REPORT

We performed SAXS and selected WAXS experiments on ID02 beamline on the following systems: A) Lipid nanoparticles of lecithin with chitosan-based coating in different proportions and preparation protocols, giving different size, stratification and overall charge; B)-vitE-TPGS based Nanoparticle with different proportiion of added; C)PEG-PLGA PEI siRNA Nanoparticles . a) Muco models consisting in mucin type II in nasal model fluids, b) artificial mucus model for CF disease, c) cellular mucus from primary cell culture from healthy and CF affected donors grown and differentiated at the air liquid interfaces to produce mucus.

Experiments were performed using different sample holders and setups, to allow for a 'flow-through like' background subtraction for samples with very low intensity, while preferring a different setup to allow contemporary SAXS and WAXS acquisition when needed.

Moreover, horizontal diffusion/migration, of selected nanoparticle solutions put in contact and facing different model mucus gel was followed during 24h. Among those NP also powders have been investigated during their migration in mucus gels.

Two sample detector distance, 1.2m and 10m was used for the SAXS WAXS measurements, one sample to detector distance, 2 m, was used for horizontal diffusion experiments. All the setups have been carefully fulfilled by the Id02 team.

Unfortunately we suffered of long hours of beam down during our beam time,

Spectra analysis performed up to now was successful.

i) cellular mucus from healthy and Cystic Fibrosis donors are structurally different (cell collected from 3 Wild Type and 3 CF-donors cultured in 20 different trans-well plate, collected twice, treated/not-treated by dialysis after collection to remove salts) [comparison in fig 1]

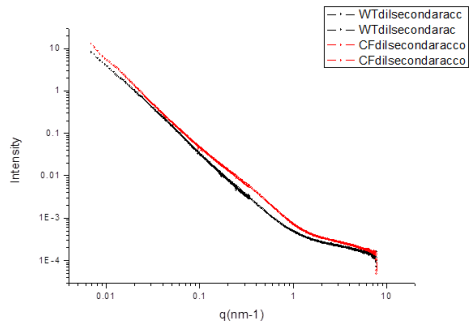

fIg. 1

ii) interaction of artificial and cellular mucus with NP shows different behaviour depending on NP specific formulation. Interesting results on CF mucus are observed. Figure 2 sx shows an example of PLGA-NP for sirRNA delivery after incubation in the two cellular muci. In Figure 2 dx a low q Guinier analysis of different PLGA-NP formulations after cellular muci incubation shows sizes variation sconnected to different mucin-sequester action of the NP specific coating.

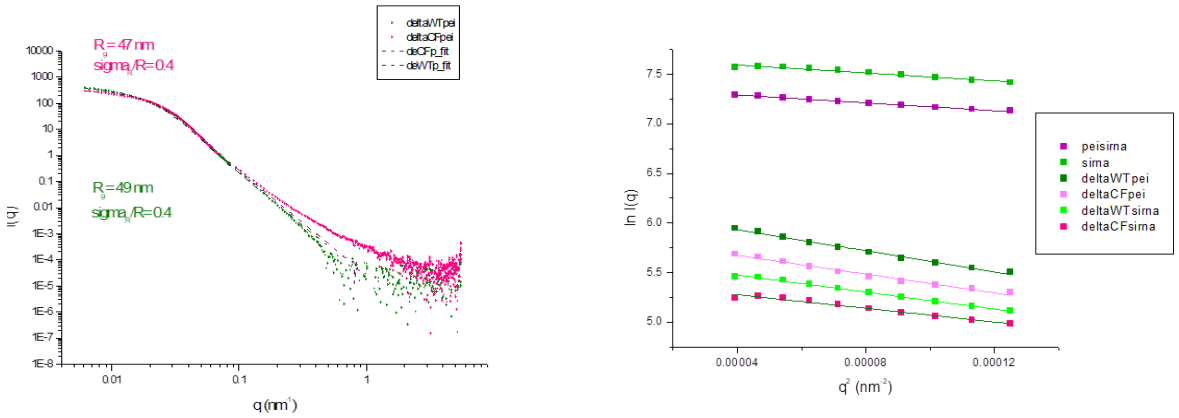

fig 2

iii) diffusion experiment in mucin solution are under analysis. Diffusion in collected cellular mucus was very fast in comparison to the model mucus due to the necessary dilution occurred during the collection procedure.

The clinical relevance of defining the physical features of CF mucus and its interaction with nanomedicines, suggests to perform experiments on the best possible mucus model.