Characterization of Human Insulin Microcrystals for Pulmonary Delivery

Hyo-Shick Jun, Se-Hwan Lim, Chan-Wha Kim
School of Life Sciences and Biotechnology, Korea University, Seoul 136-701, Korea
TEL: +82-2-3290-3439, FAX: +82-2-3290-3957, E-mail: cwkim@korea.ac.kr

Abstract

Pulmonary delivery pathway is promising alternative route for parenteral administration of peptide and protein drugs. Human insulin microcrystals were prepared in suspension which then were dried with lactose carriers to prevent agglomeration.[1] For pulmonary delivery, morphological examination using scanning electron microscopy (SEM) showed that the microcrystals were homogeneous trigonal prism shape without aggregation. The average diameter was 2.3 ㎛ with a narrow monodispersed size distributions. The percentage of high molecular weight proteins (%HMWP), the percentage of other insulin related compounds (%OIRC) and the percentage of A-21 desamido insulin (%D) of the microcrystals were included in suitable range during the processes.[2] Animal test was done with normal Sprague-Dawley rats. After the administration of 10~12 U/㎏ of the microcrystal powder by intratracheal insufflation, the blood glucose levels were reduced significantly. The percent minimum reductions of the blood glucose concentration (%MRBG) produced by the microcrystal powder and insulin solution reached 40.4% and 33.4%, respectively, of the initial level and the bioavailabilities relative to subcutaneous injection (F) were 15% and 10%, respectively.[3] These results confirm that the prepared insulin microcrystal powder is suitable for an effictive insulin dosage form for pulmonary delivery.

References

1. Kwon, J.H. and Kim, C.W. A novel insulin microcrystals preparation using a seed zone method, *J. Crystal Growth*, 263, 536-543 (2004).
2. United States Pharmacopeia (USP), 28thed: *United States Pharmacopeial Convention*, Inc.: Rockville, MD (2005).
3. Kwon, J.H., Lee, B.H., Lee, J.J., Kim, C.W. Insulin microcrystal suspension as a long-acting formulation for pulmonary delivery, *Eur. J. Pharm. Sci.*, 22, 107-116 (2004).