

**New Trends on  
Sensing- Monitoring- Telediagnosis  
for Life Sciences**

**NT SMT-LS 2018**

**Abstract book**



**Aug. 30- Sept. 1, 2018  
Brasov, Romania**



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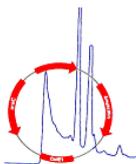
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## **PL.1. UNDERSTANDING AND MANAGING FOOD SAFETY RISKS**

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Over the past 20 years, we have seen the emergence of risk analysis as the basis for developing food security systems and policies. This period has witnessed a gradual shift from a "hazards-based approach" to food safety (ie, the mere presence of a hazard in a food was considered unsafe) to a "risk-based approach" (determination of if exposure to a hazard has a significant impact on public health). It is now common to see that industry, government and consumers are calling for the adoption of risk-based programs to manage the chemical, microbiological and physical risks associated with the production, processing, distribution, marketing and consumption of food. However, there is not always a clear understanding of what is involved in risk management or the consequences of developing risk management systems. Consequently, it is worth exploring some of the concepts and principles of food safety risk management that are emerging both nationally and internationally and are being used to establish risk management systems that are likely to dramatically transform the food security landscape in the next future.

Following the most internationally accepted criteria of the Food and Agriculture Organization of the United Nations (FAO), about the approaching to the management of public health hazards in food we will organize this conference. The approach used by WHO-FAO is called risk analysis, and is made up of three components:

- A. Risk assessment, which is the scientific evaluation of known or potential adverse health effects resulting from human exposure to foodborne hazards. The process consists of the application of four consecutive steps (Hazard identification; Hazard characterization; Exposure assessment; and Risk characterization).
- B. Risk management, which is the process of weighing policy alternatives to accept, minimize or reduce assessed risks and to select and implement appropriate options. It is also comprised by 4 components (Preliminary risk management activities; Evaluation of risk management options; Implementation of the risk management decision; and Monitoring and review).

- C. Risk communication, which is an interactive process of exchange of information and opinion on risk among risk assessors, risk managers, and other interested parties. Ideally all stakeholder groups should be involved from the start. The identification of particular interest groups and their representatives should comprise a part of an overall risk communication strategy. This risk communication strategy should be discussed and agreed upon between risk assessors and managers early in the process to ensure two-way communication.

In this conference we will enter into the Risk Analysis theory and practice through several examples of risk assessment from our research group at the ULPGC, and the risk management measures that have been adopted as a consequence.

## **PL.2. TESIGRAPHY – REVIEWED FROM THE PERSPECTIVE OF AN INFORMATIONAL – NONLINEAR APPROACH**

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The natural tendency of matter to evolve to a state of high entropy, to the thermodynamic equilibrium, contrasts with the evolution of the living who manages, by metabolic processes, to occur, develop and evolve far from the thermodynamic equilibrium. From this perspective, the need for the introduction of a negentropy process / phenomenon becomes evident. Although the relationship entropie/negentropy (information) is being studied recently, the empirical observations justified the formulation of hypotheses about the presence of certain "strengths/forces" of structural causes responsible for generating the structures and architectures of living organisms. Among the many assumptions is the one of chemist Ehrenfried Pfeiffer which postulates the existence of a constructive morphogenetic „force” associated to the appearance of the living, the cause of the organization, specific manifestations of living in the inorganic world. Starting from these premises, Pfeiffer had imagined an experiment called: sensitive crystallization method (tesigraphy), later used by many researchers including Oleg and Alla Sellawry, Frieda Bessenich etc. Modern technology of pattern recognition and the usage of artificial intelligence brought back the spotlight onto this method, whose further investigation seems to highlight the existence of an informational "field", of an informational matrix, of a code deeper than the genetic code.

In the same time, the concept of exploratory research is becoming more and more a coherent method of study of biophysics, psychological and social phenomena, suggested by the development of non-linear physics, quantum physics and computational sciences. Such studies are primarily concentrated on the cases where information is the fundamental brick of hierarchical systems, trying to design experiments that are able to reveal a potential morphogenetic field or at defining of some methodologies to show the negentropic flow, usually identified as information streaming. In this context the present paper focus on some specific theoretical principles used to design experiments beyond those suggested by the current paradigm, starting from the empirical results of tesigraphy.

## **1. Telediagnosis, Telemonitoring and Telemanagement in Medicine**

## **KN1. SIGNAL TRANSDUCTION IN TASTE AND OLFACTION**

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Olfaction and taste are dedicated to the detection of chemicals in the environment being, as so, considered as the chemical senses. While the olfactory system detects airborne molecules called “odorants”, the gustatory one detects primarily water or fat soluble ingested molecules so called “tastants”. Odorants interact with olfactory receptors found in the mucosal lining of the nose, generating action potentials that transmit the information of the chemical stimulus to central nervous system (CNS): the sensation of smelling. Similarly, tastants bind to taste receptors located mainly in the tongue taste buds, leading to an action potential that travels to the insular taste cortex via the medulla and thalamus.

The olfactory receptor neurons, distributed in the olfactory epithelium, are bipolar neurons with a thin unmyelinated axon at the basal pole and an apical dendrite that expands to a “bulb” from where several cilia arise. Generation of receptor potential involves cyclic nucleotide-gated metabotropic receptors expressing an olfactory-specific G protein that activates an olfactory-specific adenylate cyclase. Several classes of taste receptors (sweet, salty, sour, umami and bitter) can be found in the microvilli of taste cells.

Recent evidence shows a relation between olfaction and depression, indicating that depressive patients have impaired olfaction and loss of smelling ability worsens depressive state. Also, impaired olfaction can be a warning sign of Parkinson’s disease, sometimes occurring before motor symptoms develop and it can also be an initial symptom of Alzheimer’s disease. Some authors also propose a possible implication of sweet taste receptor signalling in modulating cognitive functioning.

## **01.1. TELEDIAGNOSIS FOR LIFE SCIENCES - AN ETHICAL APPROACH AND NEW OPPORTUNITIES IN MEDICINE, MEDICAL ENGINEERING AND MEDICAL PSYCHOLOGY**

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According with the new opportunities telemedicine become more and more a method under development in the country like Romania, but also a system which represent an important modern telecommunication network in all countries, especially in the rich ones.

The application of telemedicine and telecommunication in the medicine, medical engineering and medical psychology needs equipment's and in the same time a goal for developing education in a modern way

Ethical norms could represent a modality for developing the health system but in the same time a modality for supervise the telemedicine and telediagnosis or correlate the possibility to improve the lives of patients or healthy citizens.

## **O1.2. TELEMEDICINE BY USING MAGNETIC RESONANCE IMAGING IN PAROTID PATHOLOGY**

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**Background:** The parotid gland is one of the major salivary glands from the oral cavity, together with sublingual and submandibular glands. As any structure from the human body, it's cells can degenerate into different forms of tumours. Pleomorphic adenomas, also known as benign mixed tumours, are the most common salivary gland tumours.

**Aim:** In this study we identified the pleomorphic adenomas from the parotid glands by using magnetic resonance imaging and the telemedicine system.

**Method:** Two patients were sent to a private medical office from Constanta, Romania, in order to perform a cervical region MRI, because they were found with a mass located in the parotid gland. The images from the MRI were sent to Ovidius Clinical Hospital by telemedicine in order to be evaluated and to have a imagistic result.

**Results and discussion:** The patients presented a smooth, painless, enlarging mass. On MRI they were seen as well-circumscribed and homogeneous masses. On T1 were of low intensity, on T2 of very high intensity, they had a rim of decreased signal intensity on T2-weighted images representing the surrounding fibrous capsule and on T1 C+ (Gd) they demonstrated homogeneous enhancement. After the examination the diagnosis suggested the presence of pleomorphic adenomas. One of them chosen to follow it up and to the other one the surgical treatment was performed.

**Conclusion:** The telemedicine by using magnetic resonance imaging in parotid pathology was a perfect method for identifying the presence of pleomorphic adenomas to our patients.

### **O1.3. NEONATAL SCREENING FROM THE LABORATORY PERSPECTIVE**

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Through the DEZVOLT IOMC project - the development of our institute's research infrastructure, a project co-funded by European funds, the laboratory was endowed with state-of-the-art equipment allowing the extension of the National Screening Program coordinated by the Program Management Unit to the European and international vision looks at expanded neonatal screening.

Apparatus purchased by the project: UHPLC, LC MS / MS and GS MS, allow making determinations that represent the basis of the diagnosis of rare diseases caused by dysfunctions of the metabolism of amino acids and acyl-carnitines.

The more early the detection of a metabolic disorder, the better the therapeutic intervention will have a better effect. A screening result is not a diagnosis, but an important indicator.

Collaboration between the lab and the clinician is bidirectional and must be dynamic. On the one hand, the laboratory raises suspicions about metabolic disorders, the clinician will recommend other tests, and if suspicion is confirmed then therapy can be initiated early - especially through special diets and / or medication. On the other hand, given that there are undiagnosed children in the absence of such a screening program and on whom clinicians have suspicion of a metabolic disorder, the laboratory may come to support confirmation or not of the presumptive diagnosis.

Currently, besides expanding the National Screening Program, the INSMC-pediatric department's laboratory can achieve confirmation and monitoring of patients with PKU and aims to develop a range of diseases that can be both confirmed and monitored.

Congenital metabolic disorders cannot be completely cured, but early treatment will reduce or even prevent the development of serious symptoms affecting the baby's development.

## **01.4. RESTORE CELL BALANCE IN THE AGED BRAIN AFTER STROKE BY DIRECT IN VIVO REPROGRAMMING TECHNOLOGY**

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**Background:** Ischemic stroke is the second leading cause of death and the primary reason for sustained disability worldwide for which no cure exists. After stroke, neurons are frequently lost in the infarct core. Astrocytes, on the other hand, become reactive and proliferative, disrupting the neuronal vs non-neuronal cell balance in the lesioned area, especially in the aged brain.

**Aim:** Therefore, restoring the balance between neurons and non-neuronal cells within the post-stroke perilesional area is crucial for post-stroke recovery. In addition, proliferating glia become reactive and build up gliotic scars that are initially protective by confining the damaged area. In the long-term, however, the gliotic scar is deleterious by acting as a barrier to neural regeneration.

**Method:** "Melting" glial scars has been attempted for decades with little success. Alternative strategies include transforming inhibitory gliotic tissue into an environment conducive to neuronal regeneration and axonal growth. The latter idea has gained momentum following the discovery that in vivo direct lineage reprogramming in the adult mammalian brain is a feasible strategy for reprogramming non-neuronal cells into neurons; this exciting new technology emerged as a new approach to circumvent cell transplantation. However, the potential of this new methodology has not been tested to improve restoration of structure and function in the hostile environment caused by the fulminant inflammatory reaction in the brains of aged animals following stroke. To this end, used retroviral/lentiviral delivery systems encoding transcription factors, SOX2 or NeuroD1 or two transcription factors (Neurog2 and Bcl-2) to target astrocytes in the neocortex of aged rats.

**Results and discussion:** We provide evidence of successful direct in vivo reprogramming of reactive glia into neuroblasts and mature neurons after stroke in animal model which has been assessed by cellular phenotyping.

**Conclusion:** Since there is no restorative treatment available for stroke, and given the overwhelming importance of stroke therapy for both patients and society, this approach, could be a breakthrough in the field.

## **Q1.5. TOXOPLASMOSIS- CURRENT DYNAMICS AND ANTHROPOLOGICAL ASPECTS IN A ROMANIAN COHORT**

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The prevalence of toxoplasmosis in the human population is associated with exposure to several risk factors. Pregnancy represents a period in which development of toxoplasmosis affects the wellbeing of the fetus.

A high incidence of toxoplasmosis has been observed in people who come into contact with soil that consumes raw meat, fruit / vegetables that have not been thoroughly washed, but also people who do not have good body hygiene or who cook under precarious conditions.

The aim of the study is to highlight the annual dynamics of human toxoplasmosis in Romania, the rural and urban areas during 2008-2012, the descriptive and analytical epidemiological survey, and the designation of the age groups exposed to an increased risk of *T. gondii* infection.

Thorough analysis of characteristics of *T.gondii* infection is crucial for prevention and restriction of the disease in pregnant women and in general population.

## **O1.6. ELECTROCHEMICAL BIO-AFFINITY BIOSENSORS FOR EARLY CLINICAL DIAGNOSTICS**

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Protein biomarkers are one of the important classes of biomarkers, which can be indicative of disease state according to their high or low expression in serum. Several tumor markers found in biological fluids are important for early stage screening of diseases because they are usually asymptomatic until advanced stages when the prognosis of survival is poor. For example, MUC1 and NS1 proteins are associated with early diagnosis of breast cancer and dengue virus respectively.

Diagnostic accuracy for detection of these biomarkers is very limited therefore; current research needs to focus on developing disposable bio-affinity sensing devices for the reliable and sensitive detection of these biomarkers.

This work presents label free and cost-effective protocol for the detection of these two biomarkers.

The bio-affinity biosensors were fabricated by antibody/aptamer immobilization onto transducer surface via electro-grafted BSA or carboxy rich graphene oxide. The change in electron transfer resistance with biomarkers interaction was monitored. The selectivity of the designed devices was further elaborated with several interfering analytes and was finally demonstrated with human blood serum samples.

The outstanding sensitivity and selectivity of fabricated bio-affinity biosensors can potentially pave their way to be translated into point of care devices for early and precise detection of breast cancer and dengue virus.

## **O1.7. ELECTROCHEMICAL IMMUNOASSAYS FOR DETECTION OF HE4 OVARIAN CANCER BIOMARKER**

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**Background:** Human epididymis protein 4 (HE4) is a promising biomarker, which is commonly overexpressed in patients with serous endometriosis as well as epithelial ovarian and uterine cancer, and it is elevated in the serum of patients with ovarian cancer. Therefore, HE4 is today of particular interest for recognizing early stages of epithelial ovarian cancer.

**Aim:** Development of highly sensitive and selective electrochemical immunoassays for HE4 detection.

**Method:** In first approach, HE4 detection was based on immunomagnetic separation accompanied by sensitive electrochemical detection of the electroactive product formed after enzymatic conversion of a suitable substrate by alkaline phosphatase, which is conjugated with anti-HE4 IgG. Second method relies on core/shell CdSe/ZnS quantum dots conjugated with anti-HE4 IgG antibodies for sandwich-type immunosensing with superparamagnetic microparticles functionalized with anti-HE4 IgG antibodies. Electrochemical detection of immunocomplex was performed by monitoring Cd(II) ions from quantum dots at screen-printed carbon electrode (SPCE) modified with mercury or bismuth film.

**Results and discussion:** Immunosensor of first type achieved excellent LOD of 6.8 fM and LOQ of 23 fM, which meets the requirements for early detection of this biomarker. Linearity was observed up to 400 pM HE4. In case of second immunoassay, linear range of the detection was from 20 pM to 40 nM with LOD of 12 pM at mercury-film SPCE and from 100 pM to 2 nM with LOD of 89 pM at bismuth-film SPCE. Functionality of both immunosensors was tested using standard human serum.

**Conclusion:** Magnetic bead-based immunosensors were developed for detecting the ovarian cancer biomarker HE4 with a limit of detection lower than levels determined by the commonly used enzyme immunoassay and chemiluminescent microparticle immunoassay methods.

*This work was financially supported by the Czech Science Foundation (project 15–16549S).*

## **O1.8. CARBON PASTE ELECTRODE FOR DETERMINATION OF NONSTEROIDAL ANTI-INFLAMMATORY DRUG USED IN OSTEOARTHRITIS TREATMENT**

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**Background:** Non-steroidal anti-inflammatory drugs (NSAIDs) are a drug class which reduce pain, prevent blood clots, or decrease inflammation and fever. One of the representatives of NSAIDs is acetaminophen (ACM) – organic chemical compound inhibiting cyclooxygenase enzymes (COX-1 and COX-2). Acetaminophen is mainly used in osteoarthritis, in rheumatoid or psoriatic arthritis, and chronic inflammation of the joints or muscles.

**Aim:** The aim of this work was to check the analytical performance of the carbon paste electrode for the quantitative determination of acetaminophen. The newly developed voltammetric method was used to determine ACM in pharmaceuticals and in spiked urine samples.

**Method:** The experiments were carried out using square wave voltammetry (SWV) with a three-electrode system with platinum wire as an auxiliary electrode, with a Ag/AgCl electrode as a reference electrode, and a carbon paste electrode as a working electrode.

**Results and discussion:** During the experiments, a linear range of ACM determination was examined and the limit of detection and limit of quantification were calculated. Moreover, acetaminophen was determined in the pharmaceutical formulation (Rantudil Retard) and in spiked urine samples. Very good recovery values were obtained.

**Conclusion:** A voltammetric method for the determination of acetaminophen in pharmaceuticals and spiked urine samples was developed.

## **O1.9. DETERMINATION OF LIPOIC ACID IN HUMAN URINE BY CAPILLARY ZONE ELECTROPHORESIS**

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**Background:**  $\alpha$ -Lipoic acid (LA) is a disulfide-containing compound which has powerful antioxidant activity. Because LA cannot be produced in human organism, it must be supplied with food, from where is rapidly absorbed, transported to cells and reduced to dihydrolipoic acid (DHLA). LA and DHLA play a central role in cellular metabolism as the prosthetic group in  $\alpha$ -keto acid dehydrogenase complex. LA is able to recycle other natural antioxidants. LA supplementation helps in prevention and treatment of various diseases and disorders associated with oxidative stress.

**Aim:** The aim of the work was to develop the fast and reliable CE method enabling LA determination in human urine.

**Method:** The method is based on salts removing from urine with acetone, reduction of LA with TCEP, derivatization with 1-benzyl-2-chloropyridinium bromide, on-line preconcentration by FASI, separation by CZE (20 kV, 0.05 mol/L borate buffer, pH 9) and quantification by UV detector (322 nm).

**Results and discussion:** Several parameters which affect CE sensitivity and signal quality were tested during experiments. The method was validated, six-point calibration plot was made, calibration curve ( $y = 0.0913x + 0.0246$ ,  $R^2 = 0.9998$ ) was linear in the range of 2.5-80  $\mu\text{mol/L}$ . The precision of the method did not exceed 9% and accuracy values ranged from 95% to 103%. LOD and LOQ for LA were 1.2  $\mu\text{mol/L}$  and 2.5  $\mu\text{mol/L}$ , respectively.

**Conclusion:** A fast, simple and reproducible analytical CE procedure for LA determination in urine samples was developed. The method exhibits very good linearity and sufficient sensitivity.

**Acknowledgement:** *This work was supported by University of Łódź.*

## **O1.10. ELECTROANALYTICAL STUDIES OF L-DOPA**

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**Background:** L-DOPA (3,4-dihydroxy-L-phenylalanine), also known as levodopa is part of a series of biogenic amines which contains a benzene ring with an alkylamine chain and two hydroxyl groups. L-DOPA has been widely used in the treatment of Parkinson's disease for more than forty. This substance represents a necessary dopamine precursor.

**Aim:** In this study, electrochemical behavior of L-DOPA on screen-printed carbon electrodes is presented.

**Method:** The analysis was carried out on screen-printed carbon electrodes. For analytical purposes square wave voltammetry (SWV) was utilized. The influence of various factors such as buffer composition and SW parameters was studied.

**Results and discussion:** In the present study the supporting electrolyte was phosphate buffered saline (PBS) pH 7.4. Linearity of peak current on concentration of L-DOPA was found in the range from 5.0 to 100.0  $\mu\text{M}$  with a detection limit of 0.7  $\mu\text{M}$ .

**Conclusion:** The obtained results allow us to state that it is possible to carry out quantitative analysis of L-DOPA on screen-printed carbon electrodes. Additionally, low cost, short determination time and environmental friendliness are the main advantages of the proposed procedure.

**Acknowledgement:** *The work was done in Transilvania University of Brasov, in the frame of CEEPUS Project – Food Safety for Healthy Living -CIII-RO-1111-02-1718*

## **O1.11. VOLTAMMETRIC DETERMINATION OF D-DOPA ON SCREEN-PRINTED CARBON ELECTRODES**

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**Background:** Screen printed carbon electrodes (SPCEs), used in this research, have been successfully employed as an enzymatic sensors, genosensors and immunosensors. In comparison with other sensors, the technology of screen-printed electrodes enables a mass production, because it does not require advanced technical equipment. Therefore they are economically advantageous. On the SPCEs the D-DOPA was determined. In contrast to L-DOPA, which is used to treat Parkinson's disease, D-DOPA is biologically inactive and it has toxic properties.

**Aim:** The aim of this work was to check the analytical performance of the screen-printed carbon electrodes for the quantitative determination of D-DOPA.

**Method:** The voltammetric experiments were carried out on screen-printed carbon electrodes. The studies of D-DOPA determination have been conducted by means of square wave voltammetry (SWV) with optimized parameters.

**Results and discussion:** The calibration curve of D-DOPA determination was constructed in range 5.0 – 400.0  $\mu\text{mol L}^{-1}$ . Based on the developed linear range, the limit of detection (LOD) and limit of quantification (LOQ) have been calculated and were equal: 0.87  $\mu\text{mol L}^{-1}$  and 2.89  $\mu\text{mol L}^{-1}$ , respectively.

**Conclusion:** A voltammetric method for the determination of D-DOPA was developed.

**Acknowledgement:** *The work was done in Transilvania University of Brasov, in the frame of CEEPUS Project – Food Safety for Healthy Living -CIII-RO-1111-02-1718*

## **O1.12. AN OVERVIEW ON THE POTENTIAL DYSTOCIA OF HUMAN BIRTH**

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In the human species, labor is long, difficult and painful, at high risk of notable trauma and mortality for both mother and fetus. To determine when birth has become difficult, first we need to look at the causes.

As an adaptive response to bipedal posture and walking, changes in the bone structure occurs in the human pelvis. The pelvic passage for humans, as it is now, is defined by three planes that differ in size and orientation, unique in the animal kingdom.

The current study proposes to analyze dystocia that characterizes the human birth through incidence of cesarean section generally and specific on a cohort of Brasov area.

## **P1.1. STUDY ON THE DISTRIBUTION AND PATHOGENIC ROLE OF ENTEROBACTERIACEAE IN A MULTI-DISCIPLINARY HOSPITAL AND THE EVALUATION OF SHARE OF MULTI- RESISTANT STRAINS**

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Resistance to antibiotics is now a serious threat to public health globally, with wide variations depending on the geographical region, germ and antibiotic. In Europe, levels of antibiotic resistance are higher in south-eastern areas. The current trend is the increase of the resistance of gram-negative bacilli, for with there are registered increases in the weights of resistance to the third-generation of cephalosporin's, with combined resistance to generation III of cephalosporin's, aminoglycosides and fluoroquinolones and with resistance to carbapenems.

The purpose of our study was to evaluate the distribution in hospital wards and the role in the pathology of the multi-resistant *Enterobacteriaceae* strains isolated from the various samples of the patients admitted in the clinical multi-disciplinary hospital over a period of 1 year.

The study demonstrated the large involvement of *Enterobacteriaceae* in various infections, these germs being more frequently isolated from the urine (*E. coli* - 74%, *Klebsiella spp.* - 54.95%, *Proteus spp.* - 45.89%) and pus (*E. coli* - 16.61%, *Klebsiella spp.* - 24.35%, *Proteus spp.* - 18.84%). Also, these germs were isolated from patients hospitalized in various hospital departments, *E. coli* being the most common from Internal Diseases (29.65%) and General Surgery (12.23%) wards, *Klebsiella spp.* from ICU (20, 63%) and Urology (19.5%) wards and *Proteus spp.* from ICU (33.53%) and Internal Diseases (16.16%) wards. The weight of ESBL strains has varied based on the bacterial genre (*Klebsiella spp.* – 26.07%, *Proteus spp.* – 2,24%, *E. coli* -13,64%, *Serratia spp.* – 62,5%, *Enterobacter spp.* – 16,66%).

## **P1.2. THE IMPORTANCE OF THE CLINICAL LABORATORY IN IDENTIFYING THE INFECTION WITH CLOSTRIDIUM DIFFICILE**

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*Clostridium difficile* is a Gram-positive spore bearing anaerobic bacterium. It is the major etiological agent of diarrhea and colitis associated with antibiotics. It is the most common cause of health care-associated diarrhea in developed countries and is a major source of nosocomial morbidity and mortality worldwide.

*Clostridium difficile* can release two high-molecular-weight toxins, toxin A and toxin B, which are responsible for the clinical manifestations, which range from mild, self-limited watery diarrhoea to fulminant pseudomembranous colitis, toxic megacolon, and death.

In this paper is highlighted the incidence of *Clostridium difficile* infection to symptomatic patients which have been perform a specific laboratory test to identify the infection. This study will present the number of cases which a laboratory from Romania identified patients with *Clostridium difficile* infection, and the toxins that can release in the human body.

The study presents the number of 46 cases with *Clostridium difficile* infection and some of them (19 cases) with both toxins positives. In the region of Brasov were identified 21 cases with *Clostridium difficile* infection with several cases with both toxins positives. All statistic data were represented and interpreted based on graphic.

The method to identify the *Clostridium difficile* infection is a coloured chromatographic immunoassay for the simultaneous qualitative detection of *Clostridium difficile* Glutamate Dehydrogenase (GDH), Toxin A and Toxin B in stool samples. The test interpretation has been performed based on the insert in the test kit.

This study provides an enhanced understanding of *Clostridium difficile* infection and the importance of clinical laboratory to identify it.

### **P1.3. ELECTRONIC VERSUS CLASSIC CIGARETTES – PRODUCT ANALYSIS AND POSSIBLE WAYS TO INFLUENCE THE HUMAN USAGE**

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Smoking is a major threat to public health for both smokers and non-smokers. There is evidence to show that smoking causes a range of diseases, including those that affect the cardiovascular system.

Over time, as tobacco consumption declined, the industry introduced an alternative known as an electronic cigarette, claiming to be healthier, and is an alternative to smoking tobacco. Since then, the number of electronic cigarette users has increased significantly due to the perception that they serve as a healthy substitute for tobacco use with a minimum or no harm. Consequently, electronic cigarettes have become the most commonly used smoking products, especially among young people.

In addition to the potential negative effects on users' health, there is increasing evidence that electronic cigarettes emit considerable toxic substances, such as nicotine, volatile organic compounds, carbonyls, in addition to particulate matter release. Thus, they harm both users and non-users by exposing the second or third hand to the expired smoke. This is especially true for vulnerable populations such as children, the elderly, pregnant women, or people who already have cardiovascular problems.

In the present paper we analyzed various types of electronic and classic cigarettes from the point of view of package design / heats, the messages transmitted on the boxes and the declared composition respectively.

#### ***Acknowledgments***

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## **P1.4. NEW ELECTROCHEMICAL DETECTION STRATEGIES FOR IODINATED COMPOUNDS**

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Iodine is a micronutrient of high importance for the health and good development of individuals. It is contained in many foods, but it is also part of the chemical component of oceans and soil. Iodine deficiency is still a problem of humanity, which has a serious repercussion on our health. It is therefore important to have specific, fast and cost effective methods of detection from different samples.

This work aims to identify optimal parameters for potassium iodide (KI) detection from different medium, to be applied to real samples: plant extracts, water, biological fluids.

Results showed a significant difference in electrochemical results, depending on pH values of the mixture and also the time which influences the compounds stability. Differential pulse voltammetry and cyclic voltammetry using carbon printed sensors are important analytical tools which have a wide range of applications in the food, medicine, toxicology and other domains.

## **P1.5. ROMANIAN PEOPLE'S PERCEPTIONS ABOUT MEDITERRANEAN DIET AND LIFESTYLE**

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The Mediterranean diet has been followed from generation to generation for centuries and is closely linked to the lifestyle of the Mediterranean peoples throughout its history. It has evolved, received and embedded with wisdom, different foods and new techniques resulting from its strategic geographical position and the capacity for miscegenation and exchange of Mediterranean peoples. The Mediterranean diet has been, and continues to be, an evolving, dynamic, and vital cultural patrimony.

The Mediterranean diet is characterized by the use of virgin olive oil as the main source of lipids and the abundant use of plant foods such as vegetables, legumes, fruits and nuts; a high consumption of fish and crustaceans.

There are many benefits to the traditional Mediterranean diet model: increased survival rate, prevention of cardiovascular disease, cancer, diabetes, cognitive impairment and depression. This pattern is characterized by the use of olive oil as the main culinary fat (high ratio of monounsaturated lipids: saturated lipids), high consumption of fruit (ordinary dessert), nuts, vegetables, legumes, fish and whole grains, low consumption of meat in red meat) and dairy products, as well as red wine consumption during the meal.

In the research area, we used a set of questions about the Mediterranean diet in order to evaluate the level of knowledge among the Romanian general people and nurses, for example, principles of the Mediterranean diet and food consumption in the diet.

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## **P1.6. DEVELOPMENT OF POLYANILINE BASED SENSORS FOR THE DETERMINATION OF ASCORBIC ACID IN PHARMACEUTICAL PRODUCTS**

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**Background:** The use of the electrochemical sensors in the detection of pharmaceutical active compounds is of great interest due to the advantages of the electroanalytical methods. Applicability of these methods in the detection and quantification of pharmaceuticals is useful both in health and pharmaceutical industry.

**Aim:** The objectives of this work were to design and fabricate chemically modified electrode based on polyaniline for the sensitive determination ascorbic acid.

**Method:** The sensors based on polyaniline were fabricated by chronoamperometry from an aqueous solution of aniline and hydrochloric acid. The optimization of the fabrication process was carried out. The optimal sensors were employed for the detection of ascorbic acid.

**Results and discussion:** The optimal sensors were characterized initially in acidic solutions. The peaks observed in the case of hydrochloric acid are related to the redox processes of polyaniline. The processes are controlled by the electron transfer process as was obtained from the kinetics studies. In complex solutions the voltammetric signals are related to the redox processes of the polyaniline strongly influenced by the compounds presents in the electrolyte solution. In the case of ascorbic acid are observed additionally the peak related to the oxidation process. The detection of the ascorbic acid was optimized. The practical applicability of the sensor was demonstrated by the precise and accurate quantification of ascorbic acid in pharmaceutical products (Vitamin C Arena 750mg and Vitamin C Remedica 1000mg).

**Conclusion:** The sensor based on polyaniline developed in this study is applicable for the analysis of ascorbic acid in pharmaceutical products.

## **P1.7. THE TASTE OF EMOTIONS: IS THERE ANY METAPHORIC RELATIONSHIP?**

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**Background:** Metaphors are more and more recognized as influencing cognition and food consumption [3]. Although there are a few studies pointing out associations between tastes and emotions [1,2], we haven't found any study that systematically explores this linkage.

**Aim:** to discover whether there are metaphoric relationships between tastes and emotions

**Methods:** Fiftyfive participants were asked to rate (on a scale from 0 to 5) the degree of association between each of 20 common emotions and each taste. For each pair of emotions, the degrees of association with each taste were compared, the statistical analysis being performed by means of Mann-Whitney test.

**Results:** By taking into account the two (or three) most strongly associated tastes for each emotion, several patterns of association emerged, that may be gathered in two groups:

- sweet + spicy ± salty (the appealing tastes) yielded the strongest associations for positive, pleasant emotions: joy, enthusiasm, happiness, love, contentment, passion, pleasure, surprise.

- sour + bitter + astringent (the repeling tastes) are associated with unpleasant, negative emotions: disgust, scorn, fear, envy, isolation, anger, shame, sadness, hatred, guilt.

Within each group, several subgroups may be identified:

Within the first group:

- a spicy predominant subgroup: enthusiasm, interest, passion, surprise; courage too has the strongest association with spicy/pungent;

- a sweet predominant subgroup: joy, happiness, love, contentment, pleasure;

- there was no salty predominant subgroup. However, the strongest association of salty is with interest.

Within the second group:

- a bitter predominant subgroup: disgust, envy, isolation, shame, sadness, guilt;

- an astringent predominant subgroup: scorn, fear, hatred;

- there was no sour predominant subgroup.

**Conclusions:** There are definite and strong patterns of metaphoric association between tastes and emotions. Further studies are required to confirm this linkage.

## **P1.8. LIPOPHILIC VITAMIN PROFILE OF SMOKING YOUNG PEOPLE**

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It is well known that cigarette smoking will increase the risk of cancers, cardiovascular and respiratory diseases, chronic obstructive pulmonary disease, reproductive problems, and other medical maladies. Trying to explain the mechanisms of the pathogenesis associated with cigarette smoking, most of the investigators consider that free radicals are involved in the pathogenesis of diseases.

In accordance with this theory, antioxidants such as Vitamins A and E are believed to have an important role in resisting damage from oxidative stress resulting from cigarette smoking.

The aim of this study was to determine levels of plasma lipophilic antioxidants between cigarette smoking, electronic smoking and non-smoking subjects.

A total of 149 participants were enrolled in our study. They were divided in 3 groups: non-smokers (n=58), cigarette smokers (n=58) and e-smokers (n=33). Using LC/MS method we determined levels of vitamins A and E, and ELISA method for vitamin D determination.

Significantly increasing of vitamin A and E levels ( $p < 0.001$ ) were observed in controls compared with groups of cigarette and electronic smokers. No significant changes were observed in vitamin A and E levels between the groups of smokers. No significant changes were observed for vitamin D levels between all groups.

Our results are sustaining increased oxidative stress in groups of smokers. These results may be interpreted that smoking will promotes the production of excess reactive oxygen species, consuming antioxidants, and results in further cell damage.

### **Acknowledgments**

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## **P1.9. THE IMPORTANCE OF MOLECULAR MARKERS IN THE DIAGNOSIS OF CHRONIC MYELOPROLIFERATION-THE LATEST WHO CLASSIFICATION OF CHRONIC MYELOPROLIFERATIVE NEOPLASIAS (2016)**

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In haemato-oncologic pathology, chronic myeloproliferative diseases are rare diseases characterized by the proliferation of mature blood cells (eg, white blood cells, red blood cells or platelets) that affect older adults with chronic evolution but which can be complicated by the occurrence of thrombo-haemorrhagic events or transformation into acute leukemia.

Diagnosis of myeloproliferative diseases is difficult because there is phenotypic heterogeneity and interference within clinical entities. It is important to distinguish from reactive, polyclonal proliferations that are more common in the population and that have different treatment and prognosis. In past decades the diagnosis of these diseases was based only on blood morphology and the exclusion of other pathologies.

New technologies (immune phenotyping, flow cytometry, immunohistochemistry, classical cytogenetics, FISH fluorescence in situ hybridization, molecular genetics) can detect the pathological substrate involved in a haematological neoplasia as quickly and specifically as possible. Molecular markers are detectable DNA sequences using molecular genetics techniques. Their importance lies both in deciphering pathogenic mechanisms and in their use in diagnosis and monitoring of specific therapies.

The latest WHO classifications of haemato-oncologic pathology in 2008 with revision in 2016 have novelty the use of molecular markers as major criteria in the diagnosis of chronic myeloproliferation and require the use of the term "neoplasia" in defining these diseases.

### **Acknowledgments**

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## **P1.10. PURIFICATION OF NUCLEIC ACIDS: METHODS, STEPS AND APPLICABILITY IN DIAGNOSTIC**

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Nucleic Acid (DNA- deoxyribonucleic acid and RNA- ribonucleic acid) are the major genetic material of all cells (including viruses) which play an essential role in cellular organization and functionality.

The role of nucleic acids is stocking of genetic information, which will be replicated, transcribed and translated in functional proteins. Encoding the genetic information is achieved by using molecular biology techniques commonly used in diagnostics. The majority of molecular biology techniques start with the isolation and purification of the nucleic acids from any biological material: blood, cells isolated from mucosa (mouth, cervix, urethra), amniotic fluid, biopsies e.g for forensic medicine (hair, biological fluids, imprints), bacterial and cellular cultures.

There are multiple methods commonly used for nucleic acid isolation: from the manual methods, which are complicated, laborious and time consuming to novel specialized methods which are easier and faster

The general steps of nucleic acid purification include cell lysis, which disrupts the cellular structure to expose DNA or RNA, inactivation of cellular nucleases such as DNase and RNase, and separation of desired nucleic acid from cell debris, DNA precipitation.

Currently there are very specialized methods using commercial Nuclei Acid extraction. All types of kits respect similar protocols: (1) DNA precipitation, washing and DNA rehydration and (2) DNA isolation in a column and DNA elution. Isolated DNA and RNA will be used for different molecular biology techniques: PCR, sequencing, reverse-transcription PCR with a huge importance in medical diagnostics- pathology, oncology, reproduction, forensic medicine.

### ***Acknowledgments***

*The work was done in the frame of the project founded by Transylvania University in Brasov (project for the inclusion of master students in research teams 2018)*

**P1.11. THE VOMERONASAL ORGAN  
- OLD AND NEW DEBATES**

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The sense of smell is the oldest and most complex physical sense. Most mammals have bilateral chemosensory structures found in the nasal septum mucosa, called vomeronasal organs which complement the olfactory function of the primary pathway.

These structures are extremely variable as anatomical development and primary functionality. The man possesses a non-chemosensory homologue whose function is still a subject of debate.

For a long time, researchers considered it a rudimentary-atrophied and useless. However, in the late 1980s and early 1990s, several research teams suggested something else. Involved in sexual attraction and acting as a pheromone-like appetite detector (hormones commonly used for communication, including for sexual attraction), the activity of the vomeronasal organ appears to manifest unconsciously.

## **P1.12. LEVEL OF KNOWLEDGE OF YOUNG STUDENTS CONCERNING ANTIOXIDANTS AND FREE RADICALS**

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The role of antioxidants is to prevent damage of cellular components arising as a consequence of chemical reactions involving free radicals.

In the framework of the Transilvania University of Braşov has been carried out a study on the level of knowledge of young students concerning antioxidants and free radicals.

The subjects of this study were students at the University of Brasov in various study programs (the Faculty of Medicine: General nursing and the Clinical laboratory and the Faculty of Food and Tourism).

As a result of the statistical processing of the answers received from the subjects it was found that the students who follows the courses of study programs of the Faculty of Medicine are better informed and they knew how to respond properly to questions received on the notions of antioxidants, free radicals and actions and their effect they have on the human body within a larger number compare with the students who belong to the Faculty of Food and Tourism.

Also it has been observed that students who belong to the Faculty of Medicine are more concerned about their health status, and cultivate new general information related to this aspect from both items of health, but also in literature, unlike the students of the Faculty of Food and Tourism whose interest for health is reduced and the default and action designed to enrich their knowledge in this field are less.

### **P1.13. DRINKING WATER KNOWLEDGE AND HABITS - SURVEY AMONG STUDENTS FROM MEDICINE FACULTY IN BRASOV**

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Through water, all organisms carry out their lives, being an essential natural element.

Water in the human body enters the constitution of tissues, plays a role in participating in essential biochemical reactions, digestion, and energy release reactions. It brings nutrients to the body and also has the function of eliminating the excretion products of various metabolisms.

The paper contains some of the results of a questionnaire that was administered to students (second year and fourth year) of the Faculty of Medicine of Transilvania University in Brasov, Medicine study program. The aim of this study is to test the level of knowledge of these two groups of students concerning the importance of water in the body and the essential roles it has on the functioning of a metabolism.

The questionnaire includes questions about the role of water in the body, the foods that contain the greatest amount of water, questions about the main conditions that may occur in the event of insufficient water intake or excess water, but also what bacteria they can encounter in water.

## **P1.14. ROMANIAN POPULATION' KNOWLEDGE CONCERNING URIC ACID METABOLISM AND ITS ROLE IN HUMAN BODY: A QUESTIONNAIRE STUDY**

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**Background:** Uric acid is a metabolite of purine metabolism whose analytical detection is so significant due to its involvement in different pathologies such as gout, renal lithiasis, cardiovascular disease, metabolic syndrome or diabetes mellitus. Gout is an inflammatory painful arthritis mainly caused by deposition of uric acid crystals in soft tissues and joints and sometimes, gout patients have no self-trust. Therefore, the impact of this metabolic disease on the population and the knowledge are so relevant.

**Aim:** Verification of Romanian population (especially students) knowledge about uric acid metabolism and its role in human body by questionnaire.

**Method:** A number of 170 students from Transilvania University of Braşov (median age - 22) voluntary participated at this study. The study groups have been composed from 83 students from Faculty of Medicine and from 77 students from Faculty of Food and Tourism. The participants' knowledge was tested by answering 44 questions about uric acid metabolism and its role in human body. According to each participant' answer, it was realized the statistics.

**Results and discussion:** Medicine students have few difficulties in offering the right answers, while the Food and Tourism students answered correctly the questions about diet involved in gout.

**Conclusions:** The Medicine students' knowledge about uric acid was more significant than that of Food and Tourism students.

Nevertheless, the both groups of students should be more taught concerning uric acid and its involvement in pathologies, so we will prepare and share an informative brochure about this subject.

## **P1.15. INNOVATIVE ELECTROCHEMICAL DETECTION OF URIC ACID BY DIFFERENTIAL PULSE VOLTAMMETRY USING PLATINUM SCREEN-PRINTED ELECTRODE**

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**Background:** Uric acid concentration in serum and urine is associated with different diseases and it is routinely determined in clinical and biomedical laboratories and also new methods as developed.

**Aim:** Discovery of the optimal experimental conditions for electrochemical detection of uric acid and its limit of detection.

**Method:** It was considered the possible electrochemical activity of uric acid at platinum screen-printed electrode in 0.1M citrate buffer (pH 2.6) and sodium phosphate buffer solutions (pH 5.8; 6.2).

The electrochemical activity of uric acid was tested by adding different concentrations of uric acid (0.03 mM – 2 mM) in 10 mL buffer solutions. Using the voltammograms, there were quantified area, height and potential of each peak. These experiments were performed in duplicate or triplicate. There were calculated the average and standard deviation for the measurements and calibration curves were plotted.

**Results and discussion:** High precision of electrochemical method was observed in citrate buffer solution (pH 2.6).

**Conclusions:** This innovative method could be adopted for detection of uric acid in clinical laboratory because it has higher sensibility.

## **P1.16. SALTS CONSUMPTION SURVEY AMONG STUDENTS FROM MEDICINE FACULTY IN BRASOV**

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Sodium chloride is a crystalline substance that should be consumed in a moderate amount. A high salt level in the body leads to maintaining water retention as well as many other conditions, and low levels (hyponatremia) can be caused by salt loss syndrome and inadequate antidiuretic hormone.

The paper contains a questionnaire survey on the importance of salt in food, which was administered to students of the second and fourth year of the Faculty of Medicine of Transilvania University of Brasov, a medical study program, during the academic year 2017-2018.

The data obtained were statistically processed and presented graphically, revealing similar or different distributions of the obtained answers.

The purpose of this study is to test and analyze the knowledge of students in the second year of college after having acquired knowledge biochemical material compared with the level of knowledge in IV who studied internal medicine and clinical biochemistry.

The study aims to analyse the knowledge of the medical students' concerning salt consumption in both healthy subjects and patients with various conditions.

At the same time, the study has an informative purpose on aspects related to the consequences of high salt consumption, as well as a low salt intake, as well as the way in which the diseases caused by these imbalances can be prevented.

**P1.17. A NOVEL, FAST AND SIMPLE METHOD BASED ON ON-COLUMN DERIVATIZATION FOR THE DETERMINATION OF LIPOIC ACID IN URINE SAMPLES**

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**Background.**  $\alpha$ -Lipoic acid (LA), also known as 6,8-dithioctanoic acid, is a natural compound which is distributed in cells of plants, animals and humans. It is involved in the regeneration of exogenous and endogenous antioxidants, such as vitamin C, vitamin E and glutathione and oxidized proteins repairing.

**Aim.** The goal was to develop a novel chromatographic method based on on-column derivatization for the determination of LA in urine samples.

**Method.** The method was based on reverse phase high performance liquid chromatography with spectrofluorometric detection. LA was converted to the corresponding derivative by on-column derivatization with o-phthaldialdehyde (OPA) which was carried out directly during analysis.

**Results and discussion.** The optimization of chromatographic conditions for sample preparation and analysis, the effect of the reducer and coupling agent – contents on the efficiency of the derivatization reaction and the stoichiometry of the derivatization reaction were checked. Additionally, factors such as excitation and emission wavelengths, concentration of sodium hydroxide and OPA and acetonitrile in the mobile phase were tested. The developed method was characterized by linearity of detector response in the range 1.2-32.0 nmol /mL urine and  $R^2$  0.9995. The limits of detection and quantification were 0.1 nmol/ m, 0.3 nmol /mL, respectively.

## **P1.18. IMPROVEMENT OF HEALTHY LIVING OF YOUNG CHILDREN THROUGH (BREAK)DANCE**

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The mind and body work together as we dance more than we can imagine. It has been noticed that dancing exercises positively influence the driving objectives, for example: through the correct execution of the basic steps one can co-ordinate, maintaining a dance position for a longer time can lead to the development of balance, by performing certain elements of dance can increase the force of different muscles or even resistance, and so on.

Dance can both prevent and correct a lot of motor deficiencies, as dance can act on multiple targets, depending on the purpose.

In this study, children between the ages of 7 and 11 were used as subjects, as they are in a continuous development both physically and mentally.

A total of 30 subjects participated in this study in two groups as follows: 15 members in the study group and 15 members in the control group. All 30 subjects were tested both initially and finally through the following tests: the Romberg test, the Single Leg Stance Test, the Flamingo Test, the Stork Test and the SEBT (Star Excursion Balance Test).

Coordination, control and balance is a very important objective at this time if we speak about children, because at this age they explore and experiment the environment in detail, which is why we consider that dance helps and improves this whole development process.

## **P1.19. CREATING A REGIONAL DATABASE OF BACTERIAL SUSCEPTIBILITY TO ANTIBIOTICS – PREMISE FOR A CORRECT TREATMENT OF URINARY TRACT INFECTIONS**

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**Background:** Urinary tract infections are among the most common bacterial infections which leads to medical consultation and require antibiotic treatment. Susceptibility of bacteria has declined significantly in recent years to commonly used antibiotics in ambulatory and hospital settings, so choosing the right antibiotic can be difficult.

**Aim:** Assessing the need to establish a regional database, periodically updated, on susceptibility to antibiotics of bacteria involved in urinary tract infections for a correct therapeutic decision.

**Method:** Retrospective study of some etiological and therapeutic aspects of urinary tract infections cases hospitalized in the Clinical Hospital for Infectious Diseases in Brasov in the period 2016-2017.

**Results and discussion:** 284 patients were hospitalized with urinary infections; 63.38% positive urine cultures were identified. The most common isolated bacterium was *Escherichia coli* – 51,67% cases. Initial treatment was started empirically. In cases with positive urine culture the treatment was subsequently adapted, but in a significant proportion of cases treatment was conducted only on clinical and non-specific laboratory criteria.

**Conclusion:** Developing a database in Brasov area on the susceptibility to antibiotics of bacteria isolated from urine culture, performed in different laboratories, accessible to health professionals, would allow the establishment of local treatment guidelines and antibiotic treatment policies both at primary and hospital care level.

## **P1.20. VARIATION OF BLOOD PRESSURE IN ADOLESCENTS POPULATION IN BRASOV DISTRICT**

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**Introduction:** The increasing prevalence of hypertension in childhood population during last years justifies the interest of pediatricians in determination of the evolution trend of blood pressure in children.

**Objective:** Our aim was to analyze the anthropometrical parameters and the value of blood pressure in adolescents.

**Material and method:** we had performed a prospective study in 2017 (March – June) during adolescent population in Brasov district, aged between 14-18 years with measurement of weight, height, body mass index and blood pressure.

**Results:** Our study group consists 398 children, 173 girls and 225 boys; 10,15% of girls had hypertension and 89,85% had normal BP; 13,5% of boys had hypertension, 3,5% had "high normal" BP and 83% had normal BP. Regarding BMI: 16,18 % of girls were overweight and 9,24% were obese; 21,77% of boys were overweight and 9,33% were obese.

**Conclusions:** both in boys and girls the BMI tends to be higher then 50th percentile; regarding BP also the values both in boys and girls tend to be higher than 50th percentiles, boys had more often "high normal" BP then girls.

## **P1.21. THE CONSUMER'S PERCEPTION OF FOOD ADDITIVES - RISK AND BENEFIT PERCEPTIONS**

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Food, human consumption and their direct impact on quality of life and consumers well-being is the current concern of public health and an integrant part of the international policy and European Union regarding consumers protection and health.

The consumption of food enhanced with additives is highly debated and monitored by European and international bodies. Inadequate food consumption is among the world's principal causes of death, according to World Health Organization (WHO): 14 million deaths per year.

This research consisted in comparing the results obtained by applying a food questionnaire (30 items) for 2 study lots, made of 100 respondents (one at Braşov County Emergency Clinical Hospital's collecting point and another one at a Medical Analysis Laboratory in France).

The main focus of the research is to examine consumer's awareness about the relationship between the low consumption of ultra-processed food rich in additives, reducing the risks they expose to and maintaining a healthy lifestyle.

The questionnaire was structured in 3 categories:

1. Determining the respondents profile based on the socio-demographic data
2. Assessing the awareness about the food additives
3. Assessing the perception regarding the food additives safety, the attitude towards healthy food, the food behaviour determinants, the awareness about the consumption of food enhanced with additives effects, the necessity of improving nutritional information and educational programs.

The lack of an adequate nutritional education and the emergence of imbalances which can generate the development of various pathologies from Romania, is the main reason for doing this research. The purpose is to draw attention to the risk to the population is exposed buying unsafe food products without informing about the manufacturing process, labelling and ingredients list.

## **P1.22. ANTIOXIDANT ACTIVITY OF PIRACETAM AND PHENOBARBITAL "IN VITRO"**

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Oxidative stress has been shown to be associated with aging and age-related diseases, neurodegeneration, cardiovascular disease, Alzheimer disease, Parkinson disease, and amyotrophic lateral sclerosis. Oxidative stress results from an imbalance in the rate of reactive oxygen species (ROS) production and detoxification. In these conditions there is a need of a treatment with the antioxidants.

The aim of present study is to detect serum antioxidant capacity of oxidative stress in the presence of different concentrations of piracetam and phenobarbital

Using SCORE O2 device was detected serum antioxidant capacity in the presence of different concentrations of piracetam and phenobarbital.

The antioxidant activity of the serum in the presence of piracetam is detected at between 273 EDEL and 730 EDEL, corresponding to concentrations 1 -5.5 µg/mL.

The antioxidant activity of the serum in the presence of phenobarbital is detected at between 198 and 471 EDEL units, corresponding to concentrations 10 - 33 µg/mL.

Both piracetam and phenobarbital are antioxidants. The drugs can be given as antioxidants in neurodegenerative disorders.

## **P1.23. THE ANTIOXIDANT EFFECT OF AMIODARONE AND DALTEPARIN**

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Oxidative stress is a pivotal feature of the atherogenesis, and atherosclerotic plaque rupture is a usual reason of the cardiovascular diseases, myocardial infarction and stroke. The redox status is realized when an imbalance exists between antioxidant capability and reactive species.

Reactive oxygen species (ROS), nitrogen (RNS) and halogen species can cause cell injury by directly oxidizing cellular protein, lipid, and DNA.

The purpose of this study is to demonstrate the antioxidant effect induced by drugs amiodarone and dalteparin evidenced by oxidative status changes.

SCORE O2 allows analysing the antioxidant capacity using a sensor that detects in less than 30 seconds EDEL score. This device is based on the detection of the body's antioxidant defence capacity.

It is noted in the presence of serum antioxidant capacity of amiodarone and dalteparin.

The antioxidant activity of the serum in the presence of amiodarone is detected at between 210 and 488 EDEL units, corresponding to concentrations 200 - 1,500  $\mu\text{g} / \text{mL}$ .

The antioxidant activity of the serum in the presence of dalteparin is detected at between 355 and 497 EDEL units, corresponding to concentrations between 100 - 750  $\text{ui} / \text{mL}$ .

Experimental studies have clearly demonstrated antioxidant action of amiodarone and dalteparin.

**P1.24. DETERMINATION OF IBUPROFEN FROM FILM-COATED TABLETS USING HIGH PERFORMANCE THIN LAYER CHROMATOGRAPHY AND IMAGE PROCESSING. COMPARISON WITH THE EUROPEAN PHARMACOPOEIA METHOD**

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**Background:** Ibuprofen is a nonsteroidal anti-inflammatory drug (NSAID) used for treating pain, fever and inflammation. The dosage forms can be tablets, capsules, syrups, suppositories, gels and injections. European Pharmacopoeia (Ph.Eur.) provides for ibuprofen determination the acido-basic volumetric method.

**Aim:** Ibuprofen determination from filmed tablets is affected by presence of interference compounds and sample preparation. Allowing good separation of organic compounds in complex matrix, thin layer chromatography was used instead volumetric determination for quantification. In order to eliminate the errors induced by sample preparation instead of tablets powder, individual tablet as a whole were used.

**Method:** Thin layer chromatography was performed on HPTLC Sil G F254 precoated plate using toluene-ethyl acetate-acetic acid (17:13:1, v/v) as mobile phase. Volumetric analyses as described in European Pharmacopoeia were also carried out.

**Results and discussion:** The analysed tablets meet the requirements of the weight uniformity test; the average weight was 619.15 mg/tb with a relative standard deviation (RSD) of 0.55%. Ibuprofen content, determined according to European Pharmacopoeia, was 416.85 mg/tablet (RSD=1.24%). Using TLC analysis, the ibuprofen content in powder and whole individual tablets was 405.2mg/tb (RSD=0.94%) and 399.6mg/tb (RSD=0.7%) respectively.

**Conclusion:** Ibuprofen content of film-coated tablet can be successfully determined using individual whole tablet and HPTLC coupled with image processing techniques.

## **P1.25. PERSONALIZED DIET - THE WAY TO IMPROVE THE HUMAN HEALTH**

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Recent studies indicated that consumers were concerned about protection of their health status, and trust in regulators and personalised nutrition service providers.

Personalized nutrition is based on research studies that inform how dozens of health markers, including your metabolism and genetics, impact your optimal nutrition. Specific studies were performed to correlate DNA, metabolism, body measurements, and activity level of different individual people.

Since different people have different responses to food (composition, way of cooking, way of serving), we have to find out what our personal response are and plan what we eat accordingly.

Based on the results of analytical laboratories, medical databases need to be creates in order to help people to find the best plan for its personalized nutrition.

The new business model of personalized nutrition needs to combine data concerning consumers/patients – insurance, medical profession, type of dietician, place (school, retirement places, wellness/fitness centres, hospitals).

**P1.26. ELECTROCHEMICAL DETECTION STRATEGIES OF  
ANTIOXIDANT ACTIVITY OF RESVERATROL  
AND CAFFEIC ACID**

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In the last three decades the importance of the subject of oxidative stress and antioxidant protection against oxidative stress has been increasing.

Reactive oxygen species (ROS) describe very reactive molecules containing oxygen, their high reactivity being given by the presence of unpaired electrons in the valence shell. Bio-analytical tools devoted to the assessment of ROS have been applied both in ROS toxicity and antioxidant analysis.

Sensor performance assessments, which involves providing the associated values of several performance parameters: accuracy of determination, reproducibility, lifetime, operational stability, storage stability, and validation of the sensors response.

Polyphenols are important naturally antioxidants, commonly found in fruits, vegetables and medicinal plants, and have been found to have a protective role against many chronic human diseases associated with oxidative stress.

We choose for our experiments caffeic acid and resveratrol to be tested using electrochemical method as Different Pulse Voltammetry. We used screen-printed carbon electrodes DRP 110 coupled to a PalmSens 3 potentiostat analyser, Data analysis was done using PS Trace 3.2 software.

Calibration curves obtained for qualitative and quantitative analysis of resveratrol and caffeic acid, at different pH values.

There were observed the dependence of the measured signals by versus pH of samples, as well as different sensitivities - high slope corresponding to high sensitivity of electrochemical detection.

## **P1.27. A PSYCHOACTIVE PLANT USAGE IN TEENAGERS – CASE REPORT**

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**Introduction:** Teenagers are frequently admitted in hospital after using psychoactive substances (drugs, new designed substances and plants) associating especially cardiovascular and pulmonary complication beside hallucinations and delirium.

**Case report:** A male teenager aged 15 was sent for extreme agitation, hallucination, delirium and tachycardia from a county hospital to the Toxicology Department in "Grigore Alexandrescu" Emergency Children Hospital in Bucharest to establish the correct diagnose and treatment. He had no signs of trauma and neurological and cardiovascular disease history. At admission he also presented high blood pressure. Blood alcohol test was negative and urine toxicological screening was negative.

After two hours from his admission, same county hospital contacted the Toxicology Department to send another male teenager 16 years old that came at the emergency room with the same symptomatology. Blood alcohol was negative and urine toxicological screen test was positive for THC (tetrahydrocannabinol from marijuana). Patients received supportive treatment and vital functions monitoring. After 12 hours hallucinations and delirium disappeared and the teenagers told medical staff that they were good friends and have consumed together *Datura stramonium* seeds in the previous night, before the symptomatology appeared. The second teenager admitted marijuana usage 48 hours before. Tachycardia and blood hypertension persisted for 24 hours, than clinical status became normal. No antidote administration was needed.

**Discussions:** *Datura stramonium*, fam. *Solanaceae*, originates in Mexico, but now is present worldwide. It was used in traditional medicine to treat asthma and as analgesic. It is a powerful psychoactive hallucinogenic plant that has a high content of tropane alkaloids (atropine, scopolamine and hyoscyamine) in its seeds. All these substances can produce delirium, hallucinations, tachycardia and hyperthermia and in large doses even death. Symptoms may persist between 24 hours to one week. If complications occur, antidote (physostigmine) can be injected.

**Conclusion:** Different plants can be used for their psychoactive properties, but not for all of them specific toxicological diagnostic tests are available. Medical staff must be aware of this poisoning possibility to proper monitor and treat patients that use abuse substances.

**P1.28. THE SIMULTANEOUS OCCURRENCE OF THE BCR-ABL  
TRANSLOCATION AND THE JAK2V617F MUTATION.  
DETECTION AND DYNAMICS EVOLUTION IN TWO CASES OF  
CHRONIC MYELOPROLIFERATIVE NEOPLASMS**

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The concomitant occurrence of two markers defining two different myeloproliferative neoplasms is a rare, but not impossible event.

Although the discovery of the BCR-ABL transcript and of the Jak2 V617F mutation lead to some important clarifications, the pathogenesis of chronic myeloproliferative neoplasms remains extremely complex and still presents several unknowns.

We present two different situations with simultaneously occurrence of two mutations that are considered mutually exclusive.

First case is a Ph+ CML in treatment with Imatinib who developed after four years Jak2V617F positive PV. The second case is a PV diagnosed in 2003 based on standard clinical and biological criteria who developed after seven years Bcr-abl positive CML.

Particular cases showing the simultaneous presence of both markers contradict the idea that these mutations would exclude each other and raise new questions over the pathogenesis of MPNs.

Nowadays an accurate diagnosis of MPN subtype (P, ET, PMF) requires more tests of molecular biology: Jak2 exon 12 mutations, MPL, newly discovered CALR mutations.

Bcr-abl and Jak2V614F mutation detection maintain important as screening tests and even more, performing them simultaneously is highly recommended..

*New Trends on Sensing- Monitoring- Telediagnosis for Life Sciences,  
– August 30 - September 1, 2018, Brasov, Romania*

## **2. New Trends in Nutritional Sciences and Food Control**

## **KN2. PHYTO-MOLECULAR TASTE: A BRIDGE BETWEEN TRADITIONAL KNOWLEDGE AND MODERN SCIENCE**

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Taste is an important ethnopharmacological descriptor of medicinal plants and a criterion for herb selection in various systems of traditional medicine. Phyto-molecular taste is a new concept, recently introduced by us in 2018, defining the combination of tastes imparted by the major phytochemicals found in a plant.

The purpose of the presentation is to explain the significance of the phyto-molecular taste in the context of ethnopharmacology and bioscientific paradigm, as well as its potential applications in pharmacognosy and bioprospection.

We shall also present PhytoMolecularTasteDB, an open access database of Indian medicinal plants built by integration of modern data (medicinal plant composition, phytochemical taste) with ethnomedical data (ethnopharmacological activities of plant). PhytoMolecularTasteDB contains 431 Indian medicinal plants, 94 ethnopharmacological activities, 223 chemical classes of phytochemicals and 438 plant-derived tastants.

According to our studies the phyto-molecular taste may be more relevant than chemical class of the constitutive phytochemicals for the prediction of the ethnopharmacological activities of the medicinal plants. We shall provide some reasons why these results, paradoxical as they may seem, are not, however, incompatible with the bioscientific paradigm. Taking into account the recent discovery of extraoral taste receptors and their physiological roles, our results also suggest a potential mode of action for traditional medicines, which requires further experimental and clinical investigation.

## **02.1. APPLICATIONS OF NANOMATERIALS IN FOOD PACKAGING AND FOOD SAFETY – AN OVERVIEW**

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The latest developments in nanoscience and nanotechnology led to innovative applications in the food sector tending to match the applications of these in biomedicine and pharmacy. Nanotechnologies applications in food it splits in two main directions:

1. nanostructured systems in food such as liposomes, nanoemulsions, and microemulsions and
2. nanopackaging materials in which could be encapsulated functional compounds.

The first systems could enhance solubility, improve bioavailability, facilitate controlled release, and protect bioactive components during manufacture and storage. The second system is more related to food packaging for extending the shelf life of certain food using active packaging systems based on antimicrobial activity of some natural microencapsulated compounds.

Essential oils from natural herbal, the odorous, volatile products of some plant's secondary metabolism are already demonstrated antimicrobial agents that could be used to control food spoilage and foodborne pathogenic bacteria using microencapsulation in the packaging materials. This review gives an overview of nanostructured materials, and their current applications and future perspectives in food science.

## **O2.2. VALORISATION OF WINERY BY-PRODUCTS – TRENDS AND APPLICATIONS**

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The agriculture and food industry generates large quantities of by-products, which, being unused, turn into waste with a negative impact on the environment.

Grapes are of one of the agri-food products of high economic importance and a long tradition of cultivation in Romania and France. Therefore, the valorisation of the winery by-products is of high interest from the economic point of view as well as for the environmental protection.

In our studies were evaluated the antioxidant and antimicrobial properties of the by-products from grape processing. These properties could be exploited for applications in the food, pharmaceuticals, cosmetic industry, or wastewater treatment. For this purpose, there were developed and applied methods specific for the assessment of the antioxidant and antimicrobial activity of by-products from winemaking and the use of the extracts obtained from these by-products for the treatment of wastewater from the melting of hemp.

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### **O2.3. EFFECTS OF FIXED ORTHODONTIC TREATMENT ON THE DIET OF ADOLESCENT PATIENTS**

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**Background:** Orthodontic treatment is a source of physical, physiological and emotional stress that increases the mobilization and use of nutrients, thus increasing the nutritional requirements of the person. Also, the nutritional needs of adolescents are already stressed by growth and development as well as the emotional stress of puberty, the maintenance of a well-balanced diet is of great importance.

**Aim:** The aim of this qualitative study was to evaluate how patients change their diet due to fixed orthodontic treatment.

**Method:** The study was conducted by administering a questionnaire to a group of patients aged between 12 - 16 years scheduled for fixed orthodontic treatment. Questions were developed by the research team, aiming to help assess the effects of fixed orthodontic treatment on dietary behaviour. Scores for all items were summed, higher scores reflecting more dietary behaviour changes.

**Results and discussion:** Patients reported pain and discomfort during the first days of treatment that began to decrease in intensity during the first week, being more severe during the morning. Patients reported eating and chewing difficulty because of pain, and this resulted in eating a softer diet.

**Conclusion:** The results of study demonstrate that patients with fixed orthodontic treatment go through changes in food items that should not be underestimated, and this requires further investigation in a large population study. However, these diet changes seem to have potential benefits because most patients considered that their eating habits were healthier than those prior to the application of the fixed orthodontic appliance.

## **O2.4. GREEN TEA, COFFEE AND CHOCOLATE – THE TYPICAL SOURCES OF ANTIOXIDANTS**

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**Background:** With appearance of new trends in a healthy lifestyle, people are searching for alternative sources of nutrition with a high content of antioxidants. Recently, green tea, coffee and chocolate have become known sources of nutritional antioxidants, and their effect has been extensively studied.

**Aim:** To compare antioxidant capacity (AOC) and total phenolics (TP) of green tea, coffee and chocolate of different origin and to study the influence of preparation procedure on the consumable antioxidants.

**Methods:** AOC by DPPH• assay, TP by Folin-Ciocalteu assay

**Results and discussion:** Among green tea samples matcha tea infusions possess the highest AOC and TP. The antioxidants' content in tea infusions can be increased by extending the extraction time and/or by increasing the water temperature. Most of antioxidants are extracted by 1 dL of water, whereas macha tea antioxidants are extracted to a bigger extent with higher amounts of water. As for coffee, the biggest influence on AOC and TP can be assigned to the preparation procedure; preparation of espresso coffee with higher water pressure giving more than the double values compared to the filter coffee. Furthermore, the higher amount of water results in higher AOC and TP, whereas the addition of milk does not have noticeable influence. Among chocolate samples the highest AOC and TP were determined in raw cocoa, followed by dark chocolate and milk chocolate, whereas the white chocolate showed negligible AOC and TP.

**Conclusion:** The antioxidants' content strongly depends on a source and preparation procedure.

### ***Acknowledgments***

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## **O2.5. AGRO-FOOD WASTE VALORISATION**

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**Background:** Agro-food waste has a high nutrient content and minimal toxicity and often contains high added value substances thus making them optimal for their valorisation into bioenergy, biocompounds, materials, bio-fertilisers, animal feedstock or nutraceuticals and pharmaceuticals.

**Aim:** To demonstrate and validate novel processes, practices and products for the sustainable use of agro-food waste, which have been tested and evaluated from a technical, environmental and socio-economical point of view.

**Method:** Agro-food waste (walnut leaves, grape seeds, tomato seeds and skin) was used as raw material. Samples of agro-food waste extracts were obtained at different extraction methods and parameters. The content of bioactive compounds and their antioxidant profile were evaluated.

**Results and discussion:** The bioactive compounds concentrations were taken as the output factor, and it was established the final form of the second order regression equations characterizing the extraction processes of lycopene, tocopherol,  $\beta$ -carotene and phenolic compounds. The regression equations allowed the optimization of the response using the gradient ascension method, thus establishing the optimal extraction parameters of the bioactive compounds.

**Conclusion:** The study confirms that the agro-food waste is a cost-effective and readily-exploitive source of bioactive compounds. From a practical perspective, this will increase the economic viability and may assist in a more efficient valorisation of industrial agro-food waste.

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## **O2.6. PLANT FOOD SUPPLEMENTS: FROM EFFICACY TO ADVERSE EVENTS**

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**Background:** Plant Food Supplements (PFS) have received a growing interest among consumers with a consequent expansion of the market in which thousands of products and hundreds of producers are now present.

Food supplements are regulated by the food law and their efficacy must be limited to the maintenance of homeostasis/wellbeing, and to the modulation of the risk factors for chronic illness (cancer, cardiovascular diseases, dementia, diabetes, etc.).

**Aim:** The aim of this lecture is a review on risk and benefit assessment of PFS, using experimental experiences obtained by the authors during and after the European Project PlantLIBRA.

**Methods:** Different in vitro and in vivo tests useful to investigate the efficacy of botanicals will be described. Data on adverse effects from international bodies will be used to focus the importance of phytovigilance in protecting the consumers.

**Results and discussion:** The presentation will describe some practical examples of benefit/risk evaluation, with the indication of the most important problems, including strategies to reduce the complexity of human studies. Suggestions to improve the phytovigilance system will be considered taking into consideration the international sources of information.

**Conclusion:** The inclusion in the human diet of functional foods and food supplements rich in active molecules is important in maintaining homeostasis and wellbeing in populations characterized by a long life-span and stressing habits. The great interest shown by consumers in this sense must ensure surveillance in the chemical quality of botanical derivatives, the plant identification and the safety both in term of tolerability and absence of contaminants.

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## **O2.7. DEVELOPMENT AND APPLICATION OF FAST METHODS TO MEASURE THE PHENOLIC PROFILE AND ANTIOXIDANT ACTIVITY IN YELLOW AND PURPLE CORN (ZEA MAYS L.)**

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**Background:** Oxidative stress is considered one of the mechanisms responsible for the gluten toxicity in sensitive patients. Among cereals, maize is used as an alternative to wheat in the gluten-free diet. Previous studies reported a significant antioxidant activity of white corn polyphenols, which are classified as soluble/free and bound/insoluble forms. Pigmented corns contain other active molecules such as anthocyanins, carotenoids and phenolic compounds with well-known bioactive properties.

**Aim:** The aim of this study was the development of rapid methods for the characterization of phenolic profile and the evaluation of antioxidant activity, which were applied to different maize phenotypes.

**Methods:** One purple corn, three yellow corns and three hybrids were analysed. Two extraction methods were applied for the evaluation of free and bound phenolic compounds. Then, different *in vitro* techniques were applied: 1) spectrophotometric assays for quantitative determination of phenolic content and antioxidant activity 2) High Performance Thin Layer Chromatography for the separation and semi-quantitative characterization of phenolic substances, assessing in parallel the associated antioxidant activity.

**Results and discussion:** All analytical methods presented in this study showed a similar and comparable trend. Hybrid varieties showed an interesting antioxidant profile in terms of free and bound phenolic compounds.

**Conclusions:** The methods developed in this study could offer important tools for the determination of antioxidant activity in corn. Among samples analysed, hybrid varieties presented an interested antioxidant activity and could improve the nutritional and sensory quality of gluten-free products.

## **O2.8. NUTRITION AND HEALTH BENEFITS OF MUSHROOM BETA-GLUCANS AND OTHER BIO-ACTIVE COMPOUNDS**

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Beta-glucans are structural polysaccharides of fungal cell-wall. Due to their multiple functional and bioactive properties they are gaining growing interest. Fortification of ordinary foodstuff with beta-glucans will lead to increase the fiber content of food products and at the same time will enhance their health properties.

Beta-glucans can influence activity of immune cells and normalize various pathological disorders associated with immune deficiency or with the metabolic syndrome. Beta-glucans can help to weight –control, decrease of cholesterol and glucose levels in blood serum, and stimulate the growth of beneficial *Lactobacilli* and *Bifidobacteria*, which are antagonists to pathogenic bacteria in the digestive system.

Various enzymes of mushroom origin also can find their application in food and pharmaceutical industries.

## **O2.9. OREGANO (ORIGANUM VULGARE) EXTRACT AS AN INHIBITOR OF FISH SPOILAGE BACTERIA**

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Aquaculture is fast growing food-producing sector. However, majority of fish is used as fresh, chilled fish meat and a major problem remains wastage, since over a third of global fish production is lost as quantitative and qualitative loss. Fresh fish are an extremely perishable food. Bacterial growth and metabolic activity significantly contribute to spoilage of fish meat.

We prepared an ethanolic extract of oregano (*O. vulgare*) flowers, characterized its main phenolic compounds with UHPLC-PDA-ESI-MS methodology and tested it for inhibition of fish meat spoilage bacteria – first *in vitro* against *Pseudomonas fragi*, *P. psychrophila*, *Shewanella putrefaciens* and *S. xiamenensis* with broth and food model microdilution test. Further, kinetics of growth/inhibition were tested in a food model challenge test at 5 °C. The selected concentrations were used *in situ* for dip treatment of fish meat. Microbial quality was monitored until day 9 of refrigerated aerobic storage by mesophilic, psychrotrophic, *Pseudomonas* and H<sub>2</sub>S producers count.

Antimicrobial efficiency was lowered in a food model, what confirms that meat components significantly affect the activity of natural extracts. Inhibitory concentration (3.13 mg/mL) affected growth of selected strains over 9 days of observation in food model challenge test, *Pseudomonas* and *Shewanella* strains were inhibited for 1 and 2 log cfu/mL, respectively. However, when applied to fish meat, the concentration in dipping solution had been doubled to inhibit significantly ( $p < 0.05$ ) fish meat bacteria, especially of H<sub>2</sub>S producers. As mesophilic count of 6 log cfu/g has been critical that fish meat is at or near spoilage, such treatment significantly prolonged its microbial acceptability and thus fish meat shelf-life, with inhibition of strains responsible for off-odours.

**Acknowledgment:** The authors acknowledge the support from the OEAD and ARRS agencies, through Austrian-Slovenian bilateral project BI-A-SI 01/2016-17, ARRS for financing P4-0116 and Erasmus grant for C.P.

## **O2.10. DETERMINATION OF VITAMIN K1 USING SQUARE WAVE ADSORPTIVE STRIPPING VOLTAMMETRY AT SOLID GLASSY CARBON ELECTRODE**

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**Background:** Monitoring of lipophilic vitamins in the foodstuffs, food supplements, and body fluids is important in many branches such as food technology, safety control, and clinical diagnosis. Nowadays, analytical methods dominantly based on high-performance liquid chromatography (HPLC) are characterized by time-consuming sample preparation and high acquisition costs of instrumentation. Unlike this, simple voltammetric methods can be completely used as alternative way.

**Aim:** Development of a low-cost electroanalytical method suitable for routine determination of phyloquinone (vitamin K1) occurring in food samples of plant origin.

**Method:** Presented method is based on adsorptive accumulation of this biologically active compound onto nonpolar surface of freshly polished solid glassy carbon electrode (GCE) from a suitable aqueous-organic mixture with subsequent electrochemical detection using square wave adsorptive stripping voltammetry (SWAdSV) in 0.1 M HCl.

**Results and discussion:** Two linear ranges of phyloquinone determination were 0.01–1.0  $\mu\text{M}$  and 5.0–100  $\mu\text{M}$  with the detection limit of 8.9 nM. It provides in many cases better analytical performance than the recently developed electroanalytical methods, namely without utilizing health risky mercury or economically disadvantageous nanoparticles.

**Conclusion:** Anodic SWV mode used for the detection allows working in the presence of dissolved air oxygen and, what is more important; there is a real possibility of the simultaneous determination of vitamin K1 with other lipophilic vitamins. In the comparison with the HPLC method (EN 14148:2003), the electrochemical approach offers significant benefits: lower consumption of organic solvents, easier sample preparation, which is based only on dissolution of the sample in the suitable aqueous-organic mixture, and less costs comparing to HPLC. Agreement of results calculated using SWAdSV at GCE and standard HPLC method shows that the new electrochemical method can represent a possible complementary reference method, because it is based on the completely different analytical basis. It can be assumed that proposed electroanalytical method could find its use in the routine food analysis in small laboratories, which cannot afford a sophisticated chromatographic instrumentation. *Mobility funding from CEEPUS CIII-CZ-0212-10-1617 network is gratefully acknowledged.*

## **O2.11. NEW TRENDS IN INFANT NUTRITION**

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**Background:** Infancy is a period of important and impressive acquisitions in a child's life: it's weight at birth triples at one year old, the body length almost doubles, some of them start walking on their own feet without help, some grow their first teeth and start saying their first words. A lot of physiological changes also occur: brain has an accelerate rate of growth with neuron myelination and new synapses development, enzyme and metabolic functions are improving continuously, kidney function is maturing, microbiome starts colonizing different regions of the organism. All these changes need a continuously adapting nutritional support provided by specific infant food.

**Aim:** To present new trends in infant food composition and time of introducing new nutrients, and also how they can be adapted to different pathologies.

**Method:** Important new data were selected from the European Society for Paediatric Gastroenterology Hepatology and Nutrition (ESPGHAN) guidelines and articles published on Web of Science about infant nutrition indications and specific health conditions and incidents.

**Results and discussions:** Recommendations and nutrition guidelines have to be adapted to each infant's specific needs and health condition, trying to offer all support for achieving best potential.

**Conclusion:** Infant personalized adapted nutrition represents an important part in achieving best physical and neurocognitive adult status development.

## **P2.1. SIMILARITIES AND DIFFERENCES BETWEEN GRAN CANARIA'S AND TRANSYLVANIAN'S TRADITIONAL LIVING AND FOOD SUSTAINABILITY**

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Biodiversity models in Gran Canaria could be considered as comprehensive approaches to recover the traditional food systems in Gran Canaria

The project „The Island on your Plate” promote the use of local traditional food biodiversity, underlining the food system sustainability for peoples. This recent local initiative, analyse different places from the island, with regard to agriculture and environmental preservation.

Based on the gained experiences from Spain, similar initiatives are welcome also in different parts of Romania or other countries.

The aim of this paper is to present a short overview concerning the similarities and differences between Gran Canaria's and Transylvanian's traditional living, from the point of view of location, family profile, house building, plants and animals, and specific food.

**Acknowledgments:** *This work was supported by the grants of UTBV for international motilities of MB and LF in ULPG, Spain and we are grateful to LSM for this opportunity.*

## **P2.2. THE INFLUENCE OF PEDOCLIMATIC CONDITIONS ON THE POLYPHENOL CONTENT OF SOME ROSACEAE SPECIES**

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**Background:** The *Rosaceae* species are intensively used as medicinal plants in classic phytotherapy, but also by the more newly developed gemmotherapy. Because the parts of the plants with meristematic tissues used in gemmotherapy are poorly known as chemical composition, it is very important to determine also if the bioactive compounds content is influenced by the different pedoclimatic factors, as the temperature at the harvesting time.

**Aim:** This study presents the total phenolic acids and flavonoids content respectively antioxidant capacity variations with the temperature at harvesting time of three gemmotherapeutic extracts obtained from *Crataegus oxyacantha* and *Rosa canina* young shoots, respectively *Prunus spinosa* buds.

**Method:** The determinations were performed by UV-Vis spectrophotometry, using the modified Folin-Ciocalteu method for phenolic acids, the aluminium chloride method for flavonoids respectively the FRAP and SNP methods for antioxidant capacity.

**Results and discussion:** It can be observed a decrease of 13-35 % of flavonoids content with the increase of temperature. The phenolic acids content decrease in same way at young shoot extracts (24-35 %) and increases at bud extract (29 %). The antioxidant capacity variation is same with those of phenolic acids content variation.

**Conclusion:** The study demonstrate that among other pedoclimatic conditions the temperature at harvesting time influence the polyphenols content of the species from *Rosaceae* family and the parts of the plants with meristematic tissues. The study also confirm that at the buds opening the flavonoids content is decreasing, probably because they are used as energetic compounds for an intensive cell division and differentiation.

### **P2.3. INNOVATIVE STRATEGIES FOR ELECTROCHEMICAL ANALYSIS OF ANTIOXIDANT CAPACITIES OF GALLIC ACID**

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We decided to carry out our study for detection of gallic acid using some electrochemical methods taking into account that all the biological and dietary antioxidants, are molecules that shown a moderate-marked native electro activity

Detection of gallic acid in phosphate buffer pH 7.0 give back the best feedback

The linearity was founded for a big range of concentration and the stability of the sample was good.

Gallic acid tested in buffer pH 8.0 produce two different peaks that can be used for future studies, even if they are not accurate and clear like the peak at pH 7.0

Also the results with pH 5.8 are good and acceptable, the sample, probably due to the medium-acidity of the buffer is a little bit less stable than the other experiments

**Acknowledgments:** *This work was done by a collaborative team, in the frame of Erasmus Plus partnership*

## **P2.4. ADVANCES IN AFLATOXIN M1 DETECTION BASED ON FLOW INJECTION ANALYSIS AND SCREEN PRINTED ELECTRODES**

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Aflatoxin M1 represents the principal hydroxylated metabolite of aflatoxin B1, which can be detected in animal tissues and fluids (urine and milk). Contamination with AFM1 occurred not only in milk, but also in dairy products from cow milk, especially in cheese. Due to the high stability of AFM1 towards milk processing technologies, such as pasteurization and ultra-high temperature heating (UHT), and to other dairy product processing methods, this mycotoxin can be found, usually at higher concentration than that found in raw milk.

An electrochemical platform has been developed and integrated into an on-line flow injection immunoassay system for sensitive detection of AFM1.

The configuration of the immunoassay system for AFM1 detection is based on the direct competition between AFM1 and its conjugate, AFM1 labelled with horseradish peroxidase (AFM1-HRP) for the specific monoclonal antibody of AFM1. The amount of the AFM1-HRP captured by the monoclonal antibody is electrochemically determined by using 3,3',5,5'-tetramethylbenzidine (TMB) as substrate for the peroxidase at a screen printed carbon electrode (DropSens) modified with a co-polymeric film, which was inserted in an appropriate flow cell.

Cyclic voltammetry and amperometry studies were conducted for characterisation and optimization of the experimental conditions for amperometric determination of HRP activity in the flow injection analysis conditions. The working potential has been optimized and decided to be +0.1 V, while the optimum concentrations of TMB and respectively H<sub>2</sub>O<sub>2</sub>, were set at 0.5 mM and respectively 10 mM. By chronoamperometric measurements at the optimum applied potential was possible to determine the electrochemical active compound and consequently the AFM1 concentration.

**Acknowledgments:** *This work was supported by a grant of the Romanian National Authority for Scientific Research and Innovation, CCCDI – UEFISCDI, project number ERANET-MANUNET II -TOX-HAZ-ASSESS, within PCCDI III.*

## **P2.5. PLANT GROWTH PROMOTING PROPERTIES OF FUNGAL STRAINS CULTURED ON KERATIN WASTE SUBSTRATES**

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Keratin is an insoluble and resistant fibrous protein derived from living organism. Industrial and agricultural activities lead to the accumulation of keratin wastes causing environmental problems. It is of interest to extract and use keratin from organic wastes due to the high level of proteins, appreciatively 80-90%. A viable and ecological way is the biological degradation of keratin wastes by keratinolytic microorganisms through the activity of keratinolytic enzymes. Keratin hydrolysates have found multiple applications in diverse fields, such as, animal feed, bio-fuel, exhaustion of chrome in tanning effluents and cosmetics<sup>1</sup>. In addition, it has been reported that various keratinolytic microorganisms are able to produce potential plant growth-promoting effects<sup>2-6</sup>. The protein hydrolysates obtained from cultures of keratinolytic fungal strains are rich in amino acids and polypeptides and can be used as fertilizers.

The purpose of this study was to evaluate the effect of several keratinolytic fungal strains in growth and development of plants. The fungal isolates were cultured on media containing keratin wastes, good nitrogen sources (feather, hair and wool). The fungal filtrates were applied on tomato seedlings (*Solanum lycopersicum*) and after a period of incubation the roots and plant height were measured and compared control. Several strains were selected for good plant growth promotion activity. The obtained results demonstrated the viability of the treatment which could offer many economic and environmental advantages over conventional chemical agents.

***Acknowledgments:*** *This work was supported by a grant of the Romanian National Authority for Scientific Research and Innovation, CCCDI – UEFISCDI, project number PN 18.220101/2018.*

## **P2.6. NEW APPROACHES FOR ELECTROCHEMICAL DETECTION OF CURCUMIN**

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Curcumins are phytochemical polyphenols with antioxidant properties, belong to the Zingiberaceae family, commonly known as *Curcuma longa*.

Curcumin is evaluated as a source of functional food in industrial products due to its wide use for biological and pharmacological purposes, the powder form being consumed as a spice, the root of the can be boiled or the plant being used as a tincture.

It possesses anti-inflammatory, antibacterial, antiviral, hypocholesterolemic, anticancer properties and actively intervenes in the treatment of several diseases such as circulatory disorders, hematoma, dislocation, contusion, muscular fever, hepatobiliary disease, jaundice, ulcerative colitis, Crohn's disease, rheumatoid arthritis, respiratory infections, many types cancer, Alzheimer's and neurodegenerative pathologies.

The primary objective of this study is to develop a method for the electroanalytic determination of curcumin.

Practical work was carried out using a PalmSens 3 device with carbon printed electrodes (C-DRP 110). Differential pulse voltammetry was performed for testing different solutions of curcumin, at different pH values. The curcumin solution was made from powder of *Curcuma longa* with 99% purity. The experiments were repeated at least twice in the same experimental conditions.

The calibration curves were made using the values of potential, height and area of the peaks obtained using PStace software.

## **P2.7. DETERMINATION OF LIPOIC ACID AND LIPOYLLYSINE IN PLANT TISSUES**

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**Background:** Humans can synthesize lipoic acid (LA) *de novo* from fatty acids and cysteine, but only in very small amounts. Therefore, LA needs to be absorbed from exogenous sources. LA is widely distributed among microorganisms, plants and animals. In cells it acts as a cofactor in three multienzyme complexes, catalysing the oxidative decarboxylation of  $\alpha$ -keto acids. In these complexes LA is covalently bound via its carboxyl group to the  $\epsilon$ -NH<sub>2</sub> group in the lysine residue(s) (lipoyllysine).

**Aim:** The aim of our research was the development of a precise determination method for lipoyllysine (LLys) and LA in plant tissues.

**Method:** The presented method is based on hydrolysis of the proteins containing LA, reduction of disulfide bonds with tris(hydroxymethyl)phosphine and pre-column derivatization of free thiol groups with 1-benzyl-2-chloropyridinium bromide, followed by reversed-phase HPLC separation and ultraviolet detection. Baseline separation was achieved on Poroshell 120 C18 (75 × 4.6mm, 2.7 $\mu$ m) column with a mobile phase consisting of 0.5% acetic acid solution, pH 2.81 (A) and acetonitrile (B) pumped at 1 mL/min with elution profile 0-6 min, 9-21% B; 6-11 min, 21-30% B; 11-13 min, 30-9% B; 13-16 min, 9% B.

**Results and discussion:** The calibration curves for LA and LLys were linear in the tested range with correlation coefficients better than 0.99. The precision, expressed as relative standard deviation did not exceed 15% for both analytes.

**Conclusion:** This developed method is simple, reproducible and it is the first report for the determination of LA and LLys in plant tissues by HPLC-UV.

**Acknowledgments:** *This work was supported by grant No. 2016/23/N/NZ9/00071 from the National Science Centre, Poland.*

## **P2.8. METHODS OF DETECTION OF NON-ENZYMATIC ANTIOXIDANT SYSTEMS**

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Smoking is a risk factor for a variety of conditions (cardiovascular disease, chronic pulmonary disease, stroke, Alzheimer's, Parkinson's).

The main components of smoke dependence - nicotine, carbon monoxide, nitrogen and free radicals (superoxide, hydroxyl, hydrogen peroxide and reactive oxygen) cause a decrease in the production capacity of antioxidant systems due to increased production of reactive oxygen species (ROS).

Smokers constantly overexposed to free radicals contained in tobacco cause depletion of vitamin deposits in plasma and tissues.

Glutathione protects cellular components from the effects of hydrogen peroxide and other hydroperoxides by providing reduction equivalents. Long-term exposure to cigarette smoke causes a reduction in GSH levels.

In this work are indicated results obtained for detection of glutathione and cysteine using their electroactive properties at different pH values.

Electrochemical testing of glutathione and cysteine using differential pulse voltammetry (DPV) has been successful. Tests will also be performed using other experimental conditions (and for other compounds) and on real samples.

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## **P2.9. GOAT MILK YOGHURT WITH HIGH BIOLOGICAL PROPERTIES**

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**Background:** Goat milk products have valuable nutritional properties for humans. The main advantage of goat milk is the physico-chemical properties of its proteins and fats. Small fat cells are easily absorbed by the body, so they have a higher digestibility.

**Aim:** The aim of this research is the scientific development of new technologies for goat milk yoghurt with high biological properties and improved sensory properties.

**Method:** The research was conducted with physico-chemical, microbiological and technological standard methods, in accordance with the ISO (*Official Methods of Analysis of AOAC International*). To determine the self-life of goat milk yoghurt, the statistical method was used.

**Results and discussion:** In this research some new methods and processes were used: establishment of specific technological features for goat milk yoghurt procedures and assessment of correlation between the chemical composition and sensory properties of the product. Yoghurt samples had increased organoleptic and chemical properties.

**Conclusion:** Research results will contribute to the diversification of products technology through valorisation of emerging technologies to meet the demands of consumers and development of investigations in the field of food biotechnology, offering a high potential for application (scientifically justified process for producing goat milk yoghurt with high biological properties).

**Acknowledgments.** *This work was done in the framework of Project No. 16.80012.51.23A “Innovative product from goat milk with high biological properties” (InoBioProd), cofounded by the Ministry of Agriculture and Food Industry and coordinated by the Academy of Science of Moldova.*

## **P2.10. VOLTAMMETRIC DETERMINATION OF THYMOL USING PLATINUM ELECTRODE**

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**Background:** Thymol (2-isopropyl-5-methylphenol) is a low-molecular-weight phenolic compound exhibiting antimicrobial, antioxidant, analgesic, and anti-inflammatory properties. The effectiveness of thymol as an active ingredient in food, medicines, and cosmetic products depends on its concentration in these products. Its natural source is provided by plant, as for example: thyme (*Thymus vulgaris*). Being a redox active compound, electrochemical technique could be an alternative method for its detection.

**Aim:** The goal of this study was the application of an electrochemical method for detecting thymol in synthetic and real samples (natural extracts).

**Method:** Cyclic- and square wave voltammetry were used as investigation methods. At a PGSTAT-302 computer controlled potentiostat (Metrohm-Autolab) was connected an electrochemical cell equipped with platinum electrode as working electrode, a platinum wire as counter electrode and an Ag/AgCl, KCl<sub>sat</sub> as reference electrode.

**Results and discussion:** The analysis of voltammograms showed that the oxidation process of thymol on platinum electrode is an irreversible one occurring at 0.567 V vs. Ag/AgCl, KCl<sub>sat</sub>. Also, it is probably that oxidized species form a coating of the electrode surface, blocking the active surface; therefore the electrode has been polished after each measurement. In an attempt to optimize the experimental parameters of square wave voltammetry the influence of frequency, amplitude, potential step and accumulation time on the thymol detection were studied.

**Conclusion:** The calibration curves obtained in synthetic solution of thymol and real samples of ethanoic extract allow the estimation of analytical parameters and of the unknown concentration, respectively.

**P2.11. ELECTROCHEMICAL DETECTION OF  
ORGANOPHOSPHORUS PESTICIDES**

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Biosensors are designed to supplement the information obtained using classic methods or to replace the existing reference methods of analysis (for example, chromatographic methods), simplifying or eliminating sample preparation, thus reducing the analysis time and cost.

The state-of art in microfabrication technology has stimulated the development of the "microscale electrochemistry" approach. The miniaturization of entire analytical processes as lab-on-chip provides advantages that will open new areas of application. Advantages include extremely small sample size, parallel processing, automation, speed, disposability, and portability.

Organophosphorus pesticides are some of the target analytes detected using electrochemical detection. Different designs of enzyme-based biosensors are presented in this work, with their advantages and disadvantages, versus classical analytical methods.

*New Trends on Sensing- Monitoring- Telediagnosis for Life Sciences,  
– August 30 - September 1, 2018, Brasov, Romania*

### **3. New Trends in Engineering Sciences Applied in Life Sciences**

### **KN3. MULTIFUNCTIONAL COATINGS FOR PROMOTING OSSEOINTEGRATION AND FOR PREVENTING INFECTION OF METALLIC IMPLANTS**

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Nowadays great efforts are dedicated to the development of biomaterials with tuneable properties. In the clinical practice, there is a massive demand for implants with high resistance to infection, especially following a short period after insertion. Thus, the challenge is to find a solution for improving the antibacterial properties of implants, without affecting their osseointegration abilities

The goal of the present contribution is to show which is the effect of Ag addition on in vitro bioactivity and degradation characteristics of hydroxyapatite in simulated body fluid (SBF), Dulbecco's Modified Eagle's medium (DMEM) and phosphate buffer solution (PBS) over a period ranged from 1 to 21 days of immersion at  $37 \pm 0.5^\circ\text{C}$ . Also the corrosion investigations in all three media were carried out at  $37 \pm 0.5^\circ\text{C}$ .

The results show that the addition of Ag reduces and/or prevents dissolution of the hydroxyapatite in DMEM solution. Ag addition also contributes to the slow degradation of hydroxyapatite in PBS and SBF media.

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### **O3.1. CLUSTERED REGULATORY INTERSPACED SHORT PALINDROMIC REPEATS -CRISPR**

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CRISPR is a recent discovery regarding adaptive immunity in prokaryotes against viruses and a breakthrough in genetic engineering. With a little help from the scientific community, CRISPR can be used to practically modify any kind of DNA, not just only eliminate viruses' DNA. This method is so precise that it can cut down to a single letter of the DNA strand.

The future medicine using CRISPR-based methods can be able to solve any kind of human disease like cancer and could even slow down the aging process.

We started with Cas9 and Cpf1 nucleases and better methods are being developed. Who would know that an old immune system like this can have the power to obliterate almost any kind of disease?

## **O3.2. QUANTITATIVE DETERMINATION OF OCHRATOXIN A FROM GLYCYRRHIZA GLABRA ALCOHOLIC EXTRACTS USING 2D-HPTLC AND IMAGE PROCESSING**

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**Background:** Mycotoxins are secondary metabolites of fungi which occur in a variety of plant products. Commission Regulation (EC) No 1881/2006 of 19 December 2006 has set maximum levels for ochratoxin A (OTA) in liquorice root and extract at 20 µg/kg and 80 µg/kg respectively. HPLC techniques are engaged for identification and quantification of OTA in such complex matrices.

**Aim:** The aim of this research is to determine OTA in liquorice alcoholic extracts using two-dimensional high performance thin layer chromatography (2D-HPTLC) coupled with image processing for quantitation.

**Method:** Alcoholic extract obtained at different extraction ratio of liquorice root powder/ethanol of 0.5/10, 1/10 and 1.5/10 were spiked with OTA at 16.66 ng/µL and analysed on HPTLC Sil G F254 plates. The mobile phases for 1st and 2nd developing direction were CH<sub>3</sub>COOC<sub>2</sub>H<sub>5</sub>-C<sub>6</sub>H<sub>6</sub> (30:1.5, v/v) and CH<sub>3</sub>COOC<sub>2</sub>H<sub>5</sub>-C<sub>6</sub>H<sub>6</sub>-HCOOH-H<sub>2</sub>O (30:1.5:0.25:0.25, v/v) respectively. The developed plates were visualised under 366nm UV light when fluorescence spots appear. OTA determination was achieved by image processing using ImageDecipher (Biodit, China) and the calibration curve method.

**Results and discussion:** The above chromatographic conditions and 2D-HPLC allow a good separation of OTA from the liquorice biocompounds. The blue channel was used for quantitation. Linear calibration curve on the 250-450 ng/spot range (R<sup>2</sup>=0.998) was obtained. The recovery for above mentioned extraction ratio was 83%, 61% and 56% respectively.

**Conclusion:** At the same spiking level, as the concentration of bioactive compounds in the extract increases, OTA recovery decreases. Sample preparation for extract purification is needed, 2D-HPTLC technique alone being not sufficient for an accurate determination of OTA in alcoholic extracts.

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### **03.3. PROPERTIES AND APPLICATION OF GLASSY CARBON ELECTRODE MODIFIED WITH B-CYCLODEXTRIN**

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**Background:** Cyclodextrins are cyclic oligosaccharides with d-(+)-glucose as the repeating unit coupled by 1,4-linkages. In current years,  $\beta$ -cyclodextrins ( $\beta$ -CD) have been particularly employed for construction of the chemical and electrochemical sensors.

**Aim:** The aim of this study was to compare analytical performance of the bare and  $\beta$ -cyclodextrin modified glassy carbon electrode (GC) in the electrochemical determination of selected antioxidant.

**Method:** The analysis was carried out on bare and modified with  $\beta$ -cyclodextrins glassy carbon electrode.

A conventional three-electrode system was used with a saturated Ag/AgCl reference electrode and a Pt wire counter electrode. For analytical purposes square wave voltammetry (SWV) was utilized. The influence of various factors such as pH, buffer composition and SW parameters was studied. The electrochemical behavior of the proposed sensor was characterized by square wave and cyclic voltammetry

**Results and discussion:** On both electrodes recorded signals were stable and repeatable. However, in comparison to the bare GC electrode, the modified glassy carbon electrode exhibited increased sensitivity.

**Conclusion:** Both analysed sensors can be applied for antioxidants detection. What more, the preparation of the  $\beta$ -CD-GC sensor is environment friendly, convenient and low cost because of one-step preparation process?

### **O3.4. DEVELOPMENT AND CONSTRUCTION OF MINIATURIZED SENSORS BASED ON ELECTRIFIED LIQUID – LIQUID INTERFACE**

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**Background:** Electrochemistry at the liquid – liquid interface, also known as the interface between two immiscible electrolyte solutions (ITIES) found many applications in the electrochemical sensing. Detection at ITIES is not restricted to oxidation/reduction and can arise from simple interfacial ion transfer reaction.

**Aim:** Development and construction of simple, cheap and fast method for ITIES miniaturization.

**Method:** Ion transfer voltammetry (ITV) was used for electroanalytical test and together with scanning electron microscopy (SEM) allowed for miniaturized devices characterization.

**Results and discussion:** Short pieces of fused silica capillary tubing were applied to prepare novel microsensors. A silica capillary with hydrophobic pore interior, having a diameter of 25  $\mu\text{m}$ , was filled with 1,2-dichloroethane solution serving as the organic part of the liquid – liquid interface. Produced devices were characterized by ITV using tetramethylammonium cation ( $\text{TMA}^+$ ) as a model ion. We found that the Faradaic currents associated to  $\text{TMA}^+$  ion transfer agree well with the micro-pore dimensions measured by SEM. In the last stage, developed devices were used to study interfacial behaviour of the veterinary antibiotics.

**Conclusion:** A simple, rapid and cheap method for the ITIES miniaturization was developed. Produced devices hold high repeatability and reproducibility and be successfully used in electroanalytical analysis.

*Acknowledgments: Founding obtained from Erasmus+ program.*

### **O3.5. ELECTROCHEMICAL SENSORS BASED ON LIQUID – LIQUID INTERFACE TOWARDS DETECTION OF VETERINARY ANTIBIOTICS**

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**Background:** In electrochemistry liquid – liquid interface is known as the interface between two immiscible electrolyte solutions (ITIES). In recent years electrochemistry at the ITIES was employed in a range of exciting applications. Three main types of the interfacial charge-transfer reactions can be distinguish: simple ion-transfer (SIT) reaction; assisted ion transfer (AIT) reaction and electron-transfer (ET) reaction.

**Aim:** The application of microITIES based sensors constructed using fused silica capillaries for the electrochemical determination of veterinary antibiotics belonging to fluoroquinolones family.

**Method:** Ion transfer voltammetry (ITV) was used for electroanalytical measurements.

**Results and discussion:** Novel microsensors, produced using fused silica capillaries, were used to study interfacial behaviour of the veterinary drugs, such as: oxofloxacin, marbofloxacin, enrofloxacin and ciprofloxacin at the polarized liquid – liquid interface. The method presented in our work demonstrates the accurate determination of four antibiotics in concentrations ranges from 1  $\mu\text{M}$  to 50  $\mu\text{M}$ .

**Conclusion:** Constructed devices hold high repeatability and reproducibility and can be successfully used in electroanalytical studies. The microITIES based electrochemical method for the determination of veterinary antibiotics was developed. Proposed devices are cheap, simple and fast in preparation.

*Acknowledgments: Founding obtained from Erasmus+ program.*

### **O.3.6. BIONICS AND BIOMECHATRONICS USED FOR ARTIFICIAL LIMBS**

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**Background:** Bionics (biologically inspired engineering) refers to the study of biological systems found in nature for designs in engineering and technology. There are lots of biological-inspired systems that are largely used, from the velcro inspired from the bur's hooks to the artificial neuronal networks used in computer-science.

**Aim:** The goal of this work is study of fully-functional artificial limbs, also known as prostheses.

**Method:** To be used with at least the same utility and ease as a real one, such limb is closely related to robotics, thus, it must contains:

- biosensors, which can gather information related to the user's intentions and movements usually from user's nervous and muscle systems.
- actuators, that are basically artificial muscles used to assist or replace user's original muscles, made with the help of motors.
- feedback sensors, which can gather information related to the position and force of the artificial limb or actuators.
- controller, used to analyse the information gathered by the sensors and command the actuators.

**Results and discussion:** The most used and promising prosthetics control uses the myoelectric control (EMG) the reason being its accuracy, low-cost and easy implementation. An example of prosthetic arm based on a good trade-off between low-power consumption, small size, cost and processing power has 8-channel electrodes are used as the biosensors for controlling a 6-degree of freedoms prosthetic hand featuring 5 finger anthropomorphic prosthetic.

**Conclusion:** The final product has good manipulation performance enabling an expansive range of grasping motions.

### **P3.1. NEW SENSORS FOR HUMAN HEALTH TELEMONITORING**

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Telemonitoring platform and mobile health applications created new opportunities for individuals to participate actively in their healthcare, and provides the opportunity for remote monitoring of clinically relevant variables in nonclinical settings

Recent studies developed WSN (wearable sensor network) system for detecting and transmitting signals from a human body with application as healthcare sensor.

Sensors could be used as monitoring system for different medical area (cardiopulmonary, endocrine, neurological function, vascular, and rehabilitation medicine) and also in sport area. The optimised sensors are accurate and useful for perioperative monitoring and rehabilitation medicine.

Sensors have the advantages that allow patients to self-monitor, providing interfaces useful for healthcare providers.

## **P3.2. GRAPHENE BASED SENSOR FOR THE ANALYSIS OF CATECHOL DERIVATIVES**

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**Background:** Nanomaterials are widely used as sensitive materials in the development of sensors and biosensors. Among these materials, the carbonaceous nanomaterials, and especially graphene play a very important role.

**Aim:** The objective of this work was the development of a novel sensor based on graphene obtained by screen-printed technology for the sensitive and selective detection of the catechol derivatives.

**Method:** The sensor fabricated by screen-printing technology was characterized by scan electron microscopy and voltammetry. The applicability in the electroanalysis was studied by cyclic voltammetry.

**Results and discussion:** The sensor fabricated by screen-printing technology was characterized by scan electron microscopy in order to study the homogeneity of the surface and the roughness factor. The electroactive area of the sensor and the corresponding roughness factor was calculated from the study of the scan rate influence in the sensor response in ferrocyanide aqueous solution. The great value of the roughness factor is related to graphene, which facilitate the electron transfer and increase the electrochemical reaction rate. The electrochemical study of the catechol derivatives have shown two redox peaks related to reversible oxidation to the corresponding o-quinone. The kinetics studies have demonstrated that the limiting factor is the diffusion process. The detection limits obtained, in the micro molar range, demonstrates the sensitivity of the novel sensor.

**Conclusion:** The screen-printed sensor based on graphene is useful in the detection of catechol derivatives.

### **P3.3. INTERACTIONS BETWEEN STARCH AND DIFFERENT HYDROCOLLOIDS STUDIED WITH DIFFERENTIAL SCANNING CALORIMETRY, RHEOMETRY AND HYPERSPECTRAL IMAGING**

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Native starches do not generally have ideal properties for the preparation of food products. That is why blending of starch with hydrocolloid is crucial in modifying rheological and thermal properties of the system. Hydrocolloids interact with starch and modify viscosity, texture and sensory properties. Many studies have been done with a goal of understanding how and why the addition of hydrocolloid influences the properties of starch-based product.

To better understand the physicochemical changes imparted by hydrocolloids on gluten-free dough we prepared 15 model dough samples with different starch/hydrocolloids ratios. Corn and potato starch were mixed together in water with hydroxypropyl methylcellulose (HPMC) and xanthan. Properties of prepared starch/hydrocolloids systems were determined by differential scanning calorimetry (DSC) and rheometry. Samples with different corn/potato starch ratio exhibit different thermal but almost identical rheological properties. On the other hand, xanthan and HPMC have strong influence on rheological properties of the mixtures since they increase thickness and viscosity.

The formulations investigated by thermal and rheological methods were used to prepare doughs and bake loaves of bread. Hyperspectral imaging and sensory evaluation were used to analyze baked loaves. Hyperspectral imaging allowed us to obtain spectrum for each pixel in the images of bread slices and perform PCA analysis of spectral data. Our goal was to determine whether a correlation exists between data obtained from thermal and rheological analysis of model dough samples, data obtained from spectral analysis of baked loaves and sensory analysis data. Understanding such correlations could allow us to develop better-textured and more appetizing bread without unnecessary ingredients.

### **P3.4. IN VIVO EVALUATION OF OXIDATIVE STRESS INDUCED BY METALIC IMPLANTS**

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**Background:** Nowadays many people have at least one implant, but was demonstrated that metallic implants can cause oxidative stress, initiate inflammation and fibrosis, or can have genotoxicity.

**Aim:** The present study goal is the detection of oxidative stress after the introduction of metallic implant in the body by assessing Catalase and Superoxide Dismutase values.

**Method:** The experiment was conducted on two groups of guinea pigs. Lot 1 is the control group and Lot 2 is the group which has a screw of stainless steel implanted in his humerus. The study was conducted in accordance with rules for the use of laboratory animals in the Sanitary Veterinary and Food Safety Direction of Brasov, Romania. Surgery was performed after anaesthesia ip with ketamine/xilasine. After 5 months after implantation blood was collected for the detection of enzyme activity using Cayman ® - Assay Kits.

**Results and discussion:** The results were statistically analysed using MedCalc Statistical Software Program. For guinea pigs lots with metallic implant (Lot 2) the enzymatic activity of Catalase is 16.04 nmol/min/mL and of Superoxide Dismutase is 0.19 U/mL.

**Conclusion:** In the group of guinea pig which has an implanted stainless steel screw enzyme activity is lower with 10-12% as compared with the control group, which is an indicator of oxidative stress.

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