Spray Drying of Cubosomes for Oral Vaccine Delivery

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Spray Drying of Cubosomes for Oral Vaccine Delivery

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PURPOSE

To prepare cubosomes carrying the model antigen ovalbumin and the adjuvant Quil A using spray drying as method, as well as to in vitro characterize these particles.

METHOD

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)

RESULTS

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>
<thead>
<tr>
<th>Formulation</th>
<th>Size (nm)</th>
<th>PDI</th>
<th>Zeta potential (mV)</th>
<th>MMAD (µm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cubosomes with OVA</td>
<td>256±10</td>
<td>0.42</td>
<td>-31.7±1.4</td>
<td>4.1±0.4</td>
</tr>
<tr>
<td>Cubosomes with OVA and Quil A</td>
<td>233±13</td>
<td>0.24</td>
<td>-38.3±1.7</td>
<td>4.1±0.02</td>
</tr>
</tbody>
</table>

Table 2: OVA content in formulation

| OVA content in powder | 20.3±0.5 µg/mg |
| OVA load in particles | 5.1±0.1% wt |

Ovalbumin release from cubosomes

Fig. 3: Release kinetics of FITC-OVA from the cubosomes expressed as percent of total loaded FITC-OVA.

CONCLUSION

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