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Spray Drying of Cubosomes for Oral Vaccine Delivery

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METHOD

Fig. 1: 5.33 w/v% Dimodan® MO 90/D (high monoolein content) in ethanol is diluted by adding it to aqueous solution of dextran, ovalbumin (OVA) and Quil A (2.67, 0.13 and 0.14 w/v% respectively). The dilution of the ethanol causes immediate precipitation of lipid particles giving a turbid mixture in 24 v/v % ethanol. The mixture is spray dried on a Büchi mini spray dryer.

Fig. 2: Cubosomes produced from monoolein by a spray drying process. Representative cryo-TEM images of the cubosomes are shown immediately after reconstitution (a+b) and after 12 hours in suspension (c).

RESULTS

The spray dried powder was heated to 90°C for 24h. This
• Reduced electrostatic charges in the powder
• Allowed easy reconstitution to a colloidally stable suspension
• Induced weight loss of 8%

The powder was rich in cubosomes after reconstitution (Fig. 2)

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CONCLUSION

The developed cubosomes show properties suitable to be used for oral vaccine delivery in microcontainers.

Table 1: Size and zeta-potential of cubosomes with and without adjuvant as measured by dynamic light scattering in Milli-Q water. Mass median aerodynamic diameter (MMAD) measured by time-of-flight mass spectroscopy.

Table 2: OVA content in formulation

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Fig. 4: a+b) SEM image of and empty microcontainer (a) and microcontainers loaded with cubosomes (b). c+d) X-ray microtomography images of the loaded microcontainers.