenous HDL supplementation may represent a therapeutic option in the above-mentioned pathologies. We have reported that HDL therapy was efficient for reducing both infarct volume and mortality in two different rat models of ischemic stroke[3]. In addition, in case of co-treatment with rtPA (a fibrinolytic agent able to lyse the occluding thrombus), injection of HDLs limited the hemorrhagic complications and the mortality[4]. We have also demonstrated that HDL particles could be enriched *in vitro* by alpha-1-anti-trypsin (AAT, an elastase inhibitor)[5], and were more efficient than AAT alone to prevent alveolar destruction in a model of pulmonary emphysema[6]. Finally, intravenous injection of functional HDLs was shown to reduce the aneurysmal diameter development in a rat model of elastase-induced AAA. Taken together, this overview of the different results obtained during the last 5 years suggests that HDL particles, in addition to their role in the clearance of cholesterol, may represent a therapeutic option in various pathologies and in particular at the acute phase of ischemic stroke[7].

[1]Tran-Dinh A, Diallo D, Delbosc S, et al. HDL and endothelial protection. *Br J Pharmacol*. 2013;169:493-511.

[2]Delbosc S, Diallo D, Dejouvencel T, et al. Impaired high-density lipoprotein anti-oxidant capacity in human abdominal aortic aneurysm. *Cardiovascular Res*. 2013;100:307-15.

[3]Lapergue B, Moreno JA, Dang BQ, et al. Protective effect of high-density lipoprotein-based therapy in a model of embolic stroke. *Stroke*. 2010;41:1536-42.

[4]Lapergue B, Dang BQ, Desilles JP, et al. High-density lipoprotein-based therapy reduces the hemorrhagic complications associated with tissue plasminogen activator treatment in experimental stroke. *Stroke*. 2013;44:699-707.

[5]Ortiz-Munoz G, Houard X, Martin-Ventura JL, et al. HDL antielastase activity prevents smooth muscle cell anoikis, a potential new antiatherogenic property. *FASEB J*. 2009;23:3129-39.

[6]Moreno JA, Ortega-Gomez A, Rubio-Navarro A, et al. High-density lipoproteins potentiate alpha1-antitrypsin therapy in elastase-induced pulmonary emphysema. *Am J Respir Cell Mol Biol*. 2014;51:536-549.

[7]Meilhac O. High-density lipoproteins in stroke. Handbook of experimental pharmacology. 2015;224:509-26.

Kolaviron, a biflavonoid of *Garcinia kola* seed mitigates ischaemic/reperfusion injury by up-regulation of pro-survival and down-regulation of apoptotic signaling pathways

Oyagbemi AA[1,2,3], Bester DJ[3], Esterhuyse AJ[3], Farombi EO[2]

[1]Department of Veterinary Physiology, Biochemistry and Pharmacology, University of Ibadan, Nigeria

[2]Drug Metabolism and Toxicology Unit, Department of Biochemistry, College of Medicine, University of Ibadan, Nigeria

[3]Oxidative Stress Research Centre, Department of Biomedical Sciences, Faculty of Health and Wellness Sciences, Cape Peninsula University of Technology, Bellville, South Africa

(Presenting author: Ademola Oyagbemi)

Possible cardioprotective effect of Kolaviron (KV) administration and the molecular mechanism(s) involved in ischemic/reperfusion injury of isolated rat hearts were assessed. Twenty rats were used for this study. They were grouped into ten rats of group of two. Rats in group I received 2ml/kg of corn oil (vehicle) while animals in groups II received 200 mg/kg body weight of Kolaviron (KV) for four weeks respectively. Isolated rat hearts were stabilized for 5 minutes on Langendorff, perfused on working heart model for 10 minutes and subjected to global ischemia for 15 minutes followed by 25 minutes reperfusion. Antioxidant enzymes, markers of oxidative stress and western blot analyses were carried out on snap-frozen heart tissues. There was significant ($p<0.05$) increase in superoxide dismutase (SOD), catalase (CAT) and glutathione peroxidase (GPx), oxygen radical absorbance capacity (ORAC) and concomitant significant ($p<0.05$) decrease in malondialdehyde (MDA) and intracellular reactive oxygen species (ROS) in isolated rat hearts of animals that received KV compared to the control. Western blot analysis revealed significant up-regulation of Akt/PKB, p-Akt/PKB, HSP27, p-HSP27 and down-regulation of p38 MAPK, Caspase 3, cleaved Caspase 3and cleaved PARP. Taken together, KV offered cardioprotection by enhancing the expression of pro-survival signaling pathway and abrogation of apoptotic pathway in isolated rat hearts subjected to ischemic/reperfusion injury.

Photo-physiological and biochemical basis of thermo-tolerance in four scleractinian corals exhibiting differential bleaching susceptibility from Okinawa, Japan

Bhagooli R[1,2], Yakovleva I[3]

[1]Department of Marine and Ocean Science, Fisheries and Mariculture, Faculty of Ocean Studies, Réduit, Republic of Mauritius

[2]Biodiversity and Environment Institute, Réduit, Republic of Mauritius

[3]AV Zhirmunsky Institute of Marine Biology, Far East Branch of Russian Academy of Sciences, Vladivostok, Russia

(Presenting author: Ranjeet Bhagooli)

Scleractinian corals are the major builders of reefs, which have witnessed severe deterioration due to worldwide high temperature anomalies. This study probes into the photo-physiological and biochemical basis of the disassociation of the coral/algae assemblages and the variable responses to thermal stress. Four reef-building corals namely *Stylophora pistillata*, *Porites cylindica*, *Pavona divaricata* and *Platygyra ryukyuensis* were exposed to temperatures of 28 and 32^{o}C under 400 µmol quanta m^{-2} s^{-1} over a period of 36 h and photo-physiology of the algae, antioxidant enzyme (superoxide dismutase, SOD) activity, lipid peroxidation (malondialdehyde, MDA), and zooxanthellae density were monitored 6, 12, 24 and 36 h during the trials. Photo-physiological parameters such as maximum electron transport rate, efficiency and capacity of non-photochemical quenching and maximum PSII quantum yield revealed that zooxanthellae of *S. pistillata* and *P. ryukyuensis* were the most and least susceptible, respectively. A clear sequence of heat stress targets was revealed - significant damage to activation of Calvin-Benson reaction, deduced from photo-physiological parameters, and maximum electron transport rate accompanied bleaching after 12 h treatment at 32 ^{o}C in *Porites cylindrica* and after 36h in *Pavona divaricata*. Oxidative stress and oxidative damage were more severe in *S. pistillata* and *Porites cylindrica*. Oxidative stress and oxidative damage occurred along with bleaching in all species except in the resistant coral *Platygyra ryukyuensis*. These results suggest that photo-physiological damage and oxidative stress/damage occur at different time exposures to thermal stress in the four coral species investigated and thus explain variable thermal tolerance among scleractinian corals.

Seropositivity and associated differences in infecting strains and biomolecular risk markers suggest for a role for *Helicobacter pylori* in non-communicable diseases in Mauritius

Biranjia-Hurdoyal SD, Seetulsingh-Goorah SP

Department of Health Sciences, Faculty of Science, University of Mauritius, Mauritius

(Presenting author: Susheela D Biranjia-Hurdoyal)

Helicobacter pylori (H. pylori) has been associated with gastro-intestinal and non-communicable diseases (NCDs) including Type 2 Diabetes Mellitus (T2DM) and cardiovascular diseases (CVD), which constitute a major disease burden in Mauritius. The aim of this study was to investigate the possible contribution of *H. pylori* to the aetiology and pathogenesis of T2DM and CVD in a sample of the Mauritian population. Prevalence of H. *pylori* in apparently healthy (AH) subjects and NCD subjects with either T2DM, Ischaemic Heart Disease (IHD) or both T2DM and IHD was first determined using H2.1 serological detection kit. Comparison of *H. pylori* serological prevalence data and of *H. pylori*-specific antigenic proteins in the study groups were used to determine any aetiological role. Association of overall prevalence data and of antigenic markers with known biochemical NCD risk markers were investigated. The study was approved by the University of Mauritius Research Ethics Committee. Data was analysed using SPSS version 16.0. Although there was no significant difference in overall prevalence between AH participants and NCD participants, T2DM/IHD females had higher *H. pylori* prevalence than AH females (83% v/s 60%; $p<0.05$; OR=2.4). Differences in prevalence were also found between NCD types, with highest prevalence in T2DM/IHD. Antigenic scores were high with > 70% of the study population harbouring *H. pylori* strains with >3 diagnostic antigenic markers. Prevalence of traditionally studied CagA+ and VacA+ phenotypes was high in both NCD and AH participants. These markers had lower variation between study subgroups compared to *H. pylori* lower molecular weight antigenic markers p35kD, p37kd and p19.5kD which had lower but more varied prevalence between study groups. *H. pylori* phenotype was affected by various factors including obesity and NCD type. Obesity and female gender were associated with higher prevalence of p35kD strains in NCD. The inflammatory marker, CRP, and oxidative stress marker Ox LDL, were detected at higher levels in NCD participants being higher in NCD subjects seropositive to *H. pylori*. In general, *H. pylori* seropositivity was associated with higher leptin levels and lower ghrelin levels, a profile associated with increased inflammation and NCD risk. A role for *H. pylori* infection in NCD is suggested by strain differences in health and disease and association of the bacterium with a positive host biomarker risk profile for NCD. *H. pylori* might contribute to NCD via inflammation as seropositivity was associated with increased inflammation in general and in NCD in particular. When attempting to establish the potential pathogenic role of *H. pylori*, a combination of studies on the infecting strain using molecular markers of strain phenotype and biomarkers of disease risk and pathogenesis is more informative than overall prevalence data alone.

Session 6: Nutrition, Wellness and drug development

KEYNOTE ADDRESS

Nutrition, Genomics and Human Health: A Complex mechanism for Wellness

Okezie I Aruoma, American University of Health Sciences, Signal Hill, CA, USA

The causes of adverse reactions to foods and adverse drug reactions (ADRs) are many and include product defects, medication errors and differences in drug exposure. Pharmacogenetics is the study of genetic causes of individual variations in drug response and pharmacogenomics more broadly involves genome-wide analysis of the genetic determinants of drug efficacy and toxicity. Pharmacogenomics has helped understand some of the factors responsible for ADRs caused by high exposures and factors associated with the mechanism-of-action of the drug and examples continue to emerge where genetic markers identified patients at risk for serious, often life threatening ADRs before administration of drugs. The similarity of nutritional genomics and pharmacogenomics stems from the innate goal to identify genetic variants associated with metabolism and disease. Gene-diet interactions involve hundreds to thousands of compounds that are present in even the simplest foods and this chemical complexity of food make the identification of the bioactive compounds quite challenging. The advances in the knowledge base of the complex interactions among genotype, diet, lifestyle, and environment will continue to elicit changes in current medical practice to ultimately yield personalized nutrition recommendations and health and risk assessment. This information could be used to understand how foods and dietary supplements uniquely affect the health of individuals and hence wellness.

Bilirubin metabolism in the development and prevention of chronic diseases: antioxidative effects and beyond

Karl-Heinz Wagner, Department of Nutrition and Food Quality, University of Vienna, Austria

Bilirubin, the principal tetrapyrrolic bile pigment and catabolite of haem, is an emerging biomarker of disease resistance, which may be related to several recently documented biological functions. Initially believed to be toxic in infants, bilirubin's perception has undergone a transformation, to being a molecule, which may promote health in adults. Data from the last decade demonstrate that mildly elevated serum bilirubin levels, also known as Gilbert`s syndrome (GS), are strongly associated with reduced prevalence of chronic diseases, particularly cardiovascular diseases (CVD), as well as to CVD-related mortality and risk factors. Interest in GS and its potential to prevent diseases has risen recently, mainly due to the syndrome`s high prevalence. The polymorphism affects approximately 3-13 % of the general population, men more than women. Recent data also link bilirubin to other chronic diseases including cancer and diabetes mellitus type 2 and to all-cause mortality. Mechanistically the protecting effects of bilirubin and other bile pigments have mainly be attributed to their antioxidative effects, which has been proven in various *in vitro* models as well as in animal and human organisms. More recent data show additional protection such as antimutagenic effects by reducing the effects of foodborne and chemical mutagens or induction of DNA damage and apoptosis in cancer cell models. In animal and human studies hyperbilirubninaemic subjects showed an improved lipid metabolism (with lower risk factors such as total- and LDL-cholesterol or triglycerides), lower mediators for inflammation and a lower body mass index. Interestingly, the effects were more pronounced in older subjects, which opens up questions regarding an age related increase in biomarker related to lipid metabolism. Therefore, there is evidence to suggest that bilirubin is a biomarker for reduced chronic disease prevalence and a predictor of all-cause mortality, which is of important clinical significance. Given that the search for novel biomarkers of chronic diseases, as well as for novel therapeutic modalities are key research objectives in near future, bilirubin represents a promising candidate, meeting the criteria of a biomarker and should be considered more carefully in clinical practice, as a molecule which might provide insights into disease resistance.

Wagner KH, Wallner M, Mölzer C, Gazzin S, Bulmer AC, Tiribelli C, Vitek L. Looking to the horizon: the role of bilirubin in the development and prevention of age-related chronic diseases. *Clin Sci (Lond)*. 2015; In press.

Mölzer C, Huber H, Steyrer A, Ziesel G, Wallner M, Bulmer AC, Wagner KH. Bilirubin and Related Tetrapyrroles Inhibit Food-borne Mutagenesis: A mechanism for Antigenotoxic Action against a Model Epoxide. *J Nat Prod*. 2014;77(2):436.

Mölzer C, Pfleger B, Putz EM, Roßmann A, Schwarz U, Wallner M, Bulmer AC, Wagner K-H. In vitro DNA-damaging effects of intestinal and related tetrapyrroles in human cancer cells. *Exp Cell Res*. 2013;319:536.

Wallner M, Marculescu R, Doberer D, Wolzt M, Wagner O, Vitek L, Bulmer AC, Wagner KH. (2013): Protection from age-related increase in lipid biomarkers and inflammation contributes to cardiovascular protection in Gilbert's syndrome. *Clin Sci (Lond)*. 2013;125(5):257.

Treating the cognitive and social dysfunctions related to type 2 diabetes

Joseph Indelicato, Touro College Health Sciences I, New York 11706, USA

While much has been written about the effects of diabetes on cardiovascular functioning, less attention has been paid upon the role of diabetes on cognitive functioning. While researchers are still debating the pathophysiology of the cognitive dysfunction triggered by diabetes, including the possibility that Alzheimer's being Type III diabetes, among other possibilities. Less research has targeted addressing these problems among those with diabetes. Social problems associated with having cognitive dysfunctions in diabetics, have received very little attention. Social activities are perhaps the most difficult and complicated behaviors humans engage in, Even the concept of measurable Social Intelligence comes relatively new to the psychology literature. This presentation focuses on ways to address both Cognitive and Social Dysfunctions related to Type 2 diabetes. Both types of dysfunction cause significant harm to those suffering from diabetes and addressing them in evidence based fashion offers an opportunity better manage functional impediments related to this disorder. They also may help to ameliorate some of the harm done by the decrease in both cognitive and social functioning.

Sugar and hearts and all things not so nice

M. Faadiel Essop, Department of Physiological Sciences, Stellenbosch University, South Africa

The incidence and prevalence of Type 2 diabetes mellitus is rapidly increasing and is a major concern for both developed and developing countries. Moreover, future predictions indicate that numbers will continue to rise within the next few decades, with developing nations projected to be hardest hit. With the surging prevalence of diabetes, this global burden of disease is further exacerbated by cardiovascular complications that frequently manifest in diabetic individuals. This talk will focus on the link between hyperglycemia and cardio-metabolic diseases onset, emphasizing recently emerging downstream mediators, namely oxidative stress and metabolic pathway perturbations that are implicated in the development of hyperglycemia-induced cardiac dysfunction. The role of hyperglycemia-mediated activation of non-oxidative glucose pathways (NOGPs) (i.e. polyol pathway, hexosamine biosynthetic pathway, advanced glycation endproducts, PKC) as significant contributors to the development of cardio-metabolic complications will be evaluated. Here data generated indicate that there is a unique interplay between the NOGPs as well as a downstream convergence of detrimental effects such as myocardial oxidative stress, further NOGP activation, apoptosis, and impaired contractile function. Thus the proposal is made that a vicious metabolic cycle is established whereby hyperglycemia-induced NOGP further fuels its own activation by generating even more oxidative stress, and aggravating damaging effects in the heart under these conditions. Novel therapeutic interventions should therefore aim to diminish oxidative stress and/or divert flux away from hyperglycemia-mediated activation of NOGPs. For example, oleanolic acid (clove extract) administration can attenuate hyperglycemia-induced oxidative stress and apoptosis, and also enhance functional recovery of ex vivo perfused rat hearts following ischemia-reperfusion. Moreover, treatment with benfotiamine (vitamin B1 derivative) stimulates transketolase a key enzyme of the non-oxidative branch of the pentose phosphate pathway (PPP). As PPP activation can shunt flux away from the NOGPs, this results in the lowering of overall myocardial oxidative stress together with an improvement in cardiac contractile function following ischemia-reperfusion. These studies demonstrate that the inhibition of, and/or shifting flux away, from the NOGPs provide a unique opportunity to develop novel cardioprotective agents. This may be especially useful to help cope with the alarming number of diabetic individuals suffering cardiovascular complications, and also for non-diabetic patients that exhibit acute hyperglycemia within the clinical setting.

Screening and detection of mutations in exon1 and exon6 region of ext1 gene of a multiple hereditary exostoses affected proband

Vichare VV[1], Gangawane AK[2]
[1]Department of Biotechnology, Pillai's College of Arts Commerce and Science, New Panvel, Navi Mumbai 410206, India
[2]Sumandeep Vidyapeeth, Piparia, Waghodia, Vadodara-391760, Gujarat, India

(Presenting Author: Ajit Gangawane)

Multiple Hereditary Exostoses (MHE) is an autosomal dominant skeletal disorder showing cartilage-capped outgrowths in areas of actively growing bones. The sites for mutations in MHE proband are EXT1, EXT2 and EXT3 of exostosin protein located at chromosome 8q23-24, 11p11-p12&19p respectively.In this study we have reviewed four generations of a family with 32 living members, of which 13 are diagnosed with multiple exostoses. One had been operated for chondrosarcoma, giving the risk for malignant transformation as high as 7.6%. Patient's DNA was extracted from whole blood using different methods and a comparative analysis of different methods reveals the spin column method is best suitable since its gives maximum yield. The DNA extracted was used to obtain amplicons of Exon 1 and Exon 6 of EXT1 gene by using PCR technique. Nested PCR was performed for Exon 1 using internal and external primers. DNA Sequencing was performed on ABI-3500 DNA sequencer to obtain the raw chromatogram. The analysis of the raw data confirms the presence of point mutation in all the three patient samples thereby stating that point mutation at position 13 of exon 6 is prominent site for mutation for a Multiple Hereditary Exostoses affected proband residing in India.

Nano-drug formulations and combinations with bioactive compounds/ phytochemicals

Jeetah R, Veeren A, Bhaw-Luximon A, Jhurry D

ANDI Centre of Excellence for Biomedical and Biomaterials Research, University of Mauritius, MSIRI Building, Réduit, Mauritius

(Presenting Author: Archana Bhaw-Luximon)

Drug combinations in cancer chemotherapy have proved to be more efficient than single drugs as they allow different mechanisms of action for cure.[1] For instance, in pancreatic cancer preclinical studies, Irinotecan has synergistic activity when administered before 5-FU and Leucovorin, Oxaliplatin has clinical activity only when combined with 5-FU, and Oxaliplatin and Irinotecan show synergistic activity. Similarly, in breast cancer, drug combinations such as doxorubicin or paclitaxel with an anti-VEGF has led to enhanced efficacy. Recently therapy combining synthetic drugs and bioactive compounds or phytochemicals has proved quite interesting as they can address different aspects of cancer cells mode of action and their microenvironment. However, the biodistribution and bioavailability of these drugs remain low with their premature degradation and interaction with the biological environment. Nanocarriers improve therapeutic efficacy of drugs by increasing bioavailability, biodistribution and allowing targeting of diseased cells. For instance, Tamoxifen and Quercetin have been combined in PEG-based nanoparticles and proved their efficacy against cancer cells. Curcumin gold nanoparticles have also shown better efficacy. Very few examples have been reported on the use of polymeric nanomicelles for such combination. We have developed at CBBR a number of nanomicelles consisting of tunable hydrophobic and hydrophilic segments as well as nanovesicles. We have reported on dual combination of synthetic anti-cancer drugs.[2-5] We are currently investigating the combination of synthetic anti-cancer drugs and bioactive molecules such as ergothioneine for synergistic effects (Figure 1). The preliminary results will be presented.

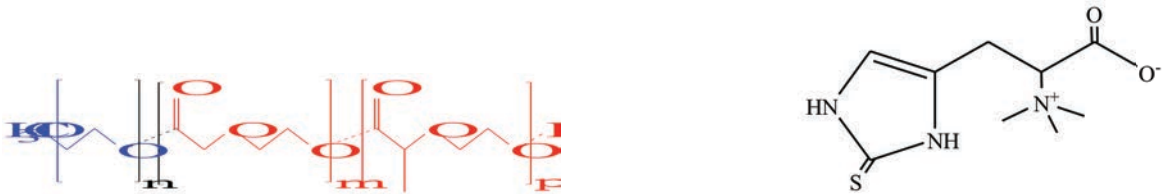


Figure 1. PEG-b-(PDX-co-PMeDX) nanocarriers and ergothioneine molecule

[1]Bhaw-Luximon A, Goonoo N, Jhurry D, Nanotherapeutics promises for colorectal cancer and pancreatic ductal adenocarcinoma, Encyclopedia Series: Applications of NanoBioMaterials (I-XI) Multi-Volume SET, Edited by: Alexandru Mihai Grumezescu, in press 2015

[2]Jeetah R, Bhaw-Luximon A, Jhurry D, New amphiphilic PEG-b-P(ester–ether) micelles as potential drug nanocarriers. *J Nanopart Res*. 2012;14:1168-1181.

[3]Jeetah R, Bhaw-Luximon A, Jhurry D, Dual encapsulation and controlled delivery of anti-TB drugs from PEG-block -poly(ester-ether) nanomicelles. *J Nanopharmaceutics Drug Delivery*. 2013;1:1-18.

[4]Veeren A, Bhaw-Luximon A, Jhurry D, Polyvinylpyrrolidone–polycaprolactone block copolymer micelles as nanocarriers of anti-TB drugs. *Eur Polym J*. 2013;49:3014-5.

[5]Jeetah R, Bhaw-Luximon A, Jhurry D, Polymeric nanomicelles for sustained delivery of anti-cancer drugs. *Mutation Research*. 2014;768;47-59.

Photodynamic therapy, past present and future

Songca SP[1], Oluwafemi OS[2]

[1]Department of Chemistry and Chemical Technology, Walter Sisulu University, 1 Nelson Mandela Drive, Mthatha, Eastern Cape, South Africa

[2]Department of Chemistry, University of Johannesburg, Auckland Park, Johannesburg, South Africa

(Presenting Author: Sandile Songca)

When Lipson and Baldes reported their preparation of hematoporphyrin derivative (HpD), little did they know that they were defining photodynamic therapy (PDT). This work established the basis for the first generation PDT and the technology was subsequently adopted in the clinic by Dougherty et al in 1978. These researchers also confirmed its effectiveness and safety by completely eradicating early stage internal squamous cell carcinoma in 1980, using argon dye laser light channeled through an optic fiber that was inserted through the bronchial cavity. The successes of PDT against many cancers that were subsequently demonstrated in many clinics attracted the attention of pre-clinical and clinical researchers and a number of drugs obtained approval for clinical use in many countries. Photofrin enjoys the widest approval; Canada, Denmark, France, Finland, Germany, Iceland, Italy, Japan, Netherlands, UK and USA, for lung, esophageal, bladder, gastric, cervical, skin and brain cancer. More than 3,000 tumors in various organs have been treated by PDT in more than 32 countries. Clinical trials show that PDT can successfully treat at least 50 % early stage cancer that would otherwise have to be treated by surgery. Thus PDT can significantly improve the quality of life. The cost of PDT computed by Fujino was found to be at least 30 percent less than that of surgery. Furthermore, unlike chemotherapy, no special training is required for nurses, and no post treatment course in intensive care; no engineer or computerized dose calculations, or additional costs for isotope re-treatment, as in radiotherapy; and no blood transfusions, or operating theatre costs, as in surgery. PDT is indicated in cases with superficial localized early stage lung cancer as a curative treatment and as a palliative treatment for opening tumor obstructed bronchi prior to surgery based combination therapy. In the future, PDT will have many applications in a wide range of fields from preclinical to clinical medicine. Indications will be extended for early stage lung cancer and improvement of therapeutic results will be achieved by the development of new photosensitizers such as chlorin, pheophorbide, phthalocyanin, amino laevulinic acid, benzoporphyrin, and others, which can be excited by longer wavelength and new lasers such as pulsed excimer, dye and diode lasers. Through these new developments, the indications of this treatment for malignant tumors will continue to expand. Recently the effectiveness of antibacterial PDT (aPDT), important for the developing world, was demonstrated by Dai et al., and Photodynamic Antimicrobial Chemotherapy (PACT) was shown by Nakonechny et al to be effective against most types of microbial pathogens, including those that are resistant to antibiotics. Jori et al have proposed the treatment of chronic ulcers, infected burns, acne vulgaris and a variety of oral infections for clinical applications of aPDT. Current interest is on the applications of nanotechnology with PDT such as drug delivery and magnetic hyperthermia. Thus, the general scope of PDT and its effectiveness in established applications will expand in the future. This paper presents the history, scientific development and future of PDT for basic and clinical researchers.

Membrane progestin receptor (mPR) a possible target for new drugs

Tokumoto T, Babul-Hossain MD, Wang J, Miyazaki T
Integrated Bioscience Section, Graduate School of Science and Technology, National University Corporation Shizuoka University, Shizuoka 422–8529, Japan

(Presenting Author: Toshinobu Tokumoto)

Oocyte maturation, reductive cell division of vertebrate oocytes, is induced by maturation-inducing steroid (MIS). A new class of steroid receptor was identified as receptor for MIS, termed as membrane progestin receptor (mPR). As well known, steroid genomic actions are mediated via nuclear steroid receptors involving mRNA and protein synthesis. In contrast, steroid hormones act at the cell surface of target tissues to initiate rapid activation of intracellular signaling pathways without transcription through mPR. These rapid actions of steroids are called as non-genomic steroid actions, for example alterations in intracellular calcium concentrations. Genome-wide phylogenetic analyses have shown that mPRs are a new protein family conserved in vertebrate, the progestin and adipoQ receptor (PAQR) family composed of 11 genes. mPRs are widely expressed in various tissues. High expression levels of mRNA for mPRs have been reported in ovarian cancer cells and breast cancer cells. There is a possibility that mPRs are responsible for mediating the non-genomic actions of steroids in various tissues. We are establishing the screening methods that make it possible to screen the ligands for mPR. Recently we succeeded to express and purify recombinant mPR protein in yeast, *Pichia pastoris*. Relatively large amount of mPR protein with hormonal binding activity can be purified by our method. The recombinant protein will be applicable to establish the molecular probe to detect mPR interacting agents. Also we established cell lines that transformed with cDNAs for mPRa and recombinant luciferase gene, named Glosensor. The cells can be used for monitoring effects of ligands on mPRa by intracellular cAMP levels. Study using these cell lines indicated that cAMP concentration was decreased by ligands for mPRa. The results provide the suportive evidence for previous results that suggested mPRa is coupled to Gi protein. On the basis of these screening system, we just started to identify the natural compounds that interact with mPR.

Green synthesis, characterization and application of semiconductor and silver nanostructures

Oluwafemi OS[1,2], Songca SP[3]

[1]Department of Applied Chemistry, University of Johannesburg, Doornfontein 2028, Johannesburg, South Africa

[2]Centre for Nanomaterials Science Research, University of Johannesburg, Johannesburg, South Africa

[3]Department of Chemistry and Chemical Technology, Walter Sisulu University Mthatha campus, Mthatha, 5117, Eastern Cape, South Africa

(Presenting Author: Oluwatobi S Oluwafemi)

The aim of this study is to synthesize highly fluorescent and stable quantum dots and silver nanoparticles (Ag-NPs) with reduced cytotoxicity via completely green methods for biological applications. The syntheses involve the use of green and biocompatible materials such as oleic acid, gelatin, starch, glutathione, cysteine and mercaptopropionicacid as capping agents while glucose, maltose, dextrose were used as reducing agents. The effects of various synthesis parameter such, pH, reaction time, concentration, ageing time and capping agents on the optical and structural properties were investigated. The as-synthesized material were characterized using UV-vis absorption and photoluminescence (PL) spectroscopy, transmission electron microscopy (TEM), high resolution transmission electron microscopy (HRTEM), x-ray diffraction (XRD), Fourier transform infrared spectroscopy (FTIR), Raman spectroscopy and energy dispersive spectroscopy (EDX). The reactions were carried out in ambient conditions and the as-synthesized materials were studied for imaging, labeling, sensing and catalytic applications. All the as-synthesized quantum dots are highly fluorescent with good absorption and emission properties. The cytotoxicity assay shows that the cell viability increased (83%) as the refluxing time, pH and passivation increased. The TEM image shows most of the nanomaterial are spherical in shape with high crystallinity while the metal nanoparticles exhibit strong antibacterial activities. Furthermore, the silver nanoparticles showed high catalytic activities against environmental pollutant and high sensitivities towards reactive oxygen species upto to a concentration of 10-10 M. All the as-synthesized materials display high stability for several months while the confocal imaging analyses showed the nanomaterials as a promising probe for cellular imaging and bio-labeling. The methods provide a facile green route for large-scale synthesis of biocompatible nanomaterials with reduced cytotoxicity for optical, sensing, catalytic, labeling and imaging applications that is useful for industrial purposes.

Abstracts for Poster presentations

Abstracts – Poster Presentations

POSTER 1

To evaluate the relationship of nutritional status with outcomes of simple diaphysel tibial fractures and CYR61

Singh A, Ali S, Mahdi AA, Srivastava RN
King George' s Medical University, Lucknow-226018, India

The main objective of this study was to correlate the healing outcomes of simple diaphyseal fractures with nutritional status of the patients. In this longitudinal cohort study, a total of 65 adult patients in the age group between 18 to 45 years with simple, fresh (< 7 days) traumatic diaphyseal fractures (42-A1, A2 & A3, as per as AO muller classification) of both bones of leg managed conservatively were analysed. The assessment of nutritional status of enrolled patients was done by measuring serum albumin (ELITech Clinical System) and serum ferritin (Roche Analyzer) at the start of treatment and clinic-radiological follow-up was done to analyze the fracture healing outcomes at 6th, 10th, 16th, 20th, 24th weeks. As per clinic-radiological outcomes, these patients were divided into two groups: Group-A: clinic-radiological bone healing with RUST score ≥ 7 by the end of 06th months (normal healing) and Group-B: clinic-radiological bone healing with RUST score < 7 by the end of 06th months (impaired healing). These healing outcomes were correlated with nutritional status of the patients. For comparison of the means between patient groups, relative risk with its 95% confidence interval and Pearson correlation coefficient was used. A p value less than 0.05 or 0.001 was regarded as significant. Demographic variables of both groups were statistically insignificant. There were 54 patients in Group A and 11 patients in Group B. Serum albumin and serum ferritin showed non-significant relative risk, having value of p=0.08 and p= 0.19 respectively, although on the same platform, the serum albumin showed a significant correlation (p < 0.001) with the bony healing progression of diaphysial tibia. In our study, we concluded that malnutrition of these patients was not always associated with result into impaired bone healing, but serum albumin showed positive correlation with the bony healing progression and outcome of diaphysial tibial fractures.

POSTER 2

CYR61: A marker to predict early the healing outcomes of diaphysel tibial fractures

Singh A, Ali S, Mahdi AA, Srivastava RN
King George' s Medical University, Lucknow-226018, India

This study aimed at analysing the correlation of serum CYR61 protein expression with fracture healing outcomes. In this longitudinal study, a total of 78 adult patients with simple, fresh traumatic diaphyseal fractures of both bones of leg managed conservatively were enrolled as per inclusion/exclusion criteria. The serial quantification of serum CYR61 protein expression level was done at 3rd, 7th, 10th, 15th and 20th days of post fracture, by western blotting technique. The clinico-radiological examination were done at 6th, 10th, 16th, 20th and 24th weeks of post fracture, by the assessment of RUST scoring, skin condition, abnormal mobility, bony tenderness and transmitted movements of the enrolled patients. Based on the clinico-radiological follow-up to analyze the fracture healing progression, these patients were further divided into two groups, Group-A: Normal healing and Group-B: Impaired healing. Furthermore, these healing outcomes were correlated with the differential expression level of CYR61 in each patient. For comparison of the means between patient groups, Pearson correlation coefficient with 95% confidence interval was used. All the baseline characteristics of the patients showed non-significant difference. According to the healing outcomes, fifty-four patients belonged to Group -A and eleven patients to Group -B respectively, however 13 patients were lost in follow up. Group-A had the mean RUST score of 11.03 (range 8-12) at the end of 06th months and Group- B had the mean RUST score of 5.91 (range 5-6.5) at the end of 6th month. The mean healing time of group-A patients was 12.40 ± 2.05 weeks having RUST score ≥ 7. The CYR61 showed a significant correlation ($P < 0.001$) with the bony healing progression of diaphysial tibia. The CYR61 may play a vital role in the early phase of fracture healing and may be used as a potential biomarker to predict the healing outcome early. However, we suggest further multi-centric research with large sample size as well as follow-up in order to make powerful analysis that strengthen the present study to make the result more generalizable.

POSTER 3

In vitro antibacterial, antioxidant and free radical scavenging activities of fractions of *Funtumia africana* (benth.) Stapf. Leaf extract

Amos-Tautua B[1,7,8], Ajileye O[2], Alayande A[3], Olawuni I[4], Ndoni S[5], Fadare O[2], Onigbinde A[6], Oluwafemi O[7], Songca S[8]

[1]Department of Chemistry, Niger Delta University, Wilberforce Island, Nigeria..

[2]Department of Chemistry, Obafemi Awolowo University, Ile-Ife, Nigeria.

[3]Department of Microbiology, Obafemi Awolowo University, Ile-Ife, Nigeria.

[4]Department of Biochemistry, Obafemi Awolowo University, Ile-Ife, Nigeria.

[5]Department of Biochemistry, Niger Delta University, Wilberforce Island, Nigeria

[6]School of Basic Sciences, Chemistry Unit, Babcock University, Ogun State Nigeria

[7]Department of Chemistry, Cape Peninsula University of Technology, Cape Town, S Africa

[8]Department of Chemistry, Walter Sisulu University, Mthatha, South Africa

Leaves of *Funtumia africana* (Lagos silk-rubber) have been used by the people of Niger Delta region of Nigeria to treat diabetes. This study evaluated the antimicrobial, polyphenolic contents and free radical scavenging activities of the leaf crude extract and fractions from the plant. The crude aqueous methanolic leaf extract of *Funtumia africana* was successively extracted by liquid-liquid partitioning into n-hexane, dichloromethane, ethyl acetate and n-butanol fractions. Total phenolics (TPC), total flavonoids (TFC) and total antioxidant capacity (TAC) were estimated by colorimetric methods. The free radical scavenging activity of the fractions was measured *in vitro* by using the ferric-reducing antioxidant power (FRAP), 2,2-diphenyl-1-picryl dihydrazyl (DPPH) and nitric oxide (NO) assays. The antibacterial activity of these plant fractions was tested *in vitro* by using agar-well diffusion method and minimum inhibitory concentration (MIC). The composition of the oily n-hexane fraction was investigated using GC-MS technique. Qualitative phytochemical tests and FT-IR analysis were also carried out. Phytochemical screening showed the presence of tannins, saponins, alkaloids, terpenoids, steroids, reducing sugars, cardiac glycosides and flavonoids in the crude extract and polar fractions. The FTIR spectrum confirmed the presence of aromatic, phenolic, hydroxyl and carbonyl groups in the fractions. The GC-MS result of the oily n-hexane fraction showed the presence of 8 fatty acids of which the major components were methyl hexadecanoate (45.96%); 6,10,14 trimethyl-2-pentadecanone (17.10%); n-hexanoic acid (14.12%) and methyl stearate (10.14%). The highest TPC, TFC and TAC were found to be 1331.18 ± 41.56 mg GAE/g, 833.96 ± 19.14 mg QUE/g and 83.74±1.88 mg AAE/g respectively in the butanol fraction. The dichloromethane and ethyl acetate fractions demonstrated low DPPH scavenging activity while the n-hexane and butanol fractions showed higher activities with IC_{50} values of 0.06 ± 0.57 and 0.06 ± 0.5µg/ml respectively. The butanolic fraction had the highest ferric reducing antioxidant activity with value of 48.46 ± 0.15 mg AAE/g of sample. The DCM fraction showed the highest NO scavenging activity with IC_{50} value of 0.741 ± 0.07 mg/ml while hexane fraction had negligible effect .The crude extract, n-hexane and ethyl acetate fractions were the most active with average MIC values ranging from 0.31 to 1.25 mg/ml against the bacteria isolates, while the dichloromethane was not active against all the microorganisms. Only the n-hexane fraction was active against the fungal isolates, *C albican* and *C pseudotropicalis* with MIC value of 0.63 mg/ml. This study revealed that the solvent fractions and leaf extract of *Funtumia africana* have potent antioxidant free radical scavenging activity, valuable phytochemicals and exhibit significant activity against most of the bacterial strains.

POSTER 4

Structural determination of new siderophore albachelin from *Amycolatopsis alba*

Kodani S[1], Komaki H[2], Suzuki M[1], Hemmi H[3], Ohnishi-Kameyama M[3]
[1]Graduate School of Agriculture, Shizuoka University, Japan
[2]Biological Resource Center, National Institute of Technology and Evaluation, Japan
[3]National Food Research Institute, National Agriculture and Food Research Organization, Japan

Iron is essential for critical processes, such as respiration and DNA synthesis, in almost all life forms. Despite being one of the most abundant elements in the Earth's crust, the bioavailability of iron in many environments, such as the soil, is limited due to the very low aqueous solubility of the ferric ion. In iron deficient condition, some bacteria secrete siderophores, which are defined as small molecular weight compounds with high-affinity of iron chelating. In the course of screening for new siderophores, a new siderophore named albachelin was found from iron deficient culture of *Amycolatopsis alba*. The planar structure of albachelin was elucidated by the combination of ESI-MS/MS experiment and NMR spectroscopic analyses of the gallium (III) complex. The structure of albachelin was determined to be a linear peptide consisting of 6 moles of amino acids including 3 mole of serine, one mol each of *N*-a-acethyl-*N*-d-hydroxy-*N*-d-formylornithine, *N*-a-methyl-*N*-d-hydroxyornithine, and cyclic *N*-hydroxyornithine. The stereochemistry of amino acids constituting albachelin was analyzed by applying modified Marfey method to the hydrolysate of albachelin. Based on bioinformatics, we deduced and discussed the possible biosynthetic gene cluster involved in albachelin biosynthesis from the genome sequence of *A alba*. By prediction of substrates for adenylation domains, a non-ribosomal peptide biosynthetase gene (AMYAL_RS0130210) was proposed to be the main biosynthetic gene for albachelin biosynthesis. The related genes including transporter for siderophore were found near the NRPS gene as a gene cluster.

POSTER 5

In Vitro Micropropagation of *Stevia rebaudiana* Bertoni

Greedharry P[1], Bahorun T[2]

[1]Food and Agricultural Research and Extension Institute, Reduit, Mauritius

[2]ANDI Centre of Excellence for Biomedical and Biomaterials Research, MSIRI Building, Faculty of Science University of Mauritius, Réduit, Republic of Mauritius

Stevia rebaudiana Bertoni, which is considered as a medicinal plant, is commercially used as non-caloric sweetener for diabetic patients. *Stevia* is a perennial herb belonging to the family Asteraceae and it is a native of the Paraguay. Stevia is a potent sugar substitute and is associated with various health benefits, as it also possesses antimicrobial properties. These properties are significant in the Mauritian context as Mauritius is among the countries with the highest prevalence of diabetes and related complications. Indeed, the large-scale cultivation of Stevia presents brilliant perspectives for commercial exploitation and production of value added health products. Propagation of *Stevia rebaudiana* Bertoni through traditional methods such as cuttings or seedlings is recalcitrant. Besides, the quality and the quantity of the offspring produced are limited when using conventional methods of propagation. Consequently, tissue culture technique was applied to achieve rapid plant multiplication. In the present study, a protocol was developed for *in vitro* micropropagation of Stevia rebaudiana using 6-benzylamino purine (BAP) and Kinetin (Kn) for the formation of multiple shoot proliferation and Indole-3-acetic acid (IAA) and Indole-3-butyric acid (IBA) for the induction of roots. Callus induction and multiplication medium was optimized for both nodal and leaf segments. Maximum callus induction was obtained on Murashige and Skoog (MS) medium supplemented with 1mg L^{-1} 6-benzylamino purine and 0.5 1mg L^{-1} Kinetin whilst maximum shoot formation was observed on a Murashige and Skoog (MS) medium supplemented with 0.75 mg L^{-1} 6-benzylamino purine. Better growth response was obtained with Murashige and Skoog (MS) medium supplemented with 0.75 mg L^{-1} 6-benzylamino purine and produced 20 ± 1.0 shoots with average length 7.6 ± 0.1 cm after 30 days. The maximum number of roots was obtained on basal MS medium. At hardening phase, a low survival rate of 20% was recorded on Perlite substrate. Additional trials need to be performed to increase the rate of survival of plantlets at the hardening stage to establish rapid mass production of true to type planting material.

POSTER 6

Impact of human activities on variation of antioxidant levels in marine organisms

Gopeechund A[1,2,3], Bhagooli R[1,4], Neergheen Bhujun VS[2,3], Bahorun T[2]

1*Department of Biosciences, Faculty of Science, University of Mauritius, Réduit, Republic of Mauritius*

[2]*ANDI Centre of Excellence for Biomedical and Biomaterials Research, University of Mauritius, Réduit, Republic of Mauritius*

[3]*Department of Health Sciences, Faculty of Science, University of Mauritius, Réduit, Republic of Mauritius*

[4]*Department of Marine and Ocean Science, Fisheries and Mariculture, Faculty of Ocean Studies, University of Mauritius, Republic of Mauritius*

Antioxidants have been reported in marine organisms. However, limited studies have determined the effect of anthropogenic impacts, in particular altered nutrient levels, on antioxidant activities exhibited by different marine organisms. The present study assessed the effect of high nutrient conditions, on the levels of antioxidant activities and phenolic content in eight species of marine organisms namely, two sea urchin species, two seagrass species, two green seaweed species and two red coralline alga. The marine organisms were sampled at a less frequented (LF) site (Gris-Gris) and five highly frequented (HF) sites (Trou aux Biches, Amber Island, Mon Choisy, Albion and Grand Baie) around the coast of Mauritius at comparable depth in May 2013. The physico-chemical parameters and nutrient levels such as nitrate and phosphate concentrations were analysed at the study sites. Antioxidant activities were determined using five antioxidant assays: di(phenyl)-(2,4,6-trinitrophenyl) iminoazanium (DPPH) scavenging assay, superoxide scavenging assay (SOS), nitric oxide scavenging (NOS), ferric reducing antioxidant potential (FRAP) assay and iron chelating assay. The total phenolic content (TPC) and the total flavonoid content (TFC) of the species were also determined. Most tested species from HF sites, except of *Halimeda discoidea* exhibited higher DPPH scavenging activity, superoxide scavenging activity, nitric oxide, TPC and TFC content compared to those from LF site ($p= 0$). Higher iron chelating activity was obtained with most species from HF sites, except for *Syringodium isoetifolium,* compared to those from LF site ($p= 0.04$). Most species under study in HF sites, except for *Halimeda discoidea* and *Amphiroa rigida,* exhibited higher nitric oxide scavenging activity compared to those from LF site ($p= 0$). A strong correlation was found between TPC & FRAP ($.692^{**}$), TFC & FRAP ($.633^{**}$) and a moderate correlation was found between TPC & iron chelating activity ($.463^{**}$), while no correlation was obtained between phenolic contents & flavonoid content and antioxidant levels of other species. The high amount of TPC and antioxidant activities observed in the HF sites may be attributed to higher nutrient contents and other prevalent stressful conditions. Further studies need to focus on the effect of other factors such as temperature in enhancing the formation of antioxidants in the marine organisms.

POSTER 7

From shelf to antibodies

Rambhujun V, Hauzaree C, Purmesur P
IOMIT's, SSR Medical College, Belle Rive, Mauritius

One drop ingested, one spray in one nostril, one injection, this is all it takes to get vaccinated. Vaccines are the category of medications, which have been around for more than 300 years. Taken for granted, we thought what better occasion to praise this discovery, which saves more lives every day than any other category of medication or intervention, than this symposium allowing the discovery or rediscovery of Translational Medicine. Translational Medicine is probably the newest sub-division of modern medicine and is gradually acquiring more and more importance as the need for transmission of theoretical knowledge of medicine into practical methods has never been stronger. The recent pandemic of Ebola is an example of how scientists were trying day and night to find a vaccine that would protect against this Filovirus. Vaccination is the process of inoculating a fragment of an organism or an attenuated form of the organism, so as to allow the host to mount an adaptive immune response to that injected particle. The antibodies produced will cross react with the pathogen once colonized or infected to render the host immune or to give the host a major degree of protection against it. The first vaccine was devised by Edward Jenner to provide protection against small pox. Small pox is a disease, which is caused by a Variola virus. This virus is estimated to have killed between 300 and 500 millions of people by 1979 when the disease was officially declared eradicated by WHO. This eradication was possible only with the help of the vaccine. Following this, the world of vaccines has very much evolved and, nowadays, covers a broader spectrum of organisms. How are vaccines engineered, how are they manufactured, how do they interact with our bodies to produce the antibodies that will protect us, how has the Expanded Program of Immunization of the WHO changed the face of modern medicine, what is the impact of vaccination on global health? Those are the questions that we all asked ourselves at some point in our life. In an attempt to answer those questions, we came up with the idea of this poster presentation. It would be interesting to assess the impact of a simple vaccine-covered disease model and to see what would be the effect of improper vaccine coverage on the population. Even though the majority of patients in U.S. were vaccinated against influenza, 60% of this population still contracted the disease (CDC statistics revealed that influenza vaccine efficacy this year was only about 40%). We wanted to know why this happened and the impact of this on the population in terms of severity of the disease.

POSTER 8

Knowledge and attitudes of university students with respect to breastfeeding

Aullybux A[1], Chan Sun M[1], Surnam LV[2]

[1]Department of Medicine, Faculty of Science, University of Mauritius, Reduit, Mauritius

[2]Ministry of Health and Quality of Life, Port Louis, Mauritius

Breastfeeding is the optimal natural food product for babies given its numerous health advantages. The World Health Organization recommends exclusive breastfeeding for a period of six months. However, the rate of exclusive breastfeeding remains low in developing countries. This study was undertaken in Mauritius, as a developing country, with the following objectives: (1) to investigate the knowledge and attitudes with respect to breastfeeding among female as well as male university students and (2) to have an insight on eventual choice of infant feeding practice by university students. A cross-sectional study was carried out among 368 randomly identified undergraduate full-time male and female Mauritian students, under the age of 25, using a self-administered questionnaire. All questions were in the form of statements, which followed a four-point Likert scale, ranging from 1 to 4. Data was analyzed using SPSS (version 21.0). Ethical clearance from the relevant institutional research ethics committee was obtained prior to the start of data collection. Students were moderately knowledgeable with slightly positive attitudes. There was a significant difference ($p<0.05$) in the knowledge and attitude scores between the different faculties, with the highest scores noted in the Faculty of science. Misconceptions were common: 58.5% believed that the mother should not breastfeed if she catches a cold and 83.3% thought that the breastfeeding woman should avoid eating certain foods. Besides, regardless of gender ($p>0.05$), most participants think that formula feeding gives more freedom to the mother and 63.5% found it a better choice for mothers who plan to go to work. However, female students were more likely to consider breastfeeding as painful and embarrassing in public ($p<0.05$). Though 93.7% of students wanted their child to be breastfed, male respondents were more likely to go for a mutual decision regarding infant feeding choices ($p=0.005$). Exposure to breastfeeding did not significantly influence the attitudes but students with higher knowledge; more positive attitudes and who were themselves breastfed had significantly greater intention to choose breastfeeding ($p<0.05$). From the linear regression model, the knowledge score was found to be a good predictor of the attitude score. This study reveals the need for health education interventions to inform students, irrespective of gender, about the numerous benefits of breastfeeding. As future parents and independent individuals of the community, students will thus be empowered to make informed infant feeding choice, which bears numerous benefits to the child, the mother as well as the society.

POSTER 9

In vitro evaluation of antioxidant activity and phenolic content of four scleractinian coral species from Mauritian waters

Kaullysing D[1], Beesoo R[2,3,4], Bhagooli R[1], Bahorun T[3], Neergheen-Bhujun VS[3,4]

[1]Department of Marine and Ocean Science, Fisheries and Mariculture, Faculty of Ocean Studies, University of Mauritius, Réduit 80837, Mauritius

[2]Department of Biosciences, Faculty of Science, University of Mauritius, Réduit 80837, Mauritius

[3]ANDI Centre of Excellence for Biomedical and Biomaterials Research, University of Mauritius, Réduit 80837, Mauritius

[4]Department of Health Sciences, Faculty of Science, University of Mauritius, Réduit 80837, Mauritius

The vast ocean is home for various groups of marine invertebrates that have constantly attracted the scientific community. The phylum Cnidaria is one such diverse group that is increasingly being explored for the presence of potential marine-derived bioactive compounds. Antioxidants have obtained a great deal of attention for their efficiency in preventing diseases caused by increased oxidative stress. The level of oxidative stress in hard corals has also been reported to be directly related to their bleaching susceptibility. The present study investigated the Total Phenolic Content (TPC) and the antioxidant activity of four species of scleractinian corals collected off the Mauritian coastal waters - *Acropora muricata, A. robusta, Pocillopora damicornis* and *Fungia repanda*. 80 % methanol was used as solvent for extraction of the polyphenolic compounds from ground coral. The TPC was determined by the Folin - Ciocalteu assay while the Ferric Reducing Antioxidant Power (FRAP) and the Trolox Equivalent Antioxidant Capacity (TEAC) assays were used for quantifying the antioxidant capacities of the scleractinian coral extracts. The phenolic levels in the crude methanolic extracts varied significantly from 63.69 to 267.40 µg GAE/g DW, with least value measured in *P. damicornis* and peak value in *F. repanda.* The antioxidant capacities of the four coral species determined by FRAP and TEAC assays ranged from 0.431 to 2.489 µM Fe (II)/g DW and 0.397 to 2.30 µM Trolox equivalent/g DW, respectively, with least value recorded in *A. robusta* and maximum value in *F. repanda* for both antioxidant assays. Significant correlations were obtained between the TPC and the antioxidant activities of the hard coral species (FRAP: r= 0.927; TEAC: r= 0.770). The high correlation values indicate that the antioxidant activities exhibited by the four scleractinian coral extracts may be due to the presence of polyphenolic compounds. Moreover, resilience to bleaching generally exhibited by the solitary coral *F. repanda* can be accounted for by the highest level of antioxidant recorded among the four scleractinian corals, *A. robusta* being the most susceptible to coral bleaching with least antioxidant activity. The tested cnidarians can be good sources of phenolic antioxidants and potential candidates of prophylactic extracts and warrant further in-depth investigations as food supplements and/or anti-cancerous agents.

POSTER 10

Prophylactic antioxidants and phenolics of seagrass species: A seasonal variation study in a Southern Indian Ocean Island, Mauritius

Ramah S[1], Etwarysing L[1], Auckloo N[1], Gopeechund A[1], Bhagooli R[2], Bahorun T[3]

[1]Department of Biosciences, Faculty of Science, University of Mauritius, Mauritius

[2]Department of Marine and Ocean Science, Fisheries and Mariculture, Faculty of Ocean Studies, University of Mauritius, Mauritius

[3]ANDI Centre of Excellence for Biomedical and Biomaterials Research, University of Mauritius, Mauritius

The human body is constantly exposed to free radicals, reactive oxygen species (ROS) and reactive nitrogen species (RNS). These include the hydroxyl radical (OH•), superoxide radical (O2•−), peroxyl radical (ROO•), alkoxyl radical (RO) and nitric oxide (NO•). Within the body, the production of ROS and antioxidant defenses are approximately balanced. When this balance is tipped in favour of ROS production, one of the outcomes is oxidative stress. The latter contributes to cellular dysfunctioning by damaging DNA, proteins, lipids, and other biomolecules leading to numerous disorders and diseases such as Alzheimer's and Parkinson's diseases, cancer, stroke and diabetes among others. Fortunately, the body has evolved intricate defense systems to reduce the cumulative load of ROS and RNS within cells. These include protection afforded by the antioxidant enzymes. This study aimed to assess the antioxidant capacities in seagrasses as an addition to the ongoing construction of a prophylactic antioxidant capacity bank in both terrestrial and marine species and providing a basis for potential industrial applications in the pharmaceutical, medical and food sectors. Seagrasses may be potentially good sources of polyphenolic antioxidants and therefore, in this study, five species of seagrasses namely, *Syringodium isoetifolium, Halodule uninervis, Thalassodendron ciliatum, Halophila ovalis* and *Halophila stipulacea*, were collected from the Mauritian coast and were analysed for their Total Phenolic Contents (TPC) (Folin-Ciocalteau method), Flavonoid Contents (FC) (Aluminium chloride method) and antioxidant activities (FRAP and the TEAC methods) in two different seasons. The TPC in the seagrass species were significantly higher during both seasons as compared to the FC, which were higher in winter. *T. ciliatum* showed higher TPC in both summer and winter (36.90 ± 1.04 mg GAE/g FW and 46.07 ± 4.56 mg GAE/g FW respectively). The highest FC was noted in *H. uninervis* (4.37 ± 1.00 mg Quercetin/g FW) in winter and in *H. ovalis* (0.47 ± 0.01 mg Quercetin/g FW) in summer. The antioxidant activities were significantly higher in *T. ciliatum* in both winter (1.21 ± 0.10 ×10-3 mM Fe2+/g FW) and summer (1.06 ± 0.02 ×10-3 mM Fe2+/g FW) when the FRAP method was used. The highest scavenging ability of ABTS+, using the TEAC method, was in *T. ciliatum* in both seasons (524.27 ± 16.48 ×10-3 mM Trolox/g FW and 539.67 ± 10.75 ×10-3 mM Trolox/g FW, respectively). The TPC were significantly different in each species seasonally. The antioxidant activities were found to be positively correlated with the TPC. These results are indicative of the potential of Mauritian seagrasses as possible sources of secondary metabolites for pharmaceuticals. However, further analysis using bio-efficacy models are warranted to further justify the phytoceutical capacity of the seagrasses.

POSTER 11

Non-communicable diseases in the island nations and ways to curb them

Singh A
SSR Medical College, Belle Rive, Mauritius

Non-communicable diseases (NCDs) form a major part of both mortality and morbidity in today's modern era. Globally, 57 million deaths were reported in 2008 of which 63% were NCD related.[1] In Mauritius, according to WHO, 85% of deaths occur due to NCDs. On average, the probability of dying between ages 30 & 70 years from four main NCDs –cancers, diabetes, cardiovascular diseases & chronic respiratory diseases – is 24%. In Fiji-a country similar to Mauritius-80% of the deaths occur to NCDs. The various aims of this poster are to draw attention to the severity of NCDs & demonstrate the change in the prevalence over the last 10 years, correlate the change in prevalence with the measures taken by the respective countries & WHO, deduce which measures had a greater impact, and make appropriate recommendations which will help in impeding the incidence of the NCDs in Mauritius. Mauritius shares ethnic, cultural & geographical similarities with the countries taken into consideration in the study in order to minimise the impact of compounding factors. Data obtained from WHO reports, scientific research papers from 2004 to 2014 were analysed. Incidence, prevalence, mortality rates were computed and the differences were analysed graphically. Similarly, a comparative study was done on the measures taken from 2004 to 2014 by the governments of these respective nations and also important organisations like the WHO & the velocity of change was compared for the two countries. While, it is true that all the diseases are multi factorial and not all factors are known to the medical sciences, it still is imperative to control these diseases. There is a decrease in prevalence of diabetes (19.3% to 17.4%) but, simultaneously an increase in prevalence of obesity (10.3% to 18.5%), smoking (29% to 39%) and consumption of alcohol (28% to 34%), according to WHO country cooperation strategy report. Fiji experienced a decrease in prevalence of obesity (18% to 30.6%), smoking (37% to 28.5%) & alcohol (45% to 52%) but saw an increase in prevalence of diabetes (16% to 40%). Currently, Mauritius along with WHO is running several programs such as the national service framework for diabetes and the physical activity action plan, to name a few.

[1]WHO. GHO: (global data observatory) data published by WHO on NCDs. 2013.

POSTER 12

Cross-sectional study of diabetes induced dyslipidaemia among residents of North-Western region of India

Ray S, Motwani CL, Jain D, Jain J, Motwani VB, Ray MK
SSR Medical College, Belle Rive, Mauritius

Type 2 diabetes mellitus (T2DM) is a metabolic syndrome with disorder in carbohydrate, fat and protein metabolism. T2DM is characterized by chronic inappropriate hyperglycaemia either due to deficiency of insulin secretion or insulin resistance or both. According to a recent survey by WHO 65 million Indians have been reported to have T2DM and the number is expected to reach 87 million by the year 2030[1]. It has been found that diabetic dyslipidaemia is more artherogenic than other type of dyslipidaemia. The present study aims to find a correlation between the glycaemic index, the lipid profile and the Body Mass Index (BMI) in T2DM patients. Early detection will minimize the risk of artherogenic cardiovascular and cerebrovascular accidents in T2DM patients. Clinicians completed questionnaires for diabetic on behalf of their patients. The questionnaires included variables such as socio-demographic data, biochemical and clinical profile and life variables. The time period of the study was from 1.2.15 to 7.4.2015. Fasting blood glucose (FBG), total cholesterol (TC), triglycerides (TG), high-density lipoproteins (HDL), low-density lipoproteins (LDL), and glycated haemoglobin (HbA1c) were evaluated. Inclusion & exclusion criteria: Patients diagnosed with malignancy, tuberculosis or any underlying infections were excluded from the study. Written informed consent were taken from each subjects before study inclusion. The data were analysed by using SPSS versions 11.5[2]. The values were expressed as mean ± S.E.M. We evaluated clinical and laboratory findings in 55 patients with T2DM out of which 51% were male and 49% were female. The mean age of male and female were 56.3 ± 2.22 and 58.8 ± 1.96 respectively. Family history of T2DM was found in 32.7% of the subjects. 64% male and 92% female were found to be overweight (BMI > 25kg/m2). 14.5% of the subjects had T2DM for less than one year and 34.5% had T2DM for more 6 years. Results of blood glucose showed that all individuals were hyperglycaemic. A significant difference was found in serum lipid profile TC, TG, HDL, VLDL, and LDL. Mean value of TC/HDL ratio, which is the good marker of insulin resistance, was 4.06 ± 0.20 and 4.08± 0.18 among male and female group respectively. In correlation studies TC/HDL ratio showed significant positive correlation with TC ($p<0.01$), LDL ($p<0.01$), TG ($p<0.05$) in both the group whereas HbA1c ($p<0.05$), HDL ($p<0.01$) only in female patients. PPG showed a positive correlation with HbA1c ($p<0.05$) only in females. Fasting blood glucose showed significant positive correlation with TC ($p<0.05$), HbA1c ($p<0.01$) in females and TC ($p<0.01$), HbA1c ($p<0.05$) in males, whereas correlation of HDL with LDL was negative ($p<0.01$) in both. This study underlines the need for the further investigations in India through longitudinal and cohort study to establish the association between poor glycaemic control and dyslipidaemia. It also highlights that the subjects should undergo a significant lifestyle change, which should include a better exercise regimen, and their diet should have the correct balance of carbohydrate, fat and protein (a diabetic diet).

POSTER 13

Thermal photo-physiological *Symbiodinium* spp. and antioxidant responses in pocilloporids with different thermal histories from Hawaii

Bhagooli R[1,2], Griffin SP[3], Weil E[4], Baker A C[5,6]

[1]Department of Marine and Ocean Science, Fisheries and Mariculture, Faculty of Ocean Studies, University of Mauritius, Réduit 80837, Republic of Mauritius

[2]The Biodiversity and Environment Institute, Réduit, Mauritius

[3]NOAA Restoration Center, USCG Airstation Borinquen, Aguadilla, PR 00603, USA

[4]University of Puerto Rico, Department of Marine Science, Mayaguez, PR 00680, USA

[5]Department of Marine Biology and Ecology, Rosenstiel School of Marine and Atmospheric Science, University of Miami, FL 33149, USA

[6]Wildlife Conservation Society, Marine Program, Bronx, NY 10460, USA

The heat stress response of photosystem II (PSII) in the algal symbionts (*Symbiodinium* spp.) and antioxidant activities of *Pocillopora damicornis* and *P. meandrina* exposed to different thermal regimes near a thermal outfall in Hawaii were investigated using pulse-amplitude-modulated fluorometry, ELISA for catalase and the ferric reducing antioxidant potential (FRAP) assay. Experimental exposure to elevated temperatures (29, 30, 31, 32 and 33^{o}C) over a period of 5 days revealed significant differences in chlorophyll *a* fluorescence parameters between *P. meandrina* at outfall versus control sites, and between *P. meandrina* and *P. damicornis* in 32 and 33^{o}C treatments. Light levels at the sampling points were 1000 – 1500 and 25-60 µmol quanta m^{-2} s^{-1} in the morning (0800) and during the afternoon (12:00 and 16:00 hrs), respectively. Declines in PSII activity of *P. meandrina* at control sites occurred earlier and to a greater degree than those from outfall sites, as well as those from *P. damicornis* at a nearby reef flat. Genetic differences in *Symbiodinium*, characterized by denaturing gradient gel electrophoresis (DGGE) of the Internal Transcribed Spacer-2 (ITS-2) region of nuclear ribosomal DNA revealed that *P. meandrina* contained the same ITS-2 symbionts at both control and outfall sites, but different symbionts from those found in *P. damicornis* on the reef flat. At the outfall site, antioxidant concentrations were highest in the morning for both coral species, but at the control site there was no change through the day for *P. meandrina*. This work demonstrates that the thermal response of PSII in *Symbiodinium* and antioxidant levels vary depending on prior thermal history, indicating that acclimatization plays an important role in determining thermotolerance. However, the capacity for these corals to respond to different temperatures by hosting different symbionts, as was the case for *P. damicornis*, indicates that community shifts in *Symbiodinium* may also be an important response to higher temperatures. Together, these findings suggest the possibility for some coral species to compensate for increasing thermal stress due to global warming.

POSTER 14

The role of cytoglobin in carcinogenesis

Bholah CT[1,2,3], Neergheen-Bhujun VS[2,3], Hodges NJ[4], Dyall SD[1,2], Bahorun T[2]

[1]Department of Biosciences, Faculty of Science, University of Mauritius, Réduit, Republic of Mauritius

[2]ANDI Centre of Excellence for Biomedical and Biomaterials Research, University of Mauritius, Réduit, Republic of Mauritius

[3]Department of Health Sciences, Faculty of Science, University of Mauritius, Réduit, Republic of Mauritius

[4]School of Biosciences, University of Birmingham, Edgbaston, Birmingham, B15 2TT, UK

The search for novel biomarkers and therapeutics is one of the prime focuses of cancer research. With increasing clinical and screening challenges, cancer research is becoming more focused on early cancer detection to provide opportunities for prompt interventions and therapies at early stages of the cancer, leading to a higher potential for recovery and survival of patients. Along the same quest, cytoglobin has positively been reviewed for its function. Cytoglobin (Cygb), a ubiquitously expressed cytoplasmic protein is known for its dynamic response in several insults such as fibrosis, oxidative stress and hypoxia. Recently, it has been reported that the expression of Cygb is down regulated in several malignancies and its induced over-expression has decreased the proliferative characteristics of cancer cells. Consequently, an up-regulation of Cygb reveals tumour suppressor ability. Furthermore, the expression of Cygb is controlled by methylation of the CpG island of its promoter region. Interestingly, differences in hypermethylation levels have been observed in different stages of cancer, namely lung adenocarcinoma and lung squamous cell carcinoma. However, no significance data was obtained and this relationship still remains ambiguous. Inducing our attentions and interests, these reports form the basis of our proposed study in the search of the role of cytoglobin in carcinogenesis. Our main focus is to explore its potential function as a biomarker to differentiate between different stages in carcinogenesis, thus providing better strategies for cancer therapy.

POSTER 15

Training primates through the supply chain from breeder to laboratory

Honess P, Baboo E, Griffiths MA
Bioculture Group, Senneville, Rivière des Anguilles, Mauritius

It is well established that the application of positive reinforcement training (PRT) can do much to reduce the impact of scientific and husbandry procedures on research animals including non-human primates. For long-term studies, the time investment in training is easily accommodated, but short-term studies (e.g. toxicology) may only last a few weeks and training would add disproportionately to the total study time and hence, the accumulation of contingent suffering. At Bioculture, where we breed long-tailed macaques (*Macaca fascicularis*) of the highest health and welfare standard for use in research, we began an extensive and intensive programme of PRT across our 18,000 animals in 2009. We aim to train animals as preparation both for general aspects of laboratory life as well as to meet specific requests of end-users. We believe that incorporating PRT in our routine activities helps *Refine* animal health and husbandry procedures, but it also helps researchers in efforts to minimise costs to the animal across its whole lifetime, when addressing the harm: benefit analysis of their programme of research. This presentation will outline the Bioculture training programme and address challenges and successes through the illustration of results of a series of training studies.

POSTER 16

Antioxidant responses and variable bleaching pattern in *Acropora muricata* colonies from differential light and thermal regimes

Louis YD[1], Gopeechund A[1,2], Kaullysing D[3], Bahorun T[2], Dyall SD[1], Bhagooli R[3]

[1]Department of Biosciences, Faculty of Science, University of Mauritius, Réduit 80837, Republic of Mauritius

[2]ANDI Centre of Excellence for Biomedical and Biomaterials Research, Faculty of Science, University of Mauritius, Réduit 80837, Republic of Mauritius

[3]Department of Marine and Ocean Science, Fisheries and Mariculture, Faculty of Ocean Studies, University of Mauritius, Réduit 80837, Republic of Mauritius

Bleaching of *Acropora muricata* has been observed in reef flat (RF) but not in near coast (NC) colonies at Belle Mare, Mauritius. Differential susceptibility of RF and NC to oxidative stress originating from thermal stress might be one of the possible reasons behind this variable bleaching pattern within this coast-reef scale. The aim of this study was to compare in summer and winter 2014; the sea temperature (ST) and light intensity at NC and RF stations, total phenolic content (TPC), the antioxidant activity (AA) of RF and NC colonies and to assess the *in situ* photo-physiological parameters of *inhospite* photosynthetic symbionts (commonly called zooxanthellae). The Folin–Ciocalteu (F–C) assay was used to quantify TPC and three assays were used to determine TAC - 2,2-diphenyl-picrylhydrazyl (DPPH), Trolox Equivalent Antioxidant Capacity (TEAC) and Ferric Reducing Antioxidant Power (FRAP) assays. Photo-physiological parameters of zooxanthellae were measured with a Diving-Pulse-Amplitude-Modulated Fluorometer (D-PAM). Both stations experienced maximum summer ST of 30.5^{o}C but daily ST fluctuations in summer and winter 2014 were higher in NC station (3-5^{o}C) compared to RF station (1-1.5^{o}C). RF station experienced higher light intensity both in summer (11,600 lux/ft^2) and winter (5,000 lux/ft^2). Relatively higher levels of TPC and AA were recorded in NC colonies compared to bleaching susceptible RF colonies. Photo-physiological data revealed relatively lower summer $rETR_m$ and NPQ_m of RF colonies at higher light intensities. Together, these findings on TPC, AA and photo-physiological responses may possibly suggest that RF colonies tend to be more susceptible to oxidative stress compared to NC colonies and thus possibly explain such bleaching variability at a coast-reef scale.

POSTER 17

Isolation, characterization and determination of probiotic properties of Lactic Acid Bacteria from effluent of a dairy processing plant in Mauritius

Boubadoor N*, Ranghoo-Sanmukhiya M, Neetoo H*

Department of Agricultural and Food Science, Faculty of Agriculture, University of Mauritius, Reduit, Mauritius

Probiotics are live microorganisms that have beneficial effects on their host's health. Heightened awareness of the health-promoting properties of these microorganisms has encouraged consumers worldwide to increase their intake of probiotic cultures in the diet. In recent years, Lactic acid bacteria (LAB), which are generally recognized as safe (GRAS) organisms, have become well known as probiotics. Dairy waste or by-product is a rich source of LAB. The main objective of this study was to isolate LAB from the effluents of an industrial dairy processing plant and to evaluate the probiotic potential of the isolate. Briefly, LAB was isolated by spread plating the sample on modified de Man Rogosa Sharpe (MRS) medium followed by incubation at 37°C for 120 hours. The isolate (IN1) was then subjected to biochemical tests such as carbohydrate utilization tests for confirmation. The probiotic property of the isolate was evaluated by characterizing its acid and bile tolerances, establishing its antimicrobial activity as well as its antibiotic resistance pattern. Finally, molecular identification was carried out through amplification of 16S ribosomal DNA (rDNA) and 16S sequencing. Based on the microscopic observation and biochemical tests, IN1 was identified as a coccobacillus able to metabolize maltose, lactose and sucrose but unable to metabolize arabinose, rhamnose, manitol, sorbitol and ribose. In addition, IN1 produced gas from glucose. It tolerated only 4% NaCl concentrations and only grew at 37 °C. The isolate exhibited resistance to stomach pH (pH 3.0) and tolerance against 0.3% bile. The isolate also displayed antimicrobial activity against *Escherichia coli* and *Staphylococcus aureus* and was resistant to ampicillin, erythromycin, streptomycin and tetracycline. All the aforementioned phenotypic characteristics were consistent with those of probiotic cultures. 16S rDNA polymerase chain reaction and 16S sequencing revealed the organism to be *Leuconostoc mesenteroides*. Taken together, this study shows that dairy plant effluent is a source of probiotic LAB and points to its potential as a valuable by-product of milk processing.

POSTER 18

Carbon footprint analysis: A potential tool to improve human and environmental health

Girish B, Bokhoree C

Centre for Applied Research in Sustainable Development, University of Technology, Mauritius, La Tour Koenig 11109, Republic of Mauritius

One of the growing concerns to the world today is climate change, which does not only affects the natural environment in multiple ways but also adversely impacts human health. Climate change is primarily attributed to global warming, which is caused by emissions of carbon in the atmosphere. A major source of these emissions, which has also been growing since the industrial times, is in the form of human activity. In their daily lives, human beings contribute to the growing carbon emissions through four main sources namely, household energy use, travel, diet and lifestyle. In order to reduce these emissions and to eventually improve human and environmental health, it becomes important to investigate the significance of these four sources towards carbon emissions. For this, a recognized technique known as carbon footprint analysis could be used, which quantifies and studies carbon emissions. This paper adopts the carbon footprint analysis technique to investigate the carbon emissions of human beings during their daily activities and discusses the potential of this technique towards improvement of human and environmental health. Through a survey conducted at the University of Technology Mauritius, data related to the four identified sources of carbon emissions of an individual were gathered via use of a questionnaire. The participants of the survey were administrative employees and academics of the university; 83 staff out of a total population of 160 personnel voluntarily participated in the study. The process involved getting the targeted population to individually fill-in the questionnaire before checking the validity of each questionnaire. At the end of the data collection process, the annual carbon footprint of each participant was calculated via the use of two online calculators namely from Carbon Footprint and Carbon Story. These results were then further analyzed statistically using SPSS. From the conducted survey, the average annual carbon footprint of administrative staff and academics were 6.25 metric tons of CO_2e ($MtCO_2e$) and 7.93 $MtCO_2e$ respectively. The results depict a relatively higher carbon footprint for academics, which were also earning a higher average income than administrative staff. This result was possibly due to the relationship between income and better standard of living, which is positively associated with higher energy consumption and carbon emissions. Furthermore, carbon footprint analysis of the four primary sources of carbon emissions showed that the highest average annual carbon footprint of the employees were for travel and lifestyle emitting 2.63 $MtCO_2e$ and 2.50 $MtCO_2e$ respectively. Carbon emissions from travel were mainly from car and buses representing 1.49 $MtCO_2e$ and 0.69 $MtCO_2e$ respectively, which highlights the predominant adoption of cars over buses as mode of travel by employees within the institution. On the other hand, the carbon footprint for diet and household energy use were relatively lower with 0.74 $MtCO_2e$ and 0.62 $MtCO_2e$ respectively. Overall, the average carbon footprint of all the employees within the tertiary education institution was 6.49 $MtCO_2e$ representing approximately twice the per capita carbon emissions of Mauritius, which was 3.20 $MtCO_2e$. Using carbon footprint analysis, this study was able to quantify the key sources of carbon emissions during the daily activities of human beings and prioritize areas for carbon emissions reduction. This prioritization process is important so that relevant stakeholders can better focus mitigation actions so as to efficiently reduce carbon emissions from human activities. As such, carbon footprint analysis does not only help to calculate and analyze carbon emissions, but is also a tool to raise awareness on carbon emissions reduction so as to eventually improve human and environmental health.

POSTER 19

Impact and vulnerability modeling of the Western Coastal Zones of Mauritius from an environmental and human health perspective

Beeharry Y[1], Bokhoree C[1], Bhagooli R[2], Makoondlall-Chadee T[1]

[1]Centre for Applied Research in Sustainable Development, University of Technology, Mauritius, La Tour Koenig 11109, Republic of Mauritius

[2]Department of Marine and Ocean Science, Fisheries and Mariculture, Faculty of Ocean Studies, University of Mauritius, Reduit 80837, Republic of Mauritius

Coastal zones are essential areas hosting economic, social and environmental interactions. Globally, owing to human development and the growing population, coastal zones have been altered from being rampant to damaged or even irreversible unproductive environment. Environmental impacts caused by human development has unfortunately been amplified by the effects of climate change and sea level rise over temporal and spatial scales, posing human health risks to coastal communities and the population at large especially for members states of SIDS. Vulnerability Index (VI) consists of quantitative indicators to measure the exposure of a population to some hazard. There exists a series of Vulnerability Index for the assessment of different criteria widely used globally. However, literature has demonstrated that VI of coastal zones from an environmental and human health perspective does not potentially exist. Hence, this study aims at developing a VI that takes into consideration the impacts of human activities and climate change on the environment and human health coupled with a Coastal Vulnerability Index (CVI). As a preliminary outcome, to assess the environmental impacts of the coastal zones, the CVI is being used for this study. The coastal zones of the district of Black River found on the Western coast of Mauritius Island was assessed because of the prevailing socio-economic activities and its natural characteristics. The survey was carried out among coastal experts well versed with the coastal zone of Black River. The obtained data was then aggregated, and the CVI and CVI related to Sea Level Rise (SLR) were calculated. The CVI and CVI (SLR) obtained for Black River coastal zone were 4.68, 4.43, 4.25, 2.43, 4.5 and 4.28 for coastal erosion, flooding due to storm surge, inundation, salt water intrusion to groundwater resources and salt water intrusion to river/estuary, respectively. These results indicate that physical and human factors have differently impacted on the vulnerability of the coastal zone of Black river. However, CVI (SLR) demonstrated that Black River coastal zone is highly vulnerable to sea level rise. The fact that the coastal zone of Black River is highly vulnerable to climatic changes, it is obvious that environmental and human health will be directly or indirectly affected. Therefore, as a means of understanding, and sustainably and adaptively managing the coastal zones, it is essential that there is an aggregated VI measuring impacts on environmental and human health issues within coastal zones.

POSTER 20

Factors influencing aggression in peer groups of weaned long-tailed macaques (*Macaca fascicularis*)

Honess PE, Andrianjazalahatra T, Naiken S, Griffiths M-A
Bioculture Group, Rivière des Anguilles, Mauritius

In the captive breeding of primates 'weaning' typically refers to the removal of infants from their mothers; not necessarily equating to the natural weaning process by which an infant gradually becomes nutritionally independent of its mother. The literature contains many examples of the potential negative effects of early weaning though little is known of the consequences of later weaning. Periodic weaning in breeding facilities frequently results in merging infants from different breeding groups in to peer groups. At Bioculture weaning has typically occurred at around 12 months of age, however a revised strategy of later weaning (about 18 months old) was accompanied by an increase in aggression. To examine whether group composition and the age at weaning influenced aggression rates we examined 566 groups (10181 animals: 4801 females, 5380 males) weaned over a three-year period (March 2008-March 2011). Analyses indicated that more aggression occurred when animals were older at weaning ($p=0.000$) and that there were significant effects on aggression resulting from the number of subgroups per group ($p=0.03$), the number of males per group ($p=0.000$) and a significant interaction between the age at weaning and the number of subgroups ($p=0.002$). These results have enabled the fine-tuning of the weaning process at Bioculture with the aim of minimising the risks of aggression and thereby improving primate welfare.

POSTER 21

Coral cell aggregates as a bioassay for testing the effect of thermal and chemical stressors

Mattan-Moorgawa S[1], Bhagooli R[1] Rughooputh S[2]

[1]Department of Marine & Ocean Science, Fisheries & Mariculture, Faculty of Ocean Studies, University of Mauritius, Reduit, Mauritius

[2]Department of Physics, Faculty of Science, University of Mauritius, Reduit, Mauritius

Coral cell aggregates can be used as a miniaturized model for testing the effect of thermal stress and the toxicity of various chemical stressors. The dissociated coral cells aggregates are also referred to as coral tissue balls. Under laboratory conditions, these form spherical bodies, which rotate by ciliary movement. When exposed to stress conditions, thermal and/or chemical, the coral cell aggregates stop rotating and disintegrate by a release of the zooxanthellae and coral tissue cells. In this study, the effect of one sponge (*Adocia sp*.) and one ascidian (*Didemnum molle*) crude extracts were tested on the density of coral cell aggregates from two reef-building corals, namely, *Acropora muricata* and *Pocillopora damicornis*. These coral cell aggregates were prepared using the protocol of Nesa and Hidaka (2008). This study investigated the effects of the sponge and ascidian crude extracts at different concentrations (0, 50, 100, and 200 µg/ml) on the density of the coral cell aggregates at different time intervals (0, 10, 60, 120 minutes) and temperatures (23ºC and 30ºC). It was observed that the presence of D. molle extract affected the density of coral cell aggregates for the two coral species at all concentrations except in the controls (0µg/ml) indicating a high toxicity of *D. molle* on the coral cell aggregates. *D. molle* extract thus had the highest toxicity on the tested coral species by causing a massive clumping of the zooxanthellae and coral cells and thus completely inhibiting the formation of the spherical bodies at the start of the experiment. An increasing concentration of Adocia sp. extract generally caused an increased negative effect on the density of the coral cell aggregates. Increased exposure to thermal stress and/or chemical extract over time indicated an increased negative effect on the density of the coral cell aggregates. A higher temperature of 30°C also affected the density of the coral cell aggregates from both species of corals, as compared to the control temperature of 23ºC. The observed toxicity of the sponge and ascidian extracts on the density of the coral cell aggregates may suggest a physiological damage at the level of the zooxanthellae symbiont and/or coral host cells. The highest toxicity of *D. molle* suggests the presence of bioactive substances that could interfere with the formation of the spherical tissue balls from the two hard corals. The coral cell aggregates allow the use of less tissue mass from live corals and could also be used as a model to test the effect of thermal stress and various other natural and chemical extracts.

POSTER 22

A comparative assessment of the effect of black tea and green tea on diabetes-induced oxidative stress

Ramlagan P[1,2], Planesse C[3], Rondeau P[3], Neergheen-Bhujun V[1,2], Bourdon E[3], Bahorun T[2]

[1]Department of Health Sciences, Faculty of Science, University of Mauritius

[2]ANDI Center for Biomedical and Biomaterials Research, University of Mauritius, MSIRI Building, Réduit, Mauritius

[3]Groupe d'Etude sur l'Inflammation Chronique et l'Obésité (GEICO), Université de La Réunion, Plateforme CYROI, Saint Denis, France

Type II diabetes mellitus, characterised by hyperglycemia, is a metabolic disorder as a consequence of the inability of the pancreatic ß cells to secrete insulin to counteract for the peripheral insulin resistance. Described as the inability of insulin to inhibit gluconeogenesis and/or stimulate glucose uptake by peripheral tissues, insulin resistance results in hyperglycemia. The sugar molecules in turn react non-enzymatically with the amino groups of proteins leading to the formation of advanced glycation end products (AGEs) which bind to specific cell surface receptors, leading to oxidative stress due to production of reactive oxygen species (ROS). ROS in turn leads to activation of Mitogen-activated protein kinases (MAPKs) and thus NFκB, which subsequently transcribe adhesion molecules and proinflammatory cytokines that mediate diabetic complications. Biochemical and/or clinical approaches have shown that supplemental natural antioxidants modulate and manage diabetic conditions but there is now an urge to assess the effect of natural antioxidants on adipocyte response to oxidative stress since it has been widely accepted that obesity has a role to play in the development of type II diabetes. The aim of this research is to compare the antioxidant capacities of Mauritian black and green teas as well as assess their effects on AGE induced oxidative stress. Biochemical assays and a multi antioxidant assay system have been used to evaluate the antioxidant potencies of the tea samples. Using a diabetes-like oxidative stress model, the potential protective effect of the black and green teas on 3T3-L1 preadipocytes is currently being investigated. Our data show that green tea has higher total polyphenolic contents as well as better antioxidant activities, in most instances, than black tea. Non-cytotoxic concentrations of the tea extracts have been shown to retard the free radical induced hemolysis of human erythrocytes. These prelimibary data point out that tea, being a commonly consumed beverage, is an important source of antioxidants with a potential antioxidative role at the adipose tissue level.

POSTER 23

An assessment of the importance of professional medical social work in providing psycho social support to clients following Harm Reduction Strategies in Mauritius

Gopaul A
Faculty of Social Studies and Humanities, Mauritius

According to IHRA (2014), harm Reduction strategies became prominent in the 1980's as a response to various transmittable disease across the world. In Mauritius, intravenous Drug Users have been the most affected by HIV/ AIDS due to low investment in harm reduction strategies such as needle exchange programmes and Substitution Therapy, by both Government and Non-governmental associations. Harm reduction aims at is an approach that aims at helping both the drug users from contracting STDs and at the same time decreasing the prevalence of substance abuse among consumers. The effectiveness of such approaches has been acknowledged at different levels by international organisations such as UNAIDS and WHO. However, success of any progammes lies in the reintegration of victims in society. According to Costa (2007) the strategies is complementary to other treatment. However, there has been a lack of research on the importance of medical social work in the process of reintegrating clients of the strategies in society at different level. This research, qualitative in nature, will investigate the effectiveness of the programmes in consolidating community and family life in Mauritius. The study, carried out among families of victims, NGOS and other experts will tend to assess the effectiveness of the Harm Reduction Strategies adopted in Mauritius in reintegrating the drug addicts at micro, mezzo and macro level of society. The importance of professional medical social workers in the process will also be assessed. Results have shown that there is a need for more professional social care in the process of reintegrating the victims in society. The research also induced that the role of every partner is important and that the main barrier to integration is not only funding but also societal rejects. Thus as in many social deviance cases, professional Psychosocial support becomes of utmost importance.

POSTER 24

A comparative study of different plant parts of selected Mauritian endemic flora, for their antioxidant activities and total phenolic contents

Rummun N[1], Bahorun T[2], Pynee K[3], Baider C[3], Neergheen-Bhujun VS[1]

[1]Department of Health Sciences, Faculty of Science and ANDI Centre of Excellence for Biomedical and Biomaterials Research, University of Mauritius, Réduit, Mauritius

[2]ANDI Centre of Excellence for Biomedical and Biomaterials Research, University of Mauritius, Réduit, Mauritius

[3]The Mauritius Herbarium, Agricultural Services, Ministry of Agro-Industry and Food Security, Réduit, Mauritius

Plant secondary metabolites contribute considerably to the development of novel cancer chemotherapeutic drugs. Mauritian endemic plants have been sparsely studied with regards to their anti-cancer properties. This study investigated the antioxidant activities of selected endemic plants to identify lead extracts for subsequent anti-proliferative screening. Leaves, flowers and twigs of four endemic plants of Mauritius from the genus *Psiadia* (Asteraceae) and *Terminalia* (Combretaceae) were investigated. The plants studied were *Psiadia terebinthina* A.J. Scott, *P. lithospermifolia* (Lam.) Cordem *P. penninerva* DC and *Terminalia bentzoe* (L.) L.f. *subsp. bentzoe*. The plant parts were extracted by exhaustive maceration using methanol as solvent. The antioxidant activities were evaluated in terms of DPPH free radical scavenging activity, ferric reducing antioxidant power and iron chelating activity. The phyto-compositions of the extracts were also analyzed for total phenolic content, total flavonoid content and total proanthocyanidin content. Preliminary screening revealed that extracts from the genus *Terminalia* exhibited more potent antioxidant activities than the genus *Psiadia*. *Terminalia bentzoe* leaves extract showed the highest ferric reducing antioxidant capacity (Frap value = 3.5 ± 0.35 mmol Fe^{2+} / g dry weight) followed by *T. bentzoe* flower extract (Frap value = 2.3 ± 0.09mmol Fe^{2+} / g dry weight). *T. bentzoe* leaves and flower were the most potent DPPH scavenging activity with estimated IC_{50} of 0.015 ± 0.001 mg dry weight/ml and 0.014 ± 0.000 mg dry weight/ml respectively compared to ascorbic acid (positive control) with estimated IC_{50} of 1.9 ± 0.35 µg/ml. From the genus *Psiadia*, only *P. terebinthina* flower extract showed potent antioxidant activities with FRAP value 1.6 ± 0.01 mmol Fe^{2+} / g dry weight and estimated IC_{50} of 0.028 ± 0.003 mg dry weight/ml for DPPH scavenging activity. The genus *Terminalia* has the highest phenolic content compared to the genus *Psiadia*. *T. bentzoe* leaves extract has the highest total phenolic content (137.7 ± 1.9 mg gallic acid equivalence / g dry weight) while *Terminalia* flower extract had the highest flavonoid content (5.17 ± 0.26 mg quercetin equivalence/ g dry weight). Only *T. bentzoe* twigs extract showed presence of proanthocyanidin (1.43 ± 0.11 mg cyanidin chloride equivalence / g dry weight). The findings suggest that all extracts from the genus *Terminalia* and *P. terebinthina* flower extract showed interesting antioxidant activities and phytochemistry profile, which justify further study to evaluate the anti-proliferative activity and underlying molecular mechanism of action of these extracts.

POSTER 25

Prevalence and Clinical Manifestations of Rotavirus and Adenovirus Infections in Children under Five in Katsina State, Northwestern Nigeria

Mukhtar GL[1], Aminu M[2], Yakubu SE[2]

[1]Department of Microbiology, Umaru Musa Yar'adua University, Katsina State, Nigeria

[2]Department of Microbiology, Faculty of Science, Ahmadu Bello University, Zaria, Nigeria

Gastroenteritis is a leading cause of childhood morbidity and mortality in developing countries. The study determines the prevalence of rotavirus and adenovirus infection and their clinical manifestations in children aged < 5 years in Katsina State, Northwest zone of Nigeria. A total of 400 (322 diarrhoiec and 78 non-diarrhoiec) stool specimens were collected from children attending six hospitals located across the three senatorial zones of the state from June 2013 to April 2014. Their socio-demographic information and clinical presentations were noted with the aid of questionnaire. Viral antigens were detected by enzyme immunoassay. Rotavirus was detected in 5.3% of the diarrhoiec and none in the non-diarrhoiec specimens while adenovirus was detected in 12.4% of the diarrhoiec and in 5.1% of the non-diarrhoiec specimens. Co-infection of rotavirus and adenovirus was observed in 0.6% of the diarrhoiec children. Generally, children < 2 years old were more vulnerable to rotavirus and adenovirus infection. Rotavirus infection was more prevalent children 7-12 months old while adenovirus virus was more prevalent in children 0-6 months old. The most frequently presented clinical features include fever (68.2%), vomiting (65.9%), fever and vomiting (61%) and mild dehydration (34.1%). There was a significant association between dehydration and the two viral infections ($p<0.05$). Rotaviruses and adenoviruses were found to be important cause of diarrhoea in children 0-5 years old in Katsina State, Nigeria with Adenoviruses circulating at a higher frequency. Rotavirus and adenovirus detection was greatest when diarrhoea, vomiting and fever occurred together and lowest when diarrhoea occurred alone.

.

POSTER 26

Seroprevalence of Hepatitis B Virus and Human Immunodeficiency Virus Infection among Students in Ahmadu Bello University, Zaria, Nigeria

Isa I[1], Aminu M[2], Abdullahi SA[1], Sani MA[3], Usman MA[3]

[1]*Department of Biological Sciences, Faculty of Science, Ahmadu Bello University, Zaria, Nigeria*

[2]*Department of Microbiology, Faculty of Science, Ahmadu Bello University, Zaria, Nigeria*

[3]*University Health Services, Main Campus, Ahmadu Bello University Zaria, Nigeria*

Hepatitis B virus (HBV) and Human Immunodeficiency Virus (HIV) are endemic in sub-Saharan Africa and share similar mode of transmission. The study was conducted to determine the seroprevalence of HBV and HIV infections and the possible potential risk factors among students of Ahmadu Bello University, Zaria, Kaduna State, Nigeria. Blood samples were consecutively collected from 600 consenting students aged between 16 and 40 years old at the University Health Services (UHS), Ahmadu Bello University, Zaria. Sera were separated from blood and screened for HIV and HBsAg serological markers (HBsAg, anti-HBs, HBeAg, anti-HBe and anti-HBc) using Determine™ HIV-1/2 kits and HBsAg, diagnostic kits. Reactive sera for HBsAg were further confirmed using ELISA kits. For HBsAg, 9.2% (55/600) of the students tested positive among which none had detectable anti-HBs antibodies, indicating recent infection. About 7.3%, 36.4% and 94.5% of the students were positive for HBeAg, anti-HBe and anti-HBc respectively. Seroprevalence of HIV infection was 2.8% (17/600). One (0.2%) of the student was infected with both HBV and HIV. There was a significant association between age group (p=0.016), gender (p=0.049), family history of HBV infection (p=0.000) and seroprevalence of HBsAg. For HIV, engaging in menial jobs (p = 0.001) was significantly associated with the infection. Other risk factors studied were not significantly associated with the viral infections. Over half of the students (52.3%: 314/600) were ignorant of HBV and the consequences of its infection. The seroprevalence of HBsAg obtained in this study indicates high endemicity according to WHO classification. Four of the students were highly infectious. Seroprevalence of HIV and the co-infection rate were very low. The results showed close contact among family members and economic disadvantages to be predisposing factors to these viral infections.

POSTER 27

Training primates through the supply chain from breeder to laboratory

Honess P, Baboo E, Griffiths MA
Bioculture Group, Senneville, Rivière des Anguilles, Mauritius

Hepatitis B virus (HBV) and Human Immunodeficiency Virus (HIV) are endemic in sub-Saharan Africa and share similar mode of transmission. The study was conducted to determine the seroprevalence of HBV and HIV infections and the possible potential risk factors among students of Ahmadu Bello University, Zaria, Kaduna State, Nigeria. Blood samples were consecutively collected from 600 consenting students aged between 16 and 40 years old at the University Health Services (UHS), Ahmadu Bello University, Zaria. Sera were separated from blood and screened for HIV and HBsAg serological markers (HBsAg, anti-HBs, HBeAg, anti-HBe and anti-HBc) using Determine™ HIV-1/2 kits and HBsAg, diagnostic kits. Reactive sera for HBsAg were further confirmed using ELISA kits. For HBsAg, 9.2% (55/600) of the students tested positive among which none had detectable anti-HBs antibodies, indicating recent infection. About 7.3%, 36.4% and 94.5% of the students were positive for HBeAg, anti-HBe and anti-HBc respectively. Seroprevalence of HIV infection was 2.8% (17/600). One (0.2%) of the student was infected with both HBV and HIV. There was a significant association between age group (p=0.016), gender (p=0.049), family history of HBV infection (p=0.000) and seroprevalence of HBsAg. For HIV, engaging in menial jobs (p = 0.001) was significantly associated with the infection. Other risk factors studied were not significantly associated with the viral infections. Over half of the students (52.3%: 314/600) were ignorant of HBV and the consequences of its infection. The seroprevalence of HBsAg obtained in this study indicates high endemicity according to WHO classification. Four of the students were highly infectious. Seroprevalence of HIV and the co-infection rate were very low. The results showed close contact among family members and economic disadvantages to be predisposing factors to these viral infections.

POSTER 28

Blood biochemistry and haematological reference values of juvenile Mauritian long-tailed macaques (*Macaca fascicularis*)

Naiken S, Griffiths MA, Hurdial S, Narainapoulle S, Honess P
Bioculture Group, Senneville, Rivière des Anguilles, Mauritius

The Mauritian long-tailed, or cynomolgus, macaque (Macaca fascicularis) is widely used in biomedical research, and determining reference intervals for biochemical and haematological parameters provides an important tool for clinical diagnosis and preclinical research. In this study, blood samples from 736 juvenile Mauritian long-tailed macaques (335 females and 401 males; 24-36 months old) were analysed to determine the normal reference intervals of 13 biochemical and 10 haematological parameters. The need for partitioning the reference interval between males and females was determined, as was variation associated with age, body weight and sex. Reference intervals for the biochemical and haematological parameters were calculated, along with their 90% Confidence interval, using the nonparametric method, as recommended by American Society for Veterinary Clinical Pathology guidelines. Partitioning of reference intervals between male and female monkeys was recommended for albumin, alkaline phosphotase, granulocytes and mean corpuscular haemoglobin. Age was shown to have a significant effect on mean corpuscular haemoglobin and mean corpuscular volume. Both age and body weight significantly interacted with the levels of aspartate aminotransferase, alanine aminotransferase, alkaline phosphotase, alpha-amylase, albumin, total protein, creatinine, glucose, total cholesterol, triglyceride, red blood cells, haemaoglobin, haematocrit, platelets and white blood cells. Sex significantly influenced the levels of lymphocytes, granulocytes and white blood cells. The findings presented in this paper provide a useful guideline for research involving Mauritian long-tailed macaques.

POSTER 29

The effects of infant and maternal factors on reproductive indices in captive-bred long-tailed macaques (*Macaca fascicularis*) from Mauritius

Naiken S, Griffiths MA, Hurdial S, Andrianjazalahatra T, Honess P
Bioculture Group, Senneville, Rivière des Anguilles, Mauritius

The long-tailed or cynomolgus macaque is widely used in reproductive research. However, the effects on their reproductive indices of infant and maternal factors such as birth order, sex of infants, twin births, maternal age and lactation status have not been fully examined. The aim of this study was to determine how such infant and maternal factors impact on infant birth weight, birth viability, neonatal loss and retained placenta in long-tailed macaques. The study was based on birth data from 789 females over an eight-year period. Consistent with reports of other macaque species, female offspring had lower birth weights compared with males. Birth weights of firstborn infants were lower compared with those of higher birth order infants. Results from a logistic regression analysis show that the risk of non-viable births was increased by maternal age and retained placenta. As in other non-human primates, maternal age had predictive value for non-viable births in long-tailed macaques. The risk of neonatal loss was reduced by maternal age but was not affected by birth order. Firstborn offspring did not have an increased risk for neonatal loss, perhaps due to the practice of retaining mothers in their natal groups, which improved maternal skills in primiparous females. However, low infant birth weight and non-lactating females increased the risk of neonatal loss, and the delivery of low birth weight infants predisposed mothers to retained placenta. The results of this study can be useful for scientists conducting reproductive studies and for colony managers seeking to maximise fertility and infant survival in long-tailed macaques.

POSTER 30

Perceived health effects of *Moringa oleifera* Lam. following consumption in Mauritius

Kassim N[1], Chan Sun M[1], Neergheen-Bhujun V[2]

[1]Department of Medicine, Faculty of Science, University of Mauritius, Réduit, Mauritius

[2]Department of Health Sciences and ANDI Center for Biomedical and Biomaterials Research, Faculty of Science, University of Mauritius, Réduit, Mauritius

M. oleifera is well known around the world as being a nutritious plant with numerous medicinal properties. In Mauritius, the latter has had a long-standing culinary tradition. However, there is a also the fear among the multi-cultural population of Mauritius that consumption of *M. oleifera* is associated with negative health effects. Thus the aim of this study is to probe the eating habits of the elderly with regards to *M. oleifera* Lam. leaves and pods and to identify any purported health effects in connection with their consumption. Semi-structured interviews using a self-designed interview protocol were conducted in "creole" with 14 Mauritians, aged ≥ 70 years, purposely recruited from Senior Citizen Associations of Mauritius. The audio-recorded data collected was then transcribed. Each transcript was read through and all relevant information was categorised into themes according to research objectives. Ethical clearance from the relevant institutional research ethics committee was obtained prior to start of the study. Analysis of the information from the 14 interviews yielded major themes, which were further subdivided into several minor themes. These themes denoted the different patterns of eating habits and perception of health effects regarding leaves and pods. In general, elderly Mauritians perceived *M. oleifera* leaves and pods as tasty vegetables and enjoyed eating them. The data indicated that the leaves and pods were cooked in different ways, and were accompanied with a staple food and meat or fish. Both the leaves and pods were considered highly nutritious and good sources of energy. They were deemed effective for pain relief and regarded as useful for optimal intestinal transit. Additionally, the leaves were used to speed up wound healing while the pods were believed to be beneficial to diabetics. However, most of elderly Mauritians also had the perception that consumption of *Moringa* leaves and pods raised blood pressure in normotensive as well as hypertensive individuals. This is in conflict with the findings of experiments performed on rats, which demonstrated the hypotensive properties of *M. oleifera* Lam. leaves and pods. Findings from this study reveal the need for evidence-based studies to confirm the adverse health effects of *Moringa* leaves and pods on blood pressure following consumption. This will certainly optimise the use of this underutilised vegetable.

POSTER 31

Antioxidant activity of *Morinda citrifolia* L. fruits at different stages of maturity

Ramful-Baboolall D, Bhatoo BNE

Department of Agricultural and Food Science, Faculty of Agriculture, University of Mauritius, Réduit, Mauritius

Access to sufficient amounts of safe and nutritious food is key to sustaining life and promoting good health[1]. Presence of reactive oxygen species (ROS) can seriously compromise the safety of foods resulting in harmful effects on human health. The suspected carcinogenicity of synthetic food antioxidants has propelled the search for natural sources of antioxidants as potential food additives. *Morinda citrifolia* L. fruit is known to be rich in phytochemicals and various studies have showed that the fruit possess high antioxidant capacity in different systems. This study was carried out to determine the total phytophenolic content and *in vitro* antioxidant activity of locally grown *Morinda citrifolia* L. fruits at three different stages of maturity namely, green, mature green and ripe. The vitamin C ranged from 41.12 ± 0.083 to 143.63 ± 0.146 mg/100 ml in fresh noni fruits. Ripe fruits contained the highest level of ascorbic acid followed by mature green and green fruits. The values obtained were significantly different at different stages of maturity ($p<0.05$). The total phenol content ranged from 0.909 (green) to 2.305 (ripe) mg/g of FW whilst the total flavonoid content from 1.054 (green) to 2.116 (ripe) mg/g of FW. The *in vitro* antioxidant activity of the *Morinda citrifolia* L. extracts was also analysed using FRAP and TEAC assays. The reducing power of the fruit extracts as assessed by the FRAP assay decreased in the following order: Ripe > Mature green > Green ($p<0.05$). The TEAC values ranges from 0.2631 to 0.8921 µmol/g FW with extracts of fruits at the mature green stage having highest values followed by fruits at the ripe and green stage respectively ($p<0.05$). High correlation values were obtained between total phenolics, total flavonoids, ascorbic acid contents and the TEAC and FRAP assays ($r > 0.8$). The ability of the *Morinda citrifolia* L. extracts to protect canola oil and mayonnaise, prepared with canola oil, against lipid oxidation during storage at 40°C was investigated. Mature green and ripe extracts were very effective in retarding oxidation in canola oil. Oil samples containing mature green and ripe extracts (at 10 and 20%) took more days than BHT to attain a PV of 10 meq/Kg ($p<0.05$). The time taken by mayonnaise samples to reach a PV of 10 meq/ Kg was in the following descending order: Ripe 20% > mature Green 20 % > ripe 10% > Mature Green 10% = BHT > Green 20% > green 10% > control. Moreover, the rate of increase in conjugated diene value was highest for the control samples of mayannaise and slowest for 20% ripe extracts ($p<0.05$). Noni fruits at the mature green and ripe stages represent potential source of natural antioxidants for use a food additive.

[1] *World Health Organisation (2015). Fact Sheet on Food Safety. http://www.who.int/mediacentre/factsheets/fs399/en/*

POSTER 32

The protective role of 3 medicinal plant polyphenol rich extracts from La Reunion against the deleterious effects of inflammatory mediators on 3T34L1 preadipocytes

Marimoutou M, Le Sage F, Gonthier M, Robert-Da Silva C

DéTROI6UMR 11886 Université de la Réunion, Plateforme CYROI6 2 rue Maxime Rivière – 97490 Saint Denis, La Réunion, FRANCE

Adipose cells responsible for fat storage are the targets of ROS like H_2O_2 and pro-inflammatory agents including TNFα and LPS. Such mediators contribute to oxidative stress and alter inflammatory processes in adipose tissue leading to insulin resistance during obesity. Thus, the identification of natural compounds such as plant polyphenols able to increase the antioxidant and anti-inflammatory capacity of the body is of high interest. We aimed to evaluate the biological properties of polyphenol-rich extracts from 3 medicinal plants from La! Reunion Island *(A. borbonica, D. apetalum, G. mauritiana)* on preadipocytes exposed to H_2O_2, TNFα and LPS. Medicinal plant extracts were analysed for their polyphenol contents by Folin-Ciocalteu and UPLC-ES-MS methods as well as for their free radical-scavenging activities by DPPH and ORAC assays. To assess the ability of polyphenol-rich extracts to protect 3T3-L1 preadipocytes against H_2O_2, TNFα or LPS mediators, several parameters including cell viability (MTT and LDH assays) ROS production (DCFHDA test), IL-6 and MCP-1 secretion (ELISA) were evaluated. Moreover, the expression of superoxide dismutase, catalase and NF-κB genes was explored (qRT-PCR). We showed that all medicinal plants exhibited high levels of polyphenols with free radical-scavenging capacities. Polyphenol-rich plant extracts did not exert any cytotoxic effect on preadipocytes but protected them against H_2O_2 anti-proliferative action. Importantly, they down regulated ROS production and the secretion of IL-6 and MCP-1 pro-inflammatory markers induced by H_2O_2, LPS and TNFα. Such a protective action was associated with an increase in superoxide dismutase antioxidant enzyme gene expression and a decrease in mRNA levels of NK-κB pro-inflammatory transcription factor. This study highlights that antioxidant strategies based on polyphenols derived from medicinal plants tested could contribute to regulate adipose tissue redox status and immune process and thus participate to the improvement of obesity-related oxidative stress and inflammation.

POSTER 33

Isolation and Characterization of Bioactive Metabolites from the South African Marine Algae *Laurencia elata*

Sunassee SN[1,2], Beukes DR[3]

[1]Chemistry Department, University of Cape Town, Rondebosch 7701, South Africa

[2]Marine Research (Ma-Re) Institute, University of Cape Town, Rondebosch 7701, South Africa

[3]School of Pharmacy, University of the Western Cape, Belville 7535, South Africa

The natural product investigation of South African marine algae and seaweeds has resulted in the identification of numerous compounds with various biological activities, e.g. cytotoxic, antimicrobial and antiplasmodial. The marine red algal genus *Laurencia* is a prolific producer of structurally intriguing and biologically active natural products. In an effort to contribute to the continuing studies on South African marine algae, we have collected a specimen of *Laurencia elata*, which is known to produce a range of sesquiterpenes and C15 acetogenins with biological activity against leishmaniasis and malaria. This study involves the isolation, characterization and biological assessment of *Laurencia elata* secondary metabolites, using a bioassay-guided fractionation approach.

POSTER 34

Valorisation of seaweeds from Indian Ocean

Youssouf L[1], Lallemand L[1], Giraud P[2], Jhurry D[3], Bhaw-Luximon A[3], D'Hellencourt CL[2], Couprie J[2]

[1]CYROI

[2]UMR DétROI

[3]CBBR

Seaweeds are an abundant resource of natural valuable compounds in the Mascarene Islands. In this study several algae from Mauritius and Madagascar have been screened for the presence of antioxidative molecules, which can be evaluated for their possible application domains such as food or cosmetic industries. Furthermore marine algae contain polysaccharides including carrageenans and alginates known for many properties. These polymers are present in many food products such as gelling agents, emulsifiers, thickeners or stabilizers[1]. The pharmaceutical industry is also interested in valuable properties of these biopolymers. For example, alginates are used as a dressing for their capacity to activate the healing process or as drug encapsulation agent. The CYROI, the University of Reunion and the CBBR develop the characterization and valuation of these marine biopolymers. A method more economical and ecological than extraction processes has been established to extract polysaccharides. This method consists in an eco-extraction technique using ultrasound to rapidly obtain extracts with good quality. Alginates and carrageenans were extracted from various browns algae (*Sargassum binderi, Turbinaria ornata*) and red algae (*Kappahycus alvarezii, Euchema denticulatum*) using these eco-extraction methods based on ultrasound. Besides, the aim of this joint project between the CYROI, the University of Reunion and the University of Mauritius is to functionalize these natural macromolecules to obtain nanoparticles, which can be used as hydrophobic drug carriers[2,3,4]. To measure antioxidant potential of Mauritian and Madagascan seaweeds, total content of phenolic compounds was determined using Folin Coacalteu regent. Antioxidant activities were tested using ORAC and radical scavenging activities against DPPH•. All species showed antioxidant activity and the results are summarize in fig 1a, 1b and 1c. To extract polysaccharides from brown seaweeds several parameters have been studied. The optimization of conditions (pH, temperature, solid/liquid ratio, ultrasound power and application time) provided good extraction yields. Polysaccharides obtained represent 50-55% (fig 2a 2b and 2c) of the seaweeds dry weight in a very short time (15-30 min). These results represent a significant improvement compared to conventional methods, which require over 2 hours for two fold lower extraction yields. The extracts were characterized by ^{1}H and ^{13}C NMR to estimate the purity and to identify extracted biopolymers. In this work seaweeds collected from Mauritius and Madagascar showed antioxidant activities. The identification of antioxidant compounds of these extract is necessary to determine applications domains (medicine, food production or cosmetic industry). Moreover, eco-friendly extraction process was established for polysaccharides (alginates and carrageenans) in order to obtain a good quality extract. NMR analysis allowed to determine the composition of each extract and permitted to show their purity. The final objective of this study is to chemically functionalize these natural biopolymers in amphiphilic copolymers able to encapsulate hydrophobic drugs.

[1]Roberts MA, Quemener B. Measurement of carrageenans in food: challenges, progress, and trends in analysis. Trends Food Sci Technol. 1999; 10(4):169-81.

[2]Bhaw-Luximon A, Meeram LM, Jugdawa Y, Helbert W, Jhurry D. Oligoagarose-g-polycaprolactone loaded nanoparticles for drug delivery applications. Polym Chem. 2011;2(1):77.

[3]Bhaw-Luximon A, Jhurry D, Booluck MH, Correc G, Génicot S, Helbert W. Oligoagarose-Graft-Polycaprolactone Copolymers: Synthesis and Characterization. Macromol Symp. févr 2009;277(1):14-23.

[4]Motala-Timol S, Jhurry D. Synthesis of graft and block copolymers from 2-dimethylaminoethyl methacrylate and caprolactone. Polym Int. août 2007; 56(8):1053-62.

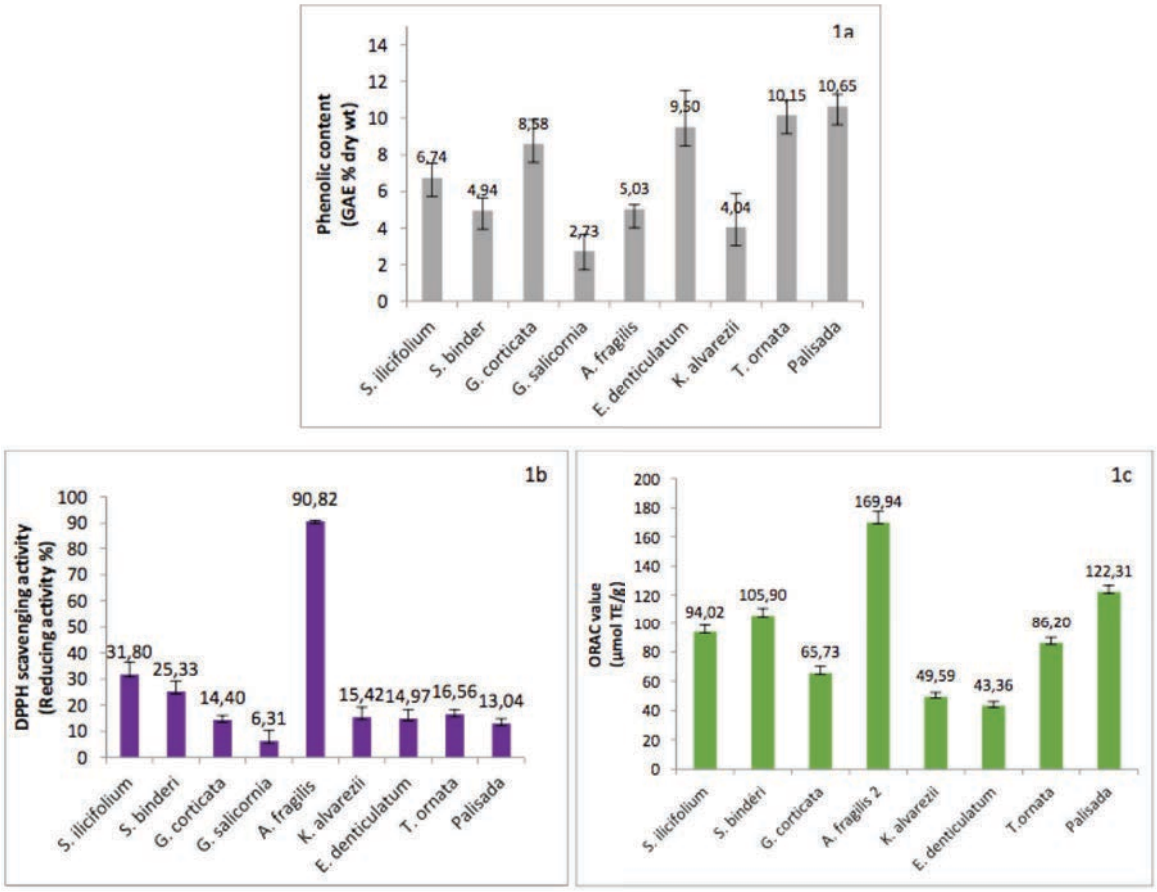


Figure 1: Antioxidant activities of ethanolic extracts of algae: a) Phenolic compounds (Folin-Coacalteu); b) DPPH radical scavenging activity; c) ORAC value

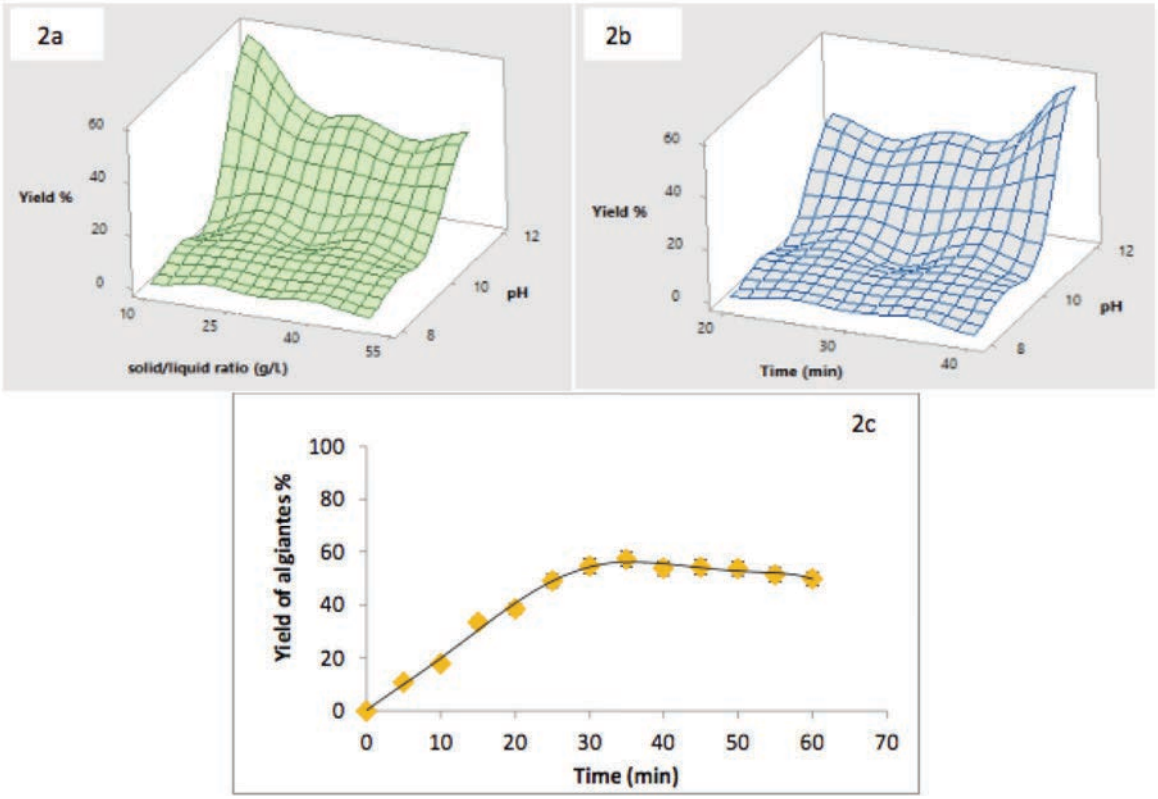


Figure 2: a) and b) screening of optimal conditions of alginates extraction; c) ultrasound-assisted extraction of alginates in determined optimal conditions

POSTER 35

A study of Mauritian mortality forecasting models

Saib AAEF[1], Peer AAI[1], Sunhaloo MS[1], Bhuruth M[2]

[1]Department of Applied Mathematical Sciences, University of Technology, Mauritius, La Tour Koenig, Pointe-aux-Sables 11134, Mauritius

[2]Department of Mathematics, University of Mauritius, Reduit, Mauritius

With the concern of an aging Mauritian population, mortality forecast is becoming of increasing importance. Such a forecast has several implications, for instance on pension payment, insurance or social care (health services, leisure) offered to retired citizens. With the rise in life expectancy, decision makers would be called upon to sanction appropriate measures in view of a sustainable support. We study different mortality forecasting methods and observe their effectiveness in forecasting Mauritian mortality rates. We apply logit and stochastic models to predict mortality rates. A fitting mortality rate is applied for years 1984-2005 and we employ an Autoregressive Moving Average (ARIMA) model to forecast the general index for the time period from 2006 to 2012 and compare their forecasting accuracy. The Lee-Carter model yields more accurate results in forecasting Mauritian mortality rates, as compared to the other methods considered.

POSTER 36

Statistical analysis of health data: the identification of risk factors associated with the onset of diabetes

Jahajeeah H, Peer AAI, Saib AAEF, Sunhaloo MS

Department of Applied Mathematical Sciences, University of Technology, Mauritius, La Tour Koenig, Pointe-aux-Sables 11134, Mauritius

Diabetes is a lifelong disease affecting a significant number of people in the world. This has led to volumetric patient related information. In this work, we aim at applying different statistical approaches to health care data in order to search for patterns and examine which are more strongly associated with the onset of diabetes. Patient data such as gender, age and fasting plasma glucose (FPG) are considered for that purpose. We compare and discuss the predictions obtained from classification techniques and discriminant analysis. We also identify some clustering methods, which can handle the data under consideration. This has been required since clustering procedures work efficiently either on pure continuous data or pure categorical data but most of them perform poorly on mixed metric and non-metric data types.

POSTER 37

Identification of needs of young smokers towards smoking cessation: a qualitative study

Chan Sun M, Vydelingum M

Department of Medicine, Faculty of Science, University of Mauritius, Réduit, Mauritius

Non-Communicable Diseases (NCD) constitutes the leading cause of deaths in the world. As smoking is the leading preventable risk factor for NCD, there is need to address smoking cessation. Considering that there is a high prevalence of smokers among young adults in Mauritius and other countries, this study was designed with the aim to identify the needs of young smokers, in the age group 19-30, with respect to smoking cessation. The objectives were to explore the attitudes of young smokers towards smoking cessation programs and to probe about any plan to quit smoking. A qualitative study was carried out among a purposeful sample of 19 young working adult smokers. Respondents were classified into two groups depending on their motivation level assessed by the Readiness to Quit Ladder and their cigarette dependence measured by the Fagerstrôm Test of Nicotine Dependence. Then, a semi structured face-to-face interview, integrating aspects of the PRIME theory was conducted. Data collected, the verbatim transcripts, were analyzed using the Thematic Framework Analysis (Ritchie and Lewis, 2003) to enable emergence of themes from data. Analysis, undertaken manually, involved transcribing each interview verbatim, familiarization with the data by reading the transcripts several times and identifying within which group of participants each point occurred. Identification of recurrent themes by grouping similar key points showed attitudes towards smoking and quitting in both groups, and any differences, which occurred between the two groups. Ethical clearance from the research ethics committee of the health authorities of the country was obtained prior to start of data collection. All smokers intended to quit. High motivation smokers wanted to quit soon while low motivation smokers wished to quit later in the future. The main motivation for intention to quit was health worries. The main barrier to quitting was social environment. The reasons identified to previous unsuccessful quit attempts were lack of knowledge about cessation techniques and smokers considered they had to quit rather than they wanted to stop smoking. This qualitative study reveals that the interviewed smokers need to be provided with the relevant counseling and supportive environment to empower them to quit successfully. Training of health professionals with respect to motivational interviewing is thus recommended. As the importance of social environment is highlighted, comprehensive smoking ban in all public places needs to be enforced. Finally, health awareness campaigns are required in order to increase uptake of smoking cessation programs.

POSTER 38

Kumquat (*Fortunella* Spp.): Biochemical composition and prophylactic actions

Bahorun T[1], Narrain D[1], Ramlagan P[2], Bholah CT[2]

[1]ANDI Centre of Excellence for Biomedical and Biomaterials Research, University of Mauritius, Réduit, Mauritius

[2]Department of Health Sciences, Faculty of Science and ANDI Centre of Excellence for Biomedical and Biomaterials Research, University of Mauritius, Réduit, Mauritius

Natural plant products continue to gain interest due to the plethora of health-promoting phytochemicals they possess. Citrus fruits have been extensively studied for the dynamo package of health benefits they confer and have been widely applied in the medical and food industry. Kumquat, a tropical fruit originally included in the genus *Citrus* has been classified a century ago in the genus *Fortunella*. The latter has so far been poorly studied, most probably due to its limited distribution and consumption. However, there exist interesting findings on the phytochemical composition of *Fortunella* species and their modulatory effects on health at biochemical and molecular levels. The main vitamins in Kumquats are vitamin C (43.9 mg/100g which meets 73% of our recommended uptake), vitamin A, B1 (thiamin), B3 (niacin), B6 (pyridoxine) and E (alpha-tocopherol). Phytochemical composition includes flavonoids, terpenoids, carotenoids, phenolic acids and essential oils. The main flavonoids found in Kumquats are flavanones (naringin, hesperidin and neohesperidin), flavones (diosmin and sinensetin), flavanol derivatives (rutin, quercetin and kaempferol) and dihydrochalcones (most abundant being phoretin 3', 5'-di-C-glucoside). Their carotenoid composition varies in peels and pulps, with peels containing mostly violaxanthin, ß-citraurin, lutein, ß-cryptoxanthin and ß-carotene while pulps additionally containing auroxanthin and luteoxanthin. Limonene is the principal essential oil of kumquat peel (around 93 % of the total). Kumquats are also rich in phenolic acids, more particularly cinnamic acids and cinnamic acid derivatives like boropinic acid and ferulic acid. Various studies have shown that the blend and multifunctional properties of these phytochemicals and nutrients confer a wide range of prophylactic activities including anti-oxidant, anti-microbial, anti-inflammatory, anti-tumor, anti-diabetic, anti-obesity, anti-hypertensive activities and modulation of neurodegenerative diseases through interesting mechanisms of action. A remarkable feature of kumquats is that the fruit can be eaten whole, with the pulp and peel, both containing the health-advocating bioactive compounds. Kumquats, thus, represent potential functional foods that can be included in normal diets and in nutritional programs for preventive and therapeutic treatments.

POSTER 39

Corrosives ingestion in Mauritius: A novel approach to management by endoscopic treatment

Bholah F, *Ministry of Health and Quality of Life, Mauritius*

Corrosives ingestion is highly fatal. A small number of patients die in the first few days. The vast majority of patients go on to develop severe GI complications and eventually die. Suicidal attempts with corrosives (caustic soda most commonly used) have increased in the recent years in Mauritius. Traditionally, patients were managed conservatively and referred for surgery once they developed complications. Surgical treatment has however been disappointing with high mortality and morbidity for survivors. In 2012/13, we noted 12 deaths out of 17 patients operated, giving a mortality rate of >70%. Since 2008, the endoscopic centre at SSRNH has progressively been involved in the management of these patients. Endoscopic management (thus avoiding surgery) is a new concept. Published literature on endoscopic management is almost non-existent as the incidence is very low in developed countries. We have treated a total number of 128 patients; and in 2014 alone, 44 patients were referred for endoscopies following corrosives ingestion. The number of patients referred for surgery has drastically dropped by 86% in the last 2 years. Our latest statistics now show a survival rate of >90%. We therefore strongly recommend this novel approach by endoscopic treatment of corrosive abuse as first line treatment.

POSTER 40

An Experimental Unit of Microsurgery in Reunion Island, Indian Ocean

Bencharif K[1], *Gimie F[1], Ait Arsa I[1], Aubier A[1], Pesnel S[1], Jestin E[1], Cesari M[1], Sauvat F[2]*

[1] *Plateforme CYROI, 2 rue Maxime Rivière, 97490 Sainte-Clotilde, La Réunion, France*

[2] *Pediatric surgery Unit, University Hospital of Reunion island, La Réunion, France*

Preclinical research on animal model recently started in Reunion Island due to the absence of an animal lab and qualified scientists, veterinaries or technical staff. Since 2009, the situation has evolved with the creation of the approved research structure for rodents in CYROI (Cyclotron Region Ocean Indien), a biotechnology platform. Moreover, the experimental microsurgery is an essential tool for the development of preclinical research projects that require a particular animal model and the microsurgical platform in CYROI is unique in the southwest area of the Indian Ocean since 2014.

This platform comes from a partnership between the Reunion University hospital, the University faculty of Sciences and CYROI. In April 2014, European funding allowed the establishment to set up an experimental laboratory in microsurgery through the acquisition of 7 Leica M320 microscopes and all the necessary equipments for preclinical microsurgery: surgical and microsurgical instruments, surgical heating plates connected to the small animal anesthesia system and heat lamps. One of the microscopes has an HD camera, connected to a screen, enabling training microsurgical techniques.

The unit has two main activities: firstly, the development of preclinical models of microsurgery, in accordance to scientific projects. For instance, Wistar Han rat is used to study renal functions of ischemia-reperfusion injury or arthrosis. Secondly, offering training sessions in surgical or microsurgical techniques under a microscope. In September 2015, two additional training sessions in surgery and microsurgery will be offered at CYROI which will be opened to researchers, research technicians, physicians, surgeons and veterinarians of Indian Ocean. One will be a surgery training using non-living tissue and a single live rat per person and the second one on microsurgery training will make use of PVC-Rat® model before any use of animal. Furthermore, CYROI has a radioisotope area due to the presence of a Cyclotron, a radiochemical laboratory and small animal imaging laboratory (RIPA Radiochemistry unity and Small Animal Imaging). A Triumph multimodal imager allows preclinical imaging to be carried out: PET (Positron Emission Tomography) and SPECT (Positron Single Photon Emission) modalities using radiotracers for monitoring; CT (CT) in order to acquire anatomical images. Its strategic localization (next to the animal Lab) offers the opportunity to use this advanced tool to monitor our surgical models. All animal care and experimental procedures linked to microsurgical and surgical training or scientific projects, comply with the guidelines for the Care and Use of Laboratory Animals, formulated by the Ministry of Education and research of France and approved by the Ethical Committee on Animal Experiments at Reunion Island (CYROI N°114).

Heartiest thanks to our Sponsors

International Sponsors

Local Sponsors

International Conference on – Translational Science & Drug Discovery

Mauritius

Platinum local sponsor

BIOCULTURE

CARING FOR LIFE

Gold local sponsors

scott health

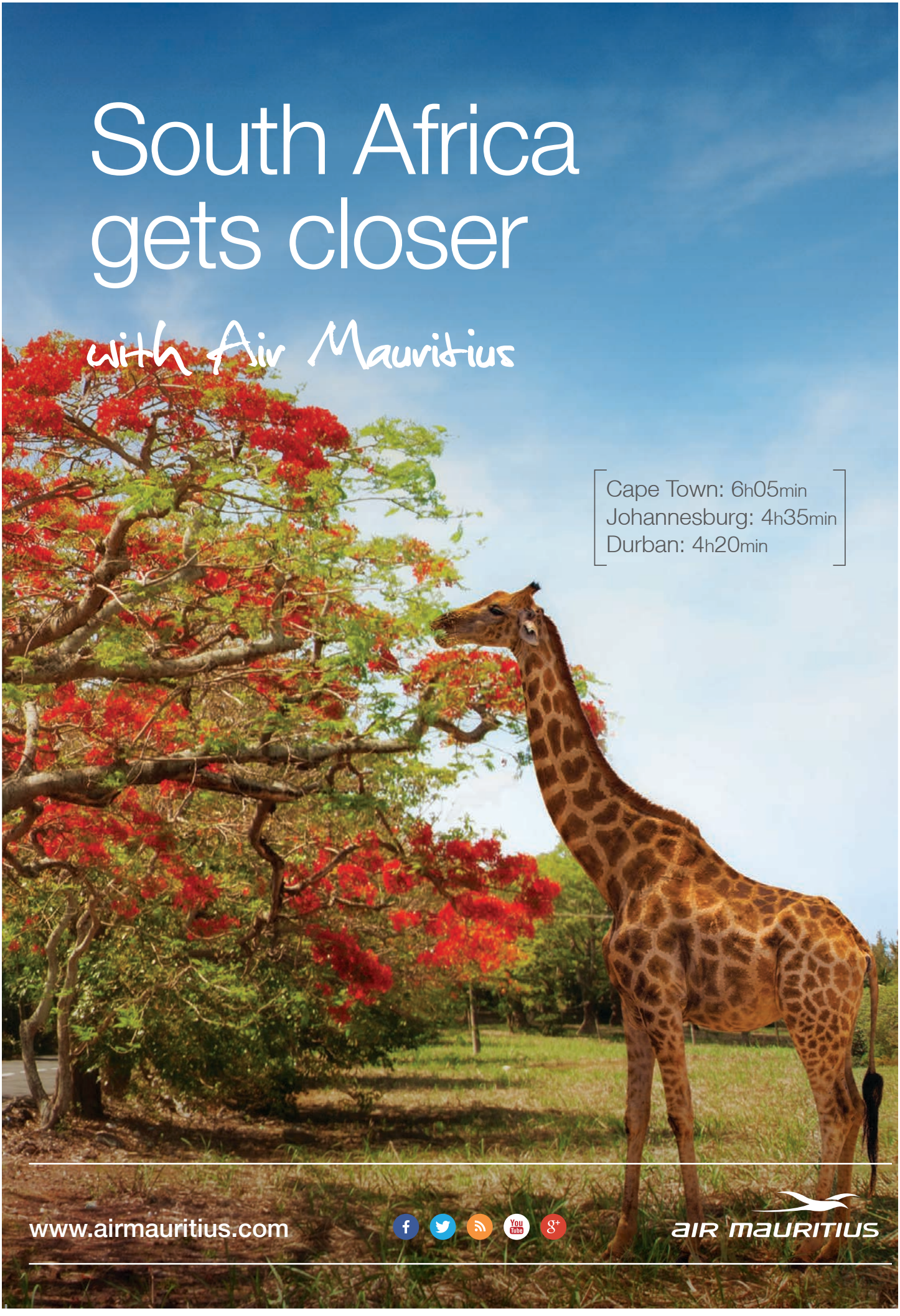
Roche

Deramann GROUP

Ducray Lenoir Ltd

QuantiLAB

ACCURATE RESULTS ON TIME


South Africa
gets closer
with Air Mauritius
Cape Town: 6h05min
Johannesburg: 4h35min
Durban: 4h20min
www.airmauritius.com
AIR MAURITIUS

Authentic Product of Mauritius

Tea and its benefits

Tea is the second most consumed beverage in the world after water.

The Bois Chéri Green tea, Black Tea and herbal tea : What's the difference?

Black and Green teas come from the same plant but their difference lies in their processing. Fermentation process and related oxidation reactions are responsible for the production of black tea. Green tea on the other hand does not undergo any fermentation reactions and has a less stringent taste than black tea. Our Ayapana and Lemongrass herbal teas are made from leaves of plants grown and dried naturally on the estate. Bois Chéri is the only producer of herbal tea namely Lemongrass and Ayapana in Mauritius.

The beneficial properties of tea:

It is rich in antioxidants and helps prevent cardiovascular diseases, several forms of cancer and diabetes.

It strengthens the immune system and reduces the aging process. The Ayapana can be used daily as infusion for difficult digestion or stomach upset. Lemongrass has a diuretic effect as it eliminates excess fluid in the body and therefore has a slimming effect.

Beauty care

An infused tea bag when cooled, can be applied onto the eyes to reduce dark circles. Added to our bath, it has relaxing actions. It is also said that tea, makes eyes clearer and brighter.

In the kitchen

In Bois Cheri Restaurant, we utilise a tea-based cuisine. An original and very popular concept. We recommend it to you.

Ice Tea

Natural and low in sugar, the Bois Cheri Ice Tea is a refreshing drink, healthy and pasteurized. Made from infused tea leaves from our natural spring water Ocheri. Three flavors are available in bottles of 500ml.

Ice Tea Peach, Ice Tea Lemon et Green Tea Mint

BOIS CHERI

BECOME AN APPROVED CENTRE -OFFER OUR WORLD CLASS QUALIFICATIONS
CONTACT OUR COUNTRY REPRESENTATIVE ON 52591541

OUR VISION

To be a leading institution in the provision of specific welfare services to employees and their families.

ELIGIBILITY

All employees of the public and private sectors contributing to the NSF

OUR MISSION

To be responsive to the evolving needs of employees and their families and continue to devise and implement specific welfare schemes for the attainment of the objectives of the institution

EMPLOYEES WELFARE FUND

CARING FOR YOUR WELLBEING

EDUCATION LOAN SCHEME

Helping you to build your career

Amount of Loan:
Rs.25,000 up to Rs.2 million

Interest Rate: **5%** up to Rs 1 million

8% above Rs 1 million up to Rs 2 million

Repayment period: 10 yrs (maximum) with repayment options

SC/HSC EXAM FEES LOAN SCHEME

Applies to those who are NOT ELIGIBLE for Social Security grant

Interest Rate: **5%**

1 GUARANTOR REQUIRED

Repayment period: 2 years

WELFARE LOAN SCHEME

Purpose of this Loan

- Travel and holidays
- Purchase of Furniture/Entertainment & domestic Appliances /Keep Fit Equipment
- Renovation works
- Medical Expenses
- Wedding

Maximum Amount
Rs 300,000.
Interest Rate: **8%**

ONLY 1 GUARANTOR REQUIRED

Repayment Period: Up to 5 years

LOAN FOR PEOPLE WITH DISABILITIES

new

Maximum Amount
Rs 300,000.
Interest Rate: **4%**

ONLY 1 GUARANTOR REQUIRED

Repayment Period: Up to 8 years

*Photos Non-Contractuelles

CAR LOAN SCHEME

New Cars:	Reconditioned Cars: Less than 4 years	All types of car:
Maximum Amount *	**Maximum Amount ***	**Maximum Amount ***
Rs 1.5 million	**Rs 1 million**	**Rs 300,000.**
LIEN ON CAR	LIEN ON CAR	1 GUARANTOR REQUIRED
Repayment period: 6 years		**Repayment period: 5 years**

Interest rate **8%**

*Terms and Conditions apply

MOTORCYCLE LOAN SCHEME

Maximum Amount
Rs 100,000.
Interest rate **8%**

1 GUARANTOR REQUIRED

Repayment period: 5 years

CALODYNE SUR MER BEACH HOTEL AND SPA

CSM Hotel, nested in the North East of Mauritius, offers special family, group and corporate packages to Mauritians.

Tailor-made packages for special events like end-of-year parties, birthday celebrations, weddings, etc.. are also offered at affordable prices.

Mirabel Avenue, Coastal Road, Grand Gaube.
Tel: 288 2590 Email: calodynesurmer@intnet.mu
Website: www.calodynesurmerhotel.com

Sodnac Wellness Park

- Weekdays

05hr00 to 08hr00 hrs and 16hr00 to 19hr30

- Weekends & Public Holidays

05hr00 to 19hr30

Find us on: facebook

6th Floor, Moorgate House, Sir William Newton Street, Port-Louis - Tel: 208 8353 - Fax: 208 8399
Colonial Building, Port Mathurin, Rodrigues - Tel: 8320577 - Fax: 8320629
Email: empwelfund@intnet.mu - Website: www.ewf.mu

Dr. Agarwal's Eye Hospital

For eyes like new

Mauritius

Extending
Advanced
Eye Care Services in
Indian Ocean Region

- Pioneers in refractive surgery
  - ICL Implantation
  - CXL (Corneal Cross Linking)
- Gamut of **Vitreo-Retinal Services**
- Treated over **1500** International patients

Your destination for complete eye care services

Mauritius
Villa Del Fol, Royal Road, Tombeau Bay,
Mauritius. Phone : +230 2474949/50
Mobile: +230 9293646
E-mail: mauritius@dragarwal.com

Madagascar
Ambatoroka Pres VD5 Faliaro Ambanidia
Analamanga, 101 Antananarivo Renivohitra,
Madagascar Phone: +261202229844
E-mail:madagascar@dragarwal.com

Seychelles
P.O. Box 88, Vasudeen Complex, Lodge Street,
Victoria,Mahe , Republic of Seychelles
Phone: +2484325882 Mobile:+2482601740
E-mail: seychelles@dragarwal.com

Our network of 60 Eye Hospitals: Africa: Madagascar | Mauritius | Mozambique (3 centres) | Nigeria | Rwanda | Seychelles | Zambia
Asia: India (48 centres) | Cambodia
Upcoming Centers: Angola | Botswana | Burundi | Democratic Republic of Congo | Malawi | Swaziland | Tanzania | Uganda

For more details contact
+230 5760 4020

58 YEARS OF CARING FOR EYES
5th
ANNIVERSARY OF OUR SERVICES in Indian Ocean Region

Follow us on:
www.dragarwal.com
(Represented by Orbit Health Care Services Limited)

...in every part and in every heart!

Leading Supplier in Jet Fuel

Only Petroleum Company having a Certified Laboratory

20 Filling Stations across Mauritius

Highest Quality Fuel through its Dedicated Pipelines

World Class SERVO Lubricants

The only Non Space Pump in Mauritius

IndianOil (Mauritius) Ltd
Mer Rouge, Port Louis, Republic of Mauritius
Tel +230 217 2710 | **Fax** +230 2175500 | **Email** indianoil@intnet.mu

IndianOil
Mauritius

www.ioml.mu

Bringing Energy to Life

Labtechmedical Services Ltd

Your partner in the Medical & Scientific Sector

❖ LABORATORY (Equipment & Consumables)

Laboratory Research, Agriculture, Environment & water , Food & Beverages, Textile, Chemicals, Industrial

❖ Medical (Equipment & Consumables)

Hospital , Clinic , Dental Clinic

❖ AFTER SALES SERVICE

Installation, Maintenance, Repairs, Technical Training of user , Spare parts Supply

HEAD OFFICE: 14 Providencia II, Providence, Quartier Militaire
Tel : 435 8564 / 5970 9628 Fax: 435 8791 /416 5405
Email: labtechmedicals@gmail.com


nip®
for a happy baby
since 1932
experience & competence
Made in GERMANY
Recommended by midwives
0 % BPA
facebook.com/NIPBaby
MAKES IT GREAT
50
Dr. Theiss Naturwaren GROUP

With more than 15 years of experience in Microbiological, Chemical testing & Research activities, our ISO 17025 accredited laboratory operates in Food, Environment, Cosmetics and Animal Health sectors.

We are equipped with systems for High Performance Liquid Chromatography, Trace Metals Analysis, Gas Chromatography-Mass Spectrometry, ELISA and Polymerase Chain Reaction among others.

More recently incorporated under the name of LIBA, our growing and dedicated team consists of skilled and experienced staff committed to ensuring tailor made services meeting the following purposes:

- For regulatory needs;
- As a support to Quality Assurance systems or internal prevention policies;
- For assistance in industrial process issues;
- In collaboration on Research projects in the biomedical or industrial fields.

LIBA is rising as one of the country's most respected Analytical & Research Laboratory, with clients across a range of industries.

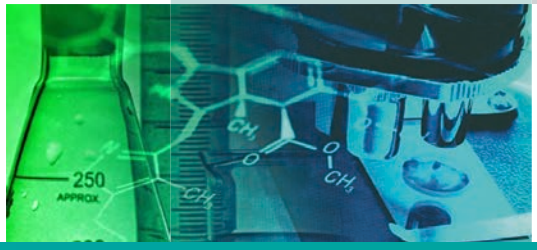
We always keep developing scientific collaborations with stakeholders looking for a serious partner to make things happen.

LiBA LABORATOIRE INTERNATIONAL DE BIO ANALYSE

LABORATOIRE INTERNATIONAL DE BIO ANALYSE LTEE
EBENE SKIES, RUE DE L'INSTITUT
EBENE, MAURITIUS
TEL : +230 465 45 00 - Email : info@liba.mu

QuantiLAB

ACCURATE RESULTS ON TIME



MODERN TECHNOLOGY

www.quantilab.mu

ISO 17025

CHEMISTRY

MICROBIOLOGY

FOOD & WATER ANALYSIS

FORENSIC TOXICOLOGY

SBM Holdings Ltd connects African and Asian Continents

SBM Holdings Ltd is a leading financial holding company listed on the Stock Exchange of Mauritius and is owned by some 18,000 domestic and international shareholders. SBM Group is present in Mauritius, India, Madagascar and Myanmar and is engaged in banking, non-banking foreign financial services and non-financial investments. Innovation, flexibility, accessibility and reliability are the key attributes that have contributed to the Group's reputation and trustworthiness.

The banking entity in Mauritius, namely SBM Bank (Mauritius) Ltd, is the flagship of the SBM Group. Established in 1973, SBM Bank (Mauritius) Ltd has a strong franchise in Mauritius, with a market share of over 20% in domestic advances and deposits. It caters for a wide range of customer segments including Personal, SME, Corporate, Cross Border and Financial Institutions.

With international market presence and offices in Asia (India, Myanmar) and Africa (Madagascar, Mauritius), with further expansion plans in India and East Africa, SBM Group is well positioned to serve you across Asia and Africa, building on the experience and expertise garnered in Mauritius. The Group aims at significantly expanding its India business as well as entering the Asian market taking into consideration the excellent prospects that these markets offer. The Group, which currently operates three branches in Madagascar, also aims at further penetrating Africa, building on the close links of the continent with Mauritius.

The Banker
Bank of the Year 2014
MAURITIUS

AFRICAN BANKER AWARDS 2014
BEST RETAIL BANK IN AFRICA

cfi.co 2014
BEST BANK
WINNER MAURITIUS

T: +230 207 0111 E: sbm@sbmgroup.mu W: www.sbmgroup.mu

SBM

Supplier of laboratory equipment, glassware and chemicals

Authorized Dealer for Sigma Aldrich Products

Wherever you are and whatever you need for your laboratory,

please contact us for any assistance or information you may require.

Tel: +230 6961330
Fax: +230 6963084
Mail: suppliessolution@intnet.mu

SUPER UNIC WAY

SUPER UNIC EVENTS

Avenue S.S.R Corner Orchidées, Quatre Bornes Tel: 454 9052

With over 40 years of experience, and its international distribution network, the S.K.C SURAT Group is the regional leader in the wholesale and distribution of fresh fruits and vegetables. Comprising of a modern distribution centre, the logistics for import, export and storage of fresh local, imported fruits and vegetables are ensured by international standards.

S.K.C SURAT
Group of Companies:

S.K.C SURAT & Co Ltd
S.K.C Holdings Ltd
S.K.C International Ltd
S.K.C Fruits Reunion SARL
Ashbury Investments Co. Ltd
S.K.C Dairy Fresh & Co.Ltd

SKC SURAT

Head Office (Mauritius):
Surat Distribution Centre
B6 Wooton Road
Republic of Mauritius
Tel: +230 670 6700
Fax: +230 670 6706
email: skcsurat@intnet.mu

(Reunion):
S.K.C Fruits Reunion SARL
1 Rue Emile Vehaeren
Zone Industrielle No3
Reunion
Tel: +262 42 11 55
Fax: +262 42 99 77

Trevia™ [SITAGLIPTIN] Treviamet™ [SITAGLIPTIN+METFORMIN HCl]

Result Oriented Flexibility in Type-2 Diabetes

THE WORLD'S FIRST

FDA Approved DPP-4 Inhibitor with Approved OD Dose

- Once daily
- Weight neutral therapy
- Low risk of hypoglycemia
- Combination flexibility

- Better glycemic control in monotherapy
- Substantial glycemic control in combination therapy
- Well-tolerated

UNICORN

Devoted to well-being

Getz pharma

A member of the Getz Group, USA.

VESL TECHNOLOGIES LTD

1st Floor, NG Tower
Ebene Cybercity
Mauritius

Tel: +230 466 4660
Fax: +230 467 5894
Email: info@vesltech.com
Website: www.vesltech.com

Company Profile
Ducray Lenoir Ltd

2015

Your partner in the Medical and Scientific sector since 1956

DUCRAY LENOIR

YOUR MEDICAL & SCIENTIFIC PARTNER

SINCE 1956

Doing now what patients need next

We believe it's urgent to deliver medical solutions right now – even as we develop innovations for the future. We are passionate about transforming patients' lives. We are courageous in both decision and action. And we believe that good business means a better world.

That is why we come to work each day. We commit ourselves to scientific rigour, unassailable ethics, and access to medical innovations for all. We do this today to build a better tomorrow.

We are proud of who we are, what we do, and how we do it. We are many, working as one across functions, across companies, and across the world.

We are Roche.

Roche