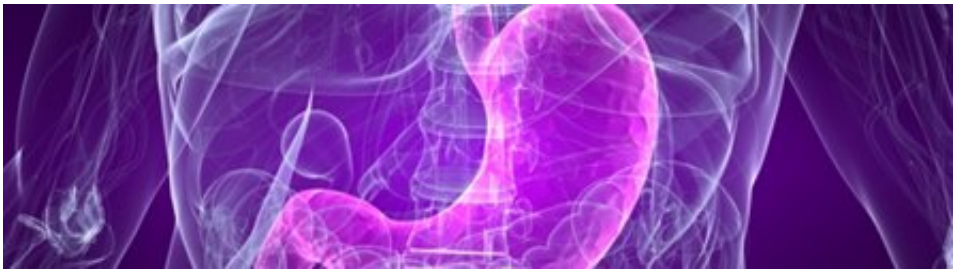
Researchers to develop more realistic models of drug and nanoparticle uptake

October 24 2013



Researchers in Nottingham are to develop a more realistic model of drug uptake which could offer a reliable alternative to animal testing methods.

The study, being led by Dr Martin Garnett in The University of Nottingham's School of Pharmacy, aims to deliver an improved cell-based model for determining how easily drugs and nanoparticles enter the body through the gut. The new model will be useful within the pharmaceutical and toxicology sectors.

The three-year project has been funded with £152,780 from the Dr Hadwen Trust, a research charity that funds and promotes the development of techniques to replace the use of animals in biomedical research and testing.

Hitting the target

The research project also involves Dr Snow Stolnik and Dr Franco Falcone in the School of Pharmacy and Professor Bob Stevens in the School of Science and Technology at Nottingham Trent University.

There are already cell models studying drug uptake across the gut. These are based on an important layer of cells called the epithelium which are one of the main barriers to drug uptake. For these conventional studies the cells are grown on a porous artificial membrane called a substrate. This allows the passage of drugs and other molecules across the cells to be measured.

Dr Garnett said: "This work builds on previous work funded by the Dr Hadwen Trust where we investigated a component called 'basement membrane' which is present in normal gut, but absent in the conventional cell model. We have shown that basement membrane is important for both the normal growth of epithelial cells and as a barrier to uptake of some molecules and nanoparticles. In our new work we will extend these findings to produce a more realistic model."

Moving molecules

In the new study, demonstrating and validating the beneficial effects of the basement membrane to the model will be an important part.

In the older model, the substrate on which the cell layer was grown has been found to prevent the movement of some larger molecules and particles. This will therefore be replaced by an innovative new support made from woven nanofibres produced by Professor Bob Stevens.

In the body, mucus produced by some cells in the epithelium can affect

how quickly drugs pass into the gut and there are other cells called M cells which have also been found to help transport some nanoparticles—both these cells will be incorporated into the new model in a bid to improve its accuracy.

It is hoped that the new model will be a comprehensive and accurate model for studying uptake of all drugs and nanoparticles. This will have the potential to reduce the need for animal studies in both the pharmaceutical industry and for toxicology studies on nanoparticles.

Provided by University of Nottingham