Title	Chitosan nanoparticles for oral antigen delivery: a permeability approach.
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Abstract	Chitosan micro and nanoparticles are widely used for oral delivery due to their attractive mucoadhesive properties. Despite this, their high solubility in acidic environments limits their use alone. Formulation with alginate coating significantly increases particle stability in gastric media and facilitates antigen protection throughout the intestinal tract. Upon neutralisation of stomach contents when passed through to the intestine, alginate coating is dissolved, releasing mucoadhesive particles into the intestinal lumen. Studies have indicated the importance of chitosan molecular weight upon formulation and behaviour of these systems however to date, particle size influence has not been explored. Particle uptake and associated immune response to orally delivered antigens are largely attributed to the presence of highly transcytotic microfold cells (M-cells) located within Peyers Patch areas of the intestinal epithelium. Previously, it has been shown that chitosan particles are effectively uptaken by mouse M-cells and facilitate enhanced antigen delivery when compared with free antigen solutions [1]. Further analysis of particle size influence allows for optimisation of chitosan vaccination delivery strategies. The purpose of this work is to assess the influence of particle size on chitosan particle uptake in the intestinal lumen utilising a variety of *in vitro* and *ex vivo* models. These models, namely Transwell, intestine-on-a-chip microfluidic device and Ussing chamber studies, are compared and contrasted for optimal permeability predictive abilities for particulate and biological molecules. Additionally, retention of mucoadhesive behaviour for gastric treated particles are assessed using porcine mucin studies. While chitosan particles are intrinsically mucoadhesive, retention of this behaviour following coating and degradation of coating must be analysed.
References	1. van der Lubben, IM, Verhoef, JC, van Aelst, AC, Borchard, G & Junginger, HE 2001, 'Chitosan microparticles for oral vaccination:: preparation, characterization and preliminary in vivo uptake studies in murine Peyer's patches', *Biomaterials,* vol. 22, no. 7, 2001/04/01/, pp. 687-694.