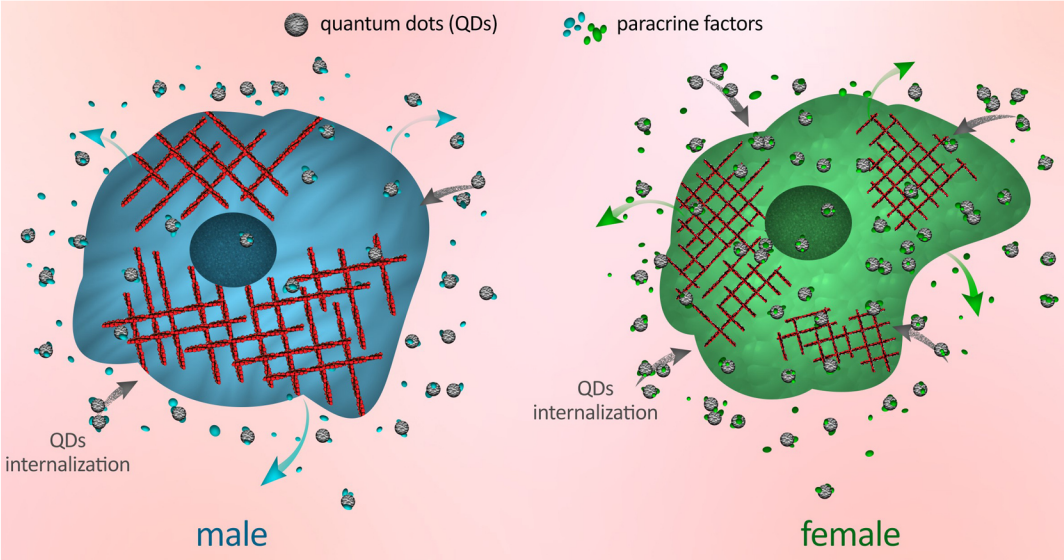
BIOENGINEERING & BIOMEDICAL ENGINEERING

RESEARCH SEMINAR



GENDER AND AGE-RELATED EFFECTS ON CYTOSKELETAL ORGANIZATION OF PRIMARY CELLS AND THEIR ROLE IN CELLULAR NANOPARTICLE UPTAKE

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ABSTRACT

Despite major advances in nanomedicine, very few nanoparticles (NPs) have made it to clinical applications. This discrepancy between bench discoveries and the effective clinical translation of nanoparticles is mainly due to ignorance of many key factors in in vitro studies, and poor understanding of interactions at the interface of NPs and the physiological environment. We introduce cell gender as a determining factor in cellular uptake of NPs. The role of cell sex in varying levels of NP (specifically quantum dots) uptake in male and female primary cultures of human amniotic stem cells and human salivary gland fibroblasts was demonstrated. We hypothesize that these differences are primarily due to structural variability in actin filament organization between male and female cells. We also found evidence that secreted paracrine factors from the cells impact their NP uptake capabilities by modifying the biological identity (protein corona) of the quantum dot nanoparticles. Although further research is required on a greater variety of cell types and on uncovering other hidden factors at play at the cell-nanoparticle interface, our study has documented the roles of previously unprecedented factors in determining cell NP uptake which has the potential to facilitate successful clinical translation of nanoparticles.

April 6, 2018
DUFF 108
1:00PM

McGill

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