

## ***DR. VINOD KUMAR BHARGAVA AWARD***

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# **GRANULOCYTE COLONY STIMULATING FACTOR (GCSF) IMPROVES MEMORY AND NEUROBEHAVIOR IN AN AMYLOID-B INDUCED EXPERIMENTAL MODEL OF ALZHEIMER'S DISEASE**

## **ABSTRACT**

GCSF is an endogenous neuronal hematopoietic factor that displays robust in vitro and in vivo neuroprotective activity. The present study aimed to evaluate the effect of GCSF on A $\beta$ -induced memory loss in an Alzheimer's disease model of rats. A total of 42 male adult wistar rats weighing 200-250gm were used in the study and were divided into 7 experimental groups. Animals were subjected to intracerebroventricular (ICV) injection stereotaxically at day 0 to instill Amyloid- $\beta$ 1-42 (A $\beta$ 1-42) or PBS (sham operated group) at the volume of 10 $\mu$ l (5 $\mu$ l bilaterally). GCSF treatment was given from day 7 to 12 of A $\beta$  injection. On day 21, behavioral tests (short term memory, exploratory behavior and motor co-ordination) in all groups were evaluated. Biochemical parameters and RNA expression was measured to ensure the efficacy of GCSF. GCSF (35 and 70 $\mu$ g/kg, s.c.) showed statistically significant improvement in memory as compared to control and sham operated groups ( $p < 0.05$ ). The mean time spent in the platform placed quadrant was found to be significantly increased in the GCSF (70 $\mu$ g/kg, s.c.) as compared to GCSF (35 $\mu$ g/kg, s.c.) and GCSF (10 $\mu$ g/kg, s.c.) groups ( $p < 0.001$ ). GCSF (35 and 70 $\mu$ g/kg, s.c.) also improved the motor co-ordination and exploratory behavior significantly as compared to naïve sham operated and GCSF (10 $\mu$ g/kg, s.c.) groups ( $p < 0.05$ ). Improvement in memory by GCSF (35 and 70 $\mu$ g/kg, s.c.) was coupled with marked reduction of lipid peroxidation, acetylcholinesterase levels and a significant increase in antioxidant enzymes as well as total RNA expression in the brain. Additionally, GCSF (35 and 70 $\mu$ g/kg, s.c.) significantly increased progenitor cells (iPSC) and surface marker CD34+ in the brain and hence induced the neurogenesis. The present findings demonstrate an improvement of memory and neurobehavioral function with GCSF in A $\beta$ -induced Alzheimer disease model in rats.