

## Cyclodextrins on Wikipedia

A lot of things can be learned about cyclodextrins from Wikipedia, the encyclopedia built collaboratively [1]. Wikipedia contains approx.  $5 \times 10^6$  articles in English a few among them in connection with cyclodextrins. In this editorial we give an overview on the knowledge summarized on Wikipedia on cyclodextrins. We will see that although the basics are already available there are plenty topics to be added.

### Cyclodextrin

It is the most detailed article on cyclodextrins. It has various subtitles: *Applications* (first of all about food applications), *Structure, Synthesis* (a brief description on the production of parent cyclodextrins), *Uses* (about Sugammadex, supramolecular chemistry, organometallic catalysis, enantiomer separation in HPLC and gold washing via complexing tetrabromoaurate with alpha-CD), *Derivatives* (only methyl CD is mentioned and its complexation with cholesterol), *Clinical applications* (it is about Niemann Pick disease type C and its therapy using HPBCD).

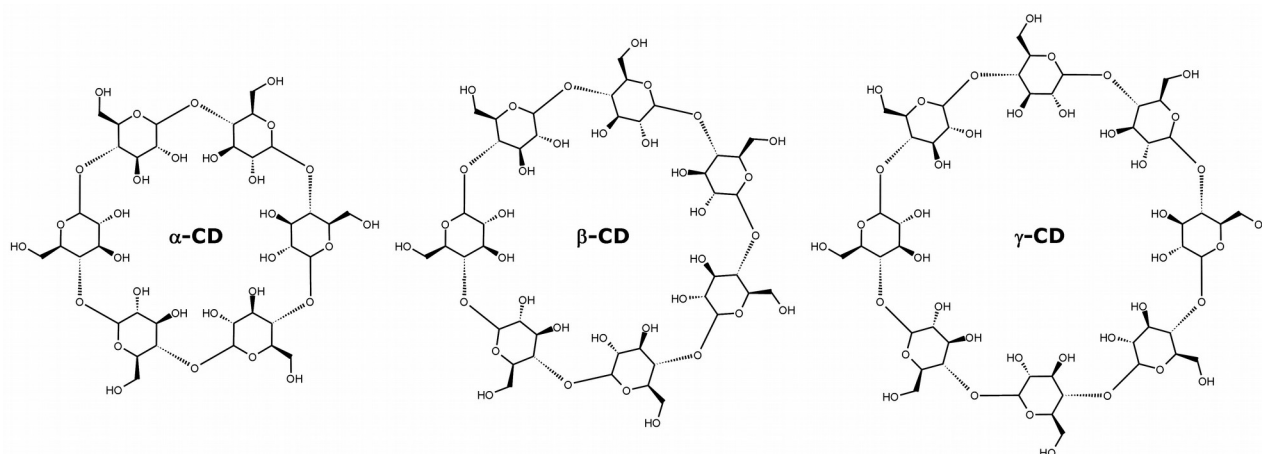


Fig. 1: The structure of the parent cyclodextrins as depicted on Wikipedia

Several related links are given. Some examples:

- Cyclodextrin Database (literature and interaction database, helps to find the CD-related literature and based on the literature to find the best CD for a given guest molecule) [2]

- Addi and Cassi Hempel, identical twins with Niemann Pick Type C being treated with HPBCD cyclodextrins (This website gives information on clinical trials of HPBCD as orphan drug applied against this rare metabolic disease) [3]
- OpenCDLig (an open source web-based application of binding data and 3D structures of 435 cyclodextrin complexes at present. The data are uploaded by the researchers or reviewers.) [4]
- The European Cyclodextrin Society [5]

### **$\alpha$ -Cyclodextrin**

It is a separate article. The special property of alpha-CD: binding fats is emphasized. The tablets marketed under the trade name Alpha-Fibe and Calorese are introduced. Under the subtitle *Applications* the effects of these tablets as dietary fibers are summarized. These effects include:

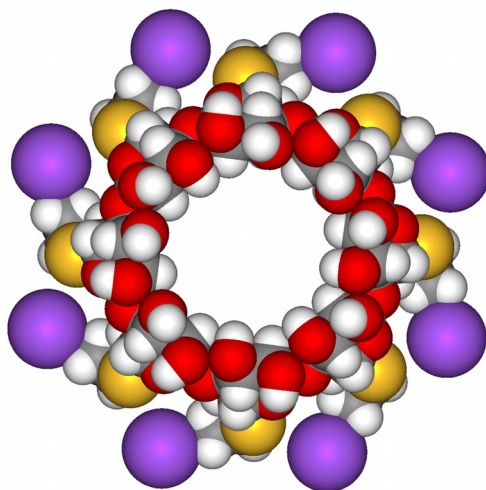
- Lower blood (LDL or bad) low-density lipoprotein cholesterol levels
- Lower blood triglyceride levels
- Preferentially lowers blood saturated fat and trans fat levels
- Increased insulin sensitivity
- Increased leptin sensitivity – increased satiety
- Improved glycemic index of foods and improved glycemic control
- Resolves chronic diarrhea and constipation immediately (anecdotal evidence)

Because of its emulsion stabilizing property alpha-CD is called as emulsifying fiber (in mayonnaise). It is called also whipping fiber because it has volume effect with and without fat.

$\beta$ - and  $\gamma$ -cyclodextrins have no separate articles.

### **Sugammadex**

The first cyclodextrin derivative approved as a drug is introduced in an article. After the *history* of its development, the effects are described under the subtitle *Mechanism of action*. The fast reversal of neuromuscular blockade after surgery is achieved through the extremely high association constant between rocuronium (vecuronium and pancuronium) and Sugammadex. Compared to other drugs used after surgery Sugammadex has no side effects and no recurarization occurs. *Efficacy* is discussed based on a Cochrane review [6]. About *Tolerability* we can learn that Sugammadex is well tolerated.



*Fig. 2: The structure of Sugammadex in Wikipedia*

### **Niemann Pick Disease**

In this article there is a session on *Experimental use of 2-hydroxypropyl- $\beta$ -cyclodextrin*. It explains how the animal experiments improved the symptoms of this fatal lysosomal storage disease, how it was approved by FDA as an investigational new drug and the treatment of twins started, how the parents filed an orphan drug designation, and how it received the orphan drug status both in the US and in Europe. The planning of a clinical trial by NIH in 2011 is mentioned, but no further update about the trial is given.

### **Miscellaneous**

In the article on **piroxicam** it can be found that it is also available in a betadex formulation, which allows a more rapid absorption of piroxicam from the digestive tract.

Cyclodextrin researchers:

Among the several famous cyclodextrins researchers there is no article on Wikipedia on Villiers, Schardinger, Cramer to mention just a few of the pioneers in cyclodextrins chemistry.

**Karl Fredenberg** has an article but his crucial role in the discovery of cyclodextrins is not mentioned. **Hans Pringsheim**'s works on polysaccharides but not on cyclodextrins are presented. Similarly in the article on **Wolfram Saenger** his achievements in the cyclodextrins crystallography are not listed.

We can find some information on cyclodextrins in the articles on **M.L. Bender**, **J. Szejtli**, **F. Cramer** (in German), **W. König**.

In the *Chemistry portal* there is a forum on cyclodextrins on the following issues [7]:

- Cyclodextrin topology
- Chemical Structure
- Industrial vs. Scientific Usage
- "Easily" available to whom?
- Have the long-term health effects of exposure to cyclodextrin been studied?
- Brain effects
- SBE- $\beta$ -CD / SBE beta cyclodextrins (e.g. Captisol)
- Toxicity (oral)

After this overview it is obvious that a lot of information on cyclodextrins are still missing from Wikipedia. We suggest the readers of Cyclodextrin News to add new articles on these unique macrocyclic oligosaccharides.

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