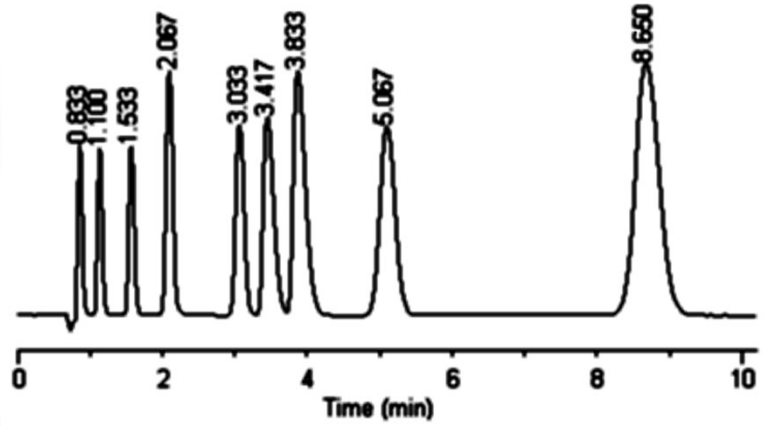
Natural Products for Medicinal Chemistry (NPMC Lab)

Prof. Federica Pellati, Associate Professor, P.I.
Dr. Virginia Brighenti, research collaborator
Dr. Laura Bertarini, PhD student
Dr. Matilde Marani, postgraduate collaborator



Main research topics

- ✓ Identification of natural compounds as new hit/lead for drug discovery by applying an integrated multi-disciplinary approach. A peculiar interest is devoted to proliferative diseases (cancer) and CNS diseases (neuropathic pain, epilepsy etc.)

- ✓ Development of new methods for targeted and untargeted analysis of bioactive natural compounds

- ✓ Development of new methods for targeted and untargeted metabolomics of compounds in biological fluids (bioanalysis)

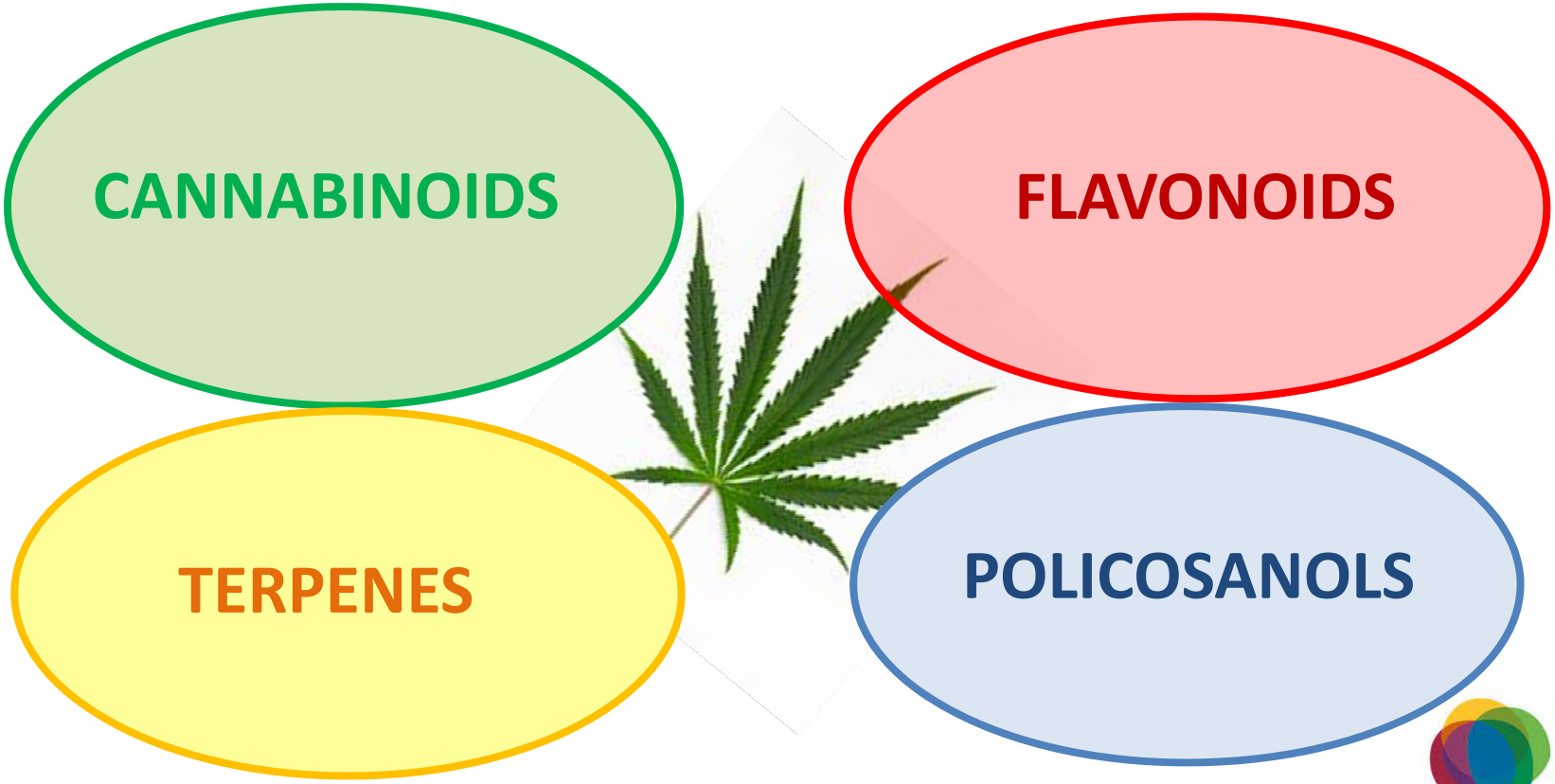
SCIENTIFIC REPORTS
nature research

CANNABIS SATIVA L.

Secondary Metabolites Profiled in Cannabis Inflorescences, Leaves, Stem Barks, and Roots for Medicinal Purposes

Cannabis sativa L. and its role in medicinal chemistry

Extraction and analysis
***In vitro* and *in vivo* biological assays**



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Ministero dell'Università e della Ricerca
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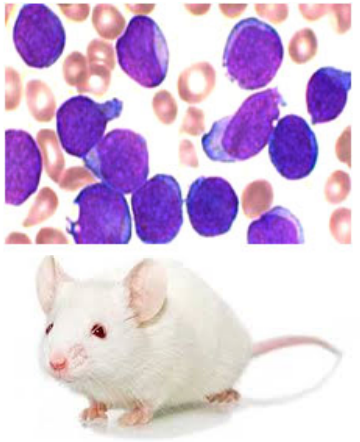
UNIMORE
PON RICERCA E INNOVAZIONE 2014 - 2020

Workflow of the study

Preparation of the raw extracts

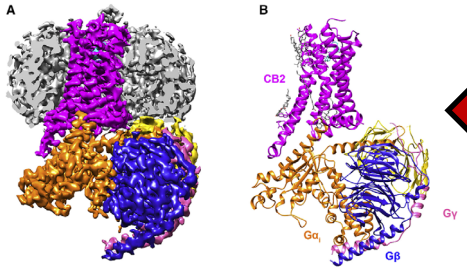
Chemical characterization



In vitro/*in vivo* biological assays

Purification and bioassays

Identification of the mechanism/s of action



In silico study

DOI: 10.1002/ptr.7357

Phytotherapy Research

WILEY

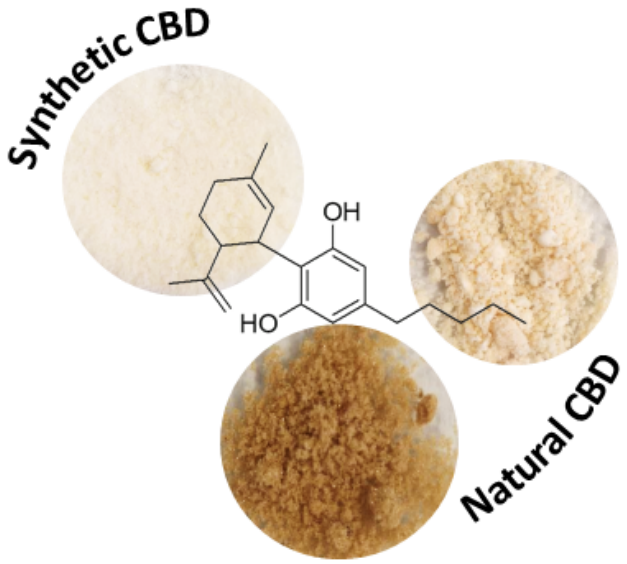
RESEARCH ARTICLE

Chemical characterization of non-psychoactive *Cannabis sativa* L. extracts, in vitro antiproliferative activity and induction of apoptosis in chronic myelogenous leukaemia cancer cells

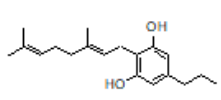
Lisa Anceschi[1,2] | Alessandro Codeluppi[1] | Virginia Brighenti[1] | Riccardo Tassinari[3] | Valentina Taglioli[4] | Lucia Marchetti[1,2] | Luca Roncati[5] | Andrea Alessandrini[6,7,8] | Lorenzo Corsi[1,8] | Federica Pellati[1]

ElSohly Award 2022, American Chemical Society

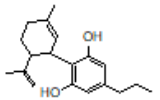
Matilde's thesis work (December 2023)



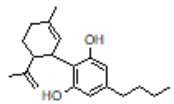
Natural impurities



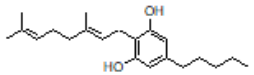
Cannabigerovarin (CBGV)



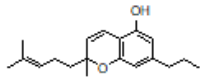
Cannabidivarin (CBDV)



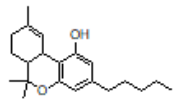
Cannabibutol (CBDB)



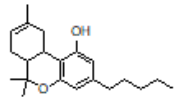
Cannabigerol (CBG)



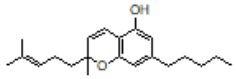
Cannabichromevarin (CBCV)



Δ^9-Tetrahydrocannabinol (Δ^9-THC)

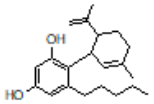


Δ^8-Tetrahydrocannabinol (Δ^8-THC)

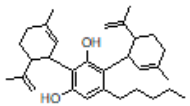


Cannabichromene (CBC)

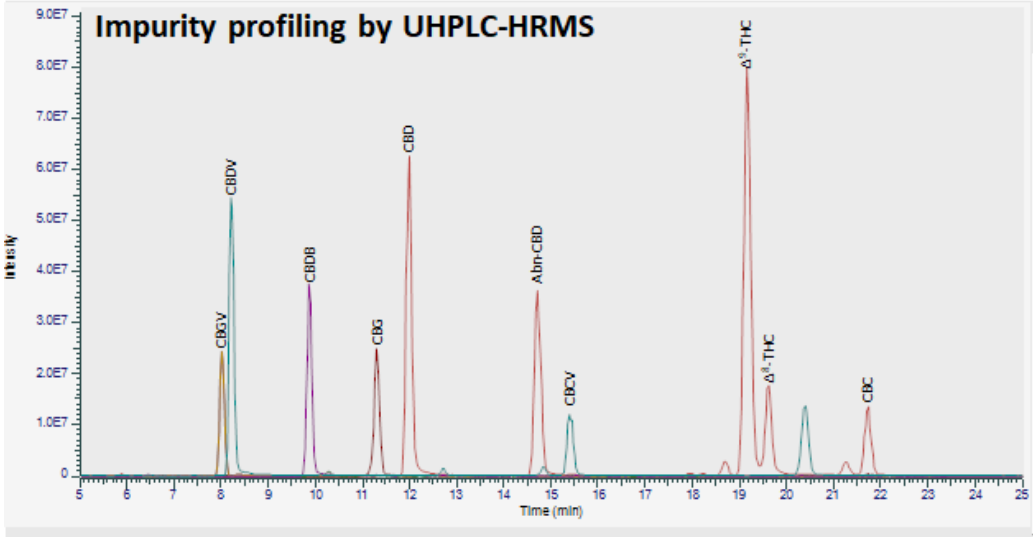
Synthetic impurities

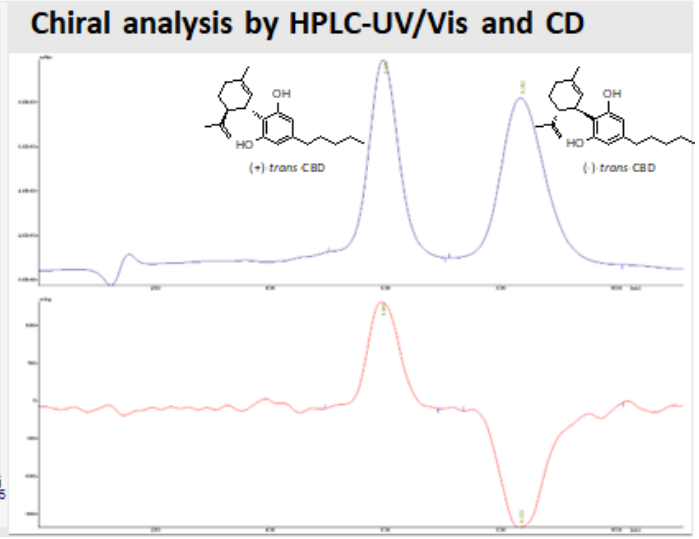


Abnormal cannabidiol (Abn-CBD)



Disubstituted cannabidiol





Analytical and Bioanalytical Chemistry (2024) 416:4555–4569
https://doi.org/10.1007/s00216-024-05396-5

RESEARCH PAPER

A new HPLC method with multiple detection systems for impurity analysis and discrimination of natural versus synthetic cannabidiol

Virginia Brighenti[1] · Matilde Marani[1] · Clarissa Caroli[1,2] · Laura Bertarini[1,2] · Alessio Gaggiotti[3] · Federica Pollastro[4] · Caterina Durante[5] · Giuseppe Cannazza[1] · Federica Pellati[1]

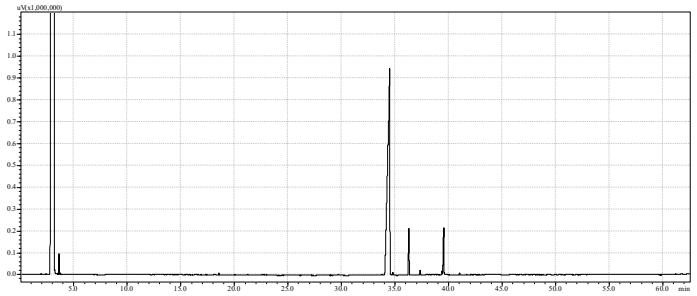
On-going PRIN-PNNR project

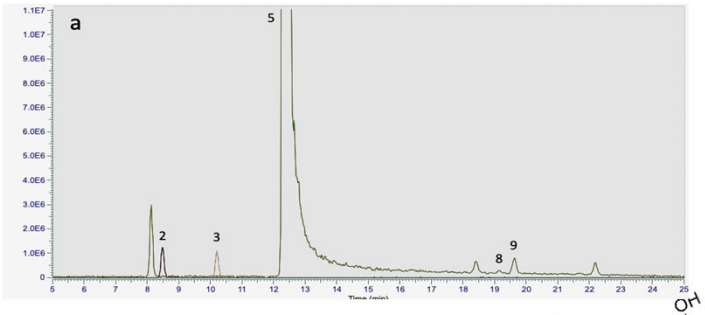
*Deep characterization **cannabinoids, polyphenols and lipophilic compounds** in hemp waste material (leaves) belonging to different hemp chemotypes by means of **HPLC and GC** techniques*

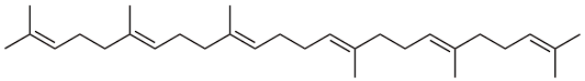
hemp leaves and other waste materials

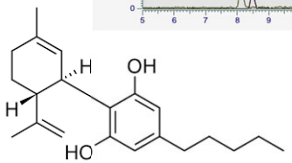
GC-MS
GC-FID

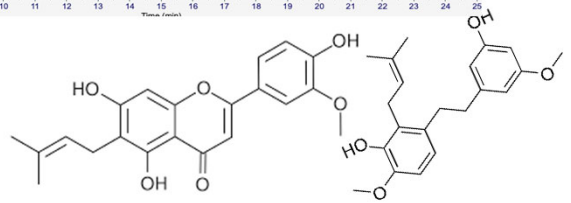
HPLC-HRMS
HPLC-UV/Vis





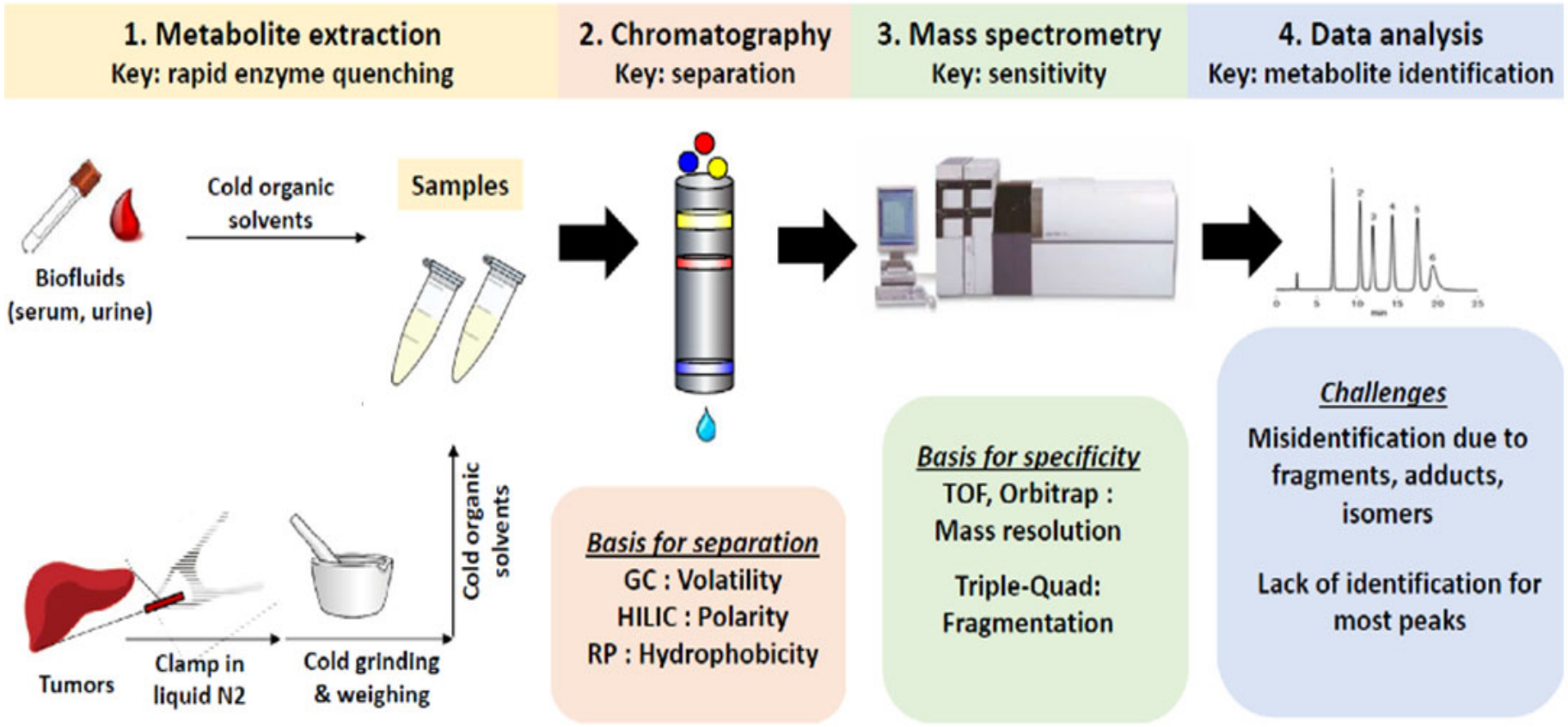






On-going PNNR project

Untargeted metabolomics on NASH patients to identify new biomarkers of the disease



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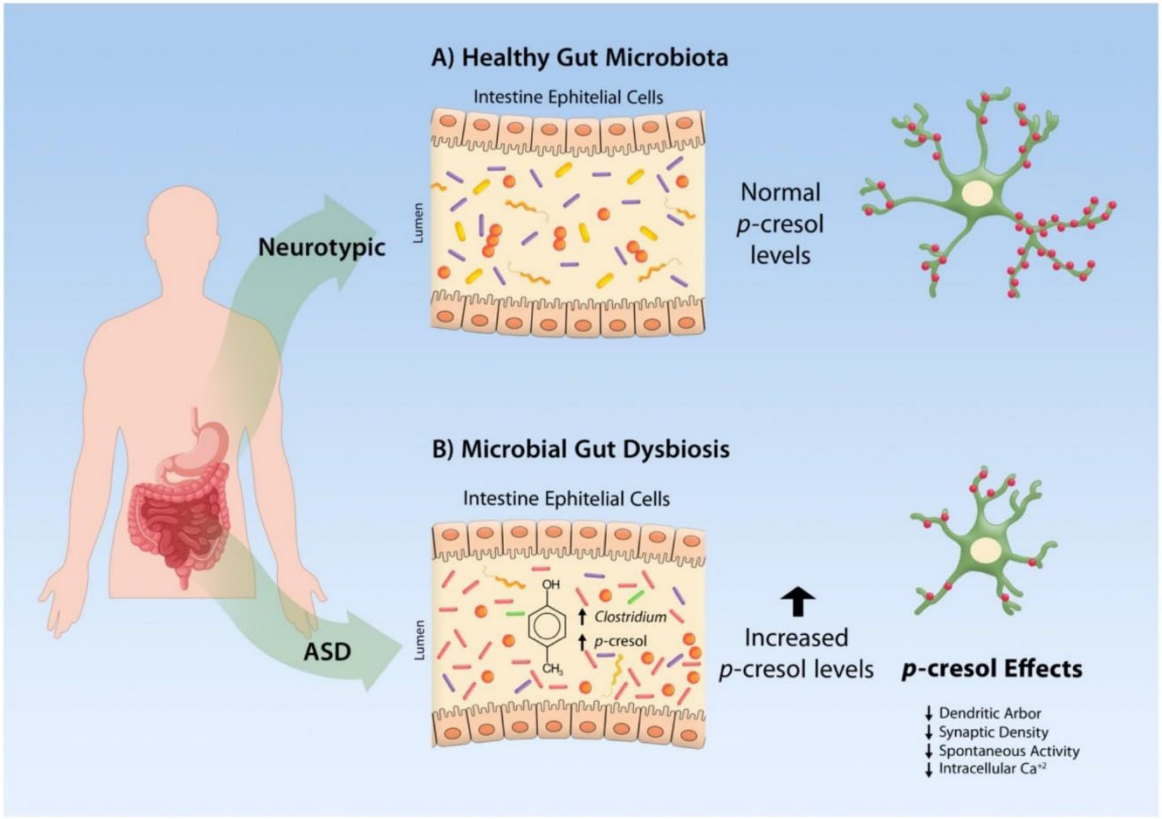
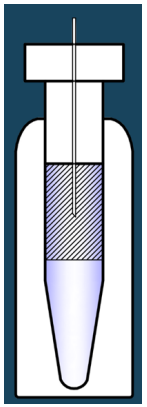
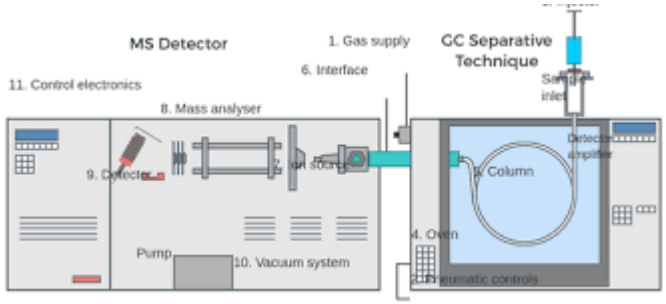
On-going project on p-cresol levels in brain tissues

Development of a new GC-MS method for the analysis of p-cresol in the CNS





In vial dual extraction



GC-MS method

On-going project on endocannabinoids

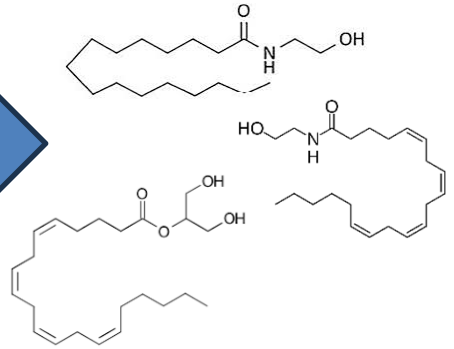
Optimization of a method for the extraction and quantification of endocannabinoids by means of HPLC-MS/MS and HPLC-HRMS

brain tissue, biofluids

Method Optimization

Extraction protocol

Chromatograpic conditions

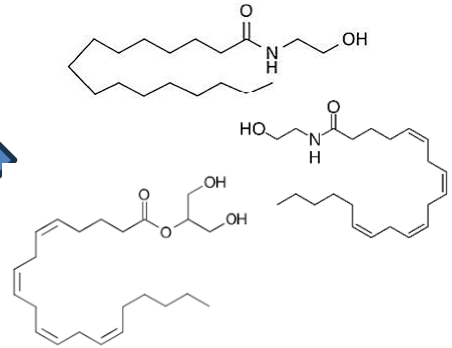


PEA, AEA, 2-AG

cell culture medium

- β-caryophyllene
- CBD
- β-caryophyllene/CBD combination
- Essential Oil

Optimized Method



Release of **PEA**, **AEA** and **2-AG** by treated cells in the culture medium

Research collaboration

Prof. Federica Pollastro (UNIUPO)
Prof. Daniele Merli (UNIPV)
Prof. Gianni Sacchetti (UNIFE)
Prof. Laura Mercolini (UNIBO)
Prof. Roccaldo Sardella (UNIPG)
Prof. Coral Barbas (CEU-San Pablo University of Madrid, Spain)

Extraction and analysis

Prof. Fabrizio Manetti (UNISI)
Prof. Caludia Mugnaini (UNISI)

***In silico* study and synthesis**

Prof. Lorenzo Corsi (UNIMORE)
Prof. Pietro Andreone (UNIMORE)
Prof. Silvia Alboni (UNIMORE)
Prof. Giovanni Vitale (UNIMORE)
Prof. Nicoletta Galeotti (UNIFI)
Prof. Celestino Santos-Buelga (University of Salamanca, Spain)
Prof. Victor Lopez Ramos (Universidad San Jorge, Zaragoza, Spain)
Prof. Francesco Tamagnini (Reading University, UK)

Biological activity

Number of experimental thesis for CTF: 2

Number of experimental thesis for Pharmacy: 2

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Everything you can imagine, nature has already created

Albert Einstein