



# The University of Bradford Institutional Repository

<http://bradscholars.brad.ac.uk>

This work is made available online in accordance with publisher policies. Please refer to the repository record for this item and our Policy Document available from the repository home page for further information.

To see the final version of this work please visit the publisher's website. Available access to the published online version may require a subscription.

## Link to publisher's version:

<http://www.physoc.org/proceedings/abstract/Proc%20Physiol%20Soc%2037PCA139>

**Citation:** Phillip R, Zahid M and Shang L (2016) Cytotoxicity of in vitro exposure of polystyrene latex bead nanoparticles to human keratinocyte (HaCaT) cells and human cervical cancer (HeLa) cells [Proceedings abstract]. Proceedings of the Physiological Society: Respiratory Abstracts. 37, PCA139.

**Copyright statement:** © 2016 The Authors. Published by the Physiological Society. Reproduced in accordance with the publisher's self-archiving policy.

**CONTROL ID:** 2528242

**TITLE:** Cytotoxicity of in vitro exposure of polystyrene latex bead nanoparticles to human keratinocyte (HaCaT) cells and human cervical cancer (HeLa) cells

**PRESENTATION TYPE:** General Communication

**CURRENT SPECIAL INTEREST GROUP:** Epithelia & Membrane Transport

**Theme GC:** Epithelia & Membrane Transport

**AUTHORS (FIRST NAME, LAST NAME):** Roy Phillip<sup>1</sup>, Myra Zahid<sup>1</sup>, Lijun Shang<sup>1, 2</sup>

**INSTITUTIONS (ALL):**

1. School of Medical Sciences, University of Bradford, Bradford, United Kingdom.

2. College of Life Sciences, Northwest University, Xi'an, China.

**ABSTRACT BODY:**

**Abstract Body :** Nanoparticles are increasingly used in industry and medicine due to their unique physiochemical properties such as their small size, charge, shape, chemical architecture, large surface area, surface reactivity and media interactions, etc [1-5]. However, very little is still known on the interactions between nanoparticles and the biological system. This study aims to evaluate the cytotoxicity of polystyrene latex bead nanoparticles on HaCaT and HeLa cell lines. Carboxyl-modified 20 nm polystyrene NPs core labelled with fluorophore were from Invitrogen. We chose to use polystyrene NPs because this specific type of NP is being increasingly characterized for use in nanosensors and drug nanocarrier investigations.  $1 \times 10^4$  cells/100  $\mu$ l of cell culture medium were plated into 96-well plates in triplicate, measuring activity post 24 hours at concentrations of 10, 50, 100  $\mu$ g/ml of polystyrene NPs exposure. The extracellular lactate dehydrogenase release was measured by using a colorimetric CytoTox 96 nonradioactive assay kit from Promega and the absorbance were recorded at 450nm (FLUO-star) with Elisa micro plate reader. The MTT assay was used to evaluate mitochondrial activity. This was performed by inserting a premixed optimized dye solution in the culture wells. The Absorbance was recorded at 570 nm, from the recorded absorbance is directly proportional to the number of live cells. The cell lines were kept in a plastic T-75cm<sup>2</sup> tissue culture flasks grown in DMEM.

We found that cytotoxicity of polystyrene NPs on both cells was concentration dependent. For HeLa cells, with exposure of polystyrene NPs at concentrations of 10, 50, 100  $\mu$ g/ml for 24 hrs, the percentage cytotoxicity of positive control for LDH assay was 35.9%, 49.5% and 73.4% respectively. With the MTT cell viability assay the percentage MTT reduction of negative control was 88.9%, 42.9% and 26.4% respectively. Cell toxicity increased with increasing polystyrene NPs concentration. For HaCaT cells, the cytotoxic effect is less significant than those on HeLa cells. With MTT assay, when compared to HaCaT cells exposed to a negative control containing only PBS, the cell viability decreased as the concentrations of NPs increased. Cells exposed to 100 $\mu$ g/ml of polystyrene NPs for a period of 24 hours compared to those exposed to a positive control (100% cell viability) had an average cell viability of 49%, with those numbers decreasing from 59% for cells exposed to 10 $\mu$ g/ml of polystyrene NPs to 57% for cells exposed to 50 $\mu$ g/ml of polystyrene NPs.

Our results indicated that polystyrene NPs acted differently in two different cell types and that cautions should be taken about its cytotoxicity. Further understanding of the mechanism involving the ROS generation could provide more information on how polystyrene NPs increase cytotoxicity.

**Acknowledgements:** RP, MZ contribute equally

**Reference 1:** Jiang et al, 2008, Nature Nanotechnology, 3:145-150

**Reference 2:** Albanese, et al, 2012, Annual Review of Biomedical Engineering, 14:1-16

**Reference 3:** McCarthy, et al, 2011, International Journal of Nanomedicine, 6:1343-1356

**Reference 4:** Xia, et al, 2006, Nano Letters, 6:1794-1807

**Reference 5:** Kumar et al, 2012, Rev Environ Contam Toxicol, 215:39-121

(No Image Selected)

**TABLE TITLE:** (No Tables)

(no table selected)

**TABLE FOOTER:** (No Tables)