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### Potential of the anticancer activity of methylglyoxal by creatine supplementation

Manju Ray<sup>1,2</sup>, Anirban Roy<sup>1</sup> and Aparajita Pal<sup>1</sup>

<sup>1</sup>Bose Institute, India

<sup>2</sup>Institute of Applied Science & Humanities GLA University, India

The creatine kinase (CK) system plays a key role in cellular energy buffering and transport. Our group demonstrated the progressive decrease of phosphocreatine, creatine and CK upon transformation of skeletal muscle into sarcoma. It was convincingly revealed that prominent expression of creatine-synthesizing enzymes L-arginine: Glycine amidinotransferase and N-guanidinoacetatemethyltransferase occurs in sarcoma, ehrlich ascites carcinoma and sarcoma 180 cells; Whereas, both these enzymes were virtually undetectable in skeletal muscle. Simultaneously, our group has been investigating the anticancer activity of the glycolytic intermediate, methylglyoxal. We observed that the tumor inhibitory effect of methylglyoxal was significantly augmented in presence of creatine. Moreover, creatine and CK, which were very low in sarcoma tissue, were significantly elevated with the concomitant regression of tumor. In recent research we verified that the potentiation of the anticancer activity of methylglyoxal by creatine extends to breast carcinoma model as well and formulated a creatine supplemented methylglyoxal based anticancer formulation. Our recent focus has shifted in combating the drug resistant cancer stem cells, which is a major limitation of present day

cancer therapy. Unpublished data from our laboratory has revealed the preferential anti-stem cancer cell activity of methylglyoxal in breast carcinoma model. Methylglyoxal at metronomic concentrations targets and reduces the population of CD44hi/CD24lo breast cancer stem cells. As future research, we aim to evaluate the potential of creatine supplementation in intensifying the potency of methylglyoxal to suppress stemness in cancer cells.

#### Speaker Biography

Manju Ray is an Indian scientist in Molecular Enzymology and Cancer Biochemistry. She has done notable work in the development of anticancer drug and understanding of differentiation process of cells. Her interests cover tumor biochemistry and molecular enzymology. Ray graduated from the Calcutta University with degrees in M.Sc. in Physiology in 1969 and PhD in Biochemistry in 1975. She started her career in the Department of Pharmacy, Jadavpur University and then shifted to Department of Biological Chemistry, Indian Association of Cultivation of Science, India and became a professor. She is now a Hon. Visiting Scientist at Bose Institute, India and also Distinguished Professor, GLA University Mathura. Her research has, over a long span of her career in the department of biochemistry at the Indian Association for the Cultivation of Science (IACS), Jadavpur, in association with a team of scientists and doctors that has led to positive development of a drug for cancer treatment. She is a Shanti Swarup Bhatnagar awardee (Highest honor in science in India).

e: manjuray@jcbose.ac.in



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