

SCIENCE FESTIVAL 2012

21.09.-30.09.

YOUTH CLUB

44. *A good and bad cholesterol and how does it work.* – E. Wyroba

Our body needs cholesterol to produce a variety of indispensable compounds. A high level of 'bad' cholesterol brings a health risk to millions of people all over the world. However, why sometimes a low fat, low cholesterol diet and aerobic exercise don't work? This may be due to inherited mutation in the protein that is involved in the pathway of 'bad' cholesterol (=low density lipoprotein, or LDL) entering the cells. This condition is known as Familial hypercholesterolemia (FH) and may lead to heart attack even in the childhood.

45. *Do biological membranes connect or separate? Transporting systems for low molecular weight compounds* – K. Nałęcz

The intracellular content of ions, delivery of compounds necessary for proper functioning of the cell, as well as protection and removal of unnecessary and toxic substances is strictly controlled by transporting systems in the membranes, including membranes of intracellular organelles. The lecture will present classification of transporting systems (pumps, channels and carriers), their energy dependence and characterization with a special emphasis on differences and similarities between different classes. The structural aspects will be also mentioned with an emphasis on structural similarities. Several examples of transporting proteins will be presented in more details, including ion channels, ATPases and proteins responsible for multidrug resistance, transport of glucose, amino acids, neurotransmitters. The question: "Why are so many transporters for the same substrate?" will be posed and examples demonstrating functioning of different tissues (muscle, brain) will be shown.

46. *Migrating cells - allies or enemies* - W. Kłopocka

Cell migration is a phenomenon essential for both the unicellular and tissue organisms – it enables their reproduction, correct development and gives protection from pathogens. However, it can also be extremely dangerous, as tumor cells migration leads to metastasis. The lecture is a presentation of the mechanisms of cell migration and its diverse functions, concentrating mainly on tissue cells.

47. *Evolution of the nervous system* – K. Turlejski

Nervous system is made of specialized cells: neurons and glia. These cells evolved only once, during transition from sponge-like to anemone-like animals. Presence of the nervous system enabled active and plastic behavior of animals. In further evolution various lines developed different types of nervous systems, mainly increasing its complexity. Vertebrates have a unique, common plan of the nervous system enabling efficient control of complex behavior. Evolution of reptiles into mammals and birds introduced radical changes in their anatomy, including brain anatomy. Each line developed differently, but both increased plasticity and complexity of their behavior. The lecture will show how did the nervous system change during evolution, what could cause these changes and what were their consequences.

THEMATIC CLUBS – TO BE HEALTHY

155. *Malaria and linked congenital anemias - the most dangerous diseases in the world* - T. Wilanowski

Malaria is the most common infectious disease in the world, which every year infects more than 220 million people and causes 1-3 million deaths. There is still no effective vaccine for malaria, and the available drugs lose their efficacy due to the resistance being developed by the parasite. A high rate of morbidity and mortality of malaria meant that malaria has had the greatest selection pressure on the human species in its history. The result of this pressure is to promote the natural mechanisms of resistance to disease in the areas of malarial threat. The best documented examples of selective pressure on the human genome are linked to malaria-causing mutations in congenital forms of anemia: sickle cell anemia and thalassemia. 10% of human population are either sick or carriers of such mutations, and thus inherited anemias are the most common genetic diseases in the world. Their consequences are often tragic: a very strong chronic pain, infections, bone deformities, stunted growth, blindness, damage to the spleen, heart, kidneys and other organs. Congenital anemias often lead to premature death. Treatment of these diseases is usually difficult and not always effective. In summary, malaria and indirectly linked to it congenital anemias are the most serious social diseases of the modern world.

156. *One world – two faces. How does an autistic person's brain process information?* – J. Grochowska

Our life and activity is based on the kind of impulses that reach us from the environment and how our brain interpretes them. Each and every moment we are being pelted with the sensual information which cause specified reactions. We are reacting to pictures, smells, sounds... Thanks to brain's appropriate interpretations of the impulses, we are able to distinguish whether somebody is sad and cheer him up, or whether he is happy and congratulate him. Although autism is more and more frequently occurring development's disorder, we still know very little about its reasons and mechanisms. We know though, that autistic person's brain receives and processes information. That is why autistic persons may act in a weird and incomprehensible way for us. During the lecture we shall discuss the fundamental problems concerning receiving and processing information by autistic persons' brains, influencing observable in this group sensoric problems and difficulties in the sphere of theory of mind and central coherence. Autism causes problems with perception of the world, communications, learning, as well as social relations. It is assessed that in Poland there are 20 children with this disability for every 10000 born. In the United Kingdom and the United States 1% of the whole society has some kind of disorder of the autistic spectrum. The UN have officially declared autism as one of the greatest health problems of the world. The others are for example cancer, AIDS and diabetes (for more information visit www.un.org). Autism, if not treated, can cause serious disablement. The SYNAPSIS Foundation carry the mission of helping children and adults with autism and their families since 1989. It also helps persons with the Asperger's Syndrome and other disorders of the spectrum of autism. The Foundation manages a center of diagnosis, therapy and rehabilitation, a therapeutic kindergarten for autistic children, a social enterprise, where the adults with the autism are hired. The SYNAPSIS Foundation is a Public Benefit Organisation.

157. *The healthy brain is not trustworthy* – A. Wróbel

The new approach in neuroscience posits that the function of the brain's sensory systems is not to form a thorough representation of reality, but rather to start a fast and appropriate reaction to reality's changes. With such an approach, the sensory inputs are thought of not as donors of information – like in classic theories – but rather as catalysts of internal brain activity. The external stimuli are thus represented in the neural network by the

impact they have on the functional state of the whole brain. Indeed, we know that conscious experience is built up much too slowly to control most of our behavior. The role of sensory perception is thus probably to control the overall strategic behavioral goal of the organism.

157. *The spine- its mechanics and function* - P. Górski, R. Krasicki

The function of the spine. Is it only a supportive column? Does its shape influence vital functions of the body? Does its mobility influence functioning of other organs? The mobility of the other organs and structures in the human body. Mechanics of movement of the humans- discussion.

EVENING WITH THE SCIENCE

28.09. 18.00-24.00

215. *Evening with Biology*

How to extract DNA from an onion? What is a neuron and how does it look like? How does the single celled organism move around? Have you heard of optical illusions – what are the neuronal mechanisms behind them? If you want to know answers for all these questions and see even more interesting experimental biology come and visit ‘Evening with Biology’.