

**SESSION XV**  
**MISCELLANEA**

Thursday (September 16, 2021; 10:15 – 11:20)  
Friday (September 17; 2021; 12:00 – 13:05)

Chair:

Prof. Pawel Winklewski  
Department of Human Physiology, Medical University of Gdansk, Gdansk, Poland

Assoc. Prof. Tomasz Wierzba  
Department of Physiology, Medical University of Gdansk, Gdansk, Poland

## DETAILED SESSION XV SCHEDULE

### **Opening lecture** (Thursday, September 16, 2021; 10:15 – 10:45; *virtual stream A*):

S15.L1 WHAT THE P-VALUE IS, AND WHAT IT IS NOT. **J. Piskorski** (Institute of Physics, University of Zielona Gora, Zielona Gora, Poland).

### **Oral presentations** (Thursday, September 16, 2021; 10:45 – 11:20; *virtual stream A*):

S15.L2 THE ASSESSMENT OF THE BIDIRECTIONAL INFORMATION TRANSFER BETWEEN BLOOD PRESSURE AND HEART RATE. **G. Graff<sup>1</sup>, B. Graff<sup>2</sup>, K. Tessmer, K. Narkiewicz<sup>2</sup>** (<sup>1</sup>Gdansk University of Technology, Faculty of Applied Physics and Mathematics, Gdansk, Poland, <sup>2</sup>Medical University of Gdansk, Department of Hypertension and Diabetology, Gdansk, Poland).

S15.L3 REAL TIME ANALYSIS OF PHYSICAL ACTIVITY AND QUALITY OF SLEEP (PAS STUDY) IN EARLY AND LATE NIGHT EATER HYPERTENSIVE PATIENTS WITH TYPE 2 DIABETES, USING WEARABLE FITNESS TECHNOLOGY. **S. Rastogi, N. Verma** (King George's Medical University, Lucknow, India).

### *Questions and answers*

### **Poster session** (Friday, September 17; 2021; 12:00 – 13:05; *virtual stream C*):

S15.P1 THE USE OF GASEOUS HYDROGEN IN THE TREATMENT OF SARS-COV-2 VIRUS INFECTION. **K. Michalak** (Adam Mickiewicz University in Poznan, Laboratory of Vision Science and Optometry, Poznan, Poland).

S15.P2 THE ROLE OF NEUROTENSIN AND ENDOMORPHIN PATHWAYS IN THE ANTI-INFLAMMATORY ACTION OF PK20 HYBRID IN MOUSE MODEL OF NON-ATOPIC ASTHMA. **E. Russjan<sup>1</sup>, D. Zajac<sup>1</sup>, D. Sulejczak<sup>2</sup>, P. Kleczkowska<sup>3,4</sup>, K. Kaczynska<sup>1</sup>** (<sup>1</sup>Department of Respiration Physiology, Mossakowski Medical Research Institute, Polish Academy of Sciences, Warsaw, Poland, <sup>2</sup>Department of Experimental Pharmacology, Mossakowski Medical Research Institute, Polish Academy of Sciences, Warsaw, Poland, <sup>3</sup>Department of Pharmacodynamics, Centre for Preclinical Research (CBP), Medical University of Warsaw, Warsaw, Poland, <sup>4</sup>Military Institute of Hygiene and Epidemiology, Warsaw, Poland).

S15.P3 ANALYSIS OF ANTIOXIDANT ENZYMES IN PATIENTS WITH NEUROENDOCRINE NEOPLASMS OF THE LUNG, GASTROINTESTINAL TRACT AND PANCREAS. **M. Budek, J. Nuszkiewicz, K. Szewczyk-Golec** (Department of Medical Biology and Biochemistry, University Nicolaus Copernicus in Torun, Collegium Medicum in Bydgoszcz, Bydgoszcz, Poland).

S15.P4 THE INFLUENCE OF ANTIMICROBIAL NEUTROPHIL EXTRACT AND PENTOXIFYLLINE ON OVINE NEUTROPHILS ISOLATED DURING THE INSERTION TITANIUM IMPLANT IN A SHEEP MODEL. **J. Zdziennicka<sup>1</sup>, J. Wessely-Szponder<sup>1</sup>, T. Szponder<sup>2</sup>, M. Latalski<sup>3</sup>** (<sup>1</sup>Sub-Department of Pathophysiology, Department of Preclinical Veterinary Sciences, Faculty of Veterinary Medicine, University of Life Sciences, Lublin, Poland, <sup>2</sup>Department and Clinic of Animal Surgery, Faculty of Veterinary Medicine, University of Life Sciences, Lublin, Poland, <sup>3</sup>Department of Pediatric Orthopedics, Medical University, Lublin, Poland).

S15.P5 miR 511-5p EXPRESSION AS A PREDICTOR OF NUTRITIONAL STATUS DISORDERS IN PATIENTS TREATED WITH INTENSITY-MODULATED RADIATION THERAPY DUE TO HEAD NECK CANCER. **M. Mazurek<sup>1</sup>, R. Mlak<sup>1</sup>, I. Homa-Mlak<sup>1</sup>, T. Powrozek<sup>1</sup>, A. Brzozowska<sup>2</sup>, T. Malecka-Massalska<sup>1</sup>** (<sup>1</sup>Department of Human Physiology, Medical University of Lublin, Poland, <sup>2</sup>II Department of Radiotherapy, Center of Oncology of the Lublin Region St. John of Dukla, Poland).

S15.P6 SILICON - A NOT-ESSENTIAL ELEMENT? **M. Blaszczyk** (University of Applied Sciences in Nysa (PWS-Nysa), Nysa, Poland).

S15.P7 SPATIAL ORIENTATION IN ADOLESCENTS. **K. Pagava<sup>1</sup>, H. Phagava<sup>2</sup>** (<sup>1</sup>Department of Child and Adolescent Medicine, Tbilisi State Medical University, Tbilisi, Georgia, <sup>2</sup>Department of Epidemiology and Biostatistics, Tbilisi State Medical University, Tbilisi, Georgia).

S15.P8 HOW VISION AFFECTS OUR TASTE SENSITIVITY? **P. Redmer, E. Leszkowicz** (Department of Animal and Human Physiology, University of Gdansk, Gdansk, Poland).

## WHAT THE P-VALUE IS, AND WHAT IT IS NOT

J. PISKORSKI

Institute of Physics, University of Zielona Gora, Zielona Gora, Poland

June 10, 2016 the American Statistical Association published the official statement on what the P-value and statistical significance are. This could be considered strange and unnecessary - everyone has been using the P-value and the concept of statistical significance for decades. However, in the view of the ASA, as well as many others, these concepts are not well understood. This has led to the „reproducibility crisis“ which has rendered whole branches and subbranches of the biomedical sciences useless. In this lecture we will tackle the problem of the interpretation of the P-value and statistical significance, their usage, some of the misconceptions related to these concepts as well as the recommendations of the ASA on their correct usage.

Author for correspondence: Jaroslaw Piskorski (jaropis@zg.home.pl)

## THE ASSESMENT OF THE BIDIRECTIONAL INFORMATION TRANSFER BETWEEN BLOOD PRESSURE AND HEART RATE

G. GRAFF<sup>1</sup>, B. GRAFF<sup>2</sup>, K. TESSMER<sup>1</sup>, K. NARKIEWICZ<sup>2</sup>,

<sup>1</sup>Gdansk University of Technology, Faculty of Applied Physics and Mathematics, Gdansk, Poland,

<sup>2</sup>Department of Hypertension and Diabetology, Medical University of Gdansk, Gdansk, Poland

In patients with cardiovascular diseases the cardiovascular regulation is often altered which might negatively impact the prognosis. Previous studies have shown that methods based on the information transfer concept might be useful in the assessment of bidirectional influences of heart rate (HR) and blood pressure (BP). The aim of the study was twofold: first, to test if the methods based on transfer entropy computed for 20-minutes recordings of ECG and blood pressure are able to differentiate groups of normotensive volunteers and hypertensive patients and second, to check what are most important cardiovascular factors which are related to the values of transfer entropies. Bidirectional interaction between heart rate and blood pressure seems to be decreased in patients with hypertension. Information transfer between BP and HR is related to age, blood pressure variability and vascular properties. The prevailing direction of the information flow did not differ in both groups.

Author for correspondence: Grzegorz Graff (grzegorz.graff@pg.edu.pl)

## REAL TIME ANALYSIS OF PHYSICAL ACTIVITY AND QUALITY OF SLEEP (PAS STUDY) IN EARLY AND LATE NIGHT EATER HYPERTENSIVE PATIENTS WITH TYPE 2 DIABETES, USING WEARABLE FITNESS TECHNOLOGY

S. RASTOGI, N. VERMA

King George's Medical University, Lucknow, India

In India, the incidence of hypertension and type 2 diabetes is very high. Invariably, patients of both diseases come to the Out Patient Department (OPD) regularly. PAS study aims to study the effect of walking 8000 steps five days a week on various parameters in early and late night eater hypertensive patients with type 2 diabetes, to study the effect of early and late meal intake on the quality of sleep in early and late night eater hypertensive patients with type 2 diabetes and to draw an inference regarding the compliance of early and late night eaters on the above parameters. One hundred patients from OPD-Endocrinology, King George's Medical University in Lucknow, were randomly divided into 2 groups of 50 patients each: first group of early night eaters (TRM group) and the second group of late night eaters. Anthropometric parameters like height, weight, neck size, waist, hip size, waist hip ratio, BMI and biochemical parameters blood sugar fasting, post-prandial, HbA1c, blood pressure, systolic, diastolic and heart rate were measured in the first visit and then after 6 months. Patient was then, made to wear MI Fit, a wearable real time tracker of heart rate, quality of sleep, pedometer, modes of walking, swimming, training on treadmill, exercise mode which the user can change according to whichever physical activity he or she is doing. Data was received on the mobile app of MI Fit on the phone of the owner of the Fit band *via* blue tooth. Subjects wore the band for 10 days, then data was collected and analysed. Standard Convention Treatment of diabetes was followed by both groups of patients. Mean arterial pressure, pulse rate, diastolic blood pressure, waist and neck size were not significantly different. BMI, hip size, systolic blood pressure, HbA1c, blood sugar (fasting and post-prandial) were significantly different ( $p < 0.05$ ). The average heart rate of TRM was 86.89 beats per minute vs. 92.46 beats per minute control group. Quality of sleep in both groups was markedly different with deep sleep approximately 1 hour more in early night eaters, time for which a patient was awake at night was 25 mins in TRM group and 1 hour 29 min in control group. Early night eaters were more compliant in their goal of walking 8000 steps daily when compared to late night eaters. This study shows that time restricted meal intake holds the potential and is a promising method which can be used as an adjunct along with the standard treatment been given to patients of type 2 diabetes. It is one of the first studies which have been undertaken in Indian hypertensive and type 2 diabetes patients, correlating the quality of sleep, sugar and blood pressure control with the time of dinner and physical activity in Indian patients.

Author for correspondence: S. Rastogi (smriti198719@gmail.com)

## THE USE OF GASEOUS HYDROGEN IN THE TREATMENT OF SARS-COV-2 VIRUS INFECTION

K. MICHALAK

Adam Mickiewicz University in Poznan, Laboratory of Vision Science and Optometry, Poznan, Poland

Sars-Cov-2 virus can provoke an inflammatory storm by excessively activating the immune system, causing severe inflammatory damage to the lungs and extrapulmonary tissue, which is also the main cause of death. It is postulated that the spike protein S of Sars-Cov-2 possesses the activity of neuraminidase being able to cut off the sialic acid molecules on the surface of lymphocytes and causing their activation. On the other side, angiotensin-converting enzyme 2 aminopeptidase (ACE-2), the human receptor for SARS-CoV-2 cell entrance is reduced on the surface of human cells during infection leading to overactivity of angiotensin II. This causes further regulatory metabolic disturbances including bronchial smooth muscle constriction, blood clotting and inflammation storm. Gaseous hydrogen is a novel molecule being potentially useful in the treatment of Sars-Cov-2 virus infection. Its metabolic activity of confining the reduction of inflammatory cytokines: IL-1a, IL-1b, IL-6, IL-8, IL-10, TNF- $\alpha$ , Fas, FasL, INF- $\gamma$ , NF- $\kappa$ B; activation of antioxidative system: NRF-2, HO-1; reduction of endoplasmatic reticulum stress factors: GRP78, TRAF2; reduction of ROS and RNS levels: OH $^*$ , ONOO $^-$ ; activation of OXPHOS in mitochondria, reduction of apoptosis: increase of BCL-2, Bcl-xL and decrease of BAX, caspase-3, -8 and -12; reduction of pyroptosis, ferroptosis and autophagy. Chinese Clinical Guidance for COVID-19 Pneumonia Diagnosis and Treatment (7<sup>th</sup> edition) issued by China National Health Commission recommended the inhalation of oxygen mixed with hydrogen gas (33.3% O $_2$  and 66.6% H $_2$ ), bringing H $_2$  to the forefront of contemporary therapeutic medical gas research.

Author for correspondence: K. Michalak (kmichalak@amu.edu.pl)

## THE ROLE OF NEUROTENSIN AND ENDOMORPHIN PATHWAYS IN THE ANTI-INFLAMMATORY ACTION OF PK20 HYBRID IN MOUSE MODEL OF NON-ATOPIC ASTHMA

E. RUSSJAN<sup>1</sup>, D. ZAJAC<sup>1</sup>, D. SULEJCZAK<sup>2</sup>, P. KLECZKOWSKA<sup>3,4</sup>, K. KACZYNSKA<sup>1</sup>

<sup>1</sup>Department of Respiration Physiology, Mossakowski Medical Research Institute, Polish Academy of Sciences, Warsaw, Poland,

<sup>2</sup>Department of Experimental Pharmacology, Mossakowski Medical Research Institute, Polish Academy of Sciences, Warsaw, Poland, <sup>3</sup>Department of Pharmacodynamics, Centre for Preclinical Research (CBP), Medical University of Warsaw, Warsaw, Poland, <sup>4</sup>Military Institute of Hygiene and Epidemiology, Warsaw, Poland

Hybrid compounds represent a new approach in experimental models of different diseases. One of such compounds is PK20 hybrid, which comprises two structural elements - endomorphin-2 and neurotensin pharmacophores. It has been proven that PK20 exhibits anti-inflammatory activity in non-allergic asthmatic mice, however the exact mechanism of its action remain unexplained. The object of the present study was to assess the contribution of opioid and neurotensin pathways in beneficial effects of tested hybrid by using a murine model of non-atopic asthma. Airway hyperresponsiveness (AHR) to methacholine nebulization, infiltration of inflammatory cells (including neutrophils) in bronchoalveolar lavage fluid (BALF), concentration of pro-inflammatory cytokines in BALF and lungs, levels of malondialdehyde and mouse mast cell protease in lung tissue, and activity of secretory phospholipase 2 were determined in five experimental group. The experimental design included negative and positive control mice, a group treated with PK20 hybrid and mice in which PK20 injection was preceded by pretreatment with mu opioid (naloxone hydrochloride) and neurotensin receptor NTS<sub>1</sub> (SR142948) antagonists to show involvement of particular pathways in anti-inflammatory activity of the hybrid. Inhibition of neurotensin NTS<sub>1</sub> or mu opioid receptors did not affect PK20 activity in terms of alleviating AHR. On the other hand, BALF cell studies revealed that advantageous effects of hybrid is related to the activation of NTS<sub>1</sub> receptor. In turn, in cytokine and biochemical analysis, the results differ significantly. In part of the studies, both pathways (endomorphin or neurotensin) contributed to PK20 action, in other only one type of receptors was responsible for the obtained effect or pretreatment with both antagonists did not alter concentrations of tested parameters. To sum up, it appears clear that full anti-inflammatory activity of PK20 peptide requires simultaneous stimulation of both opioid and neurotensin receptors.

Acknowledgements: The research was funded by a grant from National Science Centre, Poland, no. 2014/13/B/NZ7/02247.  
Author for correspondence: E. Russjan (erussjan@imdik.pan.pl)

## ANALYSIS OF ANTIOXIDANT ENZYMES IN PATIENTS WITH NEUROENDOCRINE NEOPLASMS OF THE LUNG, GASTROINTESTINAL TRACT AND PANCREAS

M. BUDEK, J. NUSZKIEWICZ, K. SZEWCZYK-GOLEC

Nicolaus Copernicus University in Torun, Department of Medical Biology and Biochemistry,  
Collegium Medicum in Bydgoszcz, Bydgoszcz, Poland

Oxidative stress is defined as the imbalance between the production of reactive oxygen species and the antioxidant capacity of biological systems. Excessive production of by-products of oxygen metabolism has a detrimental effect on essential cell components, i.e. proteins, lipids, nucleic acids, which may be responsible for inducing or aggravating various disease entities: cancer, diabetes, and cardiovascular diseases. One of the cell defense mechanisms are antioxidant enzymes: superoxide dismutase, catalase and glutathione peroxidase. The conditions of long-term oxidative stress favor the increase of mutations and DNA damage, as a consequence initiating neoplastic transformations. The aim of the study is to analyze antioxidant enzymes in patients with neuroendocrine tumors of the lung, gastrointestinal tract and pancreas. The study group consists of 75 patients with neuroendocrine neoplasms. These are preliminary studies comparing antioxidant enzymes in neuroendocrine neoplasms in separate locations (lungs, gastrointestinal tract, pancreas). Research is ongoing and numerous analyzes are carried out. In recent years, knowledge about the relationship of reactive oxygen species with cancer has increased. However, little information is available on the antioxidant activity of cell defense mechanisms in the presence of neuroendocrine tumors. Efforts are still being made to obtain the best diagnostic methods and identify effective and sensitive biomarkers that would suggest changes characteristic of neuroendocrine neoplasms.

Author for correspondence: Marlena Budek (marlenamarkiewicz@o2.pl)

## THE INFLUENCE OF ANTIMICROBIAL NEUTROPHIL EXTRACT AND PENTOXIFYLLINE ON OVINE NEUTROPHILS ISOLATED DURING THE INSERTION TITANIUM IMPLANT IN A SHEEP MODEL

J. ZDZIENNICKA<sup>1</sup>, J. WESSELY-SZPONDER<sup>1</sup>, T. SZPONDER<sup>2</sup>, M. LATALSKI<sup>3</sup>

<sup>1</sup>Sub-Department of Pathophysiology, Department of Preclinical Veterinary Sciences, Faculty of Veterinary Medicine, University of Life Sciences, Lublin, Poland, <sup>2</sup>Department and Clinic of Animal Surgery, Faculty of Veterinary Medicine, University of Life Sciences, Lublin, Poland, <sup>3</sup>Department of Pediatric Orthopedics, Medical University, Lublin, Poland

Titanium (Ti) is the metal commonly used in orthopedic field. Titanium is highly resistant to corrosion. However, Ti ions might slowly diffuse into surrounding tissue where they would be transported into circulation and may interact with blood cells, causing their excessive activation. Autologous neutrophil extract (AMP) was previously considered as factor to decrease of excessive response of leukocytes. Pentoxifylline (PTX) is a competitive non-selective phosphodiesterase inhibitor, which acts anti-inflammatory, enhances microcirculation, blood flow and tissue oxygenation. It also stimulate bone formation and could be considered in management of osseointegration. The aim of this study was to assess of neutrophil *in vitro* response to implantation of biomaterial into the tibia with or without treatment with AMP or PTX. The study was conducted on 8 sheep, females, BCP local breed, 4 months old, from the Bezek Experimental Farm. The procedure consisted of inserting a Ti implant into the proximal tibial physis. Blood sampling necessary to obtain AMP was done 7 days before implantation. For the determination of neutrophil activity, blood was collected at three time points: 7 days before implantation, 1 h and 24 h after implantation. The secretory activity of neutrophils was estimated on the basis of the degranulation and free radicals generation at above time-points, after *in vitro* stimulation with 20 µg/mL AMP or PTX added to final concentrations of 0, 1, and 100 µg/ml of culture of ovine neutrophils. The obtained results show that the addition of AMP and PTX in concentration of 1 µg/ml to the neutrophil suspension decrease of activity of neutrophils. Our study showed that AMP and PTX added at the stated concentrations to the neutrophil suspension isolated during implantation of a Ti implant into the proximal tibial physis reduces the pro-inflammatory response of neutrophils.

## MIR 511-5P EXPRESSION AS A PREDICTOR OF NUTRITIONAL STATUS DISORDERS IN PATIENTS TREATED WITH INTENSITY-MODULATED RADIATION THERAPY DUE TO HEAD NECK CANCER

M. MAZUREK<sup>1</sup>, R. MLAK<sup>1</sup>, I. HOMA-MLAK<sup>1</sup>, T. POWROZEK<sup>1</sup>, A. BRZOZOWSKA<sup>2</sup>, T. MALECKA-MASSALSKA<sup>1</sup>

<sup>1</sup>Department of Human Physiology, Medical University of Lublin, Poland,  
<sup>2</sup>II Department of Radiotherapy, Center of Oncology of the Lublin Region St. John of Dukla, Lublin, Poland

Every year approximately 630,000 cases of head and neck cancer (HNC) are diagnosed and 350,000 patients die from this cancer. The 90% of HNC cases is squamous cell carcinoma and the most common localization are pharynx, larynx and oral cavity. Malnutrition and cancer cachexia are often observed in patients with HNC and occur in 44–88% patients during treatment. The main factor contributing to the development of cachexia is the ongoing inflammatory process. Due to the potential regulatory properties (posttranslational alteration of expression of genes whose protein products are involved in inflammation) of miR-511-5p, it may play an important role in the development of nutritional status disorders. Therefore, the aim of this study was investigate the role of miRNA-511-5p in prediction of nutritional status disorders in 60 HNC patients subjected to Intensity-Modulated Radiation Therapy (IMRT). The miR-511-5p expression analysis was performed using commercial molecular probes and real-time PCR method. Study group was dominated by man (85%) and the most common localization of tumor was larynx (55%). The study included patients in advanced stage of HNC: stage III - 26.67%, stage IVA-IVC - 73.33%. Patients with good nutritional status had significantly higher expression of miR-511-5p compared to patients with moderate or severe malnutrition (SGA A vs. B or C) (6.27 vs. 0.93; p=0.0001). Patients with critical weight loss (CWL) had significantly lower miR-511-5p expression compared to those without CWL (1.64 vs. 0.51; p=0.0025). The assessment of miR-511-5p expression was characterized by 84.2% sensitivity and 88.9% specificity in detecting patients with moderate or severe malnutrition (AUC=0.90; p < 0.0001). Moreover, the assessment of this biomarker allows for the detection of patients with CWL with 50% sensitivity and 90% specificity (AUC=0.78; p=0.0003). The lower expression of miR-511-5p was significantly related with a 37-fold higher risk of moderate or severe malnutrition (OR=37.33; p=0.0013). In patients with lower expression of miR-511-5p significantly higher risk (7-fold) of CWL was observed (OR=7.36; p=0.0039). Assessment of miR-511-5p expression may be a useful tool in prediction of the nutritional disorders in patients undergoing IMRT due to HNC.

Author for correspondence: Marcin Mazurek (marcinmazurek1@umlub.pl)

## SILICON - A NOT-ESSENTIAL ELEMENT?

M. BLASZCZYK

University of Applied Sciences in Nysa, Nysa, Poland

The importance of silicon for broadly understood health has been suggested for a long time, especially in the context of the condition of skin appendages - hair and nails. This tradition is part of a later, more serious approach based on scientific research that tried to find an objective link between silicon and health. In the second half of the 20<sup>th</sup> century, attempts were made to characterise the physiological role of silicon. Very few facts have been discovered - namely, that silicon is present in trace amounts in connective tissues, especially in the blood vessels. Few studies have also been carried out to demonstrate the necessity of silicon for the development of the organism - specifically, it was implied that it is necessary for the development of connective tissues (bones). However, a consistent theory regarding the actual physiological mechanisms has never been proposed, usually limited to the claim that collagen is essential for the synthesis of collagen (in fact there is no known silicon involvement in this process). It was also impossible to repeat the research from 40 years ago, the only one on the basis of which the thesis about the necessity of silicon has been repeated so far in thousands of publications. Nevertheless, due to many years of interest in silicon, despite the lack of scientific premises, the WHO determined the amount of the human body's need for this element. The aim of the present study was to summarize the current state of knowledge in this field. The analysis of the available literature showed that despite half a century of proliferation of publications on the importance of silicon: 1) there is no documented physiological mechanism involving silicon; 2) there is no biochemical structure in which silicon is necessary; 3) a state of silicon deficiency in the body is not possible.

Author for correspondence: Marcin Blaszczyk (marcin.blaszczyk@pwsz.nysa.pl)

## SPATIAL ORIENTATION IN ADOLESCENTS

K. PAGAVA<sup>1</sup>, H. PHAGAVA<sup>2</sup>

<sup>1</sup>Department of Child and Adolescent Medicine, Tbilisi State Medical University, Tbilisi, Georgia,

<sup>2</sup>Department of Epidemiology and Biostatistics, Tbilisi State Medical University, Tbilisi, Georgia

The aim was to study was to study spatial orientation in visually impaired adolescents. Performance of early and late blind adolescents was compared (n=16, 8 early blind and 8 late blind adolescents, 4 girls and 12 boys, age range from 10 to 19). Orientation in the locomotor space was studied in a closed room by means of changing location of the poles with toys. Orientation in the manipulatory space was studied using the rotatable table and changing placement of the toys on the table. Participants had to explore, remember location and after the change, try to identify it. Performance as well as the strategy of the participants has been studied. Findings have shown that the late blind adolescents show better spatial orientation in both, locomotor and manipulatory spaces.

*Acknowledgements:* Prof. Catherine Thinus-Blanc, CNRS, France; James S. McDonnell Foundation.

Author for correspondence: Karaman Pagava (kpagava@yahoo.com)

## HOW VISION AFFECTS OUR TASTE SENSITIVITY?

P. REDMER, E. LESZKOWICZ

Department Animal and Human Physiology, University of Gdansk, Gdansk, Poland

There is little doubt that what we see affects our perception of behavioural responses to food and drink. We hypothesised that those effects are partially associated with changes in taste sensitivity thresholds, which was suggested by a study with congenitally blind people (Gagnon *et al.*, *Chem Senses* 2013). To test our hypothesis we studied taste recognition thresholds for five basic tastes in two conditions: in subjects with (1) open eyes and (2) closed eyes. Based on previous studies we expected that taste sensitivity thresholds would differ between those conditions. Twenty four volunteers (18–45 years old) without taste disorders participated in the study. Five basic tastants: sweet (sucrose, 0.94–12.00 g/l), salty (sodium chloride, 0.34–2.00 g/l), sour (citric acid, 0.2–0.6 g/l), bitter (caffeine extract, 0.09–0.27 g/l) and umami (monosodium glutamate, 0.17–1.00 g/l) were dissolved in mineral water, and five sets of six different concentrations (samples) were prepared. Each participant tested the sets at random order. Subjects were presented with 6 samples (15 ml) in a set in successive solutions, and were asked if any taste (taste detection) and what taste (taste recognition) they identified. After each sample, they rinsed their mouth with mineral water. The sensory testing was done in two conditions: first, when participants had their eyes open, and next, when they had their eyes closed. Bitter taste was recognized at lower concentrations in the closed-eyes (13 subjects) than open-eyes (5 subjects) condition (a Wilcoxon signed-rank test indicated that the median open-eyes ranks were significantly higher than the median closed-eyes ranks  $T=19$ ,  $Z=2.72$ ,  $p=0.006$ ). For sweet taste, there was a clear tendency to identify the taste at a lower concentration with eyes closed (14 subjects) than with eyes open (8 subjects), though the difference did not reach a significance level of  $p=0.05$  (a Wilcoxon signed-rank test  $T=58.8$ ,  $Z=1.74$ ,  $p=0.08$ ). Differences in recognition thresholds of salty, sour and umami tastes were less pronounced, esp. for sour and umami. The number of subjects with higher taste sensitivity in the closed-eyes than open-eyes condition and vice versa was respectively: 13 and 7 for salty; 9 and 5 for sour; 6 and 9 for umami. Our results suggests that vision may change taste recognitions thresholds for some of the basic five tastes, especially bitter and sweet, which could account for a visual component in taste perception. Yet, contrary to previous studies, taste sensitivity is rather higher than lower when there is no visual contribution to taste perception. Further study is foreseen with a larger group of subjects to obtain more conclusive outcomes.

Author for correspondence: Emilia Leszkowicz (emilia.leszkowicz@ug.edu.pl)