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Senior Research Fellow

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Personal Details:

Residential Address: F-13, 87/2 A.K. Mukherjee Road, Kolkata-700090

Date of Birth: 2nd April 1984

Citizenship: Indian

Language proficiency: English, Bengali, Hindi

Present Position: Senior Research Fellow. Department of Physiology, University of Calcutta.

Education:

2011	Thesis Submitted (Physiology)	University of Calcutta, India; under the supervision of Prof. Antony Gomes and Dr. Roshnara Mishra.
2007	M.Sc. in Physiology (1 st class).	University of Calcutta, India.
2005	B.Sc. in Physiology (1 st class).	University of Calcutta, India.
2002	Higher Secondary (1 st division)	WBCHSE, India.
2000	Madhyamik (1 st division)	WBBSE, India.

Research experiences:

Jan 2011 to Senior research fellow **“Oral delivery of anti snake venom anti sera.”**
till date (Physiology, C.U.) Funding agency: Centre for Research in Nanoscience
and Nanotechnology (CRNN), University of Calcutta.
P.I.: Dr. Roshnara Mishra. Assistant professor, Dept. of
Physiology, University of Calcutta, India

July 2010 to Senior research fellow **“Centre for sleep studies”**
Dec 2010 (SLS, JNU) Funding agency: Department of science and technology,
Jawaharlal Nehru University, New Delhi.
P.I.: Prof B.N. Mallick, Professor, School of Life
sciences, Jawaharlal Nehru University, New Delhi, India.

Doctoral Research

Nov 2007 to Project fellow **“Studies on fresh water edible snail (*Bellamia***
Nov 2009 (Physiology, C.U.) ***bengalensis*) extract on experimental arthritis”**
Funding agency: University grant commission (UGC)
under the scheme of University Potential for Excellence
(UPE) in science & technology.
P.I.: Prof. Antony Gomes. Professor, Dept. of
Physiology, University of Calcutta. India.

Post graduation research

Project Work: Antiosteoporotic activity of fresh water snail (*Viviparus bengalensis*) extract on
experimental animals.

P.I.: Dr. Roshnara Mishra. Assistant professor, Dept. of Physiology, University of Calcutta.

Diet Survey at Singur (West Bengal), organized by National Institute of Public Health And Hygiene, Kolkata, India in 2006.

Honours and Awards:

- 2012 Awarded **Young scientist and selected for workshop** organized by south Asian Association of Physiologists (SAAP) on Current Trends in Resources on Biomedical Sciences.
- 2007 **Sakuntala Dasgupta Medal award** (Gold Medal), for securing highest marks in the special paper 'Nutrition and Dietetics' in M.Sc.
- 2005 **Certificate of honor** for securing 1st class in B.Sc (2005) from City College, Kolkata India.

Publications:

1. Gomes A, **Bhattacharya S**, Chakraborty M, Bhattacharjee P, Mishra R, Gomes A. Anti-arthritic activity of Indian monocellate cobra (*Naja kaouthia*) venom on adjuvant induced arthritis.. *Toxicon*. 2010. 55(2-3):670-3
2. Chakraborty M, **Bhattacharya S**, Bhattacharjee P, Das R, Mishra R. Prevention of the progression of adjuvant induced arthritis by oral supplementation of Indian fresh water mussel (*Lamellidens marginalis*) aqueous extract in experimental rats. *Journal of Ethnopharmacology*. 2010. 28; 132 (1):316-20.

3. Gomes A, Alam MA, **Bhattacharya S**, Dasgupta SC, Mukherjee S, Bhattacharya S, Gomes A. Ethno biological usage of zoo products in rheumatoid arthritis. Indian Journal of Experimental Biology. 2011. 49 (8):565-73.
4. Chakraborty M*, **Bhattacharya S** *, Mishra R, Mukherjee D & Mishra R. Antioxidant content and activity of the Indian fresh water pearl mussel in prevention of arthritis in experimental animal model. British Journal of Nutrition. 2012. 6:1-5. (* **Both have equal contribution**).
5. Mukherjee P, Sarkar K, Chakraborty M, **Bhattacharya S**, Mishra R and Kundu P. P. Oral insulin delivery by Self-assembled Chitosan Nanoparticles: In vitro and in vivo studies in diabetic animal model. Materials Science and Engineering: C (Accepted Manuscript).
6. Bose M, Chakraborty M, **Bhattacharya S**, Bhattacharjee P, Mandal S, Kar M and Mishra R. Prevention of adjuvant induced arthritis and inhibition of NF- κ B nuclear translocation substantiate the traditional anti arthritis application of Pongamia pinnata seed oil. (Communicated in Inflammation Research).
7. **Bhattacharya S**, Chakraborty M, Mukherjee P, Kundu P. P, and Roshnara Mishra. A new approach toward antiserum delivery: Oral and controlled release from alginate coated snake venom antiserum. (Communicated in Toxicon).
8. Chakraborty M, **Bhattacharya S**, Siddhartha S Saha, Bhattacharjee P, Dhar P, Mishra R. Prevention of chronic inflammation by dietary fresh water mussel lipid, an advantageous combination of multiple anti inflammatory factors. (Communicated in Ethnopharmacology).

Memberships:

- **Life Member, Indian Pharmacological Society** (2008). Membership No: LC-112
- **Life Member, Indian Science Congress Association** (2008). Membership No: L13680.

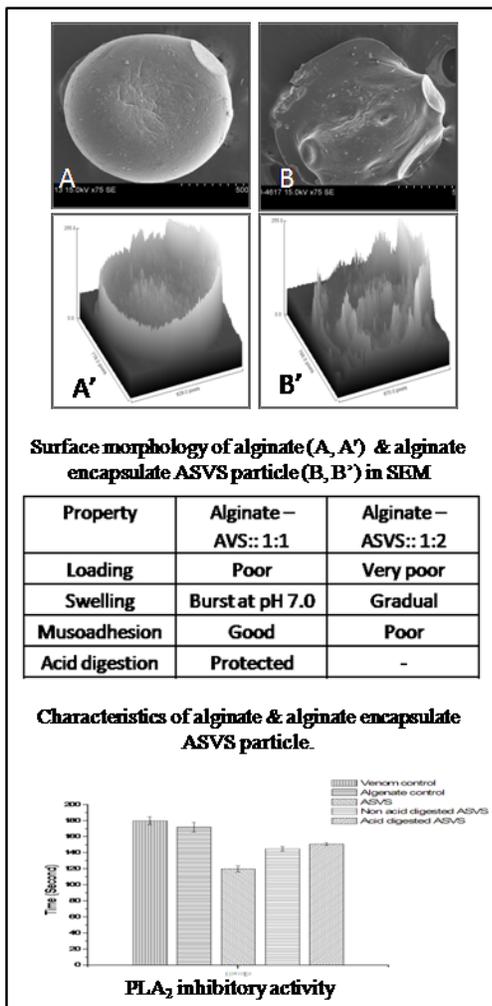
Summary of research:

Oral delivery of anti snake venom anti sera

Jan 2011 ongoing

C.U., Kolkata, India

Snake bite mediated multi organ failure and mortality is a common problem in developing countries of tropic like India. Delivery time of anti snake venom anti serum (ASVS) to the victim after snake envenomation is a determinant factor for snake bite mediated toxicity. Presently available therapeutic intervention by ASVS required hospitalization of patient for intravenous delivery as well as for treating hypersensitive reaction from ASVS which is time consuming as bites mostly occur in remote places far from hospitals.



Considering these factors, present study was designed to develop a suitable polymer coated ASVS drug for oral delivery which can retain its capacity to neutralize venom activity.

Oral delivery of protein drugs is a challenging area of current research where a variety of bio degradable natural polymers are in use. In the present study alginate was used to encapsulate ASVS and physical characteristics of alginate coated ASVS particle were studied in scanning electron microscope (SEM). It showed a smooth surface and less porosity in SEM image analysis. These particles have significant mucoadhesive properties and burst release capacity at pH 7.0, which can help them to bind to the surface of the GI tract, and release ASVS significantly in pH 7.0 of the intestine. Released ASVS from alginate coated ASVS particles was found to be protected from acid digestion as it showed significant inhibition against snake venom induced phospholipase A2 activity.

This study thus promises the oral application of polymer encapsulated ASVS and opens a new area of research to overcome snake bite mediated toxicity.

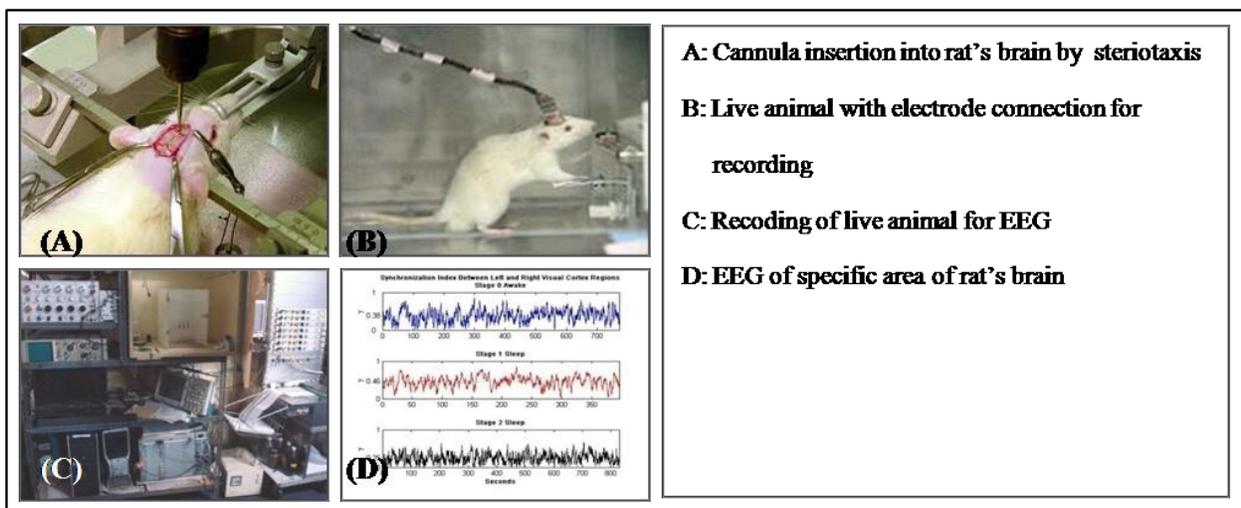
“Centre for sleep studies”

July 2010 to Dec 2010

JNU, New Delhi

Sleep is one of the most important physiological process. It is subdivided into two major classes REM sleep and Non REM sleep. REM is again very important as it help to consolidate memory; it is also called paradoxical sleep as the electrical activity in this phase is like that of wakefulness. Dreams occur in this phase of sleep. The neural circuitry of sleep is very complex and not well studied yet.

This project was designed to study the role of different areas of brain and their cross talk in rat sleep awakefulness cycle. Midbrain areas of rat were differentiated into two major classifications: 1. REM on areas 2.REM off areas. Using steriotaxis those particular area was pointed & electrodes were implanted to record single neuron activity by means of the instrument called PLEXON. This single neurone activity was then correlated with the different phase of sleep from EEG of free moving rat. Positive or negative correlations between single neurone activities with EEG helps to identify the type of neuron in those sleep areas as well as their role in different kinds of sleep cycle.



Studies on fresh water edible snail (*Bellamia bengalensis*) extract on experimental arthritis

Nov 2007 to Nov 2009

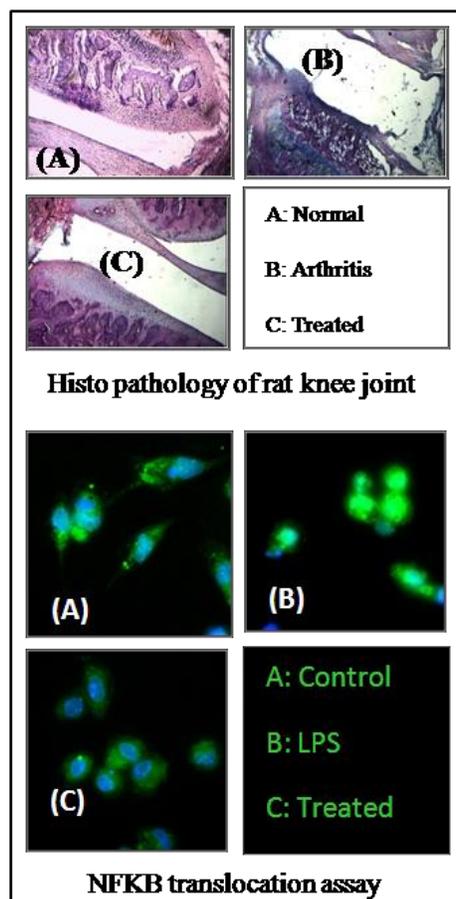
C.U., Kolkata, India

Bellamia bengalensis, the fresh water edible snail is consumed as an alternative protein source in villages of India. Traditionally this species have a wide use against musculo-skeletal and inflammatory disorders. This project was designed to validate ethnomedicinal use of fresh water edible snail against chronic inflammatory disorder.

Freund's complete adjuvant induced chronic inflammatory arthritis model was chosen for the present study & the model was developed in wistar strain male albino rats. Anti arthritis activity of Indian fresh water edible snail (*Bellamia bengalensis*) extract was then studied after per oral supplementation and efficiency of the extract was assessed from urinary, serum, & histopathological markers. Beside prevention of chronic inflammation *Bellamia bengalensis* extract showed significant protection against carrageenan, xylene induced acute inflammation and acetic acid induced acute pain in mice.

BFP1, a protein fraction from *Bellamia bengalensis* extract was isolated by IEC having anti inflammatory & analgesic property in experimental animal models. BFP1 showed five bands in SDS PAGE after CBB staining, & when further purified through HPLC, a sharp single peak with retention time 6.3 was eluted.

Studies of *Bellamia bengalensis* extract on different pro inflammatory and anti inflammatory cytokines, oxidative stress status in different inflammatory disease condition and finally its inhibitory activity on NF κ B p65 translocation in invitro murine peritoneal macrophage culture after LPS stimulation confirms the anti inflammatory activity of the extract and its mode of action against inflammation.



Seminar/ Conference presented:

National

1. **Bhattacharya Sourav**, Mishra R, Gomes A. Preliminary studies on the Antiosteoporosis activity of fresh water edible snail (*Bellamia bengalensis*) extract on experimental animal model. 2nd Eastern Regional & 19th Annual State Conference 2008. Indian Pharmacological Society West Bengal, 2008. (Poster presentation)
2. Anindhya Sundar Das, **Sourav Bhattachaya**, Mousumi Chakraborty, Roshnara Mishra. The Dilemma of Targeting Stem Cell Niche for Therapeutic Strategies. CME cum workshop on Stem Cell therapy and research. 2011.
3. **Bhattacharya S**, Chakraborty M and Mishra R. Charecterization of ASVS Polymer Complex. 100th Indian Science Congress conference 2013.

International

1. **Sourav Bhattacharya**, Roshnara Mishra, Antony Gomes. Effect of aqueous fresh water edible snail (*Bellamia bengalensis*) extract on pain and inflammation. International Conference on integrative Physiology: Modern perspective & platinum jubilee celebration of the physiological society of India. 2009. (Poster presentation).
2. **Sourav Bhattacharya**, Roshnara Mishra, Antony Gomes. Antiarthritic activity of fresh water edible snail (*Bellamia bengalensis*) extract on experimental animal models. International Conference on Integrative & Personalized Medicine and 42nd Annual Conference of the Indian Pharmacological society by National research Institute of Ayurveda for Drug development and Indian Pharmacological society, West Bengal Branch, kolkata, 2009. (Poster presentation).
3. **Sourav Bhattacharya**, Mousumi Chakraborty, Madhura Bose, Piyasi Mukhopadhyay, Patit P Kundu, Roshnara Mishra. Assessment of intestinal protein absorption in ex-vivo

experimental model. International Conference on Molecule to System Physiology: 100 Years Journey; Centenary celebration of the Department of Physiology, 2011. (Poster presentation)

4. **Sourav Bhattacharya**, Mousumi Chakraborty, Anindhya Sundar Das, Patit P Kundu, Roshnara Mishra. Oral Delivery of Anti Snake Venom Antisera (ASVS). International Conference on Frontiers in Biological Researches, Organised by Department of Human Physiology with Community Health Vidyasagar University, Medinipur- 721 102. West Bengal, India. 2012. (Poster presentation)

Workshop and training programmes:

- 2011 Flow cytometry and cell sorting (BD FACS Aria III)
Organized by University of Calcutta and BD biosciences (4 days).
- 2012 Workshop & hands on training on current trends in resources on biomedical sciences.
Organized by South Asian association of Physiologists, University of Calcutta, Bose Institute, National institute of Cholera and Enteric Diseases (NICED) and Indian Institute of Chemical Biology (IICB) (5 days).
- 2012 International workshop on applications of flow cytometry and imaging in cell biology and nano-biotechnology (Attended the lecture schedule).
Organized jointly by University of Calcutta and Becton Dickinson (7 days).
- 2012 5th Annual Meeting of the Cytometry Society , India. Cytometry and its role in tackling Infectious Disease 12th -13th October, 2012

Techniques known:

Experimental Animal Handling & Pharmacology	<p>Toads: Maintenance, Pithing, Surgery, Isolated amphibian heart preparation, Nerve muscle preparation.</p> <p>Mice & Rats: Maintenance, Feeding, Surgery, Treatment through intraperitoneal, intravenous, intraderma, subcutaneous, intramuscular, per oral routes, Capillary permeability study, Sleeping time of mice, Defibrinogenating activity, Plasma recalcification time study, Platelet aggregation, Hemorrhagic activity, Hemolytic activity study.</p> <p>Rat respiration study set up preparation, Development of osteoporotic rat model by ovariectomy, arthritic animal models, acute & chronic inflammation models, pain models in experimental animals, oxidative stress model in animals, Gastric ulcer in animal models, Cancer model development. Histology of different tissues of mice and rats.</p> <p>Rabbits: Maintenance, Handling, antibody rising for specific antigen.</p> <p>Scorpion: Maintenance, extraction of venom from live animals.</p>
Microscopy	<p>Fluorescent microscopy, Phase contrast microscopy, Confocal microscopy, Basic concept and use of Atomic force microscopy and Scanning electron microscopy.</p>
Immunology	<p>Isolation of cell from spleen, lymph, macrophage from experimental animals & culture in invitro condition.</p> <p>Polymorpho nuclear cells & neutrophil separation and their activity study after mitogen stimulation, Immunogel Diffusion, Immunogel electrophoresis, Immunocytochemistry.</p> <p>Antibody rising in murine & mammalian experimental animals against specific antigen.</p>

Biochemistry & Molecular Biology	<p>Spectrophotometry, Spectrofluometry.</p> <p>Biochemical parameters analysis from blood, serum, tissue & urine.</p> <p>Blood Hematology: TC, DC, Hemoglobin, ESR.</p> <p>Studies on antioxidant parameters (Total anti oxidant assay , Total oxidative status, SOD, Lipid peroxidation, Glutathion, Catalase), Invitro antioxidant activity measurements (hydroxyl radical scavenging activity, Superoxide radical scavenging activity, Nitric oxide scavenging activity, metal chelating activity).</p> <p>Protein Purification & Characterization, Lipid purification.</p> <p>Chromatography techniques (Ion exchange chromatography, HPLC, GC)</p> <p>Electrophoresis techniques (Native & SDS PAGE).</p> <p>DNA Laddering, Comet Assay.</p> <p>Western Blot, ELISA, Flow cytometry, NF-KB translocation assay.</p>
Electrophysiology	<p>Steriotaxic surgery, implantation of cannulae in different specific regions of rat's brain, electroencephalographic recording and analysis.</p> <p>Microinjection of different chemicals and biological agents in different parts of the brain.</p> <p>Recording of single neuron from live un-anesthetized animals.</p>
Toxicity Study	<p>MLD / LD 50, acute & chronic toxicity study in experimental animals and in IC50 in cell culture developing specific toxicity models.</p>
Nanotechnology	<p>Synthesis of gold nanoparticle, Dynamic light scattering. Refractometer, FTIR, Sonicator.</p>

Referees:

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Scientist D

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National Institute for Research in Reproductive Health (ICMR)

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Email: srabanimuk@yahoo.com