

Investigating the “Secret Killer”: Chronic Inflammation
Dr Goutam Chowdhury, Assistant Professor, Department of Chemistry receives the
Ramalingaswami Fellowship



Chronic inflammation is a “secret killer”. Chronic inflammation is responsible for a diverse array of diseases including cancer, diabetes, depression, heart disease, stroke, and Alzheimer's. More than 15% of all malignancies worldwide can be attributed to infections, a global total of 1.2 million cases per year. Chronic "hidden" inflammation occurs throughout the body due to infection or exposure to chemicals and most people don't even know they're inflamed. Inflammation causes release of reactive species that damage cellular macromolecules.

Recently, a novel class of agents, collectively termed as 8-NO₂-G, were detected at sites of chronic inflammation. Dr. Goutam Chowdhury, Assistant Professor, Department of Chemistry, School of Natural Sciences is trying to determine if these recently detected “primary” damaged products 8-NO₂-G, are responsible for the carcinogenicity associated with chronic inflammation. He has been awarded the prestigious DBT Ramalingaswami Fellowship of the DBT, Government of India to further his research in the “Role of 8-nitroguanosine and its analogs in chronic inflammation associated cancers”. The proposed research is intended to determine if these 8-NO₂-G molecules are responsible for development of cancer associated with chronic inflammation. Till now it is believed that the “primary” DNA damages caused by reactive species are responsible for the toxicity associated with chronic inflammation. However, DNA damage caused by these reactive species is efficiently repaired. Unless the load of the damage overwhelms the repair systems, it is improbable that these species and the corresponding DNA lesions are responsible for the carcinogenicity associated with chronic inflammation.

Dr. Chowdhury works at the interface of chemistry and biology trying to understand, at the molecular level, the effect of small organic molecules on biological systems". His research involves "understanding the molecular mechanisms of toxicity of various agents including drugs, pesticides and environmental agents". Talking about his research, Dr. Chowdhury says, “Demonstrating these 8-NO₂-G species as mutagenic and carcinogenic is of immense importance not only from a translational but also from a toxicological and biochemical point of view. It will provide an opportunity to better understand the mechanism of toxic and carcinogenic effects of chronic inflammation. In addition, the proposed research will also address the ability of these agents to inhibit DNA repair and modulate epigenetic regulation. Together the possibility of a novel multi-dimensional mechanism of toxicity (DNA damage, inhibition of DNA repair and epigenetics) associated with chronic inflammation will be investigated.”