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Study on physicochemical interaction between a variety of saccharide and nanoparticles during freeze-drying and normal drying

There are many reports on the in vivo behavior study of nanoparticles administered to the systemic circulation. However, there are few reports on the preservation of nanoparticles. It is very difficult to maintain the nanoparticle suspension state for a long-term storage because it is thermodynamically unstable. Thus, maintaining a constant state in nanoparticles is an important major issue. A lyophilization method with the addition of saccharides has been utilirized to maintain their particle size of nanoparticles. Despite this method is very predominant, the physicochemical intereaction between nanoparticles and saccharides was not studied till now. At the present study, trisaccharides, tetrasaccharides, or pentasaccharides were added to the nanoparticle suspensions, followed by rehydration of the samples, which had been either dried normally or freeze-dried. The particle size after rehydration at that time was then measured. In addition, each saccharide was measured using a powder X-ray diffractometer and differential scanning calorimetry (DSC) device. We studied the association between the nanoparticles aggregation and the crystal form of saccharides and their mechanisms by using the obtained results of the data of particle size, powder X-ray pattern, and DSC curves. The particle size of the nanoparticles was maintained when it was freeze-dried, while particle aggregation occurred when normal dried samples were used. In addition, crystallinity of each saccharide was not observed in the in the freeze-dried group but was in the normal dried group.

Biography

Seitaro Kamiya has completed his PhD at the age of 27 years from University of Shizuoka and entered employment as assistant professor at a Faculty of Pharmaceutical Sciences Nagasaki International University. He is the senior assistant professor of this university. He has published more than 12 papers as a first author in reputed journals.

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