The synergy between polymeric nanoparticles and oral dosage forms to improve biomolecules administration

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Oral drug delivery is the most accepted route of administration because of its non-invasive nature. It presents different advantages that include patient's compliance which helps the therapeutic efficacy of the drug. Despite that, the oral route of administration is characterized by some problems linked, particularly, to the stability of biological drugs, due to physiological and anatomical features of the gastrointestinal tract. The nanotechnology tries to solve these issues using oral nanoparticles (NPs): they represent an alternative approach to improve the solubility and the stability of poorly bioavailable active ingredients, due to their specific uptake mechanism by active or passive targeting that could prevent first pass metabolism of encapsulated drugs.
In this scenario, the aim of the project is to develop oral-nano devices able to vehiculate biomolecules into the body, protecting its stability and its efficacy thanks to the nano characteristics and, moreover, getting close the nanotechnology's research field and the pharmaceutical industry in order to promote the clinical translation.
The first step of this process will refer the development of a scale up protocol from single synthesis of NPs to continuous manufacturing production guaranteed by microfluidics systems. The following steps will concern the process to approach the nanotechnology to pharmaceutical industry: to vehiculate NPs in several oral devices systems, like pellets, minitablets or the newest "printlets" (tablets produced by 3D printing). The stability and the functionality of the nanocarrier will be tested and the activity of final product as oral devices will be verified, in order to obtain a device able to vehiculate biomolecules in gastrointestinal tract**.**