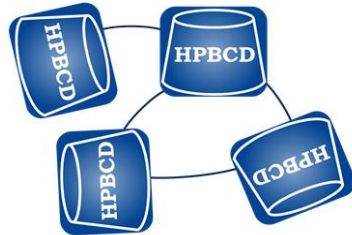


CYCLOLAB



The Cyclodextrin Company



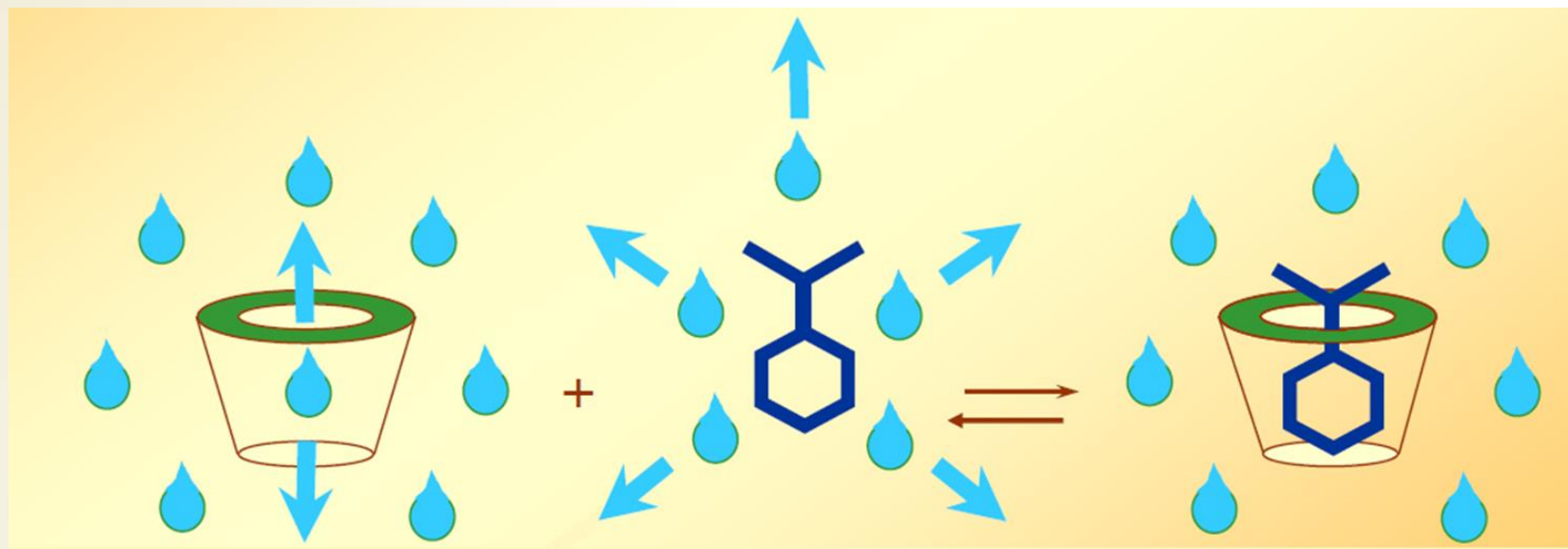
Custom Cyclodextrin Synthesis





What are cyclodextrins (CDs)?

- **Composed of sugars**
- **Cyclic molecules**
- **Naturally occurring compounds**
- **Used in food, pharmaceuticals, drug delivery, chemical industries, agriculture, etc.**



Host molecule (CD)

Guest molecule

Complex



Why use cyclodextrins?

- **Potential APIs (e.g. HPBCD in Niemann-Pick, in focal segmental glomerulosclerosis (FSGS), 2,6-DIMEB in Alzheimer)**
- **Chiral resolving agents**
- **Increased bioavailability, facilitated delivery**
- **Intensify the enzymatic conversion of lipophilic substrates**
- **Significant solubility enhancement**
- **Improvement of chemical stability**
- **Taste and odour masking of APIs**
- **Reduced aggregation**
- **Enables formulation of water-insoluble APIs in all dosage forms**



Who we are and what can we offer?

CycloLab is the world's only all-around Cyclodextrin Service Provider

Our services include:

- **Supplying cyclodextrins for commercial products and product development**
- **Screening cyclodextrin derivatives to find the right candidate for target API.**
- **Providing formulation development services, composition optimization, stability assessment.**
- **Offering analytical services to characterize complexes and products.**
- **Preparing pilot-scale amounts for cyclodextrin-API complexes under GMP for development purposes.**
- **Assisting in compilation of regulatory documentation.**
- **Custom cyclodextrin synthesis**

For more information please click [here](#)



Cyclolab product portfolio

We have on stock over 150 different cyclodextrin derivatives.

Besides the commercially available cyclodextrins we offer several derivatives with different degrees of substitution, creating a variety of analogues (e.g. methylated beta-cyclodextrins).

RAMEB (DS= \sim 12),
Low DS RAMEB
(DS= \sim 4)

TRIMEB
(single isomer,
DS =21)



Methylated beta
cyclodextrins

Heptakis-(2,3 or 6)-
monomethyl- beta-
cyclodextrin (2-MEB, 3-MEB
or 6-MEB) (single isomers,
DS=7)

2,6-DIMEB (DS= \sim 14)
2,3-DIMEB (DS= \sim 14)
3,6-DIMEB (DS= \sim 14)
Single isomers

Products

Pharma grade
CDs

Standard grade
CDs

Fine chemical
grade CDs

Single isomer
CDs

Fluorescent
derivatives



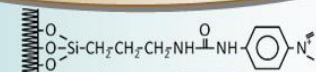
CD complexes

Maltooligomers

Analytical standards -
Sugammadex
impurities



CD polymers



Special HPLC
columns

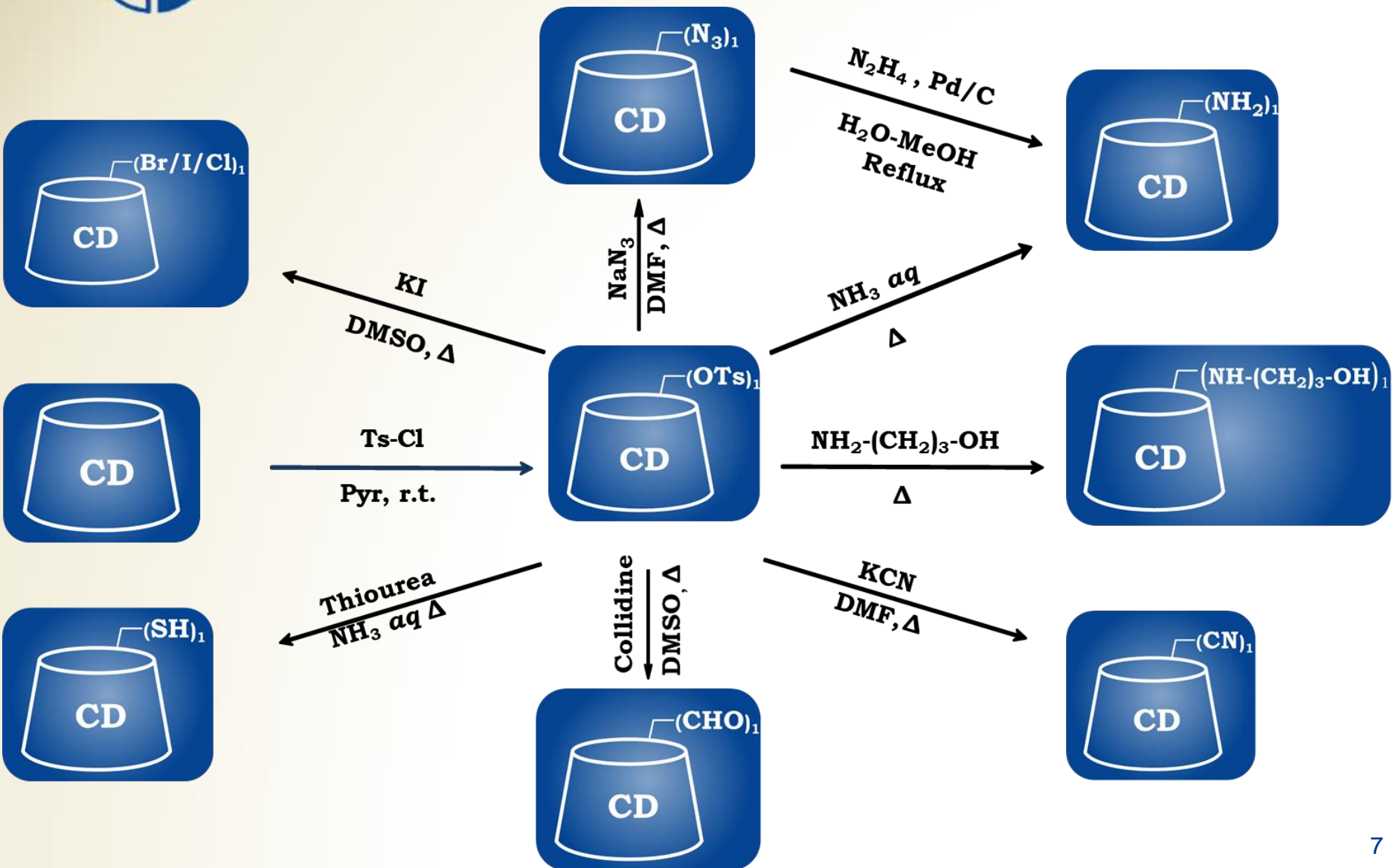


Custom cyclodextrin synthesis

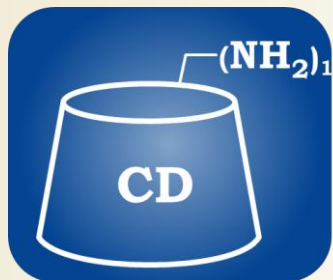
- 1) Commercially available cyclodextrins with different degrees of substitution**
- 2) Single isomer cyclodextrins**
 - a) Fluorescent cyclodextrins for biological imaging**
 - b) Cyclodextrins for cell targeting**
 - c) 'per'-cyclodextrins**
- 3) Photoactivatable cyclodextrins**
- 4) Cyclodextrins as chiral resolving agents**
- 5) Cyclodextrins for DNA/RNA delivery**
- 6) Cyclodextrin polymers**

Single isomer cyclodextrins

The key intermediate is the *6-monotosyl-CD*

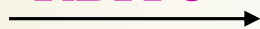


Fluorescent cyclodextrins for biological imaging



6-monodeoxy-6-monoamino-cyclodextrin

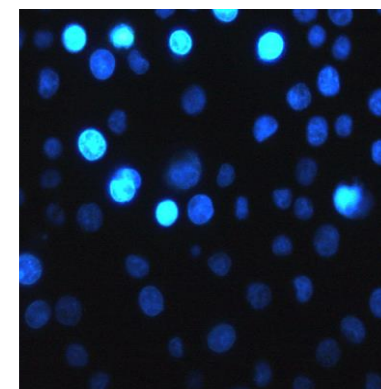
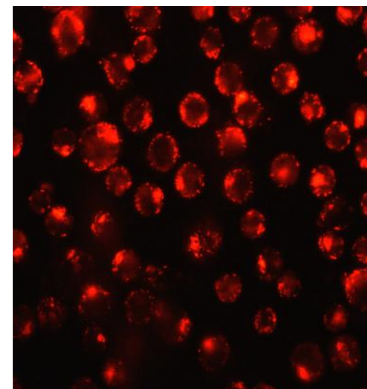
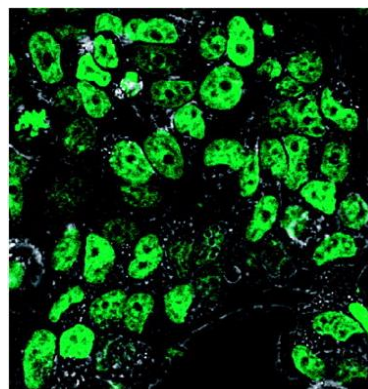
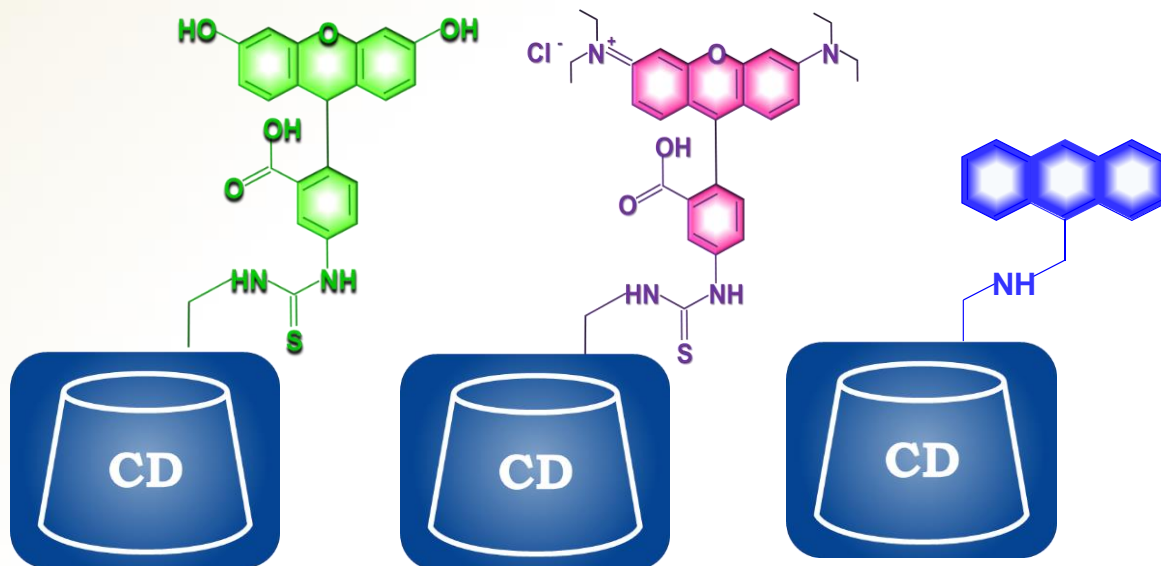
RBITC¹



FITC²



Anthr-Cl³



²Fluorescein isothiocyanate ¹Rhodamine B isothiocyanate

³Anthracenyl chloride

Cyclodextrins for cell targeting

Cell Targeting Units:

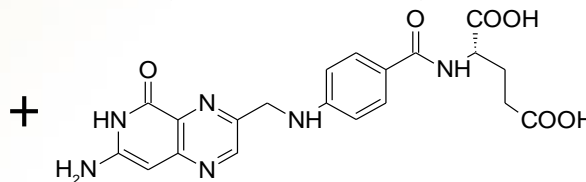
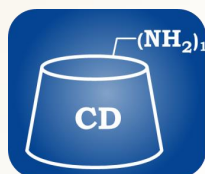
Folate (cancer cells)

Biotine (cancer cells \ bacteria)

Anisamide (cancer cells)

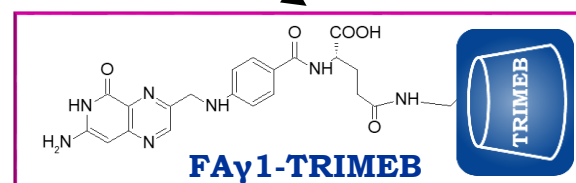
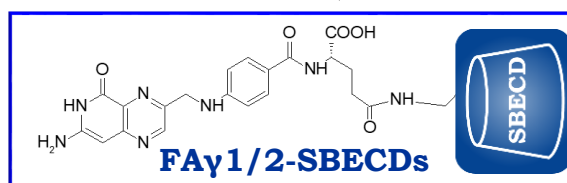
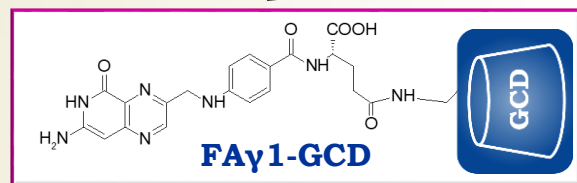
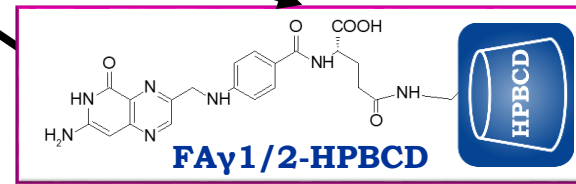
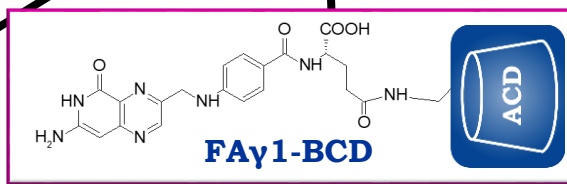
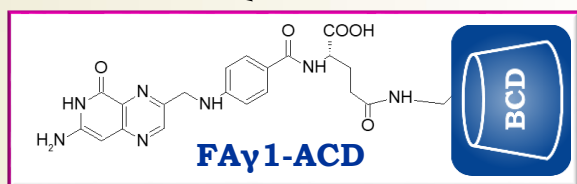
Mannose (macrophages \ cancer cells)

Mannobiose (cancer cells)



**6-monodeoxy-
6-monoamino
CD**

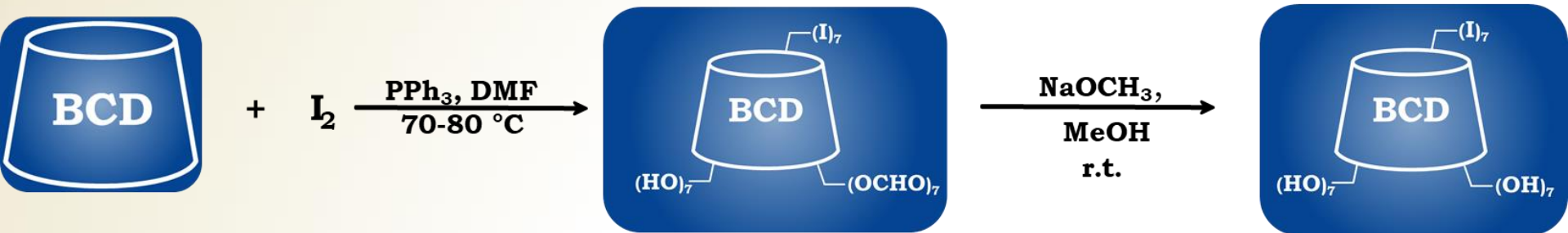
Folic acid (FA)





,Per'-cyclodextrins

Per-6-halogen cyclodextrins, versatile compounds



Selective per-6-halogenation also for α - and γ -CD

Per-6-I/Br-CD production: **500** g scale

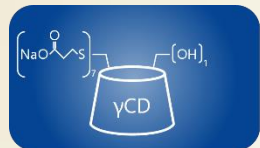
Per halogenated γ -cyclodextrins are key intermediates in the synthesis of **Sugammadex**



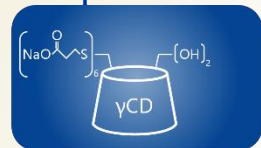
Sugammadex and related impurities

CycloLab has vast experience in the production of per-6-halogen-gamma-CD intermediates and has developed **Sugammadex (SGM)** and related compounds via various process routes and related compounds, supported by sensitive analytical tools to characterize the products.

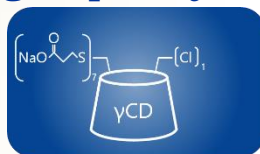
We have **in stock** several high purity, process related starting materials, standards and impurities.



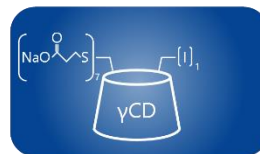
Mono-



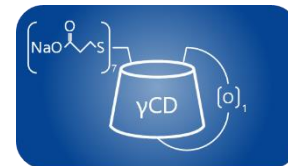
and dihydroxy SGM



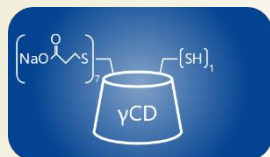
Monochloro



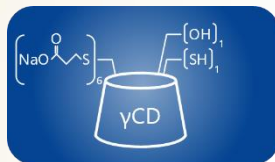
and monoiodo SGM



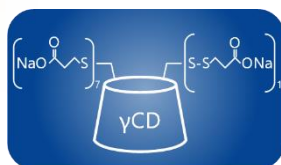
Monoanhydro SGM



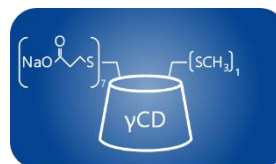
Monothio SGM



Monothio and monohydroxy SGM



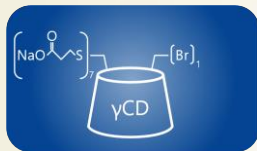
Monodisulfide SGM



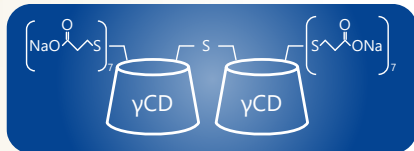
Monomethylthio SGM



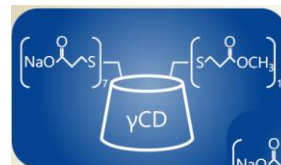
Monosulfoxide SGM (mixture and epimers separately)



Monobromo SGM



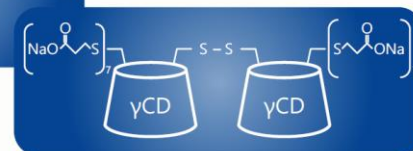
Monosulfide SGM dimer



Monomethylester SGM



Monoethylester SGM

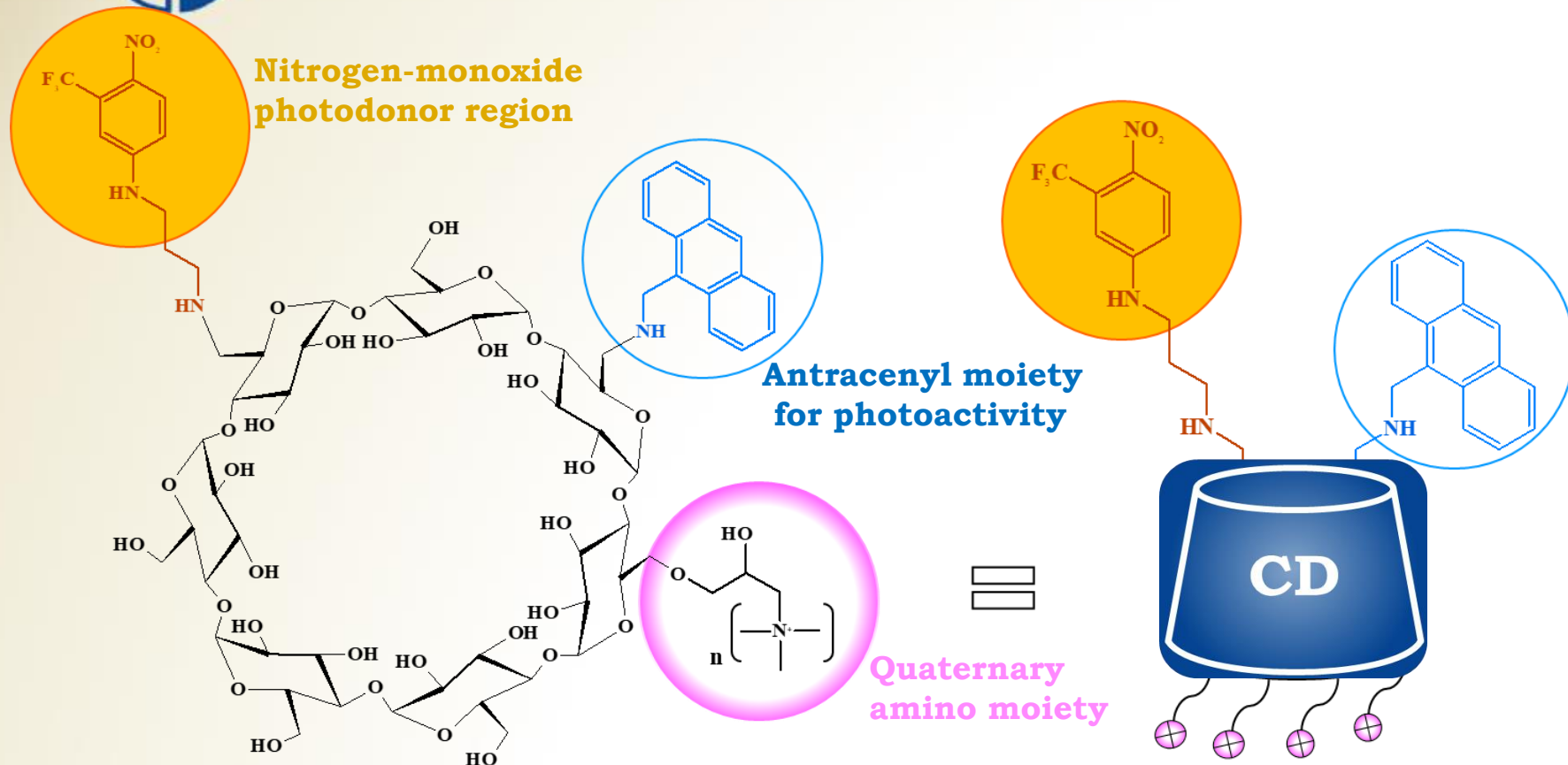


Disulfide-sugammadex dimer

Under Development

Photoactivable cyclodextrins

A Photoactivable Bichromophoric CD-system



- Drug encapsulation – DNA targeted drug delivery
- Enhanced solubility
- Enhanced membrane penetration
- Antimicrobial activity of quaternary amino-CDs
- Potential interaction with the phosphate backbone of the DNA because of the quaternary amino moiety

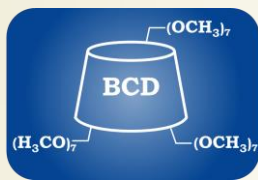


Cyclodextrins as chiral resolving agents

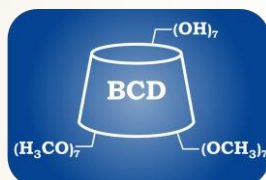
a.) Single isomer methylated beta-cyclodextrins

- Heptakis-2,3,6-trimethyl-beta-cyclodextrin (TRIMEB)
- Heptakis-2,3-dimethyl-beta-cyclodextrin (2,3-DIMEB)
- **Heptakis-2,6-dimethyl-beta-cyclodextrin (2,6-DIMEB)**
- Heptakis-3,6-dimethyl-beta-cyclodextrin
- Heptakis-(2,3 or 6)-monomethyl-beta-cyclodextrin (2-MEB, 3-MEB or 6-MEB)

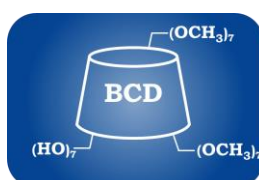
b.) Heptakis-6-sulfobutyl-beta-cyclodextrin (6-OSBECD)



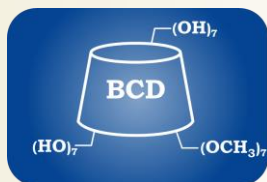
TRIMEB



2,3-DIMEB



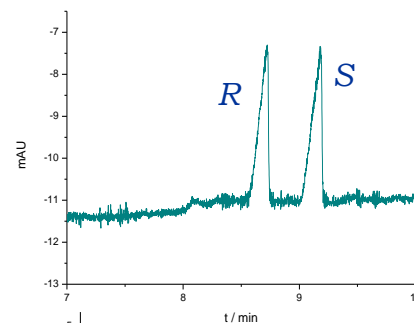
2,6-DIMEB



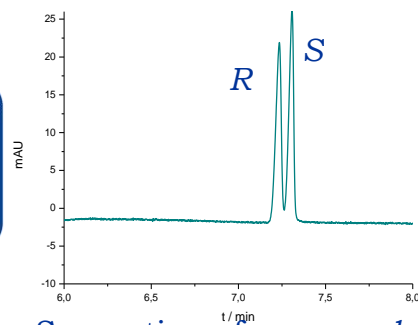
2-MEB



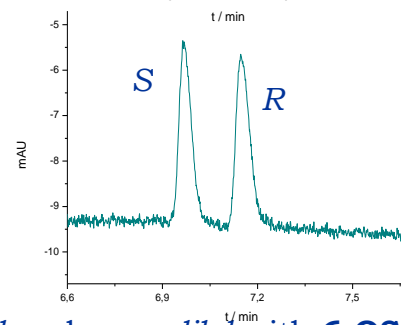
6-OSBECD



Separation of
terbutaline
with 2,6-DIMEB

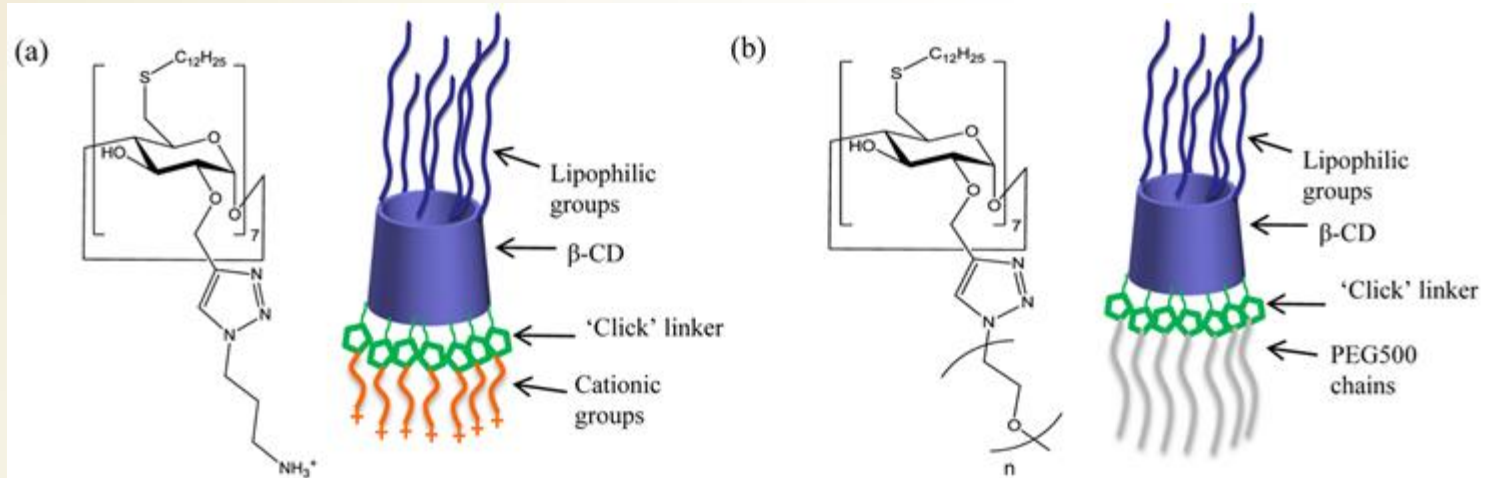


Separation of *propranolol* and *carvedilol* with 6-OSBECD

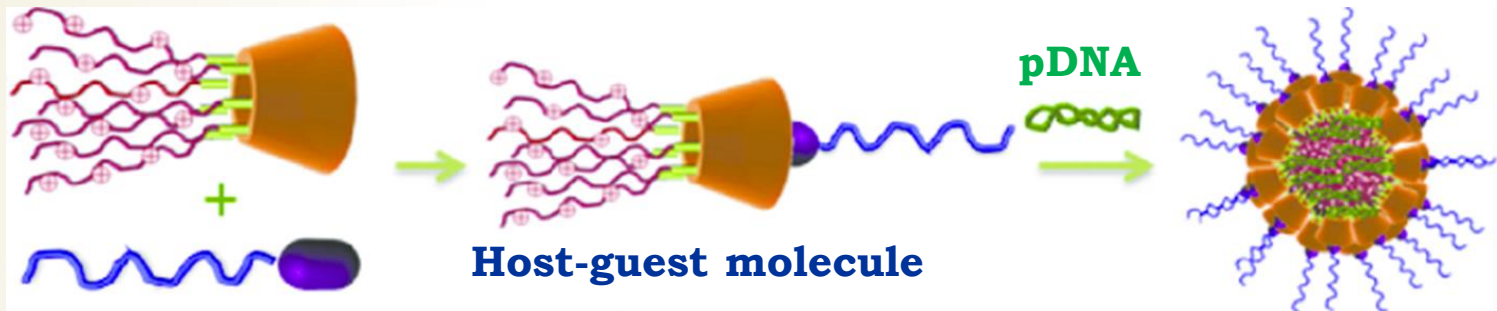


Cyclodextrins for DNA/RNA delivery

1.) Amphiphilic Cyclodextrins for siRNA Delivery



2.) CD-based Supramolecular Systems for Gene Delivery

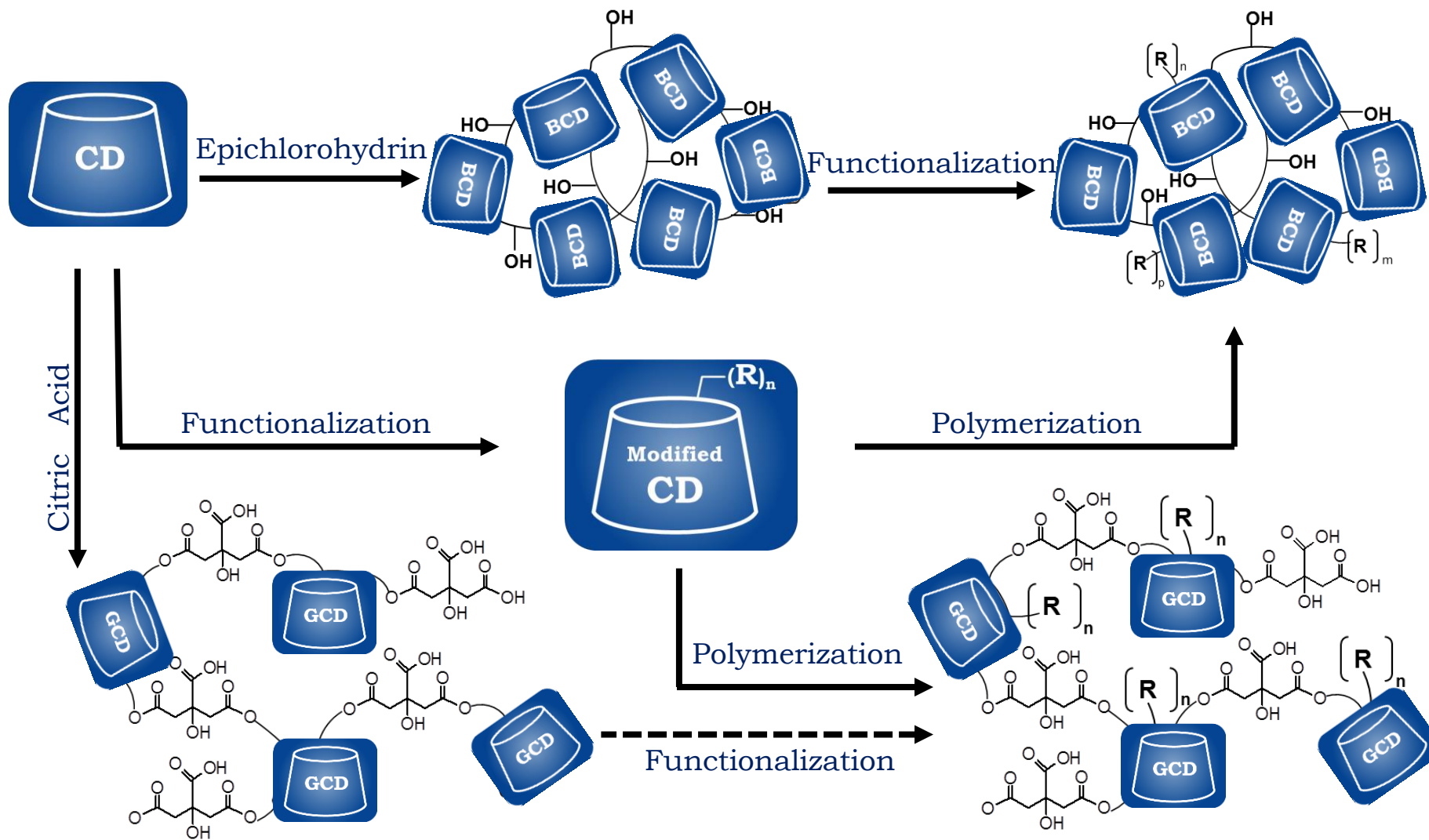


Successful gene delivery by modified BCDs to a variety of cell types including liver cells and intestinal epithelial cells and to *in vitro* and *in vivo* tumour models

3.) Cyclodextrins in Non-Viral Transfection

Cationic and dendrimer-cyclodextrin conjugates offer the possibility to deliver oligonucleotides

Cyclodextrin polymers





Company contacts:

CycloLab Cyclodextrin Research & Development Laboratory Ltd.

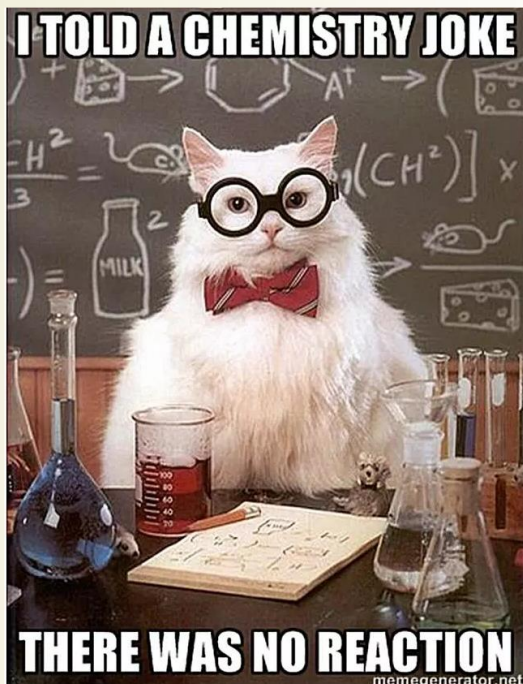
Budapest, P.O. Box 435, H-1525 Hungary

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FAX: (+36) 1-347-60-68

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