



THE ATHENS INSTITUTE FOR EDUCATION AND RESEARCH

# Abstract Book:

3<sup>rd</sup> Annual International Conference on  
**Biology**  
19-22 June 2017, Athens, Greece

Edited by  
Gregory T. Papanikos

2017



Abstracts  
3<sup>rd</sup> Annual International  
Conference on Biology  
19-22 June 2017, Athens, Greece

Edited by Gregory T. Papanikos

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## Preface

This book includes the abstracts of all the papers presented at the 3<sup>rd</sup> Annual International Conference on Biology, 19-22 June 2017, organized by the Athens Institute for Education and Research (ATINER). All ATINER's conferences are organized by the Academic Committee (<https://www.atiner.gr/academic-committee>). This conference has been organized with the assistance of the following academics, who contributed by chairing the conference sessions and/or by reviewing the submitted abstracts and papers:

1. Gregory T. Papanikos, President, ATINER.
2. Christopher Janetopoulos, Head, Biology Research Unit, ATINER & Associate Professor of Biological Sciences, University of the Sciences, USA.
3. Anthony Koutoulis, Head of School of Biological Sciences, University of Tasmania, Australia.
4. Peter Tompa, Professor, VIB Center for Structural Biology, Belgium.
5. Richard Grimes, Adjunct Professor, University of Texas Health Science Center at Houston, USA.
6. Leonas Valkunas, Professor, Vilnius University, Lithuania.
7. Taylor Robinson, Instructor, Gavilan College, USA.
8. Tolga Cavas, Professor, Uludag University, Turkey.
9. Semir Ozdemir, Professor, Akdeniz University, Turkey.
10. Lampros A. Pyrgiotis, President, Greek Society of Regional Scientists, Greece.
11. Vassilis Skianis, Research Fellow, ATINER.
12. Olga Gkounta, Researcher, ATINER.
13. Hannah Howard, Research Assistant, ATINER.

In total 17 papers were submitted by 20 presenters, coming from 13 different countries (Algeria, Australia, Belarus, Belgium, Brazil, Egypt, Lithuania, Philippines, Poland, South Korea, Switzerland, Turkey and USA). The conference was organized into nine sessions that included a variety of topic areas such as disease, biological mechanisms, and more. A full conference program can be found beginning on the next page. In accordance with ATINER's Publication Policy, the papers presented during this conference will be considered for inclusion in one of ATINER's many publications.

The purpose of this abstract book is to provide members of ATINER and other academics around the world with a resource through which to discover colleagues and additional research relevant to their own

work. This purpose is in congruence with the overall mission of the institute. ATINER was established in 1995 as an independent academic organization with the mission to become a forum where academics and researchers from all over the world could meet to exchange ideas on their research and consider the future developments of their fields of study.

It is our hope that through ATINER's conferences and publications, Athens will become a place where academics and researchers from all over the world regularly meet to discuss the developments of their discipline and present their work. Since 1995, ATINER has organized more than 400 international conferences and has published nearly 200 books. Academically, the institute is organized into seven research divisions and 38 research units. Each research unit organizes at least one annual conference and undertakes various small and large research projects.

For each of these events, the involvement of multiple parties is crucial. I would like to thank all the participants, the members of the organizing and academic committees, and most importantly the administration staff of ATINER for putting this conference and its subsequent publications together.

**Gregory T. Papanikos**  
**President**



**FINAL CONFERENCE PROGRAM**  
**3<sup>rd</sup> Annual International Conference on Biology, 19-22 June 2017**

**Athens, Greece**

**PROGRAM**

**Conference Venue: Titania Hotel, 52 Panepistimiou Avenue, Athens, Greece**

**C O N F E R E N C E P R O G R A M**

**Monday 19 June 2017**

**08:00-09:00 Registration and Refreshments**

**09:00-09:30 (Room D-10<sup>th</sup> Floor) Welcome and Opening Address**

Gregory T. Papanikos, President, ATINER.

**09:30-11:00 Session I (Room C-10<sup>th</sup> Floor): Mechanism of Human Disease I**

**Chair:** Richard Grimes, Adjunct Professor, University of Texas Health Science Center at Houston, USA.

1. Peter Tompa, Professor, VIB Center for Structural Biology, Belgium, Steven Boeynaems, University of Leuven, Belgium, Elke Bogaert, University of Leuven, Belgium, Denes Kovacs, Vrije Universiteit Brussel (VUB), Belgium & Ludo Van Den Bosch, University of Leuven, Belgium. Structural Disorder Promotes Phase Separation of C9orf72 Dipeptide Repeats in ALS.
2. Noha Elghazally, Lecturer, Tanta University, Egypt. Evaluation of Nutritional Care Given to Patients with Chronic Diseases Admitted at Tanta University Hospitals.
3. Natallia Puzan, Researcher, Institute of Radiobiology of the National Academy of Sciences, Belarus & Ihar Chesnyk, Director, Institute of Radiobiology of the National Academy of Sciences, Belarus. State of the Extracellular Transport System (Albumin) in Women of Gomel Region of the Republic of Belarus.

**11:00-12:30 Session II (Room C-10<sup>th</sup> Floor): Diabetes**

**Chair:** Anthony Koutoulis, Head of School of Biological Sciences, University of Tasmania, Australia.

1. Richard Grimes, Adjunct Professor, University of Texas Health Science Center at Houston, USA & Deanna Grimes, Professor, University of Texas Health Science Center at Houston, USA. A Population based Approach to Quantifying the level of Control of Hypertension and Diabetes.
2. Baris Ozgur Donmez, Assistant Professor, Akdeniz University, Turkey. The Effect of Tungstate Treatment on Poly Polymerase Activity in Diabetic Rat Testis.

**12:30-14:00 Session III (Room C-10<sup>th</sup> Floor): Mechanism of Human Disease II**

**Chair:** Peter Tompa, Professor, VIB Center for Structural Biology, Belgium.

1. Tolga Cavas, Professor, Uludag University, Turkey, Huzeyfe Huriyet, MSc Student, Uludag University, Turkey, Ozgur Vatan, Associate Professor, Uludag University, Turkey & Nilufer Cinkilic, Professor, Uludag University, Turkey. Evaluation of the In Vitro Cytotoxic and Genotoxic Effects of Parabens (Butylparaben, Methylparaben and Propylparaben) in BEAS-2B Human Lung Epithelial Cell Line.
2. SungChul Seo, Professor, Catholic University of Pusan, South Korea, Han-Jong Ko, Professor, Korea National Open University, South Korea & Dong Hyun Lee, Senior Researcher, Technology Institute of Environmental Health and Safety, South Korea. Spatiotemporal Patterns of Allergic Disease Prevalence in Korea: Looking beyond Aggregates.
3. Glenn Oyong, Academic Service Faculty, De La Salle University, Philippines, Maria Carmen Tan, Academic Service Faculty, De La Salle University, Philippines, Saeed Karami Ishghlo, Faculty of Engineering, Payam e Noor University of Bukan, Iran, Khristina Judan Cruz, Assistant Professor, Central Luzon State University, Philippines & Esperanza C. Cabrera, Professor, De La Salle University, Philippines. Preferential Regulation of *Akt*, *CD133*, *cfos* and *cjun* Genes Linked to Anti-Neoplastic Activity of *Gundelia tournefortii* L. on Malignant Melanoma Stem Cells.

**14:00-15:00 Lunch**

**15:00-17:00 Session IV (Room C-10<sup>th</sup> Floor): General Topics I**

**Chair:** Taylor Robinson, Instructor, Gavilan College, USA.

1. Anthony Koutoulis, Head of School of Biological Sciences, University of Tasmania, Australia, Robert Shellie, Technology / Market Manager, Trajan Scientific Australia Pty Ltd, Australia, Laura Tedone, Postdoctoral Research Fellow, University of Tasmania, Australia, Dandan Yan, PhD Student, University of Tasmania, Australia, Aina Price, Technical Officer, University of Tasmania, Australia & Simon Whittcock, Hop Breeder, Hop Products Australia, Australia. An Overview of Hop (*Humulus lupulus* L.) Research in Australia (1997-2017).
2. Leonas Valkunas, Professor, Vilnius University, Lithuania. Modeling of self-Regulation Ability of Light-Harvesting Antenna.
3. Kaouther Hamaidia, Lecturer, University Mohamed Cherif Messaadia, Algeria & Nouredine Soltani, Professor, University Badji Mokhtar, Algeria. Effects of Methoxyfenozide, a Molting Hormone Agonist, on Fecundity and Fertility of *Culex pipiens* L. (Diptera: Culicidae).

**17:00-19:00 Session V (Room D-10<sup>th</sup> Floor): A Symposium on the Future Developments and Prospects of Engineering and Science Education & Research in a Global World**

**Chair:** Lampros A. Pyrgiotis, President, Greek Society of Regional Scientists, Greece.

1. **Abhijit Deshmukh**, James J. Solberg Head and Professor, School of Industrial Engineering, Purdue University, USA. Convergence of Knowledge.
2. **Anthony Koutoulis**, Professor & Head of School of Biological Sciences, University of Tasmania, Australia. The Future Developments and Prospects of Biology Education and Research in a Global World – a Tasmanian and Australian context.
3. **LuAnn Carpenter**, Director, Student Program Assessment and Administration, Industrial and Systems Engineering, Auburn University, USA. Issues and Trends in Engineering Education at Auburn University, Alabama, United States of America.
4. **David H. Sanders**, UNR Foundation Professor, Past-Chair UNR Faculty Senate, Department of Civil and Environmental Engineering, University of Nevada, Reno, USA. Is the Future for Higher Education bright in the United States?
5. **Ravi Mukkamala**, Professor, Old Dominion University, USA. The Future of Computer Science.

For details on the discussion please [click here](#).

**21:00-23:00 The Pragmatic Symposium of the Conference as Organized in Ancient Athens with Dialogues, Food, Wine, Music and Dancing but fine tuned to Synchronous Ethics**

**Tuesday 20 June 2017**

**07:30-10:30 Session VI: An Educational Urban Walk in Modern and Ancient Athens**

**Chair:** Gregory Katsas, Vice President of Academic Affairs, ATINER & Associate Professor, The American College of Greece-Deree College, Greece.

Group Discussion on Ancient and Modern Athens.

Visit to the Most Important Historical and Cultural Monuments of the City (be prepared to walk and talk as in the ancient peripatetic school of Aristotle)

**11:00-12:30 Session VII (Room C-10<sup>th</sup> Floor): Biological Mechanisms**

**Chair:** Tolga Cavas, Professor, Uludag University, Turkey.

1. Semir Ozdemir, Professor, Akdeniz University, Turkey & Nihal Ozturk, Assistant Professor, Akdeniz University, Turkey. Dietary Magnesium Supplementation Alters Relaxation Kinetics and Electrical Activity of Rat Ventricular Myocytes.
2. Enis Hidisoglu, Research Assistant, Akdeniz University, Turkey, Deniz Kantar Gok, Postdoctoral Researcher, Akdeniz University, Turkey, Alev Duygu Acun, Research Assistant, Akdeniz University, Turkey, Hakan Er, Research Assistant, Akdeniz University, Turkey & Piraye Yargicoglu, Professor, Akdeniz University, Turkey. Dose Dependent Effects of Amyloid Beta 1-42 on Auditory Evoked Potentials.
3. Giulia Vendramini Ferreira, Pontificia Universidade Católica de Campinas, Brazil, Otacilio Camargo Junior, Pontificia Universidade Católica de Campinas, Brazil, Gustavo Santos, Pontificia Universidade Católica de Campinas, Brazil, Guilherme Abreu, Pontificia Universidade Católica de Campinas, Brazil, Antonio Crhispm, Pontificia Universidade Católica de Campinas, Brazil & Stefano Gabriel, Pontificia Universidade Católica de Campinas, Brazil. Traumatic Arteriovenous Fistula of the Superficial Temporal Artery.

**12:30-14:00 Session VIII (Room C-10<sup>th</sup> Floor): Respiratory Health**

**Chair:** Semir Ozdemir, Professor, Akdeniz University, Turkey.

1. Joanna Reszczyńska, PhD Student, National Centre for Nuclear Research, Poland, Ludwik Dobrzyński, National Centre for Nuclear Research, Poland & Krzysztof W. Fornalski, PGE EJ, Poland. Collective Data Analysis of Correlation between Lung Cancer Incidences and Residential Radon Concentration.

**14:00-15:00 Lunch**

**15:00-16:30 Session IX (Room C-10<sup>th</sup> Floor): General Topics II**

**Chair:** Leonas Valkunas, Professor, Vilnius University, Lithuania.

1. Taylor Robinson, Instructor, Gavilan College, USA. The Critical Importance of Human Cadaver Dissection in the Study of Human Anatomy for Pre-Medical and Pre-Nursing Undergraduate Students.
2. Marcelo Boareto, Post-doc, BSSE – ETH Zurich, Switzerland. Interplay between Notch Signaling and ID Factors during Adult and Embryonic Neurogenesis.

**21:00- 22:30 Dinner**

**Wednesday 21 June 2017**

**Educational Island Tour or Mycenae and Epidaurus Visit**

**Thursday 22 June 2017**

**Delphi Visit**

**Marcelo Boareto**

Post-doctoral Researcher, BSSE-ETH Zurich, Switzerland

## **Interplay between Notch Signaling and ID Factors during Adult and Embryonic Neurogenesis**

During neurogenesis, multipotent neural stem cells (NSCs) give rise to the correct number and types of neurons. Notch signaling and inhibitor of DNA binding (ID) factors are recognized as pivotal during neurogenesis, however it has been difficult to evaluate experimentally the underlying mechanism of their interactions and the differences between embryonic and adult neurogenesis. Here, we combined mathematical modeling with single-cell transcriptomics to elucidate key interactions between the Notch and ID pathways in embryonic and adult NSCs. We show how both pathways regulate neurogenesis in a complementary and independent manner in the adult brain. In contrast, during brain development, Notch signaling directly regulates the expression of IDs and this regulation together with the presence of high levels of E proteins precludes ID-induced quiescence. Our analyses unveil key molecular interactions underlying NSC quiescence, maintenance and differentiation, highlighting mechanistic differences between embryonic and adult NSCs. Similar mechanisms are expected to be critical in other stem cell systems during development and disease.

**Tolga Cavas**

Professor, Uludag University, Turkey

**Huzeyfe Huriyet**

MSc Student, Uludag University, Turkey

**Ozgur Vatan**

Associate Professor, Uludag University, Turkey

&

**Nilufer Cinkilic**

Professor, Uludag University, Turkey

### **Evaluation of the In-Vitro Cytotoxic and Genotoxic Effects of Parabens (Butylparaben, Methylparaben, and Propylparaben) in BEAS-2B Human Lung Epithelial Cell Line**

In the present study, the in vitro cytotoxic and genotoxic effects of three parabens (butylparaben, methylparaben and propylparaben) have been evaluated in BEAS-2B human bronchial epithelial cell line. Cytotoxicity assays were carried out using the XTT test whereas the comet assay was used as genotoxicity endpoint. The intracellular reactive oxygen species (ROS) levels were also measured following paraben exposure to assess possible toxicity mechanism. XTT test revealed significant decreases in the viability of BEAS-2B treated with three parabens with the IC<sub>50</sub> values of 2.90, 3.13 and 2.68 mM for butylparaben, methylparaben and propylparaben, respectively. Genotoxicity analyses showed that, all three parabens are capable of induce DNA strand breaks as demonstrated with significant increases in comet assay parameters such as tail length, tail moment and tail % DNA. We also detected significantly increased reactive oxygen species (ROS) in BEAS-2B cells treated with all three parabens. In conclusion, our findings provide evidence that butylparaben, methylparaben and propylparaben exposure may cause cytotoxic and genotoxic effects in human cells via ROS induction.

**Baris Ozgur Donmez**

Assistant Professor, Akdeniz University, Turkey

### **The Effect of Tungstate Treatment on Poly Polymerase Activity in Diabetic Rat Testis**

Diabetes mellitus has adverse effects on male sexual and reproductive functions in diabetic patients and animals, but the exact mechanism of diabetes mellitus causing testicular damage and dysfunction has not been clearly defined. The aim of the present study was to investigate the preventive and therapeutic potential of tungstate on testicular damage in STZ-induced diabetic rat model and to elicit whether tungstate has anti-apoptotic effects. STZ-induced diabetic rats exhibited increase in plasma glucose concentration and decrease in body weight gain. Plasma glucose levels were significantly but partially improved by sodium tungstate administration in diabetic rats with respect to initial values. We showed first time that PARP activity increased in STZ-induced diabetes and testicular dysfunction. Furthermore, the results of this study also suggested that sodium tungstate, in addition to anti-diabetic effects, possesses decreased PARP activity. Sodium tungstate can either increase antioxidant defense mechanisms or reduce the oxidative stress, probably due to reduction in plasma glucose level and in consequence alleviation of protein glycation or induction of gene expression of some antioxidant enzymes. In conclusion, sodium tungstate could be a potential treatment for diabetes and its complications in testis.

**Noha Elghazally**  
Lecturer, Tanta University, Egypt

## **Evaluation of Nutritional Care Given to Patients with Chronic Diseases Admitted at Tanta University Hospitals**

Good nutrition is essential for the improvement of the patient health. Providing care for the sick is the primary purpose for which the hospital exists. All aspects of the hospital operation must be developed with the focus centered on the patient and his needs. This study was conducted to evaluate the nutritional care given to patients with chronic diseases admitted at Tanta University Hospitals, in Tanta city, Gharbia Governorate, Egypt. Non probability purposive sample technique was used to include three hundreds hospitalized adult patients above twenty years old suffering from diabetes mellitus, chronic obstructive pulmonary disease and hepatitis diseases admitted at Internal Medicine, Chest and Tropical Medicine Departments at Tanta University Hospital for a period of one year. The studied cases were interviewed to fill a specially designed questionnaire sheet included the following items: patient's history and sociodemographic data, assessment of the nutritional status of patients, patient satisfaction, assessment of nutritional services conducted by Tanta University Hospital. Comparing nutritional status of patients at admission and at leaving the hospital; a decrease in BMI during the period of hospitalization and the food intake of patients was affected during the period of hospitalization. The majority of patients were satisfied by the food given from the hospital kitchen. The applied food safety measures were poor in both university kitchens. It was evident that nutritional status of patients were affected during the period of hospitalization, so emphasis on improving the nutritional care of hospitals and application of food safety measures in hospital kitchens.

**Giulia Vendramini Ferreira**

Pontificia Universidade Catolica de Campinas, Brazil

**Otacilio Camargo Junior**

Pontificia Universidade Catolica de Campinas, Brazil

**Gustavo Santos**

Pontificia Universidade Catolica de Campinas, Brazil

**Guilherme Abreu**

Pontificia Universidade Catolica de Campinas, Brazil

**Antonio Chrispin**

Pontificia Universidade Catolica de Campinas, Brazil

&

**Stefano Gabriel**

Pontificia Universidade Catolica de Campinas, Brazil

## **Traumatic Arteriovenous Fistula of the Superficial Temporal Artery**

Arteriovenous fistulae of the scalp are direct connections between the arterial feeding vessels of the scalp and the draining veins without an intervening capillary bed. The draining veins are often grossly enlarged and tortuous, resembling a varix. Most of these fistulae occur as a result of an incidental injury or iatrogenic injury. Arteriovenous fistula of the scalp is relatively rare. The superficial temporal artery is particularly vulnerable to trauma due to its long and relatively exposed course in the scalp.

We report the case of a 44-year-old man who presented a traumatic arteriovenous fistula of the superficial temporal artery, five years after a motorcycle accident, treated by complete surgical excision and review the literature with regard to etiology, clinical manifestations, pathogenesis, diagnosis and management of these unusual lesions.



**Richard Grimes**

Adjunct Professor, University of Texas Health Science Center at  
Houston, USA

&

**Deanna Grimes**

Professor, University of Texas Health Science Center at Houston, USA

## **A Population Based Approach to Quantifying the Level of Control of Hypertension and Diabetes**

**Background.** Public health agencies usually evaluate success in controlling diabetes and hypertension by determining what percent of treated individuals reach target goals. A population based approach to control of these conditions should examine whether the entire population of persons with these conditions (in treatment or not) have controlled their disease. This requires examination of clinician and patient adherence to screening recommendations and whether successfully screened patients are properly treated for their condition and whether they adhere to treatments.

**Methods.** Literature searches identified prevalence of hypertension, hypertensives diagnosed, hypertensives being treated and percent controlled (<140/90) in Canada, France, Germany, Greece, Portugal, Spain, United Kingdom and United States. We used studies that: 1) were conducted on representative samples of a country's population, 2) estimated the percent of a population with hypertension (systolic >140/diastolic >90 or took antihypertensive medications), 3) published since 2010, 4) reported percents of diagnosed hypertensives receiving treatment and 5) reported percent of treated person with blood pressure <140/90. Data from the International Diabetes Foundation were used to identify prevalence of type 2 diabetes, percent of diabetics diagnosed and persons with controlled diabetes (Hb1AC <7.0%) in Canada, France, Germany, Greece, Italy, Spain, United Kingdom, and United States. The number of persons being treated for diabetes for each country was derived from literature published since 2010.

**Results.** The percent of a country's hypertensives that had BPs below 140/90 by country: Canada (45.5%), France (45.7%), Germany (30.3%), Greece (37.9%), Portugal (24.4%), Spain (14.7%), UK (9.3%) and USA (36.1%). The percent of a country's diabetics who had Hb1AC <7.0% were Canada (34.0%), France (34.3%), Germany (19.4%), Greece (17.0%), Italy 19.9%), Spain (31.8%), UK (12.6%) and USA (36.4%).

**Conclusion.** Failure to screen, failure to diagnose, failure to treat and failure to adhere to medications are all important to control hypertension and diabetes in populations.

**Kaouther Hamaidia**

Lecturer, University Mohamed Cherif Messaadia, Algeria

&

**Noureddine Soltani**

Professor, University Badji Mokhtar, Algeria

**Effects of Methoxyfenozide, a Molting Hormone Agonist,  
on Fecundity and Fertility of *Culex pipiens* L (Diptera:  
Culicidae)**

Chemical insecticides have represented the most widely method used to control mosquito-borne vectors. However, despite their efficiency, resistance of vector populations against them poses a threat to public health. Their negative effects on non-target organisms, have led to search other alternative methods, more simple and sustainable for mosquito control. The current study aimed to evaluate the effects of an insect growth disrupter (IGD), ecdysone agonist (methoxyfenozide: RH-2485), against *Culex pipiens* L. (Diptera: Culicidae) under laboratory conditions. Lethal concentrations (LC<sub>50</sub> = 24.54 µg/L and LC<sub>90</sub> = 70.79 µg/L) previously determined, were tested on adult female fertility and fecundity after tarsal contact before mating. Methoxyfenozide showed an oviposition inhibition against *Cx. pipiens*. Eclosion rate (fertility) was significantly higher in control group than under treatment with methoxyfenozide. Furthermore, changes in the egg shell morphology were observed. Survey data clearly demonstrated that methoxyfenozide have significant sterilizing activity against medically important vector while minimizing ecotoxicological risks in mosquitoes management.

**Enis Hidisoglu**

Research Assistant, Akdeniz University, Turkey

**Deniz Kantar Gok**

Postdoctoral Researcher, Akdeniz University, Turkey

**Alev Dugyu Acun**

Research Assistant, Akdeniz University, Turkey

**Hakan Er**

Research Assistant, Akdeniz University, Turkey

&

**Piraye Yargicoglu**

Professor, Akdeniz University, Turkey

## **Dose Dependent Effects of Amyloid Beta 1-42 on Auditory Evoked Potentials**

Amyloid beta ( $A\beta$ ) is the principal component of the amyloid plaques and initiate pathological processes in the cortex, hippocampus, and several other structures of the brain in the Alzheimer's disease (AD). Therefore, we aimed to identify how brain electrical activity change by  $A\beta$  injection and whether the observed changes can be used as a new biomarker for early diagnosis of the AD.

In our present study, 64 Wistar rats were divided randomly into eight experimental groups: Control group (C) and seven AD model groups obtained by intracerebroventricular  $A\beta_{42}$  injection in increasing concentrations. In all rats, anesthesia was provided with mixture of Ketamine-based anesthetics (Ketamine, 50 mg/kg and Xylazine, 10 mg/kg; intraperitoneally, i.p.). Under the anesthesia, either  $A\beta_{42}$  peptide or saline (0.9% NaCl) was injected into both lateral ventricles in 1  $\mu$ l/minute rate by using Hamilton microsyringe. Following this process, recording electrodes were placed bilaterally into the frontal, parietal, temporal and occipital cortex while the reference electrode was placed into cerebellum. Then, auditory evoked potentials (AEPs) were recorded by using multi-electrodes in awake, freely moving rats, and were analyzed mathematically to determine the changes related to accumulation of  $A\beta$ .

There was no difference in the latency values of AEPs among groups, but injection of  $A\beta_{42}$  significantly affected peak to peak amplitudes of AEPs. It was also found that there were significant differences among the auditory evoked gamma responses between groups.

These results demonstrated that  $A\beta$  administration induces significant changes in brain activity and the observed changes in the

gamma responses could be used to determine the localization of the A $\beta$  in the brain.

**Anthony Koutoulis**

Head, School of Biological Sciences, University of Tasmania, Australia

**Robert Shellie**

Technology/Market Manager, Trajan Scientific Australia Pty Ltd,  
Australia

**Laura Tedone**

Postdoctoral Research Fellow, University of Tasmania, Australia

**Dandan Yan**

PhD Student, University of Tasmania, Australia

**Aina Price**

Technical Officer, University of Tasmania, Australia  
&

**Simon Whittock**

Hop Breeder, Hop Products Australia, Australia

**An Overview of Hop (*Humulus lupulus L.*)  
Research in Australia, 1997-2017**

The Australian hop industry has a rich history of continued commitment to R&D dating back to the 1950s. To remain internationally competitive, hop production in Australia relies upon varieties that have been bred in the Australian environment. Since the mid-1990s, a research partnership between the University of Tasmania and Hop Products Australia has focused on incorporating modern technologies into the Australian hop breeding program. This includes the use of flow cytometry for the development of triploid hop varieties, discovering hop genetic information using molecular markers and understanding the complex chemical composition of hop using analytical chemistry. This successful university-industry collaboration has advanced hop research and breeding efforts in Australia and promoted the development of higher yielding, seedless varieties with diverse and exciting flavour profiles and provides a flexible framework to respond to future research requirements.

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## **Preferential Regulation of Akt CD133, *cfos* and *cjun* Genes Linked to Anti-Neoplastic Activity of *Gundelia tournefortii* L. on Malignant Melanoma Stem Cells**

**Introduction and Objectives:** The discovery of cancer stem cells (CSCs), which drive the relentless neoplastic development and growth within tumors, has clarified the obscurity of recurrent cancers unresponsive to consequent chemotherapies. Evasion of conventional therapies was later linked to the CD133+ phenotype in CSCs. Since CSCs are resistant to many current radiation- and chemo-related treatments, there is a rising trend in the discovery of bioactive compounds with chemotherapeutic potential from traditional medicinal plants. This study investigated the anti-proliferative activity of *Gundelia tournefortii* L., an ancient and traditional herb, against the multi-drug resistant CD133+ CSC subpopulation of malignant melanoma. Effects on the expression of *Akt*, *CD133* marker and pro-apoptotic *cfos* and *cjun* genes were also investigated.

**Materials and Methods:** *G. tournefortii* was obtained from West Azerbaijan and confirmed taxonomically by phenotypic and molecular methods. Working extracts from *G. tournefortii* were prepared by dichloromethane (DCM) extraction, rotavap drying and resuspension using 0.2% dimethylsulfoxide. CD133+ CSCs from WM-115 human melanoma were purified by flow cytometry and automated antibody-labeled cell sorting. Cell viability assays were performed using standard procedures employing PrestoBlue®. Gene expression studies involving specific primers for *Akt2*, *CD133*, *cfos* and *cjun* were accomplished via qRT-PCR. Gas chromatography tandem-mass spectrometry (GC-MS) was employed to determine the phytochemical composition of *G. tournefortii* extract.

**Results:** Purified CD133+ WM-115 human melanoma CSCs were examined for susceptibility to 5-fluorouracil (5FU) and doxorubicin (DOX) and were found to survive treatment towards increased proportions compared to CD133- WM-115. IC<sub>50</sub> values were >100 µg/mL (5-FU and DOX) in CD133+ WM-115 and 6.2 µg/mL (5-FU) and 5.1 µg/mL (DOX) in CD133- WM-115, respectively. Absolute quantitation of expressed *Akt2* transcripts by qRT-PCR was significantly upregulated in CD133+ compared to CD133- cells (P < 0.05). Expressed *cfos* and *cjun* transcripts were significantly downregulated in CD133+ cells compared to CD133- cells (P < 0.05). However, addition of Akt inhibitor benzimidazole IV in CD+133 cells significantly increased sensitivity to 5-FU and DOX suggesting an Akt survival pathway-dependent chemoresistance. Anti-proliferative investigation of *G. tournefortii* DCM extract showed high toxicity in 5FU-resistant (IC<sub>50</sub> = 8.45 µg/mL) and DOX-resistant (IC<sub>50</sub> = 7.15 µg/mL) CD133+ cells and CD133- cells (IC<sub>50</sub> = 6.97 µg/mL). Moreover, *Akt2* transcripts were significantly downregulated in both extract-treated CD133+ and CD133- cells compared to untreated controls (P < 0.05) while *cfos* and *cjun* transcripts were significantly upregulated compared to controls (P < 0.05). Surprisingly, plant extract treatment also resulted to significant decrease of expressed *CD133* in the CD133+ subpopulation compared to untreated control (P < 0.05). Chemical investigation of the plant extract by GC-MS afforded mevalonolactone and ester derivatives of palmitic, oleic, linoleic, stearic and heptadecanoic acids.

**Conclusions:** Results suggest that *G. tournefortii* preferentially induced early apoptosis by upregulating *cfos* and *cjun* expression, downregulated *Akt* expression and abolished the Akt-dependent survival of multi-drug resistant CD133+ WM-115 melanoma CSCs. Identified phytochemicals may target the Akt pathway suggesting that *G. tournefortii* may be a source of chemotherapeutic compounds.



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### **Dietary Magnesium Supplementation Alters Relaxation Kinetics and Electrical Activity of Rat Ventricular Myocytes**

Magnesium is an essential mineral that plays a critical role in some metabolic functions in the body. However, the relationship between  $Mg^{2+}$  and excitation-contraction coupling in cardiac myocytes has not been clearly elucidated. Therefore, we investigated whether  $Mg^{2+}$  supplementation has impact on electrical and mechanical functions of cardiac myocytes.

Eight-week old male rats were randomly separated into two groups as control (C) group and magnesium oxide administered (MgO) group. The group treated with chronic MgO was fed with rat chow containing MgO (1 g/kg) for 6 weeks. Cardiac hypertrophy parameters such as heart weight, heart weight/tibia length ratio and cell capacitance was not different between groups. Intracellular free  $Mg^{2+}$  levels measured in Mag-fura2 loaded ventricular myocytes didn't change significantly in MgO-treated group. Although the fractional shortening didn't change in MgO administered group myocytes, significant slowing in contraction kinetics was measured. The amplitude of  $Ca^{2+}$  transients and rate of removal were also similar between groups. In the MgO-administered rats, the time to 50% of repolarization of action potential (AP) was significantly longer compared to control myocytes. Accordingly, repolarizing potassium currents were examined and transient outward potassium current ( $I_{to}$ ) was significantly suppressed in MgO group myocytes while sustained potassium current ( $I_{ss}$ ) wasn't affected. Furthermore, neither L-type  $Ca^{2+}$  currents and NCX activity nor SR  $Ca^{2+}$  content of ventricular myocytes was influenced by MgO administration.

In summary,  $Mg^{2+}$  rich diet suppresses  $I_{to}$ , causes prolongation in AP duration and results in slower relaxation, although it doesn't change  $Ca^{2+}$  regulation. Despite the prominent role of  $Ca^{2+}$  for contractile activity of ventricular myocytes,  $Mg^{2+}$  ion can also affect the dynamics of contractile function due to regulation of myofilament proteins. These results imply that even small changes in intracellular or extracellular  $Mg^{2+}$  concentration may exert significant effects on the functions of contractile proteins, independent of  $Ca^{2+}$  modulation.

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**State of the Extracellular Transport System (Albumin) in  
Women of Gomel Region of the Republic of Belarus**

Albumin is a major extracellular transport system. About 1/3 of albumin is within the vascular bed, the other 2/3 are extravasal. A pool of blood albumin and a pool of tissue albumin are exchanged. Therefore, the state of albumin reflects metabolic processes and is an informative system.

The aim of study was to study the conformational state of serum albumin in women in norm and in different pathology. Were studied 63 women (6 groups):

- 10 healthy (1 gr.);
- 9 healthy with full-term pregnancy (2 gr.);
- 11 women with full-term pregnancy with diagnosis: preeclampsia (3 gr.);
- 18 women with full-term pregnancy with diagnosis: iron deficiency anemia (4 gr.);
- 11 patients with diagnosis: cervical cancer, undergoing a split course of radiation therapy (first stage – 30 Gy, with a break of three weeks the second stage – 20 Gy) (5 gr.);
- 4 patients with diagnosis: cervical cancer, undergoing an unsplit course of radiation therapy (40 Gy) (6 gr.).

State of binding sites of serum albumin was estimated by the method [Y.A. Gryzunov et al. *Serum albumin: properties, functions and their evaluation in critical conditions. Anesthesiology and Resuscitation. 2004; 6: 68-73*].

1. The total concentration of serum albumin is within the normal range for all study groups.
2. The values of IT (Index of Toxicity), characterizing the filling of albumin centers by toxic ligands, is close to zero in healthy women (IT=0.05) and healthy with full-term pregnancy

(IT=0.07); but increase in women with full-term pregnancy with diagnosis: preeclampsia (IT=0.14), in women with full-term pregnancy with diagnosis: iron deficiency anemia (IT=0.31) and in cancer patients (IT=0.48 in 5 gr. and IT=0.55 in 6 gr.).

Determination of albumin indicators, characterizing the state of binding sites of serum albumin, can be used as an individual diagnostic and prognostic criterion in the dynamics of patients monitoring with different types of pathology.

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## **Collective Data Analysis of Correlation between Lung Cancer Incidences and Residential Radon Concentration**

Naturally occurring radioactive gas radon is claimed to be responsible for approx. half part of an average annual effective dose for humans. This is the reason why its influence on health of people is a subject of many studies worldwide - especially, when one tries to compare its level of concentration with the number of observed lung cancer cases. The question arises is there any correlation between those two values. We performed collective data analysis for 30 case-controlled studies and 2 ecological ones that were published in past years. Original data single analyses were very confusing, suggesting that the lung cancer morbidity and mortality increase or decrease with increasing radon concentration at concentrations up to 200 - 300 Bq/m<sup>3</sup>. In all cases the collective data up to 475 Bq/m<sup>3</sup> show, within error bars, neither elevated nor diminished risks, so the overall conclusion is that in this concentration range one sees no clear-cut radiation effect. In the next step the data analysis was extended to 838 Bq/m<sup>3</sup>. This time the analysis was carried out in the whole range of radon concentration, and in 3 sub-regions. In all cases both, least-square fitting and Bayesian analysis of a few simplest models were carried out. The general conclusion is that the model of the independence of the radon risk describes the data in the best way. The best conclusion suggests, in light of the data collected so far, that they are insufficient to support the concept of increased risk of lung cancer for considered low concentrations of residential radon.

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## **The Critical Importance of Human Cadaver Dissection in the Study of Human Anatomy for Pre-Medical and Pre-Nursing Undergraduate Students**

As an Instructor of Human Anatomy for over twenty years at the college and junior college levels, I have discovered that human cadaver dissection is a critical component to this study, especially as it relates to the future pursuit by a select group of my students of careers in the fields of medicine and nursing. The purpose of this paper is to not only justify my contention that cadaver dissection is the *most* important ingredient in teaching this course, but also to demonstrate how it intensifies students' passions for achieving a greater understanding of the anatomy of the human body. Having taught Human Anatomy to classes with and without access to the use of human cadavers for dissection, I firmly believe that the addition of this technique has piqued the fervor for learning of my more gifted students, has given them a greater incentive to pursue careers in medicine or nursing, and has, by their own accounts, greatly improved their performances in subsequent postgraduate medical and nursing school career studies. To substantiate this thesis, I will provide brief descriptions of follow up conversations that I've had with a select group of postgraduate students who've completed my course and who have gone on to complete medical or nursing school.

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## **Spatiotemporal Patterns of Allergic Disease Prevalence in Korea: Looking Beyond Aggregates**

A recent 6-year population-based study in Korea reported decreasing trends in the prevalence of atopic dermatitis and asthma at the national level, but the underlying reasons remain unknown. Moreover, further research would be needed to examine whether or not the slowdown has been consistent throughout the country. This paper examines the spatial and temporal patterns of the three types of allergic diseases (allergic rhinitis, atopic dermatitis and asthma) using the patient count data collected at the regional level by the National Health Insurance Corporation (NHIS) of South Korea from 2010 to 2015. It appears that substantially different disease patterns exist between megacities, central and south regions. South regions show a greater fluctuation in prevalence of asthma and atopic dermatitis compared to megacities or central regions, including a huge drop in 2010 and a big rebound in 2011 for all three diseases. We also created maps of the allergic disease prevalence at the sub-district level in Seoul for the 6-year period, which reveals smaller-scale spatial and temporal variations of each allergic disease. The study results highlight that aggregation of disease data over time and space could cause distinctive distribution of diseases to become indiscernible and thus have a possibility to mislead policymakers. A spatiotemporal approach using more disaggregated data is expected to suggest guidance on targeted intervention in terms of effectively preventing allergic diseases.

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## **Structural Disorder Promotes Phase Separation of C9 or F72 Dipeptide Repeats in ALS**

Liquid-liquid phase separation (LLPS) of RNA-binding proteins plays a role in the formation of multiple membrane-less organelles involved in RNA metabolism, including stress granules [1,2]. Defects in stress granule homeostasis constitute a cornerstone of Amyotrophic lateral sclerosis (ALS)/ Frontotemporal lobar degeneration (FTLD) pathogenesis. Polar residues (tyrosine, glutamine) have been previously demonstrated to be critical for phase separation of ALS-linked stress granule proteins. We now identify an active role for arginine-rich domains in these phase separations. Moreover, arginine-rich dipeptide repeats (DPRs) derived from C9orf72 hexanucleotide repeat expansions similarly undergo LLPS, and induce phase separation of a large set of proteins involved in RNA and stress granule metabolism [3]. Expression of arginine-rich DPRs in cells induced spontaneous stress granule assembly that required both eIF2 $\alpha$  phosphorylation and G3BP. Together with recent reports showing that DPRs affect nucleocytoplasmic transport, our results point at an important role for arginine-rich DPRs in the pathogenesis of C9orf72 ALS/FTLD.

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## **Modeling of Self-Regulation Ability of Light-Harvesting Antenna**

The photosynthetic apparatus of green plants is well-known for its extremely high efficiency that allows them to operate under dim light conditions. On the other hand, intense sunlight may result in over-excitation of the light-harvesting antenna and the formation of reactive compounds capable of “burning out” the whole photosynthetic unit. Non-photochemical quenching (NPQ) is a self-regulatory mechanism utilised by green plants on a molecular level that allows them to safely dissipate the detrimental excess excitation energy as heat. While it is believed to take place in the plant's major light-harvesting complexes (LHCII), there is still no consensus regarding its molecular nature. To get more insight into its physical origin, high-resolution time-resolved fluorescence measurements of LHCII trimers and their aggregates are analyzed over a wide temperature range [1]. For simulations of the experimental data two-state model as well as multi-state model are applied. It is demonstrated that both approaches explain the experimental data for the LHCII aggregates reasonably well. However, the experimental for the trimers at low temperatures cannot be fitted using the two-state model and can be understood only in terms of the multi-state model. Based on simulations of the excitation energy transfer in the LHCII aggregate, we associate the red-emitting state, having fluorescence maximum at ~700 nm, with the partial mixing of excitonic and chlorophyll-chlorophyll charge transfer states. On the other hand, the quenched state has a totally different nature and is related to the incoherent excitation transfer to the short-lived carotenoid excited states. Our results also show that the required level of photoprotection *in vivo* can be achieved by a very subtle change in the number of LHCII switched to the quenched state.