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Project :	Development and hazard assessment of new food technology-based nanoparticles
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Introduction

With the rapid growth of nanotechnology, especially in the last decade, it is only very recently that the scientific research community as well as the industry had expressed concerns over its toxic potentials. Nanomaterials due to its very small dimensions possess novel properties and hence pose unconventional health hazards. Unfortunately, our knowledge on the toxic properties of nanomaterials continues to be rudimentary as the research focussed on this topic had only started to gain momentum. As a result, many questions regarding the mechanism of cytotoxicity of nanomaterials are yet to be answered. Surface charge and size of the nanoparticles are hypothesized to be the two major factors in determining cellular interactions as well as cellular uptake of nanoparticles.

Goal

The goal of this project is to understand how surface (surface charge) and physical (size) properties of nanoparticles influence the cytotoxicity and cellular interaction of nanoparticles. Additionally this project will encompass synthesis and testing of well characterized nanoparticles with variation of their properties (surface charge, size, tagging the particles with fluorescent probe etc.) to render them in better understanding of the mechanistic aspects of nanoparticle interactions with biological systems as well as cytotoxicity.

Progress achieved

In this project, we could successfully delineate the different effects of surface charge on cytotoxicity of nanoparticles. Our data suggested that apart from surface charge, other factors that might influence the surface properties (like protein adsorption) can also influence cytotoxicity. Oxidative stress was found to be a major occurrence associated with cytotoxicity of nanomaterials which might also be a mechanism.

Further research

We are currently concentrating our research on to understand how different physical properties influence cytotoxicity as well as cellular uptake of nanoparticles. We also plan

to perform animal studies in near future to assess bioavailability of polymer nanoparticles after oral administration as they can be exciting fro sustained delivery perspectives.

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References

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