



ASSOCIATION
TUNISIENNE DE
Toxicologie



10Th International Scientific Days Of the Tunisian Association of Toxicology

28-30 October 2023

Hotel «Vincci Marillia»
YASMINE HAMMAMET

TOXICOLOGY & Sustainable Development



-  Preventive bio-activities, Pathological incidence, Anticancer therapy
-  Environment, Climate change: Impacts on health and ecosystems
-  Food Safety
-  Environmental Toxicology and Epidemiology
-  Nanobiotechnology for Nanomedicine



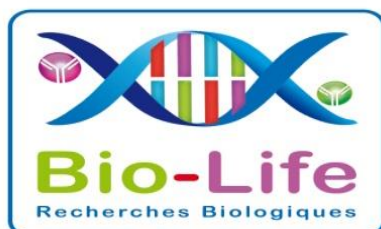
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*10th International Scientific Days of the
Tunisian Association of Toxicology (ATT)*

Toxicology & Sustainable Development

**28-30 October 2023
Vincci Marillia Hotel - Yasmine Hammamet**

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Program

Saturday, 28 October 2023

From 11h00 Reception of the participants/ Registration

Theme 1: Food Safety

Theme 5: Environment, Climate change: Impacts on Health and Ecosystem

Session 1 **Chairman :**

15h00-16h00 **Oral Communication Session 1**

Salle 1

C1-C8

16h00- 16h30 Coffee break

16h30-17h00 **Conference N°1: Pr. Isabel CAÇADOR**

MARE-Marine and Environmental Sciences Center, Faculdade de Ciências, Universidade de Lisboa, Portugal

« **Salt marshes, halophytes and restoration of artificial margins consequences on the resulting ecological and social values** »

17h00-17h30 **Conference N°2: Pr. Pedro Raposo de ALMEIDA**

MARE - Marine and Environmental Sciences Centre / ARNET – Aquatic Research Network Department of Biology, School of Sciences and Technology, University of Évora, Portugal

« **Living in a changing environment: threats and challenges faced by diadromous fishes** »

17h30-19h00 **Poster Session 1**

P1-P45

19h00 Dinner

21h00 Art Gallery Opening

Sunday, 29 October 2023

08h30-09h00 Inaugural Session

Theme 2: Preventive Bio-activities, Pathological incidence, Anticancer therapy

Session 2 **Chairman :**

09h00 – 09h30 **Conference N°3: Pr. Noureddine BOUAÏCHA**

Laboratoire Écologie, Systématique et Évolution, UMR 8079 Univ. Paris-Sud, CNRS, Agro Paris Tech, Université Paris-Saclay, France

« (Eco) toxicologie des cyanotoxines et leurs impacts sur la santé humaine, animale et environnementale dans le concept une seule santé »

09h30-10h00

Conference N°4: Pr. Sylvie BABAJKO

Directrice de Recherche à L'INSERM, UR- Pathologies, Imagerie et Biothérapie Orofaciales, Université Paris Cité, France

« **Health impacts of chronic exposures to low-dose endocrine disruptors** »

10h00-10h15

Talk N°1: Dr. Aicha LAOUANI

Laboratory of Metabolic Biophysics and Applied Pharmacology, Faculty of Medicine of Sousse, University of Sousse, Tunisia.

« **First in Human: Exploring the effects of short-term daily intake of *Nitraria retusa* tea on lipid profile in both healthy and overweight/obese adults** »

Session 3 ***Chairman :***

10h15-12h30

Oral Communication Session 3

Salle 1	Salle 2
C09-C21	C22-C35

12h30

Lunch

Theme 5: Environment, Climate change: Impacts on Health and Ecosystem

Session 4 ***Chairman :***

14h30-15h00

Conference N°5: Pr. Mohammed BANNI

Laboratory of Agrobiodiversity and Ecotoxicology, Higher Institute of Agronomy, University of Sousse, Tunisia

« **Plastic: From the Environment to Human Health** »

15h00 –15h15

Talk N°2 : Dr. Ines ELBINI-DHOUB

Laboratoire des Biomolécules, Venins et Applications Théranostiques, Institut Pasteur de Tunis, Université de Tunis El Manar

« **Exploring the Connection Between Pesticide Neurotoxicity and Neurodegenerative Pathway** »

15h15- 15h30

Talk N° 3: Pr. Meriem DENGUEZLI

Laboratoire de Recherche « Physiologie de l'exercice et physiopathologie : de l'intégré au moléculaire » Faculté de Médecine de Sousse, Université de Sousse

« **Prevalence and risk factors of reduced forced vital capacity: A report from the Tunisian population-based BOLD study** »

15h30-15h45

HTDS Presentation

15h45-16h15

Coffee Break

Theme 3: Nanobiotechnology and Nanomedicine

Session 5 Chairman :

16h15 – 17h30 **Oral Communication Session 5**

Salle 1	Salle 2
C36-C42	C43-C48

17h30-19h00 **Poster Session 2**

P46-P91

From 19h00 Dinner

Monday; 30 October 2023

Theme 4: Environmental Toxicology and Epidemiology

Session 6 Chairman :

09h00 – 10h30 **Oral Communication Session 6**

Salle 1
C49-C59

10h30 – 11h00

Conference N°6: Pr. Karim HOUALI

Director at University Mouloud Mammeri, Tizi Ouzou, Algeria

« **Virus et cancer entre diagnostic et thérapie** »

Session 7 Chairman :

11h00-12h15 **Oral Communication Session 7**

Salle 1	Salle 2
C60-C66	C67-C73

12h15 Discussion Recommendations and Closing of the Days

12h30 Lunch

NB:

- C = Communications
 - Conference time is 30 minutes.
 - Talk time is 15 minutes with discussion
 - The time for oral communications is 10 minutes
- e-Posters will be posted during the day according to the program

Abstracts

Of Conferences

Conference N°1:

Salt marshes, halophytes and restoration of artificial margins; consequences on the resulting ecological and social values

Isabel CAÇADOR

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Abstract:

The ecology of marshes has been intensively investigated due to the well-documented biogeochemical functions that occur in these ecosystems and the resulting ecological and social values. Vascular plants are, in addition to the main primary producers, essential components of these ecosystems. Salt marshes are valuable ecosystems, as they provide food, shelter, and important nursery areas for fish and macroinvertebrates, and a wide variety of ecosystem services for human populations.

These ecosystem services heavily rely on the floristic composition of the salt marshes. Blue carbon, nitrogen, and phosphorous stocks are no exception to this, and rely on the interspecific differences in the primary production metabolism and physiological traits. Furthermore, these intrinsic physiological characteristics also modulate the species response to any environmental stressor, such as the ones derived from ongoing global changes. This will heavily shape transitional ecosystem services, with significant changes of the ecosystem value of the salt marshes in terms of cultural, provisioning, regulating, and supporting ecosystem services, with a special emphasis on the possible alterations of the blue carbon, nitrogen, and phosphorous stocks retained in these key environments.

Thus, the need to integrate plant physiological characteristics and feedbacks towards the expected climate change-driven stressors becomes evident to accurately estimate the ecosystem services of the salt marsh community, and transfer these fundamental services into economic assets, for a fluid communication of the ecosystems value to stakeholders, decision and policy makers, and environmental management entities.

Key words: Salt marshes, Blue carbon ecosystems, Climate change, Restoration.

Conference N°2:

Living in a changing environment: threats and challenges faced by diadromous fishes

Pedro Raposo DE ALMEIDA

*MARE - Marine and Environmental Sciences Centre / ARNET – Aquatic Research Network
Department of Biology, School of Sciences and Technology, University of Évora, Largo dos Colegiais,
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Abstract:

Diadromous fish are responsible for providing valuable ecosystem services (e.g., provision, cultural, regulatory, supporting) and are the main target of several commercial fisheries in the northern hemisphere. These precious halieutic resources have been heavily exploited since the Middle Ages resulting in the collapse of most of their populations. To complete their life cycle diadromous fish are forced to migrate between the marine environment and freshwater habitats, with catadromous species (e.g., European eel, thinlip grey mullet) spawning at sea and anadromous species (e.g., sea lamprey, allis and twaite shads, sea trout, Atlantic salmon and European sturgeon) reproducing in freshwater. The severe decline in population numbers across diadromous species distribution range was mainly due to habitat loss and overexploitation. But there are other factors impacting the fitness of these fish, jeopardizing the success of the management and conservation actions that have been implemented extensively, particularly in Europe and North America, costing millions of euros/dollars every year. During their complex life cycle diadromous fish encounter many different contaminants which act at the sublethal levels affecting individual migratory behaviour, spawning success, osmoregulatory capacity and disease resistance. Determining the effects that pollutants have on diadromous fish requires study designs that consider life history, habitat and the complexity of contaminant exposures. This difficulty is particularly relevant for emerging contaminants such as pharmaceuticals, PFAS (per- and polyfluoroalkyl substances) or microplastics. As these contaminants become more ubiquitous, not only do we need to know how these species are affected, but the lack of knowledge in this area has implications for fish consumption advisories, which need to be reviewed and their scope expanded. Finally, climate change is exerting massive and long-lasting impacts on aquatic ecosystems and aggravates the negative impacts of other anthropogenic actions. Considering the present climate change scenario, diadromous species are bound to endure increased pressures, demanding novel management approaches to ensure population numbers that are able to secure their survival and sustainable exploitation.

Key words: Migratory fish; Management; Conservation; Climate change; Contaminants.

Conference N°3:

(Eco)toxicologie des cyanotoxines et leurs impacts sur la santé humaine, animale et environnementale dans le concept une seule santé

Noureddine BOUAÏCHA

Laboratoire Écologie, Systématique et Évolution, UMR 8079, CNRS, AgroParisTech, Université Paris-Saclay, 91190 Gif-sur-Yvette, France

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Résumé:

L'efflorescence des cyanobactéries toxiques dans les eaux de surface est souvent accompagnée par une libération de diverses molécules toxiques, appelées "cyanotoxines". Ces dernières sont généralement classées selon les organes sur lesquels elles agissent : les hépatotoxines (foie), les neurotoxines (système nerveux) et les dermatotoxines (peau). La présence de cyanotoxines a été rapportée sur tous les continents et parmi elles les hépatotoxines de type microcystine sont les plus fréquemment produites dans 40 à 75% des proliférations (1). À fortes doses, les microcystines sont responsables chez l'homme et l'animal d'une hépatotoxicité hémorragique, pouvant provoquer une insuffisance hépatique telle qu'une nécrose hépatique évoluant vers une fibrose, une cytolysse ou le plus souvent la mort (2). Leur activité toxique résulte d'un effet inhibiteur sur certaines enzymes, les sérine/thréonine phosphatases, qui contrôlent les principaux mécanismes impliqués dans le métabolisme, la division cellulaire, le développement, la transcription et la traduction des gènes tant chez les animaux que chez les plantes supérieures (3). Ils sont également connus pour induire un stress oxydatif, qui peut entraîner des dommages oxydatifs sur les protéines, les acides nucléiques et les lipides (4, 5). Les preuves de leur cancérogénicité sont actuellement considérées comme insuffisantes chez l'homme et limitées chez l'animal. Par conséquent, en 2010, le Centre international de recherche sur le cancer (CIRC) a classé la microcystine-LR comme « probablement cancérogène pour l'homme » (groupe 2B), sur la base de son activité tumorale connue et prouvée (6).

La contamination des eaux de surface par ces cyanotoxines engendre des nuisances écologiques, sanitaires et socio-économiques, affectant l'ensemble de l'écosystème aquatique, à savoir, les animaux, les plantes ainsi que l'Homme utilisateur et consommateur de cette eau (7). À ce jour, les différentes voies d'exposition à ces toxines sont connues : eau de boisson ; eau de baignade ; consommation des suppléments diététiques à base de cyanobactéries ou la consommation d'aliments contaminés (poissons, légumes et autres organismes aquatiques). Bien que la voie de l'eau potable soit suffisamment connue, l'exposition par l'alimentation, y compris la consommation de poissons et de plantes cultivées, doit être étudiée plus en détail. Bien qu'aucun cas d'intoxication alimentaire par ingestion d'aliments contaminés par des cyanotoxines, y compris la consommation de poissons et de plantes comestibles, n'ait été signalé, cette possibilité ne doit pas être ignorée. En effet, une étude épidémiologique a montré que l'incidence excessive de cas de la Sclérose Latérale Amyotrophique dans la population des îles de Guam dans le Pacifique était liée à une consommation des graines de cycas contaminées par une neurotoxine, le β -methylamino-L-alanine (BMAA), produite par une espèce de cyanobactéries du genre *Nostoc* vivant en symbiose dans les racines de cette plante (8). Ce qui montre bien que les cyanotoxines pourraient s'accumuler dans la chaîne alimentaire, et en

particulier dans des produits agricoles, et représenter ainsi une autre voie d'exposition possible pour l'Homme.

L'accumulation de ces toxines dans la chaîne alimentaire est actuellement une source d'inquiétude et de questionnements et les limites de qualité proposées sont rares, en raison de l'insuffisance des données toxicologiques. Afin de protéger les consommateurs des effets néfastes des microcystines, l'Organisation mondiale de la santé (OMS) a proposé une limite supérieure provisoire dans l'eau potable de 1 µg/L pour le congénère le plus toxique, la microcystine-LR, ainsi qu'une dose journalière tolérable (DJT) de 0,04 µg/kg de masse corporelle (9).

Mots-clés : cyanobactéries, cyanotoxines, microcystines, toxicité, chaîne alimentaire, santé publique.

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Conference N°4:

Expositions chroniques aux faibles doses de perturbateurs endocriniens et conséquences sur la santé

Sylvie BABAJKO

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Résumé:

Notre environnement quotidien évolue et s'enrichit de multiples polluants pouvant impacter la santé des individus exposés et de leur descendance. L'exposition à ces polluants dépend à la fois du lieu d'habitation (climat, pollutions, etc...) et du mode de vie (alimentation, activité, etc...), leurs effets sur la santé dépendent des modes et doses d'exposition et des aptitudes propres à chacun à réagir à ces substances. Parmi ces polluants chimiques, certains ont montré des activités de perturbation endocrinienne contribuant ainsi à générer ou aggraver des troubles de la fertilité mais aussi des troubles cognitifs, des maladies chroniques comme le diabète et l'obésité ou même des cancers. Ces molécules appartiennent à des classes chimiques très diverses et leur nombre et classification font l'objet de vifs débats. L'objectif de cette conférence est de présenter ces substances, leur classification, leurs mécanismes d'action pour expliquer comment ils peuvent altérer la santé des individus même à de faibles doses. Leur reconnaissance aide à s'en prémunir et ainsi prévenir au mieux les effets sanitaires néfastes dont ils sont responsables.

Abstract :

Health impacts of chronic exposures to low-dose endocrine disruptors

Our daily environment is changing and enriched with many pollutants impacting health of exposed organisms and their progeny. Exposures to pollutants depends on the place of living (climate, pollutions, etc...), on the life habits (alimentation, activities, etc...) and their health impacts depend on the way and doses of contamination and organisms' own background. Among chemical pollutants, some have endocrine disrupting activities and generate or aggravate fertility troubles, cognitive defects, chronic diseases such as diabetes, obesity and cancers. These molecules belong to various chemical families, their number and classification are actively debated. The aim of this presentation is to introduce endocrine disruptors, their mechanisms of action explaining their health effects even at very low doses. Recognizing them helps to prevent the harmful health effects they can cause.

Conference N°5:

Plastic: From the Environment to Human Health

Mohamed BANNI

*Laboratory of Agrobiodiversity and Ecotoxicology, Higher Institute of Agronomy, University of Sousse,
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Abstract:

Every year, more than 8 million tons of plastic are dumped into the environment, both on land and in the sea. The term microplastics (MPs) refers to very small particles with a diameter of less than 5 mm. PM also includes nanoplastics (NP), which have diameters less than 0.1 μm (100 nm). Due to their small size, PM can be potentially dangerous as it can be easily absorbed by body tissues and organs. As PMs remain constantly in the environment, they accumulate in organisms, especially in marine ecosystems. In this context, marine species are a major source of contamination and transmission to humans via the food chain.

The presence of MPs has also been documented in water, in cooking salt, in vegetables and fruits and of course in several types of edible fish. Recent studies have demonstrated the presence of plastic particles in human blood as well as in the placentas providing strong evidence for the occurrence of plastic contamination in the human body.

Unfortunately, little is known about the long-term effects of this type of contamination on both ecosystems and human health. However, everything indicates that there is an urgency to take mitigation and protection measures against this type of contamination.

Key words: Plastique, Microplastique, ecosystem, human health.

Conference N°6:

Virus et cancer entre diagnostic et thérapie

Karim HOUALI

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Abstract:

Early diagnosis of cancers represents the greatest challenge in medical research. Oncogenic viruses, particularly the Epstein-Barr virus as well as the Papilloma virus, represent a very controversial biological entity. In fact, more than 90% of the world population are positive for these viruses, which makes their direct involvement in the development of cancers quite difficult to demonstrate. Our research focused on the identification of viral tumor markers associated mainly with EBV-associated cancers. These markers must obviously satisfy the condition of being both reliable, specific and above all reproducible in patients around the world.

The study aimed to investigate the antitumor efficacy of anti-LMP1 antibodies in EBV-positive nasopharyngeal and xenograft models. The study also examined of NPC-serum-exosome-associated LMP1. Anti-LMP1 antibody treatment before or during cell implantation prevented tumor growth in nude mice. A small dose of antibodies resulted in complete tumor regression for at least three months after the tumors had grown in size. The consumption of antigen-antibody complexes by tumor cells limited tumor growth. In vitro experiments showed that anti-LMP1 antibodies killed EBV-positive NPC- and EBV-positive human B-cell lines but not EBV-negative cell lines. The animal model experiments showed that anti-LMP1 inhibited and prevented NPC-. The results suggest that LMP1 antibody immunotherapy could cure nasopharyngeal cancer. However, further validation of these findings is required through human clinical trials.

Keywords : EBV oncogenes, LMP1 ; nasopharyngeal, mouse model, tumor suppression and prevention.

Abstracts

Of Talks

Talk N°1 :

First in Human: Exploring the Effects of Short-term Daily Intake of *Nitraria retusa* Tea on Lipid Profile in Both Healthy and Overweight/Obese Adults

Aicha Laouani^{1,2}, **Hana Nasrallah**^{1,2}, **Awatef Sassi**^{1,2}, **Farhana Ferdousi**^{3,4}, **Feten Zar Kalai**^{4,5}, **Yosra Hasni**⁶, **Khelifa Limem**⁷, **Hiroko Isoda**^{3,4,8} and **Saad Saguem**^{1,2}

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Abstract:

Introduction: *Nitraria retusa*, is a salt-tolerant plant belonging to the Nitrariaceae family. Several studies have found that *Nitraria retusa* leaf extract contains significant amounts of tannins, alkaloids, steroids, and flavonoids that may be responsible for its beneficial effects.

Pre-clinical trials conducted on laboratory animals have demonstrated that *Nitraria retusa* extract regulates the expression of genes involved in lipolysis and lipogenesis, thereby promoting lipid metabolism in the liver of obese mice...

Study objective: The objective of the present study is to explore the safety, tolerability and efficacy of short daily administration of *Nitraria retusa extract* (NRE) in overweight and obese participants (BMI > 25 Kg/m²).

Study Population and Protocol: A total of 98 participants, including 37 healthy subjects and 61 overweight/obese adults, were randomly assigned to a low-dose (5 mg flavonoid/day) or high-dose (20 mg flavonoid/day) intervention group. Plasma lipid biomarkers, liver and kidney function, general hematology and blood glucose were measured at baseline and 10 days after the procedure.

Results and discussion: Although the lipid profile of healthy participants showed no statistically significant changes, obese participants in the high-dose group experienced a significant decrease in triglyceride levels (p= 0.004) and an increase in HDL levels (p < 0.001).

Our research revealed, for the first time, the safety and efficacy of the 20 mg dose of flavonoids per day contained in *Nitraria retusa* extract in reducing serum lipid levels in human volunteers over a brief period of 10 days especially in overweight and obese people.

Conclusion: Our study is the first to provide valuable information on the lipid-lowering potential of *Nitraria retusa* in human volunteers.

Keywords: *Nitraria retusa*; HDL; triglyceride; overweight; obesity; dyslipidemia.

Talk N°2 :

Exploring the Connection Between Pesticide Neurotoxicity and Neurodegenerative Pathways

Ines ELBini

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Abstract:

Neurotoxicity relates to the adverse changes in the structure or function of the nervous system. Herein, a neurotoxin is considered to be a substance which elicits a pathological response primarily or specifically in the nervous system. Indeed, pesticides exposure has been convicted as a major candidate in neurotoxicity. The effect of the pesticides has been suggested to be involved in oxidative stress, alterations in neurotransmitter transporters, mitochondrial dysfunction, protein agregation, and neuroinflammation in neurodegenerative diseases. The present work discusses the influence of pesticides on neurodegeneration and its related factors conducted on these pathologies. Furthermore, it focuses on the common pesticides involved in neurodegenerative diseases and their associated genetic alterations as well as the probable mechanisms behind brain pathogenesis.

Keywords: Pesticide, Neurotoxicity, Neurodegeneration.

Talk N°3 :

Prevalence and risk factors of reduced forced vital capacity: A report from the Tunisian population-based BOLD study

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Abstract:

Background: Reduced forced vital capacity (FVC) is a risk factor of all-cause mortality; however, the prevalence and determinants of reduced FVC are not available for the Tunisian population. This study investigated the association of reduced FVC with risk factors and health variables in an urban population of subjects aged ≥ 40 years and living in the city of Sousse in Tunisia.

Methods: A cross-sectional survey was performed using data from the Tunisian Burden of Obstructive Lung Disease (BOLD) study. We defined reduced FVC as a post-bronchodilator FVC below the lower limit of normal using National Health and Nutrition Examination Survey (NHANES) values and Global Lung Function Initiative 2012 equations (GLI 2012) and determined the relation between this finding and the potential risk factors (demographic and socioeconomic factors and the presence of chronic diseases), using multivariable regression analysis.

Results: The prevalence of reduced FVC was 26.6% (176/661) when using NHANES values for white Americans and 14.2% (94/661) using the GLI 2012 equations. Compared to people with normal FVC, those with a reduced FVC were significantly older, taller, had a lower body mass index (BMI), more respiratory symptoms and a higher prevalence of heart disease and hypertension. Multivariable analysis showed that reduced FVC was essentially driven by exposure to biomass smoke for heating, a number of schooling years lower than or equal to 6 years, a childhood history of hunger for a lack of money, aging and height.

Conclusions: The prevalence of reduced FVC is associated with a poor socioeconomic status aging and height.

Keywords: Reduced forced vital capacity, Lung function, Spirometry, Risk factors, Prevalence.

Repartition of Oral Communications

Saturday 28 October 2023

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