

Grant-in aid Projects

1. SERB-DST-India-total 50 lakhs, “Mechanism of white matter damage by a mixture of As, Cd and Pb: Investigating the role of glutamate metabolism during CNS development”-**2014-2017**
2. DBT-India-total 60 lakhs; “Mechanism underlying white matter damage by metals during brain development: Role of glia-neuron interaction-**2014-2017**
3. DST-India-Characterisation of pathogenic mechanism of action of metal mixture on neurodevelopment-**2009-2012**
4. ICMR-India-Characterisation of the protective role of omega3 fatty acid against neurodevelopmental damage in metal mixture exposed rat model-**2009-2013**

Editorial Board membership: Toxicological Sciences **Current Aging Science**

Patent filed

International patent filed: Model of Alzheimer’s disease”, Detail in WIPO; detail Pub. No.:WO/2014/184809, International Application No.: PCT/IN2014/000330; Publication Date:20.11.2014; International Filing Date: 15.05.2014; No. 0036NF2013-CSIR

Technologies available for transfer

A “Model of Alzheimer’s disease (AD)” features a non-transgenic rat model for early AD, using a metal mixture of As, Cd and Pb, characterized by enhanced synergistic amyloidogenicity in rat cortex and hippocampus. This model can serve as a tool for (a) AD-directed drug screening, and (b) determining mechanism of AD pathogenicity. It features induction of the Abeta-mediated apoptosis and induction of inflammation in rodent brain. The invention features novel astrocyte and neuronal cellular models for AD, using a metal mixture of As, Cd and Pb, characterized by enhanced synergistic amyloidogenicity. This model can serve as a tool for (a) AD-directed drug screening in astrocytes and neurons, and (b) determining mechanism of AD pathogenicity in cells. It features induction of the Abeta-mediated apoptosis and induction of inflammation in astrocytes and neurons.

Research Papers

- Docosahexaenoic acid up-regulates both PI3K/AKT-dependent FABP7-PPAR γ interaction and MKP3 that enhance GFAP in developing rat brain astrocytes. Tripathi S, Kushwaha R, Mishra J, Gupta MK, Kumar H, Sanyal S, Singh D, Sanyal S, Sahasrabudhe AA, Kamthan M, Mudiam MK, **Bandyopadhyay S.** ***J Neurochem.*** **2017 Jan;140(1):96-113.** doi: 10.1111/jnc.13879.
- Chronic cerebral hypoperfusion-induced impairment of A β clearance requires HB-EGF-dependent sequential activation of HIF1 α and MMP9. Ashok A, Rai NK, Raza W, Pandey R, **Bandyopadhyay S.** ***Neurobiol Dis.*** **2016 Nov;95:179-93.** doi: 10.1016/j.nbd.2016.07.013.
- As, Cd and Pb-mixture induces synergistic A β pathology via amyloidogenic APP processing in developing rats: Role of oxidative stress, IL-1 and APP 5’UTR;

- Anushruti Ashok, Nagendra Kumar Rai, Sachin Tripathi and ***Sanghamitra Bandyopadhyay**. *Toxicol Sci.* 2015 Jan;143(1):64-80. doi: 10.1093/toxsci/kfu208.
- Cypermethrin stimulates GSK3 β -dependent A β and p-tau proteins and cognitive-loss in young rats: Reduced HB-EGF signaling and downstream neuroinflammation as critical regulators; SK Maurya, J Mishra, S. Abbas, ***S Bandyopadhyay**. *Mol Neurobiol.* 2016 Mar;53(2):968-82. doi: 10.1007/s12035-014-9061-6.
 - Rai A, Tripathi S, Kushwaha R, Singh P, Srivastava P, Sanyal S, ***Bandyopadhyay S**. CDK5-induced p-PPAR γ (Ser 112) downregulates GFAP via PPREs in developing rat brain: effect of metal mixture and troglitazone in astrocytes.. *Cell Death Dis.* 2014 Jan 30;5:e1033. doi: 10.1038/cddis.2013.514.
 - **Bandyopadhyay S** and Rogers JT. Alzheimer's disease therapeutics targeted to the control of amyloid precursor protein translation: maintenance of brain iron homeostasis. *Biochem Pharmacol.* 2014 Apr 15;88(4):486-94. doi: 10.1016/j.bcp.2014.01.032
 - Rai NK, Ashok A, Rai A, Tripathi S, Nagar GK, Mitra K, ***Bandyopadhyay S**. Exposure to As, Cd and Pb-mixture impairs myelin and axon development in rat brain, optic nerve and retina. *Toxicol Appl Pharmacol.* 2013 Dec 1;273(2):242-58.
 - S. Abbas, K. Khan, MP Khan, GK Nagar, D Tewari, SK Maurya, J Dubey, NG Ansari, ***S Bandyopadhyay** and N Chattopadhyay, Developmental exposure to As, Cd and Pb-mixture diminishes skeletal growth and causes osteopenia at maturity via osteoblast and chondrocyte malfunctioning in female rats. *Toxicol Sci.* 2013 Jul;134(1):207-20. doi: 10.1093/toxsci/kft093. Epub 2013 Apr 19
 - **Bandyopadhyay S**, **Cahill C**, **Balleidier A**, **Huang C**, **Lahiri DK**, **Huang X**, **Rogers JT**. Novel 5' untranslated region directed blockers of iron-regulatory protein-1 dependent amyloid precursor protein translation: implications for down syndrome and Alzheimer's disease. *PLoS One.* 2013 Jul 31;8(7):e65978. doi: 10.1371/journal.pone.0065978
 - SK Maurya, A Rai, N Rai, S Deshpande, R Jain, MKR Mudiam, YS Prabhakar and ***S Bandyopadhyay**. Cypermethrin Induces Astrocyte Apoptosis by the Disruption of the Autocrine/Paracrine Mode of Epidermal Growth Factor Receptor Signaling. *Toxicological Sciences*, 125(2), 473–487 (2012).
 - MKR Mudiana, R Jain, SK Maurya, HA Khan, **S Bandyopadhyay**, RC Murthy; Low density solvent based dispersive liquid–liquid microextraction with gas chromatography–electron capture detection for the determination of cypermethrin in tissues and blood of cypermethrin treated rats; *Journal of Chromatography B*, 895–896 (2012) 65– 70.
 - **Rogers JT**, **Mikkilineni S**, **Cantuti-Castelvetri I**, **Smith DH**, **Huang X**, **Bandyopadhyay S**, **Cahill CM**, **Maccacchini ML**, **Lahiri DK**, **Greig NH**.The alpha-synuclein 5'untranslated region targeted translation blockers: anti-alpha synuclein efficacy of cardiac glycosides and Posiphen. *J Neural Transm.* 118(3):493-507, (2011).
 - A Rai, SK Maurya, P Khare, A Srivastava and ***S Bandyopadhyay**. Characterization of Developmental neurotoxicity of As, Cd and Pb mixture: Synergistic Action of

Metal Mixture in Glial and Neuronal Functions. **Toxicological Sciences**; **118(2):586-601 (2010)**.

- ***S Bandyopadhyay**, X Huang, DK Lahiri and JT Rogers; Novel drug targets based on metallobiology of Alzheimer's Disease. **Expert Opinion on therapeutic targets**, **2010**; **14(11):1177-97**.
- **S Bandyopadhyay**, Jacob Tfelt-Hansen and Naibedya Chattopadhyay. Diverse roles of extracellular calcium-sensing receptor in the central nervous system. **Journal of Neuroscience Research**, Aug **1;88(10):2073-82, 2010**.
- RA Sinha, P Khare, A Rai, SK Maurya, A Pathak, V Mohan, GK Nagar, MK Reddy Mudiam d, Madan M. Godbole b, ***S Bandyopadhyay**; Anti-apoptotic role of omega-3-fatty acids in developing brain: perinatal hypothyroid rat cerebellum as apoptotic model; **Int. J. Devl Neuroscience** **27 (2009) 377–383**.
- **S Bandyopadhyay**, Jose R. Romero and Naibedya Chattopadhyay. Kaempferol and Quercetin Stimulate Granulocyte-macrophage colony-stimulating factor Secretion in Human Prostate Cancer Cells. **Molecular and Cellular Endocrinology**. 2008, **11;287(1-2):57-64**.
- N Chattopadhyay, AE JeffreyJTF-Hansen, S Yano, **S Bandyopadhyay**, EM Brown, J de Vellis. Calcium Receptor Expression and Function in Oligodendrocyte Commitment and Lineage Progression: Potential Impact on Reduced MBP in CaR-null Mice. **Journal of Neuroscience Research** **2008, 1;86(10):2159-67**.
- Sinha RA, Pathak A, Mohan V, **Bandyopadhyay S**, Rastogi L, Godbole MM. Maternal thyroid hormone: a strong repressor of neuronal nitric oxide synthase (nNOS) in rat embryonic neocortex. **Endocrinology**. **2008 ;149(9):4396-401**.
- ***S. Bandyopadhyay**, L. E. Goldstein, D. K. Lahiri and J. T. Rogers: Role of the APP non-amyloidogenic signaling pathway and targeting α -secretase as an alternative drug target for treatment of Alzheimer's disease. **Current Medicinal Chemistry** **14, 17 (2007)**.