



# The NGS MIPS Herald

NITTE

The Official news letter of the Nitte Gulabi Shetty Memorial  
Institute of Pharmaceutical Sciences, Mangalore

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## Drug Targeting to the Brain

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### **VISION**

To build a humane society through excellence in education and health care.

### **MISSION**

To develop Nitte University as a centre of excellence, imparting quality education, generating competent, skilled manpower to face the scientific and social challenges with a high degree of credibility, integrity, ethical standards and social concern.

*'For Private Circulation Only'*

*From the Editor's desk*

Friends

The year 2011 has been very eventful. The world economy saw a downward swing, many countries facing severe recession. However, the pharmaceutical industry held its forte with decent growth rate during the year.

A fall out of the global recession is diminished employment opportunities. The pharmaceutical sector is also no exception. Despite the shortage of trained medical and paramedical personnel in the country, the industry has shied away from going for expansion and new recruitment. The situation is quite paradoxical.

The New Year holds much promise for the students. While the engineering courses continue to be the preferred choice of large number of students, there is a renewed interest in pharmaceutical sciences. Some of the initiatives that are to be taken up to make the pharmacy course attractive and more relevant are

1. Exposure to industry in an effective manner during the study
2. Up gradation of the syllabi keeping the requirement of the prospective employer in mind.
3. Exposing the students to the recent advancement made in the area – both at undergraduate and post graduate level.

That reminds me of the 33<sup>rd</sup> Annual conference of Indian Association of Biomedical Scientists to be held in the first week of November 2012 and will be organized by Nitte University. More than thousand delegates from India and abroad are expected to participate in the conference. With the theme **“Recent trends and advances in biomedical research - an integrated approach”**, the conference would provide a platform to all the researchers, scientists and academia to exchange their findings in the area of biomedical sciences.

With a new vigor, resolve and vision, let us greet the New Year.

**Wishing you all a very happy, prosperous and successful new year.**



**C.S. Shastry, Editor in-Chief**

**Guest Lectures**



**Dr. G. Jagadeesh**



**Dr. Ravindranath Aithal**



**Dr. Harsha Halahalli**



## CAMPUS BUZZ

### Inauguration of the NGSMIPS Student Council



*Capt. Ganesh Karnik lights the ceremonial lamp. Also in the picture are Dr. C.S. Shastry, Mr. Adithya Rao, Former Student Presedint and Mr. Praveen Agarwal, incoming President*

The Institution celebrated the inauguration of its new Student Council for the academic year 2011-2012 in an impressive function held at the K.S.Hegde Auditorium on November 16, 2011. The new team is headed by Mr. Praveen Agarwal of the III Year B.Pharm. Captain Ganesh Karnik, MLC & Deputy Chairman, NRI Forum, Govt. of Karnataka was invited to be the Chief Guest and the formal ceremony was presided over by Dr. C.S. Shastry, Principal.

#### Members of the Student Council

##### President

Mr. Praveen Agarwal, *III B.Pharm*

##### Vice President

Mr. Ananth Vinayak Prabhu, *III B.Pharm*

##### General Secretary

Ms. Zunaira Mohammed Sharief, *II B.Pharm*

##### Cultural Committee

Mr. Subhash Nayak, *III B.Pharm*

Ms. Safa Hassan, *II B.Pharm*

Ms. Flancita D'Souza, *II B.Pharm*

##### Sports Committee

Mr. Zainul Azeem Sheikh, *III B.Pharm*

Ms. Murshida Banu, *II B.Pharm*



*The new members of the Student Council with their President, Mr. Praveen Agarwal*

### Literary Committee

Ms. Melanie Viola D'Souza, *III B.Pharm*

Mr. Lenson Paul D'Souza, *III B.Pharm*

Ms. Ritika Iris Mascarenhas, *II B.Pharm*

In the cultural programme that followed, there was enthusiastic participation from both UG and PG students. Not far behind were the freshers who also put up a wonderful show that culminated in a colorful and imaginative Fashion Show.

### Guest Lectures

A series of guest lectures were conducted in the final quarter of 2011.

Dr. Ravindranath Aithal, renowned Herpatologist from Puttur delivered a lecture on, "Snakes, snake bite poisoning and its management" on October 10<sup>th</sup>, 2011. The discourse included description of various types of venomous snakes of South East Asia such as Cobras, King Cobra, Kraits, Coral snakes and the sea snakes; composition of snake venom, signs and symptoms of snake bite and treatment and first aid after snake bite.

Dr Harsha Halahalli MD, Associate Professor, Dept. of Physiology, KS Hegde Medical Academy, Nitte University lectured on the subject, "Searching and Citing Biomedical Literature" on December 2<sup>nd</sup>, 2011. The lecture attended by M.Pharm students, research scholars and faculty gave valuable insight on the right methods of literature search, reference citation and writing research protocols.

On 5<sup>th</sup> December, 2011, Dr. Jagadeesh, Expert Pharmacologist, Division of Cardiovascular and Renal Products, Center for Drug Evaluation and Research, US Food and Drug Administration (USFDA), Silver Spring, Maryland, USA delivered a lecture on, "Drugs and Drug targets and Getting started in research: The Basic Concepts of Scientific Research for PGs and Beyond"

Dr. G. Jagadeesh who is an Alumnus of Government College of Pharmacy, Bangalore is working at USFDA and is responsible for Drug Evaluation and Research. He touched upon on the various aspects of Drug Design and Development and recent Advancement in the area of Pharmaceutical Sciences. The Lecture was attended by Post Graduate students, faculty members and Research Scholars of Nitte University.

Mr. Soumen Paul, Research Scholar, Netherlands and also an alumnus of NGSMIPS was invited to lecture on the topic, "Advances in Adenosine Receptors" on the 14<sup>th</sup> of December, 2011.

### Staff Development Program for Senior Faculty at NGSMIPS

A one day work shop was organized by the Nitte University as a part of the Staff Development program on the subject, 'Leadership for Senior Faculty of Pharmacy and Nursing Colleges' on 1<sup>st</sup> December, 2011 by Mr. George Sebastian, Professor and Trainer, India and Canada. The workshop was attended by several senior staff of the Nitte Usha Institute of Nursing Sciences as well as from NGSMIPS.

## DEPARTMENT ACTIVITIES

### DEPARTMENT OF PHARMACEUTICAL CHEMISTRY

#### Research Publications

**DR. D.SATYANARAYANA**, Professor

1. Formulation development and evaluation of analgesic activity of screx-2b gel from isolated constituents of *Syzygium cuminii* (L) *skeel* roots. *Research Journal Topical and Cosmetic Sciences*. 2011; 2(1):30-32.
2. Analgesic activity of the isolated constituent *Syzygium cuminii* (L) *skeel*. *Research Journal Pharmacognosy and Phytochemistry*. 2011; 3(4):178-179.
3. Analytical parameters of isolated constituents of roots *Syzygium cuminii* (L) *skeel*. *Asian Journal Research Chem*. 2011; 4(10):1540-1543.

**DR. K.ISHWAR BHAT**, Professor

1. Biological evaluation of Aminobenzylated Mannich bases of p-fluoro benzaldehyde. *International Journal of Pharm Tech Research* 2011; 3(4)1904-1908.
2. Synthesis, Characterisation and biological activity studies of 1, 3, 4-oxadiazole analogs. *Journal of Young Pharmacists* 2011; 3(4): 310-314.

**DR. JENNIFER FERNANDES**, Professor and **DR. RONALD FERNANDES**, Professor

Anti-inflammatory activity of fruits of *Sapindus trifoliatus* Linn. *Journal of Pharmacy Research* 2011; 4(11): 3933-3934

**DR. JANE JACOB**, Assoc. Professor

Analytical methods for the estimation of Candesartan in Pharmaceutical Formulations. *Journal of Pharmacy Research*. November 2011; 4(11)

#### PAPERS PRESENTED AT CONFERENCES

**Dr. K. Ishwar Bhat** presented a paper as oral presentation on the research paper entitled, "Synthesis, Pharmacological and biological screening of novel isoxazoline derivatives derived from chalcones" held at the Department of Chemistry, Osmania University, Hyderabad from Dec 28<sup>th</sup>-30<sup>th</sup>, 2011 at the 30<sup>th</sup> Annual Conference, Indian Council of Chemists.

The following faculty presented their research papers at the International Conference on Synthetic and Structural Chemistry (ICSSC-2011) organized by the Department of Studies in Chemistry, Mangalore University, Mangalagangothri, Mangalore from Dec 8<sup>th</sup> -10<sup>th</sup>, 2011.

1. **Dr. Jennifer Fernandes**, presented a poster on the research paper entitled, "Evaluation of the protective potential of *Averrhoa bilimbi* leaf extract of acetaminophen-induced liver damage"
2. **Dr. Jane Jacob** presented a poster on the research paper entitled, "Analytical methods developed for the estimation of Rizatriptan in bulk and pharmaceutical formulation"
3. **Mr. Abhishek Kumar**, Lecturer, presented a paper as oral presentation on the research paper entitled, "Synthesis, antimicrobial, analgesic and anticancer Activity of some substituted pyrimidines"
4. **Mr. Pankaj Kumar**, Lecturer presented his research paper entitled, "Synthesis of 5-Quinolinamines as potent antimalarial agents" as an oral presentation.
5. **Ms. Jainey P. James**, Lecturer presented a poster on the research paper entitled, "Anticancer studies of some heterocycles derived from chalcones against DLA cell lines" at the 63<sup>rd</sup> Indian Pharmaceutical Congress (IPC) held at Bangalore from Dec 16<sup>th</sup> -18<sup>th</sup> 2011.

### DEPARTMENT OF PHARMACEUTICS

#### Research Publications

**DR. R. NARAYANA CHARYULU**, Professor

1. Formulation, optimization and evaluation of a gastro buoyant multiparticulate system of famotidine using hypromellose phthalate. *International Journal of Pharmaceutical Sciences Review and Research*, 2011; 10(1): 152-158.
2. Development of Gastro Retentive Floating Matrix Tablets of Diltiazem Hydrochloride. *Nitte University Journal of Health Sciences*, 2011; 1(1-.3):38-45

**DR. MARINA KOLAND**, Professor

*In vitro* and *in vivo* evaluation of chitosan buccal films of ondansetron hydrochloride. *Int J Pharm Invest*, July 2011; 1(3), 164-171

**DR. PRABHAKARA PRABHU**, Assoc. Professor

Investigation of nano lipid vesicles of methotrexate for anti rheumatoid activity. *Int J Nanomedicine*. 2011; 6: 1-10

**MR. AMIT B. PATIL**, Lecturer

1. Development and evaluation of medicated Soap Strips of Clotrimazole for Dermal Infections. *Int J. Res Pharm Sci*, 2011; 2(3):525-528.

2. Design and preclinical studies of miconazole soap strips for dermal infections. *Int. J Institutional pharmacy and life sciences*, 2011; 1(1):68-76.

**MS. SNEHPRIYA**, Lecturer

1. Preparation and evaluation of buccal mucoadhesive patch of betamethasone sodium phosphate for the treatment of oral submucous fibrosis. *J Chem Pharm Res*, 2011, 3(6), 56-65
2. Self-emulsifying systems of aceclofenac by extrusion/spheronization: formulation and evaluation. *J Chem Pharm Res*, 2011, 3(2), 280-289

### PAPERS PRESENTED AT CONFERENCES

**Dr. Marina Koland** presented a paper entitled, "Bioadhesive polymeric matrix patches for buccal delivery of Tizanidine Hydrochloride and Diclofenac Potassium" at the 2011 AAPS Annual Meeting and Exposition, October 23-27, 2011 in Washington D.C., U.S.A

**Mrs Nisha Girish Shetty**, Senior Lecturer, also presented her research paper entitled, "Investigation of an in situ gel forming solution of imidazoline drugs for ocular administration" at the 2011 AAPS Annual Meeting and Exposition, October 23-27, 2011 in Washington D.C., U.S.A

### Workshops/Seminars Attended

**Ms. Sneh Priya** attended a three day, DST- India and Royal Society-UK sponsored seminar on "Biomaterials as Drug Delivery Matrices" on November 14<sup>th</sup> to 17<sup>th</sup> 2011, organised by Manipal College of Pharmaceutical Sciences, Manipal

### STUDENT ACHIEVEMENTS

The following Second Year M.Pharm students from the Department of Pharmaceutics presented their research papers at the Indian Pharmaceutical Congress (IPC) held at Bangalore from Dec 16<sup>th</sup> -18<sup>th</sup> 2011.

1. **Ms. Anju Thomas** presented a poster on the research paper entitled "Formulation and characterization of modafinil liquid formulation by different solubility techniques" This paper was also co-authored by Dr. R. Narayana Charulu, Dr. Marina Koland, and Ms. Neogi Rishitha Hiranmoy.
2. **Mr. Bhavik B** presented a poster on the research paper entitled "Investigation of release profile of aceclofenac transdermal films using iontophoresis". This paper was also co-authored by Dr. Marina Koland and Dr. R. Narayana Charulu.
3. **Mr. Darshan Sakhia** presented a poster on the research paper entitled "Investigation on release profile of chitosan based polyelectrolyte complexes using anti-

hypertensive agents". The paper was also co-authored by Dr. R. Narayana Charulu, Mrs. Nisha. G. Shetty and Ms. Akshaya Bhandarkar.

4. **Keyur Manavadaria** presented a poster on the research paper entitled "Formulation and in-vitro comparative evaluation of orodispersible tablets of granisetron hydrochloride" This paper was also co-authored by Dr. R. Narayana Charulu, Dr. Prabhakara Prabhu, and Mr. D. Srinivasa Sastry.

## DEPARTMENT OF PHARMACOLOGY

### Research Publications

**MR. HIMANSHU JOSHI**, Lecturer

Evaluation of the effect of reused edible oils on vital organs of Wistar rats. *Nitte University Journal of Health Sciences*. 2011; 1(4):10-15.

### PAPERS PRESENTED AT CONFERENCES

**Dr. D. Prashanth Shetty**, Professor presented a paper as poster at the Masterskill University of Health Sciences sponsored International Scientific Conference 2011, on 3<sup>rd</sup> November 2011 at the Selesa Beach Resort, Port Dickson, Malaysia. The research paper was entitled, 'In vitro anti diabetic activity of *averrhoa bilimbi* fruit extract'

**Mr. Himanshu Joshi** has presented his research paper as oral presentation entitled, 'Hepatoprotective potential of *ervitania coronoria*' at the Masterskill University of Health Sciences sponsored International Scientific Conference 2011, on 3<sup>rd</sup> November 2011 at the Selesa Beach Resort, Port Dickson, Malaysia.

## DEPARTMENT OF PHARMACOGNOSY

### Research Publications

**MR. SANTANU SAHA**, Lecturer

In Vivo Study for Anti-inflammatory Activity of *Bauhinia variegata* L. Leaves. *Pharmaceutical Crops*. 2011; 2: 70-73

**Mr. Santanu Saha** also authored a chapter with the heading, 'Bioactive triterpenoid saponins from medicinal plants' in a text book of the title, "Herbal Drugs: A modern approach to understand them better", 2011; pp. 356-378 [ISBN: 978-81-7381-653-6]. This book was edited by Mandal Subhash C and published by the New Central Book Agency (P) Ltd., Kolkata.

### GUESTLECTURES

**Mr. Santanu Saha** was invited as resource person to deliver a lecture on "Pharmacognostical aspects of Botanicals" and to demonstrate experiments on "Quantitative microscopical study for evaluation of crude drugs" at the Department of Botany, St. Aloysius College, Mangalore, on 21<sup>st</sup> Dec, 2011.

# TARGETED DELIVERY OF DRUGS TO THE BRAIN IN ALZHEIMER'S DISEASE

Compiled by: **Dr. Marina Koland**,  
Professor, Dept. of Pharmaceutics

Alzheimer's disease, a neurodegenerative disorder of the elderly, is the most common form of dementia. The cognitive decline associated with it drastically affects the social and behavioral skills of people living with this disease. This disease is also a source of great financial burdens on patients, families, and the community as a whole. The clinical symptoms of Alzheimer's disease include learning and memory impairment as the pathological result of gross cerebral atrophy, indicative of neuronal loss, with numerous extracellular neuritic amyloid plaques and intracellular neurofibrillary tangles found predominantly in the frontal and temporal lobes, including the hippocampus.

The mechanisms underlying Alzheimer's disease are not completely clear yet, and there is still no cure. However, in recent years, several approaches aimed at inhibiting disease progression have advanced to clinical trials. Among these, strategies targeting the production and clearance of the amyloid-beta peptide are the most advanced. Drugs used to treat Alzheimer's including cholinesterase inhibitors such as rivastigmine and others such as donepezil, memantine, galantamine and tacrine are administered orally. However, most of the ingested drugs do not reach the brain and are, instead, metabolized totally or partially by the liver. This inefficient utilization of drug may require ingestions of higher drug doses that can produce toxicities in the heart, liver, or kidney. Moreover, many therapeutic agents are poorly soluble or insoluble in aqueous solutions. These problems can be minimized to a great extent by targeting the drugs directly to the brain. Thus targeting amyloid-beta 1-42 in all its aggregation forms has been suggested for therapeutic and diagnostic purposes.

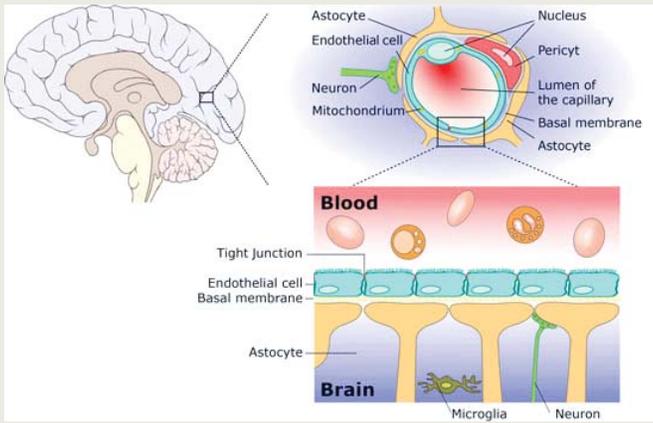
Unfortunately, targeted drug delivery to the central nervous system (CNS), for the therapeutic advancement of neurodegenerative disorders such as Alzheimer's, is complicated by restrictive transport through the blood-brain barrier (BBB) because of the presence of tight intercellular junctions at the endothelial cells. Various strategies have been developed to deliver drugs into the brain that would not otherwise be able to cross the BBB. Some of the more promising approaches include the use of polymeric nanoparticles and liposomes as carriers for targeting drugs to the brain in neurodegenerative disorders such as Alzheimer's disease and Parkinsonism.

Nanoparticles are polymeric particles made of natural or artificial polymers ranging in size between 10 and 1000 nm. Compared with other colloidal carriers, polymeric nanoparticles are more stable in the presence of biological fluids. Nanoparticles can be synthesized from preformed polymers or from a monomer during its polymerization, as in the case of alkylcyanoacrylates. Several approaches may be used in their preparation such as emulsion polymerization, interfacial polymerization, denaturation and desolvation techniques. Polymeric nanoparticles are

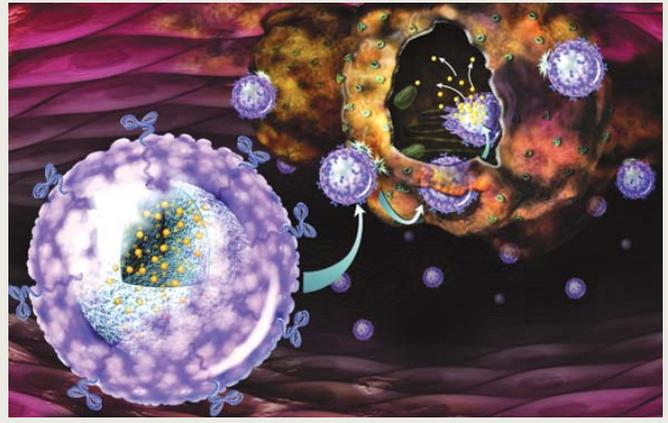
promising candidates in the investigation of Alzheimer's disease because nanoparticles are capable of: opening the tight endothelial junctions and crossing the BBB. They also have high drug loading capacities, and are capable of targeting the mutagenic proteins of Alzheimer's. So far, the only successfully used nanoparticles for the *in vivo* administration of drugs targeted to the CNS, is the rapidly biodegradable polybutylcyanoacrylate (PBCA). According to Kreuter et al., the passage of PBCA nanoparticles through the BBB probably occurs by phagocytosis or endocytosis by the endothelial cells.

Liposomes are spherical vesicle structures composed of a uni- or multilamellar lipid bilayer surrounding internal aqueous compartments and a relatively impermeable outer lipophilic phospholipid bilayer. Liposomes have gained considerable attention as drug delivery carriers because they are biocompatible, nontoxic, can deliver both hydrophilic and lipophilic drug molecules, protect their contents from degradation by plasma enzymes, and transport their load across biological membranes and the BBB. To escape uptake by the reticuloendothelial system after parenteral administration, 'Stealth liposomes' have been developed by modifying the surface of the liposome membrane. They have long been used as drug delivery systems to the brain, because the particles can entrap the compounds and prevent the rapid elimination or degradation as well as promote the penetration through the BBB which in turn decreases the effective dose. In addition, they do not elicit negative biological responses that generally occur when a foreign material is introduced in the system. With the pretreatment and adequate formulation in the brain or in places close to the brain, the liposomes are nontoxic, nonimmunogenic, noncarcinogenic, nonthrombogenic, and biodegradable. Based on the same concept the use of liposomes was proposed for the delivery of diagnostic agents across the BBB. A new method using PET imaging with positron emitter-labelled liposomes. This method allows accumulating liposomes in brain tumours and then detects small brain tumours with PET scanning. Based on liposome technology, rivastigmine liposomes were developed for delivery into the brain through intranasal route. This study showed that this particular administration with liposomes significantly increased the exposure and the concentration of the drug into the brain. Another example is the liposomal preparation of quercetin which is an agent known to improve learning and memory ability. The conventional oral administration of this drug is associated with poor absorption and difficulty in passing the BBB.

The development of novel therapeutic strategies for neurodegenerative and neurological diseases represents one of the biggest unmet medical needs today. One of the principal challenges facing research in this area is resolving the issue of binding of the drugs (loaded onto nanoparticles or liposomes) to amyloid plaques to effectively control Alzheimer's disease.



*"The Blood Brain Barrier"*



*"Targeting of nanoparticles to the brain"*

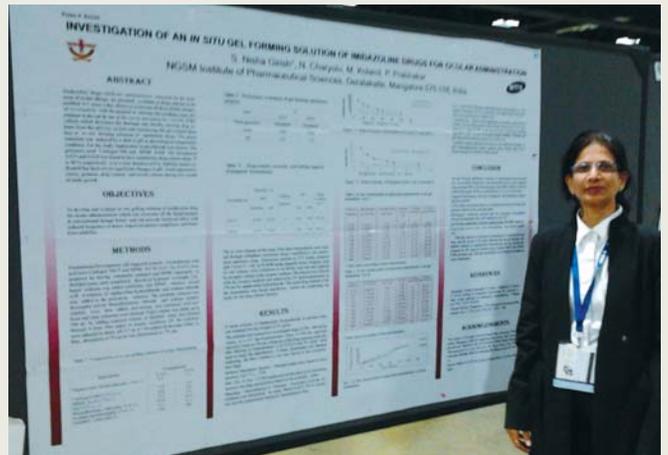
**References:**

1. Roney C., Padmaker K., et al. Targeted nanoparticles for drug delivery through the blood–brain barrier for Alzheimer’s disease. *Journal of Controlled Release* 2005; 108:193-214
2. Carlos Spuch and Carmen Navarro. Liposomes for Targeted Delivery of Active Agents against Neurodegenerative Diseases (Alzheimer’s disease and Parkinson’s disease). *Journal of Drug Delivery*; Volume 2011, Article ID 469679, 12 pages.
3. J. Kreuter, R. Alyautdin, D. Kharkevich, A. Ivanov, Passage of peptides through the blood–brain barrier with colloidal polymer particles (nanoparticles), *Brain Res.* 674 (1995) 171– 174.

**Faculty at Conferences Abroad**



Dr. Marina Koland at the 2011 AAPS Annual Meeting and Exposition, October 23-27, 2011 in Washington D.C., U.S.A. with alumni, Mr. John Mathew and Mrs. Jyothi Ann Mathew



Mrs. Nisha Girish Shetty at the 2011 AAPS Annual Meeting and Exposition, October 23-27, 2011 in Washington D.C., U.S.A.

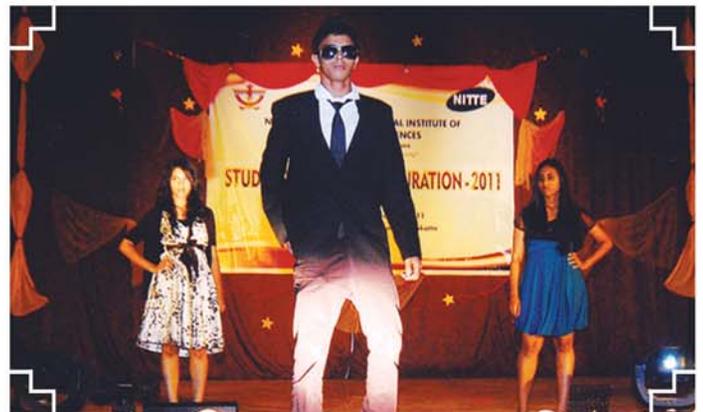


Mr. Himanshu Joshi at the International Scientific Conference 2011, Port Dickson, Malaysia on 3<sup>rd</sup> November 2011.



Dr. D.Prashanth Shetty, at the International Scientific Conference 2011, Port Dickson, Malaysia on 3<sup>rd</sup> November 2011.

# Student Council Inauguration 16.11.2011



Book Post