

IIT Bombay – Monash Joint Institute Colloquium on Wednesday, November 30, 2011. The details are as follows:

Titles and Speakers :



- **Advances in brain medicine, crossing historical divides**
by **Prof. Ed Byrne**
President and Vice-Chancellor, Monash University, Australia.



- **Nanobioengineering for Healthcare**
by **Prof. Jayesh R. Bellare**
Department of Chemical Engineering IIT Bombay



- **Start-Up Business Models**
by **Prof. Alan Finkel**
Chancellor, Monash University, Australia



- **Stabilization of microtubule dynamics induces defects in cell polarity and inhibits cancer cell migration: Implications in cancer metastasis**
by **Prof. Dulal Panda**
Department of Biosciences and Bioengineering, IIT Bombay

Day & Date : Wednesday, November 30, 2011
Time : 3.00 p.m.
Venue : Lecture Hall No. 23, Second Floor, VMCC

All are invited.

Abstracts:

Advances in brain medicine, crossing historical divides

by
Prof. Ed Byrne
Professor, President and Vice-Chancellor, Monash University, Australia

The development of a full understanding of pathoetiology followed by effective treatments for brain disorders is one of the main tasks ahead for medical science in the 21st century. This involves a journey through several stages: delineation of clinical entities supported by a knowledge of neuroanatomy; increased understanding of pathogenesis through advances in biochemistry, immunology and pathology; molecular revolution with the development of a whole range of insights and new tools related to the evolving D&A story; and finally but most importantly, the linkage of information from basic neuroscience to a fuller elucidation of clinical phenomenology. Taken together these advances are likely to see a full understanding of brain disorders with improved treatments over the next few decades.

The two dominant energy carriers for a modern economy are petroleum-derived fuels and electricity. High prices for petroleum, coupled with increased awareness of the environmental impact of the combustion of fossil fuels, are driving a wave of innovation in new energy technologies. Implementation of these replacement technologies requires long-term investment in infrastructure, development of new policies and legislation, and careful analysis of the social and environmental impacts of new technologies. Over the past three decades, Canada has developed the oil sands into a major world petroleum reserve. This presentation will review the technical innovation and policy decisions that enabled investment in the oil sands, and discuss the challenges in managing the social and environmental impacts of a major new industry. This Canadian experience offers important lessons for India as it develops new energy industries based on renewable resources.

Nanobioengineering for Healthcare

by
Prof. Jayesh R. Bellare
Department of Chemical Engineering, IIT Bombay

Nanotechnology has captured the attention of society in recent times. Human health care products of diagnostic as well as therapeutic nature arising from nanobioengineering are having the most significant impact in the growing field of nanotechnology. However, despite the immense potentials, several challenges delay or prevent speedy and efficient translation from bench to bedside. This talk is a broad overview of several of our ongoing investigations in the area of nanobiotechnology and nanobioengineering with therapeutic applications as the focus. Drug delivery with nanomedicines is one important area, but the ongoing investigations also cover a wide spectrum of biomaterials, thereby addressing both fundamental and applied aspects, since a fundamental understanding of nanoscale behavior is required so as to make an impact on applications which are sometimes very macroscopic, as in the case of bulk nanomaterials and devices.

Among the areas covered are: Novel surfactants nanoparticles with herbal additives for respiratory disease; Ophthalmic drug delivery; Nanocomposites for dental and orthodontics use; Micro-devices for cardiac use; and Nano particles in traditional medicinal systems (Ayurvedic Bhasmas). The deliverables with health care impact will include: Nanoparticle and Polymeric anti-cancer drug delivery systems; Neonatal and adult surfactant therapy product for respiratory distress syndromes; Eye-drops that reach the posterior chamber of the eye; Tissue-engineered dental and bone replacement with nano-composites; Bone plates based on nanoparticulate bioglass; Mechanistic understanding of bhasmas; and microengineering for minimally invasive surgery.

From an application viewpoint, this work is at a preliminary stage due to the safety and regulatory issues involved, and extensive in-vitro and in-vivo trials are now needed to bring this closer to human applications. These diverse examples show the immense power and potential that nanotechnology has in healthcare, and, at the same time, illustrate the joys and frustrations of bringing them from bench to bedside.

Start-Up Business Models

by
Prof. Alan Finkel
Chancellor, Monash University, Australia

The presenter will share some of his experiences from starting up Axon Instruments, a manufacturer of precision neuroscience instruments for the pharmaceutical industry and academic community, and from starting up Cosmos Magazine, Australia's premier science magazine for the lay community. He will also share his experiences at Better Place, the global charge network provider for electric cars.

Stabilization of microtubule dynamics induces defects in cell polarity and inhibits cancer cell migration: Implications in cancer metastasis

by
Prof. Dulal Panda
Department of Biosciences and Bioengineering, IIT Bombay

The assembly dynamics of microtubules plays an important role in proper chromosome segregation during mitosis of eukaryotic cells. Several microtubule-targeted agents such as estramustine and griseofulvin suppress microtubule dynamics leading to a defective chromosome segregation (Mohan and Panda 2008 Cancer Research 68, 6181-6189, Rathinasamy et al; 2010 BMC Cancer, 10, 213). Perturbation of microtubule dynamics also causes the accumulation of check point proteins like BubR1 and Mad2 at the kinetochores, which halt the cell cycle progression at G2/M phase. Since cell migration is a key process during cancer metastasis, we investigated the role of microtubule dynamics in cell migration. We found that subcytotoxic concentration of indanocine, a small molecule inhibitor of microtubule assembly, reduced the migration of highly metastatic MDA MB-231 cells. Using time lapse microscopy, the rate of migration of MDA MB-231 cells was determined to be $1.7 \pm 0.3 \mu\text{m}/\text{min}$ and 5 nM indanocine reduced the migration rate by ~58%. Moreover, indanocine treated cells were found to be defective in lamellipodium formation and could not develop polarized cell morphology. The reduction in cell migration by indanocine was found to be associated with an increase in the level of acetylated microtubules. Further, the compound stabilized microtubule dynamics in live MDA MB-231 cells. In addition, by live cell imaging of GFP-EB1 transfected cells and immunostaining of endogenous EB1, we observed that indanocine treatment caused a perturbation in the localization of EB1 at the plus ends of microtubules. EB1 was found either in the cytoplasm or localized as dots on the plus ends of microtubules in indanocine treated cells instead of the regular comet like pattern in vehicle treated cells. The results indicated that spatial regulation of the stability of microtubules is required to coordinate cell migration as well as adhesion turnover and support the hypothesis that the perturbation in microtubule dynamics by tubulin-targeted agents may be exploited to restrict the migration of tumor cells; thereby expanding their present clinical utility.