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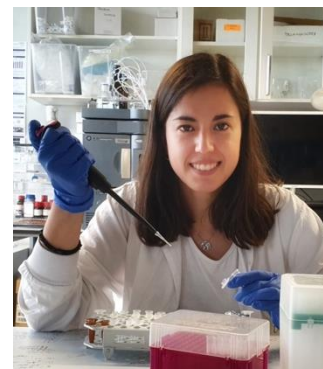
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Bioinspired pollen microcapsules to overcome mucosal barriers

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Premature removal of nanocarriers in mucosal tissues, their enzymatic degradation and elimination by intestinal immune cells constitute current limitations on nanocarrier-mediated oral delivery of biopharmaceuticals [1]. Herein we present a strategy to overcome these limitations based on a biomimetic multi-stage delivery platform, using natural pollen-derived biomaterials [2].

For this purpose, we produced hollow pollen microcapsules (HPMs) with the same external structure as intact pollen grain, but free of internal compounds and potential contaminants, and we loaded them with non-biodegradable model nanoparticles of different sizes and surface charges. Association efficacy was studied by different techniques and lack of allergenicity was analyzed in the presence of immature dendritic cells and macrophages. Mucointeraction was also evaluated *in vivo* upon oral gavage to healthy rats. Results showed that 200 nm non-biodegradable model nanoparticles reached an optimal internal loading (around 85%) and a controlled release profile during the initial 8 h followed by a continuous release up to 120 h in simulated intestinal fluid. Further, this platform did not present allergenic effects, while their specific 3D surface morphology enabled an efficient and prolonged interaction with the intestinal mucosa upon oral administration, preserving intestinal tissue integrity. These characteristics places this pollen microcapsules as interesting multistep delivery platform candidates for the oral delivery of biopharmaceuticals.

References

- 1 Traidl-Hoffmann, C. et al. *Allergy Immunol.* 131:1–13 (2003)
- 2 Thwala, L.N. *Expert Opin. Drug Deliv.* 14:23–36 (2007)

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