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Title	The Effect Of Bulk And Surface Properties On The Aerosol Performance Of Dry Powders For Inhalation
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Abstract	<p>Purpose. To investigate the role of surface properties and crystallinity on the aerosol performance of dry powders for inhalation Methods. Salmon calcitonin (sCT) was spray dried in a modified büchi 190 spray drier with and without mannitol as an excipient. Primary particle size and aerosol size distribution was measured by laser diffraction and cascade impaction, respectively. Crystallinity was measured by Raman spectroscopy. Surface concentration of sCT and mannitol was quantified by XPS, and surface energetics was measured by inverse gas chromatography (iGC). Particle morphology was assessed by SEM. Results. Dispersion of the powders showed an inverse relationship between the FPF and surface mannitol content (corr. coeff = 0.89). sCT was found to dominate on the surface of the particles. Since mannitol is hydrophilic, it suggested that surface hydrophilicity reduced the powder dispersibility. In addition, a strong positive correlation existed between the iGC surface free energy of the powder and surface mannitol composition, i.e., the FPF was inversely related to the surface energy. In addition to the surface composition and energy, the particle density and morphology were shown to vary as a function of mannitol concentration.</p> <p>Conclusion. The results are consistent with the anticipation that powders having higher surface energy are more cohesive and difficult to disperse into fine aerosols. These findings confirmed the significant role the physical state of the excipients and the surface composition in controlling powder dispersion. However, other confounding factors such as particle density and morphology need to be taken into account.</p>

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