Design of an Enhanced Cellular Model for the Assessment and Tracking of Nanomaterials

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Rationale

- There is currently poor correlation between *in vitro* and *in vivo* studies.
- The need for a better model is needed to further comprehend the body's response without human testing.

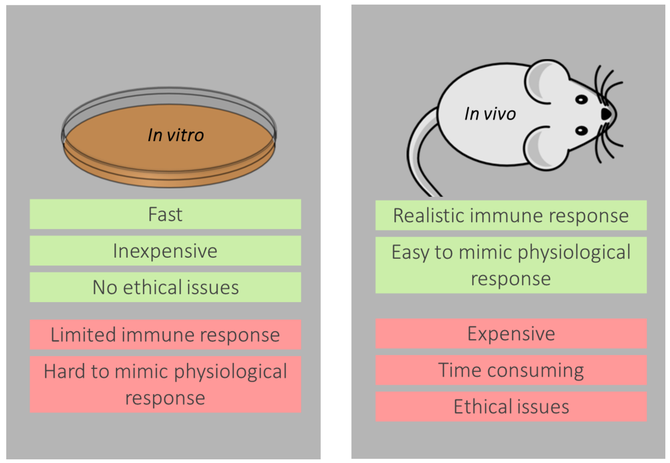

Figure 1: The pros and cons of *in vitro* and *in vivo* studies

Background

- Human cell model: A549 alveolar epithelial, HepG2 liver epithelial, HaCaT skin keratinocyte, and U937 monocyte
- Due to their unique properties, silver nanoparticles (AgNPs) are utilized in consumer and medical products.
- AgNPs are known to induce cellular stress and cytotoxicity in mammalian cells.
- *In vitro* and *in vivo* studies have been conducted separately but never together.

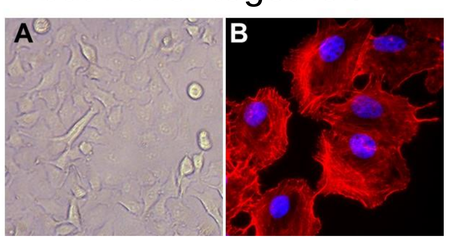

Figure 2: Images of A549 cells taken via (A) light and (B) fluorescence microscopy

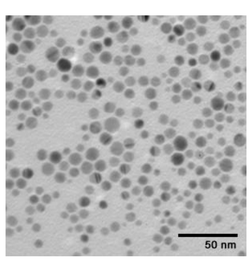

Figure 3: TEM image of the 10 nm AgNPs

Preliminary Results

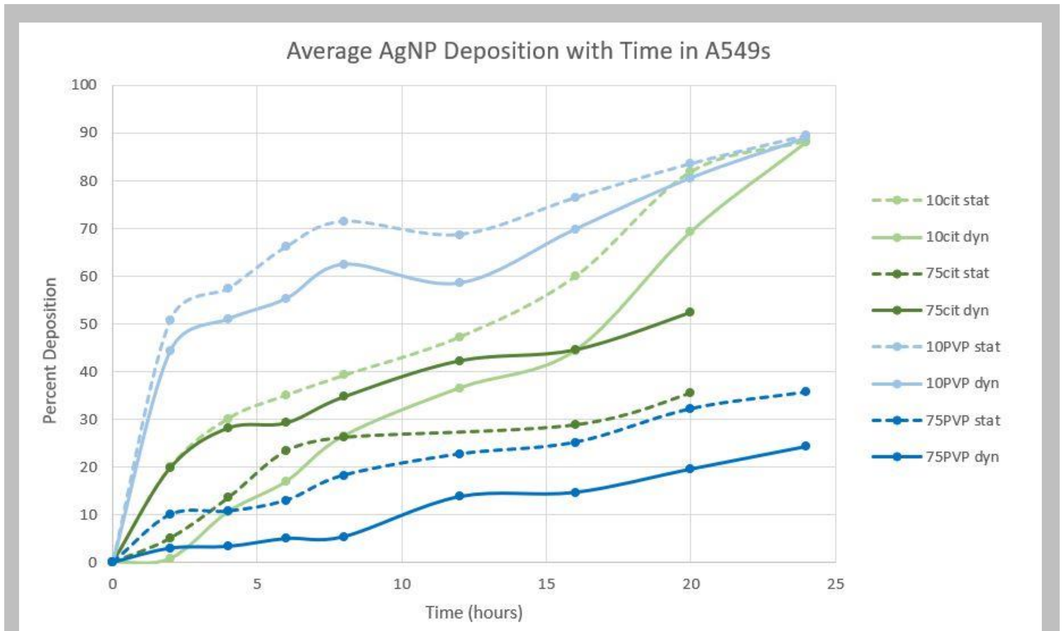

Figure 4: Deposition of 10nm and 75 nm citrate and PVP coated AgNPs under static and dynamic conditions

- As AgNP size increases, deposition increases
- Deposition increases under static conditions due to absence of fluid flow
- Deposition not correlated with surface coating

Future Efforts

- Cellular responses will be collected and analyzed following specified exposure conditions to AgNPs
- Dynamic circulation and perfusion of culture medium within a multi-welled plate using a reinnervate perfusion plate and multi-channel cassette pump.
- Transwell inserts have the potential to incorporate a 3-Dimensional aspect to the model.

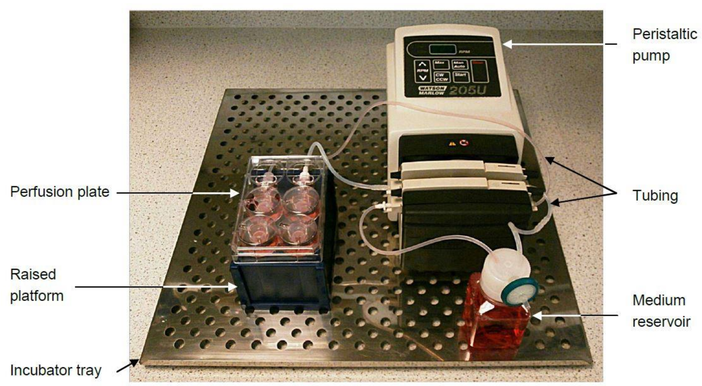

Figure 5: Dynamic circulation with perfusion plate connected to multi-channel cassette pump for dynamic flow