Meeting Report

Highlights of the 10th Annual Beaumont Symposium on Molecular Pathology: "DNA Technology in the Clinical Laboratory"

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The 10th Beaumont DNA Symposium was held March 8–10, 2001. The program was structured to include a variety of molecular diagnostic topics in sessions devoted to "New Technology in Molecular Pathology," "Molecular Cardiology," "Molecular Microbiology," and "Molecular Oncology-Hematology"; roundtables, exhibits, and workshops were also offered.

New Technology in Molecular Pathology Session

It is the tradition of the Beaumont Symposium to open with a session devoted to new technology in our rapidly advancing field. This session started with a keynote address by Dr. Stuart Schwartz from Case Western Reserve University entitled "From Bands to Colors: The Evolution of Cytogenetics," an update on the outstanding progress in technology, with multiple new techniques that "have revitalized and energized cytogenetics."

The second presentation was devoted to "Single Cell Genetic Evaluation" and given by Dr. Mark Hughes from Wayne State University. Preimplantation genetic diagnosis based on single cell molecular diagnostics at the blastomer stage was reviewed and illustrated with case studies; Dr. Hughes also presented the first case of unaffected pregnancy resulting from preimplantation genetic diagnosis for sickle cell anemia.

"Mitochondrial Dysfunction and DNA in Neurodegenerative Diseases" was the topic presented by Dr. Russell Swerdlow from the University of Virginia; this overview provided data implicating mitochondrial dysfunction in several late-onset neurodegenerative disorders and discussed the new cybrid methodology used in this area of intense research, helping us to understand how mtDNA participates in programmed cell death.

The session concluded with an overview of "Apoptosis: Detection and Potential Clinical Applications" by Dr. Frederick Kiechle, of the Department of Clinical Pathol-

ogy, William Beaumont Hospital. Multiple new techniques for detection of apoptosis were reviewed, as well as apoptotic pathways, receptor-linked apoptosis, DNA damage-induced apoptosis, DNA-binding drugs, and diseases associated with altered states of apoptosis.

The Thursday, March 8, session was followed by a dinner presentation on "Mental Tools for Thinking about DNA Technologies in New Ways" by Drs. Robert and Michèle Root-Bernstein from Michigan State University, authors of the book "Sparks of Genius," an investigation of the mental tools used by the world's most creative people. Their overview showed how creative thinking is similar across different disciplines and understanding how the greatest achievements in one field can improve the creative potential in other research fields.

Workshops

On Friday, March 9, workshops were offered by major biotechnology companies which were both informative and well appreciated by all attendees. Bayer Diagnostics: "The Utility of Molecular Diagnostic Tools for the Clinical Management of Hepatitis C Virus: From Bench to Bedside" by Elizabeth Fagan, M.D. from Rush Presbyterian St. Luke's Medical Center in Chicago; Gentra Systems: "Automated Large Sample Nucleic Acid Purification in the Clinical Laboratory" by Karissa Adkins, Ph.D.; Innogenetics, Inc: "2001: A Molecular Odyssey" by Brian Brody, Ph.D.; Promega Corporation: "READIT™ Technology for Automated Molecular Interrogation" by Hemanth Sheno, Ph.D.; QIAGEN, Inc: "Answering the Challenge for RNA Applications in Molecular Diagnostics" by Tim Fleming; Roche Diagnostics Corporation: "Clinical Utility of Molecular Testing in Managing CMV Infections in Immunocompromised Patients" by Angela Caliendo, M.D., Ph.D. from Emory University in Atlanta; Roche Molecular

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Biochemicals: "The LightCycler System: Powerful PCR Solutions" by Charles Schroeder; and Stratagene: "Real Time PCR" by Gothami Padmabandu.

Molecular Cardiology

The first speaker was Dr. Kandice Kottke-Marchant from the Cleveland Clinic, who presented "Genetic Polymorphisms and Thrombotic Cardiovascular Disease," offering a comprehensive overview of polymorphisms and mutations resulting in increased risk of thrombosis including recently reported ones; as the number of genetic abnormalities associated with thrombosis increases, the clinical laboratory has a new challenge, to determine which assays to develop and include in screening for thrombotic risk.

The second presentation was given by Dr. Thomas Kunicki from the Scripps Research Institute; the topic "Genetic Variation in Collagen Receptor Density and Its Impact on Platelet Adhesion and Thrombus Formation" was reviewed, as well as the literature debate on the value of genetic polymorphisms as risk factors for myocardial infarction, restenosis after coronary stent placement, restenosis after angioplasty, in acute renal allograft rejection, stroke, and venous thrombosis.

New technology in angiogenesis was the topic of the next presentation, "The Angiochip: A Silicon-Based Angiogenesis Assisting Device" by Dr. Nicanor Moldovan, from Ohio State University. He offered an update on the rapidly evolving research field of micro-vascular tissue engineering, followed by a discussion of the design of the angiochip and its possible applications for growing capillary-like structures, its cardiac implantation, and also its potential anti-angiogenic applications.

The Molecular Cardiology Session concluded with a presentation on "Genetic Therapy of Cardiovascular Disease: A Look to the Future" by Dr. Robert Simari from the Mayo Clinic. Clinical trials in vascular gene therapy were reviewed, transgenic expression and function was discussed, as well as the use of novel genetic imaging techniques.

Molecular Microbiology Session

Dr. Eileen Burd from Henry Ford Hospital in Detroit opened this session with her presentation on "New Approaches to Identify Patients at Risk for Cervical Cancer: Human Papillomavirus DNA Detection." The definite advantages of molecular diagnostic methods were discussed as were the clinical relevance for risk stratification and the impact on patient management.

The Molecular Microbiology session continued with a presentation on "New Technologies for HIV Patient Monitoring: HIV Genotyping and Viral Load Assays" by Dr. Terry Robins from Specialty Laboratories. A review of techniques was complemented by a discussion on the clinical utility of these assays, the pharmacogenomics implications, and the improvement of the ultimate treatment outcome.

The session concluded with a practical and lucid presentation entitled: "Making it Count: Practical Issues for Reimbursement of Molecular Microbiology," by Dr. Vickie Baselski from the University of Tennessee at Memphis.

This is an area that interests and affects us all in molecular diagnostics laboratories: Dr. Baselski reviewed issues in implementation, cost-justifying, modalities to ensure reimbursement, and the role of the clinical laboratory scientist in improving reimbursement for our laboratories.

Molecular Oncology-Hematology Session

The first speaker of that session was Dr. Leni Moldovan from Ohio State University. Her very informative overview of the "Genomics and Proteomics of the Vascular Wall" set the stage for the entire oncology session. She covered a wide array of new techniques used in the study of functional genomics and proteomics of the endothelium, the role of monocytes/macrophages in angiogenesis, and the emerging pattern of transcriptional cellular responses to specific physiological or pathogenic stimuli.

The second presentation focused on "Microarray Technology: Overview and Applications to Tumor Classification" by Dr. Lynne Abruzzo, from the University of Texas, M.D. Anderson Cancer Center. She reviewed new techniques to profile gene expression at the mRNA level, from oligonucleotide arrays, cDNA microarrays, differential display of mRNA, to SAGE (serial analysis of gene expression): their advantages and limitations and their applications in tumor classification.

The Oncology-Hematology session concluded with the presentation of Dr. Victor Velculescu from Johns Hopkins Oncology Center, on "Transcriptome Analysis of Human Cancer." The SAGE technology invented and pioneered by Dr. Velculescu is now widely used for gene expression profiling in malignant cells and their normal counterparts. It has provided a rapid and comprehensive approach for elucidation of quantitative gene expression patterns that does not depend on known transcript information. Recently "microSAGE" strategy was developed to allow analysis of small number of cells, heterogeneous tissues or microanatomical structures. A variety of applications including colorectal cancer, pancreatic carcinoma, and normal and tumoral endothelium were reviewed.

Roundtable Presentation

Four roundtable presentations were offered on diverse topics ranging from "PCR Analysis for B and T Cell Gene Rearrangement" (Dr. Rebecca Hankin, Susan Hunter, and Suzy Forbes from William Beaumont Hospital); "HLA Molecular Typing: How to Identify the 1250+ Alleles Out There" (Dr. John Gerlach from Michigan State University); "The Laboratory's Role in Response to Bioterrorism" (Dr. Barbara Robinson-Dunn, William Beaumont Hospital); and "HCV Viral Load and Genotyping" (Dr. Raymond Podzorski from the Detroit Medical Center). The presentations were considered very informative by the attendees as well as useful for information exchange and networking.

Overall, we think that presenting updates on new technology and clinical applications of molecular testing in an increasing number of medical specialties meets a need not only for those of us directly involved in clinical molecular diagnostics laboratories, but also for our colleagues in the clinical specialties.