SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION & RESEARCH, KOLAR

SDUAHER

FIFTH NATIONAL RESEARCH SEMINAR

25th to 26th APRIL 2014

"PERSONALIZED MEDICINE – THE EMERGING PARADIGM"

SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION & RESEARCH, KOLAR
(A Deemed to be University Declared under UGC, MHRD, Govt. of India)
Fifth National Research Seminar on
"PERSONALIZED MEDICINE – THE EMERGING PARADIGM"

Scientific Program Schedule
Day 2: 26th APR 2014 (Saturday)

	Speakers	***Topic***	***Chairpersons***
9.30-10.15 a.m	**Dr. Mohan Badagandi** Head of Dept. of Endocrinology & Diabetes Manipal Hospital, Bangalore	Type 2 Diabetes & Cardiovascular Disease Risk-Need for Personalized Diabetes Care	Dr. Lakshmaiah. V Dr. Narendra Datti
10.15-11.00 p.m	**Dr. Karl Arfors** Prof. Emeritus Karolinska Inst. Of Research, Stockholm, Sweden	Type 2 Diabetes & Inflammation - Role of fast Carbohydrates & Insulin Resistance	Dr. R.D.Lele Dr. B.G.Ranganath
11.00-11.15 p.m	**TEA BREAK**		
11.15-12.00 p.m	**Dr. Surendra Ugale** Laparascopic Surgeon Kirloskar Hospital, Hyderabad	Surgical management of Type 2 Diabetes	Dr. HT Gangal Dr. M.Madan
12.00-12.45 p.m	**Dr. Navakant Bhat** Professor, Dept. of Electrical Communication Engineering, IISc, Bangalore	Nanotechnology & Point of Care Diagnostics	Dr. Karl Arfors Ms Shobha Devi. N
12.45-1.00 p.m	**Dr. Mohan Badagandi** **Dr. Navakanth Bhat** **Dr. Surendra Ugale** **Dr. Karl Arfors**	Open Forum	
1.00-2.00 p.m	**LUNCH BREAK**		
2.00-2.30 p.m	**Dr. Ashish Dixit** Consultant in Clinical Hematology and Blood & Marrow Transplant Manipal Hospital Bangalore	Targeted Therapy in Haemato- Oncology	Dr.Harendra Kumar ML Dr. KNV Prasad
2.30-3.00 p.m	**Dr.Sanjiv Jain** Prof. in Psychiatry NIMHANS, Bangalore	Pharmacogenomics in Personalized Medicine	Dr. Sarala. N Dr. Mithun Shetty
3.00-3.15 p.m	**TEA BREAK**		
3.15-3.45 p.m	**Dr. Ramesh Makam** Consultant Laparoscopic Surgeon, Bangalore	Physicians Manage Diabetes, Can Surgeons Cure it?	Dr. Venkatrathnamma.PN Dr. Krishnaprasad. K
3.45-4.15 p.m	**Dr. HT Gangal** Former Professor of Surgery, KIMS, Hubli	"Translating Clinical Evidence into Practice-The Challenges"	Dr. Pushpa P Kotur Dr. Sriramulu. PN
4.15-4.45 p.m	**Dr. Karl E. Arfors** Prof. Emeritus Karolinska Inst. of Research, Stockholm, Sweden	**Valedictory Address**	Dr. PF Kotur Dr. AVM Kutty

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Scientific Program Schedule
Day 1: 25th APR 2014 (Friday)

8.30-9.30 a.m	Registration		
9.30-10.00 a.m	**Inauguration**	***Guests:*** **Mr. Rajesh N Jagadale,** Chancellor, SDUAHER **Prof. G. Padmanabhan**, Former Director, IISC ***Presided by:*** **Sri. RL Jalappa,** Chairman, SDUET ***Inaugural Address:*** **Dr P.F.Kotur,** Vice-Chancellor, Sri Devaraj Urs University, Kolar	
10.00-10.45 a.m	**Prof. G. Padmanabhan,** Former Director, IISc, Bangalore	**Key Note Address On** "Drugs & Drug Targets against Malarial Parasite"	
	Speakers	***Topic***	***Chairpersons***
10.45-11.30 a.m	**Dr. Anura Kurpad** Prof in Physiology & Nutrition St. John's Medical College & Hospital, Bangalore	Personalized Human Nutrition	Dr. R.D. Lele Dr. Karthiyanee Kutty T
11.30-11.45 a.m	**TEA BREAK**		
11.45-12.30 p.m	**Dr. R.D. Lele** Hon.Chief Physician & Director of Nuclear Medicine Jaslok Hospital, Mumbai	"Twenty landmark concepts and technological developments in the 20th Century which have made Personalized Medicine a reality in the 21st Century	Dr. Mohan Badagandi Dr. Raghavendra Prasad. BN
12.30-1.00 p.m	**Dr. Ashok Kumar Das** Prof. & Head of Endocrinology JIPMER, Puducherry	Status of Diabetes in India & Personalized Approaches to Management	Dr. Prabhakar. K Dr. Muninarayana. N
1.00-1.15 p.m	**Dr. Anura Kurpad** **Dr. R.D. Lele** **Dr. A.K. Das**	Open Forum	
1.15-2.00 p.m	**LUNCH BREAK**		
2.00-2.55 p.m	**Dr. Karl E Arfors** Prof. Emeritus Karolinska Inst. Of Research Stockholm, Sweden	Microvessel Inflammation & its Role in Cardiovascular Diseases & Coronary Heart Disease	Dr. P.R.Krishnaswamy Dr. CSBR Prasad
2.55-3.50 p.m	**Dr. Vijay Chandru** CEO, Strand Life Sciences Bangalore	Affordability as Driver of Innovation in Genomic Medicine	Dr. A.V.M. Kutty Dr. Shashidhar. K.N
3.50-4.05 p.m	**TEA BREAK**		
4.05-4.45 p.m	**Dr. Naren P Rao** Inspire faculty Centre for Neuroscience Indian Institute of Science Bangalore	"Personalized medicine in Psychiatry: Quest for predictors of treatment response"	Dr. S.R. Prasad Dr. Mohan Reddy. M
4.45-5.00 p.m	**Dr. Karl Arfors** **Dr. Vijay Chandru** **Dr. Naren P Rao**	Open Forum	

Summary

Sri Devaraj Urs Academy of Higher Education & Research, Kolar, organized the **'5th National Research Seminar'** on ***"Personalized Medicine – The Emerging Paradigm"*** on **April 25-26, 2014.** This scientific program brought to a common platform scientists and researchers through their talks and presentations and put forward strategies in Personalized Medicine. A conducive environment was created for information exchange and application in clinical patient care. Personalized Medicine promises many medical innovations and has the potential to change the way treatments are discovered and used.

The Conference Highlights were discussions on

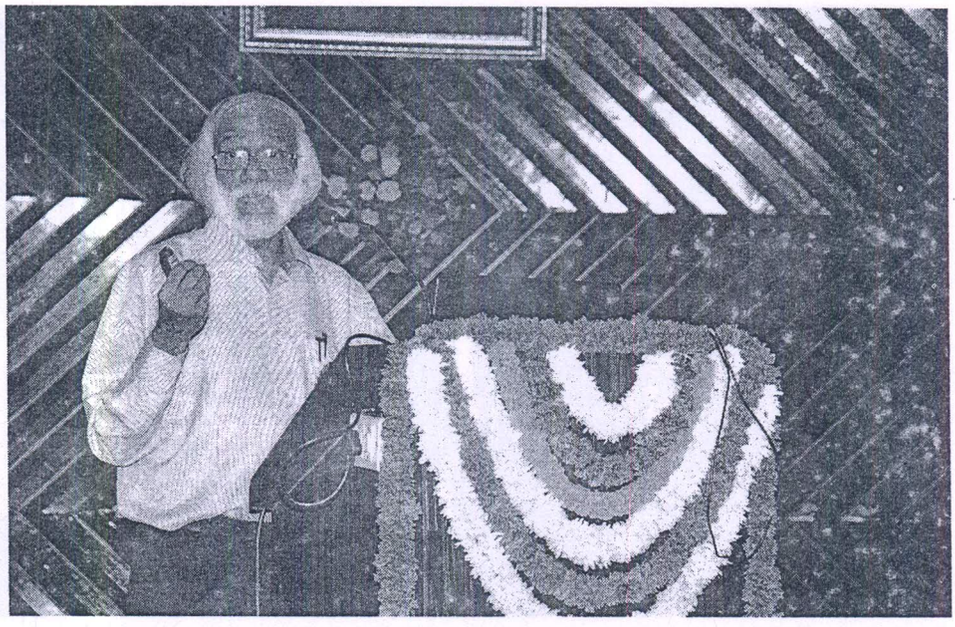
Landmark Developments leading to Personalized Medicine
Clinical aspects of Personalized Medicine
Personalized Medicine Genomics
Molecular Diagnostics in Personalized Medicine
Pharmaceutical Analysis in Personalized Medicine
Bio-Medical devices- Scope and future in Medicine
Personalized Medicine in Cancer, Cardiovascular Disease & Diabetes

Leading researchers participated in the discussions. Among them were Prof. Padmanabhan, Dr. Karl E Arfors, Dr.Anura Kurpad, Dr.Vijay Chandru, Dr.Navakanth Bhat, Dr.Sanjiv Jain and Dr.A.K.Das.

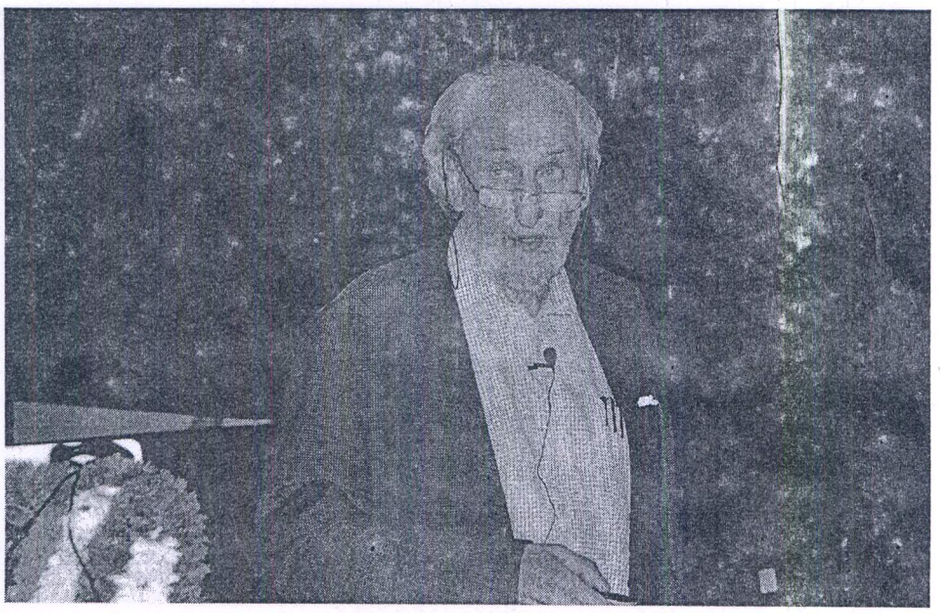
Dignitaries from Sri Devaraj Urs University and other institutes attended the two day conference.

Fifth National Research Seminar, 24TH – 25TH April 2014
Personalized Medicine – The Emerging Paradigm
SDUAHER, Kolar

Inaugural Function of 5th National Research Seminar on 25th Apr 2014



Padma Bhushan Prof. Padmanabhan, delivering the Inaugural Guest Lecture



Prof. Karl Arfors, University of Karolinska, Sweden

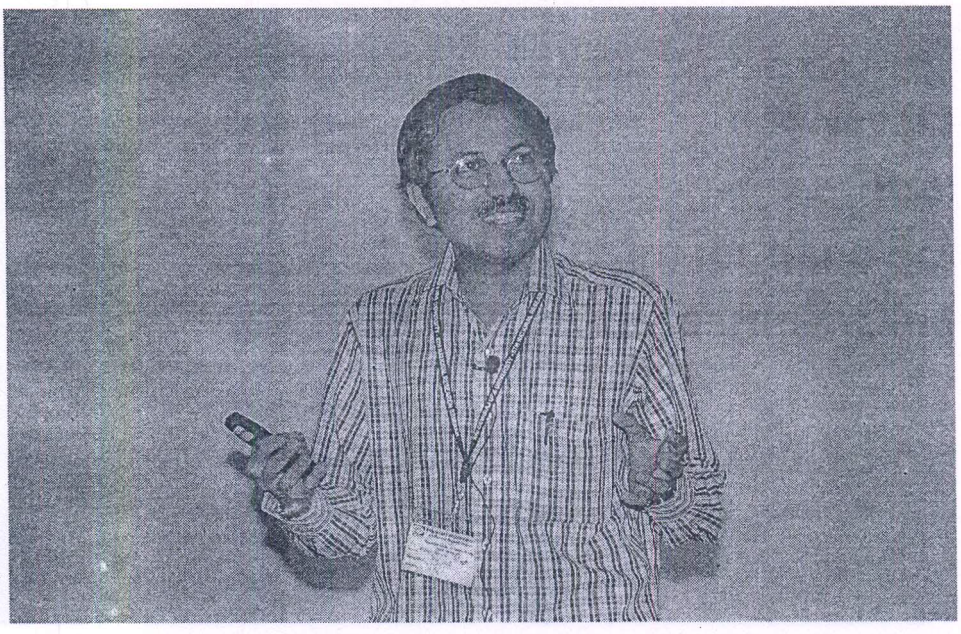
Dr.A.K.Das, Professor of Medicine, JIPMER, Puducherry & Prof. P.F.Kotur,Vice-Chancellor, SDUAHER

Dr.Anura Kurpad, Prof. of Nutrition, St.John's Medical College, Bangalore

Panel Discussion: Prof. Karl Arfors, Dr.Mohan Badagandi, Dr.Navakanth Bhat

Panel Discussion: Dr.Naren P Rao, Prof. Karl Arfors, Dr.Vijay Chandru

Dr.Surendra Ugale, Bariatric Surgeon, Kirloskar Hospital, Hyderabad



Dr. Navakanth Bhat, Professor, Nanotechnology, IISc, Bangalore

Prof. H.T.Gangal, DSc, Former Professor of Surgery, KIMS, Hubli

Dr.R.D.Lele, Hon. Professor of Medicine, Jaslok Hospital, Mumbai

20 LANDMARK CONCEPTS AND 20TECHNOLOGICAL DEVELOPMENTS IN THE 20TH CENTURY THAT HAVE MADE PERSONALIZED MEDICINE A REALITY IN THE 21ST CENTURY.

Dr. R. D. Lele
Hon. Chief Physician & Director,
Nuclear Medicine Dept.
Jaslok Hospital & Research Centre,
Mumbai

Clinical Diagnosis

- Electrocardiography, vectorcardiography, Holter monitoring
- Electroencephalography, electroretinography; electronystagmography
- Electromyography; nerve conduction studies Audiometry
- Phonocardiography
- Apex cardiography; impedance plethysmography
- Whole body plethysmography
- Thermography

PROGRESS IN SCIENCE

- "Progress in science frequently depends upon the development of good methods" Claude Bernard.
- The union of modern biology with physics chemistry and mathematics is an outstanding development of 20th century
- Biophysical chemistry
- Molecular biology
- Biophysics
- Electrophysiology
- Microelectronics and computers

- Ophthalmoscopy; Fluorescein angiography Fibre optic endoscopy; oesophagogastro-dudenoscopy;
- ERCPcolonoscpy; bronchoscopy, arthroscopy
- Radiology; digital subtraction angiography; CT Ultrasonography; Doppler studies
- Radionuclide scintigraphy; SPECT; Pet NMR imaging and spectroscopy; Magnetoencephalography. Functional MRI

Interdisciplinary Research

20th century was the century of developments of basic concepts and methodologies of individual disciplines and integration in to new disciplines.

Biophysics- Biology + physics

Biochemistry – Biology + Chemistry

Bioinformatics – Biology + Computer science

Clinical chemistry and laboratory procedures

- Automated clinical chemistry and haematology Fluorescent cell sorters for T-cell counting
- Light microscopy; electron microscopy; phase-contrast microscopy; fluorescent microscopy
- Radioimmunoassay; immuniradiometric assay; radioreceptor assay
- ELISA
- Electrophoresis and immunielectrophoresis
- Chromatography; paper, liquid, gas, HPLC
- Computerized chromosome analysis
- Flame photometry, fluorometry, spectrophometry
- Ultracentrifugation
- Microbiology; radiorespirometry
- Microbiology and serology; tissue culture for viruses
- Immunology; HLA tissue typing.

Concept of Biochemical Lesions

- Hypo and hyperglycemia,
- Hypo and hyperkalemia,
- Hypo and hypernatremia
- Hyperaldosteronism (Conn syndrome)
- Hypo and hypercalcemia and magnesemia
- Acute intermittent porphyria
- Hyperhomocysteinemia
- Hyperuricemia
- Hypercholestrolemia and hyperlipidemia

Prosthesis

- Artificial heart – Jarvis VII
- Artificial heart valves
- Implantable prostheses and shunts
- Vascular grafts – dacron, teflon, etc.
- Joint replacements, hip, knee etc.
- Artificial larynx, artificial ear, artifical mastoid
- Artificial limbs
- Myoelectrically-controlled prosthesis
- Computerized aids for the physically handicapped

Therapeutics

- Cardiac pacemakers; cardiac defibrillators
- Intra-aortic balloon pumps
- Pump-oxygenator (heart-lung machine)
- Ventilators; volume-cycled, pressure-cycled
- Hyperbaric oxygen
- Haemoperfusion; haemodialysis and peritonealdialysis
- Plasmapherisis
- Hyperthermia; hypothermia
- Electroconculsive therapy
- Electro-stimulation for pain relief

Intensive care monitoring

- Blood gases
- Central venous pressure, intra-arterial pressure
- Swans-Ganz (Lapr.)
- Intracranial pressure monitoring
- Foetal monitoring, uterine contraction monitoring
- Neonatal intensive care.

Surgical

- Anaesthesia equipment
- Surgical diathermy, electrosurgery
- Cryosurgery
- Lasers; Argon, xenon, CO_2, Nd-YAG excimer, etc
- Microvascular surgery
- Stereotactic surgery

Radiotherapy

Cobalt

Linear Accelerator

Cyclotron, van de Graff generators

Fast neutrons, electrons, heavy ions and mesons

Neutron capture therapy, Boron capture therapy

Physical therapy

- Short wave diathermy; ultra short wave (690nm)
- Infrared therapy
- Microwave therapy (120 nm)
- Ultrasonic therapy (1 MHZ)
- Phototherapy with UVR—A, UVR-B
- Shock wave lithotripsy

Robotics

= Robotics today enable the performance of difficult and precise surgical procedures that were hitherto not possible.

= Specialized manipulator designs allow robots to work through incisions that are too small for human hands to work through.

= Minimally invasive surgery made possible.

- Gall bladder surgery
- Thoracic surgery
- Gynaecologic surgery
- Orthopedic surgery
- Urosurgery
- Neurosurgery

Sterilization

- Autoclaving; dry heat, steam
- Chemical sterlisation – gas, liquid
- Gamma ray sterlisation
- Ultraviolet lamps
- Air filters, lamellar flow
- Millipore filters for instant sterlisation of i.v. material

Genetic engineering

- Production of human insulin, growth hormone, erythropoietin, tissue plasminogen activator
- Gene probes for diagnosis
- PCR: Polymerase chain reaction for gene amplification

Where is surgery heading ?

Telemedicine: virtual consultation

Tele surgery

Distinction between physicians & Surgeon blurred

- Coronary angioplasty and stenting done by interventional cardiologists
- Endoscopic biliary surgery done by gastro-enterologists
- Vascular embolization and tumour therapy done by radiologists
- Surgeons have adopted minimally invasive approaches and robotic technology which complement traditional cutting and sewing.

BIRTH OF RECOMBINANT DNA TECHNOLOGY

- This has revolutionised the study of biology and medicine
- It has ushered in the era of molecular medicine
- 100 recombinant proteins in some 25 different therapeutic areas are currently either approved, undergoing clinical trials or are under development

Physical therapy

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Regenerative Medicine

- Embryonic stem cells
- Foetal stem cells
- Umbilical cord and placental stem cells
- Bone marrow –
  - Haematopoietic stem cells
  - Mesenchymal stem cells
- Adipose tissue
- Resident stem cells – cardiac, neuronal

Sterilization

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- Ultraviolet lamps
- Air filters, lamellar flow
- Millipore filters for instant sterlisation of i.v. material

STEM CELL RESEARCH

Treated Stem cells implanted into chick embryos have resulted in growth and integration of these cells into inner ear hair cells and integration of the same into the inner ear .

Questions still to be answered:

- Some cells integrated .. What did the others become ?
- What would be the effect of fusion . i.e combination of the DNA of the stem cells with normal cells?
- What would the effects of tissue implant rejection be on the inner ear .
- While structurally similar to hair cells , what sort of function would these cells impart (currently only tested in chick embryos)

Future Drug Therapies

- Understanding drug action at the molecular level has been the greatest achievement in the 20th Century
- Characterization and classification of Receptors, Ion channels, Transporters, Signal transduction enzymes and metabolic pathways enable clinicians to understand molecular mechanisms of drug action (Protein Tyrosine Kinases - 518 Phosphatases)
- Cell signaling Pathways : Complete diagrams are available for over 20 pathways which provide clues for potential targets for new drug development.

Understanding drug action : only 100 years old!

- Opium – used for 5000 years
  - Morphine – ligand for encephalin, endorphin and dynorphin receptors in humans
- Cannabis – used for 5000 years
  - Anandamide & ligands for cannabinoid receptors CB_1 CB_2
- Ergot – used for centuries
  - LSD – agonist for serotonin receptors
- Cinchona Bark – cure for malaria for centuries
  - Quinine, Quinidine, Mefloquin
- Oil of Wintergreeen – fever remedy for centuries

  Aspirin – 1899, COX_1, COX_2 inhibitor

Neuro-receptors

- GABA
- Glutamate
- Glycine
- Opioids / cannabinoids

CONCEPT of Circadian Rhythm

- Sleep wake cycle –integration with endocrine system
- BIOLOGICAL CLOCK: SCN in anterior hypothalamus –Supra Chiasmatic Nucleus
- Surge of melatonin –biological Night
- Surge of GnRH at onset of sleep
- Surge of CRH in late part of sleep
- GH, ghrelin, NPγ, estrogen, DHEA , somatostatin and octreotide impair NREM sws sleep in night shift workers , night nurses , international travellers- linked to metabolic syndrome.

Chemicals in the brain

- Oxytocin & prolactin: "affinity hormones"
- MDMA (party drug ecstasy) – enhances empathy.
- Opioids: encephalins, endorphins.
- Cannabinoids
- Neurotransmitters
  - Acetyl Choline, MAch, Nach, Dopamine
  - Serotonin, Norepinephrin

Glutamate, Glycine

CONCEPT OF BIOSENSORS

- An analytical device consisting of an immobilised layer of biological material eg. Enzymes, hormones, nucleic acid , organelle or whole cell antibody.
- Transducer
- Product-Oxygen, H^+ ion, heat, NH4 ion, glucose electrode-glucose oxidase
- Types of biosensors –electrochemical .
- Enzyme –MAO , uricase.

Gut microbiota- Gut brain Axis

- Gut harbours 70% nerve cells –Enteric Nervous System
- Gut harbours 60-70% of immune cells
- Gut harbours 10 times more bacteria than the number of cells in the human body and hundred times more genes than human genome.
- GUT -BRAIN AXIS: Great potential of probiotics to modulate gut brain axis and impact our responses to stress and anxiety. Microbiota altered in autism, anxiety and depression.
- Stress-by altering gut environment can alter microbiota –CRH-stress response hormone alters gut physiology and habitat of gut microbiota
- Probiotics reduce physiological symptoms associated with chronic stress(abdominal pain, nausea, effect on expression of GABA and BDNF mediated via the vagal nerve)

June 2000

Draft of entire Human Genome presented to the world.

Crucial enabling role of Supercomputers.

- 800 Alpha EV6 and EV67 processors with 64 bit architecture
- Over 80 terrabytes of memory
- 1.3 trillion floating point operations per second.

Job which would have required years, finished in 15 seconds.

CONCEPT OF SYSTEMS BIOLOGY

- "Knowing all the pathways and how they interact so that one knows everything about how a cell functions".
- "The approach requires the simultaneous static/temporal/spatial measurement of genomic, proteomic and metabolomic pathways"..."It can only be successfully applied with a seamlessly integrated bioanalytical and computational biology capacity in place".

Silicon Based Biology

Computer programmes provide mathematical models of biological systems.

It includes:

- Sequence search protocol
- Detection of homologous, orthologous and paralogous relationships by means of sequence database searches.

Neurotransmitters

Over hundreds of neurotransmitters have been identified to date

Can be broadly split into two groups –

- the 'classical', small molecule neurotransmitters
- the relatively larger neuropeptide-neurotransmitters.

e.g.

- Dopamine
- Serotinin
- Norepinephrine

CRF
OXT
AVP

- Mono-aminooxidase A (MAO-A)

Genomics

- Study of the gene sequences in the genome (3.5 billion DNA base pairs).
  - Coding regions : extrons
  - Non-coding regions : introns
- Nutrigenomics
- Pharmacogenomics
- Toxicogenomics
- Structural Genomics : Determining the precise 3 dimensional structure of proteins by X-ray crystallography

Bioinformatics

- A new discipline concerned with the application of Computers to biological problems.
- The direct prediction of 3 D structure of protein and function, from the linear amino acid sequences in the human genome.
- Conversion of sequence information into biochemical and biophysical knowledge.

Transcriptomics

- Study of variations in the expression level of different genes under different environmental conditions.
- Diseased cells like cancer cells make proteins which are not made by healthy cells and vice versa.
- Tissue transcription profiling will be routine for planning appropriate treatment of cancers.

Gene Numbers : Size is not everything

- Mycoplasma genitalium 127 genes
- S. Cerevisiae (yeast) 6000 genes
- Drosophila melanogaster 13500 genes
- C. elegans (worm) 19000 genes
- M. domestica (Housefly) 30,000 genes
- Human genome ~ 30,000 genes

- SNP : The most common gene polymorphism.
- Over 300 million SNPs in the entire human genome - 60,000 in exon or coding regions (CSNPs).
- SNPs help to elucidate the complex interactions among multiple genes and lifestyle factors in multifactorial diseases : obesity, HT, T2DM, CAD, cancers, mental D.
- Disease Disposition
- Pharmaco genomics.

UNIQUENESS OF EACH INDIVIDUAL

- The greatest impact of HGP on clinical medicine is the appreciation of the extraordinary molecular and biochemical individuality of each patient.
- 3.5 billion DNA base pairs in the genome
- 1 in 1000 DNA base pair : polymorphism.

= VNTRs : variable number of tandem repeats
RFLPs : restricted fragment length polymorphisms.
Micro satellite repeats.
SNPs : Single nucleotide polymorphisms.

Pharmacogenomics

- Genetic variations affect drug absorption, distribution via binding proteins, affinity of binding to receptor sites, metabolism by various enzymes and drug excretion.
- Gene polymorphism can positively or negatively affect drug response.

No wonder the effectiveness of any drug ranges between 30 - 70 percent !

- Gene polymorphism is reflected in the diversity of gene products :

- Structural proteins, enzymes
- channel proteins, transporters
- receptors, post-receptor signal transduction.

Polymorphism can also occur n the non-coding upstream promoter sequences - which can influence the activities of several enzyme mediated processes.

Pharmacogenetics & Pharmacegenomics

- IOM -USA (1998). "100, 000 deaths occurs every year in USA alone due to adverse effects of medical treatment
- Troglitazone: PPARγ ligand-approved by USFDA used by thousands of T2DM patients with benefit. 30 deaths due to heaptotoxicity- withdrawn.
- Numesulid - selective COX-2 inhibitor - used by millions of patients for pain-relief withdrawn due to adverse cardiac events.
- How to make effective therapy safer for the individual patient ?
  Each individual has his unique biology : this can now be characterized by the DNA and protein microarrays : should be routinely available in future

Functional Genomics or Proteomics

- Study of all proteins made by a cell, tissue or organism, and determining how these diverse proteins join forces to form networks akin to electrical circuits.
- 1278 families of proteins do all the work in cells. By 2008 the entire human proteome will be deciphered.
- The Human Proteomic Organization (HUPO) aims to link public proteomic projects similar to HGP.
- Proteomics Centre–stage for new drug discovery.

BIOPHARMACEUTICAL DEVELOPMENTS

Re-engineered proteins: site-directed mutagenesis to provide "tailored" properties of existing proteins:

- "humanized antibodies" – non-immunogenic and serum $t_{1/2}$ up to 21 days (comparable to native insulin) – short- and long-acting variants and altered oligomerization tendencies.
  - pegylated to alter pharmacokinetics
  - glycosylated to alter pharmacokinetics

Metabolomics

- Especially to determine the fate of drugs
- Over 50 cytochrome P 450 enzymes determine the fate of drugs in the body.
- Cybernetic relationship in cellular, biochemical and metabolic reactions: biological network.
- **Biological Switch Boards**
  Different combinations of homodimers, heterodimers and heterotrimers initiate signalling and cell activation in several systems.
- Back up systems and tolerance of interference - Robustness

DRUG DELIVERY SYSTEMS OF THE FUTURE

- Transition from site non-specific to site-specific
- Transition from device-driven systems based on *in vitro* properties to pathophysiology-driven systems for *in vivo* performance
- Transition to hi-tech design and products with greater control of delivery
- Increased use of medicines tailored to meet individual therapeutic requirements
- Increased emphasis on development of DDS that optimize PK/PD response
- DDS *must* become an integral component of new medicine development *rather* than a mere "add-on".

Nutrigenomics :

= Field of studying nutrition-gene interaction
= Heritable drug allergies - gluten sensitivity
= dietary n3 fatty acids EPA and DHA modifying gene transcription.
= mother's milk vs formula feeding - suppression of IRS-1 PI3K pathways and insulin resistance.
= dietary constituents increasing risk of atherosclerosis, cancer.
= dietary phytochemicals with significant anti-inflammatory, anti-carcinogenic and anti-mutagenic properties. Example: curcumin NFKB and AP1, MAP/ERK, AKT induction of apoptosis.

Nanomedicine

- Nanodevices such as Dendrimers, smaller than 50nm, can enter the cells and specifically interact with cytoplasmic organelles such as ER, Golgi, mitochondria and the nucleus, delivering targeted drug therapy to the cancer cells; totally protecting normal cells
- Targeted nanoparticle will destroy Hepatitis C virus within liver cells
- DNA repair enzymes can be introduced into damaged cells

Chirality

- Chirality is a main feature of biology.
- Many molecular recognition processes are stereospecific eg. L-aminoacids and D-aminoacids
- Stereoisomers are molecules that are identical in atomic constitution and bonding, but differ in 3D arrangement of the atoms.

They are distinguished readily by biological systems and have different pharmacokinetic properties (absorption, distribution, biotransformation, excretion) and different pharmacologic & toxicologic effects.

- "Chiral Switching" - replacement of a racemic mixture of a drug by a signal enantiomer.

PATIENT EDUCATION

- The most neglected area of clinical practice
  - Time – a major issue for Indian clinicians
  - Internet – high quality information at
    - www.medlineplus.gov
    - Need to create more local content for India
  - Need to create the equivalent of Healthconnect

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Targeted Therapy of Cancer

Anti-angiogenesis :

- Role of angiogenesis in growth, progression and metastasis of solid tumours.
- Myeloma, leukemia, lymphoma-associated with increased angiogenesis in the bone marrow.

Thalidomide, withdrawn in the 1960s due to its teratogenic effects (phacomelia) has made a re-entry as anti-angiogenesis drug.

Lenalomide, an analog of thalidomide is 300 times more potent, with different profile of side effects (no constipation, sedation or neuropathy) but greater myelosuppression.

Effective in refractory multiple myeloma.

- Need of the day – Using ICT, Clinicians to move towards:
  - EMRs & EHRs
  - Quality information retrieval and updates
  - Computerized prescriptions
  - Pharmacovigilance
  - Computerized Patient Education methods

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Misuse of biotechnology

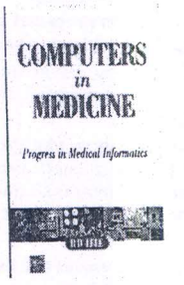
- Recombinant DNA and Genetically engineered microbes that evade known antibiotics can be used as biological weapons.
- Biological weapons are cheaper than conventional weapons.
- They are easily carried as aerosols, vials and bombs, difficult to detect
- Class A: Anthrax, small pox, plague
- Class B : Salmonella ,Typhus
- Class C:

Future practice of medicine

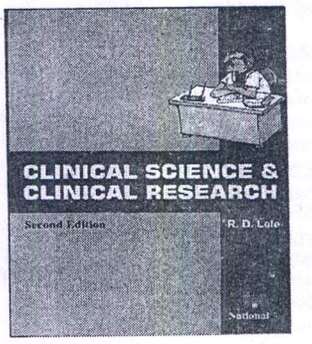
- Crucial role of information communication technology (ICT)
- internet
- Computerized patient record
  - On smart card or CD
- Computerized priscription in the patient's own language

Some Examples of new targeted therapy

- Blockage of growth factors overexpressed on cancer cell membranes: Combination of 4 synthetic peptides: VIP, SST, Bombesin and substance P. DRF7295.
- Blockade of angiogenesis in bone marrow: Thalidomide, lenalidomide – Multiple Myeloma

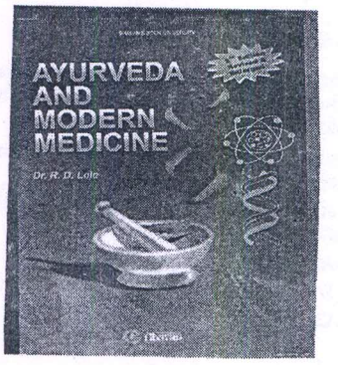


- Blockade of proteasomes : release of NFKB from NFKB-1KB. Bortezomib (Velcade) blocks this release, thereby depriving myeloma cells of growth stimulus
- Nanobodies/Aptamers/Antisense oligonucleotides: "Molecular velcros" blocking cell expression of mRNA in various cancer cells



"Primum non nocere"- Hippocrates

- "whatever good you may wish to do to the patient, at least do no harm"
- "the physician should regard his patients as his own begotten children, and vigilently guard them from all harm considering this to be his highest religion"- Charak samhita



PERSONALIZED MEDICINE FOR DIABETES

Dr. A.K. DAS
Professor of Medicine
JIPMER

- *Genetic variation* in humans was recognized as an important determinant of *individual variability of drug response* from clinical observations in late 1950s (Kalow and Staron, 1957; Kalow and Gunn, 1959; Evans et al.,1960)
- The availability of the *complete human genome sequence* has made it possible to analyze the impact of *variations of the human genome* sequence on the *pathogenesis of important diseases and the response to drug therapy* .
- Transformation of pharmacogenetics into a new entity of human genetics—pharmacogenomics

Pharmacogenomics -Relevance

- Genetic Polymorphisms of Drug Targets
- Genetic Polymorphisms of Drug-Metabolizing Enzymes
- Genetic Polymorphisms of Drug Transporters
- Genetic Variables Indirectly Affecting Drug Response
- Genetic Variables Affecting Adverse Drug Reactions
- Translating Pharmacogenomics into Clinics: Individualized Medicine
- Pharmacogenomics in Drug Development

Oral Anti diabetic Drugs	Genes identified for drug response	Genes/polymorphism identified in non responders
Sulfonylureas	KCNJ11 HNF1a ABCC8Ser1369Ala	KVNJ11Glu23Lys IRS-1Gly972Arg TCF7L2rs12255372G/T TCF7L2 rs7903146 T/C
Metformin	IRS-1Gly972Arg	STK11rs74165
TZD	PPAGPro12Ala PGC1∝Gly482Gly	APM1T45G APM1T276G LPLSer447X
∝Glucosidase Inhibitors	PGC1∝Gly482Ser	APM1T276G
DPP4 Inhibitors	TCF7L2	MTNR1Brs1387153 GLP1R T149M

SU & GENETICS

- 10-20% of treated individuals do not achieve adequate glycemic control using even the highest recommended dose (**"primary sulfonylurea failure"**)
- 5-10% of patients with T2D who initially respond to sulfonylurea treatment will subsequently lose the ability to maintain near-normal glycaemic levels (**"secondary sulfonylurea failure"**)
- **Pearson et al**, patients with **HNF1A, KCNJ11, ABCC8** mutations have shown good response with SU's compared to Metformin

- **Holstein et al** –type 2 diabetics with **KCNJ11 polymorphism Glu23Lys** were at **lower risk** for **hypoglycemia** induced by SU
- **GoDARTs** study with 4469 T2DM subjects found an **effect of TCF7L2** polymorphisms on the **failure of** treatment with **SU** derivatives
- Sulphonylureas are mainly metabolized by the enzyme cytochrome **P450 (CYP) isoform CYP2C9**.
- A recent population-based **Rotterdam study** showed that polymorphisms in **CYP2C9 gene affected the patient sensitivity to SU**

Sabina Semiz, Tanja Dujic, Adlija Causevic
Biochemia Medica 2013;23(2):154–71

METFORMIN & GENETICS

- Uptake of Metformin into hepatocytes by organic cation transporter **1 (OCT1) encoded by gene SLC22A1** is a critical step for achieving its hypoglycemic effects
- **Shu et al** , were the first to address this possibility by investigating 4 non-synonymous **SLC22A1 variants** (i.e. R61C, G410S, 420del, and G465R: all of which are associated with **reduced OCT1 function) in 21 healthy volunteers given Metformin**
- A study done by **Umamaheshwaran et al** in South Indian Population found that the frequency of OCT1 gene polymorphism was similar to the frequencies observed in African-Americans and other Asian populations

- **Shikata et al**. also investigated the role of OCT1 in the clinical response to Metformin
- **OCT2** (encoded by SLC22A2), expressed primarily at the basolateral membrane in the kidney tubular cells, facilitates uptake of metformin into proximal tubule cells
- **Song et al, 2008-** OCT2 polymorphism- Increased metformin Cmax and AUC and reduced renal clearance of metformin
- **Wang et al and chen et al** too studied the effects of OCT2 polymorphisms on metformin metabolism

THIAZOLIDINEDIONES & GENETICS

- Agonists for the nuclear receptor peroxisome proliferator-activated receptor-γ (**PPARG**)
- A specific common variant in PPARG (rs1801282; **Pro12Ala**) was initially shown to be associated with T2D and insulin sensitivity by Deeb et al
- **Rosiglitazone** was significantly more effective in diabetic patients **with Pro12Ala polymorphism of PPARG**
- A pilot study suggested **G/G genotype of resistin SNP-420** may be an **independent predictor of the reduction of FPG and HOMA-IR** (Homeostasis Model of Assessment- Insulin Resistance) by **pioglitazone**

- **Chang et al.** have suggested that rs296766 **polymorphism of AQP2** gene coding aquaporin-2 and rs12904216 **polymorphism of SLC12A1** with a key role in electrolyte movement across epithelia, represented risk factors for **TZDs-associated edema**
- The same study demonstrated that **female gender and older age** were also contributing factors to the **edema development** following TZDs treatment.

INCRETINS & GENETICS

- Gene variants in **TCF7L2, voltage-gated potassium channel, KQT-like subfamily, member 1 (KCNQ1) , and wolframin 1 (WFS1)** were associated with **decreased incretin secretion, decreased sensitivity of GLP-1 or GIP receptors**, or with **decreased suppression of glucagon secretion**
- **'t Haart et al**. used Metabochip -three genetic loci (**TMEM114, CHST3, and CTRB1/2**) had large effects on GLP-1 stimulated insulin secretion during hyperinsulinemic clamp
- Dutch DCS -West Friesland and GoDARTS
  - Matthijs L. Becker,1,2 Ewan R. Pearson,3 and Ivan Tkál4,5
  - International Journal of Endocrinology October 2013

ALPHA GLUCOSIDASE INHIBITORS & GENETICS

- In individuals carrying **Gly482Ser polymorphism of PGC1 gene**, Acarbose prevented the development of Diabetes mellitus
- Acarbose increased the risk of T2DM in patients with TT genotype of +276G/T **polymorphism of Adiponectin gene**

Neonatal diabetes

- Neonatal diabetes mellitus (NDM) is a form of monogenic disorder with an incidence of 1 in 90,000 live births in Italy
- NDM can be either permanent or transient
- India –not many systematic studies
- Mutations in SUR 1 , Kir6.2 , ABCC8 ,KCNJ11 are the most common causes of neonatal diabetes
- Success with sulfonyl ureas –in Kir6.2 and SUR1 mutations.
  - Jahnavi et al –Clin Genet 2013.

DM COMPLICATIONS & GENETICS

Diabetic Retinopathy:

- A study done by **Suganthalaksmi et al**, have shown significant association of **gene RAGE rs2070600** polymorphism with Diabetic retinopathy in Indian population

Diabetic nephropathy

- Multiple studies support association of the **ACE II genotype** with a **lower incidence of diabetic nephropathy** and the **I/D or DD genotypes with higher incidence**
- genetic variants of the **protein kinase C-B1 (PRKCB1)** gene recently were found to associate with **end-stage renal disease in T2DM**

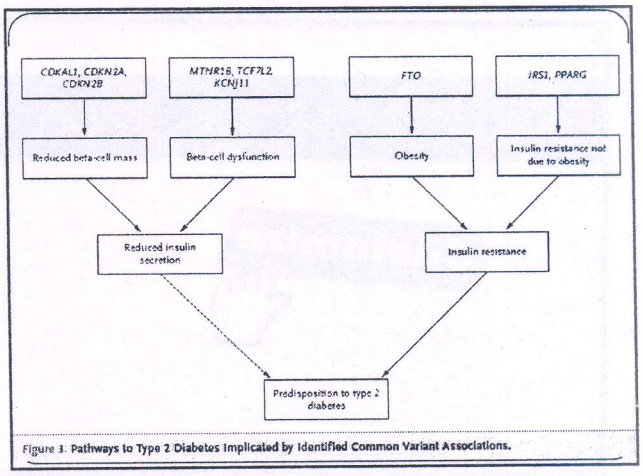
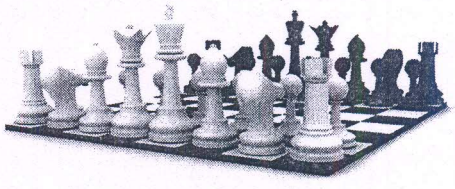


Figure 3. Pathways to Type 2 Diabetes Implicated by Identified Common Variant Associations.

1. PATIENT-CENTERED APPROACH
2. ANTI-HYPERGLYCEMIC THERAPY
3. OTHER CONSIDERATIONS
   - Age
   - Weight
   - Sex/racial/ethnic/genetic differences
   - Comorbidities

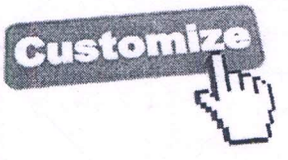


> *"...providing care that is respectful of and responsive to individual patient preferences, needs, and values - ensuring that patient values guide all clinical decisions"*

Diabetes Care 2012;35
Diabetologia 2012;55

PATIENT CENTERED CARE

- Patient involvement
- Explore therapeutic choices
- Utilize decision aids
- Shared decision making
- Adherence
- IN T2DM

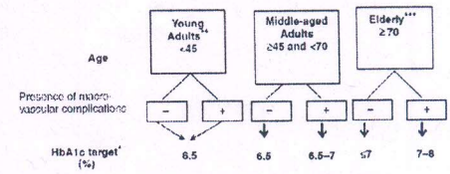


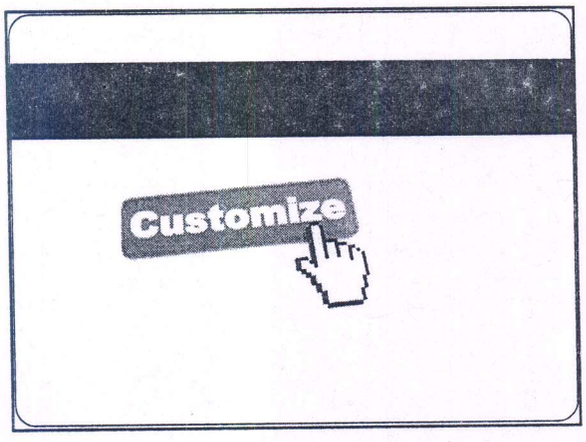
Patient subtype definition	HbA1c target/range	Recommendations for therapy/treatment
Individuals at risk of hypoglycaemia	7%–7.5% (53–58 mmol/mol)	Agents not associated with an increased risk of hypoglycaemia are preferable, as are those not contraindicated in renal insufficiency or liver dysfunction

- Use of existing technology and resources
- Genomics
- Harnessing newer technology

Patient subtype definition	HbA1c target/range	Recommendations for therapy/treatment
Diabetes in pregnancy	6.5%–7% (48–53 mmol/mol)	Insulin is recommended for glycaemic control during pregnancy; however, oral agents such as metformin may be considered on an individual basis

Personalized targets





Parameters for the characterisation of patients with type 2 diabetes, elderly and frail

Frailty criteria
- Care home residency
- Cognitive decline
- Significant lower limb mobility impairment
- Bedridden
- History of disabling comorbidities

Recommended glucose targets
- HbA_{1c} > 7.0 and <8.5% (> 53 and <69 mmol/mol)
- Fasting glucose: >126 and <162 mg/dl (>7.5 and <9.0 mmol/l)

Pharmacogenomics and the promise of personalized treatments in psychiatry

26 April 2014
Pharmacogenomics and personalized medicine

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COMMON PSYCHIATRIC DISEASES AND HUMAN GENETIC VARIATION

- Variation in allelic frequency in different populations: non –replication of linkage and association studies.
- Ethnic difference in disease presentation and outcome : variable but overlapping susceptibility alleles.
- Susceptibility and protective genes may have different population distribution.
- Critical to recognize the genetic architecture as it is characteristic of a trait in a particular population.

Mukherjee O et al., 2002

Pharmacogenetics

- Study of genetically determined interindividual variation in the therapeutic response to drugs and susceptability to adverse effects (Vogel 1959).
- The conceptual frame work for the pharmacogenetic investigation is by two major areas of study
  - Pharmacokinetics
  - Pharmacodynamics

Novel drug design or better understanding of disease biology

Issues in Pharmacogenomics & their application

- Gene to Target to Candidate selection
- Candidate to Clinic
- Genomics and kinetics: dose selection
- Predicting action, efficacy and adverse events
- Mitigating risks in development: epidemiological studies on clinical use and adverse events

Outcome of schizophrenia

- Outcome of *mania acuta* reported to be better in India than in asylums in the UK in the 19th century.
- Rapid 'social change', and 'progress' thought to contribute to insanity, though others felt causes were the same.
- More patients discharged to care of families
- Few comparative studies in first half of 20th century.
- Several studies in recent years.
- Magnitude of deviations in incidence and prevalence of schizophrenia relatively small compared to 10-fold differences in the prevalence of some other multifactorial diseases (IHD; DM); magnitude of deviance in outcomes seems higher (??)

Gene to target to candidate selection

- Few inputs directly from biology in neuro-psychiatry (PD exceptional)
- Monogenic diseases: large gap between gene discovery and Rx: Huntington's / Spino-Cerebellar Ataxias
- **Schizophrenia genetics**: current leads inadequate; the most promising (DISC, dysbindin, RGS4) have complex biology and unknown pharmacological value
- **Neuregulin**: SNP8-NRG221533 (C/T): TT genotype is overrepresented in the non-responders group compared with the responders
- Relation to mechanisms of known drugs unclear. Inadequate confirmation of direct association
- Drug outcomes may be 'pure phenotypes' and correlate better

Candidate to clinic

- **Few 'new' candidate drugs as yet: no radically new drugs developed**
- Some newer drugs in development act through glycine receptors, nicotinic receptors, COMT modulation and anti-apoptotic drugs.
- Animal modelling studies suggest a possible role
- Complex network analyses necessary
- None available at present
- Usual time from lab to phase1: 80% attrition; 8-15 years
- PGX could optimise this

Genes for schizophrenia

- Recent genetic linkage studies have identified candidate susceptibility genes for schizophrenia.

Gene	Locus	Populations studied	Prior linkage	Replication	Relevant transgenic reverse phenotype
NRG1	8p12-p21	Icelandic	Yes	Yes	Yes
DTNBP1	6p22	Irish	Yes	Yes	No
G72	13q34	French Canadian, Russian	Yes	Yes, within study	No
DAAO	12q24	French Canadian	No	No	No
RGS4	1q21-22	USA +2, Indian	Yes	Yes	No
COMT	22q11	USA, Israeli, Chinese	Yes	Yes*	Yes
PRODH	22q11	USA	Yes	Failed	Yes

NRG1=neuregulin-1, DTNBP1=dysbindin, DAAO=D-amino-acid oxidase, RGS4=regulator of G-protein signalling-4, COMT=catechol-O-methyltransferase, PRODH=proline dehydrogenase. *Some case-control studies have been negative. (Harrison & Owen 2003 *The Lancet* 361: 417)

- The modulation of excitatory transmission and in particular of NMDAR function appears to be the common link among most recently described susceptibility genes for schizophrenia.
- *Only few of these, or subsequent leads from GWAs studies, seem to have turned out as a pharmacological or disease correlate at present satte of knowledge.*

Region specific pharmacology: gene expression

- Drug binding differs within parts of brain
- **Differential distribution** i.e. it can have higher concentrations in region A than in region B.
- **Differential occupancy** i.e. for the same concentration, it can have greater occupancy in region A than in region B because of
  - differential local endogenous competition
  - different regional allosteric modulation
  - different regional receptor subtypes
- **Differential sensitivity** in terms of functional response i.e. for same equivalent levels of occupancy, functional outcome in region A differs from region B because of different numbers of spare receptors/different receptor-signal coupling mechanisms.

Complex genotype and complex phenotypes

- Similarly, subtypes of psychiatric illness (eg very early onset; or those that show definite decline) have shown more prominent association with eg 6p24 region
- Other defintions (associated with oculomotor abnormalities) or use of endophenotypes (CHRNA7/Chr15) amplified genetic signal
- Modelling studies suggest that more complex phenotype description that includes developmental, neuropsychological and drug response evaluations may be better
- *"new insights from the population distribution and behavioural effects of potential risk factors, treatments and markers suggested by biological and genetic resegrch rather than designs based on limited clinical samples"*

Phenomics and Genomics: inverse mapping: compare phenotypes and genotypes

- No confirmed, consistent co-relation between genetic variations and disease expression is currently available.
- Ethnically specific loci may contribute to differential clinical expression, disease outcome and drug response.
- **Analyses of matched clinical samples**
  or
  clinical profiles of probands with identical haplotypes at certain loci could be compared across populations
- **Gene X Environmental effects**

The Future of Psychiatric Research: Genomes and Neural Circuits

Akil H, Brenner S, Kandel E, Kendler KS, King MC, Scolnick E, Watson JD, Zoghbi HY. Science. 2010 Mar 26;327(5973):1580-1. doi: 10.1126/science.1188654.

- A parallel component of this effort is tackling the study of neural circuitry,
- in animal models and in human subjects,
- *And perhaps 'model systems' (cell culture/iPSC etc)*
- to allow functional insights into the way that these altered genes can disrupt circuit formation, function, and dynamics.
- *and be corrected*

Effect = affinity for site of action X drug concentration X biological variance

- Affinity for site of action: molecular modelling; drug-receptor interaction dynamics
- Drug concentration: metabolomics; CYP variation; blood-brain barrier kinetics
- Biological variance:
  - SNP variation
  - high-risk groups (clusters of poor outcome SCZ)
  - genetic epidemiology
  - ethno-pharmacology

SUMMARY: Alzheimer's disease in India

- The risk of AD and VaD in those with an ApoE4 allele was 3–4 times higher
- **AD subjects with ApoE4 have higher odds of DM (5.68)** than controls with ApoE4: Control of diabetes in APoE4 carriers mat influence occurrence of AD
- LOD is 4.7 times more in the Indian elderly with ApoE4
- Their may be some overlap with psychoses and depression

Summary

- Current approaches to personalized medicine hampered by incomplete understanding of basic biology/correlates of mental illness.
- Leads derived from population-based analyses, not easily translatable to the individual
- Inadequate knowledge about non-European populations as data sets are lacking.
- Future research that focus on individual tissue / biomarkers and correlate genetic variation and phenotype (at multiple levels) may accelerate the development of personalized approaches.

PERSONALIZED NUTRITION

Dr. ANURA KURPAD
Professor and Head, Division of Nutrition
St. John's Research Institute
Bangalore

Continued extracts…

- …it will take time for us to understand the complicated way (genes and environment) interact with each other and how to predict a true risk profile.

The need for 'omics' and personalization:
Some questions linked to nutrition

- Are all humans the same with respect to their response to diet?
  If not, humans must be fed differently according to the differences in their genetics and metabolic needs.
- Are these differences in humans self-evident?
  If not, genetic/physiological markers must be developed to measure the basis of differences between humans.

Personalized diets, personalized lifestyles

Measurement of whole body function

- Growth
- Body composition
- Muscle function
- Endocrine function
- Neural/Cognitive function
- Immune function
- Gastrointestinal function
- Respiratory function
- Cardiovascular function
- Renal and hepatic function

Craig Venter – Dimbleby Lecture, BBC,

December, 2007

"Let me give you a few examples to illustrate some of what I have found."

- There is a gene that is associated with the ability to degrade environmental toxins…in my own genome I found only one copy… perhaps that is why I am more susceptible to environmental toxins (wheezing).
- …one gene called APO E that is responsible for regulating levels of certain fats in the bloodstream.
- …my body's ability to rapidly metabolize caffeine. I drink many cups of coffee per day but fortunately, I carry the rapid metabolizing version of the gene.

Studying the static vs dynamic

What does a metabolome or proteome mean?

It is a snapshot – a single point in time

Is it consistent with the general state during the day?

The phenotype – the physiology…

- Is complex
- Is variable
- Is changing continuously: dynamic
- Is conditional
- Is responsive to endogenous signals (regulation)
- Is responsive to exogenous signals (environment)
- Changes over the lifespan

While it can be associated with genomic information to understand the components of phenotypic variation that are due to genetics, understanding genotype–phenotype relationships is becoming more dependent on the availability of high-quality phenotypic and environmental information.

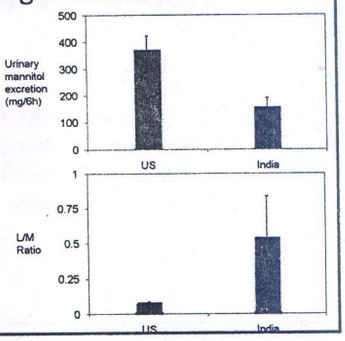
REVIEW

Next-generation phenotyping: requirements and strategies for enhancing our understanding of genotype–phenotype relationships and its relevance to crop improvement

Jessica N. Cobb · Genevieve DeClerck · Anthony Greenberg · Randy Clark · Susan McCouch

Differences in gut function

- 10 NPNL young women in each country
- Lactulose / mannitol absorption & excretion
- Index of absorptive capacity and gut permeability



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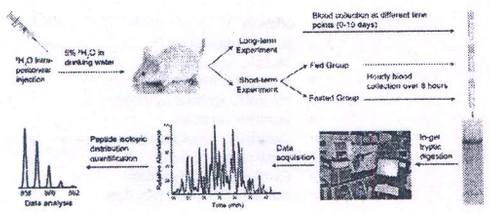
Flow chart for experimental design and analysis of proteome dynamics in an in vivo rat model.



Li L et al. Mol Cell Proteomics 2012;11:M111.014209

Terms of endearment

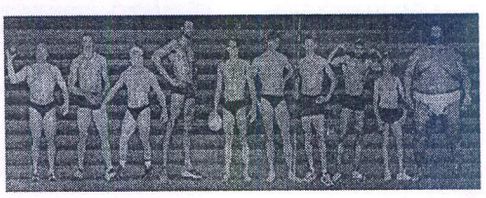
- Variability
- Homeostasis
- Regulation
- Adaptation

Steady state

- Requires a steady state of enrichment
- Can be modeled with non-steady states with a single dose of heavy water in humans

Variability of the human race

- Leading elite male athletes in various sporting events
- All healthy humans are not the same
- Actual variability in genome ~1 %



German et al, J Nutr, 2003

Everything is variable

- Fasted state BMR: 5% variability
- Fasted vs fed
- Thermoneutral vs hot/cold
- Ultradian/circadian rhythms
- Aging
- Mental state

The key is to define this- a single snapshot of a metabolome is not very helpful

Layers of complexity in the phenotype

- Steady state to minimize variability
- Different physiological conditions
- Perturbations of the physiological steady state
- Different steady states under sustained perturbation
- Adaptation and regulatory responses

Homeostasis & Adaptation

Homeostasis
- Keeps things constant
- What is constant – a pinpoint or a range?
- pH? Glucose? BP?

Adaptation
- Ability to cope with altered environment
- Accommodation
- Dys-adaptation
- New homeostasis

The importance of classical physiology

- To limit the likelihood of false discovery, studies would need to be large and the search for interaction should be restricted to biologically driven hypotheses.
- *The emphasis should be on precision of measurement of both phenotype and lifestyle behavior.*

Franks et al, 2007

Regulation

- Neural or humoral
- Cascades – amplification
- Feedbacks
- Tachyphylaxis
- Epigenetics

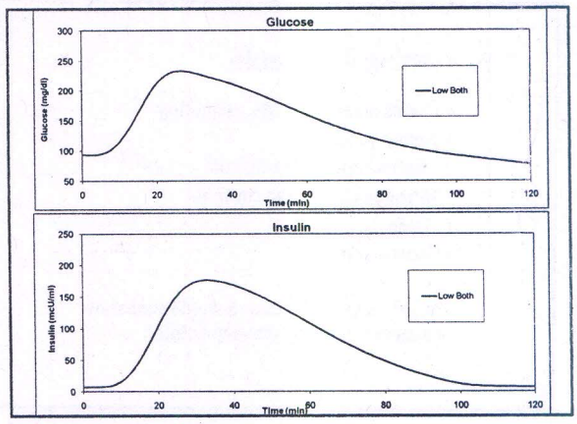
3 examples

- Advice about blood sugar regulation
- Advice about metabolic flexibility
- Advice about the perfect BMI

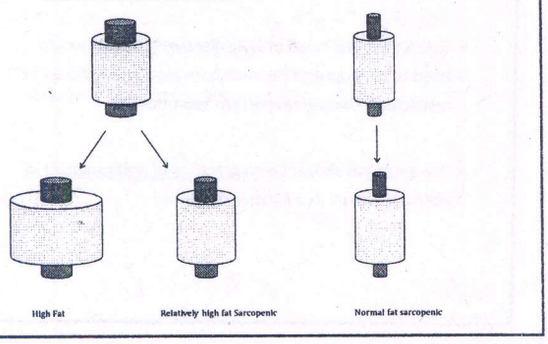
High blood glucose and insulin resistance – pieces of the puzzle

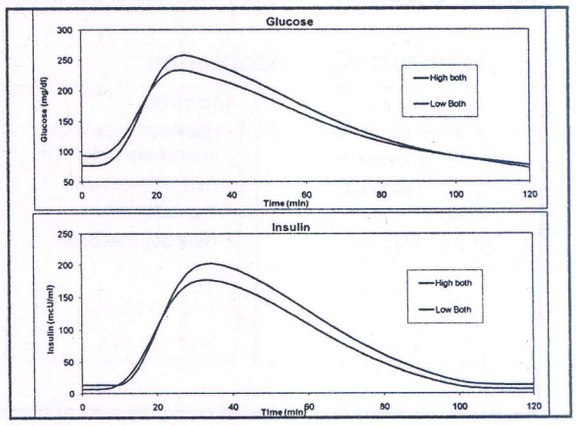
- High fat – insulin resistance
- Low muscle mass – poor glucose disposal
- Islets and liver – Insulin secretion

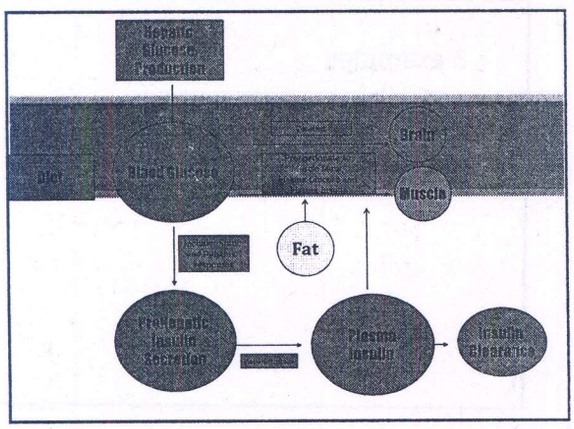
- Measuring fat is now easy: what about muscle?



Adults – fat accretion on a thin frame - insulin resistance







Historical asides on muscularity in Indians

Richard Burton: 1842-1849
Goa and the Blue Mountains:

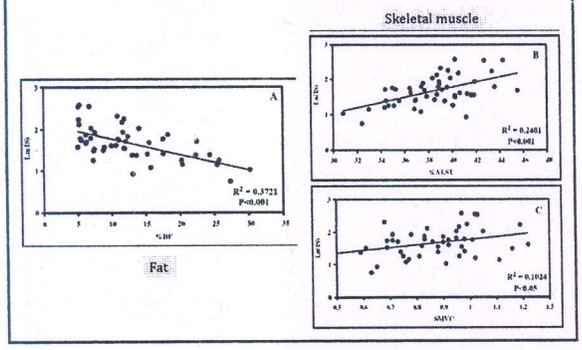
...short and small, with concave chests, the usual Indian calfless leg and a remarkable want of muscularity...
...a mixture of sensuality and cunning about the region of the mouth...

William Howard Russell: 1858-1859
My Diary in India:

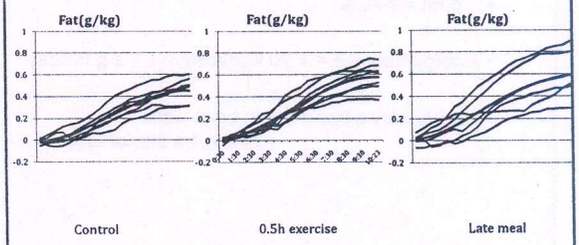
...lean, hollow-thighed, calfless...

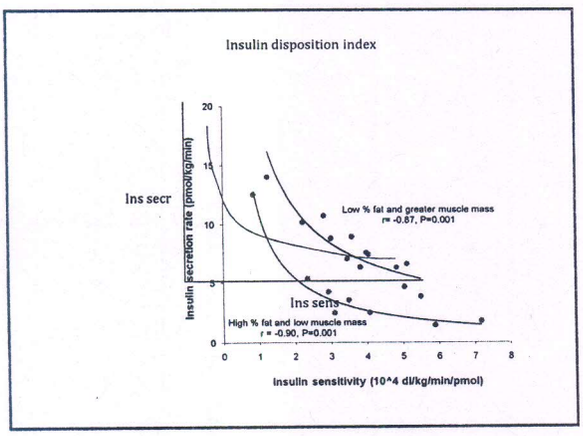
Anthropometry and Muscle Strength vs. Insulin sensitivity

Unni et al, EJCN, 2009



Cumulative fat oxidation - night





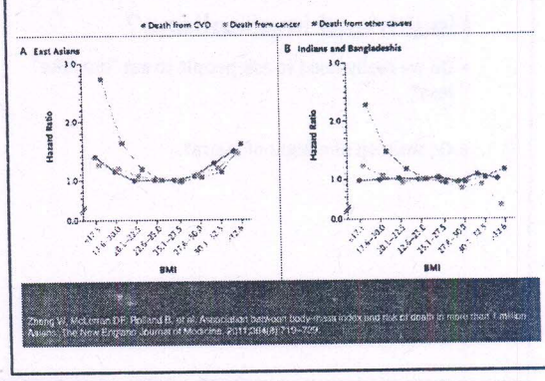
BMI and body composition

- BMI has not changed much in India- but chronic disease appears to have - diabetes
- Fuss and bother about the BMI cut-off derived for populations

Metabolic flexibility

- The ability to change substrate oxidation in response to what is eaten
- We changed two things in normal men:
  - Exercise before sleeping
  - Eating late and sleeping

Asians



What are we looking at?

- 1 g fat = 9 kCal
- Energy Balance = + 20 Kcal/day = ~ + 2 g fat/day
- That is very small = 3 min brisk walk
  = one extra bite of food

A tiny positive balance – really?

- = 60 g/month
- = 0.7 Kg/year
- = +0.3 unit BMI/year
  in a 60 kg, 1.7 M person

  = + 1 unit BMI in 3 years

Health and implications?

- Do we really need to ask people to eat "one bite" less?
- Or, walk up one flight of stairs?

300 copies only

Dear Delegate,

Sri Devaraj Urs Academy of Higher Education & Research, Kolar, invites you to attend the **'5th National Research Seminar'** on ***"Personalized Medicine – The Emerging Paradigm"*** on **April 25-26, 2014.** This scientific program intends to bring to a common platform scientists and researchers through their talks and presentations and put forward strategies in Personalized Medicine. This is intended to create a conducive environment for information exchange and application in clinical patient care. Personalized Medicine promises many medical innovations and has the potential to change the way treatments are discovered and used.

Conference Highlights:

- Landmark Developments leading to Personalized Medicine
- Clinical aspects of Personalized Medicine
- Personalized Medicine Genomics
- Molecular Diagnostics in Personalized Medicine
- Pharmaceutical Analysis in Personalized Medicine
- Bio-Medical devices- Scope and future in Medicine
- Personalized Medicine in Cancer, Cardiovascular Disease & Diabetes

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SDUAHER

Fifth National Research Seminar

on

"Personalized Medicine - The Emerging Paradigm"

25 - 26 April, 2014

Sri Devaraj Urs Academy of Higher Education & Research
(A Deemed to be University under UGC, Govt. of India)
Kolar-563 103, Karnataka, India
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SRI DEVARAJ URS ACADEMY OF HIGHER EDUCATION & RESEARCH, KOLAR

Fifth National Research Seminar on

"PERSONALIZED MEDICINE – THE EMERGING PARADIGM"

Scientific Program Schedule

Day 1: 25th APR 2014 (Friday)

8.30-9.30 a.m		Registration	
9.30-10.00 a.m	**Inauguration**	*Guests* : **Mr. Rajesh N Jagadale,** Chancellor,SDUAHER **Prof. G. Padmanabhan,** Former Director, IISc *Presided by* : **Sri. RL Jalappa,** Chairman, SDUET *Inaugural Address* : **Dr P.F.Kotur,** Vice-Chancellor,SDUAHER	
10.00-10.45 a.m	**Prof. G. Padmanabhan,** Former Director, IISc, Bangalore	**Key Note Address on** "Drugs & Drug Targets against Malarial Parasite"	
	Speakers	*Topic*	*Chairpersons*
10.45-11.30 a.m	**Dr. Anura Kurpad** Prof in Physiology & Nutrition St. John's Medical College & Hospital, Bangalore	Personalized Human Nutrition	Dr. R.D. Lele Dr. Karthiyanee Kuity T
11.30-11.45 a.m		**TEA BREAK**	
11.45-12.30 p.m	**Dr. R.D. Lele** Hon.Chief Physician & Director of Nuclear Medicine Jaslok Hospital, Mumbai	"Twenty landmark concepts and Technological Developments in the 20th Century which have made Personalized Medicine a reality in the 21st Century	Dr. Mohan Badagandi Dr. Raghavendra Prasad. BN
12.30-1.00 p.m	**Dr. Ashok Kumar Das** Prof. & Head of Endocrinology JIPMER, Puducherry	Status of Diabetes in India & Personalized Approaches to Management	Dr. Prabhakar. K Dr. Muninarayana. N
1.00-1-15 p.m	**Dr. Anura Kurpad** **Dr. R.D. Lele** **Dr. A.K. Das**	Open Forum	
1-15-2.00 p.m		**LUNCH BREAK**	
2.00-2.55 p.m	**Dr. Karl E Arfors** Prof. Emeritus Karolinska Inst. Of Research Stockholm, Sweden	Microvessel Inflammation & its Role in Cardiovascular Diseases & Coronary Heart Disease	Dr. P.R.Krishnaswamy Dr. CSBR Prasad
2.55-3.50 p.m	**Dr. Vijay Chandru** CEO, Strand Life Sciences Bangalore	Affordability as Driver of Innovation in Genomic Medicine	Dr. A.V.M. Kutty Dr. Shashidhar. K.N
3.50-4.05 p.m		**TEA BREAK**	
4.05-4.45 p.m	**Dr. Naren P Rao** Inspire faculty Centre for Neuroscience Indian Institute of Science Bangalore	"Personalized medicine in Psychiatry: Quest for predictors of treatment response"	Dr. S.R. Prasad Dr. Mohan Reddy. M
4.45-5.00 p.m	**Dr. Karl Arfors** **Dr. Vijay Chandru** **Dr. Naren P Rao**	Open Forum	

Fifth National Research Seminar on

"PERSONALIZED MEDICINE – THE EMERGING PARADIGM"

Scientific Program Schedule

Day 2: 26th APR 2014 (Saturday)

	Speakers	*Topic*	*Chairpersons*
9.30-10.15 a.m	**Dr. Mohan Badagandi** Head of Dept. of Endocrinology & Diabetes Manipal Hospital, Bangalore	Type 2 Diabetes & Cardiovascular Disease Risk-Need for Personalized Diabetes Care	Dr. Lakshmaiah. V Dr. Narendra Datti
10.15-11.00 p.m	**Dr. Karl E Arfors** Prof. Emeritus Karolinska Inst. Of Research, Stockholm, Sweden	Type 2 Diabetes & Inflammation - Role of fast Carbohydrates & Insulin Resistance	Dr. R.D.Lele Dr. B.G.Ranganath
11.00-11.15 p.m		**TEA BREAK**	
11.15-12.00 p.m	**Dr. Surendra Ugale** Laparascopic Surgeon Kirloskar Hospital, Hyderabad	Surgical management of Type 2 Diabetes	Dr. HT Gangal Dr. M.Madan
12.00-12.45 p.m	**Dr. Navakant Bhat** Professor, Dept. of Electrical Communication Engineering, IISc, Bangalore	Nanotechnology & Point of Care Diagnostics	Dr. Karl Arfors Mrs. Shobha Devi. N
12.45-1.00 p.m	**Dr. Mohan Badagandi** **Dr. Navakanth Bhat** **Dr. Surendra Ugale** **Dr. Karl Arfors**	Open Forum	
1.00-2.00 p.m		**LUNCH BREAK**	
2.00-2.30 p.m.	**Dr. Ashish Dixit** Consultant in Clinical Hematology and Blood & Marrow Transplant Manipal Hospital, Bangalore	Targeted Therapy in Haemato- Oncology	Dr.Harendra Kumar ML Dr. KNV Prasad
2.30-3.00 p.m	**Dr.Sanjiv Jain** Prof. in Psychiatry NIMHANS, Bangalore	Pharmacogenomics in Personalized Medicine	Dr. Sarala. N Dr. Mithesh Shetty
3.00-3.15 p.m		**TEA BREAK**	
3.15-3.45 p.m	**Dr. Ramesh Makam** Consultant Laparoscopic Surgeon, Bangalore	Physicians Manage Diabetes, Can Surgeons Cure it?	Dr. Venkatrathnamma .PN Dr. Krishnaprasad . K
3.45-4.15 p.m.	**Dr. HT Gangal** Former Professor of Surgery, KIMS, Hubli	"Translating Clinical Evidence into Practice The Challenges"	Dr. Pushpa P Kotur Dr. Sriramulu. PN
4.15-4.45 p.m	**Dr. Karl E. Arfors** Prof. Emeritus Karolinska Inst. of Research, Stockholm, Sweden	**Valedictory Address**	Dr. PF Kotur Dr. AVM Kutty