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Cyclodextrin-based formulations: The present and the future

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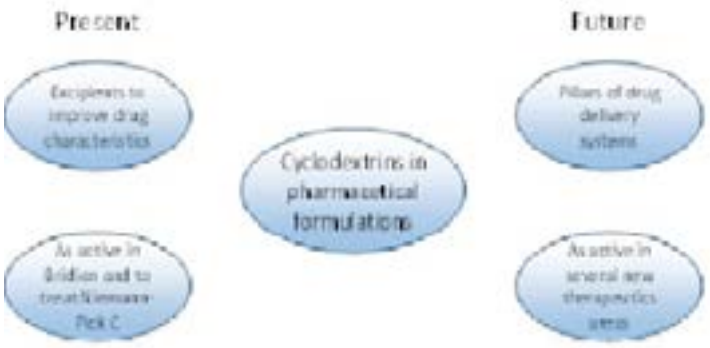
Cyclodextrins (CDs) are "cone-shaped" cyclic oligosaccharides, with a hydrophobic cavity and hydrophilic outer surface. These nanoscale substances have long been used as functional excipients in different pharmaceuticals due to their ability to encapsulate drugs and alter their disadvantageous features, e.g. increase the aqueous solubility, improve bioavailability, enhance chemical stability or simply to mask their taste. At present more than 40, CD-enabled human pharmaceutical products are on the market. The present of CDs is thus dominantly being used as excipients. The most favored are 2-hydroxypropyl-β-CD (HPBCD) and sulfobutylether-β-CD, applied in dozens of parenteral formulations, while other derivatives are used for oral, topical, nasal or ocular administration. The marvel of CDs lies in their flexibility: you can optimize the excipient for the active ingredient and for the purpose simultaneously. In the present lecture illustrative drug products will be highlighted demonstrating the applicability of derivatized oligosaccharides in the development of drug formulations. Outlook to the future potential related to drug delivery use of CDs will also be provided. CDs tagged with biological recognition-based labeling were prepared in order to deliver specific drugs to the site of action. Also, combinations with the application of colloidal structures (dispersions, liquid crystals and macromolecules) will be discussed. Yet the future of CDs is not limited to being used as excipients. We can harvest from their complex forming ability *in vivo* as well, in products, containing CDs as APIs. While the initial idea was to use CDs as detoxification agents or to selectively remove chemicals from the system (e.g. Sugammadex – Bridion), this concept has grown into clinical trials and studies using CDs as API alone (HPBCD as an orphan drug against Niemann-Pick C, Focal Segmental Glomerulosclerosis or Alport Syndrome). A number of further therapeutic applications of CDs themselves are expected to come, some potential areas will be reviewed.



Biography

Tamás Sohajda has been working at CycloLab Ltd., for six years. Currently he is the Director of Research and Development. After graduating as a Pharmacist, he obtained degrees in Pharmaceutical Economy and Quality Assurance. He wrote his PhD thesis on the investigation and understanding of cyclodextrin complexes on a molecular level studying a great number of biological activities and CD derivatives. At CycloLab Ltd. he has been coordinating all development and research works aimed at various and diverse fields such as developing new, cyclodextrin-aided formulations (solid and semi-solid dosage forms, parenterals, etc.), preparing generic formulations or improvements of current products by introducing CDs, designing new industrially important CD derivatives ideal as next generation excipients, drug delivery systems or as biologically active compounds.

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