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Tu Yifeng et al., Insights in Analytical Electrochemistry, 3:2
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A label-free genetic biosensor for diabetes based on AuNPs decorated with electrochemiluminescent signaling

Tu Yifeng, Zhai Suyan, Fang Chen, Zhao Qun and **Yan Jilin**
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The variation of *I27L* gene associates with increasing risk of type 2 diabetes. It will be greatly significant to develop various methods to identify or monitor *I27L* genovariation. We report here a novel label-free electrochemiluminescent (ECL) DNA biosensor for simple and effective determination of *I27L* gene based on Au nanoparticles functionalized ITO electrode. The fabricated electrodes were characterized by scanning electron microscopy, cyclic voltammetry, and electrochemical impedance spectroscopy. The ECL technique was employed to monitor the hybridization of DNA by measuring the changes of its intensity. Here, the ECL signal was quenched since the electrostatic repulsion and space resistance of negatively charged sensor surface toward the probe (luminol anion) to block its access. The quantification of target strand was directly accomplished by calibrating the quenched ECL signals. Under optimal conditions, the decreased ECL intensity had a good linear relation upon the logarithm of target DNA concentration in the range of $1.0 \times 10{-}^{11}$ to $1.0 \times 10{-}^{7}$ M with a detection limit of $8.06 \times 10{-}^{12}$ M. In addition, the biosensor exhibited acceptable stability, excellent reproducibility and outstanding selectivity against one-base mismatched DNA. What's more is that the simple, low-cost, sensitive device could be easily miniaturized, which makes it an attractive candidate for integrating into portable platforms for point-of-care molecular diagnostics.

Biography

Tu Yifeng has completed PhD in 2002 from Nanjing University, China. He is currently a Professor and Supervisor of PhD students in Soochow University. He is the Director of the research group of "Analytical Chemistry for Life Sciences". He has published more than 100 papers in reputed journals.

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Notes:

Hong-Lin Chan et al., Insights in Analytical Electrochemistry, 3:2
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MALDI biotyper system for oral microbial identification and diagnosis

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The microbiota has increasingly gained attention because of its relationship linked to the development of human diseases. Periodontal disease is one of the disorders induced by microorganisms, which cause bad breath, swollen and bleeding gums, plaque and even tooth loss. Here, we established an anaerobic MALDI Biotyper system for *in vitro* diagnosis of oral microbiota to monitor the distribution of bacteria in oral cavity of human. The Bruker database used in this study contains 5,989 species of bacteria were applied to MALDI-TOF to detect oral microbiota. We collected 45 specimens of saliva and subgingival area from healthy controls and periodontitis patients. We grouped the subjects to healthy, the age under 60 with periodontal disease, and the age above 60 with periodontal disease. In addition, P-113, an antimicrobial peptide which has been reported with the ability for reducing the periodontal disease was used to evaluate the microbiota in the saliva of healthy group. We have identified 126 species by using MALDI biotyper. Based on Socransky's classification, we found that the amount of red complex (*Porphyromonas gingivalis, Tannerella forsythia and Treponema denticola*) were higher in gingival specimens of the patients of periodontal disease than healthy controls. The isolates from periodontal disease and age above 60 patients have 16% abundance of red complex; On the other hand, only 2% of red complex were found in the patients with age under 60. Moreover, only three periodontal bacteria—*Aggregatibacter actinomycetemcomitans* (Aa), *Fusobacterium nucleatum* (Fn), *P. gingivalis* (Pg)—were present in the subgingival specimens of periodotal disease. We also found Fn and Pg in the group of age above 60 increased by 8 and 6 folds as compared to the group of age under 60. For *Streptococcus gordonii* and *S. intermedius* were higher in both saliva and subgingvial area of patients than healthy controls; *Actinomyces meyeri* and *S. constellatus*, however, are only detected in the patient group, and *Actinomyces odontolyticus*, *S. parasanguinis*, and *S. salivarius* have two-folds abundance in healthy group than the patient group. Our results further showed that S. mitis, *S. pneumonia*, Veillonella parvula are significantly decreased followed by using P-113 mouthwash. Interestingly, the number of *S. salivarius*, a dominant species in oral bacteria and has excellent potential for use as a probiotic targeting the oral cavity, was increased two-folds after P-113 treatment. Our results demonstrated that anaerobic MALDI-TOF Biotyper system could be a useful diagnostic tool for analyzing oral microbiota. We found that oral microbiota is periodontal disease- and age-dependent. We also provided a practical hygiene by using antimicrobial peptide P113. The results provide a way for clinical diagnosis and the basis for personal medicine of therapy in the future.

Biography

Hong-Lin Chan is head of the National Tsing-Hua University (Taiwan) for Quantitative Proteomics Group and has 10 years of experience in proteomic method development and application. Dr. Chan received his PhD degree from University College, University of London in 2005. After 2 year post-doctoral training in the wolfson institute for Biomedical Sciences, he took the current professorship from National Tsing-Hua University in Taiwan. Dr. Chan's group has expertise in the preparation, separation and quantification of proteins and post-translational modifications using mass spectrometry and other methods. Dr Chan was one of the first users of 2D-DIGE technology which is routinely used for protein expression profiling and the group has also established platforms which perform quantitative phosphoproteomics and redox-proteomics analysis. Dr. Chan's group is focused on: Serum biomarker discovery, characterising redox and UV stress responses in cell models, mechanisms of cellular signalling, proteomics based studies on breast cancer, prostate cancer and drug resistance formation. Methods include cell biology facilities, 2D-DIGE/MS and quantitative 2D-LC-MS/MS expression profiling.

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Notes:

Chun-Hsien Chen et al., Insights in Analytical Electrochemistry, 3:2
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Determination of finasteride and relative metabolites by capillary electrophoresis

Chun-Hsien Chen and **Yen-Ling Chen**
Kaohsiung Medical University, Taiwan

Androgenetic alopecia leads to hair follicle miniaturization brought on Dihydrotestosterone (DHT) which is converted from testosterone by 5α-reductase. In the treatment of androgenetic alopecia, finasteride binds irreversibly to type II 5α-reductase and inhibits the conversion of testosterone to DHT. Capillary electrophoresis (CE) is applied to establish an analytical method aimed to investigate the therapeutic effect in individuals by monitoring the concentrations of finasteride and its metabolites, finasteride 2-(2-methylpropanol)amide (M1) and finasteride carboxylic acid (M3). The on-line preconcentration technique is applied to improve stacking effect on detection of analytes. Three stacking peaks are obse

Biography

Chun-Hsien Chen is currently studying Department of Fragrance and Cosmetic Science master`s program the second grade at Kaohsiung Medical University. He has completed his master's thesis of determination of finasteride and relative metabolites by capillary electrophoresis in 2017. In the two year master career, he also participated in the presentation of poster and oral at other international conferences.

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Ying-Xuan Huang et al., Insights in Analytical Electrochemistry, 3:2
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Analysis of isotretinoin and its metabolites by capillary electrophoresis with on-line pre-concentration technique

Ying-Xuan Huang and **Yen-Ling Chen**
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The reasons for acne formation are as follow: testosterone converted into dihydrotestosterone (DHT), and DHT combines with androgen receptors simultaneously. When hair follicle is clogged, sebaceous gland cells are stimulated to produce certain amounts of sebum. It causes the propionibacterium acnes to proliferate, which secrete lipase that goes on to decompose sebum into free fatty acid, and lead to inflammation. Isotretinoin is one of the acne therapeutic drugs which reduce acne formation by binding to the retinoid receptor. According to the literature study, the dosage of isotretinoin correlates with its adverse effects, such as dryness of the skin and mucosa, conjunctivitis, night blindness, etc. Therefore, it's desirable to develop an analytical method to detect and evaluate the concentrations of isotretinoin and its metabolites tretinoin, 4-oxo-isotretinoin. In this study, capillary electrophoresis with low solvent and sample consumption was chosen as the analytical instrument. The application of on-line pre-concentration technique can be used to enhance the sensitivity.

Biography

Ying-Xuan Huang is currently studying Department of Fragrance and Cosmetic Science master`s program the first grade at Kaohsiung Medical University. She has started his master's thesis of "Analysis of isotretinoin and its metabolites by capillary electrophoresis with online preconcentration technique"in 2016. Until now she specialize in the analytical chemistry.

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Simultaneous determination of phenylenediamines derivatized with 5-(4, 6-dichlorotriazinyl) aminofluorescein by capillary electrophoresis

Yen-Ling Chen and **Hung-Yu Ko**
Kaohsiung Medical University, Taiwan

Phenylenediamines were ingredients that were used as permanent hair dyes. These compounds were reported to cause allergic dermatitis and have genotoxicity and carcinogenicity. The fluorescent derivatization strategy and micellar electrokinetic chromatography with laser-induced fluorescence detector (MEKC-LIF) were established to analyze o-phenylenediamine (OPD), m-phenylenediamine (MPD), p-phenylenediamine (PPD) and toluene-2,5-diamine (PTD) in hair dye products, hair samples and percutaneous absorption experiment. 5-(4,6-dichlorotriazinyl) aminofluorescein (DTAF) was used as a fluorescent reagent and derived at amino groups of phenylenediamines and underwent nucleophilic substitution reaction. The derivatization condition reacted at 90°C for 10 minutes in alkaline conditions. The derivatives were analyzed by MEKC equipped with LIF detection. The limit of detections (S/N=3) for MPD, PTD, PPD and OPD were 25, 25, 50 and 100 nM, respectively. Comparing to previous studies, the sensitivity enhancements were 30-81-fold. The high sensitive MEKC-LIF method was successfully established and applied to determine the content of phenylenediamines in commercial hair dye products, hair and percutaneous absorption samples.

Biography

Yen-Ling Chen was associate professor, Department of Fragrance and Cosmetic Science, College of Pharmacy, Kaohsiung Medical University, Kaohsiung, Taiwan. He is doing PhD in School of pharmacy, College of Pharmacy, Kaohsiung Medical University, Kaohsiung, Taiwan. His research interest includes cosmetic analysis, pharmaceutical and biomedical analysis, clinical DNA examination, capillary electrophoresis

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Mahipal et al., Insights in Analytical Electrochemistry, 3:2
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Surfactant self-aggregation within deep eutectic solvents

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Deep eutectic solvents (DESs) have shown tremendous promise as green solvents with low toxicity and cost. We present the first clear lines of evidence for self-aggregation of an anionic surfactant (SDS) within a DES (Reline) containing a small fraction of water. Significant enhancement in the solubility of organic solvents that are otherwise not miscible in choline chloride-based DESs is achieved within reline in the presence of SDS. The remarkably improved solubility of cyclohexane within SDS-added reline is attributed to the presence of spontaneously-formed cyclohexane-in-reline microemulsions by SDS. Self-aggregation of cationic surfactants of the n-alkyltrimethylammonium family within an archetypical deep eutectic solvent comprised of a 1:2 molar mixture of choline chloride and glycerol (glyceline). Estimated thermodynamic parameters suggest this self-aggregation process to be less entropically driven than that in water. These novel water-free self-assemblies might serve as dynamic soft templates to direct the growth of size- or shape-tailored nanoparticles within water-restricted media under ambient conditions. Surface tension, electrical conductivity, dynamic light scattering (DLS), small-angle X-ray scattering (SAXS), transmission electron microscopy, density and dynamic viscosity measurements along with responses from fluorescence dipolarity and microfluidity probes pyrene and 1,3-bis-(1-pyrenyl) propane, respectively, are employed to characterize these aggregates.

Biography

Mahipal has received his B.Sc. and M.Sc. (Chemistry) degree from Maharshi Dayanand University, Rohtak, India, in 2009 and 2011 respectively. He joined Department of Chemistry, Indian Institute of Technology Delhi, in 2012 as a research scholar. His research interests include Investigation of Molecular Aggregation within Ionic Liquids and Deep Eutectic Solvents. He has 5 publications in international peer reviewed journals and 7 international conferences/symposia on his credit.

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Rodrigo V Rodrigues et al., Insights in Analytical Electrochemistry, 3:2
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Photoluminescence properties and thermal investigation by TG-MS of $RE(DAS)_3 \cdot xH_2O$, [RE = Eu^{3+}, Tb^{3+}]

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The complex rare earth diphenyl-4-amine sulfonate $RE(DAS)_3 \cdot xH_2O$ RE = [Eu^{3+}, Tb^{3+}] were synthesized by precursor method and characterization by photoluminescence (PL), FTIR, TG-MS, DRX and SEM. The luminescence spectra of $Eu(DAS)_3 \cdot 7H_2O$ and $Tb(DAS)_3 \cdot 2H_2O$ complexes were measured at room temperature, and the thermoanalytical study was performed in dynamic air atmosphere, using TG-MS technique. The thermal investigation shows that in dynamic air atmosphere, the oxysulfates $Eu_2O_2SO_4$ and $Tb_2O_2SO_4$ were obtained at approximately 973 K from the thermal decomposition of $Eu(DAS)_3 \cdot 7H_2O$ and $Tb(DAS)_3 \cdot 2H_2O$ complexes, respectively. The PL of $Eu(DAS)_3 \cdot 7H_2O$ show emission spectrum with groups of narrow emission bands assigned to the 5D0→7FJ transitions (where J = 0−4), dominated by the abnormal high intensity $5D0 \rightarrow 7F_4$ one (685.2 and 692.8 nm), while the emission spectrum of $Tb(DAS)_3 \cdot 2H_2O$ complex shows narrow emission peaks with the most intense one at 545.4 nm due to $5D_4 \rightarrow 7F_5$ transition. In this currently work, the FTIR, DRX, MEV, thermal investigation TG/DTG/MS and photoluminescent properties was applied in the characterization and study of $RE(DAS)_3 \cdot H_2O$ RE = [Eu^{3+}, Tb^{3+}] complexes.

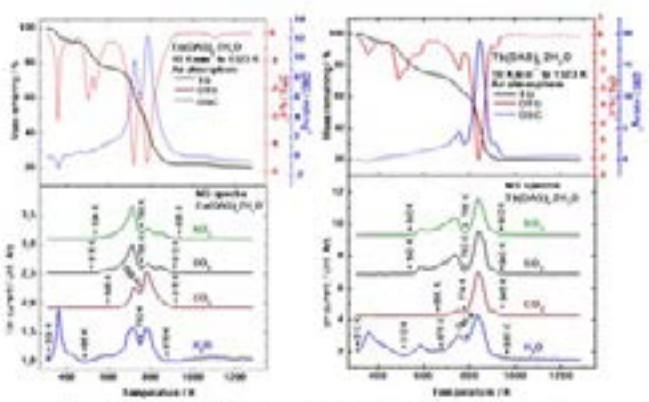

Figure 1 - TG/DTG/DSC curves and MS spectra of a) $Eu(DAS)_3 \cdot 7H_2O$ and b) $Tb(DAS)_3 \cdot 2H_2O$ complexes

Biography

Rodrigo Rodrigues It develops materials using the TG/DTG/DSC Thermal Analysis Techniques and TG/MS in the part of obtaining and characterizing the application of thermogravimetry to obtain nanomaterials and luminescent materials, studying kinetic methods (Ozawa) in determining the time of life of compounds. And in the study of photoluminescence applications of the excitation and emission spectra of the luminescence of rare earth elements RE. Has work with colaborations of São Paulo University USP – Brazil, Turku University – Finland and Institute of Low Temperature of Wroclaw – INTIBS – Poland

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Steven Janvier et al., Insights in Analytical Electrochemistry, 3:2
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Identification and quantification of illegal peptide drugs via HILIC-DAD-MS

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Biopharmaceuticals have established themselves as highly efficient medicines, and are still one of the fastest growing parts of the health-product industry. Unfortunately, the introduction of these promising new drugs went hand in hand with the creation of a black market for illegal and counterfeit biotechnology drugs. Particularly popular are the lyophilised peptides with a molecular weight of less than 5 kDa. Most of them are meant for subcutaneous injection and are easily accessible via the internet. In recent years, different methods based on Reversed Phase Liquid Chromatography (RPLC) have been developed to detect and quantify these peptides. The emerging of more polar peptides however requires the introduction of other separation techniques. Therefore, we set out to develop and validate an analytical method based on Hydrophilic Interaction Liquid Chromatography (HILIC) to identify and quantify the most frequently encountered illegal peptides on the European market. For this objective, five different HILIC columns were selected and screened for their chromatographic performance. Among those columns, the ZIC HILIC column showed the best performance under the tested screening conditions in terms of resolution and symmetry factor for the targeted peptide set. Hence, the operational conditions were further optimised for the identification of illegal preparations via Mass Spectrometry (MS) and quantification via UV. Validation was performed via accuracy profiles based on the ISO 17025 guideline. The obtained validated HILIC-method allows for the detection and quantification of the most frequently encountered illegal peptides on the internet in a total run time of 35 minutes including post gradient equilibration and online cleaning step. Combined with a previously developed RPLC-method, the ZIC HILIC system allows for the detection and quantification of a wide spectrum of illicit peptide drugs available on the internet. Furthermore, the developed method could also be envisaged for the detection of new emerging polar peptide drugs.

Biography

Steven Janvier was a PhD-student in pharmaceutical sciences; subject: quality and risk assessment of illegal biopharmaceuticals and he done Master in bio-engineering. He Published articles in Analysis of illegal peptide drugs via HILIC-DAD-MS.

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Youngsam Kim et al., Insights in Analytical Electrochemistry, 3:2
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The role of the organoselenium in small molecular probe for detection of biologically important analytes

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Organoselenium molecular probes show great promise in the detection of deleterious/essential biological analytes such as reactive oxygen species (ROS) and biothiols in living biological systems. These biological species are thought to play important roles for normal physiological processes; an overproduction or deficiency of them can be indicative of cancer, neurodegenerative disease disorders such as Alzheimer's and Parkinson's disease. ROS play an important role in many biological systems such as apoptosis, gene expression and activation of cell signalling cascades. When cells produce ROS beyond its antioxidant capacity, damage to lipids, proteins, and DNA may occur. It is a major cause of cellular damage and cell death resulting in/suspected in many disorders, e.g. cancers, neurodegenerative diseases and cardiovascular diseases. Biothiols, such as cysteine (Cys), homocysteine (Hcy) and glutathione (GSH), play crucial roles in biological systems. GSH, an enzymatic antioxidant, is the most abundant intracellular biothiol, composed of Cys, glutamine and glycine. GSH plays a central role in protecting the cell from oxidative damage and in maintaining biological homeostasis which plays a significant role in cell growth and function among other biothiols (e.g. Cys, and Hcy). Although GSH is concentrated in the liver, it protects the whole body from various toxins produced by the body itself as a result of normal metabolic processes and exposure to external toxins such as environmental agents, harmful and illicit drugs, etc. Abnormal levels of GSH lead to oxidative stress responsible for, or observed in, premature aging and other conditions such as Alzheimer's disease (AD), Parkinson disease (PD), cancer, cystic fibrosis, AIDS, osteoporosis, cardiovascular disease and sickle cell anemia. Hence, selective determination of these species is required for a better understanding of their role in biological systems and in early diagnosis of disease. The task of preparing next generation probes is found at the synthetic laboratory bench. The details of synthesis, screening, biological studies and general application of phenyl selenium-based small molecular probe will be discussed in this presentation.

Biography

Youngsam Kim is presently studying Ph.D. coursework at KAIST under supervision of Professor David G. Churchill. He has obtained a bachelor's degree in Chemistry from Kyung Hee University. While an undergraduate, he worked in the "Organic catalyst and Synthesis Laboratory" as a research student

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Yoon Jae Cho et al., Insights in Analytical Electrochemistry, 3:2
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Determination of 27 phenolic compounds in human urine by LC-MS/MS with online SPE system

Yoon Jae Cho, In Kyung Bae, Dahyun Jeong, Min Jeong Jo, Seul Gi Lee, Myungsil Hwang and **Yong Eui Koo**
National Institute of Food and Drug Safety Evaluation, South Korea

Several phenolic compounds exposed to us in daily life are toxic. Xenobiotic substances are classified as endocrine disruptors with negative effect on the hormonal system. To assess the content of exposure to these chemicals in human, the accurate and efficient monitoring of extent of contaminants is desirable. This study describes a simple and sensitive analytical method for 27 phenolic compounds and their metabolites including bisphenol-F and bisphenol–S using high-performance liquid chromatography tandem mass spectrometry coupled with online solid phase extraction (online SPE) system. Particularly, bisphenol-F and bisphenol–S are alternatives to bisphenol-A as a raw material of plastic. This study will show the simplicity and validation result of this method which is being able to efficiently analyze a large number of human urine samples to assess the human exposure to phenolic compounds.

Biography

Yoon Jae Cho completed PhD from Pusan National University, Korea. He is the Scientific Officer of Ministry of Food and Drug Safety, Korea. He has been working in the field of development of analytical method for veterinary drug residues in livestock and fishery products using LC-MS/MS for the past five years, and he is currently involved in field of human biomonitoring for hazard assessment of harmful substances.

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Hsiu-Chuan Chou et al., Insights in Analytical Electrochemistry, 3:2
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Proteomic survey of metabolic pathways in xylose-fermenting yeasts *Scheffersomyces stipitis*

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It is generally regarded that international energy shortages cause energy prices continuing to rise further, that the production of bio-ethanol is indispensable. In the past, glucose was used to produce biofuel. However, it is controversy over using food crops to produce fuel because most alcoholic fermentation of glucose is often obtained from sugar cane, corn and other food crops. Fortunately, the second most abundant sugar, xylose, can be utilized to generate ethanol as well. Moreover, xylose can be obtained from lignocellulosic biomass, which is in the form of forestry, agricultural, and agro-industrial wastes, such as rice rods and other plant fibers. As shown in literatures, *Scheffersomyces stipitis* is most suitable for fermenting xylose in microaerobic environment, whereas *Scheffersomyces stipitis* mutant LC11S02 collected in outdoors is most suitable for fermenting xylose in anaerobic environment. Interestingly, after mutations induced by NTG (N-methyl-N-nitro-N-nitrosoguanidine) for 30 minutes, a yeast strain LC321, similar to wild-type *Scheffersomyces stipitis* that is able to produce a high level of ethanol under microaerobic condition, was selected from mutated 483 strains. Furthermore, protein expression profiles were distinguished among wild-mutant (LC11S02), chemical-mutant (LC321) and standard strain (BCRC21775) by means of two dimensional differential gel electrophoresis (2D-DIGE) and matrix-assisted laser desorption/ionization time-of-flight mass spectrometry (MALDI-TOF MS). Our results revealed 108 identified proteins that are associated with metabolic pathways in xylose-fermenting yeasts. Taken together, this study has the potential to provide new insights for biofuel production by efficient xylose utilization from plant biomass.

Key words: alcoholic fermentation, xylose, Scheffersomyces stipitis, proteomics

Biography

Hsiu-Chuan Chou is a Professor at National Tsing Hua University in Taiwan since 2016. she received her PhD degree from King's College, University of London in 2005. Her group focuses on studying immune cell migration, podosomes dynamics as well as proteomic approaches for the phenotypic hallmark traits and cellular signaling pathways in targeting toxic effect of environment and drug resistance of cancer treatment.

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Lamivudine-poly-E-caprolactone conjugate based particles for targeted drug delivery, synthesis and characterization

Tomasz Urbaniak and **Witold Musial**
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Poly-E-caprolactone (PCL) is biodegradable, nontoxic polyester synthesized mainly in ring-opening polymerization (ROP) of E-caprolactone (CL). PCL alone or in blends was utilized in numerous medical applications, such as scaffolds, implants, nano- and micro- drug carriers. It is characterized by slow degradation of polyester chains in hydrolytic mechanism. Lamivudine (LV), as well as other antiretroviral drugs used in HIV-1 treatment, targets infected immune system cells, mainly CD4+ T helper cells. However, other infected cells like macrophages, monocytes, dendritic cells are found through whole body, including lungs and central nervous system. This cells halflife, measured in weeks/years, is dramatically longer in comparison to CD4+ T helper cells, which is counted in hours/days. Such cells are often recognized as reservoirs of retroviruses, especially these which are found in sites hardly available for drug substances, so called "sanctuaries". The aim of this study was to design a process of poly-E-caprolactone-lamivudine conjugate (PCL-LV) synthesis, and forming it into microspheres. Due to extremely slow hydrolytic degradation, phagocytosis would be main mechanism of intravenously administered particles clearance. Suggested mechanism of ROP includes formation of bond between initiator and polymer backbone. Drug bound covalently to oligomeric chain would not be released from polymeric matrix in to plasma, therefore whole administered dose would eventually achieve phagocytic cells, i.e., HIV-1 infected macrophages, monocytes or dendritics cells. Conjugate structure was confirmed by the proton nuclear magnetic resonance and electro-spray ionization time of flight mass spectroscopy. Further stage of study included microsphere forming in a variant of solvent evaporation method. Shape and size of obtained particles was determined by scanning electron microscopy, light microscopy and dynamic light scattering. Average molecular weight of obtained polymers was 5400 Da, size of prepared particles varied from nanometric to micrometric dimensions.

Biography

Tomasz Urbaniak is a Pharmacist and Research Assistant in Physical Chemistry Department of Faculty of Pharmacy, Wroclaw Medical University. His activity includes evaluation of polymerization methods, structural analysis of polymeric materials on molecular and bulk level, and examination of drug release from nanometric and micrometric particles. Also, utilization of quantum chemistry calculations in the field of pharmaceutical science is in scope of his interests. Interdisciplinary approach is the way he thinks and acts in his work.

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Tolerogenicity, anti-melanogenicity and anti-tyrosinase effects of sericin on melanocyte and dendritic cells: A possibility to alleviate post inflammatory hyperpigmentation

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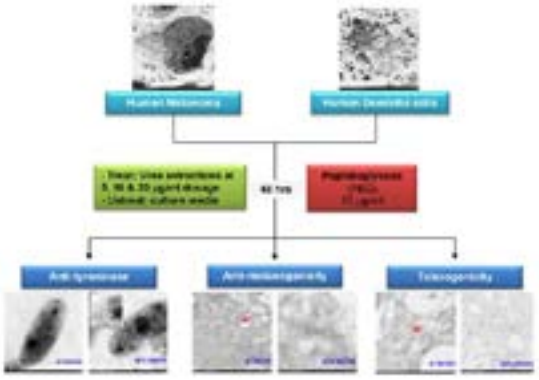
Sericin has been conducted to characterize its immunomodulatory effects especially anti pro-inflammatory activities for decades. In addition, it is also well known that hyperpigmentation disorders such as post inflammatory hyperpigmentation (PIH) and melanoma, are a major concern not only in white skin type people, but also raises in darker skin type of Asian population. Although there are many types of therapeutic products, more effective treatments still need to be evolved. The important modulators of epidermal innate immune responses are melanocytes and dendritic cells (DCs), which composed of induction, regulation, and maintenance of inflammatory responses on skin. However, the immunomodulatic role of sericin on melanocytes and DCs relate to therapeutic effect of hyperpigmentation disorders has not been well established. Moreover, sericin composes of the anti-tyrosinase property. Although the most prominent target for inhibitors of hyperpigmentation is tyrosinase, unfortunately, a little is known about its anti-melanogenic property and clinical efficacy. In this study, we conducted *in vitro* model and electron microscopic studies (immune-gold labeling) to determine (i) the tolerogenic effect sericin on melanocytes and DCs indicated by the level of IL-10 and transforming growth factor (TGF)-ß, (ii) the anti-melanogenic property of sericin characterized by tumor progressive marker (Mtif) and (iii) the anti-tyrosinase effect of sericin using tyroninase marker. The results showed that sericin (at leat 5 µg/ml) composed of tolerogenicity, anti-tyroninase and anti-melanogenicity effects on melanocytes and DCs as demonstrated by the up-regulation of IL-10 and TGF- ß in association with the down-regulation of tyrosinase and Mtif, respectively. This study provides the understanding of immunomodulatic role of silk sericin on melanocytes and DCs underlying hyperpigmentation disorders lead to the applications allowing affected people to have a better quality of life and their guidelines for therapeutic approaches.



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Biography

Supamas Napavichayanun is a PhD student, Faculty of Pharmaceutical Sciences, Chulalongkorn University, Thailand. She earned a BSc from Faculty of Pharmaceutical Sciences, Chulalongkorn University in 2010. Her research experience has ranged from protein including silk proteins and biomaterials. She also did clinical researches in the area of dermatology especially materials for wound healing application.

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Kampanart Huanbutta et al., Insights in Analytical Electrochemistry, 3:2
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Development and characterization of seed gums from Cassia fistula as disintegrating agent for fast disintegrating Thai cordial tablet

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Crude seed gum and their carboxymethyl derivatives from Cassia fistula seed was developed and characterized to apply as the pharmaceutical disintegrant in fast disintegrating Thai cordial tablet. The chemical structure of crude gum was chemically modified via carboxymethylation. Degree of substitution (DS) of carboxymethylated gums was determined. Carboxymethylated gums with minimum and maximum DS values were chosen for further application. IR absorption spectra of gum samples were observed to verify their chemical structure changes. In physical properties, the intrinsic viscosity and swelling property of all gum samples were evaluated. The results showed that carboxymethylated gums had higher intrinsic viscosity than those of crude gum. Moreover, they could swell and be soluble in cold water better than those of crude gums. In conclusion, the modified gums from both plants could provide higher hardness and be better used than that crude gums for fast disintegrating Thai cordial tablet. However, this is a preliminary assessment to expressing pharmaceutical application possibility of these gums as disintegrants, diluents and drug release controlling agents.

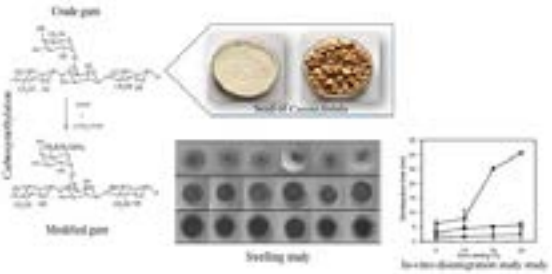

Figure 1. Gum modification method and physical evaluation the prepared tablet

Biography

Kampanart Huanbutta has his expertise in drug delivery system and application of polymer in pharmaceutical dosage forms. He graduated from Faculty of Pharmacy, Silpakorn University, Thailand. After that, he received Postdoctoral Scholarship from Erasmus Mundus to conduct research concerning anticancer drug delivery system in University of Porto, Portugal. Now he is working at Faculty of Pharmaceutical Sciences, Burapha University as an Assistant Dean for academic affair and post-graduation study. He also works as Secretary General of Pharmaceutical Association of Thailand under Royal Patronage. He has published research and review articles in international journals for more than 20 articles.

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Notes:

M Planque et al., Insights in Analytical Electrochemistry, 3:2
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Sensitive detection of allergens in incurred and complex foodstuffs

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Food allergy is a major public health problem and implies a mandatory labelling of food allergens. However, the undeclared putative presence of these allergens in food products is still widespread.

A UHPLC-MS/MS method will be presented, with the ultimate goal of improving the food labeling. Milk, egg, soybean and peanut were incurred and processed in chocolate, ice cream sauce and cookies.

The selected and optimized sample protocol consists in the extraction of food proteins in the targeted matrices, followed by a trypsin digestion, a clean-up and finally an UHPLC-MS/MS analysis. To determine the sensitivity of this method, a single and common LOQ, based on a signal to noise ratio of 10, were defined in the studied matrices. This routine method, running within a day, used a single protocol for the detection of 10 allergens. To the best of our knowledge, to date this method is still the most sensitive one for the detection of allergens by mass spectrometry in processed food products. We obtained a limit of quantification (LOQ), defined by a signal to noise ratio higher than 10, of: 0.5 mg of milk proteins, 2.5 mg of peanut, cashew, hazelnut and pistachio, 3 mg of egg proteins, and 5 mg of soy, almond, walnut and pecan proteins per kg of incurred foodstuffs.

Mélanie Planque, holder of a master degree in chemistry, started a PhD in 2014 at CER Groupe (Health department) and at the University of Namur in Belgium. She is working on the sensitive detection of allergens by ultra-high performance liquid chromatography coupled to tandem mass spectrometry.

Recent Publications:

1. Planque M, Arnould T, Dieu M, Delahaut P, Renard P, Gillard N. Advances in ultra-high performance liquid chromatography coupled to tandem mass spectrometry for sensitive detection of several food allergens in complex and processed foodstuffs. Journal of Chromatography A. 2016;1464:115–23.
2. Planque M, Wallace A, Gillard N. [APPLICATION NOTE] Targeted and Sensitive Detection of Food Allergens in Complex and Processed Foodstuffs Using UPLC-MS / MS [APPLICATION NOTE]. 2016;1–6.
3. Planque M, Arnould T, Renard P, Delahaut P, Dieu M, Gillard N. Highlight on Bottlenecks in Food Allergen Analysis: Detection and Quantification by Mass Spectrometry. Journal of AOAC International [Internet]. 2017 [cited 2017 Mar 15]; Available from: http://www.ingentaconnect.com/content/10.5740/jaoacint.17-0005

Biography

M Planque holds a Master's degree in Chemistry. She started her PhD in 2014 at CER Groupe (Health Department) and at the University of Namur in Belgium. She is currently working on the sensitive detection of allergens by ultra-high-performance liquid chromatography coupled to tandem mass spectrometry.

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Gellan hydrogel and its modification as a diagnostic and cleaning tool for paper artworks: A case study

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Wet cleaning of ancient papers is one of the most delicate and important steps in a conservation treatment. It allows the improvement of the optical qualities the removal of pollution, and the partial dissolution of organic substances resulting from cellulose degradation

In this contest, a new wet cleaning technique based on the use of a rigid hydrogel of Gellan gum has been recently developed. This gel is able to gradually release the water contained within their polymer network, also to absorb the water-soluble degradation products present on paper. This compound is rigid and therefore its application and removal are fairly simple not leaving residues on the paper surface after treatment. Moreover, it could be easily combined with selective electrochemical biosensors, suitable to monitor the cleaning process. In this way, the cleaning time could be optimized, minimizing time costs and unnecessary treatments.

Here we report the results obtained by applying the proposed system to the "Breviarium Romanum ad usum Fratum Minorum", of 18th century, highlighting the advantage and the potentiality of this new tool with respect to the traditional old paper cleaning methodologies. We also used Gellan gel as a carrier of a tuned cleaning agent, that is the enzyme proteinase K to remove animal glue from the cover of the Breviary respectively. In this system, the enzyme works as selective cleaning agent, hydrolyzing not easily removable glues into smaller fragments soluble into the gel, which, in turn, plays the role of support and removal matrix for the enzymatic products.To assess the validity of this approach, several invasive and not invasive techniques, such as, fluorescence microscopy, SEM, FTIR-ATR, HPLC have been used.

Biography

Academic career 2014-until now: Associate Professor in Analytical Chemistry at the Department of Chemical Science and Technologies of the University of Rome "Tor Vergata"; 2002-2014: Senior Researcher in Analytical Chemistry; 1999: PhD Fellowship at the School of Chemical Sciences of Dublin City University (Ireland); 1998-2001: PhD in Chemistry Science; 1997: Master degree 110/110 cum laude in Industrial Chemistry Research. Her research activity is focalized on the study and development of disposable electrochemical tools for seafood toxins, development of immunosensors and interference-free biosensors based on screen printed electrodes (SPEs) in the field of environmental, cultural heritage, clinical and food analysis, using for their validation spectrophotometric and chromatographic methods. She has been involved in the She collaborates from 2006 until now with the Department of CEMIS-OULU of the University of Oulu. She received People-exchange-Marie Curie International Research Staff Exchange Scheme IRSES-PEOPLE-2008 at the School of Chemistry University of Melbourne (Australia). Her research work had been presented at several national and international scientific meetings. 7 chapters on international books, 38 on international scientific papers, 12 proceedings.

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A flow-inection immunoassay for saxitoxin determination in sea water

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One of the most lethal non-protein toxins (LD50 9 µg Kg-1) is Saxitoxin (STX). It is the only marine natural product that has been declared chemical weapon. Contamination of shellfish with STX has been associated with harmful algal blooms throughout the world. STX has the ability to bioaccumulate up trophic levels. Ingestion of infected marine organisms, by humans, induces a lethal disease known as Paralytic Shellfish Poisoning (PSP) that is currently without antidote or detoxification pathway. This family of toxins acts blocking the sodium channels on cells and cause very serious symptoms varying from a slight tingling sensation to fatal respiratory paralysis. The maximum tolerance levels, as established by the European Union and according with the Food and Drug Administration, refer to 40 - 80 µg PSP x 100 g edible portion of fresh, frozen or tinned shellfish.

Presently, laborious and expensive mouse assay and HPLC methods are used to detect the presence of STX in fish [3]. The goal of this work is based on a flow injection immunoassay system (FI-IA) with colorimetric detection. The method consists in an off-line incubation of the sample containing STX (Ag) with fixed amounts of anti-STX antibody (Ab) and STX labelled with peroxidase (Ag*) until the equilibrium is established. In this mixture, a competition between Ag and Ag* for the Ab occurs. The mixture is then injected into a flow system where the separation of the free Ag* and the antibody-bound tracer (AbAg*) is performed in a column with immobilized protein G. In the column all the antibodies due to the protein G affinity for the constant (Fc) of the antibody are retained. The activity of the enzyme labelled Ag* is measured spectrofotometrically using the TMB substrate (ready to use). The immunoanalytical system was optimised, characterised and tested in sea water.

Biography

Laura Micheli was a Associate Professor in Analytical Chemistry at the University of Rome Tor Vergata; 2002-2014: Senior Researcher in Analytical Chemistry; 1999: PhD Fellowship at the School of Chemical Sciences of Dublin City University (Ireland); 1998-2001: PhD in Chemistry Science; 1997: Master degree 110/110 cum laude in Industrial Chemistry. Research. Her research activity is focalized on the study and development of disposable electrochemical tools for seafood toxins, development of immunosensors and interference-free biosensors based on screen printed electrodes (SPEs) in the field of environmental, cultural heritage, clinical and food analysis, using for their validation spectrophotometric and chromatographic methods. She has been involved in the She collaborates from 2006 until now with the Department of CEMIS-OULU of the University of Oulu. She received People-exchange-Marie Curie International Research Staff Exchange Scheme IRSES-PEOPLE-2008 at the School of Chemistry University of Melbourne (Australia). Her research work had been presented at several national and international scientific meetings. 7 chapters on international books, 38 on international scientific papers, 12 proceedings.

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Accepted Abstracts

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Chemical constituents of the aerial parts of *Ducrosia* ismaelis

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Ducrosia species belong to the *Apiaceae* family, the members of which typically contain unusual and/or unique phytochemicals, especially coumarins. In traditional medicine, various *Ducrosia* species are used as analgesics, pain relievers and cold treatments. Antimicrobial, antimycobacterial, antifungal, central nervous system depressant, and antianxiety effects have been reported for several *Ducrosia* species, including *D. anethifolia* and *D. ismaelis. D. ismaelis* Asch. (commonly known as Haza or Geshea) is a perennial, herbaceous, and branched plant with a characteristic aromatic odor. The whole herb, especially its aerial parts, has been used in traditional medicines to treat skin infections and to repel insects and reptiles. A new pterocarpan glycoside, glycinol-3-O-β-D-glucopyranoside (1), and a new dihydrochalcone glycoside, ismaeloside A (2), were isolated together with 10 known compounds, including several flavonoids (3–8), lignans, and phenolic compounds (9-12), from the methanol extract of the aerial parts of *Ducrosia* ismaelis. The chemical structures of these compounds were elucidated from spectroscopic data (ESI-MS, HR-ESI-MS, 1D, 2D-NMR, UV. and FT-IR) and by comparison of these data with previously published results. The anti-osteoporotic and antioxidant activities of the isolated compounds were assessed using tartrate-resistant acid phosphatase (TRAP), oxygen radical absorbance capacity (ORAC), and reducing capacity assays. Compound 12 exhibited a dose-dependent inhibition of osteoclastic TRAP activity with a TRAP value of 86.05±6.55% of the control at a concentration of 10 μM. Compounds 1, 3-5, and 8 showed potent peroxyl radical-scavenging capacities with ORAC values of 22.79±0.90, 25.57±0.49, 20.41±0.63, 26.55±0.42, and 24.83±0.12 μM Trolox equivalents (TE) at 10 μM, respectively. All the compounds were isolated for the first time from a *Ducrosia* species.

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Biologics delivery across the blood brain barrier

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There are approximately 400 known neural disorders, some of which being due to a disruption or failure (breakdown, opening, damage) of the blood brain barrier (BBB), while other disorders may still be due to unknown effects on it. Examples include: meningitis (an inflammation of the meninges or membranes surrounding the brain and spinal cord); epilepsy (chronic or acute seizures caused by inflammation); multiple sclerosis (MS - a disease of the immune system or/and the breaking down of the BBB in a section of the brain or spinal cord); Alzheimer disease (AD - a disease in which amyloid beta contained in blood plasma enter the brain and adhere to the surface of astrocytes); possibly prion and prion-like diseases such as Parkinson disease (PD) and AD; HIV encephalitis (a precursor of HIV-associated dementia in which latent HIV can cross the BBB inside circulating monocytes in the blood stream); and systemic inflammation (sterile or infectious) that may lead to effects on the brain, cause sickness behavior and induce or/and accelerate brain diseases such as MS and PD. Of interest, here are those disorders requiring treatment by delivery of biologics across the BBB, more particularly, glioblastomas. It is therefore of utmost importance to grasp the difficulties encountered when attempting to deliver biologics at the right brain locations and at the right time-dose fractionations. I will first briefly review the brain diseases, particularly cerebral glioblastomas, and describe how immune cells can deliver cancer drugs to the brain. Neutrophils loaded with the chemotherapy drug paclitaxel (a cationic liposome) can traverse the BBB and kill residual cancer cells after tumor-resection surgery and slow the growth of new tumors (as demonstrated in mice). I will also discuss the capabilities of the method, its advantages and limitations.

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Geochemistry of plio-quaternary alkali basalts from Kozdağ (Muş) district, Bitlis Zagros Suture (BZS) zone, SE Anatolia, Turkey

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Plio-quaternary alkaline basalts from Kozdag (western Mus) district, SE Anatolia, erupted at the collision-related Arabian-Anatolian plate boundary, in front of the Bitlis-Zagros Suture (BZS) zone. The lavas are made up by olivine, plagioclase, clinopyroxene and opaque Fe–Ti oxides. Geochemically, they exhibit a range of SiO_2 (47.15 to 50.29 wt %) and MgO (2.7 to 7.03 wt %), and are relatively enriched in TiO_2 (1.88 to 3.11 wt %), Na2O (3.5–4.0 wt.%), and resemble those of alkaline basalts from other plio-quaternary BZS zone (e.g. Nemrut, Solhan and Varto districts) and Karacalidag district (the foreland of Arabian plate). Cr (0.002-0.019 wt.%) and Ni (10-77 ppm) contents are moderate in composition. Trace element variations also clearly demonstrate that there is a distinct geochemical variation for Kozdağ basalts [e.g. HFSE depletion in Nb (6.7-27.8 ppm), and Ta (0.5-1.9 ppm), and enrichment in Zr (163-355 ppm), Y (31-63 ppm), moderately Th (1.2-6.5 ppm) and LILE enrichment in Ba (100-227 ppm) and Sr (412-518 ppm)]. These compositions, resembling to those of Karacalidag foreland Arabian plate basalts, reflect strong affinities to enriched continental lithospheric mantle, rather than lower crust assimilated asthenosphere. Despite the previous models proposed, the absence of lithospheric mantle beneath the eastern Anatolia continent, our data do not confirm it, and on the contrary suggest the presence of (probably metasomatised) lithospheric mantle beneath the region. It is suggested that Kozdağ (Muş) basaltic magma, from BZS zone, were probably derived from the small degree partial melting of (probably amphibole-bearing) spinel peridotitic lithospheric mantle source interacting with asthenosphere, and metasomatised lithospheric mantle domains played a significant role on their genesis.

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Uncertainty contribution of the baseline noise effect during an HPLC-UV elution of four vitamer compounds

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The sensitivity of the HPLC instrument is strongly required to track the inadequacy of many of biological compounds in their native medium. However, this sensitivity is influenced at this level, by the chromatographic parameters variability, where the integration errors arising from the baseline noise constitute an important effect. In fact, noise blurs the base of a peak making it difficult to locate where it starts and ends and therefore where to measure the area. This effect was inspected, using experimental data, obtained on a simultaneous HPLC-UV elution of four vitamers compounds. Considering that the detection of the integration points in the elution zone of the compounds of interest, is randomly oriented by the shape of the baseline noise, it is thus possible to limit the surface, of the base of the corresponding Gaussian peak, to a simple geometrical form. This approximation allows the elaboration of a model for calculating the peak area dispersion, relating to this effect. Assuming in one hand, a noise magnitude comparable to the constructor given threshold (50 µV) and on the other hand, performing this calculation for peak area quantities, corresponding to the commonly existing natural content of the analytes of interest. Consequently, the uncertainty estimation during an isocratic elution, in two separated zones of the same chromatogram, shows that for low-content samples, the contribution of integration can reach (2.5% to 5%) and (2% to 10%) of the overall uncertainty budget, respectively, for the first and the last eluted compounds.

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Ethnopharmacological studies for sustainable development in Cameroon

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Aim of the study: Several diseases continue to affect strongly the populations' health in Africa. Meanwhile Ethnopharmacology, a scientific interdisciplinary study of natural substances and related knowledges or practices that cultural groups implement for therapeutic, curative, preventive or diagnostic purposes, must be developed in the continent. Therefore sustainable development, a conception of common well being developed since the end of the 20th century can be effective by developing in Africa low-priced phytodrugs for consumption and exportation. The objectives of this study were to sustainably collect and document important cultural heritage before it is lost and to investigate and evaluate agents used to promote drug discovery in Cameroon.

Materials & Methods: To achieve these objectives we have used a methodology that begun by a field work, that started by harvesting and identifying plant species with confirmation in National Herbarium and the ethnopharmacological detailed preparation of recipes and ended by the research of previous studies on recorded plants.

Results: 43% of recorded plants is been documented for the treatment of diseases and investigated for their phytochemical and activities confirming of the rationalization of their traditional uses. Some plants are documented for the first time for their medical use, for example *Massularia acuminata* for hypertension, *Pentaclethra macropylla* for infectious diseases, *Hallea stipulosa* for difficult deliverance, *Guibourtia tessmannii* for diabetes, *Piliostigma rufescens* for dysentery, Carica papaya for cancer and *Solanum torvum* for gastric pains.

Conclusion: The results of this study stimulate a sustainable development by providing the basis for low cost drugs discovery and by documenting biodiversity for long time exploitation.

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The use of HPLC and capillary zone electrophoresis for the study of inorganic complexes in solution

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It is known that the chemistry of polyoxometalates (POM) as well as of polynuclear complexes (PNC) is one of the fastest growing areas of modern inorganic chemistry. These substances are widely used in many areas of modern science as catalysts, pharmacology and medicine, in the fields of micro- and nanotechnology. Frequently as a result of their synthesis, the composition of solid phase and solution are substantially different. The main problems of these compounds study is their instability in solution resulting in the presence of the different equilibrium chemical forms. On the other hand they demonstrate the different trends in the changing of their structure, depending on the medium conditions. There are a number of problems in the study of such compounds. Firstly, it is the presence of variety of chemical forms of indefinite composition presenting in solution; secondly, their limited stability which complicates the choice of separation conditions. Third, similarity in composition and structure of this type of complexes often appears in resembling UV-VIS absorption spectra, creating difficulties for identification. Finally, the lack of individual compounds also complicates the identification of speciation patterns. The observation of such processes requires special direct techniques and approaches, so the data interpretation is obstructed. In frame of the present work the separation possibilities of POM on the base of molybdenum, vanadium and phosphorus, and hydroxo-complexes of rhodium with the similar structure and composition using capillary electrophoresis (CE) and HPLC were estimated. The data obtained are in consistency with each other and in some cases confirmed using NMR spectroscopy. Thus, the approaches for the study of the mixtures formed in self-assembly reactions of POM and in the process of rhodium polynuclear forms generation were developed. It was shown that capillary electrophoresis and HPLC may be successfully applied for the study of the state of inorganic complexes in solution. However, the most appropriate approach for the study of these compounds is the use of complex of techniques such as HPLC, CE and spectroscopic methods such as NMR, et al. The use of two different modes of pre-capillary and in-capillary was also examined and compared. As a result the best-compromise conditions for the separation of the mixtures containing the reactants, intermediates and the reaction to achieve the best effectiveness, symmetry, and peak areas were optimized. It was shown that in-capillary mode is more informative than pre-capillary one for the study of the complex compounds formation process.

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PEGylation optimization and formulation development of pegvaliase drug product in prefilled syringe of PEG phenylalanine ammonia lyase (pegvaliase) for the treatment of phenylketonuria

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Phenylketonuria (PKU) is an inherited metabolic disease caused by a deficiency of the enzyme phenylalanine hydroxylase (PAH). This results in elevated, neurotoxic levels of phenylalanine (Phe) which can affect brain function, causing severe intellectual disability, behavioral abnormalities, delayed speech and seizures. However, lowering Phe levels can improve/reverse some of these symptoms. Current management options are limited to a medical diet and treatment with sapropterin, the synthetic form of tetrahydrobiopterin (BH4), the cofactor for PAH. Only patients with residual PAH activity may benefit from sapropterin treatment. Traditional enzyme replacement therapy with recombinant PAH has many obstacles. However, treating PKU patients by enzyme substitution therapy with an alternative, exogenous Phe-metabolizing enzyme such as phenylalanine ammonia lyase (PAL) is an option for adult PKU patients. Developing PAL as a therapeutic required overcoming immunogenicity, protein expression, stability and mode of delivery challenges. After extensive evaluation of PAL enzymes from multiple species, recombinant double mutant version of *Anabaena variabilis* (rAv) PAL which improved stability by reducing aggregation was selected for PEGylation to overcome immunogenicity. An optimal PEGylation ratio was found to be critical for rAvPAL-PEG (pegvaliase) efficacy. In addition, the rAvPAL substrate, L-Phe, and product, trans-cinnamate, stabilized pegvaliase for long-term storage at 2-8°C. The optimized pegvaliase formulation has been used in several clinical studies and has successfully lowered and maintained Phe levels in PKU patients. The need to improve the dosing administration procedures and end-user convenience drove the development of pegvaliase in a Pre-Filled Syringe (PFS) packaging system for Phase III clinical trials and commercial applications. This container closure system including all the components in PFS selected for the Phase III and commercial presentation of pegvaliase drug product (DP) is compatible with pegvaliase. PFS is a suitable primary packaging system for pegvaliase DP under the recommended storage conditions of 2-8°C.

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Modern techniques for monitoring flow units in the ignimbrite sequences from Central Anatolia (Turkey): μ-XRF, CRS and GPR methods

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Ignimbrites are deposits resulting from the eruption of volatile-rich silicic magma and represented the main lithology of pyroclastic products. They can be spread out to tens to thousand cubic kilometers during single or multiple eruptions. The widespread ignimbrite outcrops don't exhibit lateral changes, whereas vertical changes are not easily distinguishable. This may cause to identify the same ignimbrite series with different definition. The Central Anatolia of Turkey contains well-preserved volcanic structures and voluminous ignimbrite outcrops to test the new methods for determining their eruption histories. The well-welded Incesu ignimbrite has a wide distribution in the Central Anatolia. It is possible to identify three levels (Lower Level, Medium Level, Upper Level) separated by different color, texture, and structural features. LL shows blackish brown in color and glassy, strongly to very strongly welded, non-jointed, mostly massive structure. Well-welded ML is reddish pink in color, moderately to strongly welded, vertically fractured structure. ML has high amount of fiammes. UL of the ignimbrite has pale grey-pinkish gray in color, fine grained, poorly welded, friable and vertically jointed. It has high amount of pumice and rock fragments with different composition. The mineralogical composition of the Incesu ignimbrite is composed of plagioclase (oligoclase, andesine) + pyroxene (augite, enstatite) + opaque minerals and less amount of amphibole biotite and quartz. The Incesu ignimbrite has andesite/basaltic andesite composition and medium-high K calcalkaline, peraluminous nature. Its geochemical properties reflect subduction related magma derived from Ocean Island Basalt (OIB) like magma. Ground Penetration Radar (GPR) studies were carried out to support the geological and petrographically determined differences. The GPR is a new geophysical application and quite useful in the determination of lithological changes within the pyroclastic successions. In this study the processed data of GPR measurements show that the Incesu ignimbrite has composed of 3 different levels and each level has different electromagnetic properties (Figure 1). To provide a better understanding of color change within the Incesu ignimbrite, new research tools that combine μ-XRF and Confocal Raman Spectrometry (CRS) were utilized. The μ-XRF results demonstrated that there are a clear rapid increase of K and slightly Fe intensities within the matrix of the LL relatively to the ML (Figure 2). The high concentration of K and slight concentration of Fe may cause to change the color of the LL to dark brown-black. The CRS studies reveal that the matrix of the LL and ML was composed of anorthoclase and volcanic glass, respectively (Figure 3). As conclusion, Incesu ignimbrite composes of LL, ML and UL. This result is supported by geological and petrographical, GPR, μ-XRF and CRS studies. In addition, this study has presented successful applications of the optical microscopy, GPR, μ-XRF, CRS to the determination of vertical changing in ignimbrite flow unit.

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Nanostructured chitosan-based hydrogels for psoriasis: Rheological and drug release characterization

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Nanostructured hydrogels (NSH) provide many advantages for topical administration of drugs, as well as provide adequate viscosity and stability, they can prolong drug release into the skin. This work proposes the development of NSH based on chitosan containing 8-Methoxypsoralen (8-MOP) for topical treatment of vitiligo. Prior to NSH, nanoemulsions (NE) were formulated containing 5 wt% of clove essential oil as oil phase and 10 wt% of surfactant Pluronic F68 (NEC) and also containing 5 wt% of sweet fennel essential oil as oil phase and 3 wt% of the surfactant Cremophor® RH40 (NEF). Chitosan with low, medium and high molecular weight (MW) was used as hydrogel-forming polymer. NE were characterized for their morphology with atomic force microscopy, average droplet diameter and physical stability. NSH were characterized regarding their rheological behavior, physical stability and drug release properties. Results showed that stable NE were obtained with average droplet diameters of less than 100 nm. The rheological characterization showed that all developed NSH produced had shear thinning behavior as expected. NSH with high and medium MW were characterized as weak gels, while those consisting of low MW chitosan were essentially viscous systems. NSH consisting of sweet fennel oil and Cremophor RH40 (NHF) showed drug rapid release, apparently depending on MM chitosan, following the Korsmeyer-Peppas model with anomalous behavior of 8-MOP release. However, the NSH consisting of clove oil (NHC) showed the opposite behavior, with slow and sustained drug release for a period up to 6 hours following the Higuchi kinetic model. Drug release from NHC showed strong dependency on chitosan molecular weight. On the other hand, NHF showed an unexpected pH-dependent behavior not fully understood at the moment. These results need further investigation, nevertheless NSH revealed to be interesting and complex dermal delivery systems for poorly soluble drugs. From the results, it can be seen the complex interaction between the components of the formulation and how it affects drug release.

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Investigating the effect of binder type on the material and tableting properties of two novel co-processed excipients

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Background: The development of novel excipients for tablet formulation by co-processing forms the basis of this study.

Objective: The aim of the research was to investigate the effect of varying the binder type on the material and tableting properties of two novel co-processed excipients namely SGS and SMS.

Methodology: Co-processed excipients consisting of either tapioca starch (TS, 90%), gelatin (GEL, 7.5%) and colloidal silicon dioxide (CSD, 2.5%) or tapioca starch (TS, 90%), microcrystalline cellulose (MCC, 7.5%) and colloidal silicon dioxide (CSD, 2.5%) were prepared by a method of co-dispersion followed by drying using a fluidized bed dryer. Analytical characterization of SGS and SMS were carried out using scanning electron microscopy (SEM) and differential scanning calorimetry (DSC). Flow properties of SGS and SMS were assessed by measuring the parameters of angle of repose (AR), Carr's index (CI) and Hausner's ratio (HR). The compaction behaviour of SGS and SMS were evaluated using Heckel and Walker equations. Tablets containing ibuprofen were prepared by direct compression incorporating SGS and SMS as multifunctional excipients.

Findings: SEM images revealed a slightly irregular or angular shaped appearance of SGS particles with a folded surface while the SMS particles appeared spherical with rough surfaces. DSC curves for SGS and SMS showed a characteristic glass transition event occurring between 252.15°C – 262.49°C. The flow parameters of AR, CI and HR were consistent with good flowing powders. SMS particles deformed at a higher pressure (564.52 MPa) compared to SGS (419.82 MPa). Tableting properties demonstrated a significant difference at $p<0.05$ for tensile strength ($p=0.001$) and disintegration time ($p=0.000$) comparing SGS and SMS.

Conclusion: This study has shown that the type of binder used influenced the material and tableting properties of the co-processed excipient developed.

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Halloysite clay nanotubes as biocompatible multi-functional tablet compression excipient

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Statement of the Problem: There are wide varieties of nano scale materials that are being developed for drug delivery. Commercial use of some of these materials is limited by accelerated clearance and toxic side effects. We introduce natural aluminosilicate halloysite clay nanotubes as potential pharmaceutical tablet compression filler. This abundantly available, cheap and biocompatible tubule material has outer diameter 50±10 nm; inner lumen 10-15 nm; length of 700±300 nm. A number of researchers developed HNTs as a nanovehicle for the loading of drugs with 5-10 wt.% loading efficiency and release for 5-20 hours at a sustained rate. Halloysite being a non-biodegradable material cannot be used for intraperitoneal delivery and oral (tablets, capsules) and transdermal (cosmetics) delivery is a plausible approach.

Methodology & Theoretical Orientation: We demonstrated halloysite nanoclay as a dual purpose tablet filler i.e. vehicle for drug and compression excipient. Flow and compressibility properties such as Hausner ratio, Carr's index and brittle fracture index were determined as similar to the best industrial formulations. Nifedipine and paclitaxel were loaded at 6-8 wt. % capacity in unmodified halloysite lumen and incorporated in a 100 mg tablet formulation. Release studies were conducted in simulated gastric and intestinal fluids which allowed to employ pH 1-7 switch due to the tubes' PMMM coating.

Findings: Hausner ratio, Carr's index and BFI were 1.1, 13 and 0.08, correspondingly, and release studies demonstrated pH-switchable and sustained drugs' release for more than 20 hours, a tenfold increase compared to commercial formulations.

Conclusion & Significance: We introduced natural aluminosilicate halloysite clay nanotubes as a pharmaceutical tablet compression and demonstrated this nanoclay as a dual purpose tablet filler i.e. vehicle for extended drug release and tablet compression excipient.

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Role of alkaline magmatism in the formation of fluorite in Central Anatolia

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Fluorite generally has three different types of formation, in relation to the hydrothermal fluids of silica undersaturated alkaline magmatism in Central Anatolia. The reaction between fluorine rich fluids and calcium of carbonate rocks at the contact of alkaline rocks act in the formation of the fluorite in the region. Silica undersaturated intrusive can be used as an indications of fluorite occurrences in the explorations of these minerals in the region. Central Anatolia is the unique region where fluorite bearing silica undersaturated alkaline intrusives (foid bearing syenitic rocks) are widely observed. These rocks have outcrops near Kırşehir (Bayındır, Yeniyapan, İsahocalı, Alişar, Tatarilyas, Çökelik, Akçakent, Pöhrenk), Yozgat (Akdağmadeni, Cankılı, Tad Dere, Ortaköy, Akçakışla), Nevşehir (Genezin–İdişdağ), Kayseri (Özvatan) and Sivas (Yaylagözü) cities. Fluorites are formed in the form of lenses, fracture and vein fillings in relation to the hydrothermal fluids of silica undersaturated alkaline magmatism. Apart from these localities, Pöhrenk is the only locality where fluorites are observed as open space fillings within the carbonate rocks. The deposits around Kırşehir have lower homogenization temperatures and salinity values than the deposits around Yozgat and Sivas region. In accordance, the fluorite occurrences in Pöhrenk are sedimentary in nature whereas other deposits are hydrothermal and pegmatitic in nature. The geological, mineralogical and geochemical features of the alkaline rocks and the fluorite reveal that the fluorine rich fluids are generated from the late residual products of the alkaline magma and act with the Ca rich products forming the fluorite depositions within the host rock in Central Anatolia.

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Fluorite generally has three different types of formation, in relation to the hydrothermal fluids of silica under-saturated alkaline magmatism in Central Anatolia. The reaction between fluorine rich fluids and calcium of carbonate rocks at the contact of alkaline rocks act in the formation of the fluorite in the region. Silica undersaturated intrusives can be used as an indications of fluorite occurrences in the explorations of these minerals in the region. Central Anatolia is the unique region where fluorite bearing silica undersaturated alkaline intrusives (foid bearing syenitic rocks) are widely observed. These rocks have outcrops in the vicinity of Kırşehir (Bayındır, Yeniyapan, İsahocalı, Alişar, Tatarilyas, Çökelik, Akçakent, Pöhrenk), Yozgat (Akdağmadeni, Cankılı, Tad Dere, Ortaköy, Akçakışla), Nevşehir (Genezin–İdişdağ), Kayseri (Özvatan) and Sivas (Yaylagözü) cities. Fluorites are formed in the form of lenses, fracture and vein fillings in the relation to the hydrothermal fluids of silica undersaturated alkaline magmatism. A part from these localities, Pöhrenk is the only locality where fluorites are observed as open space fillings within the carbonate rocks. The deposits around Kırşehir have lower homogenization temperatures and salinity values than the deposits around Yozgat and Sivas region. In accordance, the fluorite occurrences in Pöhrenk are sedimentary in nature whereas other deposits are hydrothermal and pegmatitic in nature. The geological, mineralogical and geochemical features of the alkaline rocks and the fluorite reveal that the fluorine rich fluids are generated from the late residual products of the alkaline magma and act with the Ca rich products forming the fluorite depositions within the host rock in Central Anatolia.

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Formation of solid dispersions famotidine with HPMC E5LV and mannitol with co-grinding technique

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Solid dispersion have attracted considerable interest as an efficient means of improving the solubility and the dissolution rate of poorly water-soluble drug. The aim of this study was to prepare solid dispersions of famotidine with HPMC E5LV and mannitol as carrier to improve its sollubility and its dissolution rate. Co-grinding techniques by using ball milling was used. 18 formulas with 3 different ratio to HPMC and mannitol (1:1, 1:2, 2:1) and 3 different grinding time (30', 60', 90') were prepared. Characterization of solid dispersion was analyzed with Scanning Electron Microcopy analysis (SEM), X-ray diffraction, Fourier Transform Infrared (FTIR), Optilab Microscope Camera, solubility test and dissolution test. The solid state interaction of co-ground and physical mixture were evaluated by X-ray powder diffraction and SEM. The dissolution studies were conducted in USP type II apparatus. The result of X-ray powder diffraction analysis showed that the co-ground of famotidine with HPMC E5LV and mannitol decreased the drug crystallinity. X-ray powder diffraction showed the transformation of crystalline state of famotidine to amorphous by co-grinding with HPMC E5LV and mannitol. SEM results showed the co-ground mixture with HPMC E5LV had smaller size and co-ground mixture with mannitol showed agglomerate form. The highest in solubility and dissolution rate was observed for famotidine-HPMC E5LV showed in 1:1 ratio with 90' grinding time and famotidine-mannitol showed in 1:2 ratio with 30' grinding time compared to the intact famotidine and its physical mixture.

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Spherical crystals of celecoxib to improve solubility, dissolution rate and micromeritic properties

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Celecoxib spherical agglomerates were prepared with polyvinylpyrrolidone (PVP) using acetone, water and chloroform as solvent, non-solvent and bridging liquid, respectively. The agglomerates were characterized by differential scanning calorimetry (DSC), X-ray diffraction (XRD), IR spectroscopic studies and scanning electron microscopy (SEM). The IR spectroscopy and DSC results indicated the absence of any interactions between drug and additives. XRD studies showed a decrease in crystallinity in agglomerates. The crystals exhibited significantly improved micromeritic properties compared to pure drug. The loading efficiency (% or mg drug per 100 mg crystals) was in the range of 93.9±2.3 and 97.3±1.3% (n=3) with all formulations. The aqueous solubility and dissolution rate of the drug from crystals was significantly ($p<0.05$) increased (nearly two times). The solubility and *in vitro* drug release rates increased with an increase in PVP concentration (from 2.5 to 10%). The SEM studies showed that the crystal possesses a good spherical shape with smooth and regular surface.

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Formulation and evaluation of budesonide nanocapsules for colon targeted drug delivery

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Specific drug delivery to the colon is highly desirable for local treatment of a variety of bowel diseases such as ulcerative colitis, crohn's disease. The use of nanoparticular systems for the delivery of therapeutic agents in inflammatory diseases is receiving considerable attention for medical and pharmaceutical applications. In this study, the novel ex vivo model was developed to ensure the entrapment of nanocapsules in the inflamed areas. Budesonide was used as a model drug because of its therapeutic potential for Crohn's disease. The manufacture and the *in vitro* release characteristics of the nanocapsules were described; especially, the *in vivo* performance in rat was evaluated by examining myeloperoxidase (MPO) enzyme in the inflamed tissue and the histopathology scoring of the same. The particle size analysis of the nanocapsule showed particle size in the range between 480 nm to 780 nm. In this study we got the zeta-potential of all formulation less than 30 mV. The zeta potential value of optimized formulation was 41.2 mV. Percent EE of the nanocapsule dispersion was found to be in the range of 78% to 90%. The intestinal inverted sac method was used to evaluate the effect of nanocapsular budesonide on the entrapment of drug as compared to pure drug. The percent drug entrapped for nanocapsular budesonide and plain budesonide are 21.86±2.52 and 15.90±2.68 respectively. The concentration of drug remaining outside the tissue i.e. in the organ tube was also determined which represents the unentrapped drug and it was found to be 76.48±4.053 and 84.08±2.67 for nanocapsular budesonide and plain budesonide respectively. The SEM images of the surface of the spray dried powder surface showed that nanocapsules remained intact and no change in shape was detected after spray drying process. The study showed decrease in the activity of MPO in tissue is the sign of repair and healing of the tissue.

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Systematic metabolomic analysis of eicosanoids after omega-3 poly-unsaturated fatty acid supplementation by a high-specific LC-MS/MS–based method

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Omega-3 poly unsaturated fatty acids (PUFAs) have beneficial effects in many pathological processes, especially cardiovascular disease, and their protective eicosanoid metabolites are thought to play important roles. However, how omega-3 PUFAs affect the eicosanoid profile has not been elucidated comprehensively. Here, we systematically analyzed the eicosanoid metabolites induced by omega-3 PUFA supplementation. We developed an LC-MS/MS–based method covering 32 arachidonic acid (ARA) metabolites and 37 omega-3 PUFA-derived products. The limits of detection for eicosanoids were between 0.0625 and 1 pg and the detection specificity was optimized. We then quantified eicosanoids in mouse and human plasma and mouse aorta samples after omega-3 PUFA supplementation. Levels of EPA hydroxyl products, 4-HDoHE, 17,18-EEQ, 17,18-DiHETE, TXB2, and LXA4 were significantly changed in both mouse samples, and that of 2-series PGs, EDPs and DHA hydroxyl products were changed in aorta samples. Correlation network analysis of mouse plasma data revealed that some eicosanoids were more important than others after omega-3 PUFA induction. Eicosanoids in human plasma were profiled across 5-time points after omega-3 PUFA supplementation. Fuzzy c-mean clustering algorithm suggested that the time curves of eicosanoid activity could be described with 3 kinetic patterns: sustained upregulation, short-term upregulation and downregulation. This is the first systematic profiling of eicosanoids with omega-3 PUFA induction. The highly specific eicosanoid metabolomic and related data analysis methods would be powerful tools for comprehensive eicosanoid study.

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