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## Processes and protecting agents for drying of biopharmaceuticals

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Biopharmaceuticals play an emerging role in the treatment of various diseases and amongst them therapeutic peptide and proteins have the fastest growing area in biopharmaceutical industries. Similar to other biologics, instability is the major concern in formulation of proteins in large scale. Compare to liquid formulations, development of a solid formulation improves protein stability and elongates the product's shelf life. Also, maintaining cold chains to store and transport biopharmaceuticals is a challenging task and keeping products at the recommended temperature range of 2-8 °C costs millions of dollars each year and involves major commitments for purchasing equipment and instituting handling procedures.

Dry pharmaceutical are often produced by currently available drying processes such as spray drying, freeze drying, spray-freeze drying, foam drying and supercritical fluids based techniques which enable scientists to design solid dosage forms tailored to possess optimal physicochemical attributes.

In this way, drying can create mechanical and thermal stresses (due to heat for spray drying or freezing for lyophilization) that may destabilize biopharmaceuticals. Due to these considerations, it is not possible to dry the liquids without using appropriate drying adjuvant. Different types of protectant excipients have been proposed and evaluated for this rationale. Sugars, amino acids, polymers, cyclodextrins have been shown to play an advanced role in particle properties and protein stability.

In this lecture, some experiences will be reviewed to define proper methods and formulations to form dry powders containing biopharmaceuticals.

### Biography

Alireza Vatanara, Ph.D. is Assistant Professor at Tehran University of Medical Sciences (TUMS). He is working in the field of particle engineering (Nano and Micro) and has published about 35 research articles in prominent journals. He also serves as Managing Editor of "DARU, J Pharm. Sci.", the most cited Iranian pharmaceutical journal.

During recent years, he has focused on processing of biopharmaceutical powders and in this field; he has accumulate some valuable experiences about a variety of drying methods and protecting excipients.

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