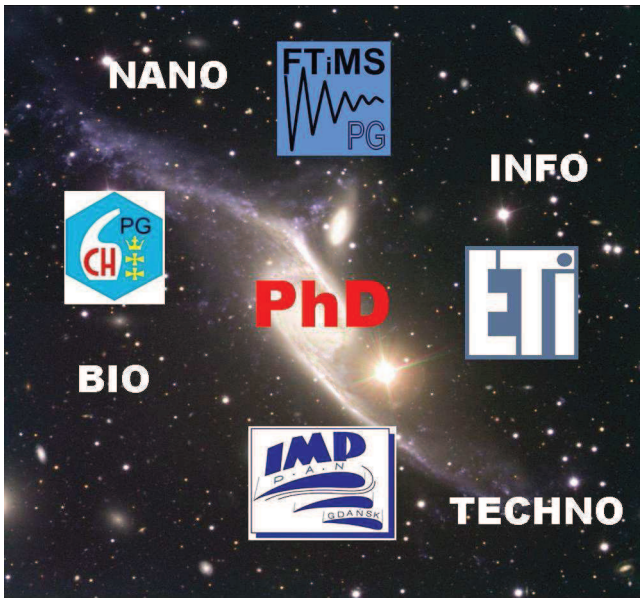
Materiały 2012

Szkoła jesienna

New trends in biotechnology

Sopot, 23-24.11.2012

materiały dydaktyczne dla szkoły jesiennej realizowanej w ramach projektu „Rozwój interdyscyplinarnych studiów doktoranckich na Politechnice Gdańskiej w zakresie nowoczesnych technologii"



KAPITAŁ LUDZKI
NARODOWA STRATEGIA SPÓJNOŚCI

UNIA EUROPEJSKA
EUROPEJSKI
FUNDUSZ SPOŁECZNY

Program szkoły jesiennej pt. "New trends in biotechnology"

Miejsce:

CENTRUM SZKOLENIOWO-REHABILITACYJNE W SOPOCIE
ul.Emilii Plater 7/9/11, 81-777 SOPOT
tel./ fax (058) 551-23-67,

Program:

Piątek 23.11.2012

14:15 – 14:45 - Przyjazd do Centrum i rejestracja:

Sesja I:

14:45 – 15:00 - Otwarcie Szkoły

15:00 – 15:45 – Prezentacja I - Agnieszka Bartoszek (Department of Food Chemistry, Technology and Biotechnology, Gdańsk University of Technology), "GMO foods - update 2012"

15:45 – 16:30 – Prezentacja II - Paweł Sachadyn (Department of Microbiology, Gdańsk University of Technology), "Mammalian regeneration: Recent findings and epigenetic aspects"

16:30 – 17:00 – Przerwa Kawowa

17:00 – 17:45 – Prezentacja III - Robert Brodzik (Blirt SA, Gdańsk), "It's all about antibodies!"

17:45 – 18:30 – Prezentacja IV - Maciej Bagiński (Department of Pharmaceutical Technology and Biochemistry, Gdansk University of Technology), "Modern approaches in drug design and development"

19:00 – Kolacja

Sobota 24.11.2012

9:15 – Śniadanie dla osób mieszkających w Centrum

Sesja II

10:00 – 10:45 – Prezentacja I - Joanna Nakonieczna (Intercollegiate Faculty of Biotechnology University of Gdansk and Medical University of Gdansk), “Antimicrobial photodynamic therapy as a tool to control growth of microorganisms“
10:45 – 11:30 – Prezentacja II - Andrzej Składanowski (Department of Pharmaceutical Technology and Biochemistry, Gdansk University of Technology), “Targeting DNA-protein complexes as a new approach in cancer chemotherapy“

11:30 – 12:00 – Przerwa Kawowa

12:00 – 12:45 – Prezentacja III - Satish Raina (Department of Microbiology, Gdańsk University of Technology), "Chaperone mediated assembly of the outer membrane"
12:45 – 13:30 – Roundtable discussion

14:00 – Lunch

16:30 – 18:30 – Wyzwanie Naukowe (Cztery prezentacje 15 min + 15 min dyskusji)
16.30 – 17.00 - Bartosz Górnikiewicz
17.00 – 17.30 - Aleksandra Miszkiel
17.30 – 18.00 - Marcin Serocki
18.00 – 18.30 - Kasjan Szemiako

19:00 - Ogłoszenie wyników wyzwania naukowego

19:10 - Kolacja

GMO foods - update 2012

Agnieszka Bartoszek

Department of Food Chemistry, Technology and Biotechnology,

Gdansk University of Technology

Genetic manipulations of edible crops represent the most controversial topic in food area over past two decades. The protagonists point to benefits to the environment, especially decreasing chemical pollution in the case of Bt pesticide resistant and herbicide tolerant crops and more economical production. The antagonists indicate the unpredictable risks of genetic manipulation to healthiness of GMO foods. Despite the huge agricultural areas used to cultivate such novel crops, none of these issues has been studied thoroughly. But the new developments in cell biology, especially growing recognition of epigenetic mechanisms in plants and in humans consuming them, place the old controversy in a new context.

Mammalian Regeneration: Recent Findings and Epigenetic Aspects

Paweł Sachadyn

Microbiology Department, Gdansk University of Technology

Regeneration, the ability to restore the lost parts and structures of organism, is essential for life. Urodele amphibians which regenerate lost limbs, injured hearts and transected spinal cords are known to display the most spectacular regeneration capacity among vertebrates.

The mammals have limited ability of regeneration. Mammals do not regenerate lost limbs, digits, serious heart lesions and spinal cord injuries. Some injuries as skin wounds in mammals heal but often with scarring. However, there are exceptional cases of regenerative response in mammals that exceed usual limitations. The most conspicuous models of mammalian regeneration include scarless skin and heart wound healing in fetus, the regeneration of spinal cord after complete transection in marsupial infants, fast and perfect healing of huge skin lesions in spiny mouse, the complete heart repair after partial resection in newborn mice, and a number of regeneration phenomena in the adult MRL/MpJ mouse comprising scarless ear-hole closure and scarless heart healing. These models indicate that mammals possess some regeneration potential which is usually repressed. As epigenetic regulation play a key role in organ development and tissue differentiation, it seems that these are the epigenetic mechanisms which are responsible for the repression, but could be manipulated for the induction of regenerative response.

It's all about antibodies!

Robert Brodzik

Blirt SA, Gdansk

Since 1975, when Kohler and Milstein successfully fused antibody-producing B lymphocytes with myeloma tumor cells and obtained, for the first time, clones of cells producing monoclonal antibodies (mAbs), termed hybridoma, the whole new era in science, biotechnology and medicine has begun. The hybridoma technology over the following years brought enormous number of mAbs that bind to various targets including protein, carbohydrate, nucleic acid and hapten antigens. The constant improvement of mAb technology has resulted in increasing application of monoclonal antibodies in research and human health care.

Today, antibodies are used extensively almost in every aspect of basic research, biotechnology, medicine including diagnostic and treatment of numerous diseases. Antibodies have become essential research tools for many applications, including western blotting, immunohistochemistry, immunocytochemistry, enzyme-linked immunosorbant assay (ELISA), immuno precipitation analysis, microarrays and flow cytometry. Antibody-based immunoassays are the most commonly used diagnostic tool to determine the concentration of specific proteins in the body fluids as a marker for infectious and genetic diseases. Monoclonal antibody based treatment have been proven to be useful method of treatment for various cancer types especially in conjunction with classic methods like chemotherapy or radiotherapy. The global market for therapeutic mAbs was estimated at $44.6 billion in 2011 and steadily growing.

Modern approaches in drug design and development

Maciej Bagiński

Department of Pharmaceutical Technology and Biochemistry,

Gdansk University of Technology

Design and development of innovative drugs become more and more expensive and less effective concerning number of small molecule entities (drug candidates) waiting in the pipeline to be approved by the regulatory bodies. This situation emerged mainly due to the failure of an old paradigm applied to drug design, due to different scientific and technological bottlenecks in the process of drug design and development and as a result of increased safety requirements for new drugs. The situation becomes even worse if one considers availability of effective medicines for medical treatment, since drug-resistance problem has emerged substantially within last two decades, especially in the area of anticancer and antimicrobial drugs.

In order to overcome problems in drug design, different alternative approaches should be tested and proposed. Currently, a new paradigm of drug design, different than the classical approach, is challenged. In this paradigm, translational of basic knowledge to the drug design process and later to the treatment of patients is essential. This new approach tries to include among others, the results of human genome project, biomarkers, personalized medicine, and new computational technologies to design more effectively (i.e. faster and cheaper) new innovative drugs.

The current lecture presents an overview of these new approaches/trends. Different actions supporting these changes will also be discussed. Especially, European Union Join Undertaking Innovative Medicine Initiative (IMI) will be presented. In addition to this overview, specific projects and approaches concerning new computer-aided drug design methodologies will be presented. These new methodological approaches are promising and give hope for the breakthrough in drug design. Especially, efficacy and toxicity of drug candidates will be covered by this computer-based methodology.

Antimicrobial photodynamic therapy as a tool to control growth of microorganisms

Joanna Nakonieczna

Intercollegiate Faculty of Biotechnology University of Gdansk
and Medical University of Gdansk

A major challenge for combating infectious diseases is the increasing emergence of antibiotic resistance of pathogenic bacteria. It is therefore urgent to look for alternative antimicrobial strategies. One approach with a high therapeutic potential for clinical management of infectious diseases is photodynamic therapy (**A**ntimicrobial **P**hoto**d**ynamic **T**herapy, APDT). Photodynamic therapy consists of three major components: light, a chemical molecule known as a photosensitizer and oxygen. The photosensitizer (PS) can be excited by absorbing a certain amount of energy from the light of visible spectrum, leading eventually to production of toxic reactive oxygen species. These are responsible for destruction of microbial cells. During the lecture the newest trends in APDT field will be presented based on literature as well as the data from our research group.

Targeting DNA-protein complexes as a new approach in cancer chemotherapy

Andrzej Skladanowski

Department of Pharmaceutical Technology and Biochemistry,

Gdansk University of Technology

DNA is still one of the most important targets for anticancer therapeutics. Many very successful antitumor drugs used in the treatment of cancer patients bind to DNA that leads to changes in its structure and integrity. Some ligands bind to specific DNA sequences, some ligands (both small molecules and proteins) can recognize of or interfere with structural motifs in particular DNA regions. One of the prominent examples of such structures is telomeric DNA.

The ends of chromosomes in mammals are composed of telomeric DNA containing TTAGGG repeats, which bind specific proteins called shelterins. This telomeric DNA together with shelterins form a cap that protects the ends of chromosomes from being recognized as sites of DNA damage and from chromosomal fusions. We propose a new target for antitumor drugs where small molecule ligands can bind to telomeric DNA and induce specific structural changes. These changes would lead to a selective interference with the formation of telomeric DNA-shelterin complexes, especially involving TRF1 and TRF2 proteins, as these proteins bind double-stranded telomeric DNA in a sequence- and structure-dependent manner. The rationale of the proposed therapeutic strategy is further justified by the fact that tumor cells have relatively short telomeres and frequently de-regulated shelterin expression and/or functionality. Thus uncapping of chromosome ends by DNA binding compounds which disrupt DNA-shelterin complexes can ultimately induce of selective cytotoxic effect in tumor cells. Possible implications for rational design of new antitumor drugs which interfere with telomeric DNA structure and formation of DNA-shelterin complexes will be discussed.

Chaperone-mediated assembly of the outer membrane

Satish Raina, Gracjana Klein and Natalia Kobylak

Department of Microbiology, Chemical Faculty,

Gdansk University of Technology

We address three issues fundamental to all living cells concerning protein folding using model organism Escherichia coli. This comprises study of regulation and function of response to high temperature stress (the RpOH-directed heat shock response), homeostatic control of extracytoplasmic function of the cell (the RpOE-directed envelope stress response) and function of protein folding catalysts [catalysis of rate-limiting steps of protein folding like disulfide bond formation and prolyl cis/trans isomerization (Dsb and PPIase folding catalysts)].

Up to now, it is thought that main function of RpoH (heat shock sigma factor) is to encode functions (heat shock proteins) required for the folding and assembly of cytoplasmic proteins. Concerning envelope stress response and outer membrane biogenesis, it is controlled and regulated by RpoE-transcribed gene products. Thus, we showed that RpoE regulon comprises periplasmic folding catalysts like DsbC, proteases like DegP, OMP chaperones like SurA and Skp, and members of OMP insertion complex called as Bam proteins. The major component of outer membrane is LPS (more than 90%). We have also shown that some of the steps of LPS biogenesis and its translocation as well as its alterations are sensed and regulated by RpoE.

In a further new twist we have identified a new heat shock locus designated as lprA/B transcribed by RpoH sigma factor, whose function seems to be required for the assembly of LPS at a step prior to its translocation. LprA contains 6 TPR repeats, an essential Zn finger and interacts with the essential inner membrane chaperones like YidC and DjlA and Lpt transport protein. Our data suggest that LprB binds LPS and LprA/B in concert with other chaperones are required for the folding of early glycosyltransferases and delivery of mature LPS for translocation to OM.

Lista uczestników szkoły letniej

LP	Nazwisko i imię	Wydział	Katedra
1.	Dargacz Piotr	WCh	Technologii Chemicznej
2.	Dębski Bartosz	WCh	Technologii Chemicznej
3.	Eichstadt Katarzyna	WCh	Katedra Chemii Organicznej
4.	Głazowska Joanna	WCh	Inżynierii Chemicznej i Procesowej
5.	Głod Barbara	WCh	Technologii Leków i Biochemii
6.	Gorczyca Grzeogrz	WCh	Technologii Leków i Biochemii
7.	Gorzelak Patrycja	WCh	Mikrobiologii
8.	Górnikiewicz Bartosz	WCh	Mikrobiologii
9.	Grygoryshyn Khrystyna	WCh	Mikrobiologii
10.	Haenel Andreas	WCh	Technologii Chemicznej
11.	Henke Joanna	WCh	Technologii Chemicznej
12.	Jaszczołt Mariusz	WCh	Inżynierii Chemicznej i Procesowej
13.	Kobylak Natalia	WCh	Mikrobiologii
14.	Kordalewska Milena	WCh	Mikrobiologii
15.	Krajewska Ewelina	WCH	Mikrobiologii
16.	Księżniak Katarzyna	WCh	Technologii Chemicznej
17.	Latowska Anna	WCh	Technologii Chemicznej
18.	Lustig Zofia	WCh	Technologii Chemicznej
19.	Marchel Justyna	WCh	Technologii Leków i Biochemii
20.	Miszkiel Aleksandra	WCh	Technologii Leków i Biochemii
21.	Nowak Marta	WCh	Mikrobiologii
22.	Pawlak Anna	WCh	Mikrobiologii
23.	Piszcz Katarzyna	WCh	Technologii Chemicznej
24.	Podolak Justyna	WCh	Mikrobiologii
25.	Ptaszyńska Aleksandra	WCh	Technologii Chemicznej
26.	Rybarczyk Maria	WCh	Technologii Chemicznej
27.	Serocki Marcin	WCh	Technologii Leków i Biochemii

28.	Stupak Anna	WCh	Mikrobiologii
29.	Szemiako Kasjan	WCh	Mikrobiologii
30.	Wicka Monika	WCh	Mikrobiologii