

## Research Focus Forum

---

## HEALTHY AGING FROM A MULTIDISCIPLINARY PERSPECTIVE

---

# ABSTRACT BOOK

June 27-29, 2022

Life Sciences Center, Vilnius

# Organizers



Vilnius  
universitetas

## Organizing committee:

dr. Inga Griskova-Bulanova

prof. Egle Lastauskiene

Dr. Alisa Gricajeva

Dovile Simkute

# PROGRAMME

June 27, 2022

12:00-12:30	<b>REGISTRATION, WELCOME COFFEE</b>
12:30-13:00	<b>Opening:</b> Dr. Artūras Vasiliauskas, Pro-Rector for Partnerships of VU prof. Daumantas Matulis, Director of LSC prof. Egle Lastauskiene, Director of IBS
13:00-13:20	<b>Overview of funding opportunities:</b> Sigita Auvertin (Bagdoniene), Research Council of Lithuania Vida Lapinskaite, Directorate of Research and Innovation, VU
13:20-13:40	Wenming Liang. <b>How Aging Affects Respiratory Movements.</b>
13:40-14:00	Justina Kilaite. <b>Genome and epigenome features of sarcopenia and frailty.</b>
14:00-14:20	Sally Liechocki. <b>Intracellular delivery of antibodies for the blockage of viral protein secretion and future perspectives.</b>
14:20-14:50	<b>COFFEE</b>
14:50-15:10	Egle Lastauskiene. <b>Pulsed electric field vs prions, yeast model.</b>
15:10-15:30	Marco Tosi. <b>Work–family lifecourses and later-life health in the United Kingdom.</b>
15:30-15:50	Aurelijus Burokas. <b>Targeting the microbiota-gut-brain axis in aging.</b>
15:50-16:10	Milda Pleckaityte. <b>The role of vaginal microbiome in women's health.</b>
16:10-17:00	<b>POSTERS/SNACKS/COFFEE</b>
17:00-18:00	<b>Excursion at LSC</b>
18:00	<b>DINNER</b>

June 28, 2022

9:55	<b>OPENING</b>
10:00-10:20	Antanas Kairys. <i>The Survey of Health, Ageing, and Retirement in Europe: the Platform for Understanding the Sociobiological Processes of Ageing.</i>
10:20-10:40	Luis C. Lopez. <i>Oral <math>\beta</math>-RA prevents and rescues metabolic syndrome and NAFLD in mice with diet-induced obesity.</i>
10:40-11:00	Migle Tomkuvienė. <i>Covalent labeling of DNA as a versatile method for (epi)genetics.</i>
11:00-11:20	Irina Leonova. <i>Socio-psychological aging of personnel as a problem for organizational resilience.</i>
11:20-11:50	<b>COFFEE</b>
11:50-12:10	Zoryna Boiarska. <i>Smart Ageing and “Human Health Passport.</i>
12:10-12:30	Sara Torres-Rusillo. <i>The use of b-RA in leptin-deficient mice reveals novel mechanisms of this compound for the treatment of obesity.</i>
12:30-12:50	Brenda Bogaert. <i>Epistemic Contribution in Healthcare Policy: an important factor in Healthy Aging.</i>
12:50-13:10	Jurate Charenkova. <i>(In)formal care decision making: perspectives of the family caregivers and older people.</i>
13:10-13:30	Bienvenu Bongue. <i>Could social marketing campaigns help to prevent falls in older adults?</i>
13:30-14:30	<b>LUNCH/POSTERS</b>
14:30-14:50	Eric Dinet. <i>Smart lighting as a visual aid for the mobility of low vision people.</i>
14:50-15:10	Esperanca Gago. <i>Successful aging through people's social participation in social networks.</i>
15:10-15:30	Maria Chiara Maccarone. <i>Spa setting programs for multidisciplinary prevention and healthy ageing.</i>
16:30	<b>Excursion at VU</b>

June 29, 2022

10:00-10:20	<b>Arqus network opportunities</b>
10:20-10:40	Rima Budvytyte. <b>Electrochemical Assessment of Dielectric Damage to Phospholipid Bilayers by Amyloid <math>\beta</math>-Oligomers: Implications for neurodegeneration.</b>
10:40-11:00	Maria Jose Rodriguez Fortiz. <b>Healthy ageing preventing frailty and dependency by means of ICTs.</b>
11:00-11:20	Maria Manuela Pereira. <b>Screening for Elder Abuse.</b>
11:20-11:40	Irena Nedveckyte. <b>Antioxidant properties of various extracts of some Lithuanian medicinal and aromatic plants.</b>
11:40-12:00	<b>MSC funding opportunities:</b> Justyna Lucinska. Research Council of Lithuania
12:00-13:00	<b>ROUND TABLE DISCUSSIONS/COFFEE</b>
13:00-13:15	<b>Closing remarks</b>

## Contents

<b>ABSTRACTS</b>	<b>8</b>
HOW AGING AFFECTS RESPIRATORY MOVEMENTS	9
<i>W. Liang, O. Ruksenas, Z. Bai, M. Aihemaiti, L. Yuan, J. Xiao, F. Ren, Y. Zhu, Z. Chen</i>	
GENOME AND EPIGENOME FEATURES OF SARCOPENIA AND FRAILTY	10
<i>J. Kilaite, V. Gineviciene, V. Alekna, A. Mastaviciute, E. Pranckeviciene</i>	
INTRACELLULAR DELIVERY OF ANTIBODIES FOR THE BLOCKAGE OF VIRAL PROTEIN SECRETION AND FUTURE PERSPECTIVES	11
<i>S. Liechocki, A.M. Plaszczyca, M. Gunkel, R. Bartenschlager, H. Erfle, V. Starkuviene</i>	
PULSED ELECTRIC FIELD (PEF) VS PRIONS, YEAST MODEL	12
<i>E. Lastauskiene, J. Versockiene</i>	
WORK–FAMILY LIFECOURSES AND LATER–LIFE HEALTH IN THE UNITED KINGDOM	13
<i>M. Tosi, E. Grundy</i>	
TARGETING THE MICROBIOTA-GUT-BRAIN AXIS IN AGING	14
<i>A. Burokas</i>	
THE ROLE OF VAGINAL MICROBIOME IN WOMEN’S HEALTH	15
<i>M. Pleckaityte</i>	
THE SURVEY OF HEALTH, AGEING, AND RETIREMENT IN EUROPE: THE PLATFORM FOR UNDERSTANDING THE SOCIOBIOLOGICAL PROCESSES OF AGEING	16
<i>A. Kairys, O. Zamalijeva, J. Navicke</i>	
ORAL $\beta$ -RA PREVENTS AND RESCUES METABOLIC SYNDROME AND NAFLD IN MICE WITH DIET-INDUCED OBESITY	17
<i>C. Lopez Luis, E. Diaz-Casado, P. Gonzalez-Garcia, S. Lopez-Herrador, A. Hidalgo-Gutierrez, E. Barriocanal-Casado, J. Corral</i>	
COVALENT LABELING OF DNA AS A VERSATILE METHOD FOR (EPI)GENETICS	18
<i>M. Tomkuvieni, S. Klimasauskas</i>	
SOCIO-PSYCHOLOGICAL AGING OF PERSONNEL AS A PROBLEM FOR ORGANIZATIONAL RESILIENCE	19
<i>I. Leonova, F. Diaz Bretones</i>	
SMART AGEING AND “HUMAN HEALTH PASSPORT”	20
<i>Z. Boiarska, O.Poliakov, O.Tomarevska</i>	
THE USE OF $\beta$ -RA IN LEPTIN-DEFICIENT MICE REVEALS NOVEL MECHANISMS OF THIS COMPOUND FOR THE TREATMENT OF OBESITY	21
<i>S. Torres-Rusillo, S. Lopez-Herrador, P. Gonzalez-Garcia, E. Diaz-Casado, L. Jimenez, J. Corral, J. Manuel Martinez, L. C. Lopez</i>	
EPISTEMIC CONTRIBUTION IN HEALTHCARE POLICY: AN IMPORTANT FACTOR IN HEALTHY AGING	22
<i>B. Bogaert</i>	
(IN)FORMAL CARE DECISION MAKING: PERSPECTIVES OF THE FAMILY CAREGIVERS AND OLDER PEOPLE	23
<i>J. Charenkova</i>	
COULD SOCIAL MARKETING CAMPAIGNS HELP TO PREVENT FALLS IN OLDER ADULTS?	24
<i>B. Bongue, J. Guyot, B. Chapoton, N. Barth, D. Hupin, F. Roche, V. Regnier, L. Goethals</i>	
SMART LIGHTING AS A VISUAL AID FOR THE MOBILITY OF LOW VISION PEOPLE	25
<i>E. Dinet, A. Tremeau, P. Katemake</i>	
SUCCESSFUL AGING THROUGH PEOPLE’S SOCIAL PARTICIPATION IN SOCIAL NETWORKS	26
<i>E. Gago</i>	
SPA SETTING PROGRAMS FOR MULTIDISCIPLINARY PREVENTION AND HEALTHY AGEING	27
<i>M. C. Maccarone, S. Masiero</i>	
ELECTROCHEMICAL ASSESSMENT OF DIELECTRIC DAMAGE TO PHOSPHOLIPID BILAYERS BY AMYLOID $\beta$ -OLIGOMERS: IMPLICATIONS FOR NEURODEGENERATION	28
<i>R. Budvytyte, F. Ambrulevicius, E. Jankaityte, G. Valincius</i>	
HEALTHY AGEING PREVENTING FRAILTY AND DEPENDENCY BY MEANS OF ICTS	29
<i>M. J. Rodriguez Fortiz, F. Garcia Moreno, M. Bermudez Edo, J. M. Perez Marmol, J. L. Garrido Bullejos</i>	

SCREENING FOR ELDER ABUSE	30
<i>M. M. Pereira Machado and F. A. Soares Petronilho, J. Ferreira-Alves, J. F. Mendes Fundinho</i>	
ANTIOXIDANT PROPERTIES OF VARIOUS EXTRACTS OF SOME LITHUANIAN MEDICINAL AND AROMATIC PLANTS	31
<i>A. Judzentiene, J. Budiene, R. Garjonyte, I. Nedveckyte</i>	
<b>POSTER PRESENTATIONS</b>	<b>32</b>
IS THERE A RELATION BETWEEN MENOPAUSAL SYMPTOMS, GUT MICROBIOTA, AND EXPERIENCED STRESS?	33
<i>I. Brimiene, M. Siaudinyte, A. Burokas, R. Griksiene</i>	
SILVER NANOPARTICLES TOOL FOR BIOCONTROL OF PATHOGENIC SKIN MICROBIOTA?	34
<i>K. Cekuolyte, E. Zemgulyte, R. Gudiukaite, E. Lastauskiene</i>	34
INFLUENCE OF FLAVONOIDS ON [PSI] PRION FORMATION IN YEAST CELLS	35
<i>G. Dicipetryte, J. Versockiene, A. Sakalauskas, V. Smirnovas, E. Lastauskiene</i>	
MICROORGANISM ECOSYSTEM STUDIES TO OPTIMIZE MICROPLASTIC DEGRADATION	36
<i>G. Jansonaitė, E. Lastauskiene, L. Raubaite</i>	
NOTCH AND WNT SIGNALLING IN COLORECTAL AND ENDOMETRIAL CANCER	37
<i>V. Jonusiene, E. Kukcinaviciute, E. Eidenaitė, D. Dabkeviciene, V. Stucyte, A. Sasnauskiene</i>	
INVESTIGATION OF THE ROLE OF MYOKINES IN IMMUNOMETABOLISM TO ASSESS THE RISK OF METABOLIC SYNDROME AND THE IMPACT OF PHYSICAL ACTIVITY ON PERSON'S HEALTH AND HEALTHY AGING	38
<i>E. Malysko, V. Hendrixson, L. Zabuliene, R. Dadeliene, V. Gineviciene, N. Fatkulina, D. Karciauskaite</i>	
IMPACT OF PHYSICAL EXERCISES ON BLOOD PRESSURE IN OLDER CANCER SURVIVORS	39
<i>A. Mastaviciute, J. Kilaite</i>	
INTERPLAY BETWEEN EPIGALLOCATECHIN-3-GALLATE AND IONIC STRENGTH DURING AMYLOID AGGREGATION	40
<i>K. Mikalauskaite, M. Ziaunys, A. Sakalauskas, V. Smirnovas</i>	
BACTERIAL AMIDOHYDROLASES FOR GENE-DIRECTED ENZYME PRODRUG THERAPY: A POTENTIAL ADVANCE IN GERIATRIC ONCOLOGY	41
<i>V. Preitakaite, R. Stanislaukiene, N. Urbeliene, R. Meskys</i>	
BIOPHENOLS IN OLIVE LEAVES FROM OIL INDUSTRY. CORRELATION BETWEEN FIVE EXTRACTION SOLVENT ANALYSED BY HPLC-DAD-UV-VIS METHOD AND ANTIOXIDANT POWER DETERMINATION	42
<i>C. L. Ronca, S. S. Marques, A. Ritieni, R. G. Martinez, L. Barreiros, M. A. Segundo</i>	
RESEARCH OF PRION PROTEIN SUP35 BIOMOLECULAR CONDENSATE FORMATION IN SACCHAROMYCES CEREVISIAE CELLS	43
<i>A. Rudzianskas, J. Versockiene; G. Katauskas; E. Lastauskiene</i>	
THE ROLE OF AUTOPHAGY IN ACQUIRED CHEMORESISTANCE OF COLORECTAL CANCER CELLS	44
<i>A. Sasnauskiene, V. Zitkute, A. Jasinevičius, E. Kukcinaviciute, V. Jonusiene</i>	
DIET MODULATED EFFECTS ON MICROGLIA FUNCTIONS IN AGEING MICE	45
<i>A.K. Vijaya, S. Kuras, E. Simoliunas, J. Mingaila, D. Baltriukiene, A. Burokas</i>	



**Vilnius  
University**

# Abstracts

**Research Focus Forum**

**HEALTHY AGING FROM A MULTIDISCIPLINARY PERSPECTIVE**



## How aging affects respiratory movements

W. Liang<sup>1</sup>, O. Ruksenas<sup>1</sup>, Z. Bai<sup>2</sup>, M. Aihemaiti<sup>2</sup>, L. Yuan<sup>2</sup>, J. Xiao<sup>3</sup>, F. Ren<sup>4</sup>, Y. Zhu<sup>2</sup>, Z. Chen<sup>5</sup>

Contact: [wenming.liang@gmc.stud.vu.lt](mailto:wenming.liang@gmc.stud.vu.lt)

<sup>1</sup> Life Sciences Center, Vilnius University, Vilnius, Lithuania;

<sup>2</sup> School of Sports Medicine and Rehabilitation, Beijing Sport University, Beijing, China;

<sup>3</sup> Department of Physiotherapy and Rehabilitation, Xiyuan Hospital of Chinese Academy of Chinese Medical Sciences, Beijing, China;

<sup>4</sup> Department of Physical Education, Beijing Language and Culture University, Beijing, China;

<sup>5</sup> College of Physical Education, Minzu University of China, Beijing, China.

Respiration can be performed in different ways, abdominal and thoracic breathing being typical examples. Aging and sex affect respiration, but knowledge about these effects is still scarce. The present study aimed to investigate the changes in respiratory movements with aging and the differences between genders. 675 healthy subjects (age: 20-69) were enrolled and conducted quiet breathing with two respiration belts (Vernier, Beaverton, OR, USA) tied at the height of the navel and xiphoid for recording the abdominal motion (AM) and thoracic motion (TM). A spirometer (Xindonghuateng, Beijing, China) was used to test vital capacity (VC, represents maximal inhalation movement). 622 subjects (men:176, women:446) were included and divided into five age groups by ten-year intervals for statistical analysis. In men's groups, there were significant changes in AM, but not in TM and AM+TM. AM/(AM+TM) increased with aging in 20-59 years groups (28%, 31%, 37%, 42%), dropped down in 60-69 years group (28%), and the differences were significant ( $X^2=22.8$ ,  $p=0.00$ ). VC, presented as median (IQR) in unit of milliliter, reduced significantly with aging [4169 (848), 3833 (1207), 3335 (944), 3130 (677), 2535 (1227)]. In women's groups, there weren't significant changes in AM, TM, AM+TM and AM/(AM+TM), but in VC [2612 (830), 2531 (659), 2356 (720), 2113 (685), 1957 (837)]. Compared to men, women's AM/(AM+TM) were significantly less in the 40s and 50s age groups, relative VC (absolute VC divided by BMI) was significantly less in all ages. In conclusion, men's abdominal contribution to quiet breathing increased from 20 to 59 years old, while women's respiratory movements did not change much with aging. The maximal inhalation movement decreased consistently with aging in two genders. Women's abdominal contribution to quiet breathing was less than men's in the middle age (40-59 years), and women's relative maximal inhalation movement was less than men's in all ages.

## Genome and epigenome features of sarcopenia and frailty

J. Kilaite, V. Gineviciene, V. Alekna, A. Mastaviciūte, E. Pranckeviciene

Contact: [justina.kilaite@gmail.com](mailto:justina.kilaite@gmail.com)

Vilnius University

Sarcopenia and physical frailty are common in older persons and pose particular challenges for health and social care systems especially in the context of global population aging. Sarcopenia is an age-related syndrome characterized by progressive loss of skeletal muscle mass, weakening strength and decreasing physical performance. Likewise, frailty is geriatric syndrome which is characterized by loss of all reserves of physical ability, cognition, energy, and health, that gives rise to vulnerability. Aging-related phenotype (such as frailty indices), based on the accumulation of declines in health and function ability, are regarded as one of best characterized measures of biological age. They are closely related to chronological age, and may predict longevity. Another indicator of biological age is the recently established epigenetic clock, also known as DNA methylation (DNAm) age and telomere length. The deviation of thus derived DNAm age (i.e. the epigenetic clock) from the chronological age is termed epigenetic age acceleration. Studies analysing informative specific genomic variations, telomere length and DNAm age, and their mutual correlation apparently was not investigated. Molecular analysis of the genome-epigenome-phenome interactions that modulate aging will help to identify biomarkers for sarcopenia and frailty, and longevity promotion. The project will enable a development of new technologies to assist those who are affected. It will also give tools for public health institutions to inform and promote best preventive practices and healthy living in elderly population. The overall goal of this project is to identify informative genome variants, telomere length and epigenetic marks associated with age-related phenotypes and their combinations, providing biomarkers for early prediction of sarcopenia and frailty.

1. Cruz-Jentoft AJ, et al. Sarcopenia: revised European consensus on definition and diagnosis. *Age and Ageing* 2019; 48: 16–31.
2. Ofori-Asenso et al. Global Incidence of Frailty and Pre frailty Among Community-Dwelling Older Adults. A Systematic Review and Meta-analysis. *JAMA Network Open*. 2019;2(8):e198398.
3. Inglés M., et al. Relation Between Genetic Factors and Frailty in Older Adults. *Jamda* 2019, 1525-8610.
4. Pratt et al. Genetic Associations with Aging Muscle: A Systematic Review. *Cells* 2020, 9, 12.
5. Haapanen et al. Telomere Length and Frailty: The Helsinki Birth Cohort Study. *JAMDA* 2018, 19, 658e662.

## Intracellular delivery of antibodies for the blockage of viral protein secretion and future perspectives

S. Liechocki, A.M. Plaszczyca, M. Gunkel, R. Bartenschlager, H. Erfle, V. Starkuviene  
Contact: [sally.liechocki@bioquant.uni-heidelberg.de](mailto:sally.liechocki@bioquant.uni-heidelberg.de)  
BioQuant, Ruprecht-Karls-University Heidelberg, Germany

Several factors contribute to the host-virus interaction. Age plays a significant role in the host's impaired response to viral infections; however, the cellular and molecular mechanisms driving these alterations are not well understood (1,2). Transfection is a versatile and widely used tool for studying gene function and protein expression in eukaryotic cells. Although the transfection of nucleic acids is well-established, the efficient delivery of larger molecules, such as antibodies, into living cells is still a challenge. We developed a solid-phase reverse transfection method (TOP-fase®) suitable for the delivery of proteins without adversely affecting their functionality and fitness of transfected cells (3). Herein we show the applicability of this method by targeting NS1, an essential protein for viral replication and virus production, located in the lumen of intracellular organelles in DENV infected cells and present in great amounts in the serum of patients with dengue fever (4). We aimed for the inhibition of NS1 secretion through transfection of different commercially available anti-NS1 antibodies in the Huh-7 cell line that stably expresses DENV-NS1 protein (Huh-7-NS1mCherry and Huh-7-NS1HA). Our method showed high antibody transfection efficiency (67.6% ± 7.7%) with no significant decrease in cell viability. The impairment of DENV-NS1 secretion was observed by the accumulation of the protein in the cells in a dose-dependent manner, and so was a reduced amount in the cell culture supernatant. The TOP-fase® method allowed us to transiently interfere with cellular processes by delivering a fairly low amount of antibodies in a “ready-to-transfect” manner. Our scalable transfection approach has potential for myriad biological research and clinical application, such as aiding in better elucidating the cellular processes behind the high susceptibility to viral infection in the context of immunosenescence at the gene level (CRISPR-Cas9 transfection), protein level (antibodies/recombinant proteins transfection), or drug screening.

1. Wu, Y., Goplen, N.P. & Sun, J. Aging and respiratory viral infection: from acute morbidity to chronic sequelae. *Cell Biosci* 11, 112 (2021).
2. Cunha LL, Perazzio SF, Azzi J, Cravedi P and Riella LV (2020) Remodeling of the Immune Response With Aging: Immunosenescence and Its Potential Impact on COVID-19 Immune Response. *Front. Immunol.* 11:1748. doi: 10.3389/fimmu.2020.01748
3. Bulkescher R, Starkuviene V, Erfle H. Solid-phase reverse transfection for intracellular delivery of functionally active proteins. *Genome Res.* 2017 Oct;27(10):1752-1758. doi: 10.1101/gr.215103.116. Epub 2017 Sep 5. PMID: 28874398; PMCID: PMC5630038.
4. Murugesan, A. & Manoharan, M. Dengue Virus. *Emerging and Reemerging Viral Pathogens: Volume 1: Fundamental and Basic Virology Aspects of Human, Animal and Plant Pathogens* 281–359 (2020) doi:10.1016/B978-0-12-819400-3.00016-8.

## Pulsed electric field (PEF) vs prions, yeast model

E. Lastauskiene, J. Versockiene

Contact: [eglelast@gmail.com](mailto:eglelast@gmail.com)

Vilnius University, Life Sciences Center, Institute of Biosciences

Prions are misfolded, self-replicating, and transmissible proteins (Prusiner., 1991). Originally, the concept of the prion was used to describe transmissible spongiform encephalopathies: human neurodegenerative diseases Creutzfeldt-Jakob, scrapie in sheep, the chronic wasting disease in deer, and bovine spongiform encephalopathy in cattle (known as “mad cow disease”) (Wickner et al., 2019, Shewmaker et al., 2011). *Saccharomyces cerevisiae* is common to model systems for prion research. Prion in yeasts can appear spontaneously in infectious amyloid conformation. Proteins in the amyloid conformation are highly resistant to various inactivation mechanisms and substances such as heat shock or proteases (Scheckel et al., 2018). Electrostatic interactions, such as salt bridges (a combination of two non-covalent interactions: hydrogen and ionic bonding between the same amino acid residues) and self-energy, are key factors in stabilizing the secondary and tertiary structure-forming elements in prion proteins (Guest et al., 2010). The prion fibril does not contain any covalent bonds that would not be theoretically capable of breaking down by an electric field. In this research we are analyzing 3 main problems:

1. Do [PSI+] prions increase PEF resistance in *S. cerevisiae* cells and how do different variants change this resistance?
2. Can PEF induce the appearance of prions in the cell population de novo or change the type of prion from weak to strong by producing free amyloid ends for protein polymerization?
3. Is it possible to disintegrate [PSI+] amyloids by applying PEF to the purified proteins?

We discovered that prions are providing the cells significant increase in PEF resistance, despite that yeast cells with the prions can be successfully eliminated using 26 kV/cm long duration pulses. PEF itself can't act as a prion-inducing agent in yeast cells and PEF can be used as a fast and safe method in the disintegration of prion aggregates in vitro.

1. Prusiner, S.B. *Molecular biology of prion diseases. Science* 1991, 252, 1515–1522, doi:10.1126/science.1675487.
2. Wickner, R.B.; Son, M.; Edskes, H.K. *Prion variants of yeast are numerous, mutable, and segregate on growth, affecting prion pathogenesis, transmission barriers, and sensitivity to anti-prion systems. Viruses* 2019, 11, 238.
3. Shewmaker, F.; McGlinchey, R.P.; Wickner, R.B. *Structural insights into functional and pathological amyloid. J. Biol. Chem.* 2011, 286, 16533–16540.
4. Scheckel, C.; Aguzzi, A. *Prions, prionoids and protein misfolding disorders. Nat. Rev. Genet.* 2018, 19, 405–418.
5. Guest, W.C.; Cashman, N.R.; Plotkin, S.S. *Electrostatics in the stability and misfolding of the prion protein: Salt bridges, selfenergy, and solvation. Biochem. Cell Biol.* 2010, 88, 371–381

## Work–family lifecourses and later-life health in the United Kingdom

M. Tosi, E. Grundy

Contact: [marco.tosi@unipd.it](mailto:marco.tosi@unipd.it)

University of Padua

Socio-economic inequalities in physical and mental health persist at older ages and previous studies have shown that partnership and parenthood histories are also associated with differentials in later-life health. These domains of adult life interact, and both may be influenced by earlier life circumstances, indicating a need for a holistic approach to understanding lifecourse influences on health at older ages. In this paper, we identify classes of lifecourse types for a United Kingdom (UK) cohort born 1933–1945 and investigate differences between the latent classes identified in physical and mental health, and changes in health over a five-year follow-up period. Data were drawn from Waves 1–5 (2009–2013) of the nationally representative UK Household Longitudinal Study. Multi-level models were used to analyse associations with summary indicators of physical and mental health measured using the SF-12, and changes in health, controlling for childhood circumstances and taking account of support from family and friends in later life. Lifecourses characterised by lower socio-economic position, early parenthood and large family size were associated with worse physical and mental health in later life, with respondents who had combined a high socio-economic position and two children being the most advantaged. The study indicates that socio-economic disparities in later-life health vary depending on the way in which individuals combine work and family life.

## Targeting the microbiota-gut-brain axis in aging

A. Burokas

Contact: [aurelijus.burokas@gmc.vu.lt](mailto:aurelijus.burokas@gmc.vu.lt)

Life Sciences Centre, Vilnius University

It is estimated that one in three people in Europe are or will suffer from brain disorder and this number is expected to increase as a consequence of the general ageing of the European populations. Brain disorders include neurodegenerative diseases, like Alzheimer's and Parkinson's diseases, but also schizophrenia, epilepsy, autism, depression, stroke, migraine, sleep disorders, traumatic brain injury, pain syndromes and addiction. Currently, many of them lack an effective treatment or do not have cure at all. Neuroinflammation characterized by activation of microglia cells is involved in various brain disorders and could be one of main target of treating them. Meanwhile, ageing increases neuroinflammation while some microbiota-derived metabolites can reduce it. Therefore, the microbiota-gut-brain axis seems an interesting candidate for modulation of neuroinflammation for treating various brain disorders and diminish negative ageing related consequence.

Accordingly, we aim to identify the possible targets in the gut microbiota for ageing brain and to create the tools that allow to manipulate those targets. The obtained results could provide a deeper understanding of the role of the gut microbiota in microglia activation and a possibility to obtain a safer and more economical treatment intervention for ageing related brain disorders.

## The role of vaginal microbiome in women's health

M. Pleckaityte

Contact: [milda.pleckaityte@bti.vu.lt](mailto:milda.pleckaityte@bti.vu.lt)

Institute of Biotechnology, Life Sciences Centre, Vilnius University

The vaginal microbiome is a very complex and dynamic system that fluctuates continually throughout a woman's life. The microbiome has a crucial role in regulating the mucosa's function as a barrier against pathogens and sexually transmitted infections in the female genital tract. An alteration of vaginal microbiome (dysbiosis) affects not only a woman's quality of life and self-esteem but could lead to poor reproduction sequelae in IVF patients, adverse pregnancy outcomes, and increased risk of cancer. Bacterial vaginosis (BV) is a type of vaginal dysbiosis characterized by depletion of lactobacilli and overgrowth of diverse anaerobes. Bacteria commonly associated with BV include Gardnerella spp., Fannyhessea vaginae, Dialister spp., Megasphaera spp., and Prevotella spp. Although Gardnerella spp. is detected in almost all BV cases, this bacterium is found in individuals with lactobacilli-dominated vaginal microbiota. Gardnerella exhibits exceptional virulence potential compared with other BV-associated bacteria. Gardnerella secretes the toxin vaginolysin which is associated with cytotoxicity to host cells and sialidase which degrades vaginal and cervical mucus. Gardnerella is able to adhere to vaginal epithelial cells and produce a biofilm. Recent Gardnerella differentiation into separate species prompted us to analyze their virulence potential which may result in different clinical characteristics. Analysis of Gardnerella adhesion to the vaginal epithelium virulence and virulence factors will allow an understanding of the mechanism of Gardnerella spp. in BV pathogenesis.



## The survey of health, ageing, and retirement in Europe: the platform for understanding the sociobiological processes of ageing

A. Kairys, O. Zamalijeva, J. Navicke

Contact: [antanas.kairys@fsf.vu.lt](mailto:antanas.kairys@fsf.vu.lt)

Vilnius University

The ageing of the society is an inevitable process in almost every part of the world, but especially in Europe. This rapid change in the composition of the society creates challenges for healthcare as well as social security systems across Europe and raises the need for multidisciplinary, cross-national comparable and high-quality data. The Survey of Health, Ageing, and Retirement in Europe (SHARE) is the platform for analysing the processes of an ageing society (Bergmann & Börsch-Supan, 2021). SHARE is a research infrastructure that was initiated in 2004, and until today collected 530,000 in-depth interviews with 140,000 people aged 50 or older from 28 European countries and Israel. SHARE allows researchers interested in health, social, economic and environmental policies over the life course to have the access to high-quality longitudinal micro-data. The SHARE-LT team at Vilnius University is responsible for coordinating the collection of data in Lithuania. The members of the team are also involved in the analysis of SHARE data using the paradigm of active ageing (United Nations, 2019). By analysing the domains of active ageing (employment, participation in society, independent, healthy and secure living and capacity and enabling environment for active ageing) the team aims to understand the challenges of active ageing in Europe and provide social and health policy recommendations for the national government and international organizations. The SHARE-LT team consists of social sciences researchers (psychology, sociology, economics) and therefore is particularly interested in international multidisciplinary collaboration with scientists interested in active ageing and focuses on the practical application of scientific results in terms of evidence-based policy-making.

1. United Nations (2019). *2018 Active Ageing Index Analytical Report*. United Nations.
2. Bergmann, M., & A. Börsch-Supan (Eds.) (2021). *SHARE Wave 8 Methodology: Collecting Cross-National Survey Data in Times of COVID-19*. Munich Center for the Economics of Aging (MEA).



## Oral $\beta$ -RA prevents and rescues metabolic syndrome and NAFLD in mice with diet-induced obesity

C. Lopez Luis, E. Diaz-Casado, P. Gonzalez-Garcia, S. Lopez-Herrador, A. Hidalgo-Gutierrez, E. Barriocanal-Casado, J. Corral

Contact: [luisca@ugr.es](mailto:luisca@ugr.es)

Universidad de Granada

Aging is associated with an increase in abdominal obesity, a major contributor to insulin resistance, metabolic syndrome, and non-alcoholic fatty liver disease (NAFLD). Some treatments for obesity show low efficiency, heterogeneous results, or side effects. Here, we identify a novel therapeutic application for the treatment of obesity and NAFLD based on the oral administration  $\beta$ -resorcylic acid ( $\beta$ -RA), a natural phenolic compound. Oral supplementation with  $\beta$ -RA in mice fed under high-fat high-sucrose (HFHS) diet induces weight loss, without loss of muscle mass, in mice with obese phenotype.  $\beta$ -RA improves glucose homeostasis by reducing insulin/glucagon ratio and GIP levels in plasma; reduces white adipose tissue (WAT) hypertrophy and hyperplasia; and prevents hepatic steatosis. Moreover, HFHS feeding induces alterations in metabolites involved in glycolysis, TCA cycle and urea cycle in the WAT, liver and serum; increases carnitines in the WAT and liver; and increases triglycerides in the liver.  $\beta$ -RA results in the metabolic normalization on those tissues. Thus,  $\beta$ -RA is an efficient and safe therapeutic option to treat and/or prevent obesity, metabolic syndrome and NAFLD, all of them with increased prevalence during aging.

*Unpublished*

## Covalent labeling of DNA as a versatile method for (epi)genetics

M. Tomkuvienė, S. Klimasauskas

Contact: [migle.tomkuvienė@bti.vu.lt](mailto:migle.tomkuvienė@bti.vu.lt)

Life Sciences Center, Vilnius University

At the VU LSC Department of Biological DNA modification we study epigenetics focusing on DNA modification which is a well-known molecular mechanism of the regulation of gene expression. The epigenetic regulation is vital for a healthy life. Unfortunately, when disrupted, it can lead to many kinds of complex disease, including cancer. There is mounting evidence that ageing is a consequence of epigenetic dysregulation at the scale of the entire tissues, organs and body. Therefore we are developing novel laboratory techniques that enable epigenetic research. The chemo-enzymatic assay developed in our laboratory is called mTAG - methyltransferase-directed Transfer of Activated Groups. Engineered DNA methyltransferases are combined with synthetic cofactors to form a molecular toolbox that allows covalent site-specific attachment of extended alkyl groups at the 5th position of cytosine or the 6th of adenine in DNA (reviewed in 1,2). Moreover, we have a similar toolbox for RNA modification too (3). The transferable groups may contain reactive moieties enabling further chemical attachment of various markers for detection purposes. At this step, we often use click-chemistry which is biorthogonal and therefore allows the labeling to proceed in complex mixtures (4). The approach has been used for a multitude of genetic and epigenetic applications, ranging from genotyping, detection of genomic structural variations, to whole genome methylation profiling. Interestingly, one of the synthetic modifications enhances nucleosome assembly at the modified DNA sites, expanding the powers of the synthetic modification beyond detection (5). Currently we are mostly dedicated to detection of natural and synthetic modifications with the means of nanopore sequencing, and nucleosome assembly in vitro at modification-predefined sites.

Overall, covalent labeling of DNA is a powerful technology which enables elaborate and versatile (epi)genetic research and is approaching implementation in medical diagnostics.

1. Tomkuvienė M., Mickutė M., Vilkaitis G. and Klimasauskas S. Repurposing enzymatic transferase reactions for targeted labeling and analysis of DNA and RNA. *Current Opinion in Biotechnology*, 2019, 55: 114-123.
2. Tomkuvienė M., Kriukienė E., Klimasauskas S. DNA labeling using DNA methyltransferases. *Advances in Experimental Medicine and Biology*, 2016, 945:511-535.
3. Tomkuvienė M., Clouet-d'Orval B., Černiauskas I., Weinhold E., Klimasauskas S. Programmable sequence-specific click-labeling of RNA using archaeal box C/D RNP methyltransferases. *Nucleic Acids Research*, 2012, 40(14):6765-73.
4. Lukinavičius G., Tomkuvienė M., Masevičius V. and Klimasauskas S. Enhanced chemical stability of AdoMet analogues for improved methyltransferase-directed labeling of DNA. *ACS Chemical Biology*, 2013, 8(6):1134-9
5. Tomkuvienė M., Meier M., Iksalaitė D., Wildenauer J., Kairys V., Klimasauskas S., and Manelytė L. Designer Nucleosomes: enhanced nucleosome assembly at CpG sites containing an extended 5-methylcytosine analogue. *Nucleic Acids Research*, 2022, under revision.

## Socio-psychological aging of personnel as a problem for organizational resilience

I. Leonova, F. Diaz Bretones

Contact: [irinaleonova@correo.ugr.es](mailto:irinaleonova@correo.ugr.es)

University of Granada

The analysis of new competences of Industry 4.0 required by the labor market under the conditions of technological changes and age-related stereotypes is given. Significance of the staff Social and Psychological Age (SPA) as the basis for decisions made by employers is shown. The work presents the results of the empirical research, which is intended to identify the SPA characteristics of the staff under the conditions of organizational cultures (OC) of a hierarchically clan type and a market hierarchical type with expressed innovative component as the most typical characteristics for companies with low and high level of engagement in innovation processes. Determination of social and psychological ageing is described on the bases of the Talcott Parsons methodology. Kim Cameron and Robert Quinn's diagnostic method for organizational culture and value-based organizational and cultural preferences (Organizational Culture Assessment Instrument), Ronald Kessler's distress test, and the author's questionnaire, comprising questions and direct scaling, aimed at identification of the staff subjective well-being were used as a toolkit. It is demonstrated that the social and psychological age of the staff depends on the specifics of organizational and cultural conditions and staff management peculiarities during implementation of innovations. It is revealed that stress during implementation of innovations in organizational cultures of hierarchically clan type is expressed in tiredness, health and age self-assessment decline, and it raises staff resistance. The management assesses the resisting staff as significantly older than its chronological age. Staff in organizational culture with the expressed innovation component supports innovative development path, feels healthier, younger, and less tired. Managers assess the age of the major part of the staff as young or relevant to the chronological age. Thus, a new basis for the managers' age-related assessment of staff is revealed - it is not the characteristics of chronological age, but the characteristics of social and psychological age. This basis is a value-based readiness for acceptance of innovations. Significance of stress prevention during organizational culture changes and innovations implementation is shown.

1. Leonova I.S., Zakharova L.N., Bretones F.D. *Stress, Health Self-Assessment, Social and Psychological Age of Women's Staff in Organizational Cultures of Different Types // Talent Development and Excellence. 2018.*
2. Leonova I.S., Zakharova L.N., Bretones F.J. *Subjective Well-Being Of Russian Female Personnel As An Indicator Of Socio-Psychological Age // Opcion. № 21. V. 35. 2019. P. 2899-2921.*
3. Leonova I.S., Zakharova L.N., Makhlin A.I. *Organizational culture and socio-psychological age of medical female personnel: management opportunities // Personal and Regulatory Resources in Achieving Educational and Professional Goals in the Digital Age. European Proceedings of Social and Behavioural Sciences EpSBS. 2020. Vol.91. P. 189-195.*

## Smart Ageing and “Human Health Passport”

Z. Boiarska <sup>1,2</sup>, O.Poliakov <sup>3</sup>, O.Tomarevska <sup>3</sup>

Contact: [z.boiarska@gmail.com](mailto:z.boiarska@gmail.com)

<sup>1</sup> Vilnius University (Lithuania)

<sup>2</sup> Vasyl` Stus Donetsk National University (Ukraine, Vinnytsia)

<sup>3</sup> D.F. Chebotarev Institute of Gerontology of the National Academy of Medical Sciences of Ukraine (Ukraine)

In the age of digitalization of medical documents, telemedicine, and the pandemic crisis, online assistants for the prevention of cardiovascular diseases, the consequences of hypodynamic stress and the increasing cognitive load in modern hybrid workplaces are becoming very actual. High cognitive load accompanies every workplace and is associated with the lifelong learning of new vocational upskilling and reskilling and contributes to success and high competition among employees.

In this aspect, healthy adulting and aging need objective indicators, which are based on simple, reliable symptoms of age-related functional assessment and non-drug correction to improve the adaptive reserves of the human organism. For this purpose, the "Human Health Passport" and its scale for assessing health and the need for health care, social assistance is used as an online tool. This epidemiological study covers occupational status, socio-demographic and economic aspects, parameters of sensory and physical and cognitive abilities, anthropometry, and metabolism. The study involved 249 people aged 20 to 85 years.

The results of the study showed a significant relationship between age and body mass index ( $r=0.491$ ,  $p0.001$ ), the amount of daily favorite exercises performed ( $r=-0.281$ ,  $p0.001$ ), online automatic primary health assessment ( $r=-0.488$ ,  $p0.001$ ). Health status is also significantly associated with body mass index ( $r=-0.221$ ,  $p0.001$ ), and the quantity of kilometers walked out daily ( $r=0.336$ ,  $p0.001$ ).

In conclusion, this online multi-sided monitoring study effectively identifies the main key points of change in the functional capabilities of adults, and the proposed preventive approaches and algorithm of deed help to pay attention to a decrease in working capacity timely and to harmonize adaptive reserves of the health.

1. Boiarska Z.O., Tomarevska O.S., Poliakov O.A. Health passport of higher education seekers: risk assessment and the possibility of reducing them // Proceedings of the scientific conference of faculty, researchers and applicants for scientific degrees based on the results of research work for the period 2019-2020 (April-May 2021). - Vinnytsia, 2021. P. 234-236. (In Ukrainian).
2. Tomarevska O., Poliakov O. Online self-assessment of the older workers with human health data passport in covid-19 conditions / ICSFR: 11th International Conference on Frailty, Sarcopenia Research & Geroscience. September 29 - October 2, 2021, Boston, USA // The Journal of Frailty & Aging. - 2021. - 10, S1. - P. S57.
3. Ponomarenko N.P., Tomarevska O.S., Maidikov Yu.L., Zaitsev V.O. Health status of students according to the «Health Passport» in a pandemic Covid-19. Ukraine. Nation's Health, 2021. - Vol. 1 No. 4 - C. 11-15. (In Ukrainian). DOI 10.24144/2077-6594.4.1.2021.246995
4. Poliakov, O., Tomarevska, O., Prokopenko, N., & Maidikov, I. Reliability and informativeness online research method "Human Health Passport". Ageing and longevity, (2022). - 3(1), - P. 14-26. DOI 10.47855/jal9020-2022-1
5. Olena Tomarevska, Oleksandr Poliakov Human Health Passport for Self-assessment in COVID-19 Lockdown // Abstract Book: EU FALLS FESTIVAL 2022. 4-5 April 2022, Leuven, Belgium. - P. 81. <https://eufallsfest2022.eu/>

## The use of $\beta$ -RA in leptin-deficient mice reveals novel mechanisms of this compound for the treatment of obesity

S. Torres-Rusillo, S. Lopez-Herrador, P. Gonzalez-Garcia, E. Diaz-Casado, L. Jimenez, J. Corral, J. Manuel Martinez, L. C. Lopez  
Contact: [sergiolopez@ugr.es](mailto:sergiolopez@ugr.es)  
Universidad de Granada

Obesity has become one of the major health problems worldwide, affecting a high percentage of the young and adult population and reaching epidemic status in many developed countries. Obesity is characterized by an increase in adipose tissue associated to hyperglucemia, dyslipidemia and hypertension, all risk factors of developing diabetes and cardiovascular diseases, known as metabolic syndrome (MetS). Aging, as well as obesity, are connected and associated with the development of MetS and white adipose tissue (WAT) redistribution may be a key factor in the altered metabolic state of the elderly. Beta-resorcylic acid ( $\beta$ -RA), a natural phenolic compound derived from hydroxybenzoic acid (HBA), has been shown to have a clear effect in reducing the accumulation of WAT and increasing the survival in adult wild-type mice. However, the action mechanisms of  $\beta$ -RA to decrease WAT are still unknown. Here, we demonstrate that treatment with  $\beta$ -RA in a genetic mouse model of obesity due to the lack of leptin (Ob/Ob) reduces body size and WAT content, with a modification in the pattern of plasma metabolic hormones, proinflammatory genes and morphological features in the liver and WAT. However,  $\beta$ -RA does not rescue the hyperglycemic phenotype, most likely due to the lack peripheral leptin signal in this mouse model. Moreover, we observe an intriguing reduction in food intake, which is increased in these mice as a consequence of the absence of leptin. Altogether, our results contribute to decipher the mechanisms of action of  $\beta$ -RA, and postulate it as a promising drug for the treatment of obesity and its associated acute and chronic diseases.

1. Santos AL, Sinha S. Obesity and aging: Molecular mechanisms and therapeutic approaches. *Ageing Res Rev.* 2021 May;67:101268.
2. Reyes-Farias M, Fos-Domenech J, Serra D, Herrero L, Sánchez-Infantes D. White adipose tissue dysfunction in obesity and aging. *Biochem Pharmacol.* 2021 Oct;192:114723.
3. Hidalgo-Gutiérrez, A.; Barriocanal-Casado, E.; Díaz-Casado, M.E.; González-García, P.; Zenezini Chiozzi, R.; Acuña-Castroviejo, D.; López, L.C.  $\beta$ -RA Targets Mitochondrial Metabolism and Adipogenesis, Leading to Therapeutic Benefits against CoQ Deficiency and Age-Related Overweight. *Biomedicines* 2021, 9, 1457.

## Epistemic contribution in healthcare policy: an important factor in healthy aging

B. Bogaert

Contact: [brenda.bogaert@univ-lyon3.fr](mailto:brenda.bogaert@univ-lyon3.fr)

Healthcare Values Chair, University Lyon III

I would like to present an interdisciplinary project idea that may be of interest to the Arqus network. The project focus will be on the capability of seniors to contribute to healthcare policy and whether it may facilitate healthy aging.

Healthcare democracy is a hot topic today. The concept suggests that having citizens participate in their healthcare is not only an individual right, but also a means of ensuring that healthcare systems become more efficient. However, despite the ideal, the real engagement of citizens in healthcare policy has not (yet) been accomplished. To move realistically toward this goal, it will be necessary to better understand the epistemic contributions that citizens bring at the micro, meso, and macro levels to healthcare organization and how it may help persons to live better with chronic disease.

Indeed the elderly are a special group at the level of healthcare policy at the meso and macro levels: it is often persons that are retired that are the most active in patient associations, as patient trainers in medical schools, those involved as patient researchers, etc. They have both the time and the skills to provide a real benefit to healthcare organization; however, their epistemic contributions to healthcare organization – and how it may benefit them personally – is understudied at this time.

In this project idea, we seek to:

1. Better understand what epistemic contribution seniors in particular bring to healthcare organization and healthcare policy
2. Elucidate how participation can be empowering to those participating and under what conditions
3. Clarify how participating in healthcare organization can lead to better healthcare outcomes for the person involved, if it is a facilitating factor in social inclusion, etc.

1. *Réinventer la démocratie en santé—Retour sur les 20 ans de la loi « droits des malades »* | Espace éthique/Ile-de-France. <https://www.espace-ethique.org/actualites/reinventer-la-democratie-en-sante-retour-sur-les-20-ans-de-la-loi-droits-des-malades>
2. Crogan, N. (2021). *What Happened to Person-Centered Care? Observations During the COVID-19 Pandemic*. *The Journal for Nurse Practitioners: JNP*, 17(3), 367. <https://doi.org/10.1016/j.nurpra.2020.11.001>
3. Bogaert, B. (2020b). *Need for patient-developed concepts of empowerment to rectify epistemic injustice and advance person-centred care*. *Journal of Medical Ethics*, medethics-2020-106558. <https://doi.org/10.1136/medethics-2020-106558>
4. Fricker, M. (2009). *Epistemic injustice : Power and the ethics of knowing* (1. publ. in paperback). Oxford University Press.
5. Carel, H., & Kidd, I. J. (2014).
6. *Epistemic injustice in healthcare : A philosophical analysis*. *Medicine, Health Care and Philosophy*, 17(4), 529–540. <https://doi.org/10.1007/s11019-014-9560-2>



## (In)formal care decision making: perspectives of the family caregivers and older people

J. Charenkova

Contact: [jurate.charenkova@fsf.vu.lt](mailto:jurate.charenkova@fsf.vu.lt)

Vilnius University

I am a recent PhD in Sociology graduate and Postdoctoral fellow at the faculty of Philosophy of Vilnius University. Since 2019 I have actively participated in various scientific projects, related to ageing, care policy and social services for older people. With colleagues, I also had an academic trip to Japan to learn more about the various aspects of the use of technologies in social care, such as their effect on the dependency of older people, impact on social work role and relationships with the client, etc. The project (title “Technologies in social care: Considering future directions for social work professionals in Japan and Lithuania” was funded by the Research Council of Lithuania under grant agreement no. P-LJB-19-8).

Currently, I am working on my postdoctoral project, titled „Preconditions, motives and process of (in)formal care choices: the perspective of informal carers“. The project aims to reveal the influence of factors affecting (in)formal care choices not only on the individual level (for example, social support network, work-life balance, financial opportunities, subjective assessment of the social care system) but also on cultural and social factors (for example, peculiarities of the organization of social care services, functioning of the residential care system and public expectations about acceptable care standards for ageing relatives).

My academic research interests include but are not limited to various qualitative aspects of the well-being and (in)formal care of older people (such as moving into residential care, ageing-related changes in social network, occupation, leisure, social roles, and identity), innovations in the care sector, technological innovations and social work.

## Could social marketing campaigns help to prevent falls in older adults?

B. Bongue, J. Guyot, B. Chapoton, N. Barth, D. Hupin, F. Roche, V. Regnier, L. Goethals  
Contact: [bienvenu.bongue@univ-st-etienne.fr](mailto:bienvenu.bongue@univ-st-etienne.fr)  
Chaire santé des aînés, Institut PRESAGE, Université Jean Monnet de Saint-Etienne

Falls are a common and serious problem for older adults. Nearly one third of people aged 65 years or older fall each year and can have many consequences in this population. There is evidence that physical activities reduce the rate of falls among older people living in the community. Physical activity programs that focus on balance are the most effective strategies to reduce loss of independence. However, it is hard to get older adults to participate in these physical activity programs. Social marketing is useful in building prevention programs. However, its use in prevention programs for older adults, particularly for physical activity, remains weak.

Our team developed and improved an existing fall prevention program by mobilizing social marketing. First, the realization of a qualitative survey with the target audience has allowed us to identify the obstacles to the older adult's participation. Then we have identified various elements which could encourage older adults to enroll in the proposed program. These elements and the realization of pre-tests made it possible to develop a communication campaign. Based on several panels of older adults, a series of open conferences were organized, and an advertising campaign was created. These tools are now used to promote this program and encourage older people to participate.

1. Soares, W. J. S., Lopes, A. D., Nogueira, E., Candido, V., de Moraes, S. A., & Perracini, M. R. (2018). *Physical Activity Level and Risk of Falling in Community-Dwelling Older Adults : Systematic Review and Meta-Analysis. Journal of Aging and Physical Activity, 1-10.* <https://doi.org/10.1123/japa.2017-0413> ;
2. Sherrington, C., Fairhall, N. J., Wallbank, G. K., Tiedemann, A., Michaleff, Z. A., Howard, K., Clemson, L., Hopewell, S., & Lamb, S. E. (2019). *Exercise for preventing falls in older people living in the community. Cochrane Database of Systematic Reviews, 1.* <https://doi.org/10.1002/14651858.CD012424.pub2> ;
3. Gallopel-Morvan, K. (2019). *Le Marketing Social—De la Compréhension des Publics aux Changements de Comportement. Ehesp ;*
4. Bongue, B., Hugues, J., Achour, É., Colvez, A., & Sass, C. (2016). *Mieux prévenir les chutes chez les personnes âgées. Soins. Gerontologie, 21(120), 24-29.* <https://doi.org/10.1016/j.sger.2016.05.006> ;
5. Aribaud, F., & Tréguer, J.-P. (2016). *Le Silver Marketing - Les meilleures pratiques pour communiquer aux seniors : Les meilleures pratiques pour communiquer aux seniors. Dunod.*



## Smart lighting as a visual aid for the mobility of low vision people

E. Dinet, A. Trémeau, P. Katemake

Contact: [eric.dinet@univ-st-etienne.fr](mailto:eric.dinet@univ-st-etienne.fr)

Laboratoire Hubert Curien, Université Jean Monnet, Saint-Étienne

A report on low vision news released in October 2018 estimates that approximately 1.3 billion people live with some form of vision impairment worldwide [1]. The majority of people with vision impairment are over the age of 50 years and 81% were not concerned by any visual deficiency when they were younger. Concurrent with the increase in the average age of people, it is estimated that the number of visually impaired people could triple in the next 10 years [2]. Low vision can seriously affect the ability to perform simple activities of everyday life as walking safely even at home, pouring water in a glass or easily finding familiar and household objects. The quality of life can be dramatically altered and it can be impossible to maintain independence in a safe manner. Yet loss of independence is a predominant concern of the older adult [3].

The collaborative project we propose aims to facilitate the vision rehabilitation and the socioeconomic independence of the population with vision impairment. The approach that will be investigated is a direct extension of the research works we developed in the last few years [4, 5].

The objective of the project is to carry out researches to understand how light affects or can change the visual perception of visually impaired people. Today there are neither clear knowledge nor extensive data regarding the influence of light in low vision situations. This is currently a major scientific obstacle that needs to be addressed in order to have a chance to develop adaptive and smart lighting systems to assist the visually impaired. The underlying idea would be to dynamically adapt the light characteristics and its 3D spatial distribution to the visual context and to the visual needs.

1. World Health Organization, "Blindness and vision impairment", <https://www.who.int/news-room/fact-sheets/detail/blindness-and-visual-impairment>, Published October 2018, Accessed April 19, 2022.
2. Bourne R.R.A., Flaxman S.R., Braithwaite T., Cicinelli M.V., Das A, Jonas J.B., Keefe J., Kempen J.H., Leasher J., Limburg H., Naidoo K, Pesudovs K, Resnikoff S., Silvester A., Stevens G.A., Tahan N., Wong T.Y., Taylor H.R., "Magnitude, temporal trends, and projections of the global prevalence of blindness and distance and near vision impairment: a systematic review and meta-analysis", *Lancet Glob Health*, 5(9), pp. 888–897, 2017.
3. Owsley C., "Aging and vision", *Vision Research*, Vol. 51, pp. 1610-1622, 2011.
4. Sa-Ngadsup P., Dinet É., Katemake P., Trémeau A., "Using light to facilitate the mobility of low vision people", *Proc. CIE Topical Conference on Smart Lighting, Taipei, Taiwan*, pp. 181-190, 2018.
5. Katemake P., Radsamrong A., Dinet É., Heng C.W., Kuang Y.C., Kalavally V., Trémeau A., "Influence of LED-based assistive lighting solutions on the autonomous mobility of low vision people", *Building and Environment*, Vol. 157, pp. 172-184, 2019.

## Successful aging through people's social participation in social networks

E. Gago

Contact: [epereira@ese.uminho.pt](mailto:epereira@ese.uminho.pt)

Universidade do Minho - Portugal

Social participation is one of the indicators of successful aging. Information and communication technologies are material and social resources that have the potential to reduce discomfort, associated with a need for contact, especially in older people. Aims: To understand how online communities promote social participation among the elderly. Methodology: Qualitative, observational study following the principles of netnography. Population of 35 participants, mean age 77.5 years, 63% female and 37% male. The obtaining of the information shared on Facebook was authorized by the participants after a "friend" request from the researcher. Results: The following dimensions emerged: "Memories in individual identity sustainability", "Memories in collective identity sustainability", "Living lives that matter", "Being a significant person". Conclusions: social networks, namely Facebook, promote the development of interpersonal relationships, constituting a group with common interests and motivations. This interaction is processed according to the rhythm of each one, at a time and space that is comfortable for them. Through the feedback messages that each person receives from their group of followers, the "friendship network", they realize that they are significant beings in the group they belong to. Nurses should recognize these virtual spaces on the Internet are a means to develop support networks, which provide the older person with a sense of being cared for and valued. They also promote social interaction as one of the key components in preventing social isolation, helping to keep the older person active and included in a social group. Keywords: interpersonal relationships; elderly; internet; social isolation

1. *European Observatory on Health Systems and Policies, Spasova, Slavina, Baeten, Rita & Vanhercke, Bart. (2018). Challenges in long-term care in Europe. (W. H. Europe, Ed.) Eurohealth, 24(4), pp. 7*
2. *World Health Organization 2017 Integrated care for older people Guidelines on community-level interventions to manage declines in intrinsic capacity.*
3. *Cacioppo, S., Grippo, A. J., London, S., Goossens, L., & Cacioppo, J. T. (2015). Loneliness: Clinical import and interventions. Perspectives on Psychological Science, 10, 238–249.*
4. *Marjan Abbasi, Darryl Rolfson, Amandeep S. Khera, Julia Dabravolskaj, Elsa Dent, Linda Xia BSc Identification and management of frailty in the primary care setting Cite as: CMAJ 2018 September 24;190:E1134-40.*
5. *Kozinets, Robert. Netnography: redefined. 2ª Ed. Nova York: SAGE Publications. ISBN 9781446285756. 2014* *onomia e ciência da informação, vol.22, n.49, p. 1-18, maio/ago, 2017. ISSN 1518-2924. DOI10.5007/1518-2924.2017v22n49p1*

## Spa setting programs for multidisciplinary prevention and healthy ageing

M. C. Maccarone, S. Masiero

Contact: [mariachiara.maccarone@studenti.unipd.it](mailto:mariachiara.maccarone@studenti.unipd.it)

University of Padua

Elderly subjects with musculoskeletal and neurological diseases spend less time training on a regular basis, worsening their mobility concerns and undergoing muscular atrophy. As a result of the pandemic, access to regular physical activity has reduced even in healthy older individuals, due to mobility restrictions and quarantine. The exploitation of spa facilities may represent a valid and cost-effective out-of-hospital alternative to the traditional rehabilitation setting for these individuals, both affected by chronic disorders and healthy, allowing to take care of many aspects of the complexity of aging.

Based on the research tradition linking the University of Padua and the Euganean Thermal Basin, our proposal is to develop specific programs for healthy ageing and prevention in the spa facilities, taking advantage of the possibility to offer both multidisciplinary interventions and staff. Spa therapy interventions includes balneotherapy (immersion in thermal waters, balneological interventions with natural gases, mud applications and other traditional remedies), hydrotherapy and climatotherapy aimed at health promotion, prevention, therapy and rehabilitation. The beneficial effects — especially through water-based interventions — on musculoskeletal, respiratory, and cardiocirculatory disorders are well-known. Thanks to the collaboration, specific programs of management of comorbidities and motor skills improvement could be developed matching the specific chemical effects of thermal water and the physical effects of immersion (mainly due to temperature, buoyancy, viscosity, and hydrostatic pressure) with the benefit of exercising. In addition, including the chance to provide health education and health promotion strategies, education sessions to well ageing and healthy lifestyle could be implemented in the spa environment. Moreover, having a positive effect on mood, sleep quality and stress, the spa setting could also be employed for the development of psychological and cognitive healthy ageing programs. Finally, collaboration could improve the application of telerehabilitation and remote sensors in this particular setting for elderly subjects management and rehabilitation.

1. Fitzgerald KN, Hodges R, Hanes D, et al. Potential reversal of epigenetic age using a diet and lifestyle intervention: a pilot randomized clinical trial. *Aging (Albany NY)*. 2021;13(7):9419-9432.
2. M.C., Magro, G., Solimene, U. et al. From in vitro research to real life studies: an extensive narrative review of the effects of balneotherapy on human immune response. *Sport Sci Health* 17, 817–835 (2021).
3. Gálvez I, Torres-Piles S, Ortega-Rincón E (2018) Balneotherapy, immune system, and stress response: a hormetic strategy? *Int J Mol Sci* 19(6):1687.
4. Masiero S, Maccarone MC. Health resort therapy interventions in the COVID-19 pandemic era: what next?. *Int J Biometeorol*. 2021;65(11):1995-1997. <https://doi.org/10.1007/s00484-021-02134-9>
5. Cheleschi S, Tenti S, Seccafico I, Gálvez I, Fioravanti A, Ortega E. Balneotherapy year in review 2021: focus on the mechanisms of action of balneotherapy in rheumatic diseases. *Environ Sci Pollut Res Int*. 2022;29(6):8054-8073. <https://doi.org/10.1007/s11356-021-17780-0>

## Electrochemical assessment of dielectric damage to phospholipid bilayers by amyloid $\beta$ -Oligomers: implications for neurodegeneration

R. Budvytyte, F. Ambrulevicius, E. Jankaityte, G. Valincius

Contact: [rima.budvytyte@gmc.vu.lt](mailto:rima.budvytyte@gmc.vu.lt)

VU GMC

A central event in pathogenesis of neurodegenerative diseases are thought to be intracellular and extracellular accumulation, aggregation and misfolding of low molecular mass peptides such as  $\beta$ -amyloid ( $A\beta$ 1-42) and S100A9 (in Alzheimer's),  $\alpha$ -synuclein ( $\alpha$ -syn) (in Parkinson's) and others. Small size aggregates were found to be extremely neurotoxic in vitro and in vivo with the ability to disrupt neuron membranes and lead to synaptic dysfunction, mitochondrial dysfunction, neuronal apoptosis and brain damage.

In this work  $A\beta$ 1-42 oligomers produced in vitro with and without the oligomerization inhibitor hexafluoroisopropanol (HFIP) were studied and compared as agents inflicting the damage to the phospholipid bilayers. The morphology and size of  $A\beta$ 1-42 aggregates was monitored by dynamic light scattering (DLS) and atomic force microscopy (AFM). However, differently sized amyloid oligomers exhibited different levels of neurotoxicity in CGC toxicity tests. Tethered lipid membranes (tBLMs) of different compositions were used as models for biological membranes. Dielectric damage of tBLMs by  $A\beta$ 1-42 oligomers was monitored by electrochemical impedance spectroscopy (EIS), which provides additional information on the lateral distribution of  $A\beta$ 1-42 species across the surface of tBLMs. Membranes containing sphingomyelin exhibited the highest susceptibility to  $A\beta$ 1-42 oligomers when assembled in the absence of an inhibitor. Moreover, the activation barrier of ion translocation through the  $A\beta$ 1-42 oligomer entities in tBLMs was lowest in sphingomyelin membranes (50 pS) nanopores in tBLMs by  $A\beta$ 1-42 oligomers assembled without oligomerization inhibitor. Finally, analysis of the EIS data revealed differences in the lateral distribution of  $A\beta$ 1-42 oligomers on the surface of the tBLMs. The inhibitor-free  $A\beta$ 1-42 oligomers tended to cover the surface in a random heterogeneous manner, whereas the HFIP-generated  $A\beta$ 1-42 oligomers were distributed in a cluster-like manner and exhibit coexistence of surface areas with markedly different densities of  $A\beta$ 1-42 associated defects.

# Healthy ageing preventing frailty and dependency by means of ICTs

M. J. Rodriguez Fortiz, F. Garcia Moreno, M. Bermudez Edo, J. M. Perez Marmol, J. L. Garrido Bullejos

Contact: [mjfortiz@ugr.es](mailto:mjfortiz@ugr.es)

University of Granada

Frailty is a syndrome of the elderly that increases the dependence, the risk of falls, health costs such as hospitalizations, and even can cause death. Dependence is also an elderly syndrome. We are currently researching in applying technologies with the objective of providing an early detection and intervention in the prevention of these symptoms and to contribute to their active and healthy ageing. Our proposal includes a software system based on services to collect and analyse health data from the elderly and their environment in a holistic and ecological way, aka sensing or collecting several kinds of data while the users are carrying out their activities of daily living. We use mobile and wearable devices to monitor physical health, cognitive status, mental health (emotions) and social relationships. To analyse these data, we apply machine learning algorithms, such as k-Nearest Neighbors and Random Forest. We have performed an experiment with 79 old adults to detect their frailty and dependence status. The results confirm that wearable data reported an accuracy of 97% in the assessment of dependence (<https://doi.org/10.1016/j.ijmedinf.2021.104625>). Regarding frailty, we can classify correctly the different frailty status (robust, pre-frail and frail) in more than 99% of the participants, using only 29 features extracted from the wearable sensors (<https://doi.org/10.3390/s20123427>). Currently, we are improving the system to facilitate the adaptation to new wearables or ambient sensors, as well as to use other techniques to analyse the data, designing new experiments (e.g. measuring electroencephalography data to detect emotional states). Our research group is multidisciplinary, formed by computer science, occupational therapy and nursing experts. Our research work is funded by: the Junta of Andalusia and the European Regional Development Funds (FEDER, UE) through the project Ref. B-TIC-320-UGR20, and by the Spanish Ministry of Science and Innovation through the project Ref. PID2019-109644RB-I00/AEI/10.13039/501100011033.

1. Garcia-Moreno, F. M., Bermudez-Edo, M., Rodríguez-García, E., Pérez-Mármol, J. M., Garrido, J. L., & Rodríguez-Fórtiz, M. J. (2022). A machine learning approach for semi-automatic assessment of IADL dependence in older adults with wearable sensors. *International journal of medical informatics*, 157, 104625.
2. Garcia-Moreno, F. M., Bermudez-Edo, M., Garrido, J. L., Rodríguez-García, E., Pérez-Mármol, J. M., & Rodríguez-Fórtiz, M. J. (2020). A microservices e-Health system for ecological frailty assessment using wearables. *Sensors*, 20(12), 3427.

## Screening for elder abuse

M. M. Pereira Machado and F. A. Soares Petronilho, J. Ferreira-Alves, J. F. Mendes Fundinho

Contact: [mmachado@ese.uminho.pt](mailto:mmachado@ese.uminho.pt)

University of Minho - School of nursing

Evidence shows that abuse in later life is linked to adverse health impacts, such as: higher risk of mortality, hospitalization, experience disability, and nursing home placement; suicidal thoughts and attempts; chronic pain; lung, bone ore joint problems; metabolic syndrome; gastrointestinal symptoms; stress, depression or anxiety; and traumatic injuries.

If detected early enough, elder abuse victims can have the opportunity of an intervention to reduce risks. This can prevent serious harm from occurring or even save lives. Incidents that may appear relatively minor can have a debilitating and long-lasting effect on older people. Older persons are a large group of users of health care services, which is why the role of health and social care professionals in identifying elder abuse is the key. However, identification can be a complex and lengthy process that requires multi-professional collaboration. SAVE – Screening for Abuse Victims among Elderly - is an EU project, involving six partners – PCG Polska; University of Minho; Anziani e non solo and Cadiai; Cyprus University of Technology; and VOIVA - of five countries , respectively, Poland, Portugal, Italy, Cyprus and Finland. The project aims to improve the adoption of screening programs for elder abuse in health and social care settings, by providing training and support to professionals on how to use and implement them effectively. It's already available on the project website a Literature Review about screening older adults for mistreatment, a training curriculum for health and social care professionals as well as screening guidelines for each country and a pilot screening program, in health and social settings, is underway.

1. American Psychological Association (2012) "Elder Abuse and Neglect: In Search of Solutions." Washington D.C.: APA.
2. Blundell, B., Warren, A. and Moir, E. (2020) "Elder abuse protocols: identifying key features and establishing evidence for their use and effectiveness," *Journal of Elder Abuse and Neglect*, 32(2), pp. 134–151. doi: 10.1080/08946566.2020.1736225.
3. Cohen, M. (2011) "Screening tools for the identification of elder abuse," *Journal of Clinical Outcomes Management*, 18(6), pp. 261–270.
4. Dong, X. (2015) "Screening for Elder Abuse in Healthcare Settings: Why Should We Care, and Is It a Missed Quality Indicator?," *Journal of the American Geriatrics Society*, 63(8), pp. 1686–1688. doi: 10.1111/jgs.13538.
5. Fundinho, F., Machado, M., Petronilho, F. and Ferreira-Alves, J. (2021) What we know about screening older adults for mistreatment: results from the SAVE Project literature review. Available at: <https://www.projectsaveno.eu/>



## Antioxidant properties of various extracts of some Lithuanian medicinal and aromatic plants

A. Judzentiene <sup>1,2</sup>, J. Budiene <sup>2</sup>, R. Garjonyte <sup>2</sup>, I. Nedveckyte <sup>1</sup>

Contact: [asta.judzentiene@gmc.vu.lt](mailto:asta.judzentiene@gmc.vu.lt)

<sup>1</sup> Institute of Biosciences, Life Sciences Center, Vilnius University, Lithuania

<sup>2</sup> Department of Organic Chemistry, Center for Physical Sciences and Technology, Vilnius, Lithuania

The health-benefits of plant extracts, including antioxidant activity, correlate with content of various bioactive constituents. Due to the presence of different classes of compounds (various polyphenolics, terpenoids), the extracts show the ability to scavenge radicals, decompose peroxides, or to block the propagation of oxidizing chain reactions. Application of natural antioxidants of vegetal origin in the food industry is of great interest [1, 2]. Previous studies performed in our laboratory confirmed the antioxidant properties of essential oils and other extracts of medicinal plants, such as hemp agrimony (*Eupatorium cannabinum* L.), marsh rosemary (*Rhododendron tomentosum* H.) and sandy everlasting (*Helichrysum arenarium* L.) [3-5] growing wild in Lithuania. Evaluated in vitro by spectrophotometric assays, the essential oils from these plants effectively scavenged free radicals 1,1-diphenyl-2-dipicrylhydrazyl (DPPH•), 2,2-azino-bis(3-ethylbenzothiazoline-6-sulfonic acid (ABTS•+).

Raspberry (*Rubus idaeus* L.) is a popular plant in Lithuanian folk medicine. Extracts of raspberry leaf and stem extracts were found to possess both antioxidant and prooxidant properties. Antioxidant activity assayed by spectrophotometric (ABTS•+ and DPPH•) tests correlated with the amount of total phenolics in the extracts. Electrochemical studies (cyclic and differential pulse voltammetry) revealed the presence of easily oxidizable substances, i.e., possible antioxidants. Raspberry leaf and stem extracts prepared at temperatures below 70o C, showed the ability to decompose effectively hydrogen peroxide. As determined by hydrogen peroxide-producing activity, prooxidant properties of raspberry stem extracts were dependent both on the pH of the solution and total polyphenolic content.

Additionally, identification of individual phenolic components was performed, using HPLC-DAD-TOF technique.

1. A. Dapkevicius, R. Venskutonis, T. A. van Beek, J. P. H. Linssen. Antioxidant activity of extracts obtained by different isolation procedures from some aromatic herbs grown in Lithuania. *Journal of the Science of Food and Agriculture* (1999) 77(1), 140-146.
2. D. Bandonienė, A. Pukalskas, P. R. Venskutonis, D. Gruzdienė. Preliminary screening of antioxidant activity of some plant extracts in rapeseed oil. *Food Research International* (2000) 33(9), 785-791.
3. A. Judzentiene, R. Garjonyte, J. Budiene. Variability, toxicity, and antioxidant activity of *Eupatorium cannabinum* (hemp agrimony) essential oils. *Pharmaceutical Biology* (2016) 54(6), 945-953.
4. A. Judzentiene, J. Budiene, J. Svediene, R. Garjonyte. Toxic, radical scavenging, and antifungal activity of *Rhododendron tomentosum* H. essential oils. *Molecules* (2020) 25(7), 1676 (1-17) doi:10.3390/molecules25071676.
5. A. Judzentiene, J. Budiene, I. Nedveckyte, R. Garjonyte. Radical scavenging and toxic activity of *Helichrysum arenarium* (L.) Moench and *Helichrysum italicum* (Roth) G. Don essential oils and extracts. *Molecules* (2022) 27(4), 1311 (1-19) doi:10.3390/molecules27041311.

# Poster Presentations

**Research Focus Forum**

**HEALTHY AGING FROM A MULTIDISCIPLINARY PERSPECTIVE**



## Is there a relation between menopausal symptoms, gut microbiota, and experienced stress?

I. Brimiene<sup>1,3</sup>, M. Siaudinyte<sup>3</sup>, A. Burokas<sup>2</sup>, R. Griksiene<sup>1</sup>

Contact: [jievai@yahoo.com](mailto:jievai@yahoo.com)

<sup>1</sup> Department of Neurobiology and Biophysics, Institute of Biosciences, Life Sciences Center, Vilnius University, Vilnius, Lithuania

<sup>2</sup> Institute of Biochemistry, Life Sciences Center, Vilnius University, Vilnius, Lithuania

<sup>3</sup> Vilnius University Hospital Santaros Klinikos and Vilnius University, Institute of Clinical Medicine, Vilnius, Lithuania

Women experience menopause at a median age of 51.4 years. This means that women live a third of lives after menopause. Up to 80% of women experience different menopausal symptoms which have a negative impact on their daily activities. Reproductive hormones play an important role in the emergence of these symptoms however, the exact pathophysiology has not been elucidated. There is increasing amount of data showing that various women health factors and lifestyle might be related to symptoms type, strength and duration. Therefore, the aim of our project is to evaluate the relationship between menopausal symptoms, gut microbiota, and experienced stress. In order to evaluate this relationship, we plan to conduct a three steps study: an anonymous survey, a clinical human study, and validate the results using an animal model. We already performed the survey using the questionnaire including demographic and medical history questions, the Perceived Stress Scale (PSS), and The Menopause-Specific Quality of Life Questionnaire (MENQOL). Data of 785 pre- to post-menopausal women were analyzed. The preliminary analysis of the survey data revealed that physical activity, sleeping hours, some gastrointestinal symptoms (frequency of defecation and feces consistency) are related with more severe menopausal symptoms. In addition, the relationship exists between stress experienced by women and the menopausal symptoms.

The results of the survey support our hypothesis that gastrointestinal functions and experienced stress are related to menopausal symptoms. Nevertheless, to confirm and expand these findings we plan to conduct a clinical study assessing women's health and menopausal symptoms, autonomic nervous system activity in resting state and its reactivity to stress. We will measure the levels of sex and stress hormones and will evaluate women's gut microbiota. The obtained results and the established relations will be confirmed using an animal model.

1. Gracia, C. R., & Freeman, E. W. (2018). Onset of the Menopause Transition: The Earliest Signs and Symptoms. *Obstetrics and Gynecology Clinics of North America*, 45(4), 585–597.
2. Kim, S., & Jazwinski, S. M. (2018). The Gut Microbiota and Healthy Aging: A Mini-Review. *Gerontology*, 64(6), 513–520.
3. Morais, L. H., Schreiber, H. L., & Mazmanian, S. K. (2021). The gut microbiota-brain axis in behaviour and brain disorders. *Nature Reviews. Microbiology*, 19(4), 241–255.
4. Mosconi, L., Berti, V., Dyke, J., Schelbaum, E., Jett, S., Loughlin, L., Jang, G., Rahman, A., Hristov, H., Pahlajani, S., Andrews, R., Matthews, D., Etingin, O., Ganzer, C., de Leon, M., Isaacson, R., & Brinton, R. D. (2021). Menopause impacts human brain structure, connectivity, energy metabolism, and amyloid-beta deposition. *Scientific Reports*, 11(1), 10867.
5. Nelson, H. D. (2008). Menopause. *The Lancet*, 371(9614), 760–770.

## Silver nanoparticles tool for biocontrol of pathogenic skin microbiota?

K. Cekuolyte, E. Zemgulyte, R. Gudiukaite, E. Lastauskiene

Contact: [kotryna.cekuolyte@gmc.vu.lt](mailto:kotryna.cekuolyte@gmc.vu.lt)

Vilnius University Life Sciences Center, Institute of Biosciences, Vilnius, Lithuania

Due to weakened immunity, the elderly is more susceptible to yeast infections, and the number of fungal infections increases with life expectancy. Also, natural skin microbiota changes with age, making it easier for pathogenic species such as *Candida*, the main yeast pathogens, to become established. Current antifungal drugs have severe side effects, and yeast cells acquire resistance to these substances, making it difficult to treat patients. For these reasons, attempts are being made to find new antifungal agents that have fewer side effects and yeast cells would not have resistance to them.

Metal, for example silver, nanoparticles are one of the possible alternatives to currently used antifungal drugs. The main methods to produce nanoparticles are chemical and physical synthesis, which are expensive and not environmentally friendly, which would increase the cost of products containing these nanoparticles. The green synthesis of nanoparticles using, for example, microorganisms is a safer to the environment and cheaper alternative. Metal nanoparticles have the complex antimicrobial activities that simultaneously affect different parts of the cell, making it difficult for microorganisms to acquire resistance to these substances. One of the consequences of their mechanism of action is the production of reactive oxygen species (ROS) and therefore the cells undergo strong oxidative stress. Although nanoparticles are known to have excellent antimicrobial properties, their medical applicability is limited by their toxicity to host cells, and current research is focused on how to reduce their toxicity to the host.

In this research, thermophilic *Geobacillus* spp. genus bacteria have been adapted for the synthesis of silver nanoparticles (AgNP). Moreover, minimum inhibitory concentrations of the obtained AgNP were determined for two species of the genus *Candida* and yeast pseudohyphae. The results show that AgNP obtained by *Geobacillus* spp. induced synthesis can become an alternative tool for biocontrol of pathogenic microbiota.

## Influence of flavonoids on [PSI] prion formation in yeast cells

G. Dicipetryte, J. Versockiene, A. Sakalauskas, V. Smirnovas, E. Lastauskiene

Contact: [gabija.dicipetryte@gmc.stud.vu.lt](mailto:gabija.dicipetryte@gmc.stud.vu.lt)

Vilnius University, Life Sciences Center

Prions are proteinaceous infectious particles that can retain replication and spread like an infection. Prion protein aggregates are toxic to neuronal cells, which causes them to die. Prions cause transmissible spongiform encephalopathies – fatal neurodegenerative diseases in mammals. Neurodegenerative diseases also include amyloidosis, more known as Alzheimer’s or Parkinson’s diseases or tauopathy. Heretofore no effective drugs have been found that could cure prion diseases or amyloidosis in mammals. The compounds are sought that could be used to inhibit the formation of prion structures, the spread of prions, and to promote the degradation of oligomeric and amyloid structures. According to the literature, the group of flavonoids has been found to contain potential anti-amyloid compounds. Flavonoid compounds are found in all foods and beverages of plant origin. Five flavones were chosen to be examined in this study: 6,2',3'-trihydroxyflavone, 7,8,3'-trihydroxyflavone, 3,6,2',3'-tetrahydroxyflavone, 5,7,3',4',5'-pentahydroxyflavone and myricetin. The yeast *Saccharomyces cerevisiae* is a widespread model system suitable for prion studies and is identified with higher eukaryotic systems due to many conservative mechanisms. In this system, the mechanisms of prion formation, aggregation, propagation, and elimination, as well as the interactions of prion proteins, have been identified. The aim of the studies was to determine the effect of flavonoids on [PSI] prion formation in *S. cerevisiae* [psi-][PIN+] cells. For this purpose, cells were cultured in a liquid medium with oxidized flavonoids. Graphs of *S. cerevisiae* growth and prionization were plotted during the study. Concentrations of 7,75  $\mu\text{M}$ , 15,6  $\mu\text{M}$ , 31,25  $\mu\text{M}$  and 62,5  $\mu\text{M}$  oxidized flavonoids were used. It was concluded that oxidized flavonoids have no effect on cell growth. However, concentrations of 62,5  $\mu\text{M}$  of 3,6,2',3'-tetrahydroxyflavone, and myricetin were found to prolong the formation of [PSI] prion proteins, whereas the other four used flavones had no effect. The results obtained suggest that two used flavones have the potential to be an effective drug for the prevention of prion diseases.

1. Houston, F., & Andréoletti, O. (2019). Animal prion diseases : the risks to human health. *Brain Pathology*, 29, 248–262.
2. Lemarre, P., Pujol-Menjouet, L., & Sindi, S. S. (2020). A unifying model for the propagation of prion proteins in yeast brings insight into the [PSI + ] prion. 1–15. <https://doi.org/10.1371/journal.pcbi.100764>
3. Sakalauskas, A., Ziaunys, M., & Smirnovas, V. (2020). Gallic acid oxidation products alter the formation pathway of insulin amyloid fibrils. *Scientific Reports*, 10(1), 1–9.
4. Sakalauskas, A., Ziaunys, M., Snieckute, R., & Smirnovas, V. (2021). Autoxidation enhances anti-amyloid potential of flavone derivatives. *Antioxidants*, 10(9).

## Microorganism ecosystem studies to optimize microplastic degradation

G. Jansonaite, E. Lastauskiene, L. Raubaite

Contact: [gintare.jansonaite@gmc.stud.vu.lt](mailto:gintare.jansonaite@gmc.stud.vu.lt)

Department of Microbiology and Biotechnology, Institute of Biosciences, Life Sciences Center, Vilnius University

The growing amount of microplastic (MP) in the environment is a global problem caused by the constant and rapidly growing production of synthetic plastics and the insufficient management of plastic waste. (Karbalaie et al., 2018). Microplastics are particles of plastics smaller than 5 mm in diameter, such as polystyrene, polyamide, polyvinyl chloride, polypropylene, polyurethane, and polyethylene (Auta et al., 2017; Purohit et al., 2020). MP can be found even in clean waters and air all around the world. Although its impact at the ecological level is difficult to determine, it is known that MP enters the aquatic organisms, and so the entire food chain due to its small size, changes the diversity and function of microorganisms (Karbalaie et al., 2018b; Seeley et al., 2020; Sharma & Chatterjee, 2017). MP particles readily bind hydrophobic organic pollutants, metals, other chemical compounds from the environment or additives used in the production process and can therefore serve as a vector for their transport to living organisms (Auta et al., 2017; Karbalaie et al., 2018b). Thus, once in the food chain, microplastics become consumed by humans as well (Karbalaie et al., 2018b). The introduction of MP into the human body can cause serious health problems such as insomnia, obesity, or cancer (Karbalaie et al., 2018b; Sharma & Chatterjee, 2017). One of the biggest problems is that MP is hard to biodegrade and therefore lasts for a very long time, possibly between 10 and 1000 years. For this reason, efficient, low-cost waste management technologies are now being sought. Microorganisms such as bacteria or fungi can be used effectively for this purpose. To this day there have not been identified many microorganisms or secreted enzymes that degrade MP, and those that have been found does not have high efficiency (Purohit et al., 2020). To identify the potential of microorganisms found in the environment to biodegrade MP in this study we use metagenomic analysis.

1. Auta, H. S., Emenike, C. U., & Fauziah, S. H. (2017). Screening of *Bacillus* strains isolated from mangrove ecosystems in Peninsular Malaysia for microplastic degradation. *Environmental Pollution*, 231, 1552–1559.
2. Karbalaie, S., Hanachi, P., Walker, T. R., & Cole, M. (2018a). Occurrence, sources, human health impacts and mitigation of microplastic pollution. *Environmental Science and Pollution Research*, 25(36), 36046–36063.
3. Karbalaie, S., Hanachi, P., Walker, T. R., & Cole, M. (2018b). Occurrence, sources, human health impacts and mitigation of microplastic pollution. *Environmental Science and Pollution Research*, 25(36), 36046–36063.
4. Purohit, J., Chattopadhyay, A., & Teli, B. (2020). Metagenomic Exploration of Plastic Degrading Microbes for Biotechnological Application. *Current Genomics*, 21(4), 253–270.
5. Seeley, M. E., Song, B., Passie, R., & Hale, R. C. (2020). Microplastics affect sedimentary microbial communities and nitrogen cycling. *Nature Communications*, 11(1), 1–10.
6. Sharma, S., & Chatterjee, S. (2017). Microplastic pollution, a threat to marine ecosystem and human health: a short review. *Environmental Science and Pollution Research*, 24(27), 21530–21547.

## Notch and Wnt signalling in colorectal and endometrial cancer

V. Jonusiene, E. Kukcinaviciute, E. Eidenaitė, D. Dabkeviciene, V. Stucyte, A. Sasnauskiene

Contact: [violeta.jonusiene@gf.vu.lt](mailto:violeta.jonusiene@gf.vu.lt)

Vilnius University

Aging is a physiological process that leads to the changes in cells covered that may contribute to certain diseases. Several biological changes linked with aging process may promote tumour growth. Research in aging diseases, such as cancer, helps identify cellular mechanisms that are involved in physiological aging.

Aim of our research is the evolutionary conservative developmental signalling pathways Notch and Wnt, which plays important role in embryogenesis, tissue homeostasis and pathogenesis. These signalling pathways also are necessary to maintain intestinal morphogenesis and homeostasis and dysregulation of cell signalling events often leads to promotion of colorectal cancer. We analysed changes in Notch and Wnt signalling after 5-FU and OxaPt treatment in colorectal carcinoma cells HCT116 and its chemoresistant sublines HCT116/FU and HCT/OXA. The impact of Notch and Wnt signalling on cell chemoresistance was studied using inhibitors of these pathways as well as knockdown of HES1, the target of Notch and Wnt signalling, was performed. The aberrant expression of Notch signalling receptors and ligands suggests that this pathway is important for changes in cycling endometrium and in disorders such as endometriosis or endometrial cancer. Currently we investigate the role of the Notch signalling pathway in the samples from human endometrial cancer patients and endometrial cancer cell line KLE. We offer cooperation in research of the importance of Notch and Wnt signalling in different ageing-related pathologies in cellular models and tissue samples.

## Investigation of the role of myokines in immunometabolism to assess the risk of metabolic syndrome and the impact of physical activity on person's health and healthy aging

E. Malysko, V. Hendrixson, L. Zabuliene, R. Dadeliene, V. Gineviciene, N. Fatkulina, D. Karciauskaite

Contact: [elvira.malysko@mf.vu.lt](mailto:elvira.malysko@mf.vu.lt)

Institute of Biomedical Sciences, Department of Physiology, Biochemistry, Microbiology and Laboratory Medicine, Faculty of Medicine, Vilnius University

Myokines are newly identified markers that are important for studying glucose and lipid metabolism, brown fat and endothelial cell function, tumorigenesis, neurogenesis and a range of other body processes. Recent studies have shown that myokines released from skeletal striated muscle during exercise are involved in the regulation of cellular immune responses, inflammation and metabolic processes. Recently, the role of myokines in healthy ageing has attracted a lot of scientific interest due to their potential beneficial effects on anti-inflammatory processes and the body's metabolic functions, potentially lowering the risk of a number of chronic diseases, such as type 2 diabetes, atherosclerosis, or metabolic syndrome. Investigation of exercise-induced myokines functions could help to identify metabolic processes involved in healthy ageing, and therefore could enable a significant contribution to improve prevention of chronic diseases. There is lack of knowledge on the impact of myokines on healthy ageing. Ageing leads to skeletal muscle changes, which often results in muscle atrophy. It is not entirely clear the relationship between secretion of myokines rate and age of the person. Increased permeability of sarcolemma membrane of ageing muscles may lead to increased release of myokines. Recent studies have shown the opposite effect: decreased myokines release with an age. The physical activity however stimulates myokine release and has a positive effect on body functions.

The topic of investigation on myokine's physiology is quite new in Lithuania. The aim of our research is to investigate healthy individuals of different age groups, to identify myokines released during physical activity, and to analyze their association with specific immuno-metabolic functions, and to offer more effective algorithms for prevention of chronic lifestyle-related conditions and new therapeutic options.

Our research involves scientists from the Institute of Biomedicine, Institute of Health Sciences and Institute of Clinical Medicine of the Faculty of Medicine, Vilnius University.

1. Kim, J.-S., Lee, Y.-H., and Yi, H.-K. (2016). Gradual downhill running improves age-related skeletal muscle and bone weakness: implication of autophagy and bone morphogenetic proteins. *Exp. Physiol.* 101, 1528–1540.
2. Piccirillo Rosanna. Exercise-Induced Myokines With Therapeutic Potential for Muscle Wasting. *Front. Physiol.*, 29 March 2019 |
3. Bay ML, Pedersen BK. Muscle-Organ Crosstalk: Focus on Immunometabolism. *Front Physiol.* 2020;11:567881.
4. Chen, W.; Wang, L.; You, W.; Shan, T. Myokines mediate the cross talk between skeletal muscle and other organs. *J. Cell. Physiol.* 2021, 236, 2393–2412.
5. De Sousa Fernandes MS, Effects of Physical Exercise on Neuroplasticity and Brain Function: A Systematic Review in Human and Animal Studies. *Hindawi Neural Plasticity* Volume 2020, Article ID 8856621



## Impact of physical exercises on blood pressure in older cancer survivors

A. Mastaviciute, J. Kilaite

Contact: [asta.mastaviciute@mf.vu.lt](mailto:asta.mastaviciute@mf.vu.lt)

Faculty of Medicine, Vilnius University. Department of Rehabilitation, Physical and Sports Medicine, Lithuania;

Faculty of Medicine, Vilnius University. Clinic of Internal Diseases, Family medicine and Oncology, Lithuania

Cardiovascular disease is the important cause of death in older cancer survivors, related to exposure to chemotherapeutic agents, radiotherapy used to treat patients with cancer. The aim of the project is to analyse the impact of exercises initiated post-cancer treatment on hypertension in older patients and to prepare exercises recommendations for this specific population. Patients with newly diagnosed cancer are at 2- to 3-fold greater risk of incident myocardial infarction or ischemic stroke compared with patients without cancer [1]. From point of holistic medicine, clinical community is missing the window to act on many modifiable risk factors, such as poor nutrition, low physical activity, poor oral health, high blood pressure in older adults after cancer treatment. Hypertension before, during and/or after cancer treatment is a key risk factor in development of heart failure in cancer survivors treated with cardiotoxic therapy [2]. Studies showed 10 mmHg reduction in systolic blood pressure is related to 30% lower risk of ischemic heart disease death and to 40% lower risk of stroke death [1]. Recently increases awareness of the connection between health behaviors and cardiovascular diseases in older cancer patients. For geriatric patients physical exercise may be a potential factor to counteract the cardiotoxic medicine effects. It is known that physical exercises focused on increasing cardiovascular function has the potential to reduce damage from specific cancer therapy and improve patient quality of life. Unfortunately physical exercise is not recommended routinely to cancer patients despite that growing evidences indicating exercise are generally safe and every survivor should avoid inactivity [3].

1. Navi BB, et al. *J Am Coll Cardiol*, 2017
2. Salz T, et al. *J Clin Oncol*, 2017
3. Scott JM, et al. *Circulation*, 2020

## Interplay between epigallocatechin-3-gallate and ionic strength during amyloid aggregation

K. Mikalauskaite, M. Ziaunys, A. Sakalauskas, V. Smirnovas

Contact: [kamile.mikalauskaite@gmail.com](mailto:kamile.mikalauskaite@gmail.com)

Life Sciences Center, Vilnius University

Structural changes in amyloidogenic proteins, which lead to the formation of amyloid fibrils is one of the hallmarks of neurodegenerative diseases, such as Alzheimer's, Parkinson's, or prion disease. The resulting fibrils are distinguished by their beta-sheet-rich secondary structure, making them insoluble and partially resistant to proteases [1]. Although researchers have been working for many years to elucidate the onset of these neurodegenerative diseases, very few effective drugs or treatments have been found. One reason is that various environmental factors, such as temperature or pH, alter not only the rate of aggregation but also the structure and morphology of the resulting fibrils, which may lead to false-positive identifications of potential inhibitors during in vitro studies [2,3]. The aim of this work was to analyze how solution ionic strength influenced the inhibitory effect of the anti-amyloid compound epigallocatechin-3-gallate (EGCG) using three amyloid proteins/peptides.

For the study, three amyloidogenic proteins/peptides were selected: amyloid- $\beta$  (associated with Alzheimer's disease),  $\alpha$ -synuclein (Parkinson's disease), and recombinant human insulin (insulin-derived amyloidosis). It was analyzed how different solution NaCl concentrations could change the aggregation kinetic parameters of these three proteins/peptides by tracking the signal intensity of a amyloid-specific fluorescent dye – thioflavin-T. The resulting secondary structures of the formed fibrils were also compared using Fourier-transform infrared spectroscopy. After analyzing the obtained results, it was discovered that each amyloid protein had a characteristic concentration of NaCl in the solution, at which EGCG inhibition efficiency was highest. In the case of insulin and  $\alpha$ -synuclein, the inhibitory effect of EGCG was stronger at low NaCl concentrations. But a different situation was observed during amyloid- $\beta$  aggregation, where EGCG retained a similar level of efficiency at concentrations higher than 100 mM NaCl. In addition, the results showed that both ionic strength and EGCG affected the resulting structure of insulin and alpha-synuclein.

1. Chiti F, Dobson CM. 2017. Protein misfolding, amyloid formation, and human disease: a summary of progress over the last decade. *Annual Review of Biochemistry* 86(1):27–68. DOI 10.1146/annurev-biochem-061516-045115.
2. Sneideris T, Darguzis D, Botyriute A, Grigaliunas M, Winter R, Smirnovas V. 2015. pH-Driven polymorphism of insulin amyloid-like fibrils. *PLOS ONE* 10(8):e0136602. DOI 10.1371/journal.pone.0136602.
3. Sakalauskas A, Ziaunys M, Smirnovas V. 2019. Concentration-dependent polymorphism of insulin amyloid fibrils. *PeerJ* 7(13):e8208. DOI 10.7717/peerj.8208.



## Bacterial amidohydrolases for gene-directed enzyme prodrug therapy: a potential advance in geriatric oncology

V. Preitakaite, R. Stanislauskienė, N. Urbeliene, R. Meskys

Contact: [viktorija.preitakaite@gmc.vu.lt](mailto:viktorija.preitakaite@gmc.vu.lt)

Department of Molecular Microbiology and Biotechnology, Institute of Biochemistry, Life Sciences Center, Vilnius University, Vilnius, Lithuania

Age is one of the main risk factors for cancer development. While the progress in cancer therapies shows promise, the problem of older patients experiencing more severe side effects persists. One emerging strategy to reduce the risk of toxicity is gene-directed enzyme prodrug therapy. It is based on the delivery of a gene that encodes an enzyme that is able to convert a prodrug into a potent cytotoxin exclusively in target cancer cells. However, the lack of suitable enzyme variants and the limited choice of chemical bonds that could be activated limits the application of the therapy. Therefore, this study aimed to determine the ability of bacterial amidohydrolases YqfB and RL\_D8 to activate prodrugs that would affect the viability of eukaryotic cancer cells. First, the HCT116 human colorectal carcinoma cell lines, which stably express the genes encoding the YqfB or the RL\_D8 enzymes, were generated by retroviral transduction. In parallel, several N<sup>4</sup>-acylated cytidine derivatives were selected in vitro as possible substrates of the YqfB and RL\_D8 enzymes and tested for their possible toxicity. Next, the transduced cells expressing the bacterial amidohydrolases were exposed to several concentrations of the new prodrugs (1 to 100 μM) and their viability was assessed using the MTT assay. The results show a significant decrease in the viability of cell lines expressing either the YqfB or the RL\_D8 amidohydrolase, compared to the control cell line transduced with a vector without a gene insert. These results imply that the bacterial enzymes used in this study, together with the cellular cytidine deaminase, can convert the nontoxic prodrugs to a well-known chemotherapeutic drug 5-fluorouridine in eukaryotic cancer cell lines. In conclusion, our results suggest that bacterial YqfB and RL\_D8 amidohydrolases, together with the modified cytidine-based prodrugs, may serve as future enzyme-prodrug systems for gene-directed enzyme prodrug therapy.

## Biophenols in olive leaves from Oil Industry. Correlation between five extraction solvent analysed by HPLC-DAD-UV-Vis method and antioxidant power determination

C. L. Ronca, S. S. Marques, A. Ritieni, R. G. Martinez, L. Barreiros, M. A. Segundo

Contact: [carolinaronca@outlook.it](mailto:carolinaronca@outlook.it)

Department of Nutrition and Bromatology, Faculty of Pharmacy, University of Granada (Spain), in collaboration with Department of Chemical Sciences, Faculty of Pharmacy, University of Porto (Portugal) and Department of Pharmacy, University Federico II of Naples (Italy).

Obesity, cancer, cardiovascular disorder are the three most important causes of mortality in advanced countries. Previous epidemiologic studies have demonstrated the healthy landscape-diet important role in the prevention of chronic diseases. Phenolic compounds, acquired from the food or supplements, contribute in the chronic diseases' prevention. Olive tree leaf, a waste by-products of olive oil industry, is a rich polyphenolic compounds resource. The refuse-products and food by-products play a important role in environmental problem about its management and recycling. Many scientific in vivo and in vitro studies demonstrate and expound the health effects of byphenols such as anti-hypertensive, hypoglycemic, anti-inflammatory, anti-cholesterolaemic, anti-cancer and anti-proliferation effects. In different investigation works, inhibition capacity of tyrosol against pro-oxidant effects of cholesterol oxidation, oleuropein and hydroxytyrosol protective activity cellular molecules as lipids, proteins or DNA and preventive effects against the degenerative diseases' development were investigated. In this work antioxidant activity of olive leaf extracts, obtained with ethanol/aqueous solution in different percentile of ethanol, were evaluated. The main bioactive compounds identified were hydroxytyrosol, rutin, oleuropein, verbascoside and pinoresinol. The amount of biophenols was determined by HPLC-UV-Vis method associated with antioxidant assays in vitro such as Folin-Ciocalteu, DPPH, ABTS, towards studying a correlation between polyphenols contenet and equivalent antioxidant capacity. The best extract rich in polyphenol was used for future bioaccessibility studies in vivo, for the development of innovative functional foods.

1. De la Ossa, J.G., et al., Waste Autochthonous Tuscan Olive Leaves (*Olea europaea* var. *Olivastra seggianese*) as Antioxidant Source for Biomedicine. *International Journal of Molecular Sciences*, 2019. 20(23): p. 5918.
2. Ünlü, A.E., Green and Non-conventional Extraction of Bioactive Compounds from Olive Leaves: Screening of Novel Natural Deep Eutectic Solvents and Investigation of Process Parameters. *Waste and biomass valorization*, 2021. 12(10): p. 5329-5346.
3. Koca, U., et al., Wound repair potential of *Olea europaea* L. leaf extracts revealed by in vivo experimental models and comparative evaluation of the extracts' antioxidant activity. *J Med Food*, 2011. 14(1-2): p. 140-6.
4. Redan, B.W., et al., Altered Transport and Metabolism of Phenolic Compounds in Obesity and Diabetes: Implications for Functional Food Development and Assessment. *Advances in Nutrition*, 2016. 7(6): p. 1090-1104.
5. Lockyer, S., et al., Impact of phenolic-rich olive leaf extract on blood pressure, plasma lipids and inflammatory markers: a randomised controlled trial. *European journal of nutrition*, 2017. 56(4): p. 1421-1432.

## Research of prion protein Sup35 biomolecular condensate formation in *Saccharomyces cerevisiae* cells

A. Rudzianskas, J. Versockiene; G. Katauskas; E. Lastauskiene

Contact: [airidas.rudzianskas@gmc.stud.vu.lt](mailto:airidas.rudzianskas@gmc.stud.vu.lt)

VU LSC Institute of Biosciences

In recent years it was discovered that under some conditions like nutrient deficiency stress, some proteins can assemble into a liquid like biomolecular condensate during process of phase separation. Protein assembly during stress allows the cell to organize its resources and allocate them towards survival rather than proliferation (Banani et al., 2017). If stress conditions persist, newly formed protein assembly can age into a more solid-like condensate rich in beta sheets that are also characteristic to amyloid fibrils, which is the hallmark of ageing associated neurodegenerative diseases like Alzheimer, Parkinson syndromes, prion diseases or other (Alberti and Hyman, 2021). Because of that it is thought that amyloid formation and biomolecular condensate formation processes are closely related and research of link between these two phenomena might lead to better understanding of neurodegenerative diseases to which there are no cure yet.

For research in this field it is good to use model organisms. Some yeast proteins also have been found to undergo phase separation process during stress (Franzmann et al., 2018) In this project *Saccharomyces cerevisiae* yeast will be used to look into whether some phenolic compounds can alter recovery from stress conditions. The planed approach to test this is to genetically modify *S. cerevisiae* and fuse green fluorescent protein (GFP) to genome located aggregation prone Sup35 protein, cultivate yeast under various conditions (nutrient deficiency stress induction, recovery with or without phenolic compounds) and perform fluorescence microscopy to see how proteins assemble to biomolecular condensates (fluorescent foci) and dissolve back into the cytoplasm.

1. Alberti, S., and Hyman, A.A. (2021). Biomolecular condensates at the nexus of cellular stress, protein aggregation disease and ageing. *Nat. Rev. Mol. Cell Biol.* 1–18.
2. Banani, S.F., Lee, H.O., Hyman, A.A., and Rosen, M.K. (2017). Biomolecular condensates: organizers of cellular biochemistry. *Nat. Rev. Mol. Cell Biol.* 18, 285–298.
3. Franzmann, T.M., Jahnelt, M., Pozniakovsky, A., Mahamid, J., Holehouse, A.S., Nüske, E., Richter, D., Baumeister, W., Grill, S.W., Pappu, R.V., et al. (2018). Phase separation of a yeast prion protein promotes cellular fitness. *Science* 359.
4. Liebman, S.W., and Chernoff, Y.O. (2012). Prions in yeast. *Genetics* 191, 1041–1072.

## The role of autophagy in acquired chemoresistance of colorectal cancer cells

A. Sasnauskiene, V. Zitkute, A. Jasinevičius, E. Kukcinaviciute, V. Jonusiene

Contact: [ausra.sadauskaite@gf.vu.lt](mailto:ausra.sadauskaite@gf.vu.lt)

Vilnius University

Autophagy can have different effects on senescence – it can suppress senescence by clearing damaged intracellular organelles and macromolecule aggregates or it can promote senescence by facilitating the production of senescence-associated secretory proteins.

Thus the precise role of autophagy in different aging-related conditions has to be determined and the evaluation of molecular changes in autophagic machinery can offer new strategies to improve anti-aging therapies.

We have analyzed the importance of autophagy in the cellular model of acquired chemoresistance of colorectal cancer cells. In spite of cytotoxic effects, anti-cancer drugs have different impact on autophagy – they can either promote it or inhibit. We have determined that anti-cancer drugs reduce the expression of core-autophagy genes making the cells susceptible to gene silencing of autophagy-related molecules.

## Diet modulated effects on Microglia functions in ageing mice

A.K. Vijaya, S. Kuras, E. Simoliunas, J. Mingaila, D. Baltriukiene, A. Burokas

Contact: [akshay.vijaya@gmc.vu.lt](mailto:akshay.vijaya@gmc.vu.lt)

Vilnius University, Life science centre, Institute of Biochemistry

Microglia are the resident macrophagic cells of the brain that play a crucial role in homeostasis and neuroinflammation [1], therefore microglia dysfunction has major implications on neurodegenerative diseases [2]. Recent evidence suggest that the gut microbiota influences the brain functioning via gut-brain axis and could affect microglia functions in immune response [3]. Importantly, the diet has a major impact on microbiota modulation [4]. To understand the diet effects on microglia cells we used C57BL/6JRj mice for our research. The animals were divided into two groups (old and young) and subjected to a different diet (control, control & prebiotics, high-fat and high-fat & prebiotics). After 10-month diet (old group) and 1-month diet (young group), the animals were culled, and microglial cells were isolated to perform phagocytosis, ROS and senescence experiments which directly correlate to microglial activation and functioning in the CNS. We observed that microglia showed a decline in functionality in aged animals when compared to young animals. Moreover, microglia from animals fed with high-fat diet showed a bigger decline even when compared with other diets.

1. Streit, W.J., Mrak, R.E. & Griffin, W.S.T. Microglia and neuroinflammation: a pathological perspective. *J Neuroinflammation* 1, 14 (2004).
2. Hickman, S., Izzy, S., Sen, P. et al. Microglia in neurodegeneration. *Nat Neurosci* 21, 1359–1369 (2018).
3. Abdel-Haq R, Schlachetzki JCM, Glass CK, Mazmanian SK. Microbiome-microglia connections via the gut-brain axis. *J Exp Med*. 2019;216(1):41-59.
4. Singh RK, Chang HW, Yan D, et al. Influence of diet on the gut microbiome and implications for human health. *J Transl Med*. 2017;15(1):73. Published 2017 Apr 8.