**Exposure of primary hepatocytes to three different types of titanium dioxide nanoparticles induces Reactive Oxygen Species (ROS) production and loss of hepatic functions**

Titanium dioxide ($TiO_2$) is one of most widely manufactured and consumed engineered nanoparticles utilized (NPs) in numerous industries such as cosmetics, pharmaceuticals, water treatment and foods. Recent studies indicate that $TiO_2$ NPs have adverse effects on human health but there are limited studies that correlate the effects observed to specific biological pathways. The liver is the major accumulation site of $TiO_2$ NPs, directly through intentional ingestion or indirectly via NP dissolution from food containers. Additionally, increased environmental contamination and unintentional ingestion via water and aquatic species may also result in increased accumulation of $TiO_2$ in the liver. However, the toxicological effects of $TiO_2$ on liver function have not been extensively investigated. In this work, we investigated the concentration and phase dependent effect elicited by $TiO_2$ NPs on primary hepatocytes. Hepatocytes are the most abundant cell type of the liver and perform numerous vital hepatic functions related to synthesis, catabolism and clearance. We exposed the primary hepatocytes to three different forms of commercially available $TiO_2$ NPs; Degussa P25, pure Anatase (50nm) and pure Rutile (50nm). $TiO_2$ exposure resulted in a concentration dependent loss of cell viability and alteration in cell morphology. We also observed an increase in production of Reactive Oxygen Species (ROS). Furthermore, liver-specific functions (urea and albumin synthesis) were also affected by $TiO_2$, P25 treated cells exhibiting the most significant loss in the functions. Currently, we are investigating the molecular mechanistic aspects of the observed change in cell phenotype, focusing primarily on the effect of oxidative stress and mitochondrial dysfunction induced by $TiO_2$ NPs.