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THE CHARGE EFFECT OF INSULIN PLGA NANOPARTICLES ON CELL UPTAKE *IN VITRO* AND BIOAVAILABILITY *IN VIVO*

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Introduction: Poly (D, lactic-co-glycolic) acid (PLGA) nanoparticles (NP) are known to be effective drug carrier with a long acting profile but have less than 20% of bioavailability.

Aim: The aim of this work was to increase encapsulated insulin bioavailability modifying the surface properties like charge of NPs to improve their interaction with cell membrane.

Materials & Methodology: Particles were prepared in presence or not of polyvinyl alcohol (PVA), with Sodium dodecyl sulfate (SDS) or coated with chitosan chloride to play on NPs charge. In vitro internalization was tested on epithelial coculture (Caco-2/RevHT29MTX) by flow cytometry. NPs were then administrated thanks to a pharmaceutical complex vector in vivo by oral route (10, 20 and 50 UI) in diabetic rats.

Results: SDS-NPs and 1% PVA-NPs were smaller (141±3 and 154±24 nm) than chitosan coated NPs with size (236±29 nm) which is increased in comparison to the control (200±9 nm). Compared to classical NPs (PVA+), cells uptake was improved by SDS-NPs, in contrast to without PVA and chitosan coated NPs. Administration by oral route of vehicle contained SDS-NPs 20 and 50 UI) reduced glycaemia faster than empty vehicles and vehicles with standard NPs. Negative charge of NPs could interact with cell membrane which is negatively charged too.

Conclusions: Mucoadhesive particles (chitosan) formulation is definitely not the good approach to improve the bioavailability of encapsulated insulin contrary to negative NPs are the most efficient both in vitro and in vivo and represent a promising formulation for oral insulin delivery.

Biography

Elodie Czuba is a PhD student in European Diabetes study center. She is interested in nanoencapsulation of drugs for a biological application

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