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STRUCTURAL EVALUATION OF DRUG NANO SUPENSION BY AFM

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ABSTRACT

Drug nanoparticle formulations have been widely investigated to improve the dissolution and subsequent absorption of poorly water-soluble drugs. However, it is sometimes difficult to explain the absorption phenomena in terms of particle size and the surface area. Physicochemical characterization of drug nanoparticles, such as morphology, surface properties, and molecular states of each component, gives us useful information to understand the mechanism of absorption enhancement.[1)] In this presentation, physicochemical properties of drug nanoparticles in suspended states are characterized by focusing on atomic force microscopy (AFM) and the force-distance curve analysis. Probucol nanoparticles were prepared by the cogrinding with polyvinylpyrrolidone K17 (PVP K17) and sodium dodecyl sulphate (SDS) at the different grinding conditions. Particle size and surface charges were evaluated by dynamic light scattering and zeta potential, respectively. Negatively-charged probucol nanoparticles were fixed on a mica plate modified with polylysine. Alternative contact mode atomic force microscopy was performed in the aqueous environment using a silicon tip-cantilever with a spring constant of 0.03 N/m. When probucol was coground with PVP K17 and SDS by a vibrational rod mill for 30 min, mean particle size evaluated by dynamic light scattering was about 90 nm. The size of nanoparticle evaluated by AFM showed comparable values. In addition to primary probucol nanocrystals, the agglomerated secondary particles were observed by AFM force-distance curve analysis. The agglomerated structure was also observed for probucol nanoparticles prepared by different condition. The advantage of AFM measurement in solution is to evaluate not only the morphology but also the stiffness of each particle. This information contributes to know the structure of nanoparticles in aqueous media.

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