Development of 2D and 3D mucus models and their interactions with mucus-penetrating paclitaxel-loaded lipid nanocapsules.

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Résumé en anglais	**PURPOSE:** To study, diffusion through mucus (3D model) of different formulations of paclitaxel loaded lipid nanocapsules (Ptx-LNCs), to interpret the results in the light of LNC behavior at air-mucus interface (2D model). **METHODS:** LNC surface properties were modified with chitosan or poly(ethylene glycol) (PEG) coatings of different size (PEG 2,000 to 5,000 Da) and surface charges. LNC diffusion through 446 µm pig intestinal mucus layer was studied using Transwell(®). LNCs were spread at the air-water-mucus interface then interfacial pressure and area changes were monitored and the efficiency of triglyceride (TG) inclusion was determined. **RESULTS:** Ptx-LNCs of surface charges ranging from -35.7 to +25.3 mV were obtained with sizes between 56.2 and 75.1 nm. The diffusion of paclitaxel in mucus was improved after encapsulation in neutral or positively charged particles ($p < 0.05$ vs Taxol(®)). No significative difference was observed in the 2,000-5,000 PEG length for diffusion both on the 2D or 3D models. On 2D model positive or neutral LNCs interacted less with mucus. Highest efficiency of TG inclusion was observed for particles with smallest PEG length. **CONCLUSIONS:** The results obtained with 2D and 3D model allowed us to select the best candidates for in vivo studies (neutral or positive LNCs with smaller PEG length).
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