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Modes of neuropharmacological actions of taurine and its potential therapeutic usage

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Taurine is an inhibitory neuromodulatory endogenous amino-acid in the CNS and activates GABA- and glycine-insensitive chloride channel and inhibits the glutamate NMDA receptor. We investigated taurine's interaction with the NMDA receptor using electrophysiological, receptor binding studies and explored its long-term effects by using western blot determination of NMDA and AMPA receptor subunits expression in the rat frontal cortex. Taurine was found to modulate NMDA receptor function without affecting AMPA receptor mediated activity perhaps by partially blocking spermine-potentiated NMDA receptor activation. Furthermore, our studies revealed that inhibition of evoked responses by taurine overlapped with that by Ro-25-6981, a selective antagonist for the GLuN1/GLuN2B NMDA receptor subtype, suggesting that taurine modulates NMDA receptor by acting on the NMDA GLuN1/GLuN2B receptor subunit (s). This observation was confirmed by conducting receptor binding studies using tritiated-spermidine or-taurine that showed that taurine and polyamines may interact at a common binding site. Chronic administration of taurine caused significant increase in the expression of NMDA GLuN2B, but not GLuN1 subunit and a significant decrease in the expression of the AMPA GLuR2 subunit. The up-regulation of the GLuN2B subunit suggests a consequence of its possible long-term interaction with taurine, and the down-regulation of the AMPA GLuR2 subunit is possibly correlated to an increased recruitment of the GLuR2-subunit-lacking, calcium-permeable subtype of AMPA receptor. Other studies in our laboratory showed that taurine is an effective anti-cataleptic and neuro-protective agent. Also, microdialysis investigation of effects chronic administration of psychotropic drug, cocaine revealed an increase in extracellular release of endogenous taurine which may protect against deleterious effects of the substances of abuse. In addition, taurine administration was found to prevent cocaine-induced addiction by suppressing spontaneous locomotor activity and conditioned place preference. Thus taurine is a unique psychopharmacological compound with potential for a variety of therapeutic uses including as a neuro-protective, anti-cataleptic, and anti-addicting agent.

Biography

Shailesh P Banerjee received his PhD in Pharmacology from University of Toronto and a MPH degree from the Columbia University. He has served as an Associate Editor of the *Journal of Neuroscience* 1981-84. He has been in the Medical School Faculty in either University of Rochester School of Medicine or CUNY Medical School for last forty years or more and published more than 100 scientific research papers in reputed journals.

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