CYCLOLAB

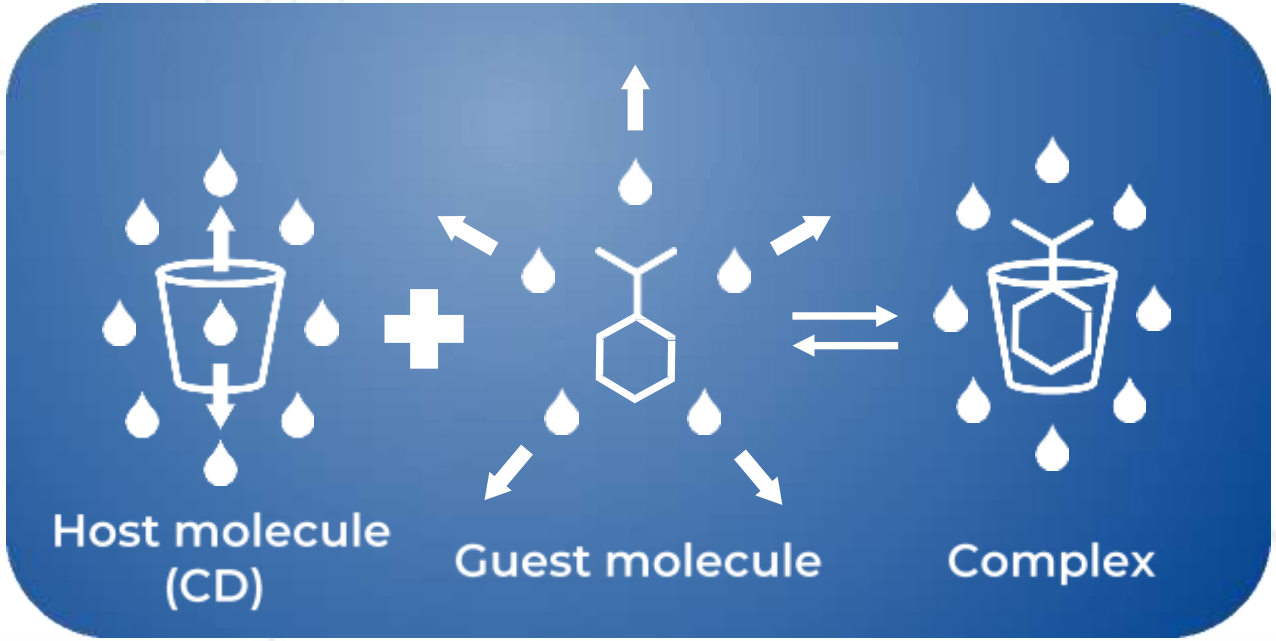
PIONEERS IN CYCLODEXTRIN-BASED INNOVATION

GETTING THE BEST OUT OF CYCLODEXTRINS

Custom Cyclodextrin Synthesis

WHAT ARE CYCLODEXTRINS (CDs)?

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



WHY USE CYCLODEXTRINS?

- Potential APIs (e.g. HPBCD in Niemann-Pick, in focal segmental glomerulosclerosis (FSGS) or 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
- Enable formulation of water-insoluble APIs in all dosage forms

WHO WE ARE AND WHAT WE CAN 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

GMP Manufacturing

Betadex Sulfobutyl Ether Sodium
Dexolve ™

Custom cGMP synthesis of CDs, CD complexes, investigational medicinal products

Preparation/filing of regulatory dossier

Products

- Pharma grade CDs
- Fine chemical grade CDs
- Standard grade CDs
- Single isomer CDs
- Fluorescent derivatives
- Maltooligomers
- CD complexes
- Analytical standards
- Sugammadex impurities
- CD polymers
- Special HPLC columns

DEXOLVE™

CUSTOM CYCLODEXTRIN SYNTHESIS

Commercially available cyclodextrins with different degrees of substitution

Single isomer cyclodextrins

Fluorescent cyclodextrins for biological imaging

Cyclodextrins for cell targeting

‚per'-cyclodextrins

Photoactivatable cyclodextrins

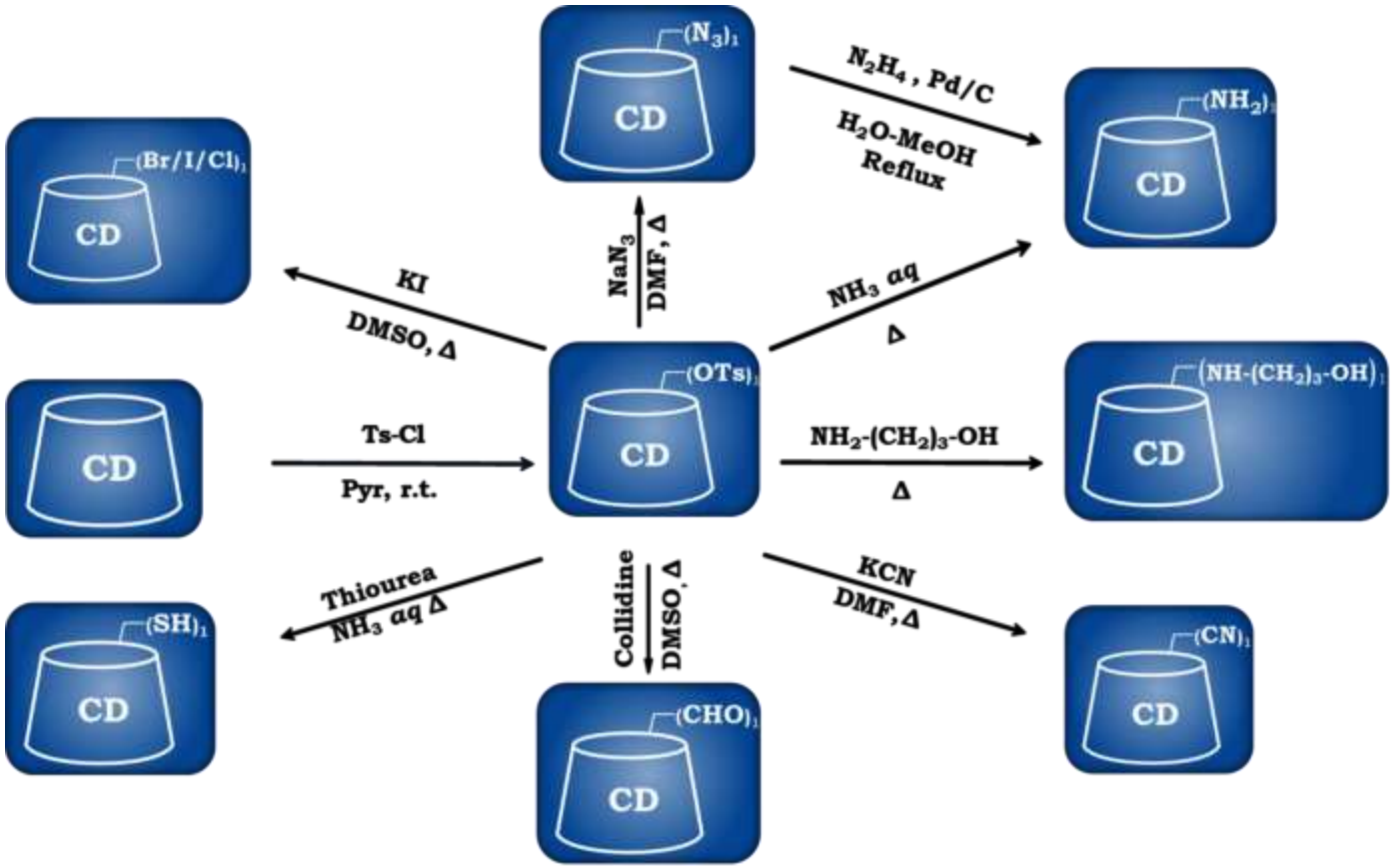
Cyclodextrins as chiral resolving agents

Cyclodextrins for DNA/RNA delivery

Cyclodextrin polymers

SINGLE ISOMER CYCLODEXTRINS

The key intermediate is the 6-monotosyl-CD



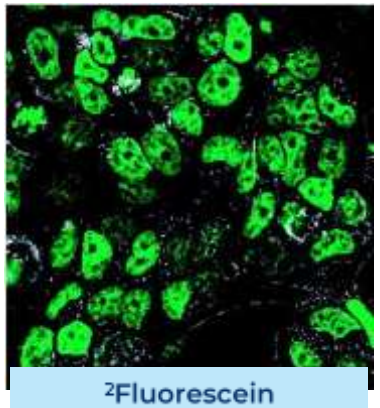
FLUORESCENT CYCLODEXTRINS FOR BIOLOGICAL IMAGING

6-monodeoxy-
6-monoamino-
cyclodextrin

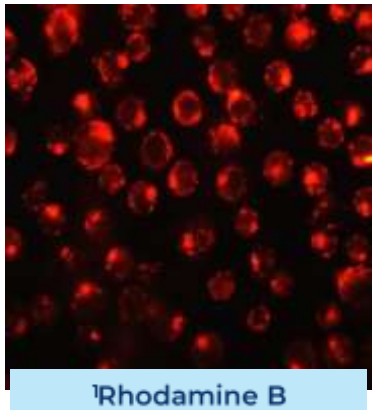
RBITC[1] →

FITC[2] →

Anthr-Cl[3] →



[2]Fluorescein isothiocyanate



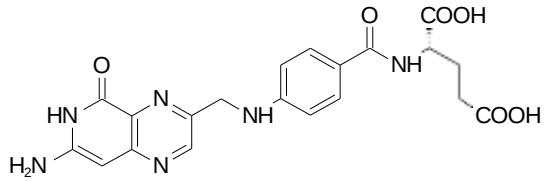
[1]Rhodamine B isothiocyanate

[3]Anthracenyl chloride

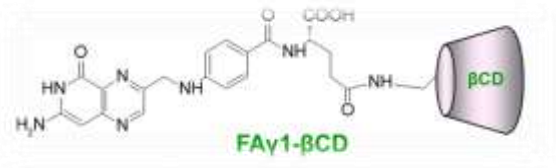
CYCLODEXTRINS FOR CELL TARGETING

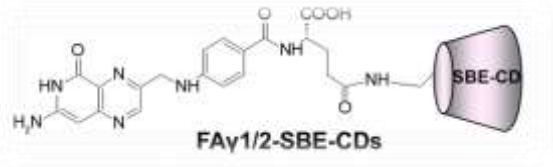
Cell Targeting Units:
Folate (cancer cells)
Biotine (cancer cells/bacteria)
Mannose (macrophages/cancer cells)
Mannobiose (cancer cells)

6-monodeoxy-
6-monoamino-CD



Folic acid (FA)



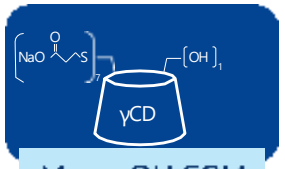


'PER'-CYCLODEXTRINS

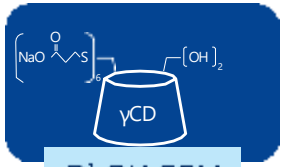
Per-6-halogen cyclodextrins, versatile compounds

Selective per-6-halogenation also for α- and γ-CD
Per-6-I/Br-CD production: 500 g scale
Per-6-halogenated γ-cyclodextrins are key intermediates in the synthesis of Sugammadex

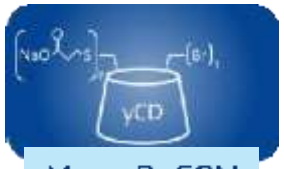
SUGAMMADEX AND RELATED IMPURITIES



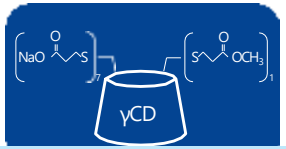
Mono-OH-SGM



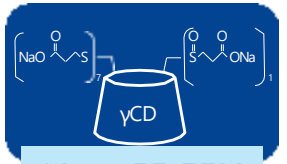
Di-OH-SGM



Mono-Br-SGM

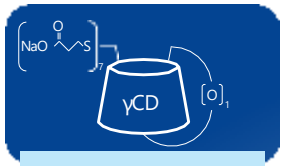


Mono-COOMe-SGM

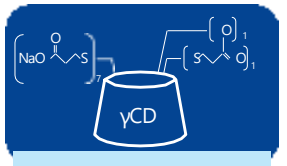


Mono-SO-SGM

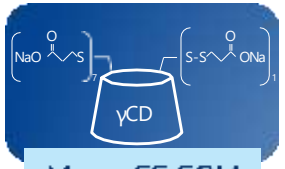
CycloLab has vast experience in the production of per-6-halogen-gamma-CD intermediates and has developed Sugammadex (SGM) and related compounds via various process routes, supported by sensitive analytical tools to characterize the products.
We have in stock several high purity, process related starting materials, standards and impurities.



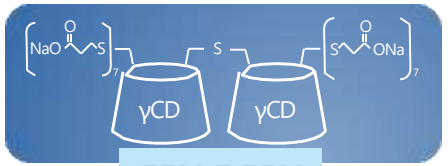
Mono-AH-SGM



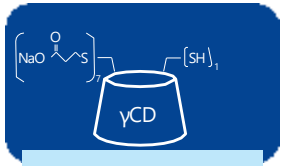
Mono-LAC-SGM



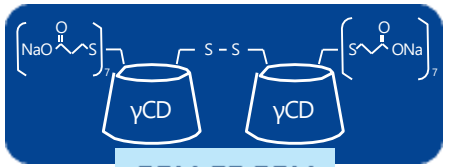
Mono-SS-SGM



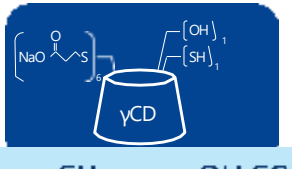
SGM-S-SGM



Mono-SH-SGM



SGM-SS-SGM



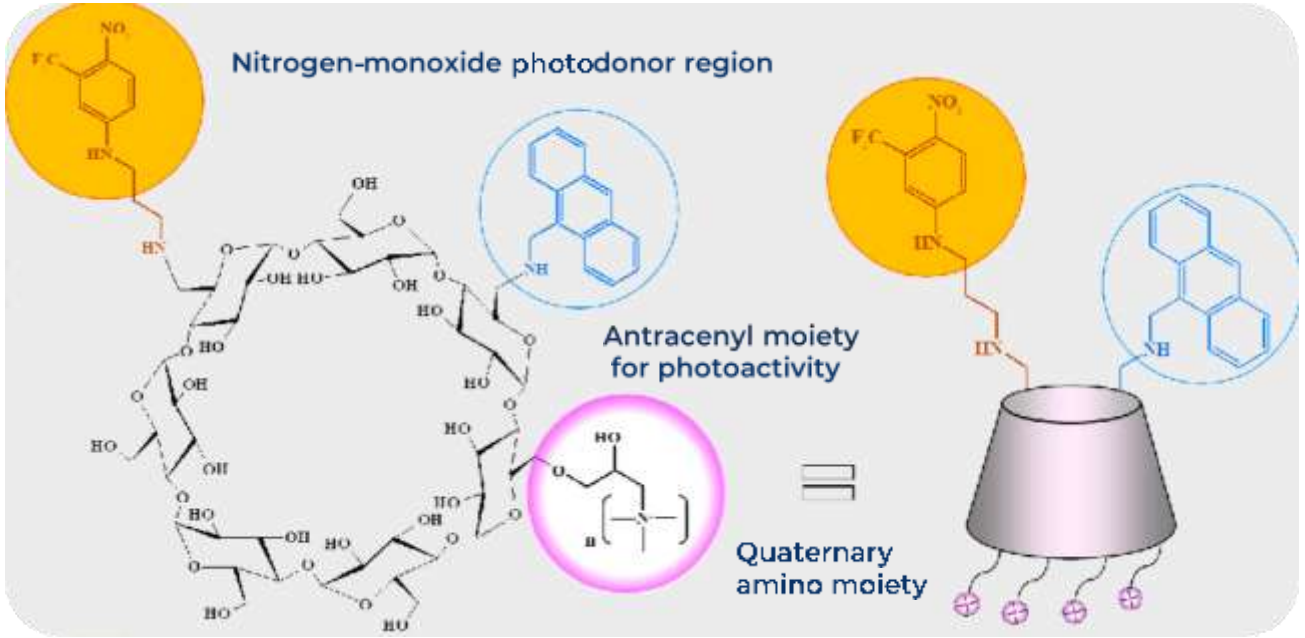
Mono-SH-mono-OH-SGM

Further derivatives are under development

DEXOLVE™

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)

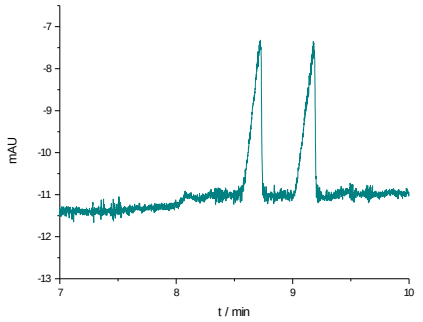
TRIMEB

2,3-DIMEB

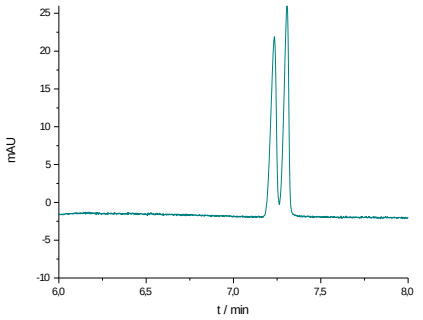
2,6-DIMEB

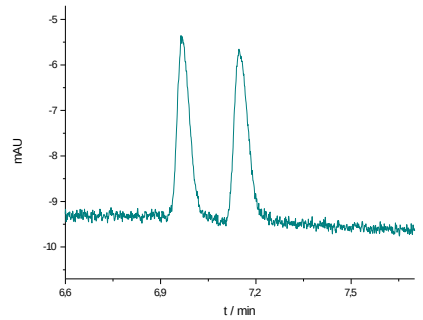
2-MEB

6-OSBECD



Separation of terbutaline with 2,6-DIMEB

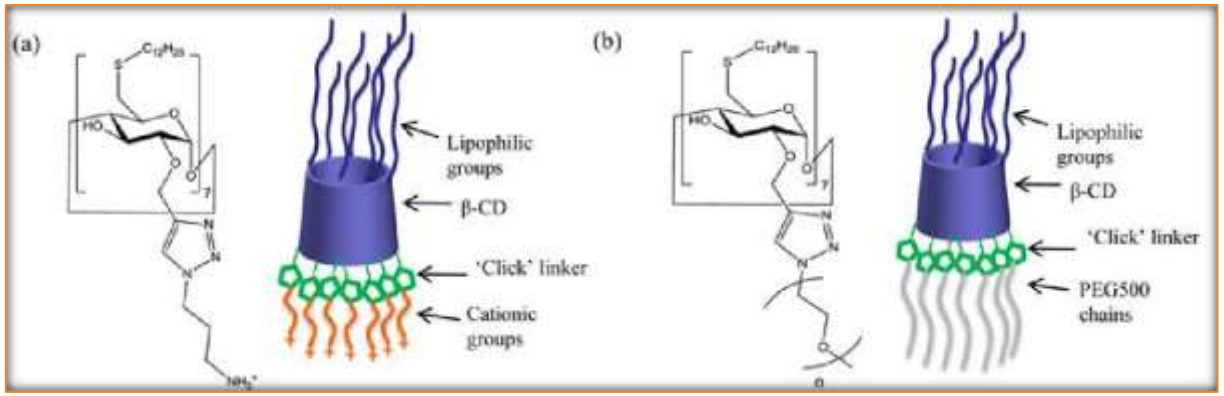




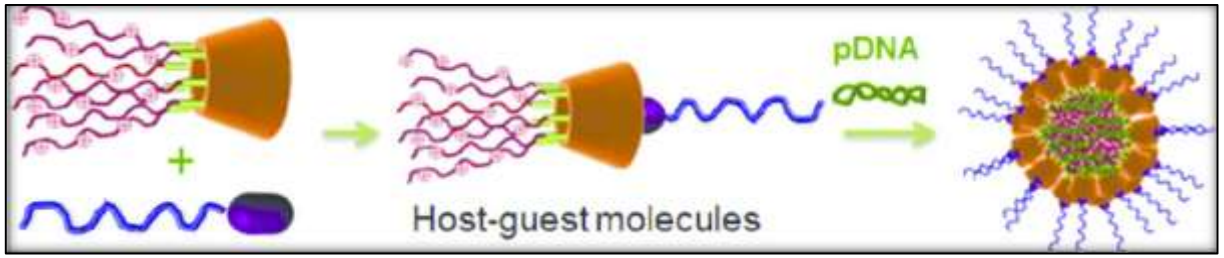
Separation of propranolol and carvedilol with 6-OSBECD

CYCLODEXTRINS FOR DNA/RNA DELIVERY

1.) Amphiphilic Cyclodextrins for siRNA Delivery



2.) CD-based Supramolecular Systems for Gene Delivery

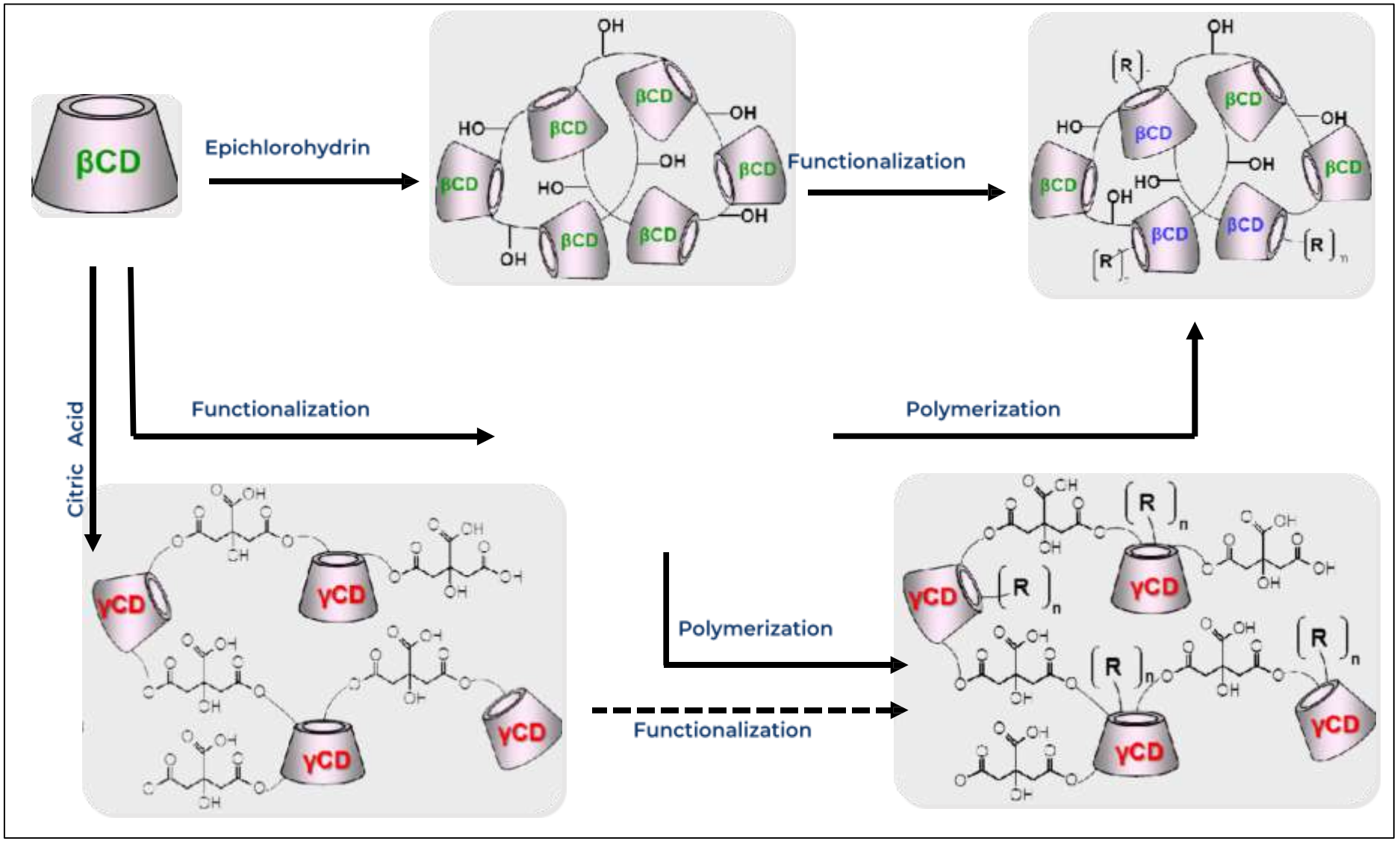


3.) Cyclodextrins in Non-Viral Transfection

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

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 tumor models

CYCLODEXTRIN POLYMERS



CYCLOLAB SERVICE PORTFOLIO
RELATED SERVICES – R&D

Feasibility study

Running a short feasibility study with your molecule free of charge

Proof of concept to consider CD based formulations

CycloLab Grant

CycloLab offers a unique possibility to collaborate on creating novel and interesting cyclodextrins under the terms of the CycloLab Grant

The proposal after application is thoroughly evaluated by CycloLab

If the application is approved, the cyclodextrin is provided free of charge for the beneficiary

GLOBAL FOOTPRINT OF CYCLOLAB

EUROPE 97

Executed R&D projects: 97
Key market for Cyclolab's Dexolve

NORTH AMERICA 48

Executed R&D projects: 48
Key market for Cyclolab's Dexolve,
DMF in U.S. and Canada

SOUTH-AMERICA 9

Executed R&D projects: 9
Emerging market for Cyclolab's Dexolve

AFRICA 1

Executed R&D projects: 1
Emerging market for Cyclolab's Dexolve

ASIA 44

Executed R&D projects: 44
Key market for Cyclolab's Dexolve,
DMF in China, South Korea

AUSTRALIA 2

Executed R&D projects: 2
Emerging market for Cyclolab's Dexolve

DEXOLVE™: BETADEX SULFOBUTYL ETHER SODIUM (SBECD)
2016 - 2022 NUMBER OF EXECUTED R&D PROJECTS: 201

CYCLOLAB SERVICE PORTFOLIO
RELATED SERVICES – R&D

Early phase drug development

Customization of CD enabled formulations

Investigation of changes in physico-chemical properties

Life cycle management

Custom cyclodextrin synthesis

Exclusive manufacture, unique synthetic routes

Self-tailored products and characteristics

In vitro bioequivalence studies

Design and performance of in vitro studies to support bioequivalence of a CD enabled formulation

Analytical services

Method development, validation; cGMP release testing of pharma grade CDs

HPLC, GC, CE, UV, MS, NMR, IR, Micro and BET content methods

Stability studies

CD-guest interaction studies

CD-based chiral separations

Assay, impurity tests

Bioanalytical investigations

IP services and consultation

Experience in the compilation of CD-related patents (synthesis, application, etc.), patent claim analysis, and consultancy in CD-related projects since 1991.

Over 62.000 CD related papers

DEXOLVE™

COMPANY CONTACTS

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DEXOLVE™