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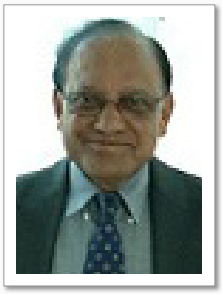

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Fluorescent heme degradation products: A novel marker for red blood cell oxidative stress

In mammals, since red blood cells (RBCs) are the only cells that carry oxygen to deliver to tissues, these cells are exposed to the highest concentration of oxygen. Work from our laboratory has shown that under hypoxic conditions (such as when RBCs travel through microcapillaries), hemoglobin, the most predominant protein in RBCs, undergoes auto-oxidation producing reactive oxygen species (ROS) like superoxide and hydrogen peroxide. In fact, RBCs have an extensive antioxidant system to eliminate the formation of ROS as soon as they are formed. Even then, an increase in RBC oxidative stress has been reported in many pathological conditions associated with various diseases and aging. Our work has demonstrated that hemoglobin autoxidation in RBCs eventually undergoes further oxidation, perhaps when hemoglobin binds to membranes, thus escaping its antioxidant system in hypoxic conditions and breaks down itself to produce heme degradation products. These heme degradation products are fluorescent, stable and thus could be easily measured *in situ* by a spectrofluorimeter. Our results show that there is an increase in the fluorescent heme degradation products in different pathological conditions as well as *in vitro* RBC aging. Hence, the level of heme degradation products in RBCs is a marker of RBC oxidative stress and may be an indicator of RBC health.

Biography

Joy G. Mohanty completed his Ph.D. in Chemistry in 1977. Following his Ph.D. he has been involved in biomedical research at various institutions like, NIH, Northeast Ohio Universities College of Medicine, University of Montreal, McGill University and Hahnemann University Medical School (presently xel University College of Medicine) prior to joining NIH as a researcher in 2003. Since then, he has been involved in studies on hemoglobin oxidation mechanisms, red blood cell (RBC) deformability changes, RBC properties in mouse model involving oxidative stress, RBC properties in Alzheimer's disease patients and RBC properties in human subjects having anemia. He has published several papers in the field with more than 40 papers including other research areas in reputed journals and has reviewed several research manuscripts of different journals.

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