Summer Genetics Institute
Lecture and
Laboratory Schedule

June 7 - July 2, 2010

Summer Genetics Institute Express
Course Outline
June 7 - July 2, 2010

Monday, June 7, 2010
9:00 - 11:30

1. The Uniqueness of Genetic Testing
2. Pre-Mendelian Theories on Heredity
3. Genetic Tests of Times Past
4. Classification of Genetic Disorders
5. Types of Genetic Testing
6. Practical Considerations
7. Ethical Considerations
8. Counseling Issues
9. Direct-to-Consumer (DTC) Testing (Dr. Gregory Leppert)

Lunch

Afternoon – Clinical Seminars

1:00 - 3:00 & 3:15 - 5:15

1. Research Methodologies: Linkage Studies (Dr. Yvette Conley)
2. Research Methodologies: Association Studies (Dr. Yvette Conley)

Tuesday, June 8, 2010
1:00 - 3:00 & 3:15 - 5:30

1. The Genetic Blueprint - DNA
2. What is a Gene?
3. Translation of mRNA
4. Post-Translation Modification
5. Regulation of Gene Expression; The Prokaryotic Operon; Promoters and Enhancers (Dr. John Golin)

1. Mutations as Permanent Inherited Changes
2. Origin, Prevention, DNA Repair
3. Somatic vs Germ Cell
4. Point vs. Chromosomal
5. Biological/Molecular Effects: Protein Function, RNA Stability (Dr. John Golin)

Wednesday, June 9, 2010
9:00-12:00

1. Prokaryotic and Eukaryotic Cells as Experimental Tools
2. Eukaryotic Cell Structure and Function
3. A Survey of Ultrastructure of Eukaryotic Cells (Dr. J. Michael Mullins)

Lunch
Lecture - 12:45 - 2:45

1. Dominant Recessive, Codominant Genes
2. Genetic Variation: Alleles and Recombinations
3. Genetic and Epigenetic Factors
4. Independent Assortment (Dr. John Golin)

NIH Lecture Series – Masur Auditorium, Bldg. 10
3:00 – 4:30

1. A New Virus as a Culprit in Human Cancer; (Dr. Yuan Chang)

Thursday, June 10, 2010
9:00 - 11:30

1. Genomic Organization and the Human Genome Project
2. Molecular Timeline
3. The Eukaryotic Genome
4. Genomic Organization and Architectural Elements
5. The Human Genome Project Era: 1990-2003
6. What does the Draft Human Genome Sequence Tell Us?
7. Future Challenges
8. Anticipated Benefits of Genome Research
9. Ethical, Legal, and Social Issues
10. The Post-Human Genome Project Era: 2003-Present
11. A Vision for the Future of Genomics Research (Dr. Gregory Leppert)

Lunch
Afternoon – Clinical Seminars
1:00 - 3:00 & 3:15 - 5:15

1. Research Methodologies: Gene-Environment Studies (Dr. Yvette Conley)
2. Research Methodologies: Recruitment/Informed Consent Issues in Genetic Research (Dr. Yvette Conley)

Friday, June 11, 2010
9:00 - 11:30

1. Epigenetics: DNA Methylation and Chromatin
2. Epigenetic Mechanisms in Development and Cancer (Dr. Joseph Bressler)

Lunch
Afternoon – Clinical Seminars
1:00 - 3:00 & 3:15 - 5:15

1. Epigenetics and Expression Studies (Dr. Yvette Conley)
2. Genomic Databases (Dr. Yvette Conley)

Monday, June 14, 2010

1. Genetic Pedigrees and the Genetics of Inheritance
2. Linkage: Autosomal and Sex; Mitochondria and Maternal Inheritance
3. Linkage and Mapping Genetic Risk: Inheritance of Susceptibility Penetrance
4. Linkage and Family Studies (Dr. Jan Blancato)

Lunch

Afternoon Lectures

1:00 - 3:00 & 3:15 - 5:15

1. Recombinant DNA Technology
2. Genomic and cDNA Libraries
3. Identification and Selection of Recombinants (Dr. Frank Castora)

1. Restriction Enzymes: Specificity, Nomenclature and Use
2. Nucleic Acid Probes: Labeling and Use
3. Southern Blotting: Roles, Restriction Mapping, RFLP Analysis in Family
4. Pedigrees, Linked Probes and Recombination Frequency (Dr. Frank Castora)

Tuesday, June 15, 2010

9:00 - 12:00

1. Laboratory Safety Course - NIH

Lunch

Afternoon – Clinical Seminars

1:30 - 2:30, 2:45 - 3:45, 4:00 - 5:30

1. Genetics of Disorders of Complex Inheritance (Dr. Lawrence Brody)
2. Taking a 3 generation family pedigree, (Kathy Calzone, MSN, RN)
3. Hereditary Colorectal Cancer (Emma Kurnat-Thoma, MS, RN)

Wednesday, June 16, 2010

9:00 – 12:00 & 1:00 - 2:30

1. Polymerase Chain Reaction (PCR): The Basics, Variations and Clinical Applications
2. The Birth of PCR: Early Dilemmas and Resolutions

    Outline and Dissection of the PCR Process

    Oligonucleotide Selection: Guidelines for Primer Design and Usage

    Properties of Thermostable Polymerases

    Optimization

    Contamination Control

    Variations and Clinical Applications (Dr. Gregory Leppert)

NIH Lecture Series – Masur Auditorium, Bldg. 10

3:00 – 4:00

3. Memory CD8 T Cell Differentiation (Dr. Rafi Ahmed)

Afternoon Lecture

4:15 – 5:45

4. Behavioral Phenotypes and Genetic Disorders (Dr. Mary Leppert)

Thursday, June 17, 2010

Core Laboratory Exercises for All Participants - Rm 60

9:00 - 6:00

9:00-1:00

How to Maintain a Laboratory Journal; Laboratory Orientation; Laboratory Protocol and Instruction on the Proper Use of Laboratory Equipment: Pipet Aids and Micropipettors; Basic Microscopy: Bright Field, Phase and Fluorescence; Preparation of Stained Slides for Gross Cytology and Cell Cycle; Introduction to Mammalian Tissue Culture: Aseptic Technique, Cell Counting and Subculturing

(Ms. Erika Weaver and Mr. Tabari Baker)

Lunch

2:00-6:00

Overview of Molecular Biological Techniques and Clinical Applications; Analysis of the Human SIX6 Gene using the Polymerase Chain Reaction (PCR): Amplification of Buccal Cell DNA and Identification of a Single Nucleotide Polymorphism (SNP) and Genotyping by Restriction Analysis (Dr. Gregory Leppert)

Identification of the BCR/ABL Transcript in Chronic Myelogenous Leukemia (CML) by Reverse Transcription PCR (RT-PCR): Total RNA Isolation and RT-PCR (Dr. Gregory Leppert)

Friday, June 18 9:00-6:00

Amplification of the Triplet Repeat in Fragile X Mental Retardation by PCR: Amplification and Gel Analysis (Dr. Gregory Leppert)

RT-PCR Analysis of CML: Gel Analysis (Dr. Gregory Leppert)

SNP Identification by Restriction Analysis: Digestion and Gel

(Dr. Gregory Leppert)

Visualization of Cells and Discussion (Ms. Erika Weaver)

Monday, June 21, 2010
9:00 - 11:30

1. Nexus of Genomic and Proteomic Approaches for the Analysis of Gene Expression and Alteration: Proteomic Approaches and DNA Microarrays:
2. 2D gel electrophoresis
3. Automated multidimensional chromatographic techniques
4. Mass spectrometer techniques
5. Types of DNA microarrays
6. Microarrays for characterization of global gene expression
7. Microarrays for chromosomal alterations
8. Relevance for Epidemiology of Cancer, etc. (Dr. James Greene)

Lunch
Afternoon – Clinical Seminars
2:45 - 5:30

1. Hereditary Breast and Ovarian Cancer Syndrome (Kathy Calzone, MSN, RN) 2:45 -4:15
2. Pre-Implantation Diagnosis (Dr. Alan DeCherney) 4:15 – 5:30

Tuesday, June 22, 2010
9:00 - 12:15

1. Experimental Approaches to the Study of Angiogenesis and Metastasis (Dr. Enrique Zudaire) 9:00 – 11:00
2. NINR Presentation (Dr. Patricia Grady) 11:15 – 12:15

Lunch
Afternoon – Clinical Seminars
1:15 - 4:00

1. Automated Sequencing Center - off campus (Dr. Bob Blakesley)

Wednesday, June 23, 2010
9:00 - 11:30 & 1:00 - 5:15

1. Bioinformatics and Computational Analysis of Gene Expression
2. Basic analysis of microarray data
3. “Higher order” analysis of microarray expression data
4. Pathway Relationship Analysis (Dr. James Greene)

Lunch

1. Multifactorial Inheritance Models (Dr. Chahira Kozma) 1:00 – 3:00

Thursday, June 24, 2010
9:00 - 11:30

1. Antisense DNA for Intervention of Gene Expression
2. Introduction to antisense nucleic analysis
3. How antisense nucleic acid can intervene with gene expression
4. siRNA and their potential as inhibitors and regulators of gene expression (Dr. James Greene)

Lunch

Afternoon – Clinical Seminars

1:00 - 4:15

1. Polyglutamine Expansion Disorders (Dr. Kurt Fischbeck) 1:00 – 2:30
2. Turner Syndrome – Monosomy X (Dr. Carolyn Bondy) 2:45 – 4:15

Friday, June 25, 2010
9:00 - 12:00

1. Genetics of Pain and Mental Health (Dr. Ray Dionne)

Lunch

Afternoon – Clinical Seminars

1:30 - 2:30 & 3:00 - 4:30

1. Lymphangioleiomyomatosis (LAM), Tuberous Sclerosis Complex, and Cystic Fibrosis (Dr. Joel Moss) 1:30 – 2:30
2. Diabetes – (Dr. Lori Bonnycastle) 3:00 – 4:30

Saturday, June 26, 2010

Core Laboratory Exercises for All Participants
9:00 - 6:00

Western Analysis: Protein Electrophoresis, Transfer and Antibody Detection; ELISA for Screening of Clinical Samples; Fluorescence-Activated Cell Sorting (FACS) (Dr. Bergman, Dr. Wolfgang Leitner)

Monday, June 28, 2010

Core Laboratory Exercises for All Participants
9:00 - 5:00

Analysis of DNA: Restriction Endonuclease Digestion; Agarose Gel Electrophoresis; Cloning and Bacterial Transformation (Dr. Gregory Leppert)

Afternoon – Clinical Seminar

1. Current Genetic/Genomic Education Priorities & Progress in Nursing (Dr. Jean Jenkins) 1:00 – 2:30

Tuesday, June 29, 2010

Core Laboratory Exercises for All Participants
9:00 - 6:00

Preparation of Cells for Karyotyping; Cytogenetics: Chromosome Banding, Fluorescent *In Situ* Hybridization (FISH), Genetic Defects (Dr. Jan Blancato and Mr. Tabari Baker)

Thursday, July 1, 2010

Lecture & Laboratory Exercise 8:00 - 12:00 & 1:00 - 7:00

1. Laser Capture Microdissection (LCM) Technology; Laser Capture of Malignant Prostate Tissue at LCM Core Facility (Dr. Jaime Rodriguez-canales and Dr. Jeffrey Hanson)

2. Real-Time PCR of Blood Samples (Dr. Dave Kulesh) **1:00 - 7:00**

Friday, July 2, 2010

Lecture: 8:00 - 12:00

1. Introduction to Gene Therapy
2. Corrective gene therapy
3. Adoptive gene therapy
4. Approaches to the introduction of therapeutic genes
5. Candidates diseases for gene therapy (Dr. James Greene) 8:00 - 10:00

6. Affymetrix GeneChip Technology: Gene Expression & Affymetrix GeneChip Technology: Genotyping and Re-sequencing (Ray Manyoky, Affymetrix) 10:00 - 12:00

Lunch

Laboratory: 1:00 - 5:00

7. Microarray Laboratory Demonstration, GeneAtlas, Assay Overview, Strip Processing, Data Analysis (Ray Manyoky, Affymetrix) 1:00 - 5:00

Staff List

Dr. Patricia Grady, Ph.D. 301-496-8230
Director gradyp@mail.nih.gov
NIH\NINR
Building 31 - Claude D Pepper Building, 5B05
Bethesda, MD 20892

Ray Dionne, DDS, PhD 301-480-1413
National Institute of Nursing Research dionner@mail.nih.gov
National Institutes of Health
31 Center Drive
Building 10-CRC-Room 2-1339
Bethesda, MD 20892-2178

Mark Nardone 301-496-8290
Director - Biotrac Program nardonem@mail.nih.gov
FAES/NIH
Bldg. 60, Room 60
One Cloister Court
Bethesda, MD 20814

Natalie Ann Rasmussen, Ph.D. 301-443-5061
NIH\NINR rasmussenna@mail.nih.gov
10-CRC - Hatfield Clinical Research Center, 2-1339
10 Center Dr.
Bethesda, MD

Instructors

Tabari Baker 202-444-1536
Department of Oncology tabari.baker@gmail.com
Georgetown University
School of Medicine
3800 Reservoir Road
Washington, DC 20057

Elke Bergmann, Ph.D. 301-319-9278
Course Director Elke.BergmannLeitner@US.ARMY.MIL
WAIR
Dept of Immunology
Bldg. 503, Rm. 3W76
Forest Glenn Annex
Silver Spring, MD 20910

Bob Blakesley, Ph.D. 301-435-6157
NIH/NHGRI
NIHH Intramural Sequencing Center
5625 Fishers Ln
Rockville, MD 20892

Jan Blancato, Ph.D.
Department of Oncology
Georgetown University
School of Medicine
3800 Reservoir Road
Washington, DC 20057
202-444-1536
blancatj@georgetown.edu

Lori Bonnycastle, Ph.D.
NIH\NHGRI
Building 50 - Louis B Stokes Lab, 5314
50 South Dr
Bethesda, MD 20892
301-594-9206
lbonnyca@mail.nih.gov

Joseph Bressler, Ph.D.
School of Public Health
Johns Hopkins University
Baltimore, MD 21205
443-923-2677
bressler@kennedykrieger.org

Lawrence Brody, Ph.D.
NIH/NHGRI
Building 50 - Louis B Stokes Lab, 5306
50 South Dr
Bethesda, MD 20892
301-496-7824
lbrody@helix.nih.gov

Kathy Calzone, MSN, RN
NIH/NCI
Cancer Genetics Branch
Building 8, 5101
Bethesda, MD 20892
301-435-0538
calzonek@mail.nih.gov

Frank Castora, Ph.D.
Department of Physiological Sciences
Eastern Virginia Medical School
Norfolk, VA 23501
757-446-5657
CastorFJ@evmsmail.evms.edu

Yvette Conley, Ph.D.
School of Nursing
440 Victoria Building
3500 Victoria St
Pittsburgh, PA 15261
412-383-7641
yconley@pitt.edu

Alan DeCherney, Ph.D.
NIH\ NICHD
Reproductive Biology & Medicine Branch
10-CRC - Hatfield Clinical Research Center, 1-3140
Bethesda, MD 20892
301-496-5800
decherna@mail.nih.gov

Ray Dionne, DDS, PhD 301-480-1413
National Institute of Nursing Research dionner@mail.nih.gov
National Institutes of Health
31 Center Drive
Building 10-CRC-Room 2-1339
Bethesda, MD 20892-2178

Kurt Fischbeck, Ph.D. 301-435-9318
NIH\NINDS kf@ninds.nih.gov
Hereditary Neurological Disease
Building 35 - Porter Bldg, 2A1000
Bethesda, MD 20892

John Golin, Ph.D. 202-319-5722
Department of Biology golin@cua.edu
The Catholic University of America
Washington, DC 20064

Dr. Patricia Grady, Ph.D. 301-496-8230
Director gradyp@mail.nih.gov
NIH\NINR
Building 31 - Claude D Pepper Building, 5B05
Bethesda, MD 20892

James Greene, Ph.D. 202-319-5273
Department of Biology Greene@cua.edu
The Catholic University of America
Washington, DC 20064

Jeffrey Hanson, Ph.D. 301-402-5942
NCI/NIH hansoje@mail.nih.gov
LCM Core Facility
Laboratory of Pathology
Bldg. 10, Rm B1B37, MSC1500
Bethesda, MD 20892

David A. Kulesh, Ph.D. 301-619-6354
Research Microbiologist David.Kulesh@amedd.army.mil
Systems Development Branch, Diagnostic Systems Division
US Army Medical research Institute of Infectious Diseases (USAMRIID)
1425 Porter Street
Fort Detrick, Frederick, MD 21702-5011

Jean Jenkins, Ph.D. 301-496-4601
NIH\NHGRI jenkinje@mail.nih.gov
Genomic Healthcare Branch
Building 31 - Claude D Pepper Building, 4B09
31 Center Dr
Bethesda, MD 20892

Wolfgang Leitner, Ph.D. 301-402-7839
NIAID/NIH, DHHS wleitner@mail.nih.gov
Innnate Immunity Sect
6610 Rockledge Drive
Room 3070, MSC 6601
Bethesda, Maryland 20892

Greg Leppert, Ph.D. 301-435-5258
FAES/NIH/Biotrac leppertg@mail.nih.gov
Bldg. 60, Room 60
One Cloister Court
Bethesda, MD 20814

Mary L. O'Connor Leppert, M.B., B.Ch., B.A.O. leppert@kennedykrieger.org
Division of Neurology and Developmental Medicine 443-923-3240
Kennedy Krieger Institute
707 North Broadway
Baltimore, MD 21205

Joel Moss, Ph.D. 301-496-1597
NIH\NHLBI mossj@nhlbi.nih.gov
Building 10 - Magnuson Clinical Center, 6D03
10 Center Dr
Bethesda, MD 20892

J. Michael Mullins, Ph.D. mullinsj@cua.edu
Department of Biology
The Catholic University of America
Washington, DC 20064

Jaime Rodriguez-Canales, MD, FEBP 301-402-5942
NCI/NIH rodrigja@mail.nih.gov
LCM Core Facility
Laboratory of Pathology
Bldg. 10, Rm B1B37, MSC1500
Bethesda, MD 20892

Emma Kurnat-Thoma, MS, RN 301-496-5849
NIH\NHGRI kurnate@mail.nih.gov
Molecular Pathogenesis Sect.
Building 50 - Louis B Stokes Lab, 5305
50 South Dr
Bethesda, MD 20892

Erika Weaver 301-435-5258
FAES/NIH/Biotrac
Bldg. 60, Room 60
One Cloister Court
Bethesda, MD 20814

Enrique Zudaire, Ph.D.
Senior Scientist, NCI Angiogenesis Core Facility
Office of the Director
Advanced Technology Center, NCI/NIH
8717 Grovemont Circle, Suite 115
Gaithersburg, MD 20877

301-496-8050
zudairee@mail.nih.gov