The 10th International Congress of Societas Humboldtiana Polonorum

Longevity – a blessing or a curse? Medical, technological, cultural, socio-economic and legal aspects.


The Organizers
Lodz Branch of the SHP
Chair: Prof. Wiesława Apoliszczuk-Fogel

Honorary Committee:
Mr. Rolf Nikel - HE Ambassador of the Federal Republic of Germany
Prof. Włodzimierz Nityński - HMA Rector of the University of Łódź
Prof. Stanisław Bińiński - HMA Rector of Łódz University of Technology
Prof. Paweł Górski - HMA Rector of the Medical University of Łódź
Prof. Jurcik Olczewski - Dean of the Military Medical Faculty at the Medical University of Łódź

Held under the auspices of
Ms. Hanna Zdanowska - President of the City of Łódź
Mr. Zbigniew Rau - Governor of the Łódź Province
Mr. Włodzimierz Stepiński - Marshal of the Łódź Province

Lodz, 30.06 – 02.07.2016
Dear Attendants

It is our great pleasure to welcome you to the 10th International Congress of Societas Humboldtiana Polonorum, held, for the first time, in Lodz, Poland. Taking into account Longevity - i.e. the leitmotif of this Meeting, Lodz may really be considered an elderly woman. The City was established in 1423, remaining rather unknown till the 19th century, when textile industry was established there. Wealthy and experienced in cotton fabrics production and cotton trading Germans, Jews, Russians and Czechs helped Lodz flourish in the business. Numerous beautiful buildings of Art Nouveau provide convincing evidence of that Golden Era. Recently, as in other European countries, the textile industry in Lodz faced its twilight. In the last twenty years the character of the city has outstandingly changed. The cotton and textile industry has been replaced by white goods industry and Lodz has become a major European centre of manufacturing household appliances but also of power energy equipment, chemistry and others. Simultaneously, it is an educational and cultural centre, with a broad academic offer related to life sciences, art, music and technology, etc. For example, a highly-reputed Film & Theatre School has got its headquarters here.

Another example of the new image of Lodz is “Manufaktura”, one of the largest centre for shopping and leisure with a large cinema complex, a theatre plus numerous fancy restaurants. What makes it more appealing is the fact that “Manufaktura” has been installed at once the second largest cotton-mill in Lodz, owned (till World War II) by a Jewish family of Poznanski.

The multi-cultural heritage of Lodz is best expressed in the Annual Festival of Four Cultures, during which eminent Jewish, German, Russian and Polish artists (corresponding to the four big nations which have built Lodz) present their music and other genres of art, while specialties of the four cuisines are served at restaurants. All that gives the aged woman of Lodz a highly lifting spirit and new energy.

Going back to our Congress, its Scientific Programme covers different aspects of longevity and assumes participation of excellent invited speakers. We have also invited a large group of young researchers to share experience and propose new ideas.

Hopefully, the Congress will leave us an important message how to stay young, regardless of calendar age.

On behalf of the Organisers,

[Signature]
### Thursday, 30 June 2016

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<td>13:00 - 15:45</td>
<td>Registration (hall, Faculty of Law &amp; Administration)</td>
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<td>16:00 - 16:30</td>
<td>Congress Opening (aula)</td>
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<td></td>
<td>Wieslawa Agnieszka Fogel – Chairperson of the Congress</td>
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<td>Tomasz Sterzynski – SHP President</td>
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<td>The Societas Humboldtiana Polonorum Medal Award Ceremony</td>
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<tr>
<td>16:30 - 19:00</td>
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<td>Chairpersons: W. Agnieszka Fogel and Tomasz Sterzynski</td>
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<td>Holger Stark, Heinrich-Heine-Universitaet Duesseldorf:</td>
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<td></td>
<td>Therapeutic Strategies to Fight Parkinson’s Disease</td>
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<td>Ewa Bartnik, University of Warsaw:</td>
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<td>Are Our Genes Responsible for Aging??</td>
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<td>Stanislaw Waltos, Jagiellonian University in Krakow:</td>
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<td>Retirement and What’s Further, Professor?</td>
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<td>19:00 - 22:00</td>
<td>Get-together party, hall</td>
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### Friday, 01 July 2016

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<tr>
<td>08:30 - 10:30</td>
<td>Invited lectures</td>
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<td>Chairpersons: Ewa Stachowska and Stanislaw Ledakowicz</td>
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<td>Michael Giersig, Freie Universitaet Berlin:</td>
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<td></td>
<td>Profit and Disadvantage of Modern Medicine Based on Knowledge in Nanotechnology</td>
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<td>Miroslawa El Fray, West Pomeranian University of Technology, Szczecin:</td>
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<td>Tissue Engineered Spare Parts for the Human Body: Science-Fiction or Realistic Future?</td>
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<td>Pawel Strumillo, Lodz University of Technology:</td>
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<td>Electronic Systems Supporting the Elderly and Disabled</td>
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<td>Ulrich Luettge, Technische Universitaet Darmstadt:</td>
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<td>Born in the Stone Age and Still Alive: Potential Immortality and Longevity in the Plant Kingdom</td>
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<td>10:30 - 11:00</td>
<td>Coffee Break</td>
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<td><strong>Young Researcher’s Session 1</strong></td>
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<td>Chairpersons: Edeltrauda Helios-Rybicka and Adam Borkowski</td>
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<td>11:00 - 13:15</td>
<td>1. Dariusz Guziejewski (Department of Inorganic and Analytical Chemistry, University of Lodz) Electrode Kinetic Measurements with Square-Wave Voltammetry at a Constant Scan Rate</td>
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<td>2. Anna Brudzisz, A. Brzozka, G.D. Sulkai Faculty of Chemistry, Jagiellonian University in Krakow) Silver Nanowires Array Electrodes for Reduction of Trichloromethane</td>
</tr>
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<td></td>
<td>3. Magdalena Olak-Kucharczyk, S. Ledakowicz (Faculty of Process and Environmental Engineering, Lodz University of Technology) Removal of Estrogenic Compounds from Aqueous Environment Using Advanced Oxidation Processes</td>
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4. Marta Gmurek, M. Foszpanczyk, M. Olak-Kucharczyk, S. Ledakowicz
(Faculty of Process and Environmental Engineering, Lodz University of Technology)
The Toxicity Assessment of Photochemical Decomposition of Hazardous Aqueous Contamination under Natural Sunlight

5. Adam Buczkowski, H. Piekarski, B. Palecz
(Department of Physical Chemistry, University of Lodz)
Spectroscopic and Calorimetric Studies of PAMAM G4-NH2 and G4-OH Dendrimers as Carriers of 5-fluorouracil in Aqueous Solutions

(Department of Physical Chemistry and Electrochemistry, Jagiellonian University in Krakow &
Department of Environmental Chemistry and Bioanalytics, Nicolaus Copernicus University in Torun)
Epinephrine Determination and a Study of its Oxidation Metabolism

7. Karolina Gawlak, L. Zaraska, G. D. Sulka (Department of Physical Chemistry and Electrochemistry, Jagiellonian University in Krakow)
Optimization of Electrochemical Oxidation of Tin in Basic Electrolyte

8. Vasyl Ripenko, V. Khomenko (Institute of Geochemistry, Mineralogy and Ore formation;
National Academy of Science of Ukraine, Kyiv, Ukraine)
Experimental Study of Zircon-Baddeleyite Equilibrium in Alkali Alumosilicate Melt

(Poznan University of Technology, Poznan University of Medical Sciences & Symbiosis Dermatology Centre, Poznan)
Interferometric Test of Possible Damage of a Hydrogel Dressing by Irradiation from a Therapeutic Laser

10. Galyna Deichuk-Sokol, Sprynsky M., Ganzyuk A., Buszewski B.
(Department of Chemistry, Khmelnitsky National University, Khmelnitsky, Ukraine & Department of Environmental Chemistry and Bioanalytics, Nicolaus Copernicus University, Torun)
Preparation of Silver/Saponite Nanocomposites

11. Svitlana Filonenko, N. Shcherban (L.V. Pysarzhevsky Institute of Physical Chemistry of NASU, Kyiv, Ukraine)
Carbon Based Porous Materials Modified with Earth Abundant Elements as High-Performance Nonprecious Catalysts for Clean Energy Applications

(Institute of Fundamental Technological Research, Polish Academy of Sciences, Warsaw, Poland,
Toyota Central Research & Development Laboratories, Inc., Nagakute Aichi & Department of Mechanical Engineering, College of Engineering, Ibaraki University, Hitachi, Japan)
Thermomechanical Investigation of Gum Metal – a New Innovative Titanium Alloy for Biomedical Applications

13. Ljubov Jaanuska, H. Hein (Institute of Computer Science, University of Tartu, Tartu, Estonia)
Random Forest for Crack Identification in Beams on Pasternak Foundation

(Institute of Materials Technology, Poznan University of Technology, Poznan)
Environmentally Friendly Polymer Composites

15. Anna Pawlik, M. Jarosz, M. Jaskula, G. D. Sulka (Department of Physical Chemistry & Electrochemistry, Faculty of Chemistry, Jagiellonian University in Krakow, Poland)
Nanoporous Titanium Oxide Layers as a Potential Implant Material

16. Olena Tynkevych, A.Selishchev, Y. Khalavka
(Department of Inorganic Chemistry of Solid State and Nanomaterials, Yuriy Fedkovych Chernivtsi National University, Chernivtsi & L.V. Pysarzhevsky Institute of Physical Chemistry, NASU, Kiev, Ukraine)
Alloyed Semiconductor Quantum Dots as Promising Materials for the Biomedical Applications

17. Olena Ustavytska, Y. Kurys
(L.V. Pysarzhevsky Institute of Physical Chemistry of NASU Kyiv, Ukraine)
Electrochemical Preparation and Properties of Multilayer N-Graphene
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<th>Time</th>
<th>Session</th>
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| 11:00 - 13:15| 18. Ilona Senyk, O. Kruykova, V. Barsukov *(Kyiv National University of Technologies and Design Kyiv, Ukraine)*  
**People Protection from Microwaves Using Graphite-Carbon-Polymer Composites**  
19. Denitza Zgureva, S. Boycheva *(Department of Thermal and Nuclear Power Engineering, Technical University of Sofia, Bulgaria)*  
**Closed Cycle for Environmental Protection in Thermal Power Plants – CO₂ Capture by Fly Ash Zeolites**  
20. Anna Stefaniuk-Grams, J. Jung, J. Ulanski *(Department of Molecular Physics, Faculty of Chemistry, Lodz University of Technology, Lodz, Poland)*  
**Determination of the Correlation Between the Electrical Parameters of Organic Solar Cells and Photogeneration Quantum Yield of Charge Carriers**  
21. Karol Lawniczak *(Department of Theoretical Physics, Faculty of Informatics, University of Lodz, Lodz, Poland)*  
**Dark Energy – the Key to the Longevity of the Universe**  
22. Grazina Korvel *(Institute of Mathematics and Informatics, Vilnius University, Vilnius, Lithuania)*  
**Developing Mathematical Models for Speech Sounds**  
23. Jedrzej Stranz, P. Sauer *(Faculty of Mechanical Engineering and Management, Poznan University of Technology, Poznan, Poland)*  
**The Comparison of Exoskeleton’s Control Algorithms on the Example of an Elbow Joint** |
| 13:15 - 14:00| Lunch                                                                   |
| 14:00 - 15:30| Lectures  
Chairpersons: Andrzej Szwarc and Aleksander Strasburger  
Irena Lipowicz, Cardinal Stefan Wyszynski University, Warsaw:  
**Das Recht auf eine gute Verwaltung - verwaltungsrechtliche Aspekte der Rechte der Senioren**  
Sebastian Knell, Rheinische Friedrich-Wilhelms-Universitaet Bonn:  
**Radikales Anti-Aging? Ueberlegungen zur philosophischen Bewertung einer biotechnischen Zukunftsvision**  
Tomasz Kalinowski, Gdansk:  
**Sozio-oekonomische Aspekte und Rahmenbedingungen des demographischen Wandels in Polen und in Deutschland – ausgewaehlte Vergleiche und Konsequenzen fuer die Politik** |
| 15:30 - 17:00| Young Researchers Session 2  
Chairpersons: Henryka Dlugonska and Herbert Szurgacz  
24. Szymon Kubala, E. Samowska, C. Koncz, T. J. Sarnowski *(Institute of Biochemistry and Biophysics, Polish Academy of Sciences & Marie Curie Memorial Cancer Center, Warsaw, Poland & Max-Planck Institute for Plant Breeding Research, Köln, Germany & Institute of Plant Biology, Biological Research Center of Hungarian Academy of Sciences, Szeged, Hungary)*  
**Identification of Functional Interdependence Between SWI/SNF Dependent Chromatin Remodeling and Pre-mRNA Splicing in Arabidopsis**  
25. Dominika M. Gratkowska, S. P. Sacharowski, E. Samowska, A. T. Rolicka, G. Coupland, C. Koncz, T. J. Sarnowski *(Institute of Biochemistry and Biophysics, PAS & Cancer Center Institute Warsaw & Department of Plant Molecular Biology, University of Warsaw, Poland & Max-Planck, Cologne, Germany & Institute of Plant Biology, Biological Research Center of Hungarian Academy, Szeged, Hungary)*  
**Arabidopsis SWI/SNF Chromatin Remodeling Complexes Play a Crucial Role in Cold Response** |
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<th>Title</th>
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<td>Study of Protein-Ligand Interactions for Molecular Medical Diagnosis by Means of Atomic Force Spectroscopy</td>
<td>Katarzyna Herman, L. Majchrzycki, M. Lekka, A. Ptak (Institute of Physics, Poznan University of Technology &amp; Wielkopolska Center of Advanced Technologies, Poznan &amp; Department of Biophysical Microstructures, The Henryk Niewodniczanski Institute of Nuclear Physics, Polish Academy of Sciences, Krakow, Poland)</td>
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<td>27</td>
<td>N-Homocysteinylation as a Damage Factor of Structure and Functions of Keratins – a Potential Relationship with Aging</td>
<td>Kamila Borowczyk (Department of Environmental Chemistry, Faculty of Chemistry, University of Lodz, Poland)</td>
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<td>28</td>
<td>Evolutionary Rate of Antibacterial Drug Targets</td>
<td>Arkadiusz Gladki, Kaczanowski S., Szczesny P., Zienkiewicz P. (Institute of Biochemistry and Biophysics, PAS, Warsaw, Poland)</td>
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<td>29</td>
<td>Longevity and Genome-Scale Metabolic Models</td>
<td>Tomasz Boruta, M. Bizukojc, S. Ledakowicz (Department of Bioprocess Engineering, Lodz University of Technology)</td>
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<td>30</td>
<td>Mediators of Inflammation in Antinociceptive Action of JNJ7777120 in Rat</td>
<td>P. Rzodkiewicz, E. Gasinska, D. Lazewska, K. Kiec-Kononowicz, M. Bujalska-Zadrozy, S. Maslinski (Department of Biochemistry and Molecular Biology, National Institute of Geriatrics, Rheumatology and Rehabilitation &amp; Department of General and Experimental Pathology &amp; Department of Pharmacodynamics, Medical University of Warsaw &amp; Department of Technology and Biotechnology of Drugs; Jagiellonian University Medical College, Krakow, Poland)</td>
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<td>31</td>
<td>Synthesis and Evaluation of Antimicrobial Activities of Aziridine-Thiourea Derivatives</td>
<td>Adam M. Pieczonka, A. Strzelczyk, S. Lesniak, P. Staczek (Department of Organic and Applied Chemistry &amp; Department of Microbial Genetics University of Lodz, Poland)</td>
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<td>32</td>
<td>The Influence of Exogenous Salsolinol on Rat Metabolism</td>
<td>Magdalena Kurnik-Lucka, K. Gil, V. Aleksandrovych, A. Bugajski, P. Thor (Department of Pathophysiology, Jagiellonian University Medical College, Krakow, Poland)</td>
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<tr>
<td>33</td>
<td>Natural Polymers in Medical Applications</td>
<td>Monika Dobrzynska-Mizera, M. Knitter (Polymer Division, Institute of Materials Science, Poznan University of Technology, Poznan, Poland)</td>
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<td>34</td>
<td>Thermographic Test of the Usability of Hydrogel Dressings During Therapeutic Laser Irradiation on the Human Skin</td>
<td>Karol Grochalski, L. Rożanski, K. Wachal, E. Kilian-Pieta, E. Stachowska (University of Technology &amp; Poznan University of Medical Sciences &amp; Symbiosis Dermatology Centre, Poznan, Poland)</td>
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<td>35</td>
<td>Characterization of Bioengineered Spider Silk Spheres for Biomedical Applications</td>
<td>Marek Weiss, K. Kucharczyk, H. Dams-Kozlowska, A. Mackiewicz, A. Ptak (Institute of Physics, Faculty of Technical Physics, Poznan University of Technology &amp; Department of Cancer Immunology, Poznan University of Medical Sciences &amp; Department of Diagnostics and Cancer Immunology, Greater Poland Cancer Centre, Poznan)</td>
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<td>36</td>
<td>The Influence of Aging on the Human Microbiota</td>
<td>Nataniel Bialas (Department of Microbiology, University of Silesia, Katowice, Poland)</td>
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<td>37.</td>
<td>Kalina Owczarek (Department of Otolaryngology, Laryngological Oncology, Audiology and Phoniatry, Medical University of Lodz, Poland)</td>
<td>Risk Factor Assessment of Oral and Oropharyngeal Cancer as Part of the Head- and-Neck Cancer Prevention Program in Lodz</td>
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<td>38.</td>
<td>Emil Fabian, M. Kamieniczna, M. Kurpisz, E. Stachowska (Poznan University of Technology &amp; Institute of Human Genetics, Polish Academy of Science, Poznan, Poland)</td>
<td>The Phase-Contrast Holographic Microscopy in Noninvasive Human Sperm Morphology Investigations</td>
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<td>39.</td>
<td>Marcin Klonowski (Department of Criminal Procedure, Faculty of Law and Administration, Jagiellonian University in Krakow, Poland)</td>
<td>Delayed Motherhood and Posthumous Parenthood: in Search of the Legal Framework for Artificial Insemination</td>
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<td>40.</td>
<td>Krzysztof Michalak (Department of Criminal Procedure, Faculty of Law and Administration, Jagiellonian University in Krakow, Poland)</td>
<td>Advance Care Planning - Remedy for Human Longevity in Medical and Legal Aspect</td>
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<td>42.</td>
<td>Barbara Cichy-Jasiocha, A. Sekowski (Chair of Psychology of Individual Differences Institute of Psychology John Paul II Catholic University of Lublin, Poland)</td>
<td>Before They Become Seniors. Life Satisfaction in Artistically Gifted Adults Aged 50-60 years: An Axiological Perspective</td>
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<td>43.</td>
<td>Tomasz J. Lis (Nicolaus Copernicus University in Torun)</td>
<td>Great Leaders at the End of their Life - a Comparative Study</td>
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<td>44.</td>
<td>Joanna A. Ciesielska, R. J. Stark (Institute of Archaeology, Faculty of Historical Studies, University of Warsaw, Poland &amp; Department of Anthropology, Faculty of Social Sciences, MacMaster University, Canada)</td>
<td>Was it About Time? On Longevity and Living Conditions in a Monastic Community of Medieval Christian Sudan</td>
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<td>45.</td>
<td>Anna Maras (University of Silesia in Katowice, Department of Literary and Cultural Theory Sosnowiec, Poland)</td>
<td>Age(lessness) and Transmission of Traumatic Experience (on the Example of Bracha L. Ettinger’s Theory and Art)</td>
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<td>46.</td>
<td>Michal Kisiel (University of Silesia in Katowice, Department of Literary and Cultural Theory, Sosnowiec, Poland)</td>
<td>Technologies of Longevity and Evanescence in Samuel Beckett</td>
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<td>47.</td>
<td>Justyna Bokajlo (University of Wroclaw, Faculty of Social Science, Institute of International Studies, Wroclaw, Poland)</td>
<td>The Impact of the Quantitative Changes, on Quality Dysfunctions of European Order</td>
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<td>48.</td>
<td>Ewa Wyrebska-Dermanovic (Department of Ethics, Institute of Philosophy, University of Lodz, Poland)</td>
<td>Longevity — The Point of View of Kantian Ethics vs Consequentialism</td>
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<td>49.</td>
<td>Jakub Zawila-Niedzwiecki (Center for Bioethics and Biolaw, Institute of Philosophy, University of Warsaw, Poland)</td>
<td>The Curses of Longevity: Cognitive Decline, Memory Loss and Diminished Agency – a Bioethical Perspective</td>
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17:00 - 19:00 General Assembly of Societas Humboldtiana Polonorum

20:00 - 23:00 Barbecue Party - Conference Center, Rogowska
## Saturday, 02 July 2016

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<td>Lectures</td>
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<td>Chairpersons: Aldona Pobojevska and Franciszek Gruca</td>
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<td>Joanna Drynda, <em>University of Poznan</em>:</td>
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<td>“Keine Grenze verlockt mehr zum Schmuggeln als die Altersgrenze.”</td>
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<td>Zu Altersbildern in der deutschsprachigen Gegenwartsliteratur.</td>
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<td>Slawomir Magala, <em>Erasmus University Rotterdam</em>:</td>
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<td>Cultural Relativity of Ageism. Getting Old in Global Information Age</td>
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<td>Christoph Horn, <em>Rheinische Friedrich-Wilhelms-Universitaet Bonn</em>:</td>
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<td>Longevity from an ethical perspective: Is there a general duty to prolong human lives?</td>
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<td>10:30 - 11:00</td>
<td>Coffee Break</td>
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<td>11:00 - 13:30</td>
<td>Lectures</td>
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<td>Chairpersons: Waldemar Pfeiffer and Andrzej M. Kaniowski</td>
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<td>Klaus von Klitzing, <em>Nobel Laureate, Max Planck Institute, Stuttgart</em>:</td>
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<td>A New Kilogram in 2018: The Biggest Revolution in Metrology since the French Revolution</td>
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<td>Jerzy Nawrocki, <em>Jasne Blonia Eye Clinic, Lodz</em>:</td>
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<td>Aging of the eye</td>
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<td>Makoto Arai, <em>Chuo University, Tokyo</em>:</td>
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<td>Legal Protection of the Elderly in the Aged Society</td>
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<td>Ingo Marsolek, <em>Hochschule fuer Technik und Wirtschaft Berlin</em>:</td>
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<td>Longevity as a Growing Challenge from the Socio-economic and Technological Perspective – A Human Factors Oriented Approach</td>
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<tr>
<td>13:30-14:30</td>
<td>Lunch</td>
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<td>14:40</td>
<td>Presentation about the Alexander von Humboldt Foundation and its programmes</td>
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<td>15:00-16:00</td>
<td>Lectures</td>
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<td>Chairpersons: Aldona Sopata and Andrzei Bledzki</td>
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<td>Dirk Hofaecker, <em>Universitaet Duisburg/Esseen</em>:</td>
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<td>Die Politik des Aktiven Alterns und die Struktur sozialer Ungleichheiten in der spaeten Erwerbskarriere</td>
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<td>Z. Weigt, <em>University of Lodz</em>:</td>
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<td>Fremdsprachen lernen im dritten Lebensalter – einige Bemerkungen</td>
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<td>16:00 - 16:15</td>
<td>Congress Summary and Closing</td>
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<td>20:00 - 23:00</td>
<td>BANQUET (Palac Poznanski Palace)</td>
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## Sunday, 03 July 2015

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<td>Optional programme - Lodz sightseeing</td>
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Therapeutic Strategies to Fight Parkinson’s Disease

Holger Stark
Heinrich Heine University Duesseldorf, Institute of Pharmaceutical and Medicinal Chemistry, Universitaetsstr. 1, 40225 Duesseldorf, Germany

Parkinson’s disease belongs to the most frequent neurodegenerative diseases of the central nervous system (CNS). It is a chronic and slowly progressive disease which is mostly described by movement disorders with most patient cases after the age of 50. It is connected to a loss of dopaminergic neurons in substantia nigra, a special midbrain region. The exact molecular cause for this neuronal loss is unknown. Numerous aspects with polyproteinopathy with alpha-synuclein plaques in Braak stages and genetic causes have been investigated without disclosing a causal treatment. The symptomatic medical therapy is mostly based on the replacement of the dopaminergic innervation in the CNS and a restoration of the neurotransmitter balance.

Although the dopaminergic medical treatment give numerous possibilities for the movement improvement of the patient, the other effects of neuronal loss and neurotransmitter imbalance like sleep, sensory, and emotional problems get more into the focus of an optimized therapy. The histamine H3 receptor antagonist pitolisant (Wakix®)\(^1\) is one actual and innovative approach on the improvement sleep disturbance and somnolence conditions with classical L-DOPA treatment\(^2\).

The therapies with stem cells, with neuroprotective agents or genetic variations are still in experimental or early clinical phase, whereas the surgery with deep brain stimulation has achieved great progress.

References
Are our Genes Responsible for Aging?

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Many theories have been proposed to explain aging. Some involve telomeres, others free radicals, mitochondria and many many other potential culprits. Not all these theories have survived, the free radical theory, once perhaps the most pervasive, is now no longer very popular. In the last decade a quest for longevity genes has been initiated, facilitated by the rapidly decreasing price of DNA sequencing and the constantly improving methods of analyzing sequencing results. In some way the search for genes affecting longevity has close similarities for the quest for the elixir of life, though the former is of course, in contrast to the latter, a scientific pursuit. Many methods have been used to look for these genes, the most recent one has been the analysis of the genomes of some very old persons in the hope of finding some genetic reason or reasons for their longevity. Up to now no genes have been found, and it is very probable that longevity – similarly to most of our traits and most of our ailments – is a multifactorial phenomenon, due to the interactions of many genes and environmental factors.
The vast majority of professors put off any thought of impending retirement. One of the first signs that this inevitable moment is getting closer is when younger colleagues start preparing a book of mementos; in addition, serious discussions commence about who will be the successor. When the departing professor has fortunately gone through all of the difficulties associated with his retirement and has had a chance to relax after all the celebrations, the next stage of his life begins. In most cases, in Polish conditions, it is not drastically different from the previous one. Polish regulations allow that – if certain conditions are met – one can still be employed as a professor emeritus either in the same place or somewhere else.

Although the department director’s office has to be vacated, it is a custom to provide professors emeritus with new offices. One can still publish reviews, give opinions, and take seats on committees, commissions and councils, despite younger academics waiting in the wings. There is more time for coffee or cognac meetings; ones work-life balance improves. Meanwhile meetings with peers occur more and more frequently at funerals. The sad sides of retirement begin to manifest themselves: contact with students becomes weaker or stops completely, the feeling of being unique disappears and one starts to feel unnecessary in ones environment, personal contact with academics from abroad also wanes.

The lack of the right to vote in collective bodies means that one feels like one has no influence over the future or direction of ones institute and the professor emeritus no longer has a say in the education programme. Periods of bad health also occur more and more often.

There can also be advantages to this physical deterioration, one just has to notice them. As time goes by, you almost always get a seat on the bus, underground or tram, and hearing problems stop you from getting distracted by noise from the street. The inevitable lack of constructive creativity can be compensated for by writing memoirs, bibliographic work and the chance to develop ideas which had sprung to mind years ago.
Profit and Disadvantage of Modern Medicine Based on Knowledge in Nanotechnology

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One of the most prominent applications of nanotechnology is the design of matter on an atomic, molecular, and supramolecular scale. The most well-known description of nanotechnology was established by the National Nanotechnology Initiative, which defines nanotechnology as the manipulation of matter with at least one dimension sized from 1 to 100 nanometers. The impact of nanotechnology extends from its medical, ethical, mental, legal and environmental applications, to fields such as engineering, medicine, chemistry, computing and materials-science.

Nanotechnology’s health impact can be split into two aspects: the potential for nano-technological innovations in medical applications to cure disease, and the potential health hazards posed by exposure to nanomaterials. By developing small, inexpensive, highly sensitive and even portable devices based on novel nanomaterials and their surface modification it is possible to bring new insights into cellular function in real time, so that diagnostics could take place in the beginning phase of diseases. Among these nanomaterials, gold nanoparticles, carbon nanotubes, magnetic nanoparticles and quantum dots can greatly enhance the sensitivity and specificity of detection.

Because of quantum size effects and large surface area to volume ratio, nanomaterials have unique properties compared to their larger counterparts. Nanomaterials, even when made of inert elements like gold, become highly active at nanometer dimensions. This applies, for instance, to glucose monitoring and early diagnosis of cancer. Nanotechnology’s ultimate goal in this field is to pave the way to personalized medicine. The ambition of point-of-care, in-surgery or even at-a-distance diagnosis and the spectacularly exciting progress in imaging aims to take science over the current ‘one-size-fits-all’ limitations, with tremendous prospected benefits to society. In this lecture we will discuss the benefits and disadvantages by use of nanoparticles in medicine.
Tissue Engineered Spare Parts for the Human Body: Science-Fiction or Realistic Future?

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A constant need to repair wounded tissue has accompanied humans from ancient times (crusades, conquests) to nowadays military conflicts and wars. People were trying accommodate different materials, including gold, ivory and very recently different polymers (commonly called plastics) to repair diseased or wounded tissues. Artificial prosthesis of limbs or organs (artificial kidney, heart-lung machines) made our life longer and more comfortable during last few decades. However, these constructs are artificial substitutes and different foreign body reactions can occur when patient is not tolerating specific materials (so called metallosis, an allergy to metal implants can be developed). On the other hand, living tissue has a natural regenerative potential therefore different than permanent implant solutions are being developed and implemented into the clinic.

An increasing exploitation of regenerative potential of living tissues is observed from last two decades since temporary, biodegradable polymeric templates (so called scaffolds) are being developed for tissue engineering. Biodegradable polymers are synthesized from non-toxic monomers and then seeded with patient own cells. Such constructs, when exposed to the conditions similar to natural body environment, facilitates cell-to-tissue transformation, and when delivered into target defect, they easily accommodate to patient’s tissue thus restoring the tissue function and completely regenerating it. A well-known example of tissue engineered product is artificial skin. Collagenous fibres network is prepared first and then seeded with patient’s own keratinocytes and fibroblasts. During the next two weeks cells are maturing thus transforming the construct to dermal tissue which can be implanted to the patient.

A potential of tissue engineering approach for development of other tissues will be presented with the focus on civilization diseases treatment, including cardiac diseases, thus showing that spare parts for human body can be indeed grown in a lab.
Electronic Systems Supporting the Elderly and Disabled

Pawel Strumillo

Lodz University of Technology

Healthcare systems are facing new challenges due to aging societies and lifestyle related diseases such as hypertension, diabetes, neurologic and heart illnesses. Consequently, there is an increasing number of people with physical and sensory disabilities, i.e. people with special needs (PwSN). According to WHO statistics 13% of the European population, i.e. approx. 65 million Europeans qualify as PwSN. New healthcare and government programs alone cannot solve this growing problem.

The aim of this lecture is to show that current achievements in digital technologies and life sciences open new opportunities in implementation of innovative models of health care delivery. Provision of care can be made affordable, effective, ever-present and engage lower work effort of medical personnel. Such an emerging model is termed pervasive healthcare. The pervasive healthcare approach relies on changing the healthcare model from a centralized, reactive, and doctor-centric approach to decentralized, preventive, and patient-centric, personalized schemes.

Approaches to pervasive healthcare systems at different scales starting from nano- and micro-size implanted devices, through personal systems and embedded infrastructures will be shown along with examples of cutting-edge technologies such as: microsensing devices, body sensor networks and home-based monitoring of vital signs, assistive and wearable technologies for PwSN, Internet of Things (IoT) for the elderly, and mobile health (m-Health) telecare solutions. An emerging challenge that arises here, which is the smart integration of these multitude of technologies, will be shortly discussed.

The lecture will conclude by showing current research outcomes in the field of wearable and assistive technologies in the Institute of Electronics at the Lodz University of Technology.
Born in the Stone Age and Still Alive; Potential Immortality and Longevity in the Plant Kingdom

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Potential immortality occurs among unicellular green algae. The individuality of cells is lost as they divide and produce daughter cells. However, death with the occurrence of dead bodies of cells may only occur in environmental catastrophes but is not an unavoidable consequence of the life cycle. This potential immortality was already lost among colonies of the algae in differentiation during evolution; a loss necessary paying for an increase in complexity, which illustrates blessing and curse of longevity. Examples show various aspects of longevity in the life of plants. Among the higher plants annuals flower and reproduce only once, they are called hapaxanthous plants. They have sex and die. Completing their life cycle they unavoidably produce dead plant bodies. Some perennial plants also only flower once sometimes after many years of vegetative life. However, many perennials flower and produce seeds often in their life. They are called pollaxanthous plants.

The longevity of seeds remaining viably for germination varies from just on year up to 100 – 200 years. In tropical dry forests deciduous and evergreen trees co-exist, leaf longevity may be between 18 months and several years. There is an ecological tradeoff illustrating blessing or curse. Plants allocate resources either to obtain a high photosynthetic rate for a brief time or to provide a resistant physical structure which results in a lower rate of carbon assimilation over a longer time. Some of our trees may become hundreds to thousands of years old. Among trees we find the oldest organisms on Earth. We can use tree rings in paleo-ecology and history allowing extrapolations back to 12,500 years in the past. The oldest still living individuals of the pine tree *Pinus longaeva* in the west of North America are almost 5,000 years old. They were born in the Stone Age and are still alive and fertile.
Das Recht auf eine gute Verwaltung
- verwaltungsrechtliche Aspekte der Rechte der Senioren

Irena Lipowicz
Cardinal Stefan Wyszyński Universität, Warschau, Polen

Das Recht auf eine gute Verwaltung, lange Zeit nur als ein Vorschlag der Doktrin des Verwaltungsrechts behandelt, dann ein klassisches soft law der EU und schon weit mehr konkret angewendet wird gegenwärtig nicht nur im Recht der europäischer Union, sondern auch im nationalen Recht der Mitgliedstaaten der Union immer mehr präsent. Es wird aber auch verstärkt als Maßstab des Verwaltungsverhaltens in den verschiedenen Bereichen der öffentlichen Verwaltung der Mitgliedstaaten betrachtet, die -wie die kommunale Selbstverwaltung -nicht direkt zum Bereich der Integration gehören. Als Beispiel, aber vor allem als Referenzgebiet kann man hier die Rechte des Senioren /der älteren Personen/ analysieren.

Der Begriff der guten Verwaltung wird heute eher umfassend verstanden, nicht /genau genommen/ nur als das Recht auf ein gutes, faires Verfahren, sondern auch als eine effiziente, verfassungstreue, und sowohl auf Gesetzesebene wie auch in den unter -gesetzlichen Normen in der Verwaltungspolitik des Staates und der Kommunen die Rechte dieser Personen (als wichtigerer Teil der Gesellschaft) respektierte Verwaltung. Die Erfüllung der Standarde der Charta der Grundrechte in diesem Bereich ist noch weit entfernt. Im Referat wird gezeigt wie man im Rahmen der Gesetze eine <gute> oder eine <schlechte> Verwaltung führen kann; am Beispiel der Staats- und Kommunalpolitik die auf große Handelszentren außer Stadt stellt und kleine Geschäfte in Nachbarschaft durch hohen Mieten und Lokalsteuer vom Zentrum verdrängt, werden weitreichende Folgen gezeigt. So zwingt solche Kommunalpolitik, u.A. die Senioren zu früh ihre Selbstständigkeit aufzugeben um Seniorenheime wählen zu müssen. Auch eine universelle (noch zu wenig bekannte) Planung der Stadt vorbeugt architektonische Diskriminierung, bei der die Senioren und Behinderte vom öffentlichem Raum faktisch verdrängt werden. Es sind nur einige Beispiele einer komplexen Verwaltungspolitik, die durch klare Linien und entsprechend gut entworfenes Verfahren die alten Menschen in die Gemeinschaft wirklich eingliedern kann ;die Stadt gewinnt damit auf vielen Ebenen die systematisch gezeigt werden können. Dafür aber sind die neuen rechtlichen Formen der Verwaltung vor allem auf Konsensprinzip basierte notwendig und teilweise eine Modernisierung der Rechtsnormen.
Radikales Anti-Aging? Überlegungen zur philosophischen Bewertung einer biotechnischen Zukunftsvision

Sebastian Knell
Rheinische Friedrich-Wilhelms-Universität Bonn

Biwissenschaftler sind seit längerem damit beschäftigt, nach Wegen zur Verlangsamung des Alterns zu suchen, durch die sich ein radikaler Aufschub des Todes erzielen ließe. Diese Aussicht wirft grundlegende philosophische Fragen auf. In welchen Hinsichten wäre ein Zugewinn an Lebenszeit der eudaimonistischen Qualität des Lebens förderlich? Und gewinnt die Zeit, die uns zur Verfügung steht, nicht umgekehrt gerade durch ihre Knappheit überhaupt erst ihren Wert? Im ersten Teil des Vortrags wird die Frage nach dem Zusammenhang von Lebensdauer und Lebensqualität sowohl aus einer utilitaristischen als auch aus einer aristotelischen Perspektive beleuchtet. Im zweiten Teil wird dann die verbreitete These vom Wert der Zeitknappheit genauer untersucht und einer Kritik unterzogen.
Sozioökonomische Aspekte und Rahmenbedingungen des demographischen Wandels in Polen und in Deutschland - ausgewählte Vergleiche und Konsequenzen für die Politik – wichtigste Thesen

Tomasz Kalinowski
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Im internationalen Vergleich gehört die deutsche Gesellschaft zu den ältesten. Jahrelang galt Polen als eine relativ junge Gesellschaft mit einem guten Entwicklungspotential. Bis vor kurzem spielte die Politik in den beiden Ländern eine relativ zweitrangige Rolle bei der Überwindung der Probleme der demographischen Herausforderungen.

Die letzten demographischen Prognosen (World Population Prospects, UNO) zeigen jedoch, dass das Problem deutlich schärfer in Polen als in Deutschland erscheint. Das betrifft vor allem die prognostizierte Bevölkerungsentwicklung bis 2050, wo die Schrumpfung der Bevölkerung in Polen als drastisch bezeichnet werden kann. Beim Vergleich der Altersstruktur in 35 Jahren scheint das Problem in den beiden Ländern teilweise fast gleich akut zu sein.

Die Politik hat in den beiden Ländern relativ aktiv, obwohl deutlich anders, reagiert. Im europäischen Vergleich hat Deutschland traditionell stark die Familie gefördert. Die neue polnische PIS-Regierung versucht mit den neuen Programmen, vor allem 500 plus, die Lage zu verbessern. Bei der Migrationspolitik hat die neue polnische Regierung eine eher abwartende und passive Einstellung genommen.

Die Wirkung der politischen Maßnahmen in den beiden Ländern ist zurzeit schwer zu beurteilen. Die internen Politikmaßnahmen (Rentenalter, Familienförderung, Wohnungsbau für junge Familien) bringen enttäuschende Ergebnisse. Der zentrale Punkt der Überwindung des demographischen Wandels in den beiden Ländern wird die Flexibilisierung der Migrationspolitik in Polen und in Deutschland mit sich bringen. Polen und Deutschland definieren die eigenen Ziele und vor allem angesetzten Methoden etwas anders, was uns auf der europäischen Ebene nicht unbedingt verbindet.
„Keine Grenze verlockt mehr zum Schmuggeln als die Altersgrenze“ Zu Altersbildern in der deutschsprachigen Gegenwartsliteratur

„Żadna Granica Nie Kusi Tylu Przemysłowników Co Granica Wieku“. O obrazach starości we współczesnej literaturze niemieckojęzycznej

„Nothing Pushes the Limits of Deception More that the Limit of Old Age.“ About the depictions of old age in the modern German-language literature

Joanna Drynda
Die Adam-Mickiewicz-Universität Posen


Cultural Relativity of Ageism. Getting Old in Global Information Age

Sławomir Magala
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“The Enlightenment is dead. Long live the Enlightenment!”

Old age isn’t what it used to be. Wise Old Men are not taken for granted. They have to compete against Brilliant Young Women collecting “likes” and limiting “hates”. They – we – have to live in constant fear of “delete”. Perhaps we should look at the cultural relativity of ageism from the point of view of the younger and the very young? There would be, after all, no problem in getting old in virtual spaces, under the clouds of data and inside the ever-growing panopticon of surveillance, if the young did not want to negotiate a new generational cease-fire.

The evolution of the old-young debate started with an attempt at cultural brainwashing administered by the characters from Thomas Mann’s “The Magic Mountain”. The radical therapy is dispensed by a Jesuit cum Bolshevik - Naphta (whose character had been based on the Hungarian Marxist philosopher and communist politician – Gyorgi Lukacs). The humanist therapy is designed and implemented by an idealist aesthete, Settembrini (whose character had been based on an Italian philosopher Benedetto Croce).

In Witold Gombrowicz’s “Ferdydurke”, the young high school students refuse to sign the confession of faith in truth, beauty and goodness, to pretend that they are still moved by the Romantic poetry and highest values. They clearly experience a more rough class struggle and a more perverse erotic underground than their fathers (let alone grandfathers) did. What will guide them? What will they do to the older ones if they “are no longer compelled by a sense of common ancestry and are inclined to veer into increasingly divergent futures” (Fuller, Lipińska, 2014, 132)

If asked about the early 21st century novelist shots in the intergenerational war zone, we should mention Jonathan Franzen’s “Purity” and Thomas Pynchon’s “The Bleeding Edge”. Wise aging and aged men look at Brilliant Young Women, and come up with a diagnosis of the newest digital glass beads game (Glasperlenspiel) of global survival and deceit. Class struggle never stopped, war of the sexes never ended, while new generational, gender, religious, racial and other complexities added new levels of serious gaming to the sociocultural evolution. Is knowledge sharing a chance for attracting attention and bridging generational gaps?

(Literature: Fuller, Steve, Lipińska, Veronika, The Proactive Imperative. A Foundation for Transhumanism, Basingstoke & New York, Palgrave)
Longevity from an Ethical Perspective: Is there a General Duty to Prolong Human Lifes?

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The standard case of our moral judgment is that we accept a general duty to prolong human life. Take the case of a 40 years old mother of three who is brought to a hospital after a heavy car accident; as a physician, then, you will certainly have the moral obligation to do all you can to save her life. The rationale behind the moral duty is that we wish to see realized, in this case, a full human life; we want the mother to be rescued. Much more difficult is our judgment in the case of a seriously ill, old-aged person who explicitly wishes to end his or her life; here we still see the need to do prolong the patient’s life whenever there is a reasonable chance to it, but we would also respect, under certain conditions, someone’s decision to die. In the case of longevity, things are radically different. The very concept of what counts as a ‘full human life’ is then altered, and what we now know as a standard biography would then look quite different. Is it morally desirable to prolong human lifes? Should we search for the scientific and technical means towards this goal? How should we use these means given that they might become available?
A New Kilogram in 2018: The Biggest Revolution in Metrology since the French Revolution

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Metrology— the science of measurements— is responsible for the international uniformity and precision in standards. Today, the seven units for meter, kilogram, second, ampere, kelvin, mole, and candela of our international system of units (SI units) are used as a basis to express everything in nature by numbers and units. The first global system of units was introduced during the French Revolution with prototypes for the meter and kilogram. Even today, an artefact of platinum iridium is by definition the international unit of mass but this standard is not stable enough. Therefore, the General Conference on Weights and Measures at his last meeting in November 2014 encouraged the international metrology community to complete all work until July 2017 necessary for a replacement of the current SI by a new system based on constants of nature. The quantum Hall effect (Nobel Prize 1985) plays a crucial role in this development, not only for the electrical units but also for the kilogram.
The rapid improvements in surgical and medical treatments of the eye in the last years give important opportunities to successfully combat ocular diseases associated with aging; a good visual acuity can be maintained even in centenarian.

The presentation will briefly depict the anatomy of the eye and its particular structures that may be altered during aging. Different diseases will be discussed. As the first, a cataract formation, which is the most frequent disease in ophthalmology and treated with the most sophisticated methods. A short history of treatment modalities of cataract will be presented, from cryoextraction to the modern phacoemulsification technique. Next, different retinal diseases which appear in the elderly, such as vitreo-macular traction, epiretinal membrane formation and macular hole will be introduced. These diseases are also treated surgically and both, the surgical approaches and diagnostics before and after the surgery will be presented. This part of the presentation will include modern developments by in vivo demonstration of retina structure with optical coherence tomography (OCT). Age related macular degeneration is the next topic to discuss, with its clinical definition and appearance by OCT and its treatment with intravitreal injections.
The history of the acquisition of basic human rights since the Magna Carta tends to be presented as having aimed for the universality of human rights. The fact is, however, that only the class of people who fought for them (and therefore were able to fight) were granted human rights. In the French Revolution, it was the citizenry that won human rights. In the 20th century, it was workers (and of course, people without physical disabilities) who won the right to work and fundamental labor rights. People who were unable to work due to aging or disabilities did not gain rights like these.

People now say that human beings are equal from birth, and they consider the universal assurance of human rights and the guarantee of equality to be fundamental principles as a matter of course. One might wonder, however, whether the elderly and people with disabilities have ever received treatment according to those fundamental principles that in society are considered to be a matter of course. The answer is that they have not. The truth of society’s attitude is that these people are useless and to be treated as nuisances, and they have been subject to elimination by abandonment or culling. People with disabilities have been treated as unwanted. Moreover, society has for some reason shown sympathy for mothers who attempt murder-suicide with their own disabled children out of worry over their future, and even the courts have sometimes handed down lenient sentences. The lives of the murdered people with disabilities are clearly devalued.

In time, the concern became how to manage them so they would not be a nuisance, even if they were no longer eliminated. It was permitted for ordinary people to isolate the elderly and people with disabilities in their rooms so as not to disturb the social life of the regular people. Or, even if they were not held in isolation, they were told that in their old age they should obey their children, and that they should strive not to be a burden on society, and that since society was taking care of them, they should not behave insubordinately, or were told in other ways that it was the right thing (the inescapable thing) to put their own lives in the charge of others. There are numberless cases of families or guardians who misappropriated the benefits paid to these people, taking advantage of their inability to uphold their own rights.
Longevity as a Socio-Economic Challenge – A Human Factors Approach

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An increasing life expectancy characterizes countries all over the world. In Germany the average life expectancy has been increased since the 1970s by nearly 10 years [1]. This results in a dramatic impact on the retirement system, which is in many countries based on a pact across generations. Today’s working generation finances the former one now relying on retirement payments. Thus, an increasing life expectancy combined with a constant retirement age, which in Germany has not been adapted significantly enough since its introduction at the end of the 19th century, will directly result in an increasing financing gap [2]. Therefore, from the economic perspective longevity seems to be rather a curse than a blessing. But also the often praised demographic pyramid, being seen as an ideal basis for a well-balanced retirement system, in which a growing number of young employees finances the retirement payments for a decreasing number of elderly retirees, cannot be a desirable solution. Nobody would like to be part of a demographic structure being shaped by a constantly high mortality rate within all ages – thus, being rather a curse than a blessing from the social perspective. Therefore, from the socio-economic as well as human factors point of view an increasing life expectancy is neither a blessing nor a curse. But it will require sustainable strategies – especially in combination with an increasing shortage of skilled employees [3]. It is obvious and fair, that the average retirement age will need to be increased and to become more flexible for selected professions in order to avoid substantial cuttings of retirement rates as well as a shortage of employees. Together with additional financial motivators to keep elderly employees at work, this will hopefully result in more and more elderly employees – the real challenge from the socio-economic as well as human factors perspective. To face this challenge, companies will need to concentrate on three basic strategies: 1. Structural Adaptation: Continuously analyze & optimize work places, processes & organizations for an ageing work force; 2. Employee Qualification: Systematically improve staff skills & knowledge for future challenges; 3. Staff Motivation: Sustainably replace the primarily existing financial motivators by intrinsic ones concentrating on the purpose of work itself and providing employees with possibilities to achieve autonomy & mastery within their work.

Active Ageing Policies and the Structure of Social Inequalities in Late Employment Life

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From the 1970s until the mid-1990s, most European countries followed a strategy of early retirement to relieve their strained labour markets. Yet, when demographic projections anticipated an unavoidable ‘grey ing’ of national labour forces, these ‘externalisation measures’ increasingly were considered as socially and financially unsustainable. Many European governments revised their labour market and welfare policies accordingly to foster higher employment among senior workers. Legal retirement ages were raised and public pension benefits were cut to reduce the incentives for early retirement. Furthermore, employment-sustaining measures such as active labour market policies or lifelong learning were increasingly implemented. These measures were often referred to as ‘active ageing’ policies, a term that has gained remarkable popularity in public and academic discourse. Most recent figures indeed suggest that these policies have been effective, as older workers’ employment rates have risen substantially since the turn of the millennium. Yet, it remains an open question whether this aggregate increase has spread equally among all labour market strata or whether certain labour market groups are structurally excluded from this upward trend. We argue that - simultaneous to the increase in late-career employment – active ageing policies have led to an increase in social inequalities among the older workforce. Particularly weak labour market groups – those with low education, in blue-collar occupations or working under hazardous conditions – have hardly been able to profit from employability measures while at the same time being confronted with an increasing pressure to prolong their working careers. To substantiate this allegation empirically, we provide a stylized sketch of major institutional trends based on most-recent macro data. Data from available micro studies will then be used to reconstruct over-time shift in social inequalities in late career employment within European countries.
Jeder Mensch hat das Bedürfnis an einer internationalen Kommunikation teilzunehmen, um etwas Neues zu erleben und zu erfahren, sowie mit einem Anderen seine eigenen Erfahrungen auszutauschen. Bei dieser Kommunikation braucht man ein Verständigungsmittel, und so wird auf diese Art und Weise die Fremdsprache zu einem wichtigen Instrument im Kommunikationsprozess, mit Hilfe dessen das Neue kennenzulernen ermöglicht wird. Eben der Ruhestand erlaubt besser als die Zeit der beruflichen Aktivität Reisen zu unternehmen und durch die Sprache andere Welten und Kulturen kennenzulernen. Selbst die Fremdsprachen sind jedes Mal auch das Neue, das man oft erst im späteren Alter mit Zeitgenuss lernen kann. Man hat in diesem Fall oft auch die Erfahrung im Erlernen der ersten Fremdsprache, was beim aktiveren Erwerb des zweiten Sprachsystems nicht ohne Bedeutung ist. Im älteren Alter hat man auch mehr Zeit und Lust, um früher erlernte Sprache aufzufrischen. Das Wissen über den Lern- und Denkprozess beim Erwerb der weiteren Fremdsprache gibt dem Senioren die Möglichkeit, zwei unterschiedliche Sprachsysteme zu vergleichen und in den Lernprozess das alles mit einzubringen, was man bei der Erlernung der ersten Fremdsprache erfahren hat. Das dritte Lebensalter hat in seinem Thesaurus auch alle außersprachlichen Mittel gespeichert, die den Erwerb einer Fremdsprache unterstützen können. Die Erlernung der Fremdsprachen im institutionellen Modus oder im individuellen Training sind die nächsten Fragen, die gestellt werden müssen. Dazu gehört auch das Problem der Anwendung von richtigen Methoden im Lehrprozess, damit das Fremdsprachenlernen effektiv wird. Zu berücksichtigen sind auch die biologischen Prozesse jedes Menschen, die bei der Erlernung einer Fremdsprache im dritten Lebensalter eine störende Rolle spielen, wie z.B. das Leistungsvermögen im Gedächtnisbereich, Nachahmungsfähigkeit oder Lautunterscheidung im phonetischen Bereich. Auch diesen Problemen wird das Referat gewidmet. Der unbestreitbare Mehrwert im Erwerb der Fremdsprachen im dritten Lebensalter sind die Verlängerung der mentalen Aktivität und die Lust, neue Aufgaben im sprachlichen Bereich zu lösen.
Aging processes at the biochemical level are always combined with occurrence of redox processes. Therefore there is a growing need in development of analytical methods for studying reactions combined with transfer of electrons. Most of electrochemical methods are based on studying the effect of scan rate (in cyclic voltammetry) or frequency (in square wave voltammetry, SWV).

Voltammetric methods for kinetic and mechanistic characterisation of electrode processes at a constant scan rate of the voltammetric experiment are particularly appealing due to their elegance and simplicity. Such methods provide an alternative root for studying electrode reactions, taking the advantage of the unique feature of electrode kinetics to be highly sensitive to the electrode potential. The aim of this study is to contribute in the methodological development of square wave voltammetry and to develop a variety of methodologies for mechanistic characterization and kinetic measurements of different electrode mechanisms.

In the present work I propose a novel approach in processing voltammetric data where the net SW response is actually combined with the potential separation between anodic (oxidation) and cathodic (reduction) components of the response and therefore the kinetics of electron transfer. Determined during a theoretical calculations dependencies for particular electrode reaction mechanism allow to characterize kinetics of such electrode process. The method requires measurement of the peak potential separation between the forward and backward components of the voltammetric response by varying the height of the potential pulses.

The proposed methodology was confirmed by kinetic measurements of the electrode reactions of adsorbed azobenzene and dissolved hexacyanoferrate at different electrodes.

The electrode kinetics can be easily measured by varying the SW amplitude only at a constant frequency of the potential modulation. The electrokinetic measurements at a constant scan rate seem to be a unique ability of SWV. The proposed methodology is valid for both electrode mechanisms of an immobilized and dissolved redox couple, implying that it could be easily extended to more complex electrode mechanisms. For the first time I propose a novel approach in presenting the voltammetric data, introducing the so called “potential-corrected SW voltammograms” which is expected to facilitate the mechanistic and kinetic analysis of electrode processes with SWV.
Silver Nanowires Array Electrodes for Reduction of Trichloromethane

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Halogenated organic compounds (HOCs) have been frequently used in industry and disposed into wastewater despite their toxicity and suspected mutagenicity. Due to HOCs refractoriness to typical oxidative water remediation techniques, they became one of the most problematic group of pollutants. Electrocatalytic reduction of HOCs was successfully employed in abatement of HOCs, however it occurs at very negative potentials in aprotic media, what is disadvantageous due to the high energy requirement. It also requires transfer of HOCs from aqueous media to aprotic media. To shift the reduction threshold to less negative potentials, electrode materials with enhanced electrocatalytic activity toward HOCs reduction (eg. silver) are intensively studied. It is surprising that Ag nanowire arrays have never been used for electrocatalytic reduction of HOCs directly in water.

Ag nanowire array electrodes should exhibit better electrocatalytic properties than bulk electrodes. Therefore, the aim of this research was to synthesize and investigate electrocatalytic reduction of chloroform directly in aqueous solutions on nanostructured Ag electrodes with different morphologies, and compare the obtained results with a silver bulk electrode.

The electrocatalytic measurements were performed by voltammetric techniques in various supporting electrolytes in order to select the optimum one. The two-step anodization process in oxalic acid (H\textsubscript{2}C\textsubscript{2}O\textsubscript{4}) was used in order to obtain highly ordered anodic aluminum oxide (AAO) membranes that served as templates for the synthesis of silver nanowire arrays. Chloroform was selected as model compound for HOCs reduction.

Electrocatalytic measurements proved, that Ag nanowire array electrodes possess not only better electrocatalytic properties toward reduction of chloroform directly in water in comparison with bulk silver electrode, but they shoved lower LOD and LOQ, also higher sensitivity. NaOH was the best supporting electrolyte, however KClO\textsubscript{4} can also be successfully employed as such.

In our research we have proven unique properties of the Ag nanowire array electrodes toward reduction of chloroform in water. Due to reduction potential threshold less negative than potential of water decomposition, our novel electrodes can be successfully used in future as sensors for chloroform in aqueous solutions. Due to the lower energy consumption requirement they can be also used in aprotic media for organic synthesis.
Removal of Estrogenic Compounds from Aqueous Environment Using Advanced Oxidation Processes

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Endocrine disrupting compounds (EDCs) are group of xenobiotics which interfere with endocrine system of living organisms leading to the changes in the reproductive and immune system, as well as tumors formation. The objects of this research were phenylphenols (ortho-, meta- and para-phenylphenol), which possess estrogenic and androgenic properties (disruption of both male and female endocrine system) [1], what classified them as EDCs. These compounds are used as a preservative agents in many branches of industry, therefore they are widespread in the environment, especially in the water environment [2-4].

The aim of this work was to investigate the degradation of phenylphenol isomers using ozonation and advanced oxidation processes in $\text{H}_2\text{O}_2$/UV and $\text{O}_3$/UV system. The kinetic parameters of individual degradation methods and influence of different reaction parameters on the phenylphenols decay rate were determined. An important steps of this research were identification of degradation products as well as determination the toxicity of reaction mixtures before and after degradation processes.

Experiments were performed in aqueous solution in two different experimental setups in homogenous and heterogeneous gas−liquid system for $\text{H}_2\text{O}_2$/UV and ozonation or $\text{O}_3$/UV process, respectively.

All of the tested degradation processes were effective and quick methods for phenylphenols removal from aquatic environment. However, the highest phenylphenols decay rate was obtained during advanced oxidation in $\text{H}_2\text{O}_2$/UV system. All of the tested degradation methods have reduced the toxicity of reaction solutions after 1h, and in case of ozonation and advanced oxidation in $\text{H}_2\text{O}_2$/UV in this period non-toxic solution were obtained. The main intermediates of phenylphenols transformation were dihydroxybiphenyl isomers and phenol.

References:
The Toxicity Assessment of Photochemical Decomposition of Hazardous Aqueous Contamination under Natural Sunlight

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It is well-established that aquatic wildlife in marine and freshwater is exposed to natural and synthetic Endocrine Disrupting Compounds (EDCs) which are able to interfere with the hormonal system, thus possibly causing adverse effects on the intact physiology of organisms. Generally, EDCs are present in water at low level concentration (from ppb to ppm) which makes their removal in conventional biological wastewater treatment plants inefficient. Although advanced oxidation processes (AOPs) have been shown to be effective, its application is limited by relatively high operational cost. To reduce the cost of energy consumed in the AOPs, widely available solar energy should be applied. Promising possibility of removing water pollutants using solar light is the photosensitized oxidation in which the main reactant, a very reactive species, molecular singlet oxygen is generated from oxygen in air.

The main goal of the presented study was to investigate the photochemical decomposition of benzylparaben as well as 2,4-dichlorophenol under simulated as well as natural sunlight from toxicity point of view.

Photosensitized oxidation process was carried out in homogenous and heterogeneous system (photosensitizer immobilized into chitosan carrier - Patent Applications P 414438, P 414810). V. fischeri luminescence inhibition was used to determine the changes of toxicity activity in mixture during simulated and natural irradiation. UHPLC Q–ToF hybrid mass spectrometer was used for the identification of transformation products.

The experiments with natural sunlight proved applicability of photosensitive chitosan for visible-light water pollutant degradation. The results of toxicity investigation show that using photosensitive chitosan for visible-light the toxicity of reaction mixture towards V. fischeri, is much lower. However, the EC$_{50}$ was found to increase over the irradiation time, this increase was not proportional to the transformation of the parent compounds.

Acknowledgement
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Spectroscopic and Calorimetric Studies of PAMAM G₄-NH₂ and G₄-OH Dendrimers as Carriers of 5-fluorouracil in Aqueous Solutions

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Aging is associated with different limitations among others cancer diseases. Many research centers have carried out studies on the use of macromolecular compounds as carriers oncological drug. One of potential groups of such compounds are polyamideamine (PAMAM) dendrimers. Thus, it is of significance to study the thermodynamic of interactions between a ligand (oncologic drug molecule) and a receptor (dendrimer macromolecule) as well as to determine equilibrium constants of the complexes formed in aqueous solutions.

The aim of our study is to assess the effect of cationic or neutral character of terminal groups of PAMAM G₄-NH₂ and G₄-OH dendrimers on the capability of their macromolecules to bond 5-fluorouracil, which is highly toxic antitumor drug often used in the therapy of malignant neoplasm of alimentary tract, breast, head and neck.

The equilibrium dialysis (Harvard Apparatus) of the mixtures of 5-fluorouracil and PAMAM G₄-NH₂ (G₄-OH) was carried out. The concentrations of the free ligand (f̂) as well as the intensity (b̂) of ligand attachment to dendrimer were used for calculating the number of active sites in dendrimer macromolecule and the binding constants. PAMAM G₄-NH₂ dendrimer bonds about \( n = 43 \pm 1 \) drug molecules. Some of them \( n_1 = 12 \pm 1 \) are bonded with equilibrium constant \( K_1 = 5600 \pm 6000 \), while the remaining ones are bonded with equilibrium constant \( K_2 = 154 \pm 37 \). Hydroxyl PAMAM G₄-OH dendrimer bonds \( n = 7 \pm 1 \) molecules of 5-fluorouracil with equilibrium constant \( K = 70 \pm 20 \).

Using the technique of calorimetric titration we measured also the enthalpograms of the direct interaction between the dendrimers and drug tested, which were described with the model of identical active sites in the macromolecule. These results confirm the exothermic and spontaneous character of bonding 5-fluorouracil to both dendrimers.

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Epinephrine Determination and a Study of its Oxidation Metabolism

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Epinephrine (EP) is a neurotransmitter and hormone involved in an enormous number of processes in living organisms, however its highly active oxidation metabolites can cause hard damages and lead to serious health consequences. Therefore, determination of adrenaline and understanding of its metabolism pathway are important for new drugs development and diagnosis of neurological disorders.

The current research concerns a relatively simple method of fabrication of Au nanotube array electrodes for the electrochemical determination of EP, which could be easily transfer to non-laboratory conditions. Also the epinephrine electrochemical metabolism pathway was investigated by ROXY™ EC System.

The linear sweep voltammetry (LSV) and differential pulse voltammetry (DPV) revealed a good linear response for determination of EP in the range of 60 – 1000 µM EP and 10 – 150 µM respectively. The proposed DPV method was successfully applied to the determination of EP in a pure solution or in the presence of ascorbic acid, and real samples. The DPV results were evaluated and compared with those obtained by the high-performance liquid chromatography (HPLC) method. The limit of detection was estimated to be 6.68 µM, 2.84 µM, and 0.83 µM for LSV, DPV and HPLC methods, respectively. A coupling of the ROXY™ EC System with mass spectrometry creates an analytical tool for studying of oxidative products of EP and conjugation of EP reactive metabolites characterized for I (pure EP) and II stages (after GSH addition) of biotransformation. The presence of leucoadrenochrome-o-semiquinone radicals, confirmed by mass spectrometry, implies that the ECE (electron transfer - chemical reaction - electron transfer) mechanism of EP oxidation at the nanostructured Au electrode is more feasible.

The results of EP determination by the electrochemical method compared with that obtained with the use of HPLC, showed that the ordered Au nanotube array electrode can be used as a sensitive and selective sensor, even for a real system. The innovative ROXY™ system provides the results which confirmed the ECE mechanism of EP electrochemical oxidation.
Optimization of Electrochemical Oxidation of Tin in Basic Electrolyte

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Recently, a simple procedure of electrochemical oxidation (anodization) of metals is widely used as an easy method for fabrication of nanoporous metal oxides, such as Al₂O₃, TiO₂, WO₃, ZrO₂ etc. Moreover, anodic oxidation of tin in acidic or alkaline electrolytes under appropriate conditions can also result in formation of nanoporous layer of tin oxide (SnOₓ) [1]. It is widely recognized that that the homogeneity of metal surface can have a significant impact on the morphology of as grown anodic oxides [2,3]. Up to now, in most cases mechanical polishing of Sn substrate has been employed to improve the homogeneity of the metal surface before anodization. On the other hand, it is well known that chemical and electrochemical polishing can also cause the significant decrease in surface roughness, however, the optimization of the method for effective electropolishing of Sn is quite difficult. Now we present the results for the anodization of tin in alkaline electrolyte. We obtained the impact of polishing tin on the structure of tin oxide anode. Best optimal results were obtained for electropolishing and this material was used for further research. The focus is on selecting the electrolyte concentration, anodization time and value of potential.

References

Behavior of zircon in the alkali alumosilicate melt was studied experimentally. The initial mixtures were composed of SiO$_2$ (66-71%), Al$_2$O$_3$ (15-20%), Li$_2$O (2-4%), ZrO$_2$ (1-2.5%), TiO$_2$ (1.7-2%). Melting was conducted at temperature of 1650°C during 4 hours. Graphite crucibles were used as heating elements that provided reducing conditions. Electron microscopic study revealed partial melting of marginal parts of zircon followed by formation of sponged edges decorated by baddeleyite (ZrO$_2$) and ZrTiO$_4$ microcrystals. In our experiment, the melt was under the line of ZrTiO$_4$ - ZrO$_2$ buffer in the baddeleyite stability field. This caused desilication of zircon and crystallization of baddeleyite in Zr-saturated melt.

Similar baddeleyite-enriched fringing zones around zircon crystals were found in kimberlites. Based on the new experimental data, formation of such structures may be explained by incomplete reaction ZrSiO$_4$ $\rightarrow$ ZrO$_2$ + SiO$_2$ in kimberlitic magma at ca. 1200-1400°C and $a_{\text{SO}_2} = -0.35$ during fast decompression and eruption. This process was “frozen” by the rapid cooling of kimberlites at the Earth surface.
Interferometric Test of Possible Damage of a Hydrogel Dressing by Irradiation from a Therapeutic Laser

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Hydrogel dressings are commonly used with treatment of wounds. Two of the authors (KW and EK) proposed to use it during laser surgery of the skin or closely below the skin.

In order to study the changes of a hydrogel dressing (Kikgel HydroAid) \cite{1} caused by the laser irradiation we (FM and ES) proposed a non-destructive optical interferometric method. We (PŁ, AŻ and FM) designed and built an optical set-up using a Mach-Zehnder interferometer with a He-Ne laser as light source. Using this set-up we measured the effect on the hydrogel caused by the irradiation from the therapeutic lasers Fotona Dualis SP (Nd: YAG and Er: YAG) and QX Max (Nd: YAG). We studied the effect of the wavelength and the fluency as well as the time duration and the repetition frequency of the laser pulses. We found that a nanosecond pulse at wavelength 532 nm or 1064 nm did not change the hydrogel. A millisecond pulse at these wavelengths changed temporarily the structure of the gel, but the gel gradually relaxed to its original state. When illuminated with a beam from a therapeutic Er:YAG-laser at 2936 nm the gel was degraded strongly after already one pulse. We found furthermore that the structure of the gel did not change over a time interval of 30 minutes (the maximum duration of therapeutic use), when not illuminated by a therapeutic laser.

Our results show that this hydrogel dressing can be used during laser surgery when using the appropriate laser.

\cite{1} http://kikgel.com.pl
Preparation of Silver/Saponite Nanocomposites

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Synthesis of metal nanoparticles (NPs) on solid supports such as natural clays is a suitable way to prepare practically applicable supported particles as well as to control the particle size. Silver nanocomposites are used for many industrial applications, such as antimicrobial agents, cosmetic additives, biosensor materials and electronic components. The aim of this study was to prepare a silver nanocomposite consisting of silver NPs deposited on an inorganic carrier. For this purpose, silver ions were adsorbed on saponite clay. A saponite-rich clay sample from the Tashkiv deposit (Khmelnitsky region), Ukraine was used for the preparation of silver/saponite nanocomposites by adsorption method. AgNO\textsubscript{3} was used as silver precursor. The sample was fractionated to <2μm particle size obtained by careful aqueous decantation of the raw saponite material.

Particle morphology and elemental content of obtained samples was characterized by Transmission Electron Microscopy (TEM), scanning electron microscopy and energy dispersive spectroscopy (SEM–EDS). Intercalation of Ag\textsuperscript{+} into mineral was observed using X-ray diffraction (XRD). An atomic absorption spectrometry was used for the determination of silver in the filtrates using a standardized method. The effects of pH, adsorption time and silver ion concentration on the adsorption process were examined.

In adsorption studies, residual silver ions concentration reached equilibrium in a short duration of 90 min. The optimum pH for adsorption was found to be 4-8. The adsorption of silver onto saponite increased with increase of the Ag\textsuperscript{+} initial concentration in water solutions. A maximum adsorption capacity of saponite under experiment conditions (initial concentration of silver 2000 mg/l) was determined as 291mg/g that was approved by TEM and SEM–EDS analyses of samples. Microscopy study shows homogeny distribution of metal silver of regular spherical forms. The size ranging of silver particles was estimated and variable from 1 nm to 30 nm. The metal AgNPs are assumed to be located at the layer surface and crystal edges of saponite.

Synthesis of silver/saponite composite with homogenous distribution of AgNPs in the mineral structure can be achieved by silver nitrate adsorption from water solution without using chemical reducers.

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Our research is focused on preparation of active and durable materials for widespread implementation in clean energy applications. This includes harnessing the chemical energy via direct electrochemical conversion particularly in fuel cells and energy storage via both electrochemical batteries and capacitors. Recently different carbon materials were successfully used in this variety of energy related applications due to their unique and desirable properties. Additionally, doping of the carbon with earth-abundant elements (metals or non-metals) greatly improves functional properties of carbons by changing the spin and charge densities in their electronic structure and formation of new active centers. Even more stunning results can be achieved by co-doping of the carbons with two or more elements, which is distinctly demonstrated in the relation to ORR and HER catalytic activity.

For preparation of the doped carbons we use a heat-treating of the different precursors of C, N, S, B, and transition metals at 800–900 °C. Particularly, N-doped carbons were obtained by heating a mixture of preliminarily prepared carbons with urea or melamine at 900 °C. In order to increase nitrogen inclusion the initial carbons were previously oxidized with HNO₃. B-containing carbons were prepared by heating the mixture of sucrose and H₃BO₃ at 900 °C with subsequent boiling and rinsing to remove the H₃BO₃ excess. A range of materials simultaneously modified with N, S and transition metals was obtained by heating the N,S-containing synthetic fulvic acid, preliminarily precipitated by corresponding metal, to 700–900 °C in H₂ atmosphere.

Synthesized N-containing carbons are characterized by homogenous meso- (V=1.00 cm³/g, D=3.5 nm) and microporous (V up to 0.26 cm³/g, D=0.5 nm) structure and additionally show a good interfacial capacitance (0.21 F/m²) and charge-discharge durability (100 cycles). The B-doped carbons with a high spatial ordering, developed surface (up to 870 m²/g) and porosity (up to 1.2 cm³/g) possess an interfacial capacitance up to 0.36 F/m², which provides their use as materials for supercapacitors. The N,S-doped carbons with transition metals exhibits enhanced activity towards the ORR and HER, sometimes comparable to Pt/C depending on the included metal or metal combination, which allows using it as Pt-free catalysts.

Thus, by doping the porous carbons with a range of earth-abundant elements we prepared materials with enhanced electrochemical properties.
Thermomechanical Investigation of Gum Metal – a New Innovative Titanium Alloy for Biomedical Applications

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Bioengineering is a rapidly developing area of technology embracing: tissue engineering, diagnostic and special therapy equipment, prosthetics etc. The area is multidisciplinary and includes: mechatronics, biology, chemistry and materials science. In particular new materials need to meet specific requirements among many: biocompatibility, mechanical criteria and high reliability. Titanium alloys are well known for their excellent biological and mechanical performance when applied to biomedical devices. One of them called Gum Metal is a new β-type Ti alloy developed in Japan in the 21\textsuperscript{st} century offering outstanding properties. It combines high elasticity and flexibility of rubber (Young’s Modulus $E \approx 70$ GPa) with strength of metal (Ultimate Tensile Strength $UTS \approx 1100$ MPa), as well as biocompatibility of pure α-type Ti, making it a good candidate for biomedical applications. Gum Metal is fundamentally composed of $\text{Ti}_3 (\text{Ta, Nb, V}) + (\text{Zr, Hf, O})$. The alloy is fabricated by powder sintering technique and processed by cold rolling.

The presented research aims at Gum Metal thermomechanical characterization, since the temperature changes observed during the alloy deformation serve to describe precisely its elasto-plastic behavior and to learn more about still unknown deformation mechanisms. To this end, a specially designed experimental set-up combining a testing machine with an infrared measurement system was used. Since fatigue performance is critical for implants functionality, cyclic loading tests of Gum Metal were performed at various strain rates. A number of cycles till rupture was determined. Typical tension loadings were also realized. Strain-stress curves indicating non-linear elasticity of the alloy were plotted. The accompanying temperature changes were registered and the elasto-plastic regimes were determined. Thermograms, showing temperature distribution of the Gum Metal specimens were analyzed in order to identify localization, necking and rupture phenomena. The mechanical properties and temperature changes in both cyclic and classical loading tests till rupture were compared. The results showed good performance for biomedical applications. Corrosion resistance, wider fatigue analysis as well as surface treatments and osseointegration will be topics of interest for further investigation.
Random Forest for Crack Identification in Beams on Pasternak Foundation

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In this work, location identification of open cracks in the isotropic homogeneous beam resting on the Pasternak elastic foundation has been investigated.

The characteristic parameter of the crack can be calculated using various numerical solutions. A large number of the solutions are based on mesh methods, such as the finite element method, the finite difference method, the spectral finite element method, etc. Such methods have some deficiencies related to the mesh definition, calculation and computer storage.

The aim of this paper is to focus on more time-efficient and less computationally intensive mesh-free method. In particular, the random forest (RF) is a decision-tree-based method, which was conceived as a simple and accurate method of classification and regression in 2001. Due to its youth, the RF has been adopted only to the researches connected to data mining, image analysis and applied statistics.

In this work, the RF has been applied to location prediction of two open cracks occurring in the clamped beam resting on the Pasternak foundation ($G_1=10$, $G_2=2.5*\pi^2$). The depth of the cracks was equal to $2/10$ of the beam height. The ratio of the height of the beam to the length was $1/10$.

The RF was trained twice using two datasets. The first one was based on first five natural frequencies, the second one was based on Haar wavelet transform of the first mode shape into 32 coefficients. In both datasets there were 130 training patterns and 15 test patterns; the test patterns were not shown to the RF in advance.

To find the best values for the number of trees in the ensemble and the number of the predictors at nodes, the parameters were optimized using the root mean square error and the out-of-bag estimation. The accuracy of predictions was estimated by the relative error and the mean square error (MSE). Each case was tested 100 times.

The results showed that the RF predicted the location of two cracks in the beam quite accurately if the RF was trained using 32 coefficients. An average error of the predictions was 10 percent. In the case of the dataset based on five natural frequencies, an average error was 30 percent. The accuracy reduced because a decreased number of predictor variables in the training pattern correlated the trees in the RF.
An ongoing increase in the civilization related consumer goods consumption has led to the emergence of a new group of problems connected with the production of environmentally friendly engineering materials and management of post-consumer wastes. Biodegradable polymers, such as: poly(lactic acid) (PLA), poly (hydroxybutyric acid) (PHB), cellulose, starch and lignin, have been used to produce eco-friendly products in recent years. PLA is the most popular biopolymer synthesized from materials obtained from renewable sources. This polymer has a wide range of applications from disposable materials for packaging to semi-permanent materials. In order to obtain more durable materials, it is necessary to introduce reinforcement to the polymer matrix. Therefore, in the course of this study, PLA composites reinforced with basalt fiber were produced. Basalt fibers are manufactured from volcanic rock without additives, which allows for lower energy consumption and price of their production. Moreover, compared to glass fibers, basalt fibers have better mechanical strength and thermal stability.

The aim of this study was to verify the influence of the compression molding temperature on the composites' thermomechanical properties. The temperature of the compression molding was at 170°C, 180°C, 190°C and 200°C. Poly(lactic acid) (PLA) type 4043 D supplied by Nature Works (USA) was used as a matrix. Basalt fiber woven fabric (BF) type BAS 115.1270.P with 115 g/m² (BASALTEX) was applied as reinforcement. Composites molded at a higher temperature were characterized by higher values of storage modulus $G'$ determined by dynamic-mechanical thermal analysis. It is noteworthy that different molding temperatures did not affect thermal stability of the composites studied by thermogravimetric method. To conclude, in the era of global changes of natural environment, design and investigation into new material solutions have become one of the most important tasks for scientists.
Nanoporous Titanium Oxide Layers as a Potential Implant Material

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Their lack of ability of titanium and its alloys to bond chemically to the bones often results in post-operative infections. One of the solutions is anodization of titanium resulting in a bioactive and nanoporous titanium dioxide layer. The aim of the research was to examine the impact of the anodization conditions on the drug release profiles and the apatite-forming abilities of ATO layers. The possibility to coat the layers with chitosan was analyzed.

Nanoporous TiO₂ layers were obtained via a three-step anodization process in an ethylene glycol electrolyte containing NH₄F and H₂O. The duration of the last step was: 10, 5 and 2 min in order to obtain the different thicknesses of nanoporous layers. In order to obtain the anatase and a mixture of anatase and rutile phases, the amorphous TiO₂ layers were annealed at 400 and 600°C, respectively. Two drugs, ibuprofen and gentamicin, were loaded according to three different loading procedures. The release studies were carried out in a phosphate buffer solution at 37°C. The drug concentration was determined using UV-Vis spectrophotometry. The desorption-desorption-diffusion (DDD) model of the drug release was fitted to the resulting profiles. In order to examine the apatite-forming abilities of ATO layers, the samples were immersed in the stimulated body fluid (SBF) for the appropriate time. To coat nanoporous TiO₂ layers with chitosan, a dip-coating method was applied. The structural characterizations of modified ATO layers were performed using a field emission scanning electron microscope.

The results indicate that the crystalline structure and the thickness of nanoporous TiO₂ layers have a significant impact on the drug release profiles. Gentamicin is released faster than ibuprofen. It is noticed that annealed samples possess better apatite-forming abilities than amorphous ATO layers. The FE-SEM images show that the dip-coating method allows to coat samples with chitosan. To conclude, it is evident from this study that nanoporous anodic TiO₂ layers can be used as an implant material.

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Alloyed Semiconductor Quantum Dots as Promising Materials for the Biomedical Applications

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Colloidal semiconductor quantum dots (QDs) have generated tremendous interest due to their unique optical properties that enable effective their applications as biomarkers, solar cells, solid-state lighting etc. Despite presence of the toxic elements in them - Hg-alloyed CdTe QDs with emission in the near-infrared spectral region (800-1500 nm) are particularly needed for the biomedical applications such as in vivo and in vitro imaging (e.g. cancer imaging, fluorescence imaging of deep organs and tissues).

The intracellular releases of toxic ions caused by degradation of QDs may have toxic effect on the cells that are in contact with them. On the other hand, QDs could accumulate within the body for very long periods. In addition, the QDs of small size (less than 5 nm) could be easily removed from the body.

The aim of our study was to develop a synthesis of ultrasmall Cd\textsubscript{1-x}Hg\textsubscript{x}Te QDs with the emission in the near-infrared spectral region, and to determine range of their Red-Ox stability. The series of thioglycolic acid-stabilized colloidal Cd\textsubscript{1-x}Hg\textsubscript{x}Te QDs (d \approx 2.3 nm) with different Hg\textsuperscript{2+} content was synthesized in water solution by the two-step ion-exchange method.

The resulting CdTe and Cd\textsubscript{1-x}Hg\textsubscript{x}Te QDs were characterized using UV-vis absorption and photoluminescence (PL) spectroscopy, cyclic voltammetry (CV) and scanning transmission electron microscopy (STEM). We observed bathochromic shift of the PL peaks from 580-590 nm to the 700-1000 nm range as the result of the Hg-alloying with CdTe QDs. The absorption maximum also shifts to the longer wavelengths and becomes less pronounced. The influence of the Hg\textsuperscript{2+}- alloying in the CdTe QDs band gap changes and the range of reduction and oxidative stability of such particles were determined by the cyclic voltammetry measurements.
Electrochemical Preparation and Properties of Multilayer N-graphene

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The unique properties of graphene and broad prospects of its application cause necessity of the development of effective methods for producing such material, in particular electrochemical methods, considered among the most promising, as they allow relatively easy to obtain this material in sufficient quantities and what is the most interesting - with controlled properties. Considerable attention is also attracted to graphene, modified by different heteroatoms, especially by nitrogen (N-graphene). The last is able to possess some properties that are not inherent to unmodified graphene. Therefore, the development of different approaches, including electrochemical, for obtaining N-graphene is topical.

The aim of the present work was to clarify the possibility of electrochemical N-graphene obtaining via exfoliation of graphite in presence of azide anions in a pulse-mode of electrolysis in one step. Successful implementation of proposed approach was shown. The resulting material was appeared to be multilayer N-graphene packages (up to 10 individual layers) with a low oxidation degree, that was proved by means of several physicochemical methods (FTIR, UV-vis, Raman spectroscopy; TEM and AFM; cyclic voltammetry etc.). In particular, functionalization of obtained material by N atoms was confirmed by FTIR (presence of the absorption band at 1164 cm$^{-1}$ $\nu_{\text{C-N}}$), C, H, N-analysis (nitrogen content ~ 0.6%) and cyclic voltammetry - higher electrocatalytic activity in the oxygen reduction reaction, which is realized on one of electrodes in fuel cells, compared to graphene materials that do not contain nitrogen atoms in its structure. In addition resulting N-graphene proved to be electrochemically active toward oxidation of such important biomarkers as ascorbic acid and dopamine, so it can be considered as a promising candidate for the usage (both individually and as component of the composites) in electroanalysis of mentioned substrates in biological liquids, that can help in the fight against such illnesses as Parkinson’s disease.
People Protection from Microwaves Using Graphite-Carbon-Polymer Composites

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The wide application of devices that use high-frequency electronics, leads to increasing the total electromagnetic pollution not only in production and research, but also in residential premises. It stimulates protective measures that weaken the harmful effects of electromagnetic radiation (EMR).

The task can be solved by using some materials which are able to interact actively with EMR due to their reflection or absorption of electromagnetic energy in order to provide a safe EMR intensity.

The main purposes of this work were creation of electro conductive polymer systems with quite high content of conductive agents; studying influence of these conductive agents on the electrical characteristics of the systems, exploring the electromagnetic parameters of plane samples of materials that actively interact with electromagnetic radiation in the frequency range from 17 to 27 GHz which is important for some practical applications. Such form of samples selected in terms of ease technology of preparation as screens for using in areas to protect people from EMR.

The nondestructive methods, including 4-electrode method of measuring the resistivity and horn antennas - to measure the electromagnetic losses in the composite, were used for investigation the properties of materials.

The proposed composite material has the resistivity of the conductive coating in the range of 0.4 - 7.5 Ohm·cm and, in addition, has the following advantages: screening effect which is not less than 99.5% (Fig. 1) in the operating frequency range; good adhesion to a wide range of materials (plastics, ceramics, leather, metal, glass, paper); - corrosion protection.
Closed Cycle for Environmental Protection in Thermal Power Plants – CO$_2$ Capture by Fly Ash Zeolites

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The consumption of electricity and thermal energy is permanently increasing worldwide as the expected growth between 2010 and 2040 is 56%. Still the coal combusting thermal power plants (TPP) are the major producer of energy. The main disadvantage of the coal incineration systems is the obtaining of numerous by-products, which can cause trans-boundary pollution. These pollutants are solids, so called fly ash (FA), and in gaseous phase- SO$_x$, NO$_x$, and CO$_x$. Carbon dioxide (CO$_2$) belongs to the group of greenhouse gases, and it is considered that CO$_2$ causes 55% of the global warming. Our investigation program is devoted to the realization of closed-cycle for environmental protection in TPP by the conversion of lignite coal fly ash into synthetic zeolites and their applications in the flue gas cleaning systems.

Zeolitization of lignite coal FA obtained from two Bulgarian TPPs from the complex “Maritza East” was carried out by two-stage fusion-hydrothermal syntheses with sodium hydroxide as an alkaline activator. Zeolites with a dominant NaX phase were obtained under the following conditions: fusion at 550°C, hydrothermal treatment at 90°C for 2 h, and FA/NaOH ratio of 2.0. Detailed information for FA composition, mechanisms of zeolitization, and structural, morphological and surface studies of synthesized materials was previously published.

In this study the obtained FA NaX zeolites were investigated about their potential application as adsorbents of CO$_2$. Isotherms of CO$_2$ adsorption onto FA zeolites were measured using a gas adsorption analyzer TriStar 3020, Micromeritics. The experiments were performed at 273 K in a pressure range of 35-105 kPa with 5N CO$_2$. The obtained results indicate a strong dependence between surface areas ($S_{\text{BET}}$) of FA zeolites and their adsorption potential. The NaX zeolite with $S_{\text{BET}} = 176.17$ m$^2$/g obtained from FA collected by the electrostatic precipitators of TPP “Maritza East 2” reaches adsorption capacity of 58.52 mgCO$_2$/g at atmospheric pressure, while that from TPP “AES Galabovo” with $S_{\text{BET}} = 387.75$ m$^2$/g adsorbs 136.4 mgCO$_2$/g. The FA NaX adsorption capacities are comparable to that of the commercial 13X zeolite (200 mgCO$_2$/g).

This approach proposes closed-cycle for environmental protection in coal supplied TPP by solid waste utilization simultaneously with production of effective low-cost adsorbents of greenhouse gases.
Determination of the Correlation Between the Electrical Parameters of Organic Solar Cells and Photogeneration Quantum Yield of Charge Carriers

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The fundamental principle of solar cell is to convert the solar energy into electric one (process known as a photovoltaic effect). Electrical parameters of organic photovoltaics, as well as life time, do not equal to those of inorganic cells. However they possess certain unique and propitious properties (e.g. flexibility, very low thickness and lightweight; low consumption of materials and energy; low-cost production techniques) and relatively good performance under low and diffuse light (e.g. indoor illumination).

The aim of the project was to determine a correlation between the photogeneration quantum yield in the active layers and the electrical parameters of organic solar cells made of the hole transporting polymer matrix (poly(3-hexylthiophene-2,5-diyl) (P3HT)) doped with a low molecular weight dopant (phenyl-C61-butyric acid methyl ester (PCBM)) which exhibits an electron conductivity.

Photogeneration quantum yield was derived from the surface potential decays measured for thin organic films drop-casted on the metal substrate (samples with only one electrode) by the unique xerographic discharge method. Electrical properties of organic photovoltaics (devices with two electrodes) were defined based on the current-voltage characteristics. Photovoltaic devices were illuminated with a light from the LOT Oriel solar simulator.

It has been shown that PCBM exhibits high photoconductivity, which can significantly affect the photovoltaic effect observed in the organic solar cells. Moreover weak corona charging of the P3HT layer related to a high mobility and fast transport of charge carriers in the material was noted.

These results allow to understand the mechanisms responsible for photogeneration of charge carriers in semiconductor’s layer. It will also enable the selection of proper materials for fabrication of organic solar cells.

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Dark Energy – the Key to the Longevity of the Universe

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Abstract

Dark energy (DE) is a proposed form of energy, explaining two phenomena of observational cosmology: lacking mass and accelerated expansion of the Universe. The density of DE is one of the key parameters determining the longevity of the Universe. According to contemporary estimations, DE is the dominant component of the total energy of the Universe. The predominant concept explaining the origin of DE is to link it with the energy of quantum vacuum (VE). First computations of density of VE by methods of QFT diverged with the results of the observations to really tremendous extent. Newer concepts are still facing serious mathematical problems both computational, as well as of more fundamental nature. Observational reasons, properties of DE and the (in)famous historical dead end will be presented.

The overall objective of this study was to explore DE in our Universe, understood as the VE linked with the curvature of the spacetime. Investigation and discussion of this issue consists of inter alia:
- The theoretical justification for calculation of the VE with the relative formulas.
- Rigorous functional integration in Hilbert space over a curved manifold according to metric of the physical spacetime.
- Demonstration of method of relative invariants, as proposal on how to overcome the difficulties associated with the continuous spectrum of the operators.
- Finding the correct expression for the relative functional trace taking into account the different nature of the Hilbert space over the physical spacetime and flat manifold of reference.

The methods of analysis on manifolds, spectral theory, GTR and QFT has been used, with particular emphasis on Schwinger proper time formalism, method of heat-kernel and relative invariants by Muller. Calculations has been performed rigorously as far as possible without recalling additional conditions of non-geometric origin and avoiding ad hoc renormalization.
Developing Mathematical Models for Speech Sounds

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Speech is the most natural way of human communication. At least half of a century researchers and engineers are trying to automate speech recognition and synthesis. There exist two main speech synthesizing methodologies: concatenation synthesis and formant synthesis. Concatenation synthesis relies on a speech sound recorded in advanced database, meanwhile formant synthesis – on mathematical sound models. Formant synthesizers have advantages against the concatenative ones. The speech produced by them can be sufficiently intelligible even at high speed. They can control prosody aspects of the synthesized speech. The main drawback of formant synthesis is that the sounds obtained by this synthesis type sound unnaturally, robot-like. In order to reduce synthetic sounding, it is necessary to develop new mathematical models for speech sounds, which could be used as a base of a speech synthesizer.

The research object is vowel, semivowel and consonant phonemes. The goal of the research is to develop mathematical models of those phonemes, which could be used as a base of a speech synthesizer.

In order to achieve the aim, the following tasks are stated: to analyse main characteristics of speech sounds; to ascertain what models are suited best for speech sound description; to develop mathematical models of speech phonemes.

In this research, a new approach for additive sound synthesis that can be treated as a combination of additive synthesis and a source-filter model in order to make the results less synthetic than by additive synthesis alone is proposed. Using this approach the sound synthesis is carried out by adding the components. Each component is determined by the frequency of the signal harmonic and is modelled as the output of a single-input and single-output system. The proposed approach has several original contributions. First, not a pure harmonic but the harmonic along with inharmonics is modelled. Second, a specific model is used for each component of the additive synthesis. Third, the inputs of this system are periodic pulses with time varying amplitudes and slightly varying periods. These variations allow us to obtain the tremolo and vibrato effects.

The models of all the vowels and semivowels of Lithuanian speech have been created. Now the main attention is given to consonants. In order to achieve accurate modelling, the synthesized sounds have been audio tested, and the Fourier transforms of the real data and output of the MISO model have been compared. It was impossible to distinguish between the real and simulated data. The magnitude and phase responses have only shown small differences. The practical results have shown that the synthesized sounds obtained by this method are sufficiently natural, and sound pleasantly.

The proposed phoneme models can be used for developing a speech synthesizer. Those models can also be adapted to other similar problems, for example, treating language disorders, helping with pronunciation and learning of foreign languages.

The advantage of my developed phoneme modelling framework is that anyone can use it and it can synthesize any phoneme of vowels and semivowels for any speaker.
The Comparison of Exoskeleton’s Control Algorithms on the Example of an Elbow Joint

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Since the beginning of the ongoing decade, exoskeletons have gained real-life applications in industry, rehabilitation of elder and disabled people, and military. It became possible because of the recent development in robotics. BLDC motors offer high power-to-weight ratio as well the price of dedicated drivers has lowered. Light construction materials became more available. Arguably, the most important shift occurred in the field of sensors and control. High resolution signals can be obtained using strain-gauge sensors or electronic accelerometers and gyroscopes, processed by DSP units, and used in advanced control algorithms, all of this in a relatively low cost system.

A design of control algorithms for exoskeleton with one actuated DOF is considered in this paper. Different kinds of exoskeletons are presented, regarding the principle of operation: passive and active rehabilitation, augmenting strength of disabled person, augmenting strength of healthy person. For each of them, different methods of control are proposed, including usage of electromyography (EMG) and force sensing. Certain methods were tested and compared.

The algorithms were optimized and tested using a custom-made exoskeleton of an elbow joint. The device is actuated by a DC motor with a belt transmission. Main sensors are an EMG of triceps and biceps and a strain-gauge force sensor. Additionally, the drive unit contains an encoder and a current sensor. The device is controlled by Atmel ARM. The algorithms were compared with regards to efficiency in decreasing biological energy consumption while performing physical tasks. The consumption was estimated as follows: for regulators using force sensor as the time-integral of EMG signal; for regulators using EMG as the time-integral of force sensor signal. Results were normalized using force-to-EMG factor, acquired experimentally.

For augmenting strength of a disabled person, the best method was controlling the voltage on the motor by the conditioned EMG signal through a PID regulator. For augmenting strength of a healthy person, the best method was controlling the voltage on the motor by the force sensor signal through a PID regulator.

Control systems in exoskeletons designed for healthy people can be based on force sensors, as they are more reliable and often less expensive than EMG. When developing the control algorithm, it might be a good principle to look for solutions that are less accurate, but more efficient in terms of computing power.
Identification of Functional Interdependence Between SWI/SNF Dependent Chromatin Remodeling and Pre-mRNA Splicing in Arabidopsis

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SWI/SNF type chromatin remodeling complexes (CRCs) are evolutionarily conserved multiprotein machineries controlling DNA accessibility by regulating chromatin structure. The core of Arabidopsis SWI/SNF complex contains one of the four ATPases (BRM, SYD, CHR12, CHR23), two of the four SWI3 type proteins (SWI3A, SWI3B, SWI3C, SWI3D) and one SNF5 type protein (BSH). SWI/SNF CRCs play an important role in the regulation of transcription, cell cycle and DNA replication. Moreover, recent data indicate that the SWI/SNF complex is likely involved in the regulation of pre-mRNA splicing in humans, \textit{Drosophila} and yeast. In eukaryotes, intron sequences from pre-mRNAs transcribed by RNA polymerase II are removed by the spliceosome to produce mature mRNAs. The spliceosome is composed of small nuclear snRNAs and associated proteins. Catalytic activation of the spliceosome is critically dependent on its association with the evolutionary conserved NineTeen Complex (NTC), which among others carries the core PRP19A/B, CDC5 and SPF27 subunits. The aim of our study is to identify a regulatory link between chromatin remodeling and pre-mRNA splicing in Arabidopsis. According to the STRING protein-protein interaction database, several subunits of the SWI/SNF complex interact with components of the NTC. To confirm the conservation of these protein interactions in Arabidopsis, we performed yeast two-hybrid (YTH) interaction studies. In addition, using combinations of existing T-DNA insertion mutations, we identified epistatic genetic interactions between SWI/SNF and NTC, which provide evidence for functional interdependence between chromatin remodeling and pre-mRNA splicing mechanisms in Arabidopsis.

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Arabidopsis SWI/SNF Chromatin Remodeling Complexes Play a Crucial Role in Cold Response

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SWI/SNF chromatin remodeling complexes (CRCs) play important roles in the regulation of transcription, DNA replication, cell cycle, hormone signaling etc., in eukaryotes. The core SWI/SNF CRC formed by a SWI2/SNF2 type ATPase, SNF5 and two copies of SWI3 subunits is sufficient for execution of nucleosome remodeling \textit{in vitro}. Characterization of mutations in genes encoding SWI/SNF core subunits revealed their important roles in the regulation of plant development, responses to environmental factors and control of hormone biosynthesis and signaling pathways. In addition, we found that Arabidopsis SWI/SNF CRCs modulate plant responses to temperature changes. By studying the role of SWI/SNF CRCs in cold response, we observed that low temperature treatment enhances the pollen production, germination and seed production of the Arabidopsis \textit{swi3c} mutant, which lacks a core SWI/SNF subunit and shows largely impaired fertility under normal growth conditions. Subsequently, we identified ICE1, a key transcriptional activator of cold-induced genes, as interacting partner of SWI/SNF CRC. We found that SWI/SNF CRC directly controls the nucleosomal structure and thereby expression of cold-responsive \textit{ICE1}, \textit{MYB15} and \textit{CBF1} genes. Our data demonstrate that positioning of SWI3C-containing SWI/SNF CRC on these target genes depends on the temperature conditions. Furthermore, genetic analysis of \textit{swi3c/ice1}, \textit{swi3c/myb15} and \textit{swi3c/cbf1} double mutants indicate that \textit{SWI3C}, \textit{MYB15} and \textit{CBF1} cooperatively control the expression of cold-regulated genes in plants growing under different temperature conditions. Based on these results, we propose a working model outlining how SWI/SNF modulates the transcription of cold responsive genes and thereby growth adaptation to cold stress in \textit{Arabidopsis thaliana}.

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Study of Protein-Ligand Interactions for Molecular Medical Diagnosis by Means of Atomic Force Spectroscopy

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Specific protein-ligand interactions play a crucial role in various aspects of life, for instance, they are mediators in cell’s communication processes with surrounding environment. They can also reflect the inner condition of a cell, including cancer changes in the early stage of the mutation, which can be used in medical diagnosis at the single cell level. The aim of this study was to present a method of analysis which allows to characterize the specific protein-ligand interactions quantitatively at the single-molecular level. The atomic force microscopy (AFM) was used, since it enables the detection of intermolecular forces in range of pN. The AFM tip as well as a substrate had to be functionalized with proteins and their ligands, respectively. Dynamic force spectroscopy (DFS) experiments, i.e. the measurements of force-distance curves in a function of the separation rate, were performed. For each loading rate, unbinding force histograms were fitted with a log-normal distribution function and the most probable unbinding forces were extracted. Finally, the dependence of the specific adhesion force on the loading rate was obtained and analyzed with theoretical models of thermally activated unbinding \cite{1,2}. Two kinds of protein-ligand pairs were studied: concanavalin A - carboxypeptidase Y and syndecans-monoclonal antibodies. The former pair was studied to compare our results with literature data \cite{3} and demonstrate the advantages of the proposed by us method of analysis in comparison to a standard approach. The latter pair was chosen to show the ability of the method to selective detection of individual cancer cells in the early stage of the mutation.


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N-Homocysteinylation as a Damage Factor of Structure and Functions of Keratins – a Potential Relationship with Aging

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High level of total homocysteine (Hcy) in plasma is considered to be an independent risk factor of civilization diseases such as cardiovascular and neurodegenerative diseases. One of hypothesis pointing of pathological effect of Hcy is a trail leading to the incorporation of Hcy in protein structure. Homocysteinylation reaction alters physicochemical and pathophysiological properties of proteins and leads to cells apoptosis. In this case protein homocysteinylation is involved in process of body aging. The aspects of aging process have been studied on hair keratins which are a great example of long-term proteins.

The main aim of the project was to test the hypothesis concerning impact of protein homocysteinylation on alter of keratins properties and functions, hair structure damage and aging process.

The hypothesis was tested utilizing the following research plan: (a) identification of factors causing keratins homocysteinylation in vitro; (b) determination of factors causing keratins homocysteinylation in vivo; (c) determination of effect of hair life time on the content of Hcy in hair keratins. Estimation of Hcy concentration in hair keratins and in urine has been achieved by methods developed in our laboratory and based on HPLC technique with fluorescence detection and on-column derivatization.

We assayed hair keratins samples donated from human subjects in different age as well as from mice with genetically inactivated enzymes β-cystathionine synthase (CBS) or 5,10-metylotetrahydrofolate reductase (MTHFR). We have investigated these factors because all of them lead to increase of total Hcy levels in plasma.

Performed experiments have shown a strong impact of genotype on Hcy level in hair keratins. We have discovered that Hcy level in keratins of mice with severe hyperhomocysteinemia induced by inactivation of CBS and MTHFR enzymes is more than 24-fold higher compared to wild type mice. Moreover, we have found significant differences in Hcy concentration between hair beginnings and ends, which has been confirmed by a strong positive correlation ($r = 0.977$) between Hcy level and hair length and between Hcy level and age of hair keratins.

I strongly believe that obtained results will help to clarify the mechanisms of harmful effect of Hcy, as well as will provide new information about factors that may cause aging.

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Evolutionary Rate of Antibacterial Drug Targets

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Finding new antibiotics, especially with novel mechanism of action is of particular importance in the era of superbugs, which are bacterial strains with resistance to most approved antibiotics.

In this study, we hypothesized that stronger stabilizing (natural) selection is observed in the case of antibacterial drug targets than in other bacterial genes. In other words, using genomic data, the hypothesis that the evolutionary rate of antibacterial drug targets is significantly lower than the genome average was tested.

We analyzed the evolutionary rates (with dN/dS and pN/pS ratios) of the genomes of eight pathogenic bacteria. Each genome was split into three groups: genes coding for antibacterial drug targets, genes found experimentally to be essential and other genes. Using this simple approach, we were able to show that antibacterial drug targets are indeed under stronger stabilizing selection (i.e., under stronger evolutionary pressure) compared to the genome average and compared to essential genes. Thus, it appears that natural antibiotics (chemical species “discovered by nature”) are targeting slowly evolving genes, making the probability of the occurrence of resistance as low as possible.

We hypothesized that evolutionary signal may be a useful metric for in silico predictions of new drug targets supplementing already approved procedures. The rationale was that other genes (excluding those that are known drug targets) under strong stabilizing selection could be considered to be novel attractive drug targets. We were able to find three Gene Ontology classes enriched among genes under strong stabilizing selection: “succinate dehydrogenase”, “metal binding proteins” and “Two Component Systems (TCSs)”. Importantly, new potential antibiotics targeting genes belonging to these three classes will most likely have novel mechanisms of action, which should minimize the risk of cross-resistance (to known antibiotics).

Finally, we also compared the properties of natural and synthetic (human designed) antibiotics. Sulfonamides and D-cycloserine, two synthetic antibiotics, have to be used together due to a high risk of antibiotic resistance. We were able to show that targets of these antibiotics are under relatively low selection pressure compared to targets of natural antibiotics.

The results presented here are further examples that applying the theory of evolution provides a deeper understanding of biological phenomena and leads to testable predictions.
Longevity and Genome-Scale Metabolic Models

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The development of high-throughput “omics” technologies marked the beginning of the scientific discipline known as systems biology, which involves the experimental examination of complete and interdependent sets of molecules, interactions and quantitative characteristics associated with living cells (genomes, transcriptomes, proteomes, lipidomes, metabolomes, fluxomes etc.). In a broad sense, the holistic approach to biology is regarded as highly relevant in the context of research related to health, lifespan and longevity. The system-level analysis can be performed to decipher the molecular mechanisms of disease, identify drug targets, design treatment strategies and provide insights into the human gut microbiome. However, this approach is inevitably associated with the generation of extensive data sets that need to be handled and interpreted with the aid of dedicated computational tools. Application of techniques, skills and experience commonly associated with chemical engineering and computer science led to the development of modeling frameworks suitable for solving complex biological problems. Genome-scale metabolic models (GEMs), formulated as *in silico* representations of complete metabolic networks, are the key tools of systems biology used to simulate conditions-dependent cellular phenotypic states and integrate omic-based multi-level data sets. The quantitative characterization of metabolism involves the determination of fluxes within the network, typically by defining and solving the linear programming problem with a set of constraints and a carefully chosen objective function.

GEMs are applied in the studies focused on the major diseases of the civilized world, namely cancer, diabetes and obesity. In addition to elucidation of disease-related mechanisms, such models are useful for the identification of drug targets and disease biomarkers. GEMs are also employed to unravel the complexity of symbiotic interactions between the bacteria living in the gut and the host. This is relevant for the rational design of prebiotics, probiotics and the directed modulation of gut microbiome composition. Interestingly, it was demonstrated that GEM-based computational algorithms can be used to identify longevity-related genes in eukaryotic organisms.
Mediators of Inflammation in Antinociceptive Action of JNJ7777120 in Rat

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Background: Compounds with anti-inflammatory and analgesic properties could potentially be used to treat chronic inflammatory diseases. Animal studies have demonstrated that antagonists of histamine H4 receptor (H4R) have just such a profile of activity. Thereover, mechanisms of the exact analgesic action of H4R ligands and the importance of H4R in pain are unknown.

Aims: Objective of this project was to evaluate possibility of pharmacologic regulation of nociceptive pain and inflammatory process by JNJ7777120 (J77)- model H4R (H4R) antagonist and to explain its mechanism.

Methods: We analyzed antinociceptive and antinflammatory action of J77 and its interactions with COX and LOX inhibitors in acute pain (AP), carrageenan-induced inflammation (CII) and adjuvant-induced arthritis (AIA) in rats. Nociceptive treshold (Randall-Sellito, Tail flick, Plantar test), edema, blood count, histamine, prostaglandin E2 metabolite (PGEM) and LTB4 levels in plasma, levels of MCP -1 in plasma and cerebrospinal fluid (CSF) and chemiluminescence of leukocytes were analyzed.

Results: In AP, J77 increased mechanical (from 125±4g to 163±6g) and thermal threshold (6.3±0.4s to 7.7±0.9s) and decreased concentration of MCP-1 in CSF and plasma. Indomethacin and celecoxib reduced J77 impact on the MCP-1 level. Celecoxib decresed J77 activity towards mechanical but potentiated towards thermal stimulus. In CII, J77 reduced mechanical hyperalgesia (from 90±5g to 115±17g), plasma concentration of LTB4 and chemiluminescence. Administration of celecoxib with J77 potentiated analgesia and reduced level of PGEM. Coadministration of esculetin and J77 decreased chemiluminescence. In AIA, J77 reduced mechanical hyperalgesia from (57 ± 4g to 120 ± 16g), edema, percentage of neutrophils, levels of MCP-1 and chemiluminescence. Coadministration of indomethacin and J77 reduced PGEM, MCP-1, and induced chemiluminescence levels. Celecoxib administered with J77 decreased PGEM and MCP-1 levels. Esculetin completely abolished J77 produced antinociceptive effect.

Conclusions: Antinociceptive effect of J77 in models of inflammatory pain in rat is in part secondary to its anti-inflammatory action but both periphery and central mechanisms are involved in its effects. HRH4 ligands interactions with common NSAID may influence results of treatment and should be examined in more detail.
Synthesis and Evaluation of Antimicrobial Activities of Aziridine-Thiourea Derivatives

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In the presentation we report the synthesis and evaluation of in vitro antimicrobial activities of aziridine-thiourea derivatives. A series of aziridines in reaction with isocyanates and isothiocyanates to obtain urea and thiourea derivatives was used. The structures of all the new products were confirmed based on spectroscopic data (\textsuperscript{1}H-NMR, \textsuperscript{13}C-NMR, HR-MS). These compounds were screened for their in vitro antimicrobial activity against panel of Gram-positive and Gram-negative strains of bacteria. Some of the tested compounds appeared to be promising agents against reference strains of \textit{Escherichia coli}, \textit{Staphylococcus aureus} and \textit{Staphylococcus epidermidis}. Subsequently, compounds exhibiting promising antibacterial activity were tested against twelve clinical isolates of \textit{S. aureus} from three different sources of infection and screened for in vitro cytotoxicity against murine fibroblast and HeLa human tumor cell line using the 3-(4,5-dimethylthiazol-2-yl)-2,5-diphenyltetrazolium bromide (MTT)-assay.
The Influence of Exogenous Salsolinol on Rat Metabolism

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Salsolinol (1-methyl-6,7-dihydroxy-1,2,3,4-tetrahydroisoquinoline; SAL) is thought to regulate dopaminergic neurons and to act as a mediator in the neuroendocrine system. Interestingly, it was also detected in various food products, such as wine, cheese and bananas. We have reported that exogenous SAL evokes enteric neuronal cell death. Impairment of myenteric neurons might be responsible for the abnormal intestinal transit and might also affect gastrointestinal hormones homeostasis.

The aim of this study was to evaluate the influence of prolonged SAL administration on body weight, food intake, gastric emptying, serum levels of postprandial GIP (glucose-dependent insulinoceptive polypeptide) and GLP-1 (glucagon-like peptide-1) as well as adipose tissue accumulation.

Male Wistar rats were subjected to continuous intraperitoneal low dosing of SAL – 200 mg/kg in total (Sigma, USA) with ALZET osmotic mini-pumps (Durtec, USA) for 2 or 4 weeks with either normal – S1, S2 (2.86 kcal/g, Labofeed, PL) or high-fat diet – SF1, SF2 (4.34 kcal/g, Bento Kronen Products, BE) groups. Appropriate groups served as the controls (C1, C2, CF1, CF2). Consumed feed and body weight were measured each morning. Gastric emptying was assessed at the end of the experiment. Both epididymal fat pads were dissected, weighted and processed for routine hematoxylin and eosin staining. Serum samples were assayed for GIP and GLP-1 (Phoenix Pharmaceuticals, Inc. USA) by the ELISA method, according to the manufactures’ instructions. The Jagiellonian University Bioethical Committee approved the experiment (67/2009; 896/2014).

SAL significantly reduced total body mass with no differences in the total food intake between the groups. The epididymal fat pad weight over final body mass ratio was lower in SAL-treated rats on high fat diet in comparison with the control groups. The percentage of mean residual solid food in the stomachs was significantly higher S1 group than in C1 group. GIP levels were elevated in SAL-treated rats in comparison with their controls, especially in groups S2 and SF2. GLP-1 levels were lower in SAL-treated rats in comparison with their controls. The area and the perimeter of the fat pad adipocytes were decreased in SAL-treated rats in comparison with their controls.

SAL might target some regulatory mechanisms concerned with basic rat metabolism through neurohormonal pathways. However, in-depth studies are still needed to address these complex issues.
Natural Polymers in Medical Applications

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Polymeric materials, such as: lignin, polysaccharides, polypectins, cellulose, collagen, are the foundation of biological life on earth. Industry of natural polymeric materials has been developing and spreading successfully through our globe for over 100 years. One among many other areas of their application is pharmacy, in which great attention is paid to a development of starch-based soft capsules as an alternative to gelatin which is of animal origin. Some people, due to religious or ideological reasons, pay special attention to the origin of all ingredients they intake, eliminating the ones of animal origin.

The aim of this research is to develop a composition based on thermoplastic starch suitable for production of soft capsules in pharmaceutical application. Different types of starch (corn, rice, potato and amaranthus) were blended with a mixture of plasticizers consisting of water and glycerol. In order to assess usability of obtained materials for soft capsules’ production, mechanical, rheological and utility properties were examined.

Preliminary studies provided information on preparation procedure as well as properties of starch-based films, which can be potentially used as packaging material in pharmaceutical application. Maximum mechanical properties and the highest values of viscosity were obtained for thermoplastic starch films manufactured from modified potato starch plasticized with water and glycerol mixture. Utility properties, such as: water absorption and particle size, greatly influence properties of final product. It was revealed that potato starch, showing the best mechanical and rheological properties, is characterized by the highest values of water absorption and the smallest particle size.
Thermographic Test of the Usability of Hydrogel Dressings During Therapeutic Laser Irradiation on the Human Skin

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During several laser medical treatments, for removal of nevus on the skin, tattoos, hair or closing of blood vessels, hydrogel dressings are used to ensure aseptic conditions, to suppress pain and to increase patient comfort. Due to the evaporation from the hydrogel surface and changes in the structure its temperature is minimally 4 °C lower than the temperature of the environment. Additional hydrogel cooling down to 10 °C before applying it to a patient’s skin significantly reduces the perception of pain.

We wanted to determine the temperature distribution caused by laser radiation on the skin with and without hydrogel dressings (HydroAid) \cite{1}. We used a surface with similar characteristic emission and absorption as the human skin. We examined the energy loss from a laser beam passing through the hydrogel dressing and the effect of the scattering by the dressing on a beam focused on its surface. We measured the temperature distributions with a thermal imaging camera FLIR T620 and analysed them with the ResearchIR MAX software \cite{2}. The therapeutic lasers used were QX Max (Nd:YAG) and Fotona Dualis SP (Nd:YAG and Er:YAG) with wavelengths: 532, 1064 and 2936 nm. We studied the effect for different frequencies and the fluencies of the laser pulses.

Adding the hydrogel dressing to the test surface did not increase the width of the temperature distribution (FWHM) by more than 20%, depending on the type of laser. The maximum temperature of the exposed area is, when using a 1 Hz frequency and 3 J/cm\textsuperscript{2}, about 35 °C higher without dressing applied than with a dressing. For a Nd:YAG laser at 1064 nm and with a fluency of 6 J/cm\textsuperscript{2} this difference is about 77 °C. The Er:YAG laser at 2936 nm did not increase the temperature on the reference surface at all when using a hydrogel dressing due to the very high absorption in the gel. This was however after one pulse destroyed.

Our results show that this dressing can be applied during skin surgery at 532 nm and 1064 nm, but the fluency of the laser has to be increased to compensate for the energy losses caused by the hydrogel. The hydrogel dressing can not be used however with the Er:YAG laser at 2936 nm.

\textsuperscript{1} http://kikgel.com.pl
\textsuperscript{2} http://www.flir.com/instruments/display/?id=62960
Characterization of Bioengineered Spider Silk Spheres for Biomedical Applications

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Contemporary biomedical market, in a field of drug delivery systems, demands from related products, inter alia, the highest level of biocompatibility, biodegradability and extraordinary mechanical properties. To meet these requirements, scientists outdo each other in inventing increasingly better solutions in highlighted topic. One of the most promising material is silk \cite{1, part I}. It has numerous unique mechanical and biological properties as well as it can be processed into various forms: fibers, films, gels, scaffolds or micro- and nanospheres. The latter, produced from bioengineered silk, may serve as drug carriers. The aim of this work is to produce spheres from bioengineered spider silk proteins and to perform a proper characterization of the final product. Two bioengineered silk proteins – MS2 and EMS2, based on the consensus motif of MaSp2 spidroin from \textit{Nephila clavipes} spider, were composed in \textit{E.coli} expression system. Depending on a few factors like concentration of potassium phosphate and silk proteins as well as the pH of the potassium buffer, bioengineered silk spheres were produced \cite{1, part II}. Scanning electron microscopy (SEM) was used to study the morphology and dimensions of spheres. Second technique utilized in this manner, to get topography data in addition, was atomic force microscopy (AFM). Another approach was to measure the Zeta potential and to perform cytotoxicity analysis against fibroblast cells. The loading and release profiles of anticancer drugs – mitoxantrone and etoposide – were extracted from spectrophotometrical measurements. SEM and AFM analysis bring analytical information about the differences in shape and size of the spheres, as well as, about the morphology or aggregation susceptibility in function of the type and concentration of a protein, and the potassium phosphate pH. The Zeta potential reaches -13.7 mV in case of MS2 and -34.8 mV for EMS2 spheres. The cytotoxicity tests, conducted for both types of spheres, reveal no effect. While considering loading and release profiles – MS2 spheres exhibited stronger affinity to mitoxantrone. On the contrary, EMS2 cooperate better with etoposide. Various preparation parameters and experimental conditions have influence on the properties of the final product – silk spheres.

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\cite{1} A. Florczak et al. Postepy Hig Med Dosw (online) \textbf{65}, 2011.
The Influence of Aging on the Human Microbiota

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Microorganisms are very important for humans. A single person harbors tens of trillions of microbial cells which can be commensal, symbiotic or pathogenic. Most of them are symbiotic and can be found in the gastrointestinal (GI) tract. They play a role in the intestinal physiology and regulation as well as contribute to the maturation of the immune system. The appropriate activity, condition, and diversity of the human microbiota is required for health and well-being.

The process of aging alters the human microbiota. Its composition and diversity varies with the age. For example, there are differences in the proportions of bacteria from various phyla in the GI tracts of young and older adults. Furthermore, gut microbiota of the latter is poorer in beneficial bacteria, like probiotic bifidobacteria, and richer in potentially pathogenic enteric bacteria.

Once established human microbiota is rather stable throughout life, however, it can be influenced by many factors, including infections, treatment procedures and lifestyle. Unfavorable alterations in the human microbiota constitute an important risk factor for various diseases. In the elderly, there is a correlation between the host microbiota and the occurrence of some aging-associated diseases of the GI tract and circulatory, locomotor, nervous, and urogenital systems.

Manipulation of the human microbiota is believed to be a promising therapeutic strategy to prevent the development of some aging-associated diseases.
Risk Factor Assessment of Oral and Oropharyngeal Cancer as Part of the Head-and-Neck Cancer Prevention Program in Lodz

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Introduction: The aim of the study was to evaluate risk factors for oral and oropharyngeal cancers in patients taking part in the head-and-neck cancer prevention program in Lodz.

Material and methods: One hundred and four people reported to preventive examinations as part of the head-and-neck cancer prevention program in Lodz (September 25th, 2015): 66 women aged 21-68 and 38 men aged 23-71 years. Before an otolaryngologic examination, subjects completed a survey which concerned the following issues: education, sources of information on preventive programs, symptoms, smoking, number of smoked cigarettes, alcohol, number of lifetime sexual partners, number of oral sex partners, and family history of the head and neck cancers.

Results and conclusions: The analysis showed that people who took part in the program were mostly in the age group of 51-60 or over 60 years of age – 71.2% of women and 57.9% of men, respectively. Patients were at the age that predisposes to oral and oropharyngeal cancers. In this study, 15.9% of women and 23.6% of men were active smokers. Most of them smoked 10-20 cigarettes daily. On the other hand, 40.9% of women and 10.5% of men did not consume alcohol. In our study, the majority of both women and men had 1-3 sexual partners in lifespan - 78.9% and 60.5%, respectively. Oral sex was reported by 45.5% of women and 60.5% of men, of whom the majority had 1-3 partners - 95.8% and 70.0%, respectively.

Following a full ENT examination, 16 participants (15.4%) were referred for further oncological work-up including videolaryngostroboscopy, ultrasound of the neck with fine-needle biopsy, computerized tomography of the neck, and HPV testing. This finding add further support to the importance of cancer prevention program.
The Phase-Contrast Holographic Microscopy in Noninvasive Human Sperm Morphology Investigations

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Human sperm parameters such as morphology, number of spermatozoa and progressive motility are of great importance for assessing male reproductive health. The modern methods of sperm investigation include new sperm parameters as e.g. relative vacuole area. Standard morphological analysis using light microscopy and different staining methods is a very subjective and time-consuming method. The new technique - digital holography (DH) is a label-free, non-contact, non-invasive method with nanometric axial resolution in real time [1,2]. The volumetric field can be reconstructed from a single image (the hologram), without mechanical realigning the optical system. The aim of this study was to assess the morphology of human semen using a digital holographic microscope DHM-T1000 [3].

We present the results of human sperm morphology investigations for fertile and infertile patients. For each patient were examined intact sperm and separated spermatozoa by swim-up and Percoll gradient. The measurements of 200 spermatozoa in each category were performed according to the guidelines of the World Health Organization (WHO) [4].

Our results from DH measurements have shown a good agreement with the results obtained using classical method of morphology investigations. Statistical comparisons of the sperm morphology revealed differences between samples depended on method of sperm separation (swim-up, Percoll 47%, Percoll 90% sperm fractions). We conclude therefore that DH method enables the most objective morphological characterization of the live, unlabelled sperm cells.

Delayed Motherhood and Posthumous Parenthood: in Search of the Legal Framework for Artificial Insemination

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One of the most important issues in the bioethical debate is the admissibility of using assisted reproductive technologies (“ARTs”). The discussion considers few sections: society, ethics and laws. Nowadays, scientific progress made it possible to artificially inseminate in late stage of women’s life. Late maternity may be defined as conceiving and delivering a child after natural ability of an organism to procreate. The possibility to become a parent after one’s death results from the ability to preserve gametes and embryos for a long time. Posthumous reproduction occurs when a child is born after one or both genetic parents has died.

In Polish legal system issues connected with using ARTs are regulated in Fertility Treatment Act of 25th June 2015 [1]. The article 33 of that Act provides directly that it possible to use after donor’s death the embryos which were created according to partners donation procedure. According to the article 17 section 1 point 2 of above mentioned Act, it is excluded to use gametes after donor’s death, which means that it is impossible to create embryos posthumously. On the other hand the Act does not limit the women’s age in which the ART may be performed. The present wording of the regulation is far from perfect and do not consider important legal and social issues.

The basic problem arising from the regulation is the scope of the right to procreate. The limitation of mentioned right is possible within the limits of other constitutional rights. Important social issues also favor the necessity to regulate the usage of ARTs. Delayed parenting carries the risk of negative social effects such as: the generation gap, less vitality to raise the children and bigger possibility of orphaning. Also the possibility of posthumous reproduction is highly controversial. In that case, in the beginning we face the problem of orphaning. The child for the whole life is raised up without one of parents. The posthumous reproduction makes it possible to execute reproduction – one of physiological functions- after one’s death.

Both the possibility to use ARTs as a problem which is important socially and the limitations of statutory regulation have to leads to interesting debate about possible changes in the regulation.

References

Advance Care Planning – Remedy for Human Longevity in Medical and Legal Aspect

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Wherever law meets philosophy and ethics serious interpretational dilemma occurs. This state is also actual in area of human will (autonomy) expression which are aimed to bring a result in the future. In a considerable simplification advance care planning is the concept of legal instruments which enables patients to ensure their autonomy in case of future, unexpected – also emergency – medical treatment. Informed consent, advance directives and advance care planning are recognised as main instruments of patients autonomy and will protection. Due to extension of the topic main conclusions would concern advance directives and their legislative aspects. Not by accident advance directives currently are one of the most controversial issues in bio jurisprudence.

In fact advance directives are already a recent legislative phenomenon in several countries (for instance Spain). Whereas in some other legal systems (for ex. Poland) there is lack of complex regulation in this matter. Advance directives (understood as legislative challenge) are vibrant example of ethical and legal consequences which occure due to broad recognition of patient autonomy. This abstract aims to provide a prompt description and critical analysis of main legal issues connected with requirements which should be fullfilled by optimal regulation in this area. Advance directives due to its essence are difficult from a point of legislative technique. Due to this aim lex ferenda aspects are required. The main concern for legislator is to adequately implement advance directives and integrate them into already existing legislation. It is important to consider their legal, ethical and clinical dimensions. Conceptual framework should be based on doctrinal understanding of this institution. There are also important reasons, such as freedom of movement within EU, which claim for transborder regulation of this issue.

Comparative and dogmatic method are required. Most important conclusion will be ability to provide an universal legislative tools for national legislators (or other legislative body) in area of advance directives. As a result of study a coherent and crossborder instrument will be able to obtain.

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Every human activity causes direct and indirect effects on the economy and environment. The later are called external effects which can have a negative or positive character. The evolution of the Common Agricultural Policy of the European Union shows that agriculture acquires a new function. It has to provide benefits (public goods and positive externalities) to all members of society for which the government or other political institutions will pay. Organic farming generates more positive externalities and fewer negative effects than conventional agriculture. However market does not reward farmers for the provision of externalities sufficiently. Therefore there is the premise which justifies rewarding farmers from public funds. Consumers or taxpayers could react differently to the increasing cost of support for organic production methods. Designing of economic mechanisms for this support requires appropriate tools which have to be able to efficiently value individual actions of agents from a social perspective.

The aim of this research was to determine how consumers perceive and value the external effects of organic farming. The source of primary data was the results of a survey conducted on a non-representative group of consumers of organic products in July 2015 in Warsaw. Contingent valuation method was used to value the external effects of organic farming. Then multiple regression model was designed using 211 correct observations. The model consisted of one dependent variable (WTP - willingness to pay for the externalities of organic farming) and 40 independent variables (socio-economic variables).

The results indicate that a high level of environmental awareness and knowledge about organic farming can result in willingness to pay more for the externalities of organic farming. Consumers were willing to pay an average of 109.55 zlotys per year in order to maintain the positive externalities or organic production. At the same time, such factors as gender, age and education had no significant impact on the WTP. Results suggest that the shape of next reforms of Common Agricultural Policy will be significantly influenced by increase in consumer awareness and knowledge about the environment. Other research conducted in Poland has similar findings. The reason is that consumers are increasingly aware of the positive and negative externalities generated by agricultural production. What is more they are willing to allocate certain amount of money in order to preserve positive externalities of organic farming. It shows that there is significant willingness to support those agricultural methods which comply with environmental needs.

Developed under the project “Valuation of external effects of organic farming by producers and consumers of organic food” implemented within the framework of PhD study at the Faculty of Economic Sciences of Warsaw University of Life Sciences - SGGW
Before They Become Seniors. Life Satisfaction in Artistically Gifted Adults Aged 50-60 years: An Axiological Perspective

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The present research project is an attempt to formulate a psychological answer to the question of what the level of life satisfaction is in artistically gifted adults aged 50–60 years. Sekowski points out that gifted people may experience in their lives certain specific difficulties – endogenous and exogenous problems, such as perfectionism, idealism, excessive self-criticism, problems with decision making, instability of self-esteem, various difficulties in relationships, and others. The literature does not offer many studies about the sense of the quality of life in artistically gifted people. According to the concept of eudaimonic well-being, the idea of a good life focuses on the sphere of values. With this in mind, the main research questions were formulated as follows:

What is the level of life satisfaction in artistically gifted adults aged 50–60 years?

What is the relationship between the preference for value types and the level of life satisfaction in this group?

Life satisfaction is a cognitive, judgmental process. The following methods were used to measure life satisfaction and preferences for value types: the Satisfaction with Life Scale (SWLS) by Diener and co-workers, the Quality of Life Scale (QOLS) by Flanagan [which measures life satisfaction in five areas: (1) physical and material well-being; (2) relations with other people; (3) social, community, and civic activities; (4) personal development and fulfillment; and (5) recreation], and the Schwartz Value Survey (SVS). The study group consisted of 74 persons (males and females) aged 50–60 years who had outstanding artistic achievements.

The results showed that the level of the artists’ global life satisfaction was high. The high level of life satisfaction in the artistically gifted adults was associated with the preference for value types such as Self-direction (in most areas of satisfaction) and Benevolence (in the sphere of physical and material well-being). A low level of life satisfaction was associated with the preference for Power, Hedonism, Stimulation and Achievement. The preference for value types was a predictor of the level of life satisfaction.
Great Leaders at the End of their Life – a Comparative Study

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„Autumn life” is a period in the life, when man wants to end all his affairs. Professional issues are then not as much important as they used to be. Family is a priority matter. However, such a view does not concern everyone.

In my speech I would like to address the „autumn life” of some great political leaders in the context of Europe history in XX century. Josip Broz Tito, Francisco Franco, Józef Piłsudski etc., were stand-alone leaders of their countries and were politically active to the end of their lives. I want to show how their politics changed, and how their country changed. Maybe, I find the answer to the question: was “the autumn of life” of these dictators “the autumn of life” of their countries?
Was it about time? On longevity and living conditions in a monastic community of medieval Christian Sudan

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The archaeological site of Ghazali is located in the Northern Province of Sudan, ca. 20 km west of the modern city of Karima, at the entrance to the Wadi Abu Dom, part of an ancient road crossing the desert on its way to Meroe. The core of the site is a medieval monastery (VII – XIII c.), in the vicinity of which remains of three large burial fields, as well as a small village were recorded and mapped. In the course of the 2015/2016 excavation season over 80 graves at the Southern Cemetery (Cemetery 2) were excavated, yielding the remains of 74 adults that can be dated to the original phase of the use of the cemetery. All human remains were subsequently analyzed in terms of sex, age, dental health, and possible pathological conditions.

On the basis of its location, adjacent to the monastic edifices, Cemetery 2 is believed to be the burial place of the monks inhabiting the place. This assumption is supported by the existence of two other cemeteries, one in the immediate vicinity of the village. The anthropological analysis of human remains obtained during archaeological research on the site seems to confirm this thesis. Out of 74 individuals, 73 were determined to be male. The age at death ranged from 20 to 50+ years, with marked concentration in the group of 35-45 years. Meanwhile, literary sources, mostly fragments of inscribed funerary stelae, provide us with some indications of really long-lived members of the community. A fragment of a pottery stela inscribed in Greek commemorated a monk of 90 years of age at death, having served the church for more than 60. The overall health of the population does not reflect the harsh living conditions one was exposed to in such a challenging environment. Among the pathological conditions observed degenerative changes (e.g. arthritis) associated with ageing are the most prevalent. The relative lack of signs of metabolic diseases suggests a diet rich in nutrients.

Although subduing the natural environment of Wadi Abu Dom was certainly demanding at times, the small community of monks at Ghazali fared quite well under the circumstances. While the overall expectancy of life was significantly lower than now and people of over 45 might have been considered elderly, the relatively good health condition of the population, as well as some occasional mentions of monks reaching truly mature ages may indicate that the quality of life might have been a lot higher than we could have expected.
Age(lessness) and Transmission of Traumatic Experience (on the Example of Bracha L. Ettinger’s Theory and Art)

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Background
The core of this project comprises trauma studies and the matrixial theory of Bracha L. Ettinger – a supplement to Freudian-Lacanian thought, grounded upon psychoanalytical practice and artistic experience. The innovation the matrixial theory introduces to the field of trauma is the possibility of transmission of traumatic content that exceeds the transfer between generations, theorised among others by Marianne Hirsch. Such a possibility is refreshing, also for literary and cultural theory. As it was mentioned, Ettinger’s theoretical intervention is backed by her art, which is a mixture of not only media, but also traces of historical and structural traumas; her artistic technique and its results influence such theoretical notions as becoming, co-emergence, or a non-phallic gaze.

Aims
The author wishes to explore the longevity, or, more specifically, the agelessness, of trauma that is transferred through the work of art, bearing in mind that in the matrixial psychoanalysis longevity refers not to individuals, but to an experience that may outlive them. Basing on the material provided by Ettinger’s œuvre, the author aims at examining promises and threats of such de-individualised agelessness of traumatic information and its “shareability” (Ettinger’s term) between several subjects not directly affected by the event that has caused trauma.

Methods
The methodology employed in this study is a hermeneutic analysis of visual and textual material embedded in cultural and literary theory, especially psychoanalysis and trauma studies.

Results
The project results in the formulation of a methodology applicable to an analysis of trans-generational experience in literary studies and visual arts, and a following analysis of Ettinger’s work that exercises this methodology.

Conclusions
Partial de-individualisation of trauma provides one with the possibility of sharing, making trauma exceed not only structures of generations, but also those of time. Trauma in the matrixial perspective is thus more than long-lived: it does not succumb to the age of those who have experienced it. Simultaneously, trauma, despite its threat to the sense of unity and stability of the subject, reveals its humanising – even ethical – potential.
Technologies of Longevity and Evanescence in Samuel Beckett

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Background
On the one hand, longevity, evanescence and passing have been widely discussed in Beckett Studies, but on the other hand, these tropes mark the particular hiatus in this discipline, as they are often associated with the influence of both World Wars, the crisis of Western civilisation and the modernist aesthetics. More recent studies – including Ulrika Maude’s ground-breaking writings – emphasise the necessity of returning to biology and technology while analysing Beckett’s works. Another recent shift of attention can be observed in the methodology itself; as Dirk van Hulle argues in the introduction to *The New Cambridge Companion to Samuel Beckett*, it is vital to withdraw from the purely theoretical readings and turn to interpretation.

Aims
This project aims at exploring the significance of technical tropes and usage of media, understood as vehicles for longevity in Samuel Beckett’s selected works, including *Krapp’s Last Tape* and *Not I*. This presence of technology is by no means neutral; due to its oscillation between violent evanescence and promising longevity, it poses threats to one’s individuality which are worth describing and exploring.

Methods
The poster I propose employs the approaches embedded in the post-structuralist literary theory, contemporary French philosophy, and the most recent literary criticism on Samuel Beckett’s works.

Results
The results of this project cover the presentation of a non-canonical selection of Beckett’s texts with regard to longevity and the formulation of a new methodology capable of tracing such tropes in Beckett’s *oeuvre*.

Conclusions
When it comes to time and memory, Samuel Beckett’s works rely on technology, on the level of both an aesthetic trope and a medium. Due to the dynamics of medium, death becomes excluded from his rhetoric and aesthetics. Consequently, Beckett’s heroes gain exceptional improvement of cognitive abilities, which however results in diverse mental and physical incapacities. Preservation and improvement of longevity is therefore confronted with a threat to their subjectivities.
For the past nine years, the EU structure seems to gradually eroded. The EU dysfunctions are visible especially through the spill-over crisis effect: first, finance crisis, which had influence on the real economy and become a debt crisis; political and institutional crisis had spilled into migration crisis; this had transformed on the axiological and social sphere, what provoked debate on the structure and the sense of European Integration, as well as revealed asleep nationalism and populism. The last crisis is connected with possibility the exit of the GB from EU. The main hypothesis: recent crises escalation have shown, that the quantitative changes, taking place in the EU does not correspond with better quality of EU, at all. Disharmony between quantity and quality is noticeable in the following fields: political and institutional (formal and informal), economic, social, axiological and ethical.

The main goal is exemplification of EU quality dysfunction, which due to quantitative changes.

Political and institutional disharmony: the *ius dictum* between enlargement and deepening suppose by Maastricht Treaty had lifted by the Treaty of Nice: the EU joined the countries, which do not meet the accession criteria; the “new” principles of Europe of concentric circles (disorder of the equality principle); the weakening of the EU formal (supranational) institutions and informal (also axiological sphere) as: European political culture, identity, solidarity. The importance of institutional and governments quality for: economic development, effective public services, and social well-being.

Economic disharmony: there is no possible to implement effectively monetary union without economic union: the ignorance of the Heckscher-Ohlin theorem about prices factors of productions alignment, is leads to a “two-speed Union”; the GDP growth in EU countries did not translate into economic and social efficiency (welfare).

Social disharmony: the elderly population increases, but their quality of life (well-being) will decrease, because of: inefficiency of European pension systems, instable public finances, growing gap between low and high income groups, low quality of medical care, ineffective social reforms. Moreover, growing unemployment in the EU- especially among youth- lack of flexible solution for elder on the labor market and actions which can incorporate the aging society into innovation economy. That is mean that longevity seems rather problematic. Methodology: public choice theory, new institutionalism, intergovernmental approach associated with the theory of interdependence.
Longevity is not only a result of the new technologies of modern times, but also a part of some ancient-old cultures, in which those who live in a particular way are expected to live longer. Nevertheless, the subject of extending human life by multiple techniques and procedures (mainly of a medical origin) has become a topic of ethical reflection only recently — the ethical dimension of prolonging life or even eliminating death emerged as a result of development in medicine and growing knowledge of the mechanisms of ageing. Therefore, issues connected to longevity became a part of bioethics. In classical bioethics, the question concerning life prolongation is usually approached from the consequentialist perspective. This requires the analysis of a multitude of factors, which influence the overall conclusion whether longer lives in general contribute to the wellbeing of the mankind or not. If so — it is our duty to promote life prolongation; if not — we are morally obliged to prevent the practices leading to longevity.

Kantian Ethics provide a different approach to this topic, as the very consequences of longevity are not the core argument for or against a duty to promote it. While it most certainly might seem to turn the ethical question of prolonging life into much less complex problem (as we don not need empirical data), the Kantian answer may be rather vague.

Firstly, there is the question of external freedom, in which one is allowed to act freely, as long as the freedom of others remains intact. In the domain of duties of right prolonging one’s own life can be seen as a part of pursuing her happiness. Therefore it is a merely allowed action, which can be perceived as of no moral importance. Since we can establish connection between the subjective perception of happiness and long life, the promotion of longevity in others can be perceived as belonging to duties of virtue. As Kant states, one of the domains of these duties is to foster other people’s happiness — therefore we may conclude that prolonging life of others is a duty. Moreover, from the perspective of individual morality according to Kant, longevity might be understood as an opportunity to progress in perfection and so prolonging life might (indirectly) become a duty to oneself. We might conclude that Kant would favour promoting longevity as one of our moral duties, but if we consider the philosopher’s view on human nature, the answer might not be as simple.
Worldwide population of the elderly is on the steep rise and the incidence of dementia is expected to become one of the key issues for health-care. The sciences and the humanities have a variety of practical and ethical issues to solve in the care for the senile. The dream of extending the life in good health has not been realized and there are no reasons to expect this to happen in near future. Philosophers extensively discusses problems of inter-generational distributive justice and the supposed lack of further goals in the old age. Another part of the discussion is the end-of-life care including euthanasia, assisted dying and advance directives. These are I believe exhaustively discussed in the literature.

The remaining part of the issue is the adequate account of the moral problems of age-related decline in agency. This includes descriptive ethics of diminished agency, normative implications for the care-providers and other persons as well as implications for moral and legal practice regarding the cognitively-diminished elderly.

To achieve the objectives analytical methods of philosophy will be applied to the relevant facts. The analysis will consider similarities with children and their achieving agency.

Three groups of issues can be distinguished: problems with diminished capacity in health-care decision making; problems with significant life decisions; and problems with simple life choices. The threshold concept of competence usually applied to medical decision-making is not adequate for some significant life choices, probably some health-care related choices and most simple life choices. More subtle treatment of the issues, similar to one applied in case of children is required. It should be considered if persons shouldn't appoint their future legal guardians, who would act like “parents in reverse”.

Current intuitive standards regarding the treatment of the elderly are inadequate when challenged by common senility. Modelling our moral thinking through analogy with our treatment of children is promising.

Significant limitation is caused by the implication that some young adults should also be treated as the senile due to insufficient development of agency.
### Thursday, 30 June 2016

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>16:00-22:00</td>
<td>Opening Ceremony and Lectures and Welcome Reception</td>
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### Friday, 01 July 2016

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tr>
<td>9:00 - 13:00</td>
<td>Lodz guided tour (Meeting point: Reception Hall, IBIS Hotel) Visiting the Museum of Cinematography in the Palace of Karol Scheibler, then Herbst's Residence and surrounding (Ksiezy Mlyn)</td>
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<tr>
<td>13:15 - 14:00</td>
<td>Lunch at the Congress venue</td>
</tr>
<tr>
<td>20:00 - 23:00</td>
<td>Barbecue Party, Rogowska str</td>
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### Saturday, 02 July 2016

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
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<tbody>
<tr>
<td>9:30 -13:30</td>
<td>Lodz guided tour (Meeting point: Reception Hall, IBIS Hotel) Visiting Piotrkowska Street, Manufaktura and Israel Poznanski's Palace/ Museum of the City of Lodz</td>
</tr>
<tr>
<td>13:30-14:30</td>
<td>Lunch at the Congress venue</td>
</tr>
<tr>
<td>20:00-23:00</td>
<td>Farewell Dinner at Israel Poznanski’s Palace</td>
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