Promoting Health through Education and Innovation

The Third Ghana Biomed - 2010

NOGUCHI MEMORIAL INSTITUTE FOR MEDICAL RESEARCH
UNIVERSITY OF GHANA

AUGUST 11TH – 13TH 2010
Meeting Schedule

DAY 1  WEDNESDAY 11th AUGUST 2010

9.00 – 10.00am  WELCOME AND INTRODUCTIONS
10.05 – 11.00am  KEYNOTE ADDRESS: Professor Fred Binka
11.00 – 11.50am  Break
11.50 – 1.30pm  PLENARY 1: OPHTHALMOLOGY and PUBLIC HEALTH
1.30 – 2.40pm  Lunch
2.40 – 4.00pm  PLENARY 2: MOLECULAR AND CELLULAR BIOLOGY
4.00 – 4.20pm  Break
4.20 – 5.05pm  PROPOSAL SESSION
5.05 – 5.20pm  Break
5.20 – 5.50pm  WORKSHOP
5.50 – 7.00pm  POSTER SESSION I

DAY 2  THURSDAY 12th AUGUST 2010

8.00 – 9.00am  BUSINESS MEETING
9.00 – 9.55am  KEYNOTE ADDRESS: Dr. Ellis Owusu-Dabo
9.55 – 10.40am  Break
10.40 – 11:40am  PLENARY 3: BIOINFORMATICS
11.40 –12.00pm  Break
12.00 – 1.00pm  DRUG DEVELOPMENT AND HANDS-ON WORKSHOP/VISIT
1.00 – 2.00pm  Lunch
2.00 – 3.30pm  GENERAL DISCUSSION
3.30 – 3.45pm  Break
3.45 – 4.45pm  PLENARY 4: PLANT CHEMISTRY AND PHARMACOLOGY
4:45 – 5.15pm  STUDENT SESSION
5.15 – 5.30pm  Break
5:30 – 6.00pm  WORKSHOP
6.00 – 7.00pm  POSTER SESSION II
7.00 – 8.00pm  COCKTAIL DINNER

DAY 3  FRIDAY 13th AUGUST 2010

9.00 – 9.55am  KEYNOTE ADDRESS: Professor Samuel B. Kombian
9.55 – 10.40am  Break
10.40 – 12:00am  PLENARY 5: MICROBIAL PATHOGENS
12.00 –12.20pm  Break
12.20 – 1.20pm  MICROBIAL PATHOGENS (contd)
1.20 – 1.50pm  AWARDS AND CLOSING CEREMONY
Welcome from the Local Organising Committee Chair, Elsie Effah Kaufmann

On behalf of the Local Organizing Committee (LOC), it is my great pleasure to welcome you to the Third Ghana Biomedical Convention.

All too soon another year is here and with it another opportunity to strengthen professional and personal relationships forged at previous conventions. While you nurture these old relationships we hope you will make room for new ones as well.

Please join me in acknowledging the contribution of my colleagues on the LOC who have spared no effort in their enthusiasm to make this convention possible. We all wish you a successful meeting, and hope that you will share your experience of Ghana Biomed 2010 with us to improve future conventions.

Elsie Effah Kaufmann, PhD
Chair, Local Organising Committee

Local Organising Committee Members

Elsie Effah Kaufmann, PhD (Chair)
Department of Biomedical Engineering
University of Ghana
Accra, Ghana

Linda Amoah, PhD
Noguchi Memorial Institute for Medical Research
University of Ghana
Accra, Ghana

Peter Elikem Agbekoh, MRes
Department of Biomedical Engineering
University of Ghana
Accra, Ghana

Archibald Sittie, PhD
Centre for Scientific Research into Plant Medicine
Mampong, Ghana

Kwabena Duedu, MPhil
University of Ghana Medical School
Accra, Ghana

Cherie McCown, MSc
Noguchi Memorial Institute for Medical Research
University of Ghana
Accra, Ghana

Pearl Ashitey, BSc
Noguchi
University of Ghana
Accra, Ghana

Patricia Brown, PhD
Department of Biochemistry and Biotechnology
Kwame Nkrumah University of Science & Technology
Kumasi, Ghana

Fareed Arthur, PhD
Department of Biochemistry and Biotechnology
Kwame Nkrumah University of Science & Technology
Kumasi, Ghana
Welcome Message from the President, Winfried Amoaku

It is my pleasure to welcome you to the 3rd Ghana Biomedical Convention being held between 11th and 13th August, 2010 at the Noguchi Memorial Institute for Medical Research, University of Ghana, Accra. This year’s convention is under the theme: “Promoting Health through Education and Innovation.” It brings together biomedical scientists and doctors from home and abroad in order to share experiences and to create relationships that benefit biomedical science, medical practice, and education in Ghana.

To all participants, speakers and delegates, I extend on behalf of the Board of Directors warm friendships to all, and wish the deliberations are successful. Thanks to all our sponsors who have contributed generously to make our programme a success.

We have developed, and published the GBC Strategy document. It is our belief that we are now in a position to embark on other activities, in addition to the annual convention, that will enable us to achieve our strategic goals. May the convention continue to grow in membership and impact.

Board of Directors

George Acquaah-Mensah, PhD
Massachusetts College of Pharmacy and Health Sciences, Boston, USA

Samuel Kojo Kwofie, MSc
National Bioinformatics Network, South African National Bioinformatics Institute
Cape Town, South Africa

Peter Atadja, PhD
Novartis Institutes for Biomedical Research
250 Mass Avenue
Cambridge MA 01239

Winfried Amoaku, FRCS, FRCOphth, PhD
University of Nottingham
Nottingham, UK

Elsie Effah Kaufmann, PhD
Biomedical Engineering Department
University of Ghana
Accra, Ghana

Karen Duca, PhD
Department of Biochemistry and Biotechnology
Kwame Nkrumah University of Science and Technology Kumasi, Ghana

Kevin Kofi Adutwum-Ofosu, MPhil
University of Ghana Medical School
Accra, Ghana

Pearl Ashitey
Director - Student Members
University of Ghana

Marin Safo, PhD
Department of Medicinal Chemistry
Virginia Commonwealth University
Richmond VA 23219 USA
Welcome from the Scientific Committee Chair, Elvis Tiburu

It is a pleasure for me to welcome you to GBC 2010 at a time which I believe we are hearing. It is a time to expect from us not only expect this organization to move forward. We live in a time of input and suggestions organization forward. I say thanks to you all for your findings. Scientists and students will and I believe we are engaged in all these.

Scientific Committee

Elvis K. Tiburu, PhD (Chair)
BIDMC-Harvard Institute of Medicine
Boston, USA

Akwasi Anyanful, PhD (Vice Chair)
Emory University School of Medicine
Atlanta, GA 30322

Solomon Ofori-Acquah, PhD
Emory University School of Medicine
Atlanta, GA 30322

Elsie Effah Kaufmann, PhD
Biomedical Engineering
University of Ghana

George Acquaah-Mensah, PhD
Massachusetts College of Pharmacy & Health Sciences
Boston, USA

Karen Duca, PhD
Department of Biochemistry and Biotechnology
Kwame Nkrumah University of Science and Technology Kumasi, Ghana

Patricia Brown, PhD
Department of Biochemistry and Biotechnology
Kwame Nkrumah University of Science and Technology Kumasi, Ghana
Support

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The future for African biomedical scientists is ripe with potential. Scientist from all over the continent are working together to make Africa a major contributor to the global biomedical research community. Genesis Biotechnologies, Inc. facilitates the development of the African biomedical research community by providing the necessary tools in an efficient and cost-effective manner. Please have a look at our website. If there is something that is not on the list that you need, we can provide that as well. For rapid delivery of all biomedical laboratory reagents Go To Genesis.

The Future is

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**Our Contact**

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76287 Rheinstetten
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**United Kingdom**
Bruker UK Limited
Banner Lane
Coventry CV4 9GH
Tel: (44) 24-76855200

**South Africa**
Bruker South Africa (PTY) Ltd
PO Box 1091
Cramerview
2060 Johannesburg
Tel: (27) 11-4636040

**USA**
Bruker BioSpin Corporation
15 Fortune Drive
Manning Park
Billerica, MA 01821
Tel: (1) 978 667-9580
Support

The Ghana Biomedical Convention gratefully acknowledges the sponsorship of BMG Labtech.
Keynote Speakers

Professor Fred Newton Binka

PROFILE
EDUCATION/TRAINING

<table>
<thead>
<tr>
<th>INSTITUTION AND LOCATION</th>
<th>DEGREE</th>
<th>YEAR(s)</th>
<th>FIELD OF STUDY</th>
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<tr>
<td>University of Ghana</td>
<td>MB.ChB</td>
<td>1978</td>
<td>Medicine</td>
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<tr>
<td>The Hebrew University Jerusalem, Israel</td>
<td>MPH</td>
<td>1988</td>
<td>Public Health</td>
</tr>
<tr>
<td>Summa cum laude. University of Basel, Switzerland</td>
<td>PhD</td>
<td>1997</td>
<td>Epidemiology</td>
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</tbody>
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A. Positions and Honors.

Positions and Employment
2007– Dean School of Public Health, College of Health Sciences, University of Ghana
2001-2007 Associate Professor of Epidemiology & Head Department of Epidemiology and Disease Control, School of Public Health
2000–2001 Public Health Specialist, (on secondment to) School of Public Health, University of Ghana.
2002-2007 Executive Director, Indepth-Network.
1986–1989 Research Medical Officer, Noguchi Memorial Institute for Medical Research, Legon.
1983-1986 General Duty Medical Officer, Liberty Medical Centre, Abeokuta, Nigeria.
1981–1983  General Duty Medical Officer, St. Lucia Hospital, Ibadan, Nigeria.
1978–1979  House Officer, Korle-Bu Teaching Hospital, Accra, Ghana.

**Other Experience and Professional Memberships**

1995–1997  Member, Board of Directors, Graphic Corporation, Ghana, 1995-97
1978–  Member, Ghana Medical Association
1996–1998  Member, National Malaria Advisory Committee
1998-  Member, International Epidemiology Association 1998 to date
2003-2005  Member, National Roll Back Malaria Coordinating Committee
2006-  American Society of Tropical Medicine and Hygiene
2006–2009 Chairman, WHO AFRO Advisory Committee of Experts on Malaria
2006–  Member Technical and Research Advisory Committee (TRAC) of the Global Malaria Programme
2006-2009  Member, WHO global Advisory Committee on Health Research (ACHR) to DG

**B. Selected peer-reviewed publications**


Keynote Speaker

Dr. Ellis Owusu-Dabo
BSc, MBChB, MSc, MWACP, PhD

PROFILE
Deputy Director, Kumasi Centre for Collaborative Research in Tropical Medicine (KCCR).

Dr. Ellis Owusu-Dabo is a Public Health Physician Specialist in Medical Epidemiology, currently a Senior Lecturer at the Department of Community Health, School of Medical Sciences, Kwame Nkrumah University of Science and Technology. His main area of interest is non-communicable diseases in a low-income country setting, although with affection for communicable disease in particular, Tuberculosis.

He has gained extensive experience from both undergraduate and postgraduate teaching over the last eight years. He also has experience in biomedical research and has developed a wide network of contacts within various Ghanaian and international research institutions.

Dr. Owusu-Dabo has developed, secured funding for, and led research into genetic factors that determine susceptibility to pulmonary tuberculosis. He has also acted as a focal person for some international collaboration in communicable diseases through the Kumasi Centre for Collaborative Research in Tropical Medicine. He has co-authored 24 scientific articles published in the peer reviewed scientific journals and has presented about 7 papers at national and international conferences.

Since 2006, Dr. Owusu-Dabo’s main area of research has been tobacco control and hypertension. In this respect, he has secured funding to perform work in the African Tobacco Situation Analysis, a project that is ongoing.
Keynote Speaker

Professor Samuel B. Kombian
B. Pharm, PhD, RPEBC

1: Elementary/Secondary Education:
Gambaga/Yendi/Navasco

2: 1984:
Bachelor of Pharmacy (Honors)-University of Science and Technology, Kumasi.

3: 1992:
PhD (Pharmacology)-University of Alberta, Edmonton, Canada.
[Alberta Heritage Foundation for Medical Research (AHFMR) and Medical Research Council (MRC) of Canada studentships].

4: June 1992- July 1994:
Long-term Postdoctoral Fellow, Human Frontiers Science Program. Langley Porter Psychiatric Institute, University of California, San Francisco, USA.

5: August 1994- March 1998:
Research Associate: Heart and Stroke Foundation of Canada Fellow and Medical Research Council of Canada Centennial Fellow. Neuroscience Research Group, University of Calgary, Calgary, Canada.

6: Department of Applied Therapeutics, Faculty of Pharmacy, Kuwait University-Kuwait City, Kuwait.
March 1998-2002: Assistant Professor,
March 2002-July 2009: Associate Professor,
July 2009: Professor

7: Administrative:
2003-2007: Faculty Research Coordinator-Faculty of Pharmacy, Kuwait University
2005-2007: Chairman, Department of Applied Therapeutics, FOP, KU
2007-date: Vice-Dean for Academic Affairs and Research, FOP, KU

8: Research Expertise:
Electrophysiology, biophysics and neuropharmacology

Research Interests: Cellular and molecular mechanisms of substance abuse and in vitro testing of neuroactive substances.

Funded Projects: 12 research grants (7 as PI and 5 as co-I)
Published 48 peer reviewed papers and about 72 abstracts
23 invited presentations worldwide.
4 research awards in KU

Supervised: 17 final year projects and 1 MSc project
DAY 1   Wednesday 11th August, 2010

9:00 – 11.00 am  OPENING SESSION

Chair
Elsie Effah Kaufmann & Akwasi Anyanful

9.00 – 10.00am  WELCOME AND INTRODUCTIONS

Professor Ernest Aryeetey
Vice-Chancellor,
University of Ghana

Professor Alexander Nyarko
Director, Noguchi Memorial Institute for Medical Research
University of Ghana

Professor Samuel Sefa-Dedeh
Dean, Faculty of Engineering Sciences
University of Ghana

Professor Winfried Amoaku
President, Ghana Biomedical Convention
University of Nottingham. UK

10:05 – 11:00 am  KEYNOTE ADDRESS

Professor Fred Binka, MB,ChB, MPH, PhD
Dean, School of Public Health,
University of Ghana

Health Research development in Africa: where are the scientists and what is their agenda?

11:00 – 11.50am  Break

11:50 -1:30pm  PLENARY 1

OPHTHALMOLOGY & PUBLIC HEALTH

Chair
Winfried Amoaku & Karen Duca,

11:50 – 12.10pm  Essuman, V. A. & Ntim-Amponsah, C. T.
Ophthalmology Unit, Department of Surgery, College of Health Sciences,
University of Ghana Medical School, University of Ghana, Ghana.

Dermis-fat grafts and enucleation in Ghanaian children.
DAY 1   Wednesday 11th August, 2010

12.10 – 12.30pm **Addae-Afoakwa, K. O.,** Ogoe, H. A. & Effah Kaufmann, E.
Department of Biomedical Engineering, University of Ghana, Accra, Ghana
*Design of optimized seating for cargo vehicles that have been converted to commercial passenger vehicles*

12:30 – 12.50pm Essuman, V. A., **Braisah, I. Z.** & Ntim Amponsah C.T.
Ophthalmology Unit, Department of Surgery, College of Health Sciences, University of Ghana Medical School, University of Ghana, Ghana.
*Why children with retinoblastoma present late for treatment at the Korle Bu teaching Hospital – Care Takers perspective*

12:50 – 1.10pm **Osei, A. S.**
Ghana Standards Board, Accra.
*Microbial quality of packaged water : National and International Standards*

1.10 - 1:30 pm **Essuman, V.A.** & Ntim-Amponsah C.T.
Department of Surgery, University of Ghana Medical School - College of Health Sciences, University of Ghana, Accra.
*Challenges in the management of retinoblastoma at peripheral eye hospitals in Ghana*

1:30 – 2:40pm **LUNCH**

2:40 – 4:00pm **PLENARY 2**

**MOLECULAR & CELLULAR BIOLOGY**

Chair
Patricia Brown & Elvis Tiburu

2:40 – 3:00 pm **Arthur, P. K.,** Koebernick, K., Loeber, J., Tabershevich K. & Pieler T.
Dept. of Developmental Biochemistry, GZMB, University of Göttingen, D-37077 Göttingen, Germany
*ElrB protein: the mechanistic link between maternal mRNA localization in oocytes and their selective stabilization in primordial germ cells of Xenopus laevis.*
DAY 1   Wednesday 11th August, 2010

3.00 – 3.20pm   Owusu-Ofori, K.1,2, Mellon, W. S.1 & Nakada, S. Y.2
Division of Pharmaceutical Sciences1 and Department of Urology2, University of Wisconsin-Madison, Madison, WI 53705
PI3K Inhibitor LY294002 attenuates stretch-induced COX-2 Expression during Urinary Tract Obstruction

3:20 – 3.40pm   Safo, M. K.
Institute for Structural Biology and Drug Discovery, Department of Medicinal Chemistry and School of Pharmacy, Virginia Commonwealth University, Richmond, VA 23219.
Vitamin B6 – What do we know about this vitamin?

3:40 – 4:00pm   Amankwah-Addo, E.
Department of Biochemistry and Biotechnology, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana
Effects of Brain-Derived Neurotrophic Factors (BDNF) on feeding in a mouse model: Implications for eating disorders in humans.

4:00 – 4:20pm   Break

4:20 – 5:05pm   PROPOSAL SESSION
Chair
Eugene Fletcher and Pearl Ashitey

4:20 – 4:35pm   Hayford, F. E. A.1, Steiner-Aseidu, M.2 & Sakyi-Dawson, E.3
1School of Allied Health Sciences, College of Health Sciences. University of Ghana, Korle Bu, Ghana. 2Department of Nutrition and Food Sciences, University of Ghana, Accra
Nutritional knowledge, food label use and food choices among Ghanaians: implications for health promotion

4:35 – 4:50pm   McCown, C.
Noguchi Memorial Institute for Medical Research, Legon Accra
Research information audit at a Medical Research Institute in Ghana

4:50 – 5:05 pm   Kusi, S. & Duca, K. A.
Department of Biochemistry and Biotechnology, Kwame Nkrumah University of Science and Technology (KNUST), Kumasi, Ghana.
DAY 1  Wednesday 11th August, 2010

Optimization of a Long-Distance PCR Assay for Detection of the t(8;14) Chromosomal Translocation in a Burkitt’s Lymphoma Cell Line (Raji) and Patient Tumours

5.05 – 5.20 pm  Break

5.20 – 5.50 pm  WORKSHOP:

Tiburu, E.
Bouve College of Pharmacy, Northeastern University, Boston, USA
Basic qualitative description of biophysical methods in Drug Discovery: Marrying chemistry and biology

5:50 – 7:00 pm.  POSTER PRESENTATION – ALL PRESENTERS

Large classroom

Refer to Abstracts marked Poster Only for details
DAY 2  Thursday 12th August, 2010

8:00 – 9:00 am  Business Meeting

9:00 – 12:30 am  DAY 2 SESSION

9:00 – 9:55 am  KEYNOTE ADDRESS

Dr. Ellis Owusu-Dabo  BSc, MBChB, MSc, MWACP, PhD
Deputy Director, Kumasi Centre for Collaborative Research in Tropical Medicine (KCCR)
Kwame Nkrumah University of Science and Technology
Promoting health through education and innovation

9:55 – 10:40 am  Break

PLENARY 3

10:40 – 11:40 am  BIOINFORMATICS

10:40 – 11:00 am  Acquaah-Mensah, G., 1 Maholtra, D., 2 & Biswal, S., 2
1 Massachusetts College of Pharmacy and Health Sciences, 2 Bloomberg School of Public Health, Johns Hopkins University
COL4A3 and the molecular mechanisms of Senescence in Chronic Obstructive Pulmonary Disease

11:00 – 11:20 am  Obedeka, D. A., 1 Ogoe, H. A., 1 Agbekoh, P., 1 & Sagoe, K. W. C., 2
1 Biomedical Engineering Department, University of Ghana, 2 Department of Microbiology, Clinical Virology Lab., University of Ghana Medical School.
Web based national HIV Antiretroviral drug resistance monitoring system

11:20 – 11:40 am  Acquaah-Mensah, G., 2
2 Department of Pharmaceutical Sciences, School of Pharmacy-Worcester/Manchester, Massachusetts College of Pharmacy & Health Sciences, Worcester MA 01608, USA
The Pacapergic system and ethanol: Ties to phosphatidyl inositol and GSK3β
DAY 2  Thursday 12th August, 2010

11:40 – 12:00pm  Break

12:00 – 1:00pm  DRUG DEVELOPMENT & HANDS-ON WORKSHOP/VISIT

Chair
Ibok Oduro

12:00 – 12:20pm  Amoateng, P.¹, Kumah, D. B.² & Annan, K.³
¹Department of Pharmacology, ²Department of Pharmacognosy, Faculty of Pharmacy and Pharmaceutical Sciences, College of Health Sciences, KNUST
²Department of Optometry, Faculty of Bioscience, College of Science, KNUST
Antioxidant and free radical scavenging effects of Borassus aethiopum(M) FWTA aqueous ripe fruit extract

12:20 – 1:00pm  Visit to Noguchi facilities

1:00 – 2:00 pm  LUNCH

2:00 – 3:30pm  GENERAL DISCUSSION

Moderators
Samuel Kwofie & Peter Agbekoh

- Strategic activities of GBRN/GBC
- GBC – Assessment and the way forward

3:30 – 3:45pm  Break

3:45 – 4:45pm  PLENARY 4

PLANT CHEMISTRY & PHARMACOLOGY

Chair
P.K Arthur & K. Owusu-Ofori

3:45 – 4:05pm  Appiah-Opong, R.§ Commandeur, J. N.M³, Axson, C.‡ & Vermeulen, N. P.E.‡
DAY 2    Thursday 12th August, 2010

§Noguchi Memorial Institute for Medical Research, Legon, Ghana,
‡Division of Molecular Toxicology, Leiden/Amsterdam Center for Drug
Research (LACDR), Department of Pharmacocemistry, Vrije Universiteit,
De Boelelaan 1083, 1081 HV, Amsterdam, the Netherlands.

**Interactions between Cytochromes P450 and Glutathione S-
transferases and Ghanaian Medicinal plants**

4:05 – 4:25pm    **Appiah, A. A.**
Centre for Scientific Research into Plant Medicine, Mampong, Ghana.
*Comparative phytochemistry of the leaves, stems and roots of Croton membranaceus*

4:25 – 4:45pm    **Awojoodu, A. & Botchwey, E.**
Laboratory for Tissue Engineering, Department of Biomedical
Engineering, University of Virginia, Charlottesville, VA 22903
*Local pharmacological control of the Sphingosine 1-Phosphate
(S1P) receptor signaling for tissue engineering*

4:45 – 5:15pm    **STUDENT SESSION**

Chair
Nana Yaa Awua-Boateng & Kwabena Duedu

4:45 – 5:00pm    **Glover, B.**
Faculty of Science, University of Ghana
*A research on potential scientific researchers resource at the University of Ghana*

5:00 – 5:15pm    **Tawiah, E. N. M., Acquah-Amssah, B. & Duca, K. A.**
Department of Biochemistry and Biotechnology, Kwame Nkrumah
University of Science and Technology (KNUST), Kumasi, Ghana.
*Smear-based Malaria diagnosis – How consistent is it among
technicians?*

5:15 – 5:30pm    **Break**
DAY 2    Thursday 12th August, 2010

5:30 – 6:00pm    WORKSHOP

Anyanful, A.
Dept of Pathology and Lab Medicine, Emory University, Atlanta GA
Using C. elegans as a model organism for teaching Undergraduate Biology courses

6:00 – 7:00 pm    POSTER PRESENTATION 2

Large classroom
Refer to Abstracts marked Poster Only for details

7:00 pm    Cocktail Dinner
Day 3 Friday 13th August, 2010

9:00 – 12:30am DAY 3 SESSION

Chair

Cherie McCown & Linda Amoah

KEYNOTE ADDRESS

9:00 – 9:55am

Professor Samuel Kombian B. Pharm, PhD, RPEBC
Faculty of Pharmacy
Kuwait University, Safat

Drug discovery for age-related Dementias: in vitro testing of rationally developed novel compounds

9:55 – 10:40am

Break

10:40 – 1:20pm

PLENARY 5

Chair
Samuel Kombian & Daniel Achel

MICROBIAL PATHOGENS (PATHOGENESIS)

10:40 – 11:00am

Anyanful, A., Bommarius, B. & Kalman, D.
Dept. of Pathology and Lab Medicine, Emory University, Atlanta GA, USA

Enteropathogenic E. coli strategically produces and uses lethal quantities of indole to paralyze and kill Caenorhabditis elegans

11:00 – 11:20am

Karl-Heinz, H. 1, Ohene Adjii 2, Awua-Boateng 2, N. Y., Nienhuis 3, W. A., Kunaa 2, L., Siegmund 1, V., Nitschke 1, 4, J., Thompson 5, W., Klutse 6, E. Agbenorku 7, P., Schiesser 8, 9, A., Reu 8, S., Racz 4, P., Fleischer 4, B., Beissner 1, M., Fleischmann 1, E., Helfrich 9, K., Van der Werf 3, T. S. Loescher 1, T. & Bretzel 1, G.

1 Department of Infectious Diseases and Tropical Medicine, Ludwig-Maximilians University of Munich, Munich, Germany; 2Kumasi Centre for Collaborative Research in Tropical Medicine, Kumasi, Ghana; 3University Medical Centre Groningen, University of Groningen, Groningen, The Netherlands; 4Bernhard Nocht Institute for Tropical Medicine, Hamburg, Germany; 5Agogo Presbyterian Hospital, Agogo, Ghana; 6Dunkwa Government Hospital, Dunkwa-on-Offin, Ghana; 7Reconstructive Plastic Surgery and Burns Unit, Department of Surgery, School of Medical Sciences, Kwame Nkrumah University of Science and Technology, Kumasi, Ghana; 8Department of Pathology, Ludwig-Maximilians University of Munich, Munich, Germany; 9Institute of Pathology, Kantonsspital Luzern, Luzern, Switzerland
Day 3  Friday 13th August, 2010

Comparative study of the sensitivity of different methods for the laboratory diagnosis of Buruli Ulcer disease

11:20 – 11:40am  Bonney1, J. H. K., Osei-Kwasi1, M. Adiku3, T. Barnor1, J. S., Hass2, M. Amesiya4, R., Kubio5, C., Oelschlaeger6, S., Becker-Ziaja2, B. Ahadzie6, L. & Gunther
1Virology Department, Noguchi Memorial Institute of Medical Research; 2Bernard Nocht Institute for Medical Research; 3Department of Microbiology, University of Ghana Medical School; 4St. Theresa’s Hospital, Nandom, Ghana; 5West Gonja Hospital, Damongo, Ghana; 6Disease Surveillance Division, Ghana Health Service

Molecular characterisation of hemorrhagic fever viruses circulating in Northern Ghana

11:40 – 12:00pm  Oduro, F. T. & Azugah F.
Dept of Mathematics, Faculty of Science. KNUST. Ghana

A predator-prey model of HIV propagation

12:00 – 12:20pm  Break

Chair
Archibald Sittie & Michael Ofori

12:20 – 12:40pm  Bonney, E. Y.,1 Ampofo W.K.,2 Delgado, E.,3 Lartey, M.,2 Perez-Alvarez, L. &4 Addo, N.A
1Virology Department, Noguchi Memorial Institute for Medical Research, University of Ghana, Legon, Accra, Ghana. 2Unit of HIV Biology and Variability, Instituto de Salud Carlos III, Majadahonda, Madrid, Spain. 3Fevers Unit, Korle-Bu Teaching Hospital, Accra, Ghana. 4National AIDS/STIs Control Programme, Ghana

High levels of HIV drug resistance mutations among HIV-positive persons on 2nd-line antiretroviral therapy (ART) in Ghana

12:40 – 1:00pm  Anyanful, A., Kumar, V., Gerwirtz, A. & Kalman, D.
Dept of Pathology and Lab Medicine, Emory University, Atlanta GA USA.

Enteropathogenic E. coli and Salmonella typhimurium flagellin can induce conditioned response in C. elegans in a tol-1 and lpr-2 dependent manner

1:00 – 1:20pm  Drexler3,4, J. F., Corman3,4, V., Gloza-Rausch1, F., Seebens1, A., Annan2, A., Ipsen1, A., Kruppa2,3, T., Müller4, M., Kalko6, E., Adusarkodie5, Y., Oppong5, S. & Drosten3,4, C.
Day 3  Friday 13th August, 2010

1Noctalis, Centre for Bat Protection and Information, Bad Segeberg, Germany; 2Kumasi Centre for Collaborative Research in Tropical Medicine (KCCR), Kumasi, Ghana; 3Bernhard Nocht Institute for Tropical Medicine, Hamburg, Germany; 4Institute of Virology, University of Bonn Medical Centre, Bonn, Germany; 5Kwame Nkrumah University of Science and Technology, Kumasi, Ghana; 6Department of Experimental Ecology, University of Ulm, Germany

Henipaviruses in African bats

1:20 – 1:50pm  AWARDS AND CLOSING CEREMONY
KEYNOTE ADDRESS 1

HEALTH RESEARCH DEVELOPMENT IN AFRICA: WHERE ARE THE SCIENTISTS AND WHAT IS THEIR AGENDA?
Professor Fred Binka
Dean, School of Public Health, College of Health Sciences, University of Ghana, Ghana

For most countries in Sub-Saharan Africa, a structured health research development system is a post-colonial late addition to the health delivery system. Nevertheless the past decades have witnessed significant transformation to the health research landscape in many places. A phase of accelerated capacity-building is reaching its summit and it is time to consider the direction that health researchers should take next. This paper proposes that a critical and urgent agenda is how health researchers can integrate fully and situate their work within the development agenda of their countries and the continent.

The paper will review the historical context of the research capacity development efforts on the global, regional and national (with emphasis of the Ghanaian situation) level. It will explore the opportunities presented by over a dozen global and regional initiatives such as the Multilateral Initiative on Malaria (MIM), the Global fund for HIV, Tuberculosis and Malaria, The Roll Back Malaria Initiative, the Global Alliance for Vaccines and Immunisation (GAVI), European and developing Countries Clinical Trials Programme (EDCTP). The paper will also review research networks on the continent such as ISHReCA, Indepth-network, EAMAT, WARN, and their potential role in creating an enabling environment for growth in all aspects of research capacity on the continent.

The paper will explore how the opportunities being created within development agenda at national, regional and continental levels are waiting for the Africa health research scientists to either get involved or take advantage of these opportunities. The relevance of African health research scientists will be increasingly measured by their impact at local and regional levels.

The paper will propose strategies for exploring these opportunities to create a platform for rapid development of a national, sub-regional and regional research capacity, for discussion.
KEYNOTE ADDRESS 2

PROMOTING HEALTH THROUGH EDUCATION AND INNOVATION

Dr. Ellis Owusu-Dabo
Deputy Director, Kumasi Centre for Collaborative Research in Tropical Medicine (KCCR)

Biomedical science drives the quest for the search for evidence in our quest to unravel the many unanswered health questions bedeviling science and society. Whereas great strides have been made (Hill et al., 2010; WHO 2008) in this direction especially since the complete genetic sequencing of the human genome in June 2003 after the initial draft in February 2000 (Denver et al., 2000) thereby opening several avenues for the much needed breakthrough, I dare say however that the unaccomplished is perhaps more.

Indeed many have asked what options we have, if we cannot and do not commit to socio-economic change through evidenced-base high throughput scientific work that helps to improve the health of our societies.

The emerging health problems which hitherto have been unknown to the medical fraternity including but not limited to conditions such as metabolic syndrome and its related outcomes and the presence of ‘old enemies’ such as the ever-present communicable diseases, some of which have been neglected but appearing in epidemic proportions require urgent action on the part of the scientific community.

To do this requires the appropriate scientific question to be posed by well-oriented, dedicated and enterprising scientists with a focus. Data capture through rigorous and enhanced software based approaches will generate evidence through well and time tested, robust scientific testing methods and designs.

The urgency to do this is now, the opportunities are timely and although resources limited, cannot be compared with the unlimited imaginations of science. Thus the Ghana Biomedical Convention (GBC) needs commending on this approach that aims at enhancing this quest aimed at providing some solutions to our numerous health problems. Hopefully one day the wide gap between policy and evidence-based science will be closed when there is unbeatable synergism in our activities with unquestionable values and judgment.
KEYNOTE ADDRESS 3

DRUG DISCOVERY FOR AGE-RELATED DEMENTIAS: IN VITRO TESTING OF RATIONALLY DEVELOPED NOVEL COMPOUNDS.
Samuel B. Kombian and Houda Nashawi,
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Dementia is a general term referring to cognitive deficit, including memory impairment. Alzheimer’s disease (AD), a neurodegenerative disorder characterized by progressive deterioration in cognitive functioning, is the most common form of dementia and is one of the most disabling and burdensome health conditions worldwide. Memory loss, the main and initial complaint in AD, is associated with defects in synaptic transmission and plasticity in the hippocampus and other brain regions. AD is largely an age-dependent disease and since its prevalence is continuing to rise due to increasing human life expectancy, there is an urgent need for novel drugs that can cure or manage AD. In a preclinical drug evaluation program, we have tested the effects of a rationally developed compound on synaptic transmission and plasticity in the hippocampus, a brain region implicated in learning and memory. The effects of TH-9, a conjugate of theophylline and racetam has been tested on hippocampal fast synaptic transmission and long term potentiation (LTP) and depression (LTD), both cellular analogs for memory. The results to be discussed were conducted in brain slices obtained from young (20-30 days) and old (18-20 months) rats. The preliminary results indicate that TH-9 has a potential for use in the treatment of dementia characterized by defects in both memory formation and recall. This study provides evidence in support of rational drug development and testing using in vitro models.
OPHTHALMOLOGY AND PUBLIC HEALTH

DERMIS-FAT GRAFTS AND ENUCLEATION IN GHANAIAN CHILDREN
Essuman V.A, Ntim-Amponsah C.T.
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Enucleation in young children often results in retarded orbital growth of involved side due to soft tissue volume loss. Management of anophthalmia (congenital or acquired) traditionally consisted of fixed- diameter sphere within the muscle cone and prosthetic shell which is often changed to keep up with the growing child. Synthetic prosthetic expanders are used sometimes. The need for an implant that will naturally grow with the child has been of interest over the years. This study was to evaluate the use of Dermis-fat Grafts (DFG) as an implant for volume replacement post enucleation. It was a prospective, non comparative study carried out on 8 consecutive patients who had DFG either primarily or secondarily in conjunction with enucleation for intraocular tumours or conditions mimicking intraocular tumours, at the Paediatric Eye Centre of the Korle-Bu Teaching Hospital, from December 2007 to May 2010. All patients had clinical diagnosis of intraocular tumours, confirmed by Computerised Tomography Scan (CT Scan), and in 5 of them with histopathological confirmation of retinoblastoma with no extraocular extension. Expected outcomes were a complete covering of DFG with healthy conjunctiva, and increase in volume of the DFG, the latter measured by serial photographs. Eight patients aged between 8 months and 6 years (mean, 2.93 ±1.88yrs), 3 males and 5 females (m:f =1:1.7) were included in the analysis. There were 1 primary and 7 secondary DFGs. Indications for enucleation were intraocular retinoblastoma, 5; medulloepithelioma, 1 and intraocular inflammation with retinal detachment, 2. There was increase in volume of DFG in 7 and no change in 1. Complete coverage of DFG occurred in all by 4 weeks post-operatively. Complications encountered were infection, 1, infection with necrosis 1, melanosis /keratinization, 2 and macrocyst in DFG, 1. There was complete resolution of the infection and the necrosis with antibiotic therapy. The patients were followed up for 3 to 27 (mean 11.63± 9.70, median, 7.25) months. This study shows that DFG offers hope in the management of post – enucleation anophthalmia in Ghanaian children.
OPHTHALMOLOGY AND PUBLIC HEALTH

DESIGN OF OPTIMISED SEATING FOR CARGO VEHICLES THAT HAVE BEEN CONVERTED TO COMMERCIAL PASSENGER VEHICLES
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The word ‘trotro’ (coined from the Ga word “tro” which means three pence) is predominantly used in Ghana to refer to minivans used as commercial passenger vehicles. In recent times the use of ‘trotros’ as a means of transportation has become frequent among individuals due to their convenience and lower fare rates. A large majority of ‘trotros’ are crafted from cargo vehicles and although the cargo vehicles are easily converted, the seating arrangement in these vehicles is usually made with the aim of maximising profit for the owners and with disregard for regulations and standards, leaving inadequate space for passenger comfort. This results in severe injuries in the event of an accident. An analysis of the most commonly patronised ‘trotros’ established the need to design and develop seat frames, which are safe, strong and cost effective. A need for optimised seating, allowing for the accommodation of a maximum number of people without compromising comfort was also identified. A formal engineering design process was used to develop and test seat frames and optimal seating for converted cargo vehicles. The optimised seating arrangement developed accommodates more passengers than the currently available seating arrangements, while ensuring compliance with all regulations pertaining to spacing in the vehicles. Furthermore the proposed seating arrangement provides enough legroom for passengers in the event of an accident. As there are no specific standards governing the conversion of cargo vehicles into ‘trotros’, the work presented here may be used as the foundation for developing such standards. The availability of standards would ensure uniformity in the construction of seats in the converted cargo vehicles and certify that seat frames are strong enough to bear the load of passengers. As the proposed seating arrangement accommodates more passengers, vehicle owners who adopt it stand to benefit from an increased profit margin.
OPHTHALMOLOGY AND PUBLIC HEALTH

WHY CHILDREN WITH RETINOBLASTOMA PRESENT LATE FOR TREATMENT AT THE KORLE-BU TEACHING HOSPITAL - CARE TAKERS PERSPECTIVE.

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Retinoblastoma is the commonest intraocular malignancy seen worldwide and in Ghana. Majority of children present with advanced disease with fatal outcome in the Korle-Bu Teaching Hospital. We prospectively interviewed caretakers of all consecutive children with advanced retinoblastoma presenting at the Paediatric Eye Unit from 1st January 2009 to 31st March 2010. The study aimed at identifying factors that account for their late presentation.

Nine-teen caretakers were interviewed of whom 10 were females. Their mean age was 35.4yrs (range, 22- 58 yrs). Ten (52.6%) was referred on the same day of consultation at the peripheral hospital without treatment with the rest after 2 to 16 week. One (5.3%) child had enucleation and 5(26.4%) had either topical or systemic medications before referral.

Leukocoria was the initial feature noticed by 16(84.2%) caretakers, strabismus, proptosis and red eye by one caretaker each. The duration of symptoms before seeking help ranged from 1 week to 24 months (mean 3.5months). The reasons for not seeking treatment earlier included; 9(47.4%) did not know the eye condition was serious, 3(15.8%) financial problems, 4(21.1%) thought they sought treatment earlier. Fifteen(78.9%) respondents new about other forms of cancers but only one was aware that cancers can affect the eye and that retinoblastoma can be treated and cured in the hospital.

Sixteen (84.2%) caretakers would accept enucleation with prosthesis, one (5.3%) refused and two (10.5%) said they did not know. When asked about outcome without treatment, 8(42.1%) did not know, 9(47.4%) said child will die and 2(10.5%) mentioned blindness.

Conclusion: There is lack of knowledge about retinoblastoma and its outcome among caretakers. There is a prolonged interval between onset of retinoblastoma and treatment.
OPHTHALMOLOGY AND PUBLIC HEALTH

MICROBIAL QUALITY OF PACKAGED WATER: NATIONAL AND INTERNATIONAL STANDARDS
Abena Safoa Osei
Ghana Standards Board, Accra

**Background:** Packaged water has become a convenient form of “safe” water for most people all over the world including Ghana. Consumers choose packaged water for various reasons such as taste, convenience or fashion. For many however, safety and potential health benefits are important considerations. A convenient and affordable type of packaged water in Ghana is sachet water. The objective of the study was to assess the microbiological quality of sachet water against the national and international standards.

**Methods:** Sixty brands from sixty different companies of sachet water and ten samples of bottled water were sampled and the microbiological quality assessed. Bacteriological analysis was done by inoculation on Nutrient Agar for the heterotrophic plate counts (HPC). For parasitological analysis, wet preparation of the water samples were observed under the microscope at a magnification of 40X. Drops of the samples were also fixed on microscopic slides stained using the cold Z-N method and observed under the microscope. Tap water from four different homes in Osu, Cantonments, Airport and Legon and a sample of tap water from Kpong Water Works – the source water for the selected areas were used as control samples. Ten of the sachet water samples, five bottled water samples plus the five control samples were investigated for the presence of enteroviruses. Samples were concentrated using the ultrafiltration method and screened for Rotavirus using RT-PCR. The concentrates were also used to inoculate L20B and RD cells for the detection of polio and other enteroviruses.

**Results:** Eight (13.3%) out of the sixty samples had HPC levels within the recommended limits (i.e. 1x10^2 cfu per mL). The remaining fifty-two (86.7%) had HPC levels well above the recommended limits. Nine (90%) out of the ten bottled water samples were within the recommended limit for HPC. Only one (10%) sample had levels above the recommended limits. Forty-one (68.3%) out of the sixty samples of sachet water had protozoan organisms and/or debris (including free living organisms: 13.3% had free living rotifers) identified in them. No protozoan organism was identified in the bottled water samples. Rotavirus was not detected in any of the water samples; neither was any enterovirus detected. ANOVA analysis of the HPC data showed that there is no significant difference (p< 0.0000) between the microbiological quality of sachet water and tap water.

**Conclusion:** It can then be concluded that when compared with the internationally recommended guidelines and other national standards for packaged water, 86.7% of the sachet water selected does not fall within the acceptable limits. Yet because the Ghana standard does not have HPC limits such water is declared safe by the Ghana Standard. The Ghana standard does not permit free living organisms in packaged drinking water yet 8 (13.3)of the selected sachet water had free living rotifers and can therefore be said to be unsafe for human consumption. Nine (90%) of the bottled water selected within acceptable limits and are safe for human consumption.
OPHTHALMOLOGY AND PUBLIC HEALTH

CHALLENGES IN THE MANAGEMENT OF RETINOBLASTOMA AT PERIPHERAL EYE HOSPITALS IN GHANA.
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Retinoblastoma is the commonest malignant intraocular tumour in childhood. In developed countries children are diagnosed early with over 90% survival. In developing countries, including Ghana, there is late diagnosis with very low survival rates < 50%.

The purpose of this study was to determine the clinical stage of disease at which patients with retinoblastoma present at peripheral eye hospitals in Ghana, the challenges associated with their management and also solicit for suggestions for improvement in the management. It was a cross-sectional study conducted from August 2008-July 2009. One ophthalmologist each from 26 peripheral eye hospitals in Ghana were interviewed through structured questionnaire after verbal informed-consent.

Responses were received from 24 out of 26 hospitals (Response rate = 92.3%). Thirty doctors managed retinoblastoma in these hospitals. Average of 82 cases of retinoblastoma seen yearly, 69 in the year 2007. The common clinical presentations were leukocoria 20(46%), proptosis 12(27%), redness of eye 5(11%) and fungating mass 4 (11%). Diagnosis was mainly clinical (65%), 47% refer all patients and 38% manage with enucleation with histopathological analysis.

Management challenges included refusal of treatment by caretakers (62%), with reasons such as cost, distance, fear of surgery and fear of bigger hospitals. Reasons for late presentations included use of alternate medicine (34%), ignorance of prognosis (25%), and cost of care (12.5%). Other difficulties experienced by doctors included convincing parents for uptake of surgery and lack of facilities for management. Suggestions for improvement: need for standardized guidelines, early detection through health education and cheaper sources of funding for care.

In conclusion, patients with retinoblastoma present late clinically at peripheral eye hospitals. There is widespread default, refusal of treatment by caretakers, and use of alternate treatments. Standardised treatment guidelines and early detection are needed.
MOLECULAR AND CELLULAR BIOLOGY

ELRB PROTEIN: THE MECHANISTIC LINK BETWEEN MATERNAL MRNA LOCALIZATION IN OOCYTES AND THEIR SELECTIVE STABILIZATION IN PRIMORDIAL GERM CELLS OF XENOPUS LAEVIS.

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mRNA localization is an important biological process which drives the asymmetric distribution of regulatory activities within a cell. The localized mRNAs have a characteristic cis-acting elements referred to as localization elements, that assemble a set of trans-acting factors. The localization complexes formed by the mRNAs are actively transported to the specific sub-cellular domains. This localization process is known to be involved in the initial axis determination process occurring in oocytes and also in the regulation of axonal plasticity of developing neurons. In Xenopus oocytes some specific maternal transcripts are localized to the vegetal pole and their subsequent enrichment at the vegetal cortex during embryogenesis is known to play a critical role in the process of germ layer patterning and germ cell specification. Using a biochemical approach, we have isolated Elr-type proteins on the basis of their specific binding to several localization elements (LEs) of vegetally localized mRNAs such as XDead end. We provide evidence to show that the Elr-type proteins, expressed during oogenesis as ElrA and ElrB isoforms, do indeed participate in the process of vegetal mRNA localization. We also show that XDead end LE is able to mediate selective stabilization of the mRNA in primordial germ cells (PGCs) during the embryogenesis. Interestingly, the mutations in LE that inhibit both Elr-type proteins binding and vegetal localization also abolish its selective stabilization in PGCs during embryogenesis. Taken together, we demonstrate for the first time that mRNA localization during oogenesis and selective mRNA stabilization in PGCs are mechanistically linked through a common cis-acting element which require ElrB (an Elr-type protein) as a trans-acting factor.
MOLECULAR AND CELLULAR BIOLOGY

PI3K INHIBITOR LY294002 ATTENUATES STRETCH-INDUCED COX-2 EXPRESSION DURING URINARY TRACT OBSTRUCTION
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OBJECTIVE. Urinary tract obstruction (UTO) causes prostanoid-dependent pain, smooth muscle spasm, and tissue damage. Non-steroidal anti-inflammatory drugs (NSAIDs) showed promise as analgesics for UTO by blocking cyclooxygenase-2 (COX-2) enzyme activity and reducing pathological prostanoid synthesis, but recent reports indicate that NSAIDs are associated with adverse renal, cardiovascular, and gastrointestinal effects. Consequentially, narcotics remain the primary analgesics for UTO. We reported a 10-fold increase in COX-2 expression in obstructed human, porcine, and mouse ureters. Although suppressing pathological COX-2 activity remains the laudable endpoint of specific medical therapies for UTO, NSAID administration alone will not suffice. PI3-Kinase (PI3K) mediates COX-2 expression in response to several diverse stimuli. Recently, the anti-inflammatory properties of PI3K inhibitors were described in sepsis and chemically-induced asthma mouse models. As a result, the objective of this study is to evaluate PI3K-dependent COX-2 expression during UTO.

METHODS. For our in vitro experiments, we cultured primary human urothelial cells (HUCs) from normal human ureters (donor nephrectomy). HUCs were treated with either PI3K inhibitor LY294002 or siRNA complexes against specific PI3K isoforms, and cyclically stretched (5-20% displacement, 12 cycles/min) for 4-hours as optimized by our previous reports. After treatment, HUC lysates were analyzed via western blot. Our in vivo experiments were comprised of male CD-1 mice (12-weeks old) obstructed via double-ligation at the ureterovesical junction with a 6-0 nylon suture. Obstructed and contralateral mouse ureters were acquired after 4-hours of unilateral ureteral obstruction, and analyzed via western blot or immunohistochemistry.

RESULTS. PI3K inhibitor LY294002 (30uM) attenuates COX-2 expression in stretched HUCs. Our results also show that while RNA-interference of PI3Kα reduced basal COX-2 expression, RNA-interference of PI3Kβ specifically attenuates stretch-induced COX-2 expression in HUCs. More importantly, we show that LY294002 (30mg/kg) reduces urothelial cell COX-2 expression in a mouse UTO model.

CONCLUSIONS. This report is the first to show PI3K isoform specificity as a mechanism for separating pathological and homeostatic COX-2 expression. Moreover, we show that PI3K inhibitors can reduce increased COX-2 expression during UTO. Identifying signaling molecules that couple urothelial cell stretch to COX-2 expression will provide novel therapeutic targets for UTO.
MOLECULAR AND CELLULAR BIOLOGY

VITAMIN B6 – WHAT DO WE KNOW ABOUT THIS VITAMIN?

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Vitamin B6 is arguably the most important vitamin in nature. The active form of B6, pyridoxal 5’-phosphate (PLP) is a co-factor for over 145 vitamin B6 (PLP-dependent) enzymes serving vital roles in various transamination, decarboxylation, and synthesis pathways involving carbohydrates, RNA/DNA, sphingolipids, amino acids, hemes, and neurotransmitters. Failure to make adequate supplies of PLP in mammals is usually manifested first as neurological disorders as syntheses of several neurotransmitters are catalyzed by PLP-dependent enzymes. Some of these disorders include headache, convulsion, seizures, sleeplessness, agitation, tremors and neonatal epileptic encephalopathy. Other neurological disorders implicated in PLP deficiency are autism, Alzheimer’s, schizophrenia, Parkinson’s and attention deficit hyperactivity disorder.

Pyridoxine 5’-phosphate oxidase (PNP Oxidase) and pyridoxal kinase (PL Kinase) are the two key salvage enzymes involved in metabolizing nutritional and inactive B6 vitamers into the active PLP form. High doses of free PLP in the cell leads to toxic effects due to the aldehyde group propensity to react with several nucleophiles, especially amino groups on proteins. One way the cell has tried to solve potential PLP toxicity is by maintaining a low level of free PLP through hydrolysis of the PLP to the less reactive pyridoxal by phosphatases. Despite the action of phosphatases in regulating the level of free PLP in the cell to a very low level of ~1 µM, a considerable amount of this vitamer is made available to dozens of newly synthesized apo-B6 enzymes. Two of the most interesting, yet unresolved questions, focus on how PNP Oxidase and PL Kinase are regulated, and how the reactive PLP synthesized by these two enzymes is transferred to apo-B6 enzymes without forming toxic derivatives with other proteins or being depleted by phosphatases. This presentation details some of the studies by our group to answer the above questions. Studies on the effects of some polymorphisms, as well as drug inhibition of PNP Oxidase and PL Kinase in causing PLP deficiency with a concomitant pathological outcome will also be presented.
MOLECULAR AND CELLULAR BIOLOGY

EFFECTS OF BRAIN-DERIVED NEUROTROPHIC FACTORS (BDNF) ON FEEDING IN A MOUSE MODEL: IMPLICATIONS FOR EATING DISORDERS IN HUMANS.
Amankwah-Addo, Eunice

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Brain-Derived Neurotrophic Factors (BDNF), facilitators of neuronal survival, differentiation and function, play a pivotal role in energy regulation and balance in the body, during homeostatic feeding, through their actions in the hypothalamus. Studies to determine whether these neurotrophins also regulates hedonic feeding, by modulating the mesolimbic dopaminergic pathway, which facilitates the reward value of food, were carried out. Since dopaminergic cells in this pathway originate in the Ventral Tegmental Area (VTA) and project to the Nucleus Accumbens (NAc) where they release dopamine in response to palatable food consumption, neuronal activation in the NAc was measured to investigate whether activity is affected in the absence of central BDNF, during consumption of palatable food. Levels of Tyrosine Hydroxylase (TH), the rate limiting enzyme in dopamine (DA) synthesis in the VTA were also examined. BDNF \(^{2L/2L}\) CK-cre mice, which lack expression of BDNF in the brain, and wild type mice were fed standard food or palatable food (high fat food) for forty-five (45) minutes. TH and c-fos immunolabelling was carried out in the VTA and NAc to examine neuronal activation and relative levels of DA synthesis, respectively. No significant differences in TH positive cells was observed between BDNF mutant and WT mice in the VTA. However, mutants displayed significantly less neuronal activation than WT mice in the NAc on both a standard chow diet and high fat diets. Furthermore, when WT mice were placed on a high fat diet, there was a significant increase in neuronal activation in the NAc relative to standard chow. This effect was not observed in BDNF mutant mice. Taken together, these preliminary results suggest that BDNF in the brain may influence neuronal activity in the mesolimbic pathway during hedonic feeding, without necessarily altering dopaminergic cell numbers in the VTA.
PROPOSAL SECTION

NUTRITION KNOWLEDGE, FOOD LABEL USE AND FOOD CHOICES AMONG GHANAANS: IMPLICATIONS FOR HEALTH PROMOTION

Hayford Frank Ekow Atta\(^1\), Steiner-Aseidu Matilda\(^2\), Sakyi-Dawson Esther \(^3\)

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Since the 1950s the link between diet and chronic diseases such as cancer, diabetes and cardiovascular disorders has been increasingly well recognised world-wide. Evidence from WHO estimates that by 2020, such chronic non-communicable diseases will account for approximately three-quarters of all deaths in the developing world, such as Ghana. Among the multitude of risk factors for these diseases are poor dietary intake, particularly a dietary pattern characterized by greater intakes of sugar-sweetened drinks, red or processed meats, refined grains, fatty snacks, sweets, and desserts. This has been associated with a higher risk of type II diabetes and other cardiovascular diseases. On the other hand, a pattern including greater intakes of fruits and vegetables is negatively related to energy density, obesity, and diabetes risk. Lifestyle modification, including an optimal diet, is an effective prevention method for type II diabetes, and nutrition-related knowledge and skills, such as using the Nutrition Facts panel on labels can help improve dietary intake patterns. Research shows that food label use is positively related to nutrition knowledge and fruit and vegetable intakes and negatively related to fat intake.

Using data from 1,450 adult in western Washington state, studies found out that 79% of the sample reported reading nutrition labels on packaged foods and that label use was statistically significantly associated with low fat intake after controlling for various demographics, lifestyle, and psychosocial characteristics. A qualitative cross-sectional survey, mainly by questionnaire will be designed for this study. A systematic random sampling will be employed, blocking for gender during sampling to balance the proportion of female to male ratio, since traditionally more females visit the shopping centres than their male counterparts. To achieve this, every 3\(^{rd}\) shopper who enters the shopping centre for each gender will be randomly selected separately to participate in the study. Nutrition knowledge and food label information use may be related to healthful food choices and food intake patterns. Potential pitfalls may include a relatively low overall response rate, which may limit the generalizability of the findings. Secondly, since all data are from self-report, it may be subject to both random and systematic bias.
PROPOSAL SECTION

RESEARCH INFORMATION AUDIT AT A MEDICAL RESEARCH INSTITUTE IN GHANA
Cherie McCown,
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Vast quantities of data and research information are being generated and collected at the Noguchi Memorial Institute for Medical Research (NMIMR) at the University of Ghana, Legon. The need to deal with the resource is increasingly acknowledged. However, a formal strategy is not in place to assess the magnitude of the resource, or to deal with systematic collection of diverse types of data and information, or to curate these research outputs. This lack, in the context of current and impending funder requirements, means that the full value of the data and information cannot be realised and NMIMR grant applications will not remain competitive. The ulterior motive for the proposed project is to keep NMIMR grant competitive because the Institute runs on grant funding. The ultimate motive is to develop and implement the organisational changes required to preserve and curate NMIMR’s data and information, thereby, enhancing its value.

One of the first steps is to perform a Data/Information Audit. The author proposes to adapt a pre-existing survey and questionnaire framework, to fit the research culture at NMIMR to assess the types of resources and researcher preferences in terms of data and information gathering and use, and storage. NMIMR researchers are the primary stakeholders. Data requirements of secondary stakeholders (funders and collaborators) are included in the interview. The end products of the audit will be a project report detailing the modification of the survey, its methods, administration, and results. A spreadsheet file of the survey data will be appended. The findings will inform NMIMR’s subsequent decision process in designing a formal strategy for collecting, management, curation, and preservation of the data and information assets. Models will be presented and explained.
PROPOSAL SECTION

OPTIMIZATION OF A LONG-DISTANCE PCR ASSAY FOR DETECTION OF THE T(8;14) CHROMOSOMAL TRANSLOCATION IN A BURKITT'S LYMPHOMA CELL LINE (RAJI) AND PATIENT TUMOURS

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The endemic form of Burkitt’s lymphoma (eBL) is the most common childhood cancer in equatorial Africa where malaria is holoendemic. Aetiological roles for both Plasmodium falciparum malaria and Epstein-Barr virus (EBV) have been strongly suggested based on epidemiological evidence, although specific mechanisms remain elusive. Most eBL tumours (76%) display a translocation whereby the oncogene c-myc on chromosome 8 is moved and inserted in back of promoters and enhancers associated with the Ig locus on chromosome 14. Given its prevalence, the presence of this translocation t(8;14) can serve as diagnostic biomarker of the disease to augment the standard histological criteria for differential diagnosis. However, due to variability in the breakpoints for both the deletion and insertion, any primer combination for conventional, small product PCR will miss many translocations. Long distance PCR (LD-PCR) has shown itself very reliable in studies detecting translocations in Caucasian Burkitt’s Lymphoma patients, but that procedure targets only regions overlapping the translocated c-myc and the normal chromosome. In our application, capturing the entire translocated c-myc gene is of interest, as we intend to sequence the entire insertion and immediate flanking regions after PCR amplification (~7-8 kB). This project is part of a larger effort to elucidate a direct causative role for malaria in eBL. We will begin with previously developed LD-PCR protocols and optimize/adapt them for eBL. By using primers just beyond the known insertion points on chromosome 14, we will amplify the entire translocated insert for later sequencing. A cell line derived from a Nigerian eBL tumour (Raji) whose break points are known will be used to optimize our protocol. We will then obtain diagnostic biopsy material from oncology clinic patients at KATH suspected of having eBL, establish permanent cell lines from the tumour cells, and test them for the presence of the t(8;14). Those found to be positive for the genetic lesion will have their amplicons sequenced for breakpoint analysis, which has previously been shown to be tightly linked to geographic regions and, thus, possibly particular circulating strains of malaria.
BIOINFORMATICS

COL4A3 AND THE MOLECULAR MECHANISMS OF SENESCENCE IN CHRONIC OBSTRUCTIVE PULMONARY DISEASE
George Acquaah-Mensah, Deepti Maholtra, Shyam Biswal
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Chronic Obstructive Pulmonary Disease (COPD) has high prevalence worldwide. According to the World Health Organization, 210 million people are suffering from COPD, with an estimated 3 million dying from the disease in 2005. Risk factors include smoking, air pollution, and asthma, but there are indications genetic susceptibility could be key. Genome-wide linkage analyses indicate that the 2q33.3-2q37.2 region has COPD susceptibility genes. The type IV collagen alpha 3 gene (COL4A3), which occurs in this chromosomal location, has been shown to contribute to genetic susceptibility to COPD. Furthermore, inflammation remains a hallmark of COPD even though its molecular etiology remains unresolved. In this report, molecular mechanisms of the disease were explored. Gene Expression Omnibus (http://www.ncbi.nlm.nih.gov/geo/) microarray data GDS534, GDS999, GDS2604, and GDS2486, all generated from human lung epithelial cells subjected to a variety of conditions were used. From the 109 arrays on the Affymetrix (http://www.affymetrix.com/index.aff) U133 platform and 49 arrays on the U133Plus_2 platform, a transcriptional regulatory network was reverse-engineered using the Context Likelihood of Relatedness algorithm. The network was focused on genes involved in the inflammatory response, the response to oxidative stress, or apoptosis. The network was further analyzed using gene expression data from COPD patients. Key transcription factors associated with inflammation, apoptosis and senescence such as PITX2, ETS1, JUN, TBX2, HSF1, P16, were found to be in direct transcriptional regulatory relationships with COL4A3. PCR studies and Western blot analyses affirmed the central theme of the inferred transcriptional regulatory relationships in COPD patients. These novel findings link the expression of the COPD susceptibility gene COL4A3 with the expressions of other genes involved in inflammation, apoptosis or senescence, and shed light on the specific processes impacted.
BIOINFORMATICS

WEB BASED NATIONAL HIV ANTIRETROVIRAL DRUG RESISTANCE MONITORING SYSTEM

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Human Immunodeficiency Virus (HIV) is a world pandemic that causes Acquired Immune Deficiency Syndrome (AIDS). It has been estimated at the end of 2008 that 22.4 million adults and children were living with HIV in sub-Saharan Africa. Of this number, 260,000 were recorded in Ghana with a prevalence rate of 1.9%. Twenty-one thousand people were reported to have died of AIDS in the same year. However, the life expectancy of the HIV patient can be prolonged by the use of Antiretroviral drugs. There has been increase in supply and usage of these drugs in developing countries due to interventions by World Health Organization (WHO) and the eight richest nations in the world (G8). Nevertheless, there have been reported cases of emerging drug-resistant virus strains with increasing use of antiretroviral drugs in the developed world. In Ghana, antiretroviral therapy (ART) is gradually increasing; 13,357 people in 2007 as against 9,420 people in the year 2006, and therefore the possibility of the development of HIV drug resistance has increased. There is therefore the need to establish systems to monitor HIV drug resistance profiles within the country, considering the economic and social impact. Currently developed HIV database systems lack certain functionalities (e.g., localized details of viral strains) that can aid monitoring in the long term. Against this backdrop, a web-based national HIV drug resistance database and monitoring system has been developed to aid in monitoring of HIV drug resistance profiles found in HIV strains characterized in the country. The system accepts as input details of patient demographic information and genetic sequences of their HIV viral strains. It tests for HIV drug resistance mutations, indicates drugs to which the viral strains are likely to be susceptible, and also monitors comparative demographic patterns of drug resistance profiles. This information is organised into regional updates. If this system is improved and included as a tool for the national HIV/AIDS control program, it will make in country data handling easier for rapid nationwide information on HIV drug resistance mutations and subtypes accompanied by details of demographic and clinical histories.
BIOINFORMATICS

THE PACAPERGIC SYSTEM AND ETHANOL: TIES TO PHOSPHATIDYL INOSITOL AND GSK3β

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The neurotransmitter pituitary adenylate cyclase activating peptide (PACAP or Adcyap1) protects neurons from ethanol-induced toxicity. Mice lacking PACAP are less sensitive to certain ethanol effects and exhibit changes in psychomotor behaviors. Furthermore, mice lacking the type I receptor for this neurotransmitter demonstrate changes in emotional behavior. In this study, molecular interactions involving Adcyap1 were examined using computational algorithms with the goal of identifying probable molecules and processes underlying the observed effects of PACAP (Adcyap1). From the Phenogen database, a compendium of mouse whole brain microarrays was created. The Algorithm for the Reconstruction of Accurate Cellular Networks was used to generate a transcriptional regulatory network from the data. Clusters within the network were computed using the MCODE algorithm. Probabilities of interactions involving corresponding proteins centered around Adcyap1 in the network were computed using the Sum Product Algorithm. A number of database experts were then used to further characterize the relationships identified within the networks. The expression of the Adcyap1 gene was found to be statistically tied, across over four hundred microarrays, to those of glycogen synthase kinase 3 beta (Gsk3β), adenylate cyclase 7 (Adcy7), ankyrin repeat domain 6 (Ankrd6), and phosphatidylinositol 3-kinase catalytic alpha polypeptide (Pik3ca), among others. Also Adcyap1 was determined to form a cluster with Ankrd6 and Vegfa. Based on the domains present in the GSK3b protein, it is predicted to participate in protein-protein interactions with Pik3ca and several transcription factors tied to Adcyap1 including the signal transducer and activator of transcription proteins (Stat1 and Stat5b), Six3, Ankrd6, etc… Resources such as the Kyoto Encyclopedia of Genes and Genomes (KEGG), Interpro, the Gene Ontology, and the Mammalian Phenotype Ontology all affirm ties between Gsk3β and Pik3ca. Given the documented participation of Gsk3β and Pik3ca in processes impacted by ethanol, the significance of the ties between the PACAPergic system, Gsk3β, and Pik3ca to ethanol toxicity (including neuronal death) and behavior will be detailed in this presentation.
DRUG DEVELOPMENT

ANTIOXIDANT AND FREE RADICAL SCAVENGING EFFECTS OF *BORASSUS AETHIOPUM* (M.) FWTA AQUEOUS RIPE FRUIT EXTRACT

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The palmyra palm, sometimes called the African fan palm, *Borassus aethiopum*, is an important food source in Ghana and other African countries. The edible fruits, nuts and cabbage, sap obtained from the inflorescence are drunk raw or processed into wine, alcohol, vinegar and dried into sugar cakes. The present study was aimed at investigating the possible antioxidant properties of the aqueous fruit extract of this plant. The total phenolic content was assessed by the Folin-Ciocalteau assay, the antioxidant capacity assayed by the phosphomolydbenum method whereas the antioxidant activity was measured by the ability of the extract to scavenge DPPH (1, 1-diphenyl-2-picryl-hydrazil) radicals. The results indicate that the extract (0.1-10 mg/ml) contains phenolic compounds which may be responsible for the antioxidant properties since the coefficient of correlation between the total phenolic content and the total antioxidant capacity was high (\(r^2=0.9912\)). The \(n\)-propyl gallate (0.001-0.03 mg/ml), a reference antioxidant and the extract exhibited concentration dependent free radical scavenging activity. The extract (0.1-10 mg/ml) also inhibited concentration dependently the lipid peroxidation of linoleic acid. A similar effect was produced by \(n\)-propyl gallate (0.001-0.03 mg/ml). These findings suggest that the ripe fruit extract of *Borassus aethiopum* contains antioxidant principles and thus when eaten may have a beneficial role in alleviating oxidative stress.
PLANT CHEMISTRY AND PHARMACOLOGY

INTERACTIONS BETWEEN CYTOCHROMES P450 AND GLUTATHIONE S-TRANSFERASES AND GHANAIAN MEDICINAL PLANTS

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Inhibition of cytochrome P450s (CYPs) is a major cause of adverse drug reaction, whereas inhibition of detoxifying enzymes, glutathione S-transferases (GSTs) may also cause harmful effects. Seven Ghanaian medicinal plants were investigated in vitro for their inhibitory potentials towards human recombinant CYP1A2, CYP2C9, CYP2D6 and CYP3A4 heterologously expressed in Escherichia coli. Effects of the aqueous plant extracts on human recombinant GSTA1-1, GSTM1-1, GSTP1-1 and human and rat cytosolic GSTs were also investigated. Fluorescence plate reader, HPLC and spectrophotometric-based assays were employed.

Seven extracts, inhibited CYP1A2 and CYP2C9 with IC$_{50}$ values ranging from 28.3 to 134.3 µg/ml and 63.4 to 425.9 µg/ml respectively. Similarly both CYP2D6 and CYP3A4 were each inhibited by five extracts with ranges of IC$_{50}$ values being 45.8-182.0 µg/ml and 79.2-158.8 µg/ml respectively. Human and rat liver cytosolic GSTs were inhibited by the extracts with IC$_{50}$ values of the range 3.7-131.4 µg/ml, and a weak correlation was found between activities in both species. GSTM1-1 was more suscetible to inhibition by all the extracts except one, with IC$_{50}$ values in the range 3.6-50.0 µg/ml, whilst 8.9-159.0 µg/ml and 68.6-57.0 µg/ml were obtained for GSTA1-1 and GSTP1-1 respectively. These findings show the potential for CYP mediated herb-drug interactions and the GST inhibitory potential of the medicinal plants investigated.
PLANT CHEMISTRY AND PHARMACOLOGY

COMPARATIVE PHYTOCHEMISTRY OF THE LEAVES, STEM AND ROOTS OF CROTON MEMBRANACEUS
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C. membranaceus Mull. Arg. (Euphorbiaceae) is a plant that grows wildly in West Africa. Various preparations of the root of the plant are used by Ghanaian herbal medicine practitioners in the treatment of Benign Prostatic Hyperplasia (BPH). Medicinal significance and rapidly declining sources have aroused scientific interest in the plant. The clinical effects, phytochemical constituents and the results of some bioassays of C. membranaceus suggest that the plant may be very useful in prostate conditions. Some of the solid constituents that have been isolated from the plant include: larixol, campesterol, ß-sitosterol, stigmasterol and julocrotine. GC/MS analysis of the petrol and the ethyl acetate extracts also indicated the presence of other constituents including oleic acid, oleyl alcohol, psi., psi.carotene,7,7’,8,8’,11,11’,12,12’,15,15’-decahydro-, octadecanoic acid and agarospirol. This project forms part of a wider exercise with a view to exploring the possibility of the use of the leaves and/or stems of C. membranaceus in the treatment of BPH instead of the roots.
PLANT CHEMISTRY AND PHARMACOLOGY

LOCAL PHARMACOLOGICAL CONTROL OF THE SPHINGOSINE 1-PHOSPHATE (S1P) RECEPTOR SIGNALING FOR TISSUE ENGINEERING
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Nearly all organ systems in the body possess bone marrow derived stem or progenitor cells that play pivotal roles in maintenance of healthy tissues by combating infection and regenerating damaged tissue after injury. With the most severe injuries, however, the regenerative functions can be overwhelmed by the immune system, where untamed inflammatory responses can result in tissue scarring and impede healing. Sphingosine 1-phosphate (S1P) is a pleiotropic, autocrine and paracrine signaling small lipid molecule that binds to a family of five high affinity G-coupled receptors (S1P₁-S1P₅) to direct a wide range of biological processes, including trafficking and surveillance of hematopoietic stem and progenitor cells. Because such strong coordination exists between recruitment of hematopoietic cells and tissue regeneration, local modulation of S1P receptor signaling may also play an important role in recruiting other critical marrow derived stem and progenitor cells from the circulation. To this end, our laboratory seeks to develop new strategies in regenerative medicine using S1P receptor selective agonists and antagonists to regulate the recruitment and activity of marrow derived cells during tissue healing. In present study, we assessed the roles of S1P receptors on bone marrow derived stem and progenitor cells in growth and remodeling of microvascular networks. C57BL/6 wild type mice were lethally irradiated and transplanted with bone marrow isolated from the S1P₃ receptor knockout (S1P₃⁻⁻) mice. These S1P₃⁻⁻ mouse marrow chimeras lack S1P₃ receptor expression exclusively in bone marrow derived cells. We then encapsulated FTY720, an S1P₁/S1P₃ receptor selective agonist, in synthetic degradable polymer scaffolds and implanted them in a murine dorsal skinfold window chamber model, or "backpack" in both wild type mice and in S1P₃⁻⁻ mouse marrow chimeras. The backpack allowed us to track the temporal and spatial changes of vessels in the cutaneous microcirculation. Our results show that local S1P₁/S1P₃ receptor targeting and activation significantly increases the number and caliber of resistance microvessels that are critical to tissue function. However, S1P induced microvascular network growth was significantly reduced in S1P₃⁻⁻ bone marrow chimeric mice, suggesting that the therapeutic effects of localized FTY720 delivery depend on recruitment of marrow-derived cells from the circulation via S1P₃. With this in mind, we are now performing gain-of-function experiments by administering AMD3100, an investigational stem cell mobilizing agent from Genzyme, into wild type C57BL/6 and S1P₃⁻⁻ mice prior to scaffold implantation. Flow cytometry analysis showed that AMD3100 significantly increased circulating populations hematopoietic and non-hematopoietic progenitors, including CD34+, CD11B+ and CD105+ Sca-1+ positive cells. Moreover, AMD3100 significantly increased the mobilization of these cells in circulation of S1P₃⁻⁻ mice, suggesting S1P₃ may have a role in maintaining the regulatory niche of bone marrow stem cells as well as their recruitment to extramedullary tissues. Ultimately, our aim is to fully harness the body's innate regenerative ability by increasing both the systemic supply of host stem and progenitor cells that contribute to tissue repair and the tissue demand for those cells through local drug delivery. Our results strongly suggest that pharmacological modulation of the S1P receptor signaling axis could have broad clinical applications in tissue engineering and regenerative medicine.
A RESEARCH ON POTENTIAL SCIENTIFIC RESEARCHERS RESOURCE IN UNIVERSITY OF GHANA
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The research was carried out to ascertain the actual thoughts of the thousands of students who apply to pursue biological science at the University of Ghana. The hypothesis was whether students who applied to read medicine in their second year really want to end up in the consulting rooms or might be interested in research but due to limited options, opt to read medicine. 144 students took part in the research. The main subjects were Level 200 biological science students who were at the point of choosing courses they will major in and ultimately graduate with from the university. Others were levels 100, 300 and 400, medical science and dentistry students. Students were handed questionnaires with questions on subjects as earnings, prestige and other factors that determine a person's choice of a profession. In relation to good earnings; 46% preferred to be researchers, 42% preferred to be medical doctors and 12% were indifferent. In relation to future ambition; 54% preferred to be researchers, 44% preferred to be medical doctors and 2% were indifferent. In relation to opting for a research-related course if available and with equal prestige as medicine; 43% preferred the research-related course, 45% preferred medicine and 12% were indifferent. The results showed how much research potentials the country had and how essential it would be to tap into these potentials.
STUDENT SESSION

SMEAR-BASED MALARIA DIAGNOSIS – HOW CONSISTENT IS IT AMONG TECHNICIANS?
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Malaria has long been a serious disease in tropical regions, claiming lives and slowing development in Sub-Saharan Africa. As such, early and correct diagnosis is vital in the treatment and control of the disease. Many accurate and quantitative diagnostic methods exist, e.g., immunochromatography, PCR, fluorescent microscopy, but most are for research purposes or require relatively expensive equipment or reagents. Thick blood smear-based microscopic diagnosis remains the gold standard due to its low cost and ease-of-use. However, it has been reported that this method is highly dependent on a skilled operator who can distinguish the parasite in red blood cells and, thus, very inconsistent. The goal of this study was to determine how consistent malaria diagnosis was among three operators. Approximately 485 slides were obtained from various diagnostic labs in and around Kumasi. An experienced operator read the slides and diagnosed the patients using the + parasitemia scale of the WHO. His value was taken to be “accurate”. The slides were then blind coded and re-diagnosed by two additional operators. Consistency among all three operators ranged from a high of 30% (at 0 and 4+) to a low of 8% (3+). The junior operators individually performed about the same relative to the senior technician, with at best 50% agreement in diagnostic score. One-off, two-off, and even three-off errors were noted relative to the senior technician. The implications of inaccuracy in diagnosis, however, are variable depending on the level of parasitemia and are most critical in the cases of false negatives, as treatment will delay and a parasitemic individual is a reservoir for malaria transmission in the population.
MICROBIAL PATHOGENS

ENTEROPATHOGENIC *E. coli* STRATEGICALLY PRODUCES AND USES LETHAL QUANTITIES OF INDOLE TO PARALYZE AND KILL *CAENORHABDITIS ELEGANS*

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Enteropathogenic *E. coli* (EPEC) causes high mortality in developing countries by killing 2 million children annually through diarrhoea and dehydration. In the absence of a suitable host, we developed an EPEC: *Caenorhabditis elegans* model and showed that EPEC kills worms within three hours on LB-tryptophan plates via a secreted toxin as opposed to infection. We further showed that brief pre-exposure to EPEC elicited increased survival to subsequent lethal exposures. Though toxins and toxin-mediated killing has been described in other *C. elegans*:bacteria pathogens, there is no information available about the identity of this EPEC toxin(s), the amount of toxin produced in the presence or absence of a predator/prey and the regulation of toxin production. There is also no knowledge of the mechanism of toxin-mediated killing. Using molecular methodologies, mass spectroscopy and NMR, we identified indole as the toxin responsible for EPEC killing. Using synthetic indole with comparable concentration, we observed paralysis and killing in worms in a manner similar to EPEC virulence. Brief pre-exposures to indole also induced increase survival to subsequent indole exposure and similar to EPEC, is dependent on the dopamine, insulin and innate immunity pathways. We further show that EPEC can detect the presence of the worm as a threat and strategically increase indole production as a defense/survival mechanism. Our findings indicate indole as the sole toxin and show that bacteria virulence mechanism is a complicated pathway strictly regulated to ensure maximum damage. Our current efforts are geared towards the elucidation of the mechanism of indole-mediated paralyzing and killing action in worms.
MICROBIAL PATHOGENS

COMPARATIVE STUDY OF THE SENSITIVITY OF DIFFERENT METHODS FOR THE LABORATORY DIAGNOSIS OF BURULI ULCER DISEASE

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Several diagnostic laboratory methods are available for case confirmation of Buruli ulcer disease. This study assessed the sensitivity of various diagnostic tests in relation to clinical presentation of the disease, type of diagnostic specimen, and treatment history. The study subjects presented with non-ulcerative and ulcerative lesions and were divided into 3 treatment groups: (1) previously untreated patients scheduled for antimycobacterial treatment, (2) patients treated with surgery alone, and (3) patients treated with surgery in combination with previous antimycobacterial treatment. Swab samples, 3-mm punch biopsy tissue specimens, and surgically excised tissue specimens from 384 individuals with suspected Buruli ulcer disease were obtained at 9 different study sites in Ghana and were evaluated by dry reagent–based polymerase chain reaction (PCR), optical microscopy, culture, and histopathological analysis. Of the 384 patients, 268 had a diagnosis of Buruli ulcer confirmed by at least one positive test result. The overall sensitivity of PCR (85%) was significantly higher than that of microscopic examination (57%) and culture (51%). Data were then stratified by treatment group, type of lesion, and diagnostic specimen type. Analysis revealed that PCR of 3-mm punch biopsy tissue specimens (obtained from previously untreated non-ulcerative lesions) and of swab samples (obtained from previously untreated ulcers) had the highest diagnostic sensitivity (94% and 90%, respectively). Although duration of illness did not substantially influence the sensitivity of any test, previous antimycobacterial treatment was associated with dramatically decreased sensitivity of both PCR and culture. In summary, across all subgroups, PCR had the highest sensitivity. PCR assessment of 3-mm punch biopsy tissue specimens proved to be the best diagnostic tool for non-ulcerative lesions, while PCR assessment of swab samples was the best diagnostic tool for ulcerative lesions. For monitoring of antimycobacterial treatment success within controlled trials, however, only culture is appropriate.
MICROBIAL PATHOGENS

MOLECULAR CHARACTERISATION OF HEMORRHAGIC FEVER VIRUSES CIRCULATING IN NORTHERN GHANA
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Introduction: Hemorrhagic Fever (HF) viruses are prevalent in West Africa and have led to outbreaks with considerable morbidity and mortality in the past. However, information on prevalence and geographic distribution of these viruses is largely lacking. In Ghana, evidence abounds for hemorrhagic fevers but the causative agents are not well known. Molecular tools to diagnose Lassa fever and other viral hemorrhagic fevers (VHFs) and research programmes identifying and characterising VHF agents, as well as estimating their public health relevance do not exist. This study is expected to establish using molecular tools, the prevalence and document the causative agents of VHFs in Northern Ghana

Methodology: Based on reports of suspected cases and geographical locations of border countries with confirmed VHF cases, 5 health facilities in Northern Ghana have since July 2008, served as sentinel sites. Patients in all age groups who meet the case definition of high fever (≥38°C), jaundice, not responding to antibiotics and anti-malaria therapy, and in some cases hemorrhaging are recruited as study subjects and 5 ml of whole blood which is processed into serum, is collected by venipuncture. Virus detection and characterization with serological and molecular techniques is done at the NMIMR and BNITM. Laboratory investigations for all samples testing negative for VHF are screened on other assays for differential diagnoses on the notable pathogens that share clinical symptoms with viral hemorrhagic fevers.

Results: Laboratory analyses have been conducted on 90 serum samples as at June 6, 2010. Investigations with RT-PCR assays for all the clinical specimens have been negative for VHF virus types, Lassa, Crimean Congo, Pan-Flaviviridae, Pan-Filoviridae, and Rift Valley. However, antibody titers have been recorded for one case with Lassa virus exhibiting specific IgG (titers ≥ 1:20); one case exhibiting specific IgG (titer ≥ 1:80) antibodies for Dengue (type 2) and Yellow Fever; and two cases exhibiting specific IgG (titers 1:1280 and 1:1280) and IgM (titers 1:20 and 1:20) antibodies with Chikungunya virus respectively. Testing for diseases that share common symptoms with VHF, one case tested positive for Leptospira interrogans, 37 out of 116 (31.9%) for Hepatitis C virus, 11 out of 27 (40.7%) for Hepatitis E virus and 25 out of 116 (21.6%) for Hepatitis B virus.

Conclusion: In this ongoing study, results so far obtained have not shown the study area to be highly endemic for VHFs. However, the data generated suggest that viral hepatitis infections, which often share clinical symptoms with viral hemorrhagic fevers, are very prevalent in the study areas and call for sensitive differential diagnosis to be implemented.
MICROBIAL PATHOGENS

A PREDATOR- PREY MODEL OF HIV PROPAGATION
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Based on the assumption that the propagation of HIV in a given community is mainly as a result of heterosexual relations, a predator prey model is formulated in which the interaction terms represent sexual encounters between infected members of one gender and the uninfected susceptible members of the opposite gender. Using monthly time series data in respect of reported cases from the Ashanti region of Ghana covering a period of two decades, equilibrium points in the phase plane as well as stability issues are comprehensively investigated. It is found that the data agrees fairly well with the model and that one of the two equilibrium points is unstable while the other is centre stable and corresponds to periodic solutions. The management implications of the results are briefly discussed pointing to the virtual impossibility of completely eradicating the disease.
HIGH LEVELS OF HIV DRUG RESISTANCE MUTATIONS AMONG HIV-POSITIVE PERSONS ON 2ND-LINE ANTIRETROVIRAL THERAPY (ART) IN GHANA

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Ideally, persons on antiretroviral therapy (ART) should be monitored by viral load and drug resistance testing. ART, comprising of 1st-line and 2nd-line drugs, was introduced in Ghana in 2003. Treatment monitoring is currently done mainly by CD4 counts and clinical symptoms. HIV-infected persons on ART in Ghana may harbor drug-resistance mutations since viral load and drug resistant tests are not routinely done. We have investigated HIV drug-resistance mutations in patients on 2nd-line ART showing poor clinical response.

Venous blood was collected from 23 patients on 2nd-line ART from the Fevers Unit, Korle-Bu Teaching Hospital, Accra, Ghana between November 2009 and March 2010. Plasma and peripheral blood mononuclear cells (PBMC) were processed at the Noguchi Memorial Institute for Medical Research and analyzed at the Unit of HIV Biology and Variability, Instituto de Salud Carlos III, Madrid, Spain. The pol region of HIV, encoding the reverse transcriptase and protease genes of the virus, was amplified by polymerase chain reaction and sequenced. The sequences were then analyzed for drug resistance mutations by the Stanford University HIVdb program (http://hivdb6.standford.edu).

Seventeen samples (77%) had resistance mutations to nucleoside reverse transcriptase inhibitors (NRTIs) and non-nucleoside reverse transcriptase inhibitors (NNRTIs) while 6 samples (26%) had resistance mutations to Protease Inhibitors (PIs). All these patients had previously been on combinations of NRTIs and NNRTIs (1st-line) and are currently on NRTIs and PIs (2nd-line). Thus the higher levels of HIV drug resistance to NRTIs probably accounts for the poor clinical response on the 2nd-line regimen.
MICROBIAL PATHOGENS

ENTEROPATHOGENIC E. COLI AND SALMONELLA TYPHIMURIUM FLAGELLIN CAN INDUCE CONDITIONED RESPONSE IN C. ELEGANS IN A TOL-1 AND LPR-2 DEPENDENT MANNER

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The nematode Caenorhabditis elegans is killed by Enteropathogenic E. coli (EPEC) via a secreted toxin. However, killing is not observed when using an EPEC mutant (EPECΔTnaA) where the tryptophanase gene is deleted or when the media lacks tryptophan, two requirements for toxin production. We have shown that when C. elegans is briefly pre-exposed to EPEC or EPEC toxin, pathogen response pathways are activated, resulting in a four-fold increase in worm survival upon subsequent exposure to lethal levels of EPEC - a process we call “conditioning”. Interestingly, we observed similar levels of conditioning when worms are pre-exposed to EPECΔTnaA or EPEC grown on tryptophanless media before subsequent exposed to lethal EPEC levels. This indicates that EPEC can condition worms in a toxin independent pathway. To identify the toxin independent factor(s) that triggers conditioning, we determined response after pre-exposure to lipopolysaccharide (LPS) and flagellin, two common bacteria components that elicit immune responses. LPS from E. coli, Pseudomonas aeruginosa and Salmonella typhimurium had no effect. However, flagellin from Salmonella and EPEC induced significant conditioning response in the worms. This conditioning is dependent on tol-1, the C. elegans Toll-like receptor gene important for pathogen recognition and lpr-1, lipocalin protein that sequesters bacteria siderophores upon induction by flagellin. Using EPEC and Salmonella mutants deficient in flagellin, we observed some conditioning, indicating that other non tested bacterial components may play a role in inducing survival pathways. Since conditioned responses are not observed with non pathogens, our findings indicate that worms can distinguish between surface components of pathogenic and non-pathogenic bacteria and activate pathways upon contact with pathogens to ensure prolonged survival for feeding and possible escape.
Bats have recently been shown to be the reservoir hosts of a number of emerging viruses responsible for severe human and livestock disease outbreaks. During February 2008, a large colony of *Eidolon helvum* fruit bats was studied in the zoological gardens of Kumasi, Ghana for Henipaviruses. Faecal samples were collected and RNA isolated. Broad-range PCR for the genus done was also performed. In total, three of 215 individual faecal samples yielded RT-PCR products.

The three viruses from *E. helvum* were in close association with the currently established genus Henipavirus. One virus was most closely related to Hendra- and Nipahviruses, extending the internal amino acid distance within the genus Henipavirus from 6.1% to 34.0%. Inclusion of the two other viruses extended the internal distance to 38.4%. In the analyzed fragment, the highest internal distance in any mammal *Paramyxoviridae* (PV) genus was observed in the Rubulaviruses (39.6%), suggesting that all novel bat PV might actually belong to the genus Henipavirus. Even though Virus concentrations in faeces were low, it indicates moderate risk of zoonotic transmission. In spite of serological evidence, it has never been confirmed that Henipaviruses exist in African bats. These data suggest a tremendous extension of the geographic range of one of the most pathogenic viral genera known in humans and represents the first finding of putative novel Henipaviruses outside Australasia.
WORKSHOP

BASIC QUALITATIVE DESCRIPTION OF BIOPHYSICAL METHODS IN DRUG DISCOVERY: MARRYING CHEMISTRY AND BIOLOGY

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Proteins (receptors and enzymes) constitute the major class of drug targets. The drug discovery process involves rational, structure based compound design and profiling guided by knowledge of the structure of protein targets. Integration of biophysical methods (e.g., NMR, ESR) with approaches such as mutational analysis, molecular modeling, mass spectroscopy, and affinity labeling can offer unique insights into the substrate and ligand-binding architecture of enzymes and GPCRs that represent therapeutic targets.

The goal of this workshop is to provide an interdisciplinary review of biophysical methods being used in modern drug discovery. The objectives of this course are to ensure that students: 1) Understand key experimental methods including nuclear magnetic resonance (NMR) spectroscopy, X-ray crystallographic techniques, mass spectrometry, computer modeling, as well as high-throughput techniques, with emphasis on their application in drug discovery. 2) Learn major screening methods for lead generation and, 3) Identify strategies for lead optimization, ADMET profile.

At the end of the workshop I hope students will learn techniques in atomic resolution structural biology such as NMR spectroscopy and to be able to determine experimentally or model 3D structures of biomolecules based on constraints derived from experimental data.

The course is structured around the four pillars of the ligand-based structural studies of biomolecules and will be discussed as follows:
WORKSHOP

USING C. ELEGANS AS A MODEL ORGANISM FOR TEACHING UNDERGRADUATE BIOLOGY COURSES.

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The traditional way of teaching science - fact based education with little emphasis on the process of inquiry is unable to keep up with research advances. Thus a major challenge for teaching laboratory science at the undergraduate level is balancing the need for “canned” lab exercises that demonstrate important biological principles with “project-based” lab experience that accurately convey the excitement and realities of scientific discovery. This project-based course using inquiry-based approaches to address scientific questions with a variety of techniques can be successful at enhancing student learning and enthusiasm. Due to the short 10-12 weeks of a semester, the types of experiments one can do are limited by time. In this regard the soil nematode Caenorhabditis elegans becomes an ideal model organism for undergraduate study. It is easy to grow and maintain in the lab cheaply, has a rapid generation time, there are a vast array of mutants for request at the C. elegans Genetic Centre, its genome has been sequenced and there is supporting information sources such as wormbase.org, wormbook.org, wormatlas.org, wormclassroom.org, etc. Using C. elegans, students can be introduced to improving observational skills, sterile techniques, experimental design, hypothesis testing, data collection, statistical analysis, bioinformatics, DNA analysis and scientific communication amongst others. This approach has been found to (i) improve knowledge and process skills of students, (ii) introduce students to the practice of scientific research and develop their skills in scientific thinking and (iii) help them design inquiry-based experiments using model organisms. Each semester ends with a either a poster session or short research seminar, where students present their finding to enhance their communication skills. For this workshop we will demonstrate how C. elegans can be used to enhance teaching of molecular biology, neurobiology, physiology, genetics, bioinformatics, pathogenesis etc. at the undergraduate and possible graduate levels. We hope this workshop will introduce the basic model that can be adapted by scientists, educators and students to design independent experiments to answer inquiry questions.
POSTER PRESENTATIONS
THE ASSOCIATION BETWEEN ANTHROPOMETRY AND BLOOD PRESSURE AMONG FEMALE TEACHERS OF CHILD-BEARING AGE IN ACCRA DISTRICT

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Some studies have shown that the prevalence of hypertension is becoming very high among women due to the high prevalence of obesity observed among women. This study sought to determine the relationship between anthropometry and blood pressure among women of child-bearing age and to further determine the relation between their dietary intake, socioeconomic status and blood pressure. A cross-sectional survey was conducted on a group of female teachers. A total of 400 female teachers between the ages of 18-49 years were surveyed from the Ashiedu-Keteke and Garrison sub Metros in the Accra District. A questionnaire was used to gather information on the socioeconomic status, anthropometric and blood pressure measurements, physical activity, alcohol and nutrient intakes. Correlation, chi-square tests and multivariate linear regression models were used to determine the association between the different variables and blood pressure. Body fat mass was determined by anthropometric indicators. The prevalence of hypertension among the female teachers was 11.5%. 88.9% of the hypertensives were above 35 years while 41.3% of those in this category were obese. About 53.5% of the women were overweight while 27.3% were obese; 18% of them were centrally obese. Parity, income level and beer intake showed significant association with high blood pressure. Waist-to-hip ratio and age of the female teachers appeared to be the greatest predictors of high blood pressure. Women with central obesity had a two-fold higher risk of being categorized as hypertensive than those who were not [OR=2.12; 95% CI: 0.99-4.51]. Female teachers who knew their hypertension status were 6 times more likely to be detected as hypertensive by this study [OR=6.11 (95% CI: 2.37-15.78)], while those who were above 35 years were 5.7 times at risk of developing hypertension [OR=5.68; 95% CI: 2.10-15.38] than those below 35 years. The profession of teaching is challenging and can predispose those involved especially females to various risk factors for diseases. The implications of this fact and the recommendations from this study will be discussed.
DESIGN OF TRI-POSITION INFANT CARRIER FOR THE GHANAIAN WOMAN
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Infant carriers are used in carrying babies from three months to about five years in both
developed and developing countries. Baby carriers from developed countries come in many
forms. In developing countries like Ghana, over 70% of mothers stick to the traditional method
of carrying babies in cloths referred as “cloth carrier”. The “cloth carrier” is a piece of cloth
usually 0.9 x 0.7 metres. The baby is positioned at the back and the cloth is then wrapped around
the baby at the back of the mother and tied firmly across the chest. This method is associated
with problems such as; back and chest pains to both the mother and the baby, inability to change
position of the baby wrapped in the cloth, absence of head support for the baby, breast sag of the
mother and causes great discomfort to the mother when the baby is carried for long periods. This
method is also not suitable for fathers or male, thus you would hardly see a father carrying a
baby using the “cloth carrier”. Though imported baby carriers from developed countries are
available and they addressed some of the problems posed by the traditional method such as the
spinal stress that infants and their mother face and the inability of mothers to change position of
the baby in the carrier, yet about 80% of Ghanaian who used them complaint about the cost and
also not suitable for some jobs that involve brisk walking, commonest among these jobs is
carrying loads for people for exchange of money in the market locally referred to as “Kayayei”. In
this paper, the authors designed a soft baby carrier to address some of the problems posed by
the ‘cloth carrier”. It can be worn with babies up to about 20 Kg in three different positions.(i)
On the chest ,facing the care giver, (ii) On the back facing the care giver and (iii) In sling
position for nursing. The design also has additional features like a pocket and support systems
for the neck, shoulder, waste and back for the caregiver. The design was tested by considering
the weight of the baby as dynamic load. It is also convenient for male users.
BURKITT’S LYMPHOMA AND MALARIA: A STUDY OF PROBABLE INTERACTIONS
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The incidence of Burkitt’s Lymphoma (BL) has increased in areas endemic to malaria and HIV. Two microbial pathogens, the Epstein-Barr Virus (EBV) and the malaria parasite \textit{Plasmodium falciparum} have been implicated in BL. Resolution of the etiology of BL remains incomplete. Certain chromosomal translocations have been associated with BL: the t(8;14) translocation or one of the t(8;22) or t(2;8) translocations that move MYC gene (located at 8q24) to one of three immunoglobulin loci. Building on the observed association between BL and malaria, the purpose of this study was to generate transcriptional regulatory networks relevant to human B Cells as well as \textit{P. falciparum} cells. Furthermore, a goal was to identify probable protein-protein interactions between invading \textit{P. falciparum} proteins and those of the host human B cell. The Transcriptional Regulatory Network (TRN) for \textit{P. falciparum} was generated from the Derisi dataset in the PlasmoDB database, using the Context Likelihood of Relatedness (CLR) algorithm. The TRN in B Cells was generated from Gene Expression Omnibus dataset GSE12626 using CLR. The MCODE algorithm was used to identify clusters within the networks. Subcellular localizations for invading \textit{P. falciparum} proteins were predicted using a previously published primary amino acid sequence-based method that employs the C4.5 decision tree algorithm. Using the Sum Product (SPA) and Maximum Likelihood Estimate (MLE) algorithms, co-localizing \textit{P. falciparum} and human B cell proteins were examined for evolutionarily conserved domain-domain interactions. Key dependencies, clusters, and interactions involving BL-relevant molecules such as MYC and AID were identified, elucidating probable interactions in BL.
According to available statistics, vegetarianism is fast gaining ground in Ghana. Since this eating habit predisposes one to several nutrient deficiencies such as iron, vitamin B_{12} and proteins. Their vulnerability makes it necessary for us to study their lifestyle in relation to their health and nutritional status. The only solution involves supplementation of their diets.

To investigate the dietary intake, lifestyle and body measurements of vegetarians, 201 adults between the ages of 18y and 73y were selected from different parts in Accra and Tema. The sample included 54 lacto-vegetarians, 25 ovo-lacto-vegetarians, 21 ovo-vegetarians, 27 pesco-vegetarians, 5 fruitarians as well as 69 vegans. A structured questionnaire was used to solicit information on the background, lifestyle characteristics and food consumption patterns of all study participants. All anthropometric determinations were carried out using standard procedures. Outcome measures included weight, Body Mass Index, Waist and Hip circumferences. Using a Food Frequency Questionnaire, the variety of foods consumed by the subjects was investigated. Based on BMI values, 9.5% of subjects were found to be malnourished (BMI value of less than 18.5kg/m^2). Background and lifestyle factors which influenced positively their BMI included the consumption of nutrient supplements as well as reduced consumption of alcohol and decreased rate of smoking. Statistically significant associations were found between BMI and Waist circumference, Hip circumference and weight of the respondents. More nutritional education for vegetarians as well as further research that is relevant to their health and quality of life need to be pursued.
FEASIBILITY STUDIES ON THE PRODUCTION OF $^{131}$I RADIOISOTOPE USING A LOW POWER RESEARCH REACTOR

Elom Afi Achoribo

The parameters of Ghana Research Reactor (GHARR-1), the irradiation and decay times, and the quantity of the target element (TeO$_2$) have been varied to obtain maximum activity for the production of iodine 131.

Theoretical calculations, taken into consideration, the general formula of the activity of (n, $\gamma$) reaction followed by $\beta$ decay of tellurium dioxide show that a single irradiation of 0.1g of TeO$_2$ at a flux of $5 \times 10^{11}$ n.cm$^{-2}$.s$^{-1}$ and irradiation time of 6 h give an activity of $1.85 \times 10^3$ Bq. This is small compared to 1-20GBq maximum activity needed for treatment of thyrotoxicosis and carcinoma of thyroid. Consequently a repeated irradiation process was considered and a program to reach a maximum activity was written.

Theoretical data obtained from the program were plotted and a clear pattern observed. The higher the irradiation time, the neutron flux and the mass of the target, the higher the activity. Theoretically, an activity up to 5.1 GBq was reached with 5g of Tellurium dioxide irradiated at neutron flux of $1 \times 10^{12}$ n.cm$^{-2}$.s$^{-1}$ for 6 hours during four cycles.

The theoretical results were validated by continuous irradiation of 0.05 g Tellurium dioxide for four days. Only the irradiation at full power for six hours could not be done due to a technical problem. Deviations in the theoretical and measured activities were observed from the 3rd cycle. These deviations were mainly due to the fact that beta decays released by Te-131 in the process of obtaining I-131 were not taken into consideration when the measured activity is been determined.
A WEB BASED HEALTH INFORMATION MANAGEMENT SYSTEM FOR NON-COMMUNICABLE DISEASES IN GHANA
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The increasing prevalence of non-communicable diseases (NCDs) in Ghana and the world over has raised issues concerning the dissemination of health information. The World Health Organisation's (WHO) statistics indicate that globally, NCDs account for about 59% of the 56.5 million deaths recorded annually and this is expected to increase by 27% over the next few years. Information available from the Korle-Bu Teaching Hospital in Accra supports the WHO’s position that lifestyle diseases are among the top ten common causes of morbidity and mortality and what is most disturbing is that this is now occurring more and more among the younger generation, urban and literate population and account for 18.5% of the top ten causes of mortality in Ghana. In Ghana especially where there already exists a burden of communicable diseases, this issue is of utmost importance despite all the educational efforts being made to prevent the NCDs from surpassing the communicable diseases as the most prevalent. Effective communication empowers people to seek what is best for their own health and to exercise their right to good-quality health care. In Ghana, communication techniques such as the print media, electronic media (television and radio broadcasts) and human contact are the most pervasive in the country’s drive to rid itself of these diseases. These strategies are however saddled with inefficiencies such as their short lifespan and unavailability of the information after each campaign. With the increasing trend of telecommunication services usage such as the internet and mobile telephony in Ghana especially within the urban communities, the web based Health Information Management System for Non-Communicable Diseases in Ghana seeks to exploit the opportunities offered by these technologies to supplement current education strategies and help eliminate the inefficiencies. The internet as a communication tool has seen widespread use in all aspects of life the world over and provides a medium that allows information to be disseminated to a large group of people on a sustainable basis and at lower cost whilst increasing the availability of such information. This intervention is meant to help curb the prevalence rate of these diseases and reduce the amount of money spent by the government in managing those affected by these diseases and enable public health institutions effectively promulgate health information.
DESIGN OF AN ADJUSTABLE LOWER LIMB (ALL) TRACTION DEVICE.

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In orthopedic medicine, traction is a set of mechanisms for straightening broken bones or relieving pressure on the spine and the skeletal system to regain normal length and alignment by application of a pulling force. Generally, there are two types, skeletal and skin traction. From observations in two big hospitals in Ghana (Korle-Bu Teaching hospital and 37 Military hospital), it was found that two types of skeletal traction devices are available in Ghana, the locally manufactured and the imported types. Some problems were identified to be associated with these traction devices as:

i. Non-adjustability of the locally manufactured ones, making its use difficult for patients whose thighs could not fit in it.

ii. Bulky nature of imported ones; when assembled, it is a whole hospital bed therefore becomes cumbersome when it has to be moved.

iii. Insecurity of existing locally made ones; the bar on which the rope holding the weight normally slips off from the edge. This failure may lead to destruction of thigh muscle and in severe cases can lead to paralysis thus compounding the patient’s problems.

In this paper, these problems were addressed by designing an adjustable traction device for the lower limbs. The device consists of two parts, thigh and lower leg supports. In default the lockers holding the movable parts are loosen. The fractured or the affected leg is made to rest on the device with the thigh and the lower leg resting on their supports. The leg is then adjusted correctly and comfortably, the thigh support would then be pulled upward towards the lower leg support through an angle of about 30°. The lockers are tightened to maintain the current adjustments. Once the device is set up, the orthopedic nurse would tie the weight attached to the end of the rope to the pin inserted in the affected bone by the physician. The patient would then be monitored until fracture heals or dislocation aligns. This device can be used with or without a hospital bed compared to existing locally made ones that can only be used with a hospital bed. Though limited only to the lower limbs it is simple and easy to move than the cumbersome bulky imported types.
THE DESIGN OF A VIRTUAL DENTAL LEARNING AID FOR THE UNIVERSITY OF GHANA DENTAL SCHOOL
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The University of Ghana Dental School has been confronted with numerous challenges in obtaining the most appropriate learning aid in teaching the course Dental Morphology. This course requires that students conceptualise the basic anatomical features of each of the 32 human teeth in detail. This has the propensity for memorisation of facts and consequently rote learning with the students not grasping the concepts of the course well. A survey conducted at the school revealed that there were not enough teaching and learning aids available for an effective and efficient running of the course. Seventy-seven percent (77 %) of students and 100 % of lecturers out of a respective sample size of 67 and 4 admitted that the currently employed methods makes visualisation and grasping of concepts very difficult. The students and lecturers therefore called for an additional learning aid to be incorporated into the syllabus to address this problem. Currently, there are e-learning tools that can help alleviate some of the challenges raised above, but they are very expensive and more so their functionalities are not comprehensive for the objectives of the course. The Virtual Dental Learning Aid, interactive e-learning software, has therefore been designed to facilitate effective teaching and learning of Dental Morphology. Its structural framework was particularly designed to address the challenges faced by the traditional method of teaching and learning the course. It provides a platform for course information to be generated, stored and displayed as text, three-dimensional models, images and video. It contains user-friendly tools that allow both synchronous and asynchronous interaction between the lecturer and student. If further advanced and built, the learning aid would provide a platform for an interactive, effective and constructive teaching and learning experience. The design of the Virtual Dental Learning Aid can also further serve as a model for running other courses in both the dental and medical schools of the University of Ghana.
KNOWLEDGE OF AND PREFERENCES FOR FRUITS AND VEGETABLES IN PRIMARY SCHOOL CHILDREN IN, KUMASI, GHANA
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Children’s attitude to and knowledge of fruits and vegetables were studied by means of a survey of 220 children aged 7-12 using a structured questionnaire and interviews at the Infant Jesus Primary school at Ayeduasi in Kumasi, Ghana. Results indicate that children are more familiar with fruits than vegetables. The overall correct recognition of fruits and vegetables were 74% and 52% respectively. The majority of children surveyed were aged 9-10 and 11-12. In these age groups whilst some fruits were correctly identified by more than 95% of children (banana, apple, orange, pineapple and sugarcane) others were relatively unknown. Notably, 25% of children aged 9-10 either incorrectly identified mango or had never tried it, 33% were unfamiliar with guava and 33% with sour sop. Certain commonly available vegetables were familiar to the children including tomatoes, carrots, bell pepper and chilli which were correctly identified by 90% of 9-12 year olds, however others such as kkontomire, lettuce and shure were less well known and were correctly identified by 77%, 57% and 1% respectively by the 9-10 year age group. Vegetables very common in the northern part of the country were relatively unknown to the majority of the children. This may have been due to the fact that only 4.7% of the children were from Northern Ghana. The acceptability of fruits and vegetables were assessed using a five-point hedonic scale. Acceptability of fruits was found to be greater than that of vegetables. Although the majority of children (78.2%) had an appreciation of the term ‘balanced diet’ and 96.4% identified the consumption of fruits and vegetables as important, demonstrating a basic knowledge of current nutritional recommendations, only 57.3% consumed fruits daily. These findings suggest that the intake of fruits and vegetables by children needs to be further encouraged for example by an increase in awareness.
TOTAL FLAVONOIDS, TOTAL PHENOLIC CONTENTS AND ANTIOXIDANT ACTIVITIES OF AQUEOUS AND METHANOLIC EXTRACTS OF TEN COMMONLY CONSUMED LEAFY VEGETABLE IN GHANA.

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The antioxidant activity of methanol and aqueous extracts of ten leafy vegetables commonly consumed by Ghanaians was determined by the 1,1-diphenyl-picryl hydrazyl (DPPH) radical scavenging activity using Gallic acid (GA) as standard. The aqueous extracts (WEL) seemed to yield higher extractable solids than their methanolic counterparts (MEL), but the later was found to be more efficient in extracting the antioxidant suggesting the presence of both hydrophilic and lipophilic compounds. The total phenolic and flavonoid contents were also evaluated using Folin-Ciocalteu and aluminum chloride assays, GA and quercetin were as phenolic and flavonoid standards respectively. Generally methanol seemed to be a better solvent, for extracting the phenolics compounds with Occimum basilicum (akokobesa) and Amaranthus incurvatus (aleefo) exhibiting the highest values of 164.2mg GAE/g and 131.1mg GAE/g respectively. The highest values for water extracts were recorded for Manihot esculenta (cassava; 93.6mg GAE/g) and Hibiscus sabdariffa (shuure; 72.9mg GAE/g). The highest total flavonoid content were found in the methanolic extract of Vernonia amygdalina (bitter leaves), cassava leaves, aleefo leaves with values of 64.52µg QE/g, 64.40µg QE/g, and 62.02µg QE/g respectively. A good positive correlation of $R^2 = 0.663$ was observed between total phenolic content and antioxidant values for both solvents used, however, no correlation was found between flavonoids, total phenolics and total antioxidants. The study indicates that the leafy vegetables consumed locally are rich sources of antioxidants, flavonoid and phenolic compounds and could be important exogenous reservoir of these compounds and thus could probably contribute important health and nutraceutical benefits to our bodies. It is suggested that Ghanaians be encouraged to eat diets rich in their traditional leafy vegetables to promote healthy lifestyle.
BAYESIAN ANALYSIS OF THE INCIDENCE OF HIV/AIDS IN THE UPPER EAST REGION
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Bayesian methods were used to analyze the incidence of HIV/AIDS in the Upper East Region of Ghana. The Bayesian analysis produced sequences of discrete time stochastic processes, called Markov chains that represent random draws of probabilities of infections from the HIV/AIDS incidence data in respect of the two gender groups, three age groups and four HSS sites. Computations employed simple Markov chains, Markov chain Monte Carlo (MCMC) and independence chain Metropolis-Hastings (MH) algorithms for the models because of their power to simulate and easy-to-use properties. At the end of the various simulations, the two gender groups, the three age groups and the four HSS sites reached steady states. The steady states distributions were then subsequently classified as either regular (i.e. irreducible and aperiodic) or not regular (i.e. transient and absorbing).
MODELLING THE EPSTEIN BARR VIRUS (EBV) LIFECYCLE: FIRST STEPS

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EBV is a gamma-herpes virus that infects B lymphocytes. The virus has two stages in its lifecycle, the latent or persistent stage (generally, a life-long benign infection) and the lytic stage (a 48-hour viral replication stage). While infection is usually asymptomatic, it can be associated with acute illness (acute infectious mononucleosis) if it is contracted in adolescence or later. It has the potential to override apoptosis and drive cellular proliferation, thus it has been used to derive permanent B cell lines. In combination with malaria, it gives rise to endemic Burkitt’s Lymphoma (eBL), the most prevalent childhood cancer in Ghana. A primary motivation for undertaking this work is to elucidate the molecular mechanism of eBL pathogenesis, which is currently unknown. To date, no computational model of EBV infection and replication at the molecular level exists. We began by separating the two states and constructing individual models for each. After searching the primary literature, we made a very coarse cartoon model of the major steps that are known to be associated with each process. For the lytic stage, we incorporated a trigger-signal to initiate viral replication, expression of some immediate early, early, and late genes, genome replication, assembly, and exit from the cell. For the latent stage, we included viral attachment, internalization, uncoating, translocation to the nucleus, and tethering to chromosomes, with expression the latency III genetic program. The cartoon models were recast as a series of biochemical events which were then automatically converted to ordinary differential equations by a complex pathway simulator and ODE solver for biology known as COPASI. Kinetic parameters were all roughly fitted using experimental end point data from the literature. While the models are still very preliminary, initial output demonstrated that the dynamics of mRNA and protein production were roughly correct in both. The lytic model showed that new virion production reached a steady-state that was maintained to the end of the simulation (in reality, cell bursting), as expected.
MODELLING OF CELL MEDIATED IMMUNE RESPONSE TO EPSTEIN BARR VIRUS (EBV): FIRST STEPS
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EBV is an oncovirus that infects B lymphocytes, sometimes leading to lymphomas. The immune system retaliates by producing armed effector T-cells that eliminate these infected lymphocytes. Due to the destructive nature of T-cells, however, their production must be strictly controlled by the body. While the complete immune response to EBV or any other pathogen is very complex, we began by building a general model of T-cell activation. We first collected information on the various biochemical events involved in the priming of the T-cells from the literature and determined what we wanted to incorporate in the model. A schematic, cartoon model was built that was then converted to biochemical equations or events. With the help of the software platform COPASI, a free software for simulation and analysis of biochemical networks and their dynamics, those equations were converted to system of five ordinary differential equations. To use this modeling application, initial conditions and starting values for kinetic parameters were needed. Some were obtained directly from the experimental literature and others were approximated based on the literature. As this was a very preliminary model, we adjusted the species and time to be dimensionless. Our first output showed that the dynamics of T-cell priming are roughly what one would expect from known behaviors, with the EBNA1 protein antigen the most critical species. The next step in our model building process would be to elaborate the cartoon model and seek the required parameters.
EFFECT OF POLYMORPHISMS OF INTERLEUKIN 4 AND ITS RECEPTOR IN RELATION TO OXIDATIVE STRESS IN COMPLICATED AND UNCOMPLICATED MALARIA INFECTION

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Malaria remains one of the leading causes of morbidity and mortality worldwide and in sub-Saharan Africa. Mortality from malaria is due to complications arising as a result of severe infections usually caused by P. falciparum. Despite the P. falciparum importance as a human pathogen, the pathophysiologic basis of the disease is not well understood. It is however known that parasitic infections such as malaria in host organisms often lead to oxidative stress. The constant generation of free radicals and other reactive species \textit{in vivo}, leads to extensive oxidative damage of parasite bio-molecules such as DNA, lipids and proteins. Genetic factors are also a major determinant of child survival in malaria endemic countries. Identifying which genes are involved and how they affect the malaria disease risk, potentially offers a powerful mechanism to further explain the host-parasite relationship. This work seeks to determine the role of known polymorphisms of IL 4 and IL 4R genes in the generation of free radicals by the host, and the destruction of the parasite DNA during complicated and uncomplicated malaria infection. Blood samples will be collected from malaria patients who are less than five years and reporting for medical care at the Child Health Department, Korle Bu Teaching Hospital. Superoxide dismutase (SOD) activity will be determined using the \textit{SOD Assay Kit-WST} (Fluka, Germany). Oxidative DNA damage analysis will be carried out on parasite-infected RBCs using DNA Comet Assay\textsuperscript{TM} (Trevigen Inc, Gaithersburg, MD, USA) as described by manufacturer. Genomic DNA will be extracted from the samples using QIAamp DNA Mini Kit (GmbH. Hilden, Germany). To detect the different genotypes, polymerase chain reaction (PCR) products will be digested further with the restriction enzymes. The PCR and restricted PCR products will be run on a 2\% agarose gel stained with ethidium bromide. It is expected that this study would provide a better understanding of molecular mechanisms, basis and pathogenesis of \textit{P. falciparum} malaria in the human host.
GHANA BIOMEDICAL CONVENTION

http://ghanabiomedicalconvention.org