

Prof. Amitabha Chattopadhyay



Present Position and Address:

SERB Distinguished Fellow

CSIR-Centre for Cellular & Molecular Biology
Uppal Road, Hyderabad 500 007
India

Distinguished Visiting Professor

Department of Chemistry
Indian Institute of Technology Bombay, Mumbai

Emeritus Professor & Founding Dean, Biological
Sciences, Academy of Scientific & Innovative Research

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Honors and Awards:

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| The World Academy of Sciences (TWAS) Prize in Biology | 2016 |
| Shanti Swarup Bhatnagar Prize in Biological Sciences (by the Prime Minister of India for Outstanding Research Achievements) | 2001 |
| Ranbaxy Research Award (Medical Sciences – Basic Research) | 2007 |
| SERB Distinguished Fellowship | 2017 |
| Prof. G.N. Ramachandran 60th Birthday Commemoration Medal | 2015 |
| Sreenivasaya Memorial Award (Society of Biological Chemists, India) | 2000 |
| J.C. Bose Fellowship (Department of Science & Technology) | 2008 |
| Dozor Visiting Fellow, Ben Gurion University, Israel | 2006 |
| Member, Guha Research Conference | 1997 |
| Fellow, The World Academy of Sciences | 2017 |
| Fellow, The Royal Society of Biology | 2017 |

Curriculum Vitae

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|---|--------------------|
| Fellow, The Royal Society of Chemistry | 2013 |
| Fellow, Indian National Science Academy | 2005 |
| Fellow, Indian Academy of Sciences | 1999 |
| Fellow, The National Academy of Sciences, India | 1998 |
| Fellow, West Bengal Academy of Science & Technology | 2010 |
| Fellow, Andhra Pradesh Akademi of Sciences | 2003 |
| Fellow, Telangana Academy of Sciences | 2015 |
| Visiting Professor, Paul Sabatier Universite Toulouse III and the Institut de Pharmacologie et Biologie Structurale (IPBS-UPS/CNRS), France | 2019 |
| Distinguished Visiting Professor, Department of Chemistry, Indian Institute of Technology Bombay, Mumbai | 2018- |
| Adjunct Professor, Indian Institute of Science Education and Research, Kolkata, India | 2018- |
| Adjunct Professor, Faculty of Science, Engineering and Technology, Swinburne University of Technology, Hawthorn (Victoria), Australia | 2016- |
| Adjunct Professor, Department of Biosciences and Bioengineering, Indian Institute of Technology, Guwahati | 2016-18 |
| Adjunct Professor, School of Applied Sciences, Royal Melbourne Institute of Technology, Australia | 2015- |
| Adjunct Professor, Tata Institute of Fundamental Research, Mumbai | 2015-21 |
| Adjunct Faculty, Biological Sciences and Bioengineering, Indian Institute of Technology, Kanpur | 2014-18 |
| Honorary Faculty Member, Jawaharlal Nehru Centre for Advanced Scientific Research, Bangalore, India | 2004- |
| Adjunct Professor, Special Centre for Molecular Medicine, Jawaharlal Nehru University, New Delhi, India | 2008- |
| Adjunct Professor, Indian Institute of Science Education and Research, Mohali, India | 2010-18 |
| Honorary Professor, Amity Institute of Biotechnology, Gurgaon | 2016- |
| Member, Academy of Scientific and Innovative Research (AcSIR) Senate | 2011-16 2018-20 |
| Wellcome Trust Travel Fellowship | 2002 |
| Raman Research Fellowship (CSIR) | 1996 |
| Indo-Australia Senior Scientist Visiting Fellowship | 2012 |
| International Travel Grant (Biophysical Society, U.S.A.) | 2002 |
| Wood/Whelan Fellowship (IUBMB) | 1992 |
| International Union of Biochemistry (IUB) Travel Fellowship | 1991 |
| Samuel A. Talbot Award (Biophysical Society, U.S.A.) | 1986 |
| J.C. Bose Travel Award (Indian Biophysical Society) | 2014 |
| Graduate Research Fellowship (SUNY, Stony Brook) | 1983-87 |
| Graduate Teaching Assistantship (SUNY, Stony Brook) | 1980-83 |
| Devaprabhakara Memorial Award (Chemical Society, Indian Institute of Technology, Kanpur) | 1979 |

Curriculum Vitae

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|---|---------|
| MCM Fellowship (Indian Institute of Technology, Kanpur) | 1978-80 |
| 6 th G.K. Manna Memorial Lecture | 2018 |
| University of Manitoba Distinguished Visiting Lecturer | 2013 |
| Dr. R.A. Mashelkar Endowment Lecture, National Chemical Laboratory, Pune | 2015 |
| Prof. Anil K. Lala Memorial Lecture, Indian Institute of Technology, Bombay | 2013 |
| Prof. B.K. Bachhawat Memorial Lecture, Institute of Microbial Technology, Chandigarh | 2011 |
| Founder's Day Lecture, Indian Institute of Chemical Technology, Hyderabad | 2011 |
| Darshan Ranganathan Memorial Lecture Award (CRSI) | 2011 |
| CSIR Foundation Day Lecture (IICB, Kolkata) | 2010 |
| The Bires Chandra Guha Memorial Lecture (INSA) | 2008 |
| Bimala Churn Law Memorial Lecture (IACS, Kolkata) | 2007 |
| TWAS-UNESCO Associateship | 2003 |

Professional and Academic Services:

(i) Editorial responsibilities:

Academic Editor, *FEBS Letters* (Elsevier), 2012-present
Associate Editor, *Molecular Membrane Biology* (Taylor & Francis), 2016-present
Section Editor, *Journal of Membrane Biology* (Springer), 2015-present
Regional Editor, the *Journal of Fluorescence* (Springer), 2009-present
Member, Editorial Board (section editor) of *Biochimica et Biophysica Acta – Biomembranes* (Elsevier), 2007-present
Member, Editorial Board, *IUBMB Life*, 2016-present
Member, Editorial Advisory Board of *ACS Chemical Neuroscience*, 2014-present
Member, Advisory Editorial Board of *European Biophysics Journal* (Springer), 2005-present
Member, Editorial Advisory Board of *Chemistry and Physics of Lipids* (Elsevier), 2004-present
Member, Editorial Board of *Cellular and Molecular Neurobiology* (Springer), 2003-present
Member, Editorial Board of *Bioscience Reports* (Springer), 2004-2018
Review Editor, *Frontiers in Membrane Physiology and Biophysics* (Frontiers Research Foundation), 2010-present
Member, Editorial Board of the *Journal of Biosciences* (Indian Academy of Sciences and Springer), 2004-present
Member, Editorial Board of *Biophysical Journal* (Cell Press), 2009-2015.
Handling Editor, the *Journal of Neurochemistry* (Wiley-Blackwell), 2011-2014
Member, Editorial Advisory Board of the *Journal of Physical Chemistry* (ACS publication), 2011-2015
Member, Editorial Board of *PeerJ*, 2012-2014
Member, Editorial Board of the *Journal of Fluorescence* (Springer), 1999-2009
Member, Editorial Advisory Board of *Molecular Membrane Biology* (Taylor & Francis), 1996-2016

(ii) *Other responsibilities:*

Member, Scientific Committee, Faraday Discussion on Peptide-Membrane Interactions, London, 2020

Member, Science Education Panel, Indian Academy of Sciences, 2019-2021

Member, Wellcome Trust DBT India Alliance's Early Career Fellowship Selection Committee, 2016-2022

Member, Board of Studies of Biological Sciences, Academy of Scientific and Innovative Research, 2017-2019

Advisor, Hyderabad Chapter, The National Academy of Sciences, India, 2018-

Co-Chairperson, Recruitment and Assessment Center, Defence Research & Development Organization, Govt. of India (2018-)

Member, Scientific Advisory Committee, International Congress of Cell Biology, 2018

Member, Award Selection Committee of the Society of Biological Chemists (India), 2017-2018

Member, Sectional Committee (Chemistry) of the Indian Academy of Sciences, 2016-2018

Member, Research Council, Dr. Reddy's Institute of Life sciences, Hyderabad, 2015-present.

Member, Weber Prize Committee (2008, 2014)

Member, Executive Committee, Fluorescence Society

Member, Program Committee, International Biophysics Congress, Brisbane, 2014

Corresponding member, International Conference on the Bioscience of Lipids (ICBL) steering committee (2014-2016)

Member, National Advisory Committee of the 14th Federation of Asian and Oceanian Biochemists and Molecular Biologists (FAOBMB), 2015

Member, Board of Studies for Biological and Chemical Sciences, Academy of Scientific and Innovative Research (2015-2018)

Member, Governing Board, CCMB Science Foundation (2016)

Mentor, DST INSPIRE Internship Autumn Camp, Dr..K.C.B. Govt. PG College, Bhilai (2013)

Member, Expert Panel, DST workshop on "*Advanced Materials and Delivery Devices*", Indian Institute of Technology, Mumbai, 25-26 February, 2013

Co-Chair, Organizing Committee, *10th International Symposium on Biochemical Roles of Eukaryotic Cell Surface Macromolecules*, Kolkata, 20-24 January, 2014

Chair, Biophysical Society thematic meeting *Lipid-protein Interactions in Membranes: Implications for Health and Disease*, Centre for Cellular and Molecular Biology, Hyderabad, 1-5 November, 2012

Member, International Society of Neurochemistry-American Society of Neurochemistry (ISN-ASN) Program Committee for the 2013 joint ISN-ASN meeting

Reviewer, The Italian Research and University Evaluation Agency (ANVUR)

Reviewer, The Portuguese Foundation for Science and Technology (FCT)

Member, National Committee for International Union of Biological Sciences of the Indian National Science Academy, 2011-2014

Member, Sectional Committee (*Biochemistry and Biophysics*) of the Indian National Science Academy, 2008-2011

Chairman, Examination Committee, Academy of Scientific and Innovative Research

Chairman, Course Committee, Academy of Scientific and Innovative Research

Coordinator, Kishore Vaigyanik Protsahan Yojna (KVPY), 2013, 2015

Member, Scientific Advisory Committee, National Institute of Biomedical Genomics, Kalyani,

Curriculum Vitae

2010-2013

Member, Scientific Advisory Committee, Pharmakodyne Biosciences, Hyderabad, 2011-present

Member, Faculty Selection Committee, Indian Institute of Science, Bangalore

Member, Selection Committee (Life Sciences) for the Summer Research Fellowship Program, Science Academies' Education Program, 2009

Coordinator, Workshop on *Molecular Interactions and Dynamics by Fluorescence Microscopy*, Centre for Cellular and Molecular Biology, Hyderabad, 25th January, 2008

Convenor, *8th International Symposium on Biochemical Roles of Eukaryotic Cell Surface Macromolecules*, Centre for Cellular and Molecular Biology, Hyderabad, 21-25 January, 2008

Course Co-ordinator, Workshop on "*Advanced Microscopy and Cellular Dynamics*", Centre for Cellular and Molecular Biology (sponsored by Carl Zeiss), Hyderabad, 10-14 November, 2005

Convenor, Satellite Symposium of XIII International Biophysics Congress on "*Membranes, Sensors and Cell Surfaces*", Centre for Cellular and Molecular Biology, Hyderabad, 15-17 September, 1999

Member, Animal Sciences and Biotechnology grant review committee, Council of Scientific and Industrial Research (2008-2011)

Manuscript referee for *Biochemistry*, *Biophysical Journal*, *Journal of the American Chemical Society*, *Nature Chemical Biology*, *Journal of Cell Science*, *Biochimica et Biophysica Acta (Biomembranes)*, *Biochimica et Biophysica Acta (Molecular and Cell Biology of Lipids)*, *Journal of Physical Chemistry*, *Protein Science*, *The Journal of General Physiology*, *Langmuir*, *FEBS Letters*, *Nature Chemical Biology*, *Analytical Biochemistry*, *Faculty of 1000 Biology Reports*, *Journal of Fluorescence*, *Molecular Membrane Biology*, *Neuroscience*, *Journal of Colloid and Interface Science*, *Journal of Biosciences*, *Acta Tropica*, *Indian Journal of Biochemistry & Biophysics*, *Current Science*, *PLOS Neglected Tropical Diseases* and *Proceedings of the Indian Academy of Sciences*

Vice President, the Indian Society of Cell Biology (2002-2014)

Member, Executive Committee of the International Symposium on Biochemical Roles of Eukaryotic Cell Surface Macromolecules (2008-2011)

Member, Executive Council of the Asian Pacific Society for Neurochemistry (2004-2006)

Member, Executive Committee of the Indian Academy of Neurosciences (2005-2006)

Member, Executive Committee of the Indian Biophysical Society (1999-2005)

Member, Executive Committee of the Society for Neurochemistry, India (2003-2005, 2007-2009)

Member, Executive Committee of the Indian Society of Cell Biology (2003-2005)

Member, Executive Committee of the Indian Photobiology Society (1999-2001)

External observer for the Annual Research Talks of the Molecular Biology Unit, Tata Institute of Fundamental Research, 1997

Grant proposal referee, National Science Foundation (U.S.A.), Molecular Research Council (U.K.), The Austrian Science Fund, Department of Science & Technology, Department of Biotechnology, Council of Scientific and Industrial Research, Indo-French Centre for the Promotion of Advanced Research, Indo-US Science and Technology Forum

Member, Project Monitoring Expert Committee, Department of Biotechnology, Government of India

Joint organizer, IX National Symposium of the Indian Photobiology Society, Centre for Cellular & Molecular Biology, Hyderabad, 4-5 March, 1994

Ph.D. and M.Phil thesis examiner for Indian Institute of Science (Bangalore), Tata Institute of

Curriculum Vitae

Fundamental Research (Mumbai), National Centre for Biological Sciences (Bangalore), University of Melbourne, Aarhus University, Raman Research Institute (Bangalore), Indian Institute of Technology (Kanpur), Indian Institute of Technology (Mumbai), Indian Institute of Technology (Guwahati), Bose Institute (Kolkata), Saha Institute of Nuclear Physics (Kolkata), National Institute of Mental Health and Neuro Sciences (Bangalore), University of Hyderabad, Advance Centre for Treatment, Research and Education in Cancer (Mumbai), and Indian Association for the Cultivation of Science (Kolkata)

Co-convenor, Indo-U.S. workshop on “*Membrane Structure and Function: The State of the Art*”, held at Indian Institute of Science, Bangalore, and Centre for Cellular & Molecular Biology, Hyderabad, 7-18 January, 1991

Member, Faculty Selection Committee, School of Life Sciences, Jawaharlal Nehru University, and School of Life Sciences, University of Hyderabad

Member, Academic Committee, JNU-CCMB Ph.D. program

Member, Advisory Group, for preparation of CSIR 2021: Vision & Strategy

Member, CSIR Working Group for 12th Five Year Plan Preparation

Member, Working Group on PAN India Science and Technology Mission

Member, Scientific Advisory Committee, National Brain Research Centre, Manesar, Haryana

Member, Selection Committee for Faculty Recruitment, Saha Institute of Nuclear Physics, Kolkata

Member, Scientific Advisory Committee, Apollo Stem Cell Therapy Unit, Apollo Hospitals, Hyderabad

Member, Selection Committee for Prof. B.K. Bachhawat International Travel Grant for young scientists.

Adviser, Agricultural Scientists Recruitment Board, Indian Council of Agricultural Research

Member, panel of judges, Dr. K. V. Rao Scientific Society, 2002

Member, Sub-committee on Structure and Function of Biomembranes of the Technical Advisory Board (Biological Sciences) of CSIR laboratories, 1990-1991

Education:

B.Sc. (Chemistry Hons.), St. Xavier's College, Calcutta, 1977

M.Sc. (Chemistry), Indian Institute of Technology, Kanpur, 1980

Ph.D. (Chemistry), State University of New York at Stony Brook, 1987

Professional Positions:

2018-present SERB Distinguished Fellow, Centre for Cellular & Molecular Biology, Hyderabad, India

2019 (May) Visiting Professor, Paul Sabatier Universite Toulouse III and the Institut de Pharmacologie et Biologie Structurale (IPBS-UPS/CNRS), France

2016-2018 J.C. Bose Fellow, Centre for Cellular & Molecular Biology,

Curriculum Vitae

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| | Hyderabad, India |
| 2016 | Acting Director, Centre for Cellular & Molecular Biology, Hyderabad, India |
| 2010-2016 | Outstanding Scientist (Director Level), Centre for Cellular & Molecular Biology, Hyderabad, India |
| 2010-2016 | Dean, Biological Sciences, Academy of Scientific and Innovative Research |
| 2014 (April) | Visiting Professor, Swinburne University, Melbourne, Australia |
| 2004-2010 | Deputy Director (Scientist F), Centre for Cellular & Molecular Biology, Hyderabad, India |
| 2007 (March) | Dozor Visiting Professor, Ben-Gurion University of the Negev, Israel |
| 1993-2016 | Group Leader, Centre for Cellular & Molecular Biology, Hyderabad, India |
| 1999-2004 | Principal Scientist II (Scientist E II), Centre for Cellular & Molecular Biology, Hyderabad, India |
| 2003 (October) | Visiting Professor, Department of Chemistry, University of Melbourne, Australia |
| 2003 (November) 1999 (June) | Visiting Professor, Department of Chemistry, University of Kaiserslautern, Germany |
| 1997 (April-June) | Visiting Faculty, Department of Biology, The Johns Hopkins University, Baltimore, U.S.A. |
| 1994-1999 | Principal Scientist I (Scientist E I), Centre for Cellular & Molecular Biology, Hyderabad, India |
| 1992 (Sept-Dec) | Visiting Associate, Department of Biology, University of California, Santa Cruz, U.S.A. |
| 1989-1994 | Senior Scientist (Scientist C), Centre for Cellular & Molecular Biology, Hyderabad, India |
| 1987-1989 | Postdoctoral Fellow, Department of Biochemistry & Biophysics, University of California, Davis, U.S.A. |

Publications (Total citations > 11,400, h-index 57, i-10 index 190, source: Google Scholar)
(full listing and texts of papers available in pdf format at <http://e-portal.ccmb.res.in/e-space/amit/Pages/Index.htm>):

- (a) **Peer-reviewed Articles in Journals:** 249 (first and/or corresponding author in most; Five articles featured on cover)
- (b) **Books:** 2
- (c) **Articles in Books and Proceedings:** 21
- (d) **Invited Book Reviews:** 2
- (e) **Others:** 5 (Guest Editor of special issues of journals and monographs)
- (f) **Popular Article:** 1
- (g) **Abstracts:** 292

Patents: 1 U.S. patent granted, 1 Indian patent granted

Invited Seminars and Presentations: 590 (including Keynote/ Plenary/Colloquium/ Award/Mentor Lectures)

Teaching Experience:

“*Biomembranes*” (part of a Graduate level course in Molecular and Cell Biology), Centre for Cellular & Molecular Biology, Hyderabad, 1990, 1993-1998, 2002-2018

“*Excitements and Challenges in Biomembranes: Where Physics, Chemistry, Biology and Medicine Meet*”, invited lectures (2) delivered, Paul Sabatier Universite Toulouse III, France, 2019

“*Biomembranes*” (a graduate course module), Department of Chemistry, Indian Institute of Technology Bombay, Mumbai, 2018

“*Membrane Biophysics*”, (lectures as part of a Graduate level course), Department of Biological Sciences, Tata Institute of Fundamental Research, Mumbai, 2017

“*How to Write a Scientific Manuscript: Excitements, Challenges and Reality*”, (part of a Graduate level course), Centre for Cellular & Molecular Biology, Hyderabad, 2016, 2017

“*Ion Channels: A Biophysical Perspective*”, invited lectures delivered at the GIAN course on Ionic Signaling and Human Disease, University of Hyderabad, July, 2016

“*Cellular Membranes: Uniqueness, Excitement and Challenges*”, invited lectures delivered at a Graduate level course, Indian Institute of Science Education & Research, Mohali, February, 2015

“*Fluorescence in Biology*”, invited lectures delivered at a Graduate level course, Indian Institute of Technology, Kanpur, November, 2014

Curriculum Vitae

“*Fluorescence in Biology: From Solvent Relaxation to Drug Discovery*”, invited lectures delivered at a Graduate level course, Indian Institute of Science Education & Research, Mohali, October, 2011

Designed graduate level courses, curricula and examinations for the Academy of Scientific and Innovative Research (AcSIR) as Dean, Biological Sciences (2011)

“*Biomembranes: Organization, Dynamics and Function*”, invited lectures (graduate level mini course: total 6 lectures) delivered, Institute of Life Sciences, Hyderabad, August, 2011

“*Fluorescence in Biology*”, invited lectures delivered at a Graduate level course, Indian Institute of Science Education & Research, Mohali, October, 2010

“*Fluorescence and its Application in Biology*”, invited lectures delivered at a Graduate level course, Indian Institute of Science Education & Research, Mohali, March, 2010

“*Molecular Spectroscopy: Fluorescence in Biology*”, invited lectures delivered at the Refresher Course on Advances in Biophysics, Centre for Cellular and Molecular Biology, 2007

“*Biomembranes*” a Graduate level course at the Department of Chemistry, Ben-Gurion University at the Negev, Israel, 2007

“*Biological Membranes: What is Unique about Them ?*” invited special lectures at the Department of Biotechnology, West Bengal University of Technology, 2006

“*Biomembranes: What is Unique about Them ?*”, Summer Science and Research Awareness Series, SUNY Medical Center, Stony Brook, New York, 2005

“*Biophysics of Lipids: Application of Fluorescence Approaches to Membrane Biology*”, guest lectures delivered at the Graduate Course on *Biophysical Methods in Life Sciences*, National University of Singapore, 2005

“*Biomembranes: What is Unique about Them ?*” invited lecture delivered at the UGC Refresher Course in Life Science, University of Kerala, Trivandrum, 2005

“*Approaches to Monitor Membrane Dynamics*” invited lecture delivered at the UGC Refresher Course on *Chemistry of Biomolecules*, Department of Chemistry, University of Hyderabad, 2005

“*Biomembranes: What is Unique about Them ?*” invited lecture delivered at the UGC Refresher Course on *Chemistry of Biomolecules*, Department of Chemistry, University of Hyderabad, 2005

“*Biomembranes*” invited lectures delivered at a Graduate level course in Bioinformatics Program, International Institute of Information Technology, Hyderabad, 2005

“*Application of Fluorescence in Membrane Biology*” a Graduate level course in Graduate Research School, University of Kaiserslautern, Germany, 2003

Curriculum Vitae

“*Application of Fluorescence Spectroscopy to Problems in Modern Biology*” invited lectures delivered at the UGC Refresher Course, Department of Physics, Kumaun University, Nainital, 2003

“*Biomembrane Structure and Dynamics*” invited lectures delivered at the Mahabaleshwar Seminar 2002 in Modern Biology on “*Cellular Traffic*”, Department of Biological Sciences, Tata Institute of Fundamental Research, Mumbai, 2003

“*Fluorescence in Biology*” (part of a Graduate level course in Molecular and Cell Biology), Centre for Cellular & Molecular Biology, Hyderabad, 2001

“*Membrane Organization and Dynamics*”, lectures delivered as part of a Graduate level course, School of Life Sciences, Jawaharlal Nehru University, New Delhi, 2001

“*Membrane Dynamics*” (part of a Graduate level course in Molecular and Cell Biology), Centre for Cellular & Molecular Biology, Hyderabad, 2000

“*Membrane Structure and Function*” (a Graduate level course in Biotechnology Graduate Group), Department of Chemistry, University of Kaiserslautern, Germany, 1999

“*Cell Membranes*” (part of a Graduate level course in Cell Biology), Centre for Cellular & Molecular Biology, Hyderabad, 1997, 1999

“*Fluorescence in Biophysics*” workshop conducted at the National Symposium on Cellular and Molecular Biophysics, organized by the Indian Biophysical Society, at the Centre for Cellular and Molecular Biology, Hyderabad, 1995

“*Membrane Proteins*” (part of a Graduate level course in Molecular Biology), Centre for Cellular & Molecular Biology, Hyderabad, 1991

“*Undergraduate Seminar in Biochemistry*”, University of California, Davis, Spring 1988 and Spring 1989

Teaching Assistant, General Chemistry, SUNY at Stony Brook, 1980-1983

Coordinator of the General Chemistry study groups organized by the Learning Skills Center, SUNY at Stony Brook, 1981-1983

Coordinator of the General Chemistry tutorial sessions organized by the Counselling Service, Indian Institute of Technology, Kanpur, 1979

Research Personnel Mentored:

(a) *Ph.D. Student*: 15 (Ph.D. completed; *two students were awarded INSA Young Scientist Medal*)

for Ph.D. thesis; one student awarded Sun Pharma Science Scholar Award-2018 in Biomedical Sciences for Ph.D. work), 5 (current Ph.D. students)

(b) *Staff Technician/Technical Officer*: 4

(c) *Senior Research Associate*: 1

(d) *Visiting Scientist*: 2

(e) *Postdoctoral Fellow*: 13

(f) *Project Assistant*: 10

(g) *Guest Student Worker*: 1

(h) *M.Sc. Project Student*: 5

(i) *Summer Student*: 28

Society Memberships:

Biophysical Society, U.S.A.

American Chemical Society

International Society for Neurochemistry

British Biophysical Society

Society of Biological Chemists, India (Life Member)

Indian Society of Cell Biology (Life Member)

Indian Biophysical Society (Life Member)

Indian Photobiology Society (Life Member)

Indian Academy of Neurosciences (Life Member)

Society for Neurochemistry, India (Life Member)

Indian Peptide Society (Life Member)

ARC/NHMRC Network for Fluorescence Applications in Biotechnology and Life Sciences

Association of British Scholars, Hyderabad Chapter (Life Member)

Chemical Research Society of India (Life Member)

Indian Science Congress Association (Life Member)

Indian Society for Radiation and Photochemical Sciences (Life Member)

Fluorescence Society (Life Member)

Chemical Biology Society (Life Member)

Research Interests:

- ❖ Membrane structure, function and dynamics
- ❖ Application of spectroscopic techniques to biological problems
- ❖ Organization and dynamics of molecular assemblies such as micelles and reverse micelles
- ❖ Membrane hydration with special reference to the interface
- ❖ Fluorescence probes for membrane structure and dynamics
- ❖ Organization, dynamics, and function of ion carriers and ion channels
- ❖ Lipid-protein interactions in membranes and its relevance in health and disease
- ❖ Membrane domains especially in neuronal membranes
- ❖ Transbilayer organization of membrane cholesterol
- ❖ Localization, photophysics and function of membrane-bound tryptophans

- ❖ Organization, dynamics, and function of membrane lytic peptides
- ❖ Solvent relaxation dynamics in membranes and proteins
- ❖ Fluorescence microscopy
- ❖ Fluorescence recovery after photobleaching (FRAP)
- ❖ Fluorescence Correlation Spectroscopy (FCS)
- ❖ Membrane receptor dynamics and signaling: testing the 'mobile receptor hypothesis'
- ❖ Interactions of anesthetics and alcohols with membrane lipids and receptors
- ❖ Membrane organization, dynamics and function of the serotonin_{1A} receptor: interaction with membrane lipids
- ❖ Interaction of the serotonin_{1A} receptor with membrane sterols: cholesterol modulation in neuronal membranes and its relevance in health and disease
- ❖ Application of fluorescence in studying receptor-ligand interactions
- ❖ Role of membrane lipids in the entry of pathogens into host cells
- ❖ Pathogenicity involving defective cholesterol biosynthesis
- ❖ Effect of cholesterol and its evolutionary precursors on the structure and function of membranes

Scientific Achievements:

- ◆ Development and application of a novel approach (now widely known as the '*parallax*' method), suitable for determining depths of a wide variety of membrane-bound probes and proteins. This approach is based on differential fluorescence quenching of spin-labeled (or brominated) phospholipids located at various positions in the membrane. This method enjoys considerable popularity in contemporary membrane biology for localization of membrane-bound molecules. The original paper describing this method enjoys a citation of >650.
- ◆ Pioneered the development and application of *wavelength-selective fluorescence* as a novel approach to monitor organization and dynamics of probes and proteins in biomembranes, micelles, and reverse micelles. Important applications include monitoring the environment of the functionally important tryptophans in the prototypical ion channel gramicidin, and in the lytic peptide melittin from bee venom. An interesting application is to probe defined depths in the membrane utilizing depth-dependent solvent relaxation as a membrane dipstick. A unique feature of this approach is its ability to monitor dynamics of membrane-associated water molecules. This approach has been applied to the Green Fluorescent Protein (GFP).
- ◆ First demonstration of looping up of nitrobenzoxadiazol (**NBD**) probes when attached to the fatty acyl chains of phospholipids. Since NBD probes are widely used in Cell Biological, Biochemical and Biophysical work, many groups have found this information about the orientation of the NBD group in membranes to be very useful.
- ◆ Demonstration of novel cholesterol domains containing *transbilayer cholesterol dimers* in membranes of low cholesterol content such as the endoplasmic reticulum and the inner mitochondrial membrane. These domains, which have been proposed to be important for signal transduction, have been shown to be modulated by membrane curvature and thickness

and characterized by motionally restricted microenvironment and dynamics.

- ◆ First comprehensive demonstration of the *intrinsic fluorescence of serotonin*, a neurotransmitter in the central nervous system, and its modulation by ionization and polarity changes of the medium which could mimic ligand binding conditions
- ◆ Development of a fluorimetric assay using the electrically neutral probe diphenylhexatriene (**DPH**) to determine critical micelle concentrations (**CMC**) of detergents. *This assay is applicable to all types of detergents*, irrespective of their charge. Assays developed prior to this work suffered from the drawback that they generally did not work if the probe and the detergent had opposite charges. The paper¹ describing this assay enjoys a citation of ~350.
- ◆ Demonstration of ionic strength dependence of the critical micelle concentration of the zwitterionic detergent CHAPS: *functional solubilization* of a membrane-bound neuronal receptor (*serotonin_{1A} receptor*) using 'pre-micellar' concentration of a detergent
- ◆ First demonstration of the *role of cholesterol* and **sphingolipids** in maintaining the function of G protein-coupled receptors
- ◆ First report of *residual structure* in proteins in *denatured* states shown by the wavelength-selective fluorescence approach
- ◆ First demonstration of *reduction in leishmanial infection* upon *cholesterol depletion* in host macrophage plasma membranes. This idea has been patented (U.S. patent # 7186702; Indian patent # 242180) with the long-term goal of developing novel therapeutic strategies to tackle leishmaniasis
- ◆ Correlation of *lipid dynamics* in the *pathogenic yeast Candida albicans* with *drug resistance*. This represents the first report of analysis of lipid dynamics in *Candida albicans* using Fluorescence Recovery After Photobleaching (**FRAP**) approach.
- ◆ First demonstration of the *change in dynamics of a G-protein coupled receptor, the serotonin_{1A} receptor, upon G-protein activation*, using Fluorescence Recovery After Photobleaching (**FRAP**) approach. Importantly, the *correlation between signaling and dynamics* has been demonstrated for this receptor.
- ◆ First application of the *wavelength-selective FRAP* approach to resolve diffusion parameters of individual components in a mixture of two membrane-bound diffusing species
- ◆ First demonstration of the impairment of signaling by the serotonin_{1A} receptor under conditions **mimicking the Smith-Lemli-Opitz syndrome**
- ◆ First molecular link between chronic statin usage and depression (*ACS press release*)
- ◆ Reevaluation of the mechanism of amphotericin B, the best existing drug against visceral

leishmaniasis

- ◆ Exploring the spatiotemporal evolution of dynamics of a G-protein coupled receptor (the serotonin_{1A} receptor) at resolutions approaching single molecule level
- ◆ First report of nonannular lipid site and CRAC motif in G-protein coupled receptors
- ◆ First comprehensive demonstration of constitutive oligomers of the serotonin_{1A} receptor in live cells including higher order oligomers
- ◆ First demonstration of an optimum host plasma membrane cholesterol requirement for the entry of mycobacteria
- ◆ First demonstration of membrane cholesterol sensitivity of taste receptor function
- ◆ First measurement of rotational dynamics in Golgi membranes
- ◆ First experimental demonstration on the modulation of dielectric relaxation response of membrane interfacial water by membrane lipid composition in a concentration-dependent manner using Terahertz spectroscopy

Grant Support:

- “*Serotonin Receptor Type 1A: Purification, Characterization, and Lipid-Protein Interactions*”, Department of Biotechnology, Government of India, 1994-1997
- “*Monitoring Microenvironments in Membrane-Bound Peptides by Novel Fluorescence Approach*”, Department of Science and Technology, Government of India, 1995-1998
- “*Serotonin Type 1A (5-HT_{1A} receptor) Receptors as Drug Targets: Expression of 5-HT_{1A} Receptor in Membrane-Altered Strains of Yeast to Monitor the Role of Lipids in the Receptor Function*” (in collaboration with Dr. Anand K. Bachhawat of the Institute of Microbial Technology, Chandigarh). This constituted a part of the CSIR Inter-Laboratory Coordinated Program on Bioactive Molecules, 1998-2003
- “*Interaction of A Cytoskeletal Protein with Membranes*”, The Third World Academy of Sciences, 2001-2003
- “*New Applications of Flow Cytometry and Cell Sorting in Areas of Biotechnology*”, Department of Biotechnology, Government of India (joint grant proposal with six other investigators), 2002-2007
- “*Fluorescence and NMR Studies of Membrane Peptides and Proteins*”, International Collaborative Research Grant, The University of Melbourne, Australia, 2002-2003
- “*Organization of the Serotonin_{1A} Receptor in the Membrane Environment: Exploring Detergent Insolubility of Serotonin_{1A} Receptors at the Cell Surface*”, Life Sciences Research Board, Government of India, 2005-2008
- “*Exploring the Membrane Organization of the Serotonin-1A Receptor in Living Cells by Fluorescence Lifetime Imaging Microscopy (FLIM) and Fluorescence Resonance Energy*”

Curriculum Vitae

- Transfer (FRET)*”, FABLES Research Grant, Australia, 2006
“*Nanomaterials and Nanodevices*”, CSIR Network project, 2007-2012
“*Dynamics of Serotonin_{1A} Receptors by Single Particle Tracking*”, Indo-French Centre for the Promotion of Advanced Research (IFCPAR), 2011-2014
“*Neurodegenerative Diseases: Causes and Corrections*”, CSIR Network project, 2012-2017
“*Host Interactome Analysis: Understanding the Role of Host Molecules in Parasitic Infection*”, CSIR Network project, 2012-2017
“*Nano-materials: Applications and Impact on Safety, Health and Environment*”, CSIR Network project, 2012-2017
International Research & Research Training Fund (IRRTF), awarded by the University of Melbourne, 2015-2017
“*Role of Membrane Lipids on GPCR Organization: A Combined Experimental and Simulation Approach*”, Science and Engineering Research Board, Department of Science and Technology, Government of India, 2017-2020
“*Endocytosis and Trafficking of GPCRs: Role of Membrane Lipids and Actin Cytoskeleton*”, Department of Biotechnology, Government of India, (submitted)

Institutional Services:

- Member, JNU-CCMB Academic Committee
- Member, Management Council
- Chairman, Safety Committee
- Chairman, Works Management Committee
- Member (Co-Chairman), Dispensary Committee
- Member, Summer Student Selection Committee
- Member, International Deputation Committee
- Member, Honorarium Committee
- Member, Stores and Purchase Committee
- Member, Canteen and Guest House Committee
- Member, APAR Normalization Committee
- Member, BSL-4 Committee