**From early observations to product development: invention and innovation in cyclodextrin technology**

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Cyclodextrins (CDs) have long been utilised as functional excipients, auxiliary agents in a number of marketed products. The last 40 years in CD technology has witnessed the successful uses of CDs in pharmaceutical industry, in personal care, food and agricultural applications. At present 50 CD-enabled human pharmaceuticals, over 100 personal care and food products, dozens of industrial technologies are originated from the the fortunate interaction between early scientific observations (inventions) and applied research activities and engineering (innovations). The purpose of present talk is that with the help of illustrative examples to show how an early concept can take shape and leads to a real product development in this field. The history of cyclodextrin technology can be devided into two phases:

**The excipient era: (1975-2000)** In this period, CDs were applied as auxiliary materials functional complexing agents. All the research acvtivities served and supported the molecular capsule concept and functions of CDs. This was the age of non-covalent, biner host-guest complexes.

**The active ingredient era: (from 2000 onwards)** The R. and D. activites around the application of „empty” cyclodextrin nanocavities have been a source of quite a number of surprising, novel applications and biological effects of parent and chemically modified CDs. The therapeutic utility of non-occupied CD molecules were subject of a number of discoveries and patents, leading to the development and approval of the first cyclodextrin drug Bridion®.

The extensive academic researcg dedicated to the CD-cholestrol interactions resulted in orphan drug designation of the solubilizing excipient, 2-hydroxypropyl--CD, due to its selective cholesterol mobilizing property. Similar lipid complexing properties of chemically modified lipid-solubilizer CDs were used to design antiviral drug formulations, and to attempt to treat a number of rare lipid-storage diseases and ageing. The results of early research observations on the protein-cyclodextrin interactions lead to development of a novel concept for an anti-infective therapy and a diagnostic product enabling automatized and cost-effective DNA sequencing.

The decade-long academic research devoted to the synthesis and characterization of unique polymer-CD supramolecular assemblies, called rotaxanes, has led to the development of “smart” polymers with self-healing properties as surface coatings and to rotaxane-containing car-bodies with improved durability and high flexibility. The prototype cars made with such superlight polymer-enabled car-bodies are just about facing industrial production in Japan.