

**CURRICULUM VITAE**  
**PROFESSOR PARIMAL C. SEN**

Date of Birth : August 4 , 1952  
Marital Status : Married , One Son  
Nationality : Indian  
Present Address : Division of Molecular Medicine  
Bose Institute  
P – 1/12, C.I.T. Scheme. VII-M,  
Kolkata - 700 054 ( INDIA )  
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**Academic Qualifications**

B .Sc.	(Hons.in Chemistry)	Calcutta University	1971
M .Sc.	(Organic Chemistry as Special Paper)	Calcutta University	1973
Ph .D.	Chemistry	Calcutta University	1977

**Thesis Title** : Studies on Fish Lipids

**Summary of important position hold at Bose Institute**

Acting Director (2011- August 2014)

Founder Head, Division of Molecular Medicine (2008-January 2014)

Chairman, Department of Chemistry (1997-'99; 2001-'03; 2006-'08)

Chairman, Department of Microbiology (2008-2010)

Dean of Studies, Integrated M.Sc.Ph.D. Programme (2011- October 2014)

Chairman, Academic Affairs for almost ten (10) years

Teaching Experience at M.Sc. and Post-M.Sc. level (Biochemistry and Cell Biology) -  
20 years

## **Other responsibilities**

Chairman, e-Governance Monitoring Committee

Chairman, IPR Committee

Chairman, Purchase Committee

Chairman, Animal Ethics Committee

Chairman, Sophisticated Instrument facilities

Member, Human Ethics Committee

Member, DBT Post-doctoral committee

Member, Institute Staff and Faculty Re-structuring Committee

Member, Central Instrument Committee

Chairman, Biotechnology Based Opportunities Offered to Science & Technology

Departments” (BOOST), Gov’t of West Bengal

Member, Technical committee for R & D based Biotechnology Projects, Gov’t of West Bengal.

President, New Biology (including Molecular Biology, Biotechnology and Structural Biology),

101<sup>st</sup> Indian Science Congress Association

## **Awards and Recognition**

### **Fellow**

*The National Academy of Sciences ( F.N.A.Sc. ), India*

West Bengal Academy of Science and Technology ([F.A.Sc.T.](#))

### **Awards**

*Prof. P.B. Sen Oration Award from the Physiological Society of India, 2010*

*Prof. P.A.Kurup Endowment Award from the Society of Biological Chemists ( India ), 2000*

*Prof. R.C.Shah Memorial Award from Indian Science Congress Association, 1997 - 98*

*DPI Scholarship , Govt. of West Bengal , 1971 -1973*

## Recognition

Guest Editor of the Special Issue on **CELL SIGNALING & MOLECULAR MEDICINE** published in Molecular and Cellular Biochemistry, January 2010 (Springer Press)

**Editorial Board Member** – American Journal of Experimental Biology;  
International Journal of Biochemistry & Biotechnology Research (IJBBR);  
Elected Editorial Board Member of “Frontiers Pharmacology”

Austin Biochemistry

Molecular Medicine & Therapy

Reference India, Vol. 3, 1995  
WHO's Who in the world 1997

## Position Hold

2008- 2014	Senior Professor and Head, Division of Molecular
2004 – 2013	Chairman, Academic Affairs' Committee of Bose Inst.
2006 – 2010	In-charge, Sophisticated Analytical Instrument Centre
1990- 2014	Chairman / Convener / Member of a large number of Committees constituted by the Director / Academic Council of Bose Institute / DST etc. ( both academic and administrative ) to look into different affairs of the Institute and to formulate guidelines.
2005-present	Senior Professor, Bose Institute
1996 - 2005	Professor, Bose Institute, Calcutta
1999 – 2002	Represented Academic Council to Bose Institute Council
2005 – 2006	Chairman, Department of Chemistry, Bose Institute
2001 – 2003	Chairman, Department of Chemistry, Bose Institute
1997 - 1999	Chairman, Dept. of Chemistry, Bose Institute
1990 - 1996	Reader, Department of Chemistry, Bose Institute, Calcutta

- 1989 - 1991 Visiting Assistant Professor, Cornell University, New York, USA
- 1986 - 1990 Senior Lecturer, Department of Chemistry, Bose Institute, Calcutta
- 1983 - 1985 Lecturer, Department of Chemistry, Bose Institute, Calcutta
- 1980-1983 Research Associate, The Hormel Institute University of Minnesota, Austin, USA
- 1978 - 1980 Post-doctoral Research Fellow, State University of New York, Syracuse, USA
- April-July 1978 Post-doctoral Research Fellow, The University of Texas Medical School, Houston, USA
- 1977 - 1978 Post-doctoral Research Fellow, Council of Scientific and Industrial Research, Govt. of India at Bose Institute, Calcutta
- July-Nov. 1977 Post-doctoral Research Fellow. Department of Science and Technology, Govt. of India at Bose Institute, Calcutta
- 1976 - 1977 Senior Research Fellow, Department of Science and Technology, Govt. of India at Bose Institute
- 1974 - 1976 Junior Research Fellow, Bose Institute, Calcutta

### **Scientific Achievements :**

Has been working with ion transporting enzymes ( $\text{Na}^+, \text{K}^+$ -ATPase,  $\text{Ca}^{2+}$ - and  $\text{Ca}^{2+}, \text{Mg}^{2+}$ -ATPases etc) and their regulation by drugs, endogenous modulator proteins and protein kinase(s) for more than twenty years. He has made significant contribution in the above mentioned area which has been recognised Internationally as evident from publications of International repute. The mechanism of regulation of ion transporting ATPases by Chloroquine (antimalarial drug) and Chlorpromazine (antipsychotic and antifertility drug) has been established both from *in vitro* and *in vivo* studies in different organs of rat.

During the investigation, a novel  $\text{Mg}^{2+}$ -independent  $\text{Ca}^{2+}$ -ATPase has been identified in rat and goat testes that has been purified and characterized and is found to take part in  $\text{Ca}^{2+}$ -transport and  $\text{Ca}^{2+}$ -pump regulation thus possibly is involved in fertility regulation.

This  $\text{Ca}^{2+}$ -ATPase has a lot of similarities with the well known  $\text{Ca}^{2+},\text{Mg}^{2+}$ -ATPase. From immunocrossreactivity study, it is found that both belong to SERCA (sarcoplasmic-endoplasmic reticulum  $\text{Ca}^{2+}$ -ATPase) family.

The ATPase activities ( $\text{Na}^+,\text{K}^+$ -ATPase and  $\text{Ca}^{2+}$ - and  $\text{Ca}^{2+},\text{Mg}^{2+}$ -ATPase activities) are found to be regulated by endogenous modulator proteins of varying masses. One, molecular mass of 13 kDa from rat brain cytosol was found to inhibit  $\text{Na}^+,\text{K}^+$ -ATPase

and

the other, a 12 kDa protein from the same source, regulate  $\text{Ca}^{2+}$ - and  $\text{Ca}^{2+},\text{Mg}^{2+}$ -ATPases by inhibiting former and stimulating the latter.

Therefore, the 12 kDa modulator is considered to be a specific tool in distinguishing the properties of  $\text{Ca}^{2+}$ - and  $\text{Ca}^{2+},\text{Mg}^{2+}$ -ATPase, reported first time from our laboratory. Both of them have been functionally characterized with respect to the regulation of ATPases.

They also inhibit protein phosphorylation by a novel protein kinase ( PKx ) which is activated by arachidonic acid and has been purified and characterized in our laboratory from goat testis.

So these modulator proteins are believed to be involved in various cellular function (through protein phosphorylation) including the regulation of ATPase activities.

The phosphorylation and dephosphorylation steps of  $\text{Ca}^{2+}$ -ATPase is comparable to  $\text{Ca}^{2+},\text{Mg}^{2+}$ -ATPase except that in the former case it is controlled by high and low concentration of calcium ion thus further strengthened the support of its involvement in Ca- transport in sperm cells thus fertility regulation like  $\text{Ca}^{2+},\text{Mg}^{2+}$ -ATPase.

The 12 kDa modulator protein is found to be effective as female anti-fertility agent as evident from experiments with rat and rabbit. An Indian patent has been awarded on this work.

Based on the above findings and available data, a scheme has been proposed showing the regulation of ion transporting ATPases by drugs, modulator proteins and protein kinase-C.

Recently a group of analogs of calcium blockers have been synthesized and their effects on Ca-ATPase are being investigated. At least one compound, we have named it as “**nifetepimine**”, an analog of nifedipine is found to be quite effective not only as an inhibitor of SERCA but effective to induce apoptosis in breast cancer cells at a significant level.

**Teaching - Course Offered**

Biological application of UV - IR spectroscopy, organized by Regional Sophisticated Instrumentation Centre, Bose Institute, Calcutta ; Refresher Course on Chromatography for College and University Teachers; M.Sc. students at Jadavpur University; Refreshers Course on Enzymology for College and University Teachers organized by Calcutta University, 2000; Cell Biology Course to Ph.D. students at Bose Institute, 2000; Cell Signaling course to Ph.D. students 2002, 2004,2006; Cell Biology to integrated M.Sc. students in 2007; Basic Biochemistry Course to Ph.D. students, 2010 – present; Cell Biology and Nano-Medicine in Integrated M.Sc.Ph.D. Programme in Life Sciences (Bose Institute), 2011-present.

### **Invited Lectures**

Invited Lectures, Bose Institute, Calcutta; Indian Institute of Chemical Biology, Calcutta; Indian Institute of Science, Bangalore; Centre for Cellular and Molecular Biology, Hyderabad ; Jawharlal Nehru University School of Life Science, New Delhi; Central Food and Technological Research Institute, Mysore; 25<sup>th</sup> Annual Convention of Chemists; Indian Institute of Chemical Biology under the auspices of the Society of Biological Chemists' of India Indian Association for the Cultivation of Science under the auspices of the Royal Society of Chemistry, Eastern India Section; Cornell University, Ithaca, USA ; Indian Institute of Technology, Kharagpur; 9<sup>th</sup> National Symposium on Natural Products; Satellite Symposium on Calcium Homeostasis under the auspices of 16<sup>th</sup> IUBMB held at IICB, Calcutta, 1994; Biomembrane Course to Ph.D. and Post-doctoral students at Bose Institute, 1995; National Symposium of Developmental Biology, Utkal University, Bhubaneswar, 1997; Prof.R.C.Shah Memorial Award Lecture, Indian Science Congress Association, Hyderabad, 1998; International Conference on Stress Adaptation, Prophylaxis and Treatment, Calcutta, 1998; Hungarian Academy of Science, Pecs; University of Szeget Medical School, Szeget, Hungary; Eotvos University, Budapest, Hungary; 4<sup>th</sup> West Bengal Academy of Science, Calcutta, 1998; National Symposium on Andrology and Reproductive Medicine, Calcutta, 1998; Indian Science Congress, Chennai, 1999; National Symposium on Recent Advances in Structure, Synthesis and Function of Biomolecules, Calcutta, 1999; Prof. P.A.Kurup Endowment Award Lecture at the 69<sup>th</sup> Annual Meeting of the Society of Biological Chemists (India) - 2000 ; National Conference on Recent Trends in Biology inspired Physics – 2002. International Conference on Drug Development and Drug Target – 2002; International Conference on Iron – Sulfur Proteins : Biogenesis, Structure, Function ,

Pathogenesis and Evolution. Philipps University, Marburg, Germany, September 11 – 13, 2002; and September 3-23, 2002; International Symposium on Molecular Endocrinology and Cellular Signals, Kolkata, November 14 – 16, 2002. Plenary Lecture “Recent Advances in Regulatory Mechanisms in Animal Function: A Molecular Approach”, February 2005, Sreegopal Banejee College, Magra, Hoogly; 11<sup>th</sup> International Conference on ATPases, Woods Hole, USA, September 11- 16, 2005; 12<sup>th</sup> International ATPases Conference, Aarhus, Denmark, August 5-10, 2008; International Conference on Molecular Medicine and Cell Signaling, Bose Institute, Kolkata, November 27-29, 2008; 3<sup>rd</sup> International Symposium on bio-inorganic Chemistry held at TIFR, Mumbai, November 4-7, 2009; INSA

PLATINUM JUBILEE INTERNATIONAL SYMPOSIUM ON RESEARCH IN “Molecular Medicine based on Natural Resources and Traditional Knowledge” November 21-23, 2009 at National Chemical Laboratory, Pune; National Conference on Cellular and Molecular Medicine, February 4-6, 2010, Bhopal.

Delivered an invited talk in the 22<sup>nd</sup> Annual Conference of the Physiological Society of India and 2<sup>nd</sup> Biennial Asian Association of Physiologists at Bangalore in December 2010

Invited talk in the Refresher Course on “Pharmacy : A fulcrum of knowledge of drug and drug research” in Jadavpur University, February 2011; DST-INSPIRE Internship Science Camp “Explore the Ecstasy of Science” at JBNSTS, February 2011; DST-JBNSTS Sponsored Science Camp at Digha in January 2011;

DST-INSPIRE Sponsored workshop in Burdwan, November 2011; Plenary Lecture at 4<sup>th</sup> International Congress of Molecular Medicine, Istanbul, Turkey, June 27-30, 2011; International Conference on Molecular Medicine and Drug Development, Haikou, China, November 13-16, 2013; National Conference on Medicinal Chemistry (Slovenia) under a bilateral exchange programme between Indian National Science Academy and Slovenia Academy of Sciences & Arts, September 2014.

### **Symposia and Conferences :**

70<sup>th</sup> Annual Meeting of ASBC, Dallas, Texas, 1979; 71<sup>st</sup> Annual Meeting of ASBC, St.Louis, Missouri, 1981; 3<sup>rd</sup> International Symposium on Na,K-ATPase, Yale University, 1982 ; International Symposium on Ophthalmology, Sarasota, Florida, 1982; 74<sup>th</sup> Annual Meeting of ASBC,

San Francisco, California, 1983; 9<sup>th</sup> Indo-Soviet Symposium on “Structure-Function of Biomembranes” Calcutta, 1984; 13<sup>th</sup> IUB Congress, Amsterdam, 1985; 3<sup>rd</sup> National Symposium on Bio-Organic Chemistry, Hyderabad, 1987; International Conference on Biomembranes in Health and Disease, Lucknow, 1988; Society of Biological Chemists’ of India, Calcutta, 1991; Symposium on “Modern Trends in Biology and Biotechnology “ under the auspices of SBC (I), Calcutta Branch, 1994; 9<sup>th</sup> National Symposium on Natural Products, Calcutta, 1994; Attended a training-cum-workshop on MEDLARS and DATABASES organized by Distributive Information Centre at Bose Institute; Satellite Symposium on Calcium Homeostasis under the auspices of 16<sup>TH</sup> IUBMB at Calcutta, 1994; 16<sup>th</sup> IUBMB at New Delhi, 1994, Annual Convention of Society of Biological Chemists, Bangalore, 1996; International Conference on Drug Development and Drug Target – 2002; International Conference on Iron – Sulfur Proteins : Biogenesis, Structure, Function , Pathogenesis and Evolution. Philipps University , Marburg, Germany, September 11 – 13, 2002; International Symposium on Molecular Endocrinology and Cellular Sugnals, Kolkata, November 14 – 16, 2002; 10<sup>th</sup> International Conference on ATPases, Woods Hole, USA, September 2005; 4<sup>th</sup> International Congress of Molecular Medicine, Istanbul, Turkey, June, 2011; International Conference on Molecular Medicine and Drug Development, Haikau, China, November, 2013; National Conference on Medicinal Chemistry (Slovenia), September 2014.

### **Ad Hoc Reviewer**

( **Projects** ) : DST, CSIR, DBT, ICMR, Wellcome Research Foundation ( UK )

( **Journals** ) : Indian Chemical Society

Indian Journal of Experimental Biology

Indian Journal of Biochemistry & Biophysics

Journal of Indian Medical Research

Science and Culture

The Prostate

International Journal of Cancer Research

American Journal of Experimental Biology

British Journal of Pharmacology

PLoS ONE



Cancer Research  
Molecular Cellular Biochemistry  
Br. J. Nutr.  
Acta Zoologica

**Member of the Learned Society**

Indian Chemical Society  
Society of Biological Chemists', India  
Indian Photobiology Society  
Indian Science Congress Association  
New York Academy of Science  
DNA Society of India

**The Name Cited in**

Reference India, Vol.3, 1995  
WHO's Who in the world, 1997

**Projects**

1. Targeting onco-miRNAs with a novel oleic acid-pluoronic stabilized porousTiO<sub>2</sub> nanoparticle for specific synergistic delivery of small molecule combination to combat triple negative breast cancer – DST Nanomission (2017-2020)
2. Targeting the miRNA axis with a synthetic small molecule, Nifetepimine to restrict migration of triple negative breast cancer cells. DST-SERB (2016-2019)
3. Department of Atomic Energy: Remodeling the cellular calcium homeostasis by ethyl-4-(3-nitro)-phenyl-6-methyl-2-oxo-1,2,3,4-tetrahydro-pyrimidine-5-carboxylate (Nifetepimine): A mechanistic approach towards cancer regression and immune rejuvenation. (2013-2016)
2. Council of Scientific & Industrial Research ( CSIR ) : Structural and Functional Characterization of a Bi-Functional Protein from Goat Spermatozoa. 2008 – 2011
3. Department of Biotechnology : Development of highly unsaturated marine lipids and esters and specific bioactive analogues for treatment of prevailing chronic disorder. 2003 – 2006 ( in collaboration with IICB, Kolkata )

4. Council of Scientific & Industrial Research ( CSIR ) : Further Characterization of Protein Kinase x ( PK x ) from Goat Spermatozoa. 2001 - 2004
5. Indo-German (DST-DAAD) : Isolation and Characterization of Human Seminosomal and Sperm Calcium ATPases. 2000- 2003
6. Department of Science & Technology (DST) : Cellular and Molecular Mechanisms of Immunosuppression in Visceral Leishmaniasis. 2000- 2003 (with Prof. A.C. Ghosh, Department of Microbiology, Bose Institute)
7. Department of Science & Technology ( DST ) : Studies on the role of phosphorylation on the molecular chaperone function of *a*-crystallin and cataract formation. 1999 - 2003
8. Council of Scientific & Industrial Research ( CSIR ) : Amphiphilic drug induced alteration of ion transporting ATPase activities regulated through protein kinase(s) and / or endogenous modulators. 1998 – 2000
9. Department of Science and Technology ( DST ) : Ion channels in reconstituted lipid bilayer membranes.( in collaboration with Jadavpur University ) 1994 - 1998
10. Council of Scientific and Industrial Research ( CSIR ) : Regulation of ion-transporting enzymes by protein kinase, stimulator and /or inhibitor proteins in goat spermatozoa. 1994 - 1997
11. Department of Atomic Energy ( DAE ) : Interaction of drugs with ATPase and lipids in model membranes . Part-1 . 1988 -1993 .
12. Council of Scientific and Industrial Research ( CSIR ) : The interaction of drugs with ATPase and lipids in model membranes. Part -11 . 1989 - 1992.
13. Department of Science and Technology ( DST ) : Studies on Na,K-ATPase : Biochemical and pharmacological studies, 1985 -1988.
14. Council of Scientific and Industrial Research ( CSIR ) : Studies on the effect of contraceptive drugs on various functional enzymes . 1986 -1987 .

### **Present Research Interest**

The main research interest is to work on different Biochemical aspects of various transport enzymes e.g.  $\text{Na}^+$ ,  $\text{K}^+$ -ATPase,  $\text{Ca}^{2+}$ ,  $\text{Mg}^{2+}$ -ATPase,  $\text{Ca}^{2+}$ -ATPase etc and their interactions with

different drugs (contraceptive and amphiphilic) and lipids in natural and model membranes; fluorescence behaviour of enzymes and how their function/activity are affected under various experimental (e.g. drug induced) conditions ; mechanism of regulation of transport enzymes by protein kinase (through phosphorylation), phosphatase (through dephosphorylation), endogenous stimulator and/or inhibitor proteins

( to explore their role not only in cell regulation but to study them in detail in order to examine if they have any pharmacological importance and to use these modulators as drugs particularly as contraceptive drugs ), characterization of peptide domain responsible for  $\text{Ca}^{2+}$ -ATPase and Ca-transport ; determination of amino acid sequence of domain and if possible to clone it and compare the findings with the well known  $\text{Mg}^{2+}$ ,  $\text{Ca}^{2+}$ -ATPase in order to explore the role of the ATPase in fertility regulation; regulation of ATPases by synthetic compounds and their possible use as anticancer agent.

Recently we have oriented our work to some synthetic compounds which are found to regulate different ion transporting enzymes. A group of compound analog of calcium blockers have been synthesized and their effects on  $\text{Ca}^{2+}$ -ATPase are being investigated. A few of these compounds are found to be quite effective not only as an inhibitor of SERCA but it found to induce apoptosis in breast cancer cells to a significant level both in vitro and in vivo.

### **Other activities**

Served as Founder Head, Division of Molecular Medicine (2008-15, January) and as Chairman of the Chemistry Department ( which is one of the oldest Departments of the Institute ) for three terms from March 2001 – February 2003, August 1997 - August 1999, March 2005- February 2006, Chairman, Department of Microbiology from 2008-2010 (March).. Besides, I have been associated with different committees of the Institute constituted from time to time to assist and suggest ways and means for better and smooth functioning of the Institute. Represented Bose Institute in different national meetings, conferences etc., Served either as Chairman and/or member in different National Committees.

Represented Academic Council to Bose Institute Council ( 1999 – 2002 ) and 2008-2013.

### **Others**

*Number of Ph.D. produced : Fourteen ( 17 )*

1. Dr. Barsanjit Mazumder 1989  
Current : Professor  
Cleveland State University, USA
2. Dr. Rita Sikdar 1991  
DST Young Scientist Project Awardee  
Current : Teacher, Mumbai
3. Dr. Subir K. Nagdas 1993  
Current : Professor  
Fayetteville State University  
South Carollina, USA
4. Dr. Sucheta Chandra 1993  
Current : Assoc. Professor, Bethune Gov't College
5. Dr. Gautam Adhikary 1993  
Current : Case Western University, USA
6. Dr. Dipankar Bhattacharyya 1997  
Current : Associate Profesor,  
Bengal Institute of Technology, Vidyasagary University
7. Dr. Koushik Roy 1999  
Current : University of Tennessee, USA
8. Dr. Atin K. Mandal 1999  
Asst. Professor, Bose Institute
9. Dr. Bhaswati Samanta 2005  
Asst Professor, Gurudas College
10. Dr. Pyali Mukherjee 2006  
Asst. Professor, Presidency University

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| 11. | Dr. Madumouli Chatterjee<br>State University of New York, USA                     | 2006 |
| 12. | Dr. Srabasti Ghoshal<br>Asst Professor, Behala College                            | 2008 |
| 13. | Dr. Maduchhanda Kundu<br>University of Illinois, USA                              | 2008 |
| 14. | Dr. Tanusree Sengupta<br>UGC Fellow, IIT Madras                                   | 2008 |
| 15. | Dr. Tushar Kanti Dhara<br>Higher Secondary School Inspector, Gov't of West Bengal | 2010 |
| 16. | Dr. Pinki Nandi<br>Post-Doc University of Western Ontario Canada                  | 2013 |
| 17. | Dr. Swatilekha Ghosh<br>Research Associate, Bose Institute                        | 2014 |

***Number of Ph.D. student at present working*** : ***TWO***

***Number of Post-doc working at present*** : ***FOUR***

***Number of Post-Doc trained*** : ***FOUR***

- |    |  |             |
|----|--|-------------|
| 1. | Dr. Shyamali Mukherjee<br>Current : Associate Professor<br>Meharry Medical School, USA | 1984 - 1986 |
| 2. | Dr. Jitendra K. Gupta<br>Current : Koparon Pharmaceuticals Ltd., Pune                  | 1993 - 1995 |
| 3. | Dr. Amlan K. Das<br>Current : Service  | 1996 - 1998 |

4. Dr. Dipankar Bhattacharyya 2002-2005  
Assoc. Professor : Vidyasagar University

***LIST OF PUBLICATIONS INCLUDING CITATION INDEX (EXCLUDES SELF CITATION) IN REFERRED JOURNALS ACCORDING TO CD ROM SEARCH (December 2016 )***

1. **P.C.Sen**, A.Ghosh and J.Datta (1976) Fatty acids of lipids of murels. J.Sci.Food.Agric. 27: 811-818.
2. S.B.Mandal, **P.C.Sen** and P.Chakrabarti (1978) Effect of respiratory-deficiency and temperature on the mitochondrial lipid metabolism of *Aspergillus niger*. Can.J.Microbiol. 24: 586-592.
3. **P.C.Sen** and T.K.Ray (1979) Lipid environment of gastric K-stimulated adenosine triphosphatase. Biochem.J. 182: 637-640.
4. **P.C.Sen** and T.K.Ray (1979) Characterization of gastric mucosal-membranes : I. Lipid composition of purified gastric microsomes from pig, rabbit and frog. Arch. Biochem. Biophys. 198: 548-555.
5. **P.C.Sen** and T.K.Ray (1980) Control of the K-stimulated ATPase of pig gastric microsomes: Effects of lipid environment and the endogenous activator. Arch.Biochem.Biophys. 202: 8-17.
6. **P.C.Sen** and T.K.Ray (1980) Characterization of gastric mucosal membranes : II. Lipid composition of purified gastric mitochondria from pig, rabbit and frog. Biochim.Biophys. Acta, 618: 300-307.
7. **P.C.Sen**, L.L.Tague and T.K.Ray (1980) Relationship between H and K secretion in bullfrog gastric mucosa : Characterization of the K-conductive pathway. Am.J.Physiol. 239: G485-492.
8. **P.C.Sen**, Zhou Meng Ai and T.K.Ray (1980) Bi-layer orientation of membrane bound NH groups across microsomal vesicles and their role in the function of gastric K-stimulated ATPase. Arch.Biochem. Biophys. 205: 340-351.

9. T.K.Ray and **P.C.Sen** (1981) Trypsinization unmasks a Ca-stimulated ATPase activity from purified pig gastric microsomes. *Life Science* 28: 1969-1974.
10. **P.C.Sen**, J.G.Kapakos and M.Steinberg (Flashner) (1981) Modification of Na,K-ATPase :evidence for the involvement of different amino groups at different PH values. *Arch. Biochem. Biophys.* 211: 652-661.
11. J.Nandi, T.K.Ray and **P.C.Sen** (1981) Studies on gastric Ca-stimulated ATPase : : Characterization and general properties. *Biochim. Biophys.Acta*, 646: 457-464.
12. **P.C.Sen** and D.R.Pfeiffer (1982) Characterization of partially purified Na,K-ATPase from porcine lens. *Biochim.Biophys.Acta*, 693: 34-44.
13. **P.C.Sen**, R.J.Krebsbach and D.R.Pfeiffer (1986) Persistent stimulation of lens fiber cell Na, K-ATPase by sodium thiocyanate. *Exp.Eye Res.* 43: 315-327.
14. S.Mukherjee, P.Charkrabarti and **P.C.Sen** (1987) Alteration of lipid composition, Na,K-ATPase, -3B hydroxy steroid dehydrogenase activities in the microsomal membrane of toad ovary in different seasons. *J.Biosc.* 12: 249-246.
15. B.Mazumder, S.Mukherjee, S.K.Nagdas and **P.C.Sen** (1988) The interaction of chloroquine with transport ATPase and acetylcholinesterase in microsomal membranes of rat *in vitro* and *in vivo*. *Biochem.Int.* 16:35-44.
16. S.Chakrabarty, **P.C.Sen** and N.K.Sinha (1988) Purification and chrac- terization of a low molecular weight basic protein from marine turtle egg white. *Arch.Biochem.Biophys.* 262: 286-292.
17. S.K.Nagdas, S.Mukherjee, B.Mazumder and **P.C.Sen** (1988) Identification and characterization of Mg -dependent and an independent Ca - ATPase in microsomal membranes of rat testes. *Mol.Cell.Biochem.* 79: 161-169.
18. S.Mukherjee and **P.C.Sen**. (1989) Changes in lipid composition and some biologically important enzyme activities in the microsomal membranes of toad ovary in different seasons. *Ind.J.Biochem.Biophys.* 26:153- 159.
19. B.Mazumder, S.Mukherjee and **P.C.Sen** (1990) The chlorpromazine inhibition of transport ATPase and acetylcholinesterase activities in the microsomal membranes of rat *in vitro* and *in vivo*. *Mol.Cell.Biochem.* 95:13-20.
20. **P.C.Sen** and E.Racker ( 1991) Phosphorylation and proteolytic degradation of neurofilaments. *Cell.Physiol.Biochem.* 1:55-63.

21. R.Sikdar, U.Ganguly, P.Pal, B.Mazumder and **P.C.Sen** . (1991) Biochemical characterization of a Ca - ATPase from goat spermatozoa. *Mol.Cell.Biochem.* 103:121-130.
22. G.Adhikary, S.Chandra, R.Sikdar, P.Nandy and **P.C.Sen** (1991)The inhibition of transport enzyme activities in different organs of rat by chlorpromazine *in vivo* is reversible. *Biochem.Int.* 25:951-961.
23. M.R.Mawal, **P.C.Sen**, M.AbdelGhany, D.Shalloway and E.Racker (1992) Phosphorylation of Tau by purified and related protein kinase from neurofilaments. *J.Biol.Chem.* 267: 19705-19709.
24. S.Chandra, G.Adhikary, R.Sikdar and **P.C.Sen** (1992) The *in vivo* inhibition of transport enzyme activities by chloroquine in different organs of rat is reversible. *Mol.Cell. Biochem.* 118:15-22.
25. R.Sikdar, U.Ganguly, S.Chandra, G.Adhikary and **P.C.Sen** (1993) Ca - ATPase and Ca - uptake in goat spermatozoa membranes do not require Mg . *J.Biosc.* 18:73-82.
26. A.Ghose Chaudhury, **P.C.Sen** and U.Ganguly (1993) Evidence for protein kinase C stimulation in rat enterocytes pretreated with heat stable enterotoxin of E.coli (Sta). *FEMS Letters.* 110:185-190.
27. S.Chandra, G.Adhikary, R.Sikdar and **P.C.Sen** (1993) An Na ,K -ATPase inhibitor protein from rat brain cytosol. *Biochim.Biophys.Acta,* 1144:33-38.
28. D.Ghosal, **P.C.Sen** and A.K.Barua (1994) Differential effect of bone marrow protein on ATPase of immunized control and malnourished rats. *Nutr.* 10: 21-25.
29. G.Adhikary, S.Chandra, R.Sikdar and **P.C.Sen** (1994) The amphiphilic drug induced tryptophan fluorescence change of ion transporting ATPases. *Biochim.Biophys.Acta,* 1188: 220-226.
30. A.Ghose Chaudhuri, **P.C.Sen** and U.Ganguly (1995) Alteration of the microenvironment in plasma membranes of rat enterocytes after Escherichia coli heat stable enterotoxin treatment : effect on protein kinase C. *Biochem.Mol.Biol.Int.* 35,567-574.
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## Patents

"A process for producing proteins having pronounced contraceptive activity" **(2005)**

"Nanoencapsulated Nifetepimine : A Potent Therapeutic Agent for the treatment of breast cancer" Paten Application filed in September **2015**

