

CD-based Drug and Gene Delivery Systems on the 5th European Cyclodextrin Conference

EUROCD17 was held between October 2–6, 2017, in Lisbon, Portugal organized by Prof. Helena M. Cabral Marques on the Faculty of Pharmacy at the University of Lisbon. Statistics of EUROCD17:

Registered participants: around 100

Plenary lectures (PL): 6

Oral presentations (OP): 35

Flash presentations for students (FP): 6

Posters (PP): 49

The bibliographic data of the presentations (authors, title, keywords) are published in the second part of this issue. The presentations were classified into 7 chapters as it was usual earlier. The main topic was pharmaceutical application (60/96): drug and gene delivery with various CD-based systems. Very few presentations covered the synthesis of new CD derivatives (7), studying the complexes (12), food application (7), other industrial use, catalysis (7) and sensing (3). An interesting industrial application: self-healing car painting based on sliding gels (polyrotaxane) was developed by the group of Wenz (Wenz et al., OP-6).

In the followings we give an overview on the novel CD-based drug and gene delivery systems presented.

The versatility of the cyclodextrin modifications made possible to develop nanocomplexes for nucleic acid delivery (O'Driscoll, PL-3). The functional groups on CD make possible prolonged *in vivo* circulation, targeting, cell-specific uptake at the diseased site. Polyrotaxanes of anionic polyalkylphosphate with hepta-substituted cationic BCDs (with cucurbituril stopper groups) form polyplexes with DNA and improve transfection efficiency (Ekele & Wenz, OP-1). Gels consisting of positively charged tetronic and ACD pseudopolyrotaxanes were found to successfully deliver genes (negatively charged viral particles) into cartilages providing new tools in human tissue engineering and regenerative medicine (Rey-Rico et al., OP-5). Electrospray-(tandem) mass spectrometry (ESI-(MS)MS) techniques were found to be useful for characterization of oligonucleotides complexes with polycationic CDs (Przybilski et al., OP-8).

Printed bioadhesive films containing anticancer and antiviral drugs were developed (Varan et al., OP-17). Drug-containing water-based ink formulations stabilized by CDs (e.g. paclitaxel solubilized and stabilized by HPBCD) are used. Such film formulations printed with the desired drug content pave the way for personalized medicine.

Magnetic nanoparticles prepared by coating Fe_3O_4 by amphiphilic CD (heptakis(2-oligo(ethyleneoxide)-6-dodecylthio)BCD and adamantanyl-PEG, tailored with proper peptides are able to recognize amyloid β peptides Mazzaglia et al., OP-25).

A new feature of the nanosponges was demonstrated by Prof. Trotta: ACD nanosponge is able to deliver oxygen in a controlled manner, which can be useful in ischemia and reperfusion (Trotta et al., OP-27). A significant reduction in cell mortality in hypoxia was observed suggesting a potential of the system in myocardial infarction.



Drug eluting stents were produced by electrospinning of chitosan/CD-polymer system to obtain controlled simvastatin release and avoid in-stent restenosis (Kersani et al., OP-4). Electrospinning of triclosan-loaded polyelectrolyte complex formed between chitosan and HPBCD crosslinked with citric acid resulted in membranes of improved antimicrobial effect for a prolonged period (Ouerghemmi et al., OP-21).

Some further examples:

- Chitosan/CD polymer sponges (hydrogels) were impregnated with ciprofloxacin to achieve prolonged antibacterial activity (Amiel et al., FP-1) and found useful for bone tissue engineering (Palomino-Durard et al., PP-49)
- Paclitaxel loaded amphiphilic CD nanoparticles penetrate into tumor cells co-cultured with human fibroblast cells (Varan et al., OP-18).
- CD-polymers organized into nanoparticles were developed for dual delivery of both the antitubercular drug and its booster for pulmonary application (Wankar et al., OP-3).
- Nanoassemblies of dextran backbone modified with either pendant BCD or adamantyl group with or without polyethylene glycol (PEG) spacer can be tailored according to the desired drug delivery profile (Amiel et al., OP-20).
- Oral insulin delivery was aimed when fatty acid ester (C10)-BCD was synthesized and incorporated into whey protein hydrogel nanoparticles (Nguyen et al., OP-28).
- CD-hyaluronic acid conjugate was found to be useful for cell-specific delivery of steroids (Schwarz & Wenz, PP-13) and pheophorbide (Zagami et al., PP-43).
- Decreased irritation is the main advantage of the topical acyclovir formulation with pseudopolyrotaxane of pluronic threaded with CDs (Di Donato et al., PP-15).
- Ca-alginate gels containing sulfobutyl ether BCD were developed (Larsen et al., OP-24).
- Folate-appended CDs were prepared for tumor targeting (Malanga et al., OP-31; Mendes et al., OP-34; Swiech et al., PP-42).
- BCD nanosponges were applied for doxorubicin delivery in anticancer treatment (Ferrara et al., OP-33).
- EDTA-type polycarboxylated BCD was developed for delivery of radiopharmaceuticals, such as Ga(III) compounds (Agnes et al., PP-18).
- Sulfobutyl ether-BCD decorated chitosan nanodroplets were found to be effective in delivery of oxygen and acyclovir (Donalisio et al., PP-26).
- Layer-by-layer coating of a polyester nonwoven fiber with chitosan and citric acid-crosslinked CD polymer was loaded with ibuprofen to obtain antibacterial and anti-inflammatory wound dressing (Mogrovejo et al., PP-48).
- Virtual Reality (3D movie through a glass) was applied for demonstration the complexation (Garcia-Fandino et al., PP-39). It seems to be a great step forward the most up-to-date IT technologies for visualization of CDs and their guests.

The Organizing Committee has decided that the next conference will be organized by the University of Santiago de Compostela in 2019 and the 7th conference in this series will be organized by CycloLab in 2021.

References

For references see the second part of this issue, where the bibliographic data of the presentations can be found in alphabetical order of the first authors in each sub-chapter.

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Bibliography & Keywords of Selected Publications of the Month

The presentations of the 5th European Cyclodextrin Conference (October 2–6, 2017, Lisbon, Portugal) are shown in this issue based on the Abstract Book of the conference.

PL: plenary lectures, OP: oral presentations, FP: flash presentations, PP: posters

1. CDs: Derivatives, Production, Enzymes, Toxicity

Alali, U., Mathiron, D., Przybylski, C., Benazza, M., Bonnet, V.

How synthesis by sustainable route can enable the access to perglucosylated β -cyclodextrin library presenting multivalency potential

FP-6, Abstract Book, p. 55

Molecular recognition, Glucoclusters, Trojan horses, Click chemistry, 6-deoxy-6-heptaazido-BCD

Champagne, P.L., Ester, D., Williams, V., Ling, C.C.

Influence of substituents and their regiolocation on mesogenic properties of amphiphilic cyclodextrins

OP-12, Abstract Book, p. 26

Self-organized systems, Liquid crystals, Smectic and columnar mesophases

Couto, A.S., Ryzhakov, A., Loftsson, T.

Effect of urea on alpha- and gamma-cyclodextrin self-aggregation

PP-8, Abstract Book, p. 63

Critical aggregation concentration, Disassembling of CD aggregates

Kasal, P., Jindrich, J.

Synthesis of cyclodextrin derivatives suitable for binding to solid surfaces

PP-22, Abstract Book, p. 77

Oliva, E., Mathiron, D., Bonnet, V., Pilard, S., Djedaini-Pilard, F.

Ball milling: an efficient tool for lipidyl cyclodextrins synthesis

OP-13, Abstract Book, p. 27

Epoxy ring opening reaction in fatty acid esters, Nanoparticles, Saponification

Sayade, A., Vanbésien, T., Hapiot, F., Monflier, E.

A molecular dynamic study of the aqueous biphasic hydroformylation of triglycerides promoted by cyclodextrins

OP-15, Abstract Book, p. 29

Aqueous self-driven catalytic system, ACD, BCD, GCD, CRYSMEB



Tichá, I., Jindrich, J.

Regioselective mono- and disubstitution of α -CD derivatives

PP-21, Abstract Book, p. 76

Desymmetrization, Primary and secondary amines

2. CD complexes: Preparation, Properties in solution and in solid phase, Specific guest

Alvira, E.

Theoretical study of the β -cyclodextrin inclusion complex formation of eugenol in water

PP-3, Abstract Book, p. 58

Clove oil, Intermolecular and intramolecular energies, AMBER force field, Structural relaxation

Couto, A.S., Agular, S., Ryzhakov, A., Loftsson, T.

Solubility of paraben-cyclodextrin complexes in aqueous solutions

PP-7, Abstract Book, p. 62

Methyl-, ethyl, propyl and butylparaben, Solubilization efficiencies, Paraben alkyl side chain, HPCDs

Dumarcay, F., Ingrosso, F., Barth, D., Marsura, A., Ruiz-Lopez, M.F.

Toward supramolecular chemistry in non-covalent solvents

OP-11, Abstract Book, p. 25

Supercritical carbon dioxide, Benzoic acid, Peracetylated BCD

Fourmentin, S., Landy, D.

Analytical methods for the characterization of cyclodextrin inclusion complexes: good practices and pitfalls

PL-2, Abstract Book, p. 10

Formation constants, UV, GC, TOC (total organic carbon) for mixtures, ITC

Garcia-Fandino, R., Pineiro, A., Rosende, R., Grela, C., Perez-Alvite, M.J.

State-of-the-art computational tools for a new vision of cyclodextrin visualization: virtual and augmented reality

PP-39, Abstract Book, p. 94

Molecular dynamics, Different perspectives, orientations and positions

Jara, P.S., Silva, N.R., Yutronic, N.I.

Disassembly of cyclodextrin-octylamine inclusion compound conjugated to gold nanoparticles by photothermal effect

PP-2, Abstract Book, p. 57

Migration movements, Dimer disassembly, Green laser light



Majewska, K., Skwierawska, A., Olewnicak, M.

Effect of 5H-dibenzo[b,f]azepine substituent on the formation of β -cyclodextrin inclusion complexes

PP-37, Abstract Book, p. 92

Iminostilbene, Substituents of various length and hydrophilicity

Mamad-Hemouch, H., Ramoul, H., Bacri, L., Huin, C., Przybylski, C., Thiébot, B., Patriarche, G., Pelta, J., Jarroux, N.

β - and γ -cyclodextrin nanotubes syntheses: new perspectives for nanopore applications

FP-3, Abstract Book, p. 52

Polyrotaxanes, Biomimetic membrane channels

Martin-Pastor, M., Segredo-Morales, E., Acosta, T., Delgado, A., Evora, C., Alvarez-Lorenzo, C., Concheiro, A.

Diffusion of water and polymer species in supramolecular polyrotaxane gels

PP-9, Abstract Book, p. 64

ACD, Pluronic, Tetronic, Aggregation

Moufawad, T., Moura, L., Tilloy, S., Ferreira, M., Bricout, H., Monflier, E., Landy, D., Costa Gomes, M.F., Fourmentin, S.

Deep eutectic solvents: a novel medium for cyclodextrin inclusion complexes formation

OP-10, Abstract Book, p. 24

Hydrogen-bond donor and acceptor, Cholin chloride, Urea

Serres, M., Gonzalez-Gaitano, G., Isasil, J.R., Dreiss, C.

Complexation between α -cyclodextrin and PEGylated organosilica nanoparticles

OP-30, Abstract Book, p. 44

ACD and PEG covalently attached to organosilica nanoparticles, Maleimide-modified PEG

Tanwar, S., Dupont, N.

Encapsulation of polycyclic aromatic hydrocarbons (PAHs) by β -cyclodextrins in presence of aliphatic alcohols: Experimental, structural and molecular modeling studies

OP-14, Abstract Book, p. 28

Alcoholic co-solvents



3. CDs in Drug Formulation

Adeoye, O., Costa, C., Casimiro, T., Aguiar-Ricardo, A., Marques, H.C.

Preparation of ibuprofen/hydroxypropyl- γ -cyclodextrin inclusion complexes using supercritical CO₂-assisted spray drying

OP-29, Abstract Book, p. 43

Amorphous inclusion complexes

Agnes, M., Bouziotis, P., Lazarou, Y.G., Millotis, G., Miriagou, V., Yannakopoulou, K.

Polycarboxylated EDTA-type β -cyclodextrin Ga(III) complex: a probe for *in vivo* biodistribution studies

PP-18, Abstract Book, p. 73

Radiopharmaceuticals, Excretion route, Metabolic degradation, Protein binding

Amiel, C., Antoniuk, I., Plazotta, B., Wintgens, V., Volet, G., Nielsen, T.T., Pedersen, J.S.

Host-guest nanogels: influence of PEG spacers on the nanostructures

OP-20, Abstract Book, p. 34

Dextran backbone functionalized with either pendant BCD or adamantyl, Polyethyleneglycol (PEG), Tailored structure for drug delivery

Amiel, A.G., Palomino-Durand, C., Lopez, M., Maton, M., Cazaux, F., Chai, F., Neut, C., Foligné, B., Martel, B., Blanchemain, N.

Chitosan-cyclodextrin physical sponge for anti-infectious drug release device

FP-1, Abstract Book, p. 50

Crosslinking with citric acid, Ciprofloxacin, Prolonged antibacterial activity

Arama, C.C., Ionescu, A., Sleahitichi, M., Enache, I., Nedelcu, A.

Comparative study of the effect of β -cyclodextrin and γ -cyclodextrin based nanosponges encapsulation on solubility and lipophilicity of sulfonamides (sulfasalazine, sulfamethoxazole, sulfathiazole)

PP-38, Abstract Book, p. 93

Solubility, Lipophilicity

Argenziano, M., Caldera, F., Lombardi, C., Tannous, M., Dianzani, C., Prandi, C., Trotta, F., Cavalli, R.

Dual redox/pH responsive cyclodextrin based nanosponges for the intracellular delivery of strigolactones

PP-27, Abstract Book, p. 82

Plant hormones, Cancer treatment, Disulfide bridges, Prostate cancer cell lines



Basilio, N., Pina, F.

Photoresponsive inclusion complexes based on trans-chalcones

OP-23, Abstract Book, p. 37

Natural pigments, Antocyanins, Synthetic flavylum compounds, Drug delivery, Self-reporting through fluorescence

Caira, M.R., Hunt, L.E., Noonan, T.J.

Physicochemical characterization of cyclodextrin complexes containing pharmaceutically relevant guest molecules

OP-9, Abstract Book, p. 23

Single crystal XRD, TRIMEA, TRIMEB, Fluconazole, Ferrulic acid

Carvalho, L.B., Jaime, C., Venancio, T., Pinto, L.M.A.

Inclusion complex formation of γ -cyclodextrin and methyltestosterone

PP-16, Abstract Book, p. 71

Lyophilization, Solubility diagram, Molecular dynamics calculations, Geometry of the complex

Ceccone, C., Zanetti, M., Bracco, P., Trotta, F.

Getting insoluble fibers from biocompatible β -cyclodextrin based electrospun water-soluble polymers

PP-44, Abstract Book, p. 99

Hyper-branched polymer, Insoluble polymeric fibrous mats

Christoforides, E., Kakouri, E., Chatziagapiou, K., Bethanis, K.

Inclusion of natural products with potential anticancer activity in cyclodextrins

PP-28, Abstract Book, p. 83

DIMEB, TRIMEB, HPBCD, Capsaicin, Piperine, Crocins, Crystallography

Cirri, M., Maestrelli, F., Mennini, N., Mura, P.

Investigation of the effect of cyclodextrin complexation on nanostructured lipid-based formulations of hydrochlorothiazide aimed for pediatric therapy

PP-45, Abstract Book, p. 100

Solid lipid nanoparticles, SBEB CD, Tween 80

Conceicao, J., Cabral-Marques, H.M., Sousa Lobo, J.M.

Cyclodextrins in tablet and capsule formulations

PP-47, Abstract Book, p. 102

ACD, BCD, GCD, HPBCD, RAMEB, SBEB CD, BCD-epichlorohydrin polymer, Diethyl-BCD, Triethyl-BCD, hydroxyethyl-BCD, DIMEB, Triacetyl-BCD, Carboxymethyl-ethyl-BCD



Cutrin Gomez, E., Anguiano Igea, S., Gomez Amoza, J.L., Otero-Espinar, F.J.

Nail lacquers based on soluble cyclodextrin/poloxamer polypseudorotaxanes as transungual delivery system for management of onychomycosis

PP-11, Abstract Book, p. 66

Cyclopiroxolamine, SDS as permeation enhancer

Diaz, C. Valenzuela, M.L., Yutronic, N.

Cyclodextrin as a simple model of Chitosan as solid state template for the preparation of nanostructured metal-lanthanide oxides

PP-14, Abstract Book, p. 69

Metal oxide nanoparticles, Morphology

Di Donato, C., Iacovino, R., Concheiro, A., Alvarez-Lorenzo, C.

Pseudopolyrotaxanes of Pluronic F127 combined with α - and β -cyclodextrin for the topical formulation of acyclovir

PP-15, Abstract Book, p. 70

Dispersions, Gelling temperature, Irritancy degree

Donalisio, M., Argenziano, M., Caldera, F., Ritta, M., Lembo, D., Cavalli, R.

Sulfobutyl ether- β -cyclodextrin decorated chitosan nanodroplets for the combined delivery of oxygen and acyclovir

PP-26, Abstract Book, p. 81

Positive surface charge, Prolonged release kinetics

Donoso-Gonzalez, Yutronic, N., Sierpe, R.

Cationic β -cyclodextrin-based polymers conjugated to gold nanostars. A new drug carrier system for potential uses in theranostics

PP-17, Abstract Book, p. 72

Drug release, Photothermal effect, Surfactant-free system

Duchene, D., Bochot, A.

Cyclodextrins: Past, present and future, research and development

PL-1, Abstract Book, p. 9

Review, Nanoparticles, Nanosponges, Photo-responsive systems, CD-based metal-organic framework, Molecular imprinting

Fenyvesi, E., Malanga, M., Puskás I., Csabai, K., Benkovics, G., Szente, L.

Epichlorohydrin-crosslinked cyclodextrin polymers for drug delivery

OP-2, Abstract Book, p. 16

Cooperative binding, Electrostatic interactions, Fluorescent moieties for imaging



Fernandez-Ferreiro, A., Diaz.Tome, V., Luaces-Rodriguez, A., Blanco-Mendez, J., Gonzalez-Barcia, M., Otero-Espinar, F.J.

Ophthalmic ion-sensitive hydrogels containing econazole- α -cyclodextrin for the treatment of fungal keratitis

PP-10, Abstract Book, p. 65

ACD, HPBCD, HPGCD, Diffusion through hydrogel, Ocular surface bio-permanence

Ferrara, B., Gigliotti, L., Argenziano, M., Clemente, N., Caldera, F., Trotta, F., Dianzani, U., Dianzani, C., Cavalli, R.

Doxorubicin loaded β -cyclodextrin nanospheres to enhance anti-tumor efficiency: an *in vitro* and *in vivo* study

OP-33, Abstract Book, p. 47

Nano-delivery systems, Internalization in cancer cells, Enhanced cellular uptake, Cytotoxicity, Tumor neoangiogenesis, Lymphangiogenesis

Ferro, M., Castiglione, F., Pastori, N., Punta, C., Mlone, L., Panzeri, W., Rossi, B., Trotta, F., Mele, A.

Snapshots of a drug inside a polymeric network by a multidisciplinary spectroscopic approach

OP-22, Abstract Book, p. 36

Ibuprofen, Nanospheres

Garcia-Fernandez, M.J., Tabary, N., Willart, J.F., Chai, F., Blanchemain, N., Flament, M.P., Martel, B.

Multifunctional pharmaceutical excipient in tablet formulation based on citric acid-cyclodextrin polymer

FP-2, Abstract Book, p. 51

Tablets by direct compression, Ibuprofen, Simvastatin, Piroxicam, Kneading, Controlled release

Heel, A., Steckel, H.

Solvent-free inclusion complex formation of β -cyclodextrin/itraconazole-blend to improve itraconazole dissolution

OP-32, Abstract Book, p. 46

Twin-screw extruder, BCD, HPBCD

Jansook, P., Ritthidej, G., Muankaew, C., Loftsson, T.

Development of thermally triggered *in situ* gelling for periodontitis of asiaticoside-metronidazole containing cyclodextrin solubilizer

PP-1, Abstract Book, p. 56

BCD, HPBCD, RAMEB, Complexation efficiency, Hydroxypropylmethylcellulose, Carbopol, Syringeability



Jullian, C., Gomez-Machuka, H., Quiroga-Campano, C., Castro-Castillo, V., Zapata-Torres, G.

Binding of chromone-3-carbaldehyde-benzoyl hydrazine with DNA in free and DM- β -cyclodextrin complexed form

PP-30, Abstract Book, p. 85

Intercalation into DNA

Kersani, D., Lopez, M., Mougín, J., Degoutin, S., Tabary, N., Cazaux, F., Hue, B., Maton, M., Chai, F., Sobocinski, J., Blanchemain, N., Martel, B.

Drug-eluting stents coated with poly-cyclodextrin nanofibers

OP-4, Abstract Book, p. 18

In-stent restenosis, Antiproliferative drugs, Paclitaxel, Sirolimus

Larsen, K.L., Tjell, A.O., Aachmann, F.L.

Compatibility of cyclodextrins and Ca⁺⁺-alginate hydrogels

OP-24, Abstract Book, p. 38

Contact lenses, Wound dressings, BCD, HPBCD, SBEB CD

Loftsson, T.

Physicochemical properties of cyclodextrin aggregates and their application in drug delivery

PL-4, Abstract Book, p. 12

Disperse nanoscale systems, Ternary or higher order complexes, Nanoparticles

Maestrelli, F., Cirri, M., Mennini, N., Mura, P.

Preparation and characterization of flufenamic acid-cyclodextrin complexes

PP-46, Abstract Book, p. 101

ACD, BCD, GCD, HPBCD, RAMEB, SBEB CD, Kneading, Coevaporation, Co-grinding, Freeze-drying

Malanga, M., Béni, Sz., Fenyvesi, E., Varga, E., Szemán, J., Sohajda, T., Szenté, L.

Universal approach for selective delivery of anticancer drugs: *ad-hoc* development of folate-appended cyclodextrins

OP-31, Abstract Book, p. 45

Selective targeting, Coupling agent 4-(4,6-dimethoxy.1,3,5-triazin-2-yl)-4-methyl morpholinium chloride

Martinez-Louzao, R., Lucas-Abellan, C., Asin-Llorca, M.

Complexation of finasteride with γ - and HP- γ -CDs

PP-12, Abstract Book, p. 67

Prostatic hyperplasia, Prostate cancer, Androgenic alopecia, Complexation efficiency



Mathiron, D., Rollin, P., Iori, R., Pilard, S., Rajan, T.S., Mazzon, E., Djedaini-Pilard, F.

Use of cyclodextrin for the development of a novel bioactive formulation of moringin

OP-26, Abstract Book, p. 40

Antitumor activity, Protection against neurodegenerative diseases, Antibacterial effects, ACD

Mazet, R., Geze, A., Choisnard, L., Blanc-Marquis, V., Levilly, D., Wouessidjewe, D.

Cyclodextrin-based hydrogel formulation of dexamethasone for ocular delivery by means of experimental designs

PP-24, Abstract Book, p. 79

HPBCD, HPGCD, Cationic CD-based nanoconstructs, Mucoadhesion

Mazzaglia, A., Sortino, G., Zagami, R., Tosto, R., Di Natale, G., Tomasello, M.T., Cervello, M., Gouhier, G., Villari, V., Micali, N., Pappalardo, G.

Magnetic nanoparticles tailored with peptides/amphiphilic cyclodextrin assemblies: Amyloid- β detection to theranostic applications

PP-25, Abstract Book, p. 39

Heptakis(2-oligo(ethyleneoxide)-6-hexadecylthio-)BCD, Adamantanyl groups, Self-recognizing sequence of amyloid- β peptides

Mendes, C.G., Howe, O., McNamara, M.

Folate receptor targeted drug delivery system based on cyclodextrins for cancer therapy

OP-34, Abstract Book, p. 48

Methothrexate, Cancer cell lines, Internalization

Mogrovejo, A., Meton, M., Tabary, N., Neut, C., Martel, B., Blanchemain, N.

Layer-by-layer coating of a polyester non-woven with chitosan and poly-cyclodextrins antibacterial and anti-inflammatory dressing

PP-48, Abstract Book, p. 103

Citric acid crosslinked CD polymer, E. coli, S. aureus

Montes, A., Sierpe, R., Yutronic, N.

Study of 2-amino-4-(4-chlorophenyl)thiazole-loaded cyclodextrin nanosponges

PP-23, Abstract Book, p. 78

Antiviral, antibacterial, antifungal and anti-inflammatory agents, Diphenylcarbonate crosslinker

Nguyen, P.H.T., Geze, A., Mathevon, C., Duraffourg, N., Putaux, J.L., Choisnard, L., Forge, V., Wouessidjewe, D.

Oral insulin delivery: potential of hydrogel associated to cyclodextrin nanoparticle system

OP-28, Abstract Book, p. 42

α -Lactalbumin, Fatty acid ester, Hemolysin



Ouerghemmi, S., Degoutin, S., Tabary, N., Cazaux, F., Janus, L., Hue, B., Chai, F., Blqncemain, N., Martel, B.

Monolithic and coaxial antimicrobial electrospun nanofibers based on chitosan and cyclodextrin polymer

OP-21, Abstract Book, p. 35

Polyelectrolyte complex, HPBCD crosslinked with citric acid, Cytocompatibility, Antimicrobial activity

Palomino-Durand, C., Gauzit-Amiel, A., Lopez, M., Cazaux, F., Martel, B., Blanchemain, N., Chai, F.

Influence of the molecular weight of chitosan on the properties of chitosan/poly-cyclodextrin hydrogels and sponges for bone tissue engineering application

PP-49, Abstract Book, p. 1074

Anionic polymer of CD, Cytocompatibility

Peimanfard, S., Trotta, F., Caldera, F., Zarrabi, A.

Fabrication, characterization and solubility study of cyclodextrin-naringenin inclusion complex

PP-29, Abstract Book, p. 84

Flavonoid, Citrus fruits, Anti-cancer, anti-inflammatory, anti-estrogenic and anti-oxidant effects

Popielec, A., Loftsson, T.

Effect of cyclodextrins on the degradation rate of benzylpenicillin

PP-25, Abstract Book, p. 80

BCD, RAMEB, TRIMEB, Non-inclusion complex, Substitution of OH groups by methyl groups

Rolim, F.N.A., Lima, R.Q., Santos, K.S.C.G., Oliviera, M.K.S., Ferreira, M.R.A., Soares, L.A.L., Freitas, L.A.P., Marques, H.C., De Douza, T.P.

Influence of cyclodextrins on the solubility of spray dried *Endopleura uchi* bioactive

PP-40, Abstract Book, p. 95

Traditional medicine, Bergenin, ACD, BCD, GCD, HPBCD, DIMEB

Schwarz, D.H., Wenz, G.

Cyclodextrin-hyaluronic acid conjugates as side-specific carriers

PP-13, Abstract Book, p. 68

Cell-specific ligands, Adamantane groups, Side-specific transport

Silva Lima, B.

Regulatory requirements on cyclodextrin-containing medicinal products

PL-6, Abstract Book, p. 14

New CD, New formulation



Skwierawska, A., Majewska, K.

Inclusion complexes of 5H-dibenzo[a,d][7]annulene derivatives with β -cyclodextrin

PP-36, Abstract Book, p. 91

Benzosuberone, Cyclobenzaprol, Cyclobenzaprine

Stappaerts, J., Cevik, I., Augustijns, P.

The effect of cyclodextrins on the permeation of compounds through mucus

OP-35, Abstract Book, p. 49

Methyl- and heptylparabens, Artificial membrane, Porcine gastric mucus, Barrier effect of mucus

Swiech, O., Majdecki, M., Krzak, A., Stepkowski, T.M., Kruszewski, M., Bilewicz, R.

Application of new conjugate of cyclodextrin and folic acid in pH-sensitive, targeted therapy of anthracycline drugs

PP-42, Abstract Book, p. 97

Doxorubicin, Daunorubicin, Resistance of pathogenic cells, receptor mediated endocytosis

Trotta, F., Cavalli, R., Femmino, S., Pagliaro, P., Caldera, F., Bessone, F., Penna, C.

Nanosponge-cyclodextrins loaded with oxygen protects H9c2 cells from hypoxia/reoxygenation injury: Implications from an in vitro model

OP-27, Abstract Book, p. 41

Delivery of oxygen in a controlled manner, Ischemia, Reperfusion, ACD-nanosponge, Reduction of cell mortality

Varan, C., Sandler, N., Bilensoy, E.

Anticancer and antiviral drug printed bioadhesive film for cervical cancer: ink formulation development by using cyclodextrin derivatives

OP-17, Abstract Book, p. 31

Cidofovir, Polycaprolactone nanoparticles, Paclitaxel, HeLa cells

Varan, G., Borchard, G., Bilensoy, E.

Evaluation of cellular interaction and tumoral penetration properties of amphiphilic cyclodextrin nanoparticles on 3D tumor model

OP-18, Abstract Book, p. 32

Anionic 6OCaproBCD, cationic PC BCDC6, MCF-7 human breast cancer cells, HDF human dermal fibroblast cells

Wankar, J., Salzano, G., Ottani, S., Benkovics, G., Malanga, M., Fenyvesi, E., Gref, R., Manet, I.

Encapsulation of ethionamide in β -cyclodextrin-based polymers organizing in nanoparticles for pulmonary antitubercular drug delivery

OP-3, Abstract Book, p. 17

Polymeric BCD nanoparticles labeled with fluorescein, Clofazimine



Zagami, R., Piperno, A., Scolaro, L.M., Mazzaglia, A.

Cationic amphiphilic cyclodextrin decorated with hyaluronic acid: a novel assembly for targeted PDT

PP-43, Abstract Book, p. 98

CD44-expressing cells, Pheophorbide

4. CDs in Cell Biology

Egele, K., Wenz, G.

Formation of pDNA polyplexes of cationic polyrotaxanes for gene transfection

OP-1, Abstract Book, p. 15

Polyamidines, Cucurbituryl stopper groups, Hepta-substituted cationic BCD derivative, Anionic polyalkylphosphate backbone

Przybylski, C., Benito, J.M., Bonnet, V., Ortiz-Mellet, C., Garcia-Fernandez, J.M.

Mass spectrometry tools: new blades for the study of polycationic cyclodextrin alone or in complex with oligonucleotides

OP-8, Abstract Book, p. 22

Compaction/transfection agent for RNA/DNA, Polyethyleneimine

Rey-Rico, A., Babicz, H., Madry, H., Concheiro, A., Cucchiaroni, M., Alvarez-Lorenzo, C.

Polypseudorotaxane gels as viral vectors release platforms for applications in cartilage regeneration

OP-5, Abstract Book, p. 19

Pluronic, Tetronic, Hyaluronic acid, Chondroitin sulfate, Human tissue engineering, Regenerative medicine

O'Driscoll, C.M.

An innovative cyclodextrin-based delivery platform for RNAi therapeutics

PL-3, Abstract Book, p. 11

Modified CDs, Nucleic acid delivery, Prolonged in vivo circulation, Huntington's disease, Inflammatory bowel disease (IBD)

Szente, L., Domokos, A., Gervay-Hague, J., Song, B.

Cytotoxicity of chemically modified cyclodextrins re-visited: Role of degree of substitution, cavity size and cavity occupancy

OP-16, Abstract Book, p. 30

Hemolysis alleviating effect of cholesterol loading, HeLa cells



5. CDs in Food, Cosmetics and Agrochemicals

Altier, G.P., Manta, C.L., Ovsejevi, K.

A solid phase biocatalyst for continuous production of cyclodextrin: first stage toward developing food additives for controlling enzymatic browning

PP-4, Abstract Book, p. 59

Immobilization of proteins, Thiolsulfinate gels, Succinimidyl 3-(2-pyridylthio) propionate, Biotransformation products, ACD, BCD, GCD, Complexation of vitamins

Barroca, M.J., Santos, S.D., Batista de Carvalho, L.A.E., da Siva, A.M.

Encapsulation of *Salicornia macrostachya* Moric extracts –Sal@ β -cyclodextrin: A food system valorization

OP-7, Abstract Book, p. 21

Essential oils, Caffeic acid, Gallic acid

Martins, L.N.S.B., Venceslau, A.F.A, Pinto, L.M.A.

Solubility study of the inclusion complexes between essential oils from *Callistemon viminalis* and β -cyclodextrin

PP-5, Abstract Book, p. 60

Antibacterial, antioxidant and insecticide, Kneading, Co-precipitation, Phase solubility

Martins, L.N.S.B., Venceslau, A.F.A, Pinto, L.M.A.

Preparation and characterization of the inclusion complexes between essential oils from *Callistemon viminalis* and β -cyclodextrin

PP-6, Abstract Book, p. 61

Kneading, Co-precipitation, Degree of crystallinity

Kfoury, M., Geage, C., Auezov, L., Greige-Gerges, H., Fourmentin, S.

Influence of co-solvents on the encapsulation of natural antioxidants in cyclodextrins

PP-19, Abstract Book, p. 74

Caffeic acid, Ethanol, ACD, BCD, GCD

Silva, F., Trotta, F., Domingues, F.C., Nerin, C.

Encapsulation of coriander essential oil in cyclodextrin nanospheres

PP-41, Abstract Book, p. 96

ACD, BCD, HPBCD/BCD mixture, Pinene, Cymene, Camphor, Linalool, Geranyl acetate

Szente, L.

Industrial application of cyclodextrins in food, beverages and personal care products

PL-5, Abstract Book, p. 13

Functional additives, Packaging additives, Dietary fiber, Blood glucose level, Post-prandial hyperglycemia



6. CDs for other Industrial Applications

Brunke, J., Becker-Willinger, C., Wenz, G.

Polyrotaxane-based nanocomposite hard coatings with self-healing behavior

PP-20, Abstract Book, p. 75

Molecular necklace, Slide-ring gels, Silica nanoparticles, Thermal treatment

Casaletto, M.P., Figa, V., Privitera, A., Mazzaglia, A., Scala, A., Zagami, R.

Sustainable corrosion inhibition of copper-based alloys by smart β -cyclodextrin/benzotriazole complexes

PP-31, Abstract Book, p. 86

Simulation of marine environment, Films, Surface chemical composition

Casaletto, M.P., Privitera, A., Testa, M.L., La Parola, V., Mazzaglia, A., Zagami, R.

Hybrid β -cyclodextrin/silica systems for the preservation of biodeterioration of stone materials

PP-32, Abstract Book, p. 87

Carboxymethyl BCD, Hexagonal nanoporous silica

Cocq, A., Bricout, H., Rousseau, C., Tilloy, S., Monflier, E.

Novel fatty acid-modified cyclodextrins: physicochemical properties and applications in aqueous catalysis

FP-5, Abstract Book, p. 55

Hydroformylation, 1-Hexadecene, 1-Decene, Tensioactivity, Aggregation

Nonaka, K., Yamaguchi, M., Yasui, M., Fujiwara, S., Hashimoto, T., Hayashita, T.

Guest-induced supramolecular chirality based on ditopic azoprobe – cyclodextrin complexes in water

OP-19, Abstract Book, p. 34

Chiral switching and sensing devices, Benzo-15-crown-5, Dipicolylamine, Triphosphate

Menuel, S., Monflier, E., Hapiot, F.

Cyclodextrins and supramolecular effects in mechanochemistry

FP-4, Abstract Book, p. 53

Gold nanoparticles, Ball milling, Catalysis, Reduction of nitroarenes

Wenz, G., Becker-Willinger, C., Kali, G., Eisenbarth, H.

Self-healing car paints from cyclodextrins

OP-6, Abstract Book, p. 20

Elastic restoring force, Slide-ring gel, Crosslinking a polyrotaxane, Car industry



7. CDs in Sensing and Analysis

Inoue, K., Hashimoto, T., Endo, A., Hayashita, T.

Several sugar recognition by electrochemical impedance spectroscopy using β -cyclodextrin assembled on gold electrode

PP-35, Abstract Book, p. 90

Thioalkyl BCD, D-fructose, D-psicose

Mizuta, Y., Sugita, K., Kojima, S., Tsutido, Y., Hashimoto, T., Hayashita, T.

Design and function of fluorine-introduced boronic acid fluorophore/cyclodextrin complexes for selective glucose recognition

PP-33, Abstract Book, p. 88

Carboxamide linkage, Boronofluorobenzoic acid, 1-Aminopyrene

Stanescu, M., Stanescu, I., Arama, C., Constantinescu, C., Monciu, C.

The profile of β -cyclodextrin and its derivatives enantioselectivity when used in affinity capillary electrophoresis as dual selector systems with amino acids based ionic liquids

PP-34, Abstract Book, p. 89

BCD, HPBCD, RAMEB, Ondasetron enantiomers



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