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SCIENTIFIC REPORT

Workshop: Protein glycosylation in diagnostics and therapy

**as a part of 7th ISABS Conference in Forensic, Anthropologic and Medical Genetics, Bol,
Island of Brac, Croatia, June 20-24, 2011.**

Summary

Workshop “Protein glycosylation in diagnostics and therapy” present the most recent advancements in the field of Congenital disorders of glycosylation, Glyco Biomarkers in disease and genome wide association studies of the plasma glycome to the large audience at the 7th ISABS Conference in Forensic, Anthropologic and Medical Genetics. Over 500 participants attended this conference what enabled significant promotion of glycoscience outside of its field. Unfortunately the majority of scientists outside of the field is still unaware of the importance of protein glycosylation and the presentation of most recent discoveries in the field of glycoscience at general conferences is one of the ways how to promote this new and rapidly growing field.

Description of the scientific content

N-glycosylation is essential for multicellular life and its complete absence is embryonically lethal. Variations in glycosylation are of great physiological significance since it has been demonstrated that changes in glycans significantly change the structure and function of polypeptide parts of glycoproteins. Proper glycosylation of membrane receptors is particularly important as it modulates adaptive properties of the cell membrane and affects communication between the cell and its environment. Dysregulation of glycosylation is associated with a wide range of diseases, including cancer, diabetes, cardiovascular, congenital, immunological and infectious disorders. Nevertheless the knowledge of structure and function of glycans is still significantly lagging behind the knowledge of other macromolecules.

However, general scientific community is still mostly not aware of the importance of protein glycosylation. To promote glycoscience in general audience, we organized ESF Workshop Protein glycosylation in diagnostics and therapy as a part of 7th ISABS Conference in Forensic, Anthropologic and Medical Genetics. The following lectures were presented at the workshop:

- **Nicolai Bovin** (Shemyakin & Ovchinnikov Institute of Bioorganic Chemistry, Moscow, Russian Federation). **Diagnostic potential of antiglycan antibodies**
- **Thierry Hennet** (Institute of Physiology, University of Zürich, Zürich, Switzerland) **Congenital disorders of glycosylation, from genotypes to therapies**
- **Gordan Lauc** (Faculty of Pharmacy and Biochemistry, University of Zagreb, Croatia) **Antennary fucosylation of plasma proteins is a reliable diagnostic marker for HNF1A-MODY: Translation of a glycome-GWAS hit into a clinically useful screening tool**
- **Erdmann Rapp** (Max Planck Institute for Dynamic of Complex Technical Systems in Magdeburg, Germany) **Tools for the glycome analysis in the post-genomic era**
- **Manfred Wuhrer** (Leiden University Medical Center, Leiden, The Netherlands) **Glycosylation profiling for biomarker discovery of autoimmune and alloimmune diseases**
- **Hakon Leffler** (Lund University Hospital Sölvegatan, Lund, Sweden) **Galectin binding glycoforms of serum proteins, a functional biomarker in cancer and inflammation**

In addition, the lecture of prof. Pauline Rudd (The National Institute for Bioprocessing Research and Training, Dublin, Ireland) **Systems glycobiology: From genome to glycome an integrated strategy for identifying and screening potential clinical markers** was

incorporated in the main conference program as a form of introduction and “advertisement” for the workshop.

Assessment of the results and impact of the event on the future direction of the field

One of the main obstacles for glycobiology is the lack of awareness in the general scientific community about the importance and recent advances in this rapidly evolving field. To remove this obstacle it is essential for glycobiologists to present their results to the general scientific audience. With this aim in mind we organized a workshop entitled “Protein glycosylation in diagnostics and therapy” as a part of the 7th ISABS Conference in Forensic, Anthropologic and Medical Genetics, which took place in Croatia, June 20-24, 2011. ISABS conferences take place every two years and attract a large number of both young and experienced scientists mainly from Europe and America.

From the discussions after the workshop it was evident that at least several very prominent scientists (Prof. Doron Lancet from Weizmann Institute, Prof. Stanimir Vuk-Pavlovic from the Mayo Clinic, Prof. Malcolm Brenner from the Baylor College of Medicine) changed their mind about the importance of protein glycosylation and will plan collaboration with glycobiologists in their future work.

One of the problems in the field of glycobiology is that most of the time glycobiologists attend specialized conferences and talk to each other how important glycoscience is. One of the conclusions from this conference is that probably we should try harder to reach general scientific public and organization of specialized workshops, or delegating lecturers to general conferences is probably one of the good ways to achieve this.

Zagreb, July 13, 2011


Gordan Lauc

	Monday, June 20	Tuesday, June 21	Wednesday, June 22	Thursday, June 23	Friday, June 24
MORNING	<p>8:00–18:00 Registration 8:00–11:00 Poster setup</p> <p>Introductory Plenary Session</p> <p>08:30 Directors' introductory remarks 08:35 Peter Underhill: A Y chromosome perspective of post-glacial human migrations in Southeast Europe 09:05 Doron Lancet: Variogenomics–human individual variation as the cornerstone of next-generation genomics 09:35 Giulio Pompilio: Cell therapy for myocardial refractory ischemia with bone-marrow-derived CD133+ cells: translational path and preliminary results</p> <p>10:05 Coffee Break</p> <p>10:15 Inauguration of the conference</p> <p>10:30 Keynote Address - Manfred Kayser: Human appearance: genetic basis, DNA prediction, and forensic application 11:10 Malcolm Brenner: Implementing complex biological therapies in academic centers 11:40 Henry C. Lee: DNA evidence in high profile cases 12:10 Adjourn</p>	<p>Plenary Session: Molecular Medicine 1</p> <p>08:30 Introduction from the chair (Dušica Babović-Vuksanović and Henry Erlich) 08:35 Dušica Babović-Vuksanović: Clinical genetics in individualized medicine 09:05 Mark Stoneking: High-throughput sequencing of complete human mtDNA genomes: insights into population history and heteroplasmy 09:35 Henry Erlich: HLA polymorphism, disease susceptibility, and pharmacogenetics 10:05 Renato Polimanti (YIA): Role of glutathione S-transferase gene polymorphism as markers in complex diseases 10:20 Pauline Rudd: Systems glyciobiology: from genome to glycome an integrated strategy for identifying and screening potential clinical markers 11:50 Christopher Evans: Gene therapy for bone and cartilage healing 11:20 Giorgio Palù: Virus-host interactions: the role of microrna in tumorigenesis and immune evasion 11:5 Discussion</p> <p>Parallel Session: Workshop on Legal and Ethical Aspects of DNA Forensic Analysis</p> <p>08:30 Introduction from the chair (David Kaye and Frederick Bieber) 08:35 Dragan Primorac: From dust to dust: Forensic DNA analysis 09:10 Frederick Bieber: Forensic analysis of DNA data banks: process, progress, and prospects 09:45 David Kaye: Kinship matching with DNA databases (aka "Familial Searching"): legal and ethical arguments 10:20 Christopher Asplen: International perspectives on forensic DNA databases 11:05 Discussion</p>	<p>09:00-16:30 HALF DAY EXCURSION</p>	<p>Parallel Session: Forensic Science 2 Workshop on Legislation Pertinent to DNA Databases</p> <p>08:30 Introduction from the chair (Antti Sajantila and Mitchell Holland) 08:35 Dragan Primorac: From dust to dust: Forensic DNA analysis 09:10 Mitchell Holland: Applications of second generation DNA sequencing for forensic DNA analysis 09:45 Sree Kanthaswamy: Non-human forensic genetics 10:20 Mark Barash (YIA): Identification of SNPs involved in determination of facial morphology 10:35 Marilyn Menotti-Raymond: Genetics of coat patterns in the domestic cat 11:10 Antti Sajantila: Post mortem pharmacogenomics- concepts, cases and research 11:45 Discussion</p> <p>Parallel Session: Workshop on Advances in Noninvasive Prenatal Diagnosis in First Trimester</p> <p>08:30 Introduction from the chair (Eliezer Shalev and Ofer Klein) 08:35 Eliezer Shalev: Early prenatal diagnosis–an overview 09:10 Ron Tepper: Early fetal 3D ultrasound examination 09:45 Staviv Shalev: Genetic assessment of pregnancies with increased nuchal translucency and normal karyotype 10:20 Esther Guetta: Application of free nucleic acids in maternal blood for non-invasive prenatal diagnosis: techniques, advantages and limitations 10:55 Simcha Yagel: First trimester screening for trisomy 21 with ultrasound and biochemical markers vs. Fetal cell free nucleic acids in maternal serum 11:30 Ofer Klein: CEP as innovative method for isolation of fetal nucleated red blood cells for noninvasive prenatal diagnosis 12:05 Discussion</p>	<p>Parallel Session: Molecular Medicine 2</p> <p>08:30 Introduction from the chair (Christopher Evans and Jean-Pierre Kocher) 08:35 Arezou Ghazani: Advances in molecular diagnostics: Role of nanotechnology and future perspectives 09:10 Artemis Simopoulos: Nutrigenetics and nutrigenomics in personalized nutrition and medicine 09:45 Carmen Terzic: Prediction of pathophenotype through transcriptome deconvolution 10:20 George Wu: A practical immunocompetent animal model of hepatitis C viral infection 10:55 Christopher Evans: Gene therapy for arthritis 12:05 Discussion</p> <p>Conclusion of the Conference</p> <p>Parallel Session: Next Gen Sequencing and personal genomics</p> <p>08:30 Introduction from the chair (George Vasmatazis) 08:35 David I. Smith: The next generation sequencing revolution 09:00 David I. Smith: Next generation sequencing of oropharyngeal cancers 09:25 Henry Erlich: Resolution of DNA mixtures and degraded DNA by Next-Generation Sequencing 09:55 Jean-Pierre Kocher: Integration of multiple data types obtained from genomics experiments: challenges and opportunities 10:25 Rebecca Just (YIA): Investigation of next generation sequencing for mitochondrial dna applications in forensics 10:40 George Vasmatazis: Molecularly defined cancer subtypes using NextGen Sequencing 11:10 Matthew Ferber: Clinical NextGen Sequencing of hereditary colon cancer genes 12:10 Discussion</p> <p>Conclusion of the Conference Announcement of the next ISABS Conference</p>
NOON	<p>12:30-14:30 Exhibit Opening & Poster Presentation</p>			<p>Technical Workshop: 12:00 Stephen Lupton (Promega GmbH). Optimization of the forensic workflow with innovations from Promega: automated sample prep and new kits for STR-Analysis 12:20 Daniel Hellwig (Sorenson Forensics): Sorenson Forensics investigative leads–determination of suspect genetic ancestry from crime scene evidence</p>	<p>12:30-14:00 Poster and sponsors' booth removal</p>
AFTERNOON	<p>Parallel Session: Forensic Science 1</p> <p>15:00 Introduction from the chair (Katja Drobnič and Timothy Palmbach) 15:05 Timothy Palmbach: A retrospective analysis of cold-case investigations 15:40 Moses Schanfield: A review and update of forensic statistics 16:15 Vedrana Skaro (Selected Oral Presentation): Mitochondrial DNA polymorphism in 312 people in Croatia determined by the mtHV+ HaploArray targeting 61 hypervariable and coding region sites 16:30 Katja Drobnič: Perspectives and pitfalls of mRNA profiling for identification of menstrual blood and vaginal secretion 17:00 Theresa Caragine: Estimating the number of contributors to two-, three-, and four-person mixtures containing DNA in high template and low template amounts</p> <p>17:30 Discussion</p> <p>Parallel Session: Workshop on Biomathematical Modeling and Cancer Immunotherapy 1</p> <p>15:00 Chairs' overview of Workshop goals (Gunnar Kvalheim and Yuri Kogan) 15:15 Stanimir Vuk-Pavlović: The fall and rise of immunity 15:45 Gunnar Kvalheim: Dendritic cell based cancer vaccines targeting tumor stem cells 16:15 Yuri Kogan: Improving alloreactive CTL immunotherapy for malignant gliomas using a mathematical model 16:45 Malcolm Brenner: Increasing safety and practicality of cell-based immunotherapy 17:15 Filippo Castiglione: Mathematical modeling and optimal control of dendritic cell transfection cancer immunotherapy 17:45 Discussion</p>	<p>Parallel Session: Anthropological Genetics</p> <p>15:00 Introduction from the chair (Daniel Vanek and Richard Villems) 15:05 Daniel Vanek: Famous DNA lineages from the perspective of archaeogenetics and genetic genealogy 15:35 Šimun Adelinović (Selected Oral Presentation): Anthropological, genetic and chemical analysis of ancient skeletons from southern Croatia 15:50 Richard Villems: An attempt to place the Balkans on the canvas of genetic variation of West Eurasia and North Africa 16:20 Brendan Keating (Selected Oral Presentation): Genome-wide 200,000 SNP array for profiling of external visible traits, kinship and ancestry 16:35 Kristin Young: Basques in the genetic landscape of Europe 17:05 Damir Marjanović: DNA analysis of ancient skeletal remains from old Bosnian graves 17:35 Eske Willerslev: What is to be learned from ancient DNA? 18:05 Discussion</p> <p>Parallel Session: Workshop on Biomathematical Modeling and Cancer Immunotherapy 2</p> <p>15:00 Introduction from the chair (Filippo Castiglione and Zwi Berneman) 15:05 Moran Elishmereni: A validated mathematical model of systemic IL-21 immunotherapy in solid cancer for the design of beneficial treatment regimens 15:40 Zwi Berneman: Dendritic cell vaccination in leukemia and AIDS 16:15 Karin HaLevi: A method for in-treatment personalization of cancer immunotherapy 16:50 Samuel Volchenbom: New systems biology tools for cancer diagnostics 17:25 Stipan Jonjić: How viruses can teach us to make better vaccines and vaccine vectors 17:25 Discussion and drafting conclusions</p>		<p>Parallel Session: ESF Workshop on protein glycosylation in diagnostics and therapy</p> <p>15:00 Introduction from the chair (Nicolai Bovin and Gordan Lauc) 15:05 Nicolai Bovin: Diagnostic potential of antiglycan antibodies 15:35 Thierry Hennet: Congenital disorders of glycosylation, from genotypes to therapies 16:05 Gordan Lauc: Antennary fucosylation of plasma proteins is a reliable diagnostic marker for HNF1A-MODY: Translation of a glycome-GWAS hit into a clinically useful screening tool 16:35 Erdmann Rapp: Tools for the glycome analysis in the post-genomic era 17:05 Manfred Wuhrer: Glycosylation profiling for biomarker discovery of autoimmune and alloimmune diseases 17:35 Hakon Leffler: Galectin binding glycoforms of serum proteins, a functional biomarker in cancer and inflammation 18:05 Discussion</p> <p>Parallel Session: Cell Therapy</p> <p>15:00 Introduction from the chair (Andre Terzic and Henning Madry) 15:05 Andre Terzic: Stem cell platforms for heart repair 15:40 Jef Pinxteren: Adult stem cells as biologics delivery platform for ischemic injury 16:15 Martina Smolić (YIA): Low CYP2E1 gene expression permits pharmacological selection of transplanted human hepatocytes in vivo 16:30 Pavel Capek (Selected Oral Presentation): Hypertrophic cardiomyopathy–from mutation to functional analysis of protein defect 16:45 Henning Madry: Regeneration of cartilage defects using gene-based approaches and tissue engineering of cartilage based on genetically modified cells 17:20 Boris Martinac: In search of novel types of antibiotics by targeting bacterial mehanosensitive channels 17:55 Discussion</p>	
EVENING	<p>18:20-19:30 Poster Session I</p> <p>19:30-21:30 Meet the Professor I, wine and cheese</p>	<p>20:00 Welcome Reception 20:20 Conferring Young Investigator Awards</p>	<p>18:00 Special ISABS lecture: Jakov Dučić: The Open Sea (a movie) followed by lecture Marine Science and Croatian Naturalists: 430 Years of Adriatic Marine Science</p> <p>18:45 ISABS Annual Meeting</p>	<p>18:10-19:30 Poster Session II</p> <p>19:30-21:30 Meet the Professor II, wine and cheese</p>	