

**DIVISION OF INTRAMURAL RESEARCH**

**NAEHS COUNCIL UPDATE**

**FEBRUARY 2003**

## **DIR Recruitments**

### **Chief, Laboratory of Computational Biology and Risk Analysis**

An international search is being conducted for a senior tenured investigator to serve as Chief of the Laboratory of Computational Biology and Risk Analysis. The candidate will be expected to:

- Develop and maintain a strong personal research effort in the general area of bioinformatics, particularly as it relates to biological networks, proteomics and genomics.
- Provide overall leadership for the existing principle investigators within the LCBRA who study the combined development of laboratory methods for humans and animals with computational, statistical and mathematical methods to further our understanding of the mechanisms underlying environmental disease.
- Recruit talented investigators to the LCBRA and provide a focus for collaborations within the NIEHS.

The Candidate should be a senior investigator with an international reputation in a specific area within the broad context of bioinformatics and its relationship to the environment. Possible research areas include but are not limited to mathematics, statistics, genetics, bioengineering and molecular biology. The successful candidate will also have an outstanding publication record and proven history of research leadership. A search committee chaired by Dr. Clarice Weinberg, Chief of the Biostatistics Branch should start reviewing applications soon.

### **Tenure-track Bioinformaticist**

The Biostatistics Branch is conducting a nationwide search for a tenure-track investigator with training and experience in bioinformatics. The person selected will focus activities upon developing novel methods related to toxicogenomics, such as developing and evaluating data mining approaches for elucidating characteristic patterns in gene expression array or proteomic data in order to facilitate searches for functionally-coordinated families of genes related to disease processes or response to toxicants. Improved quantitative methods for functional genomics and data mining are needed to make full scientific use of the toxicogenomics data being produced by the NIEHS Microarray Center and the National Center for Toxicogenomics. A search committee chaired by Dr. Douglas Bell, Laboratory of Computational Biology and Risk Analysis has been formed and should start reviewing applications soon.

### **Tenure-track Immunologist**

The Laboratory of Pulmonary Pathobiology is conducting a national search for a

cellular/molecular immunologist. The candidate will be expected to establish a high-quality independent research program in pulmonary immunology in a laboratory with diverse research interests and backgrounds. The successful candidate will have research strengths in, but not necessarily limited to, pulmonary biology (such as mechanisms of tolerance, allergy, adaptive and/or innate immune response to respiratory infections, etc). A search committee chaired by Dr. John Drake, Chief of the Laboratory of Molecular Genetics has been formed. Review of applications should begin soon.

### **Tenure-track Environmental Epidemiologist**

The Epidemiology Branch is conducting a national search for an environmental epidemiologist. This person will be expected to develop an outstanding research program on the effects of environmental exposures and risks of chronic disease. Applicants with demonstrated research interests in biological mechanisms and etiology of (not limited to) neurodegenerative diseases, diabetes, multiple sclerosis, renal disease, cardio-respiratory diseases; and such exposures as pesticides, metals, and/or solvents are most welcome. A search committee chaired by Dr. Steven Kleeberger, Chief of the Laboratory of Pulmonary Pathobiology has been formed and should start reviewing applications soon.

### **Staff Scientist Biostatistician**

The Biostatistics Branch is conducting a national search for a statistician to collaborate closely with the National Toxicology Program. The successful candidate will provide statistical leadership and consulting support for the National Toxicology Program and will also develop methods related to design and analysis of toxicology studies. Applicants should have with experience in statistical consulting and a demonstrated ability with problems in applied statistics. The search committee, chaired by Dr. John Pritchard, Chief, Laboratory of Pharmacology and Chemistry, is interviewing candidates.

### **Chief, Laboratory of Molecular Carcinogenesis**

An international search has been conducted for a senior tenured investigator to serve as Chief of the Laboratory of Molecular Carcinogenesis. The Candidate should have an international reputation in a specific area within the broad context of molecular carcinogenesis and its relationship to the environment, an outstanding publication record, and a proven history of research leadership. The search committee, chaired by Dr. Thomas Kunkel, Chief of the Laboratory of Structural Biology selected Dr. Trevor Archer, currently a Senior Investigator in the Laboratory of Reproductive and Developmental Toxicology, who has agreed to accept the position. Final approval is pending at N.I.H.

### **Tenured or tenure-track Reproductive Epidemiologist**

The Epidemiology Branch has conducted an international search for a reproductive epidemiologist who will develop an outstanding research program on reproductive or perinatal health and the effects of environmental factors, including fertility, pregnancy loss, diseases of pregnancy, fetal development, birth defects, and other problems of the neonatal period. Dr. Joanne Promislow, currently a post-doctoral fellow in the Department of Epidemiology, University of North Carolina, has agreed to accept this position.

### **Tenure-track or tenured Biostatistician--Statistical Genetics**

The Biostatistics Branch has conducted an international search for a tenure-track or tenured statistician to conduct independent research on methods development in statistical genetics. Two different candidates were recommended and their respective appointments are pending final approval.

### **Staff Scientist-Head, Mass Spectrometry Protein Microcharacterization Core Facility**

The Laboratory of Structural Biology has conducted a national search for a Staff Scientist to serve as Head of the Mass Spectrometry Protein Microcharacterization Core Facility in the Division of Intramural Research. The successful applicant will be a Staff Scientist in the Laboratory of Structural Biology under the supervision of Dr. K. Tomer and be responsible for the MALDI/MS and capillary HPLC/ESI/MS/MS identification of proteins isolated by 1-D and/or 2-D gel electrophoresis, in-gel digestion, determination of sites of post-translational protein modifications, identification of sites of interactions in protein complexes by limited proteolysis, protein purification by LC, and use of affinity techniques combined with mass spectrometry. Additional duties will include close interaction with DIR scientists, serving as a mass spectrometry expert during the planning and execution of experiments, and supervision of laboratory technicians. The search committee, chaired by Trevor Archer, Laboratory of Reproductive and Developmental Toxicology, has recommended a candidate and negotiations are currently underway.

### **Staff Scientist—Protein Expression**

The Laboratory of Structural Biology is conducting a national search for a Staff Scientist to serve as Head of the Protein Expression Core Facility. The candidate will manage a facility the purpose of which is to provide proteins for structural and characterization studies conducted by intramural scientists. A search committee chaired by Dr. William Copeland, Laboratory of Molecular Genetics has recommended a candidate. Dr. Robert Petrovich, currently at Syngenta, has accepted an offer to fill this position.

## DIR Recruits

### **Dr. Steven Akiyama** **Deputy Scientific Director**

Dr. Steven Akiyama has recently been named one of two Deputy Scientific Directors in the DIR. He is also a Senior Investigator in the Laboratory of Molecular Carcinogenesis. He has previously served as Associate Director for Research and Training in the DIR. His research focuses on the mechanisms of adhesion and migration of human cancer cells. Cell adhesion and migration contribute to normal processes such as differentiation, embryonic development, and wound healing as well as to the progression of diseases and pathological conditions, such as cancer and inflammatory responses, that can result from either acute or chronic exposure to environmental toxicants and other chemicals. Key mechanistic steps in these processes involve the interactions of adhesive glycoproteins, e.g., fibronectin, laminin, and collagens, with the integrins, a family of heterodimeric adhesion receptors consisting of an  $\alpha$  subunit and a  $\beta$  subunit. Integrins are highly regulated receptors that can be directly activated extracellularly (outside-in signaling) and by cytoplasmic signaling pathways (inside-out signaling). His research is focused on characterizing the molecular mechanisms of integrin-mediated adhesion processes, the regulation of integrin activation, and the resulting downstream effect of cell adhesive proteins, such as fibronectin, important for the control of proliferation, adhesion, migration, and invasion of human tumor cells.

One approach that is being used employs a monoclonal antibody (mAb) as a highly specific, high affinity activator of integrin function. MAb 12G10, is an antibody that binds specifically to  $\beta 1$  integrins and induces integrin-mediated cell-cell and cell-substrate adhesion. Binding of mAb 12G10 to  $\beta 1$  integrins stimulates integrin clustering, an increase in intracellular cAMP levels, and a concomitant shift in the localization of the PKA type II regulatory subunits from the cytoplasm to areas of the plasma membrane where integrins expressing the 12G10 epitope are located. MAb 12G10-induced cell-cell adhesion was mimicked by specifically clustering  $\alpha 2\beta 1$  integrins or the binding of collagen type IV (an  $\alpha 2\beta 1$  ligand) in combination with elevating PKA activity with Sp-cAMPS or forskolin suggesting that the  $\alpha 2$  integrin and PKA play a key roles in up-regulation of cell-substrate and cell-cell adhesion.

#### *Selected Publications:*

- Akiyama, S.K., Yamada, S.S. and Yamada, K.M.: Analysis of the role of glycosylation in the structure and function of the human fibronectin receptor. *J. Biol. Chem.* 264: 18011-18018, 1989.
- Miyamoto, S., Akiyama, S.K. and Yamada, K.M.: Synergistic roles for receptor occupancy and aggregation in integrin transmembrane function. *Science*, 267: 883-885, 1995.
- Newton, S.A., Reeves, E.J., Gralnick, H.A., Mohla, S., Yamada, K.M., Olden, K. and Akiyama, S.K.: Role of integrin fibronectin receptor in metastasis of human breast carcinoma cells in athymic nude mice. *Int. J. Oncol.*, 6: 1063-1070, 1995.

- Akiyama, S.K., Olden, K. and Yamada, K.M.: Fibronectin and integrins in invasion and metastasis. *Cancer Metast. Rev.*, 14: 173-189, 1995.
- Whittard, J.D. and Akiyama, S.K.: Activation of  $\alpha_1$  integrins induces cell-cell adhesion. *Exp Cell Res.*, 263: 65-76, 2001.
- Whittard, J.D. and Akiyama, S.K.: Positive regulation of cell-cell and cell-substrate adhesion by protein kinase A. *J. Cell Sci.*, 114: 3265-3272, 2001.
- Guo, H.-B, Lee, I., Kamar, M. Akiyama, S.K., and Pierce, M.: Aberrant N-glycosylation of beta-1 integrin reduces integrin clustering and stimulates phosphorylation of focal adhesion kinase and cell migration. *Cancer Res.*, 62: 6837-6845, 2002.

**Dr. William Schrader**  
**Deputy Scientific Director**

NIEHS welcomes Dr. Bill Schrader, who has recently been appointed as Senior Scientist in the Laboratory of Reproductive and Developmental Toxicology and Deputy Scientific Director. Dr. Schrader is a biochemist and molecular endocrinologist by training. He received the Ph.D. degree in Biology from Johns Hopkins University in 1969, and then did post-doctoral research at Vanderbilt Medical School where he published the first papers describing the subunit structure of nuclear receptors. He joined the faculty of Baylor College of Medicine in 1972, was appointed Professor of Cell Biology in 1985 and became Assistant Dean of the Graduate School in 1991. His research interests have dealt with the structure, function and regulation of the steroid receptor superfamily, especially sex hormone receptors and the xenosensor receptors of liver and intestine. His laboratory has developed methods for covalent attachment of steroids to their receptors, for studying receptor-DNA interactions, and for tests of the role of the hormone ligand as a regulatory effector of gene expression. His research group mapped sites of receptor phosphorylation and the mechanisms for ligand-independent gene regulation. He has sat on federal and professional review panels, and as an editor of international scientific journals. He joined Ligand Pharmaceuticals in 1995 as Vice President for Endocrine Research where he directed drug discovery for female and male sex hormone receptor modulators, including both agonists and antagonists for benign and oncologic indications. His programs successfully identified clinical candidate drugs for a number of hormonal conditions in men and women. They range from estrogen modulators for female post-menopausal osteoporosis and breast cancer to progestins for hormone replacement therapy and drugs for androgen-related conditions such as hypogonadism, acne and hirsutism. Several of these drugs have advanced into human clinical trials at Phase I, II or III. In 2000 Dr. Schrader co-founded XenoPharm, Inc., a biotechnology company that developed diagnostic assay methods for evaluating the activity of small molecules as inducers of liver metabolism and drug-drug interactions. At NIEHS he will study the molecular mechanisms underlying the activity of tissue-selective androgen receptor modulators, the "SARMs". Utilizing a novel set of fluorescent non-steroidal androgens, the studies will use fluorescence microscopy to follow these hormones from initial exposure to elimination from both cells and whole animals. Similarly, the fluorescent molecules will be studied by fluorescence polarization anisotropy, to measure association of the hormone with receptors in the nucleus in real time. These methods will be the basis for a screening system, set up using human cells to detect small molecules that perturb

receptor-hormone interactions, but do so only transiently such that their effects are not detectable by conventional ligand-protein equilibrium methods.

*Selected Publications:*

- Weigel, N.L., Carter, T.H., Schrader, W.T. and O'Malley, B.W.: Chicken progesterone receptor is phosphorylated by a DNA-dependent protein kinase during in vitro transcription assays. *Mol. Endocrinol.* 6: 8-14,1992.
- Polett, A., Conneely, O.M., McDonnell, D.P., Schrader, W.T. O'Malley, B.W and Weigel, N.L.: Chicken progesterone receptor expressed in *Saccharomyces cerevisiae* is correctly phosphorylated at all four Ser-Pro phosphorylation sites. *Biochemistry* 32: 9563-9569, 1993.
- Schrader, W.T.: Insight: subunit functions of the steroid/thyroid receptor family. *Mol Endocrinol.* 7: 1241-1243, 1993.
- Edwards, J.P., Zhi, L., Pooley, C.L., Tegley, C.M., West, S.J., Wang, M.W. Gottardis, M., Pathirana, C, Schrader, W.T. and Jones, T.K.: Preparation, resolution, and biological evaluation of 5-aryl-1, 2- dihydro-5H-chromeno[3,4-f]quinolines: potent, orally active, nonsteroidal progesterone receptor agonists. *J. Med. Chem.* 41: 2779-2785, 1998.
- Clemm, D.L., Sherman, L., Boonyaratanakornkit, V., Schrader, W.T., Weigel, N.L. and Edwards, D.P.: Differential hormone-dependent phosphorylation of progesterone receptor A and B forms revealed by phosphoserine site-specific monoclonal antibodies. *Mol. Endocrinol.* 14: 52-65, 2002.

**Dr. Leesa J. Deterding**

**Structural Biology Staff Scientist – Mass Spectrometry**

As a result to a national search, Dr. Lisa Deterding has recently been converted to a Staff Scientist in support of Dr. Ken Tomer, Laboratory of Structural Biology. She received her M.S. in analytical chemistry from the University of Nebraska-Lincoln and her Ph.D. in analytical chemistry from North Carolina State University. Her Ph.D. dissertation focused on the separation and structural analysis of the HDL apolipoproteins as potential biomarkers of coronary artery disease. Dr. Deterding's initial research efforts at NIEHS were on the development and application of nanoscale separation techniques with mass spectrometry, which have become standard procedures in proteomics and biological mass spectrometry.

Dr. Deterding's current role in the Laboratory of Structural Biology is primarily focused on the application of mass spectrometric techniques to structural problems in biology, including determination of post-translationally modified proteins, identification of complexes via immunoprecipitates, identification of differentially expressed proteins, and interaction of proteins with other biomolecules. Current ongoing projects include mapping the protein:DNA interaction sites on  $\beta$ -polymerase and polymerase  $\iota$ , determining the extent of and changes in the phosphorylation of specific histone H1 isoforms in response to hormonal induction, and determining the mechanisms of free radical formation on proteins subjected to oxidative stress. Dr. Deterding is also

planning structural studies on the *Bacillus subtilis* transition state regulator protein AbrB that is involved in sporulation.

Selected Publications:

- Deterding, L.J., Barr, D.P., Mason, R., and Tomer, K.B.: Characterization of cytochrome c free radical reactions with peptides by mass spectrometry. *J. Biol. Chem.* 273: 12863-12869, 1998.
- Deterding, L.J., Prasad, R., Mullen, G.P., Wilson, S.H., and Tomer, K.B.: Mapping of the dRP lyase active site in DNA polymerase  $\beta$  by mass spectrometry. *J. Biol. Chem.*, 275: 10463-10471, 2000.
- Chen, Y.-R., Deterding, L.J., Tomer, K.B., and Mason, R.P.: The nature of the inhibition of horseradish peroxidase and mitochondrial cytochrome c by cyanyl radical. *Biochemistry*, 39: 4415-4422, 2000.
- Banks, G.C., Deterding, L.J., Tomer, K.B., and Archer, T.K.: Hormone mediated dephosphorylation of specific histone H1 isoforms. *J. Biol. Chem.* 276: 36467-36473, 2001.
- Chen, Y.-R., Deterding, L.J., Sturgeon, B.E., Tomer, K.B., and Mason, R.P.: Protein Oxidation of cytochrome c by reactive halogen species enhances its peroxidase activity. *J. Biol. Chem.*, 277: 29781-29791, 2002.

**Dr. Mark Gourley**

**Staff Clinician, Environmental Autoimmunity Group**

Dr. Mark Gourley joined the Environmental Autoimmunity Group (EAG) in the Office of Clinical Research, DIR, as a staff clinician at the Warren Grant Magnuson Clinical Center, Bethesda, MD, in August, 2002. Dr. Gourley provides care to patients enrolled in clinical protocols investigating the role of the environment in rheumatic diseases. His clinical research investigates factors in the environment that are implicated in causing or modifying autoimmune disease. While specializing in the autoimmune disease systemic lupus erythematosus (SLE), the EAG will begin to focus research on SLE, rheumatoid arthritis, myositis and scleroderma. It is anticipated that more than 1000 volunteers will be enrolled into a clinical research protocol that seeks to find factors in the environment in the above named diseases along with genetic factors that associate the these illnesses.

Dr. Gourley received his M.D. from Tulane University, completed his residency in internal medicine at Madison, Wisconsin and was trained in rheumatology at the National Institute of Arthritis, Musculoskeletal and Skin Diseases, NIH. Previous to joining NIEHS, he was an Attending Rheumatologist at the Washington Hospital Center where he served as the Acting Director as the section of rheumatology and the director of the lupus clinic. He is board certified in Internal Medicine and Rheumatology.

Selected Publications:

- Gourley, M.F., Austin III, H.A., Yarboro, C. H., Vaughan, E.M., Muir, J., Lindahl, M., Boumpas, D.T., Scott, D.E., Klippel, J.H., Balow, J.E. and Steinberg, A.D.:

- Methylprednisolone and cyclophosphamide, alone or in combination, in patients with lupus nephritis. A randomized, controlled trial. *Ann. Int. Med.* 125: 549-557, 1996.
- Lefkowitz, J.B., Kiehl, M., Rubinstein, J., Di Valerio, R. and Gourley, M.: Heterogeneity and clinical significance of glomerular binding antibodies in systemic lupus erythematosus. *J. Clin. Invest.* 98: 1373-1380, 1996.
- Villalba, L., Hicks, J.E., Adams, E.M., Sherman, J.B., Gourley, M.F., Leff, R.L., Thornton, B.C., Burgess, S.H., Plotz, P. H. and Miller, F.W.: Treatment of resistant myositis: A randomized crossover study of two new cytotoxic regimens. *Arthritis. Rheum.* 41: 392-399, 1998..
- Tassioulas, I.O, Aksentijevich, I., Salmon, J.E., Kim, Y., Yarboro, C.H., Vaughan, E.M., Davis, J.C., Scott, D.E., Austin III, H.A., Klippel, J.H., Balow, J.E., Gourley, M.F. and Boumpas, D.T.: Angiotensin I converting enzyme gene polymorphism in systemic lupus erythematosus: decreased prevalence of DD genotype in African American patients. *Clin. Nephrol.*, 50: 8-13, 1998.
- Solomou, E.E., Yuange-Taung, J., Gourley, M.F., Kammer, G.M. and Tsokos, G.C.: Molecular basis of deficient IL-2 production in T cells from patients with systemic lupus erythematosus. *J. Immunol.*, 166: 4216-4222, 2001.
- Illei, G.G., Austin, H.A., Crane, M., Collins L., Gourley, M.F., Yarboro, C.H., Vaughan, E.M., Kuroiwa, T., Danning, C.L., Steinberg, A.D., Klippel, J.H., Balow, J.E. and Boumpas, D.T.: Combination therapy with pulse cyclophosphamide plus pulse methylprednisolone improves long-term renal outcome without adding toxicity in patients with lupus nephritis. *Ann. Int. Med.*, 135: 248-257, 2001.
- Herdon, T.M., Yuange-Taung, J., Solomou, E.E., Rothwell, S.W., Gourley, M.F. and Tsokos, G.C.: Direct transfer of p65 into T lymphocytes from systemic lupus erythematosus patients leads to increased levels of interleukin-2 promoter activity. *Clin. Immunol.*, 103: 145-153, 2002.

**Dr. David Malarky**

**Staff Pathologist, Laboratory of Experimental Pathology**

Dr. David E. Malarkey received his B.S. and M.S. degrees from the University of Bridgeport, Connecticut; D.V.M. from Tufts University School of Veterinary Medicine; Pathology residency training at Angell Memorial Animal Hospital in Boston; and Ph.D. from North Carolina State University. Dr. Malarkey was a Research Fellow under the direction of Dr. Robert Maronpot in the Laboratory of Experimental Pathology at NIEHS from 1993-1997. He has been a Diplomate of the American College of Veterinary Pathologists since 1993 and has particular interest in the areas of toxicological and molecular pathology. Prior to his current position at NIEHS, Dr. Malarkey worked for 5 years as diagnostic pathologist, researcher, and teacher while a faculty member at North Carolina State University College of Veterinary Medicine in Raleigh, NC. His research efforts are in the areas of toxicologic pathology, carcinogenesis, and molecular diagnostic techniques. Primary efforts have been to determine the biological behavior and genetic events involved in chemically induced liver tumors in B6C3F1 mice in order to better define the mouse model for its relevance in assessing human health hazards as well as deciphering the molecular basis of cancer. To date, studies have demonstrated

chemical specific *H-ras* proto-oncogene mutations; specific gene expression patterns in chlordane-associated liver tumor regression using microarray expression analysis with collaborations with the NIEHS microarray center; and evidence that alterations in the putative tumor suppressor gene, *Brcal*, occur in mouse liver tumor progression. Other collaborative efforts have been directed at characterizing the pathology of animal diseases, including transgenic mice, and successfully integrated the fields of clinical medicine and diagnostic pathology by applying molecular research techniques in veterinary clinical applications. Such projects include the use of a PCR-based test for the detection of *Helicobacter hepaticus* infection in mouse liver and a PCR-based clonality assay for aiding in the diagnosis of canine lymphoma.

Selected publications:

- Malarkey, D.E., Devereux, T.R., Dinse, G.E., Mann, P.C. and Maronpot, R.R.: Hepatocarcinogenicity of chlordane in B6C3F1 and B6D2F1 male mice: evidence for regression in B6C3F1 mice and carcinogenesis independent of ras proto-oncogene activation. *Carcinogenesis*, 16: 2617-25, 1995.
- Malarkey, D.E. and Maronpot, R.R.: Polymerase chain reaction and in situ hybridization: Applications in toxicological pathology. *Tox. Path.*, 24: 13-23, 1996.
- Hailey, J.R., Haseman, J.K., Bucher, J.R., Radovsky, A.E., Malarkey, D.E., Miller, R.T., Nyska, A., and Maronpot, R.R.: Impact of *Helicobacter hepaticus* infection in B6C3F1 mice from twelve National Toxicology Program two-year carcinogenesis studies. *Tox. Path.*, 26: 602-611, 1998..
- Andrews, J.M. and Malarkey, D.E.: Advanced diagnostic techniques: molecular diagnostics. In: *Atlas of Canine and Feline Cytology*, 1st edition, W.B. Saunders. Raskin, R. and Meyer, D., editors, 2001.
- Christensen, J., Romach, E.H., Healy, L.N., Gonzales, A.J., Anderson, S.P., Malarkey, D.E., Cattley, R.C. and Goldsworthy, T.L.: Altered Bcl-2 family expression during nongenotoxic hepatocarcinogenesis in mice. *Carcinogenesis*, 20: 1583-1590, 1999.
- Nyska A., Moomaw, C.R, Foley, J.F., Maronpot, R.R., Malarkey, D.E., Cummings, C.M., Peddada, S., Moyer, C.F., Allen, D.G., Travlos, G. and Chan, P.C.: The Hepatic Endothelial Carcinogen Riddelliine Induces Endothelial Apoptosis, Mitosis, S phase, and p53 and Hepatocytic Vascular Endothelial-Growth-Factor Expression After Short-term Exposure. *Toxicol. Appl. Pharmacol.*, 184: 153-164, 2002.

## Training and Mentoring

### The Fellows Award for Research Excellence-2003

The Fellows Award for Research Excellence (FARE) was started in 1995 to recognize scientific excellence among NIH intramural trainees. Trainees submit an abstract of their research, which is peer reviewed in a blinded study section competition. The awards are funded by the Scientific Directors, the Office of Research on Women's Health, and the Office of Education. In 2002, 828 applications were received and 203 were funded with \$1000 travel awards to attend a meeting in the United States at which they presented their abstract, either as a poster or a seminar. FARE 2003 winners will be invited also to present their work at one of the FARE poster sessions that will follow each of the Wednesday Afternoon Lecture Seminars in Bethesda, and to serve as a judge for FARE 2004.

The NIEHS had 19 winners of FARE 2003 awards:

<u>Winner</u>	<u>Laboratory/Branch</u>	<u>Mentor</u>	<u>Abstract Title</u>
Dr. Lesley Butler	Epidemiology Branch	Dr. Stephanie London	Intake Of Fruit And Asthma Incidence in a Cohort of Chinese Adults in Singapore
Dr. Seung Baek	Laboratory of Molecular Carcinogenesis	Dr. Thomas Eling	Troglitazone, a Peroxisome Proliferator-activated Receptor g (PPARg) Ligand, Selectively Induces Early Growth Response-1 (EGR-1) Gene Independently of Pparg: A Novel Mechanism For its Anti-Tumorigenic Activity
Dr. Jennifer Nixon	Laboratory of Molecular Carcinogenesis	Dr. Thomas Eling	Divergent Effects Of 15-Lipoxygenase-1 on Colorectal Versus Prostate Carcinogenesis
Dr. Petra Koken	Laboratory of Computational Biology and Risk Analysis	Dr. Christopher Portier	A Seasonal Adjustment Method For Analyzing the Impact of Temperature and Air Pollution on Cardiovascular Diseases in Denver
Dr. Liya Qin	Laboratory of Pharmacology and Chemistry	Dr. Jau-Shyong Hong	Roles of NADPH Oxidase in Mediating LPS-Induced Neurotoxicity and the Expression of Pro-inflammatory Factor Genes in Activated Microglia
Dr. Huiming Gao	Laboratory of Pharmacology and Chemistry	Dr. Jau-Shyong Hong	Synergistic Dopaminergic Neurotoxicity of the Pesticide Rotenone and Inflammogen Lipopolysaccharide: Relevance to the Etiology of Parkinson's Disease
Dr. Haiyan Tong	Laboratory of Signal Transduction	Dr. Elizabeth Murphy	The Protective Effect of Phosphatidylinositol-3-kinase and Glycogen Synthase Kinase-3 Beta in the Heart

Dr. Alberto Inga	Laboratory of Molecular Genetics	Dr. Michael Resnick	Characterization of p53 DNA Binding Affinity, Transactivation Capacity and Effects of Post-Translational Modifications Using a Yeast-Based System
Dr. Daniel Tomso	Laboratory of Computational Biology and Risk Analysis	Dr. Douglas Bell	The Influence of Local Sequence Context on Human Single Nucleotide
Dr. Maria Gallardo	Laboratory of Molecular Toxicology	Dr. Jean Harry	Boric Acid Inhibits the Proteolytic Activity of Prostate-Specific Antigen (PSA) In Vitro and Is Effective as a Dietary Supplement to Reduce Proliferative Activity and Local Expression of IGF-1 in Human Prostate Adenocarcinoma (LNCaP) Tumors in Nude Mice
Dr. Diane Klotz	Laboratory of Molecular Carcinogenesis	Dr. Richard DiAugustine	In Vivo Evidence for IGF-1/Estrogen Receptor Cross-talk: Estrogen Receptor-alpha is a Required Intermediate in IGF-1 Stimulated Uterine Proliferative Responses
Dr. Steven Qian	Laboratory of Pharmacology and Chemistry	Dr. Ronald Mason	Optimization of Chromatography Makes a Breakthrough of Radical Identification: LC/ESR, LC/MS, and MS/MS Characterizes in vitro and in vivo POBN Adducts of Carbon-Centered Lipid-Derived Radicals
Dr. Kenichi Imahashi	Laboratory of Signal Transduction	Dr. Elziabeth Murphy	Transgenic Expression of Bcl-2 Reduces Ischemia-Reperfusion Injury and Prevents Cytosolic Acidification During Ischemia
Dr. Jennifer Ingram	Laboratory of Pulmonary Pathobiology	Dr. Jamie Bonner	Interleukin-13-Stimulated Lung Myofibroblast Growth is Mediated by Platelet-Derived Growth Factor-AA in a Stat-6-Dependent Mechanism: Implications for the Development of Airway Fibrosis in Asthma
Dr. Dario Ramirez	Laboratory of Pharmacology and Chemistry	Dr. Ronald Mason	Immuno-Spin Trapping: First application in the detection of protein radical-derived nitrono adducts
Dr. Silvia Ramos	Laboratory of Signal Transduction	Dr. Perry Blackshear	The Zinc Finger Protein Zfp3612 is Critical to Female Fertility and Early Embryonic Development
Dr. Kiyoshi Hidaka	Laboratory of Signal Transduction	Dr. Stephen Shears	Importance to Chondrocyte Differentiation of Changes in Expression of the Multiple Inositol Polyphosphate Phosphatase
Dr. Robert Mohney	Laboratory of Signal Transduction	Dr. John O'Bryan	The Ubiquitin-Interacting Motifs (UIMs) of Epsin Recruit E3 Ubiquitin Ligase Complexes and Target Epsin for Ubiquitination
Dr. Robert Kokoska	Laboratory of Molecular Genetics	Dr. Thomas Kunkel	DNA polymerase IV (Dpo4) of <i>S. sulfataricus</i> generates replication errors by active site misalignment

## Awards and Honors for DIR Scientists 2002

Dr. David Armstrong (Laboratory of Signal Transduction) was selected to Chair the inaugural meeting of a new FASEB summer conference on Ion Channel Regulation, which will take place in 2003.

Dr. Douglas Bell (Laboratory of Computational Biology and Risk Analysis) was elected to be Chairman of the Molecular Epidemiology Group, American Association for Cancer Research in 2003; in that position he is serving as Chair-Elect on the Steering Committee.

Dr. John Cidlowski (Chief, Laboratory of Signal Transduction) was selected to become the next Editor-in-Chief of *Molecular Endocrinology*.

Dr. Darlene Dixon (Laboratory of Experimental Pathology) was elected to serve a three-year term on the Society of Toxicology Education Committee; and was also selected by Society of Toxicology Council to serve as Chairperson of the K-12 Subcommittee.

Dr. Joyce Goldstein (Laboratory of Computational Biology and Risk Analysis) was selected to join the editorial board of *Drug Metabolism Reviews* and is currently Associate Editor, *Journal of Biochemistry and Molecular Toxicology*.

Dr. Thomas Kunkel (Chief, Laboratory of Structural Biology) has been selected to be the Keynote Speaker at Midwest DNA Repair Symposium, Mayo Clinic and at the Gordon Research Conference on Genetic Toxicology, Oxford, England, both in 2003.

Dr. Larry Lazarus (Laboratory of Computational Biology and Risk Analysis) was on the Organizing Committee, Annual Conference on Opioid Mimetic Analgesics Awaji, Japan, March 2002; and was the Plenary Lecturer. "Dmt (2',6'-dimethyl-L-tyrosine): the universal message determinant for opioidmimetic peptides" Annual Conference on Opioid Mimetic Analgesia, Annual Conference on Opioid Mimetic Analgesia, Awaji, Japan, March 2002.

Dr. Stephanie London (Epidemiology Branch) was elected to the international program committee of the American Thoracic Society and was appointed as an Associate Editor of *Epidemiology*.

Dr. Matthew Longnecker (Epidemiology Branch) has been appointed to the Editorial Board of *Epidemiology* and has been made an Advisory Editor for *Environmental Research* and received a Public Health Service Commendation Medal in recognition of his contributions in the use of Collaborative Perinatal Project data to study environmental effects on children's health.

Dr. Ronald Mason (Laboratory of Pharmacology and Chemistry) was invited to give the Lawrence H. Piette Memorial Lecture, at the 44th Rocky Mountain Conference on Analytical Chemistry in July 2002.

Dr. Fred Miller (Office of Clinical Research) gave the Keynote address at the International Myopain Society, Munich, Germany in May 16 and was reelected to the Board of Directors and as co-chair of the Medical Advisory Board of the Myositis Association of America.

Dr. Elizabeth Murphy (Laboratory of Signal Transduction) has been selected for the Editorial Board of the *Journal of Molecular and Cellular Cardiology*.

Dr. Masahiko Negishi (Laboratory of Reproductive and Developmental Toxicology) received the annual Scientific Achievement Award from the International Society for the Study of Xenobiotics (ISSX) their annual meeting in November 2002.

Dr. Paul Nettesheim (Laboratory of Pulmonary Pathobiology) was received a Humboldt Research Award in recognition of this past achievements by the Alexander von Humboldt Foundation.

Dr. Kenneth Olden (Laboratory of Molecular Carcinogenesis and Director, NIEHS) received the Calver Award from the American Public Health Association in November 2002.

Dr. Allen Wilcox (Epidemiology Branch) was elected President of the American Epidemiological Society for 2002-03 and received the U.S. Public Health Service Distinguished Service Medal, 2002.

Dr. Samuel Wilson (Laboratory of Structural Biology and Deputy Director, NIEHS) was named the Keynote Speaker of the New York Medical College Annual Research Forum and the Mutagenesis Gordon Research Conference; the 21<sup>st</sup> William B. Kinter Lecturer, Mount Desert Island Biological Laboratory Annual Symposium. Dr. Wilson was also selected to be an Associate Editor for *DNA Repair* and appointed to the Program Committee for the 9<sup>th</sup> International Conference on Environmental Mutagens; to the Scientific Advisory Board – Program on Structural and Cell Biology of DNA Repair, Lawrence Berkeley National Laboratory; and to the Scientific Advisory Committee, CIIT; and to be Co-Chair of the Marshall Nirenberg Symposium

Dr. Darryl Zeldin (Laboratory of Pulmonary Pathobiology) was elected into American Society for Clinical Investigation (ASCI) in April 2002 and was elected Fellow, American Heart Association, Council for High Blood Pressure Research in May 2002.

## **Technology Transfer Activities in the DIR for 2002**

### **Material Transfer Agreements (MTAs)**

A total of 324 MTAs were reviewed and approved by the NIEHS Office of Technology Transfer. This number represents a 26% increase from FY 2001. Among approved MTAs, 259 (80%) are with academic institutes and the remaining 65 (20%) with pharmaceutical and biotechnology companies.

### **Cooperative Research And Development Agreements (CRADAs)**

Three CRADAs were approved by NIEHS Technology Transfer and by NIH Bethesda:

- “Development and Utilization of cDNA Microarrays for use in Analysis of Gene Expression Changes in Model organisms for Toxicological Studies” by Dr. Richard Paules, National Center for Toxicogenomics, with Boehringer Ingelheim Pharmaceuticals.
- “Proteomic Analysis in Diabetes” by Perry Blackshear, Laboratory of Signal Transduction, with Oxford Glycosciences, Ltd (UK).
- “Tumor Necrosis Factor-Alpha Receptor-1 (TNFR1 or p55) and Tumor Necrosis Factor Receptor-2 (TNFR2 or p75) cDNAs” by Dr. Jean Harry, Laboratory of Molecular Toxicology, with Immunex.

### **Employee Invention Reports**

Four Employee Invention Reports have been or will be filed with the US Patent Office.

- “Effective Activation of poly (A)-specific ribonuclease (PARN) for AU-rich element (ARE)-containing RNA substrates by tristetraprolin (TTP) and related proteins” by Dr. Perry Blackshear, Laboratory of Signal Transduction.
- “Improved Therapy for Asthma Through Increased 1-Phosphatase Activity Against Inositol Pentakisphosphate” by Dr. Stephen Shears, Laboratory of Signal Transduction.
- “A Novel RFX4 Transcript for use in the Diagnosis and prevention of familial Congenital Hydrocephalus” by Dr. Perry Blackshear, Laboratory of Signal Transduction and Dr. Darryl Zeldin, Laboratory of Pulmonary Pathobiology.
- “Mouse Model for Early Onset Cataract” by Dr. Robert Sobol, Laboratory of Structural Biology

## **Other Activities**

### License applications.

NIEHS scientists consult with the NIEHS Technology Transfer Office for possible license application regarding NIEHS technology. Licenses may be pursued following NIH OTT review in Bethesda as well as ability to find a commercial sponsor. Five license applications await OTT action.

### Foreign country technology transfer.

NIEHS exchanges MTAs with countries throughout Europe and Asia. This year about 15% of MTAs were with researchers abroad.

### Confidential disclosure agreements (CDAs).

Commercial organizations will not share data with NIEHS scientists without prior agreement restricting who shares in seeing the data. The NIEHS Technology Transfer Office, NIEHS Deputy Director and the Technology Transfer Service Center in Bethesda review and approve CDAs.

## **National Toxicology Program Update February 2003**

### **NTP Workshop on Transgenics**

The NTP is sponsoring a workshop, *Genetically Modified Rodent Models for Cancer Hazard Identification: Selecting Substances for Study and Interpreting and Communicating Results*, on February 21, 2003, at the Hamilton Crowne Plaza Hotel, 14<sup>th</sup> and K Street, NW in Washington, DC. The objectives of this workshop are to solicit comment on

- a process for selection of appropriate nominated substances to undergo cancer hazard evaluation in genetically modified or *transgenic* models
- issues related to the proper interpretation of results from “transgenic” cancer models, the implications of these findings for public health decisions, and the most appropriate interpretive language to describe the results of such studies to the scientific/regulatory communities and the public.

This meeting is open to the public subject to available space. The meeting begins with plenary sessions followed by sessions for two different breakouts designed to address the objectives given above. The meeting will conclude with reports from the breakout groups followed by time for open discussion by all attendees.

The agenda provides time for public comment. Details about the submission of written comments and presentation of oral comments are published in the *Federal Register* (Vol. 68, No. 1, pages 381-382); this notice is posted on the NTP web site. Persons wishing to attend should contact Diane Spencer in the NTP Liaison and Scientific Review Office (919-541-0530 or [spencer2@niehs.nih.gov](mailto:spencer2@niehs.nih.gov)).

## 10<sup>th</sup> Edition of the Report on Carcinogens

The Department of Health and Human Services released and made publicly available the Tenth Edition of the Report on Carcinogens (10<sup>th</sup> RoC) on December 11, 2002. Prepared by the NTP, the RoC identifies substances -- such as metals, pesticides, drugs, and natural and synthetic chemicals -- and mixtures or exposure circumstances that are *known* or are *reasonably anticipated* to be human carcinogens, and to which a significant number of Americans are exposed. This edition of the report adds 16 new listings and brings the total of substances in the report *known* or *reasonably anticipated* to be a cancer hazard to 228. The report makes a distinction between *known* human carcinogens, where there is sufficient evidence from human studies, and *reasonably anticipated* human carcinogens, where there is either limited evidence of carcinogenicity from human studies and/or sufficient evidence of carcinogenicity from experimental animal studies. The report also identifies current regulations concerning these listings in an attempt to address how exposures have been reduced. Additional information and an electronic file of the RoC are available on the NTP web site (<http://ntp-server.niehs.nih.gov>) or by contacting Dr. C.W. Jameson (919-541-4096 or [jameson@niehs.nih.gov](mailto:jameson@niehs.nih.gov)). Hard copies are available from Environmental Health Perspectives email [ehponline@niehs.nih.gov](mailto:ehponline@niehs.nih.gov).

### Newly listed as *known* human carcinogens

**Steroidal estrogens** - A number of the individual steroidal estrogens were already listed as *reasonably anticipated carcinogens* in past editions, but this is the first report to list all these hormones as a group. This group of related hormones controls sex and growth characteristics and is commonly used in estrogen replacement therapy to treat symptoms of menopause and in oral contraceptives. The RoC cites data from human epidemiology studies showing that estrogen replacement therapy is associated with a consistent increase in the risk of endometrial cancer and a less consistent increase in the risk of breast cancer. The RoC also cites evidence suggesting that oral contraceptive use may be associated with increased risk of breast cancer but has protective effects against ovarian and endometrial cancers.

**Broad-spectrum ultraviolet radiation** - is produced by the sun as part of solar radiation and by artificial sources such as sun lamps and tanning beds, in medical diagnosis and treatment procedures, and in industry for promoting polymerization reactions. Individuals can be exposed to UVR from natural (the sun) and artificial sources. The RoC cites data that indicate a causal relationship between exposure to UVR from natural sources and skin cancer, cancer of the lip and melanoma of the eye. Individuals can be exposed to artificial sources of UVR for cosmetic, medical and occupational reasons and that exposure to these artificial sources (such as sunlamps or sunbeds) is associated with an increased risk of melanoma. The RoC also indicates that skin cancers are observed with increasing duration of exposure and for those persons who experience sunburn.

**Wood dust** - is created when machines and tools cut, shape and finish wood. Wood dust is particularly prevalent in sawmills, furniture manufacture, carpentry and cabinet making. The RoC cites data from human epidemiological studies that have

consistently demonstrated that wood dust exposure increases the risk of cancers of the nasal cavities and paranasal sinuses.

**Nickel compounds** - used in many industrial applications as catalysts and in batteries, pigments and ceramics. The RoC listing is based on sufficient evidence of carcinogenicity from studies in humans, including epidemiological and mechanistic information that provides evidence of a causal relationship between workers' exposure to nickel compounds and excess mortality from lung and nasal cancers.

Upgraded from *reasonably anticipated* to *known* human carcinogen

**Beryllium and beryllium compounds** - about 800,000 workers are exposed via inhalation of beryllium dust or dermal contact with products containing beryllium. Workers with the highest potential for exposure include beryllium miners, beryllium alloy makers and fabricators, ceramics workers, missile technicians, nuclear reactor workers, electric and electronic equipment workers, and jewelers. The RoC listing is based on the observed causal relationship between workers exposed to either beryllium or beryllium compounds and lung cancer. The listing states that higher risks for lung cancer are found in groups with greater exposure or longer time since first exposure. These dose-response patterns support a causal relationship and cannot be explained by confounding from smoking or other occupational exposures.

Newly listed as *reasonably anticipated* to be human carcinogens

**IQ, or 2-amino-3-methylimidazo[4,5-f]quinoline** – is one of a series of heterocyclic amines formed during direct cooking with high heat of foods, such as meats and eggs, and is also found in cigarette smoke. The RoC listing is based on findings from oral studies of IQ in experimental animals that produced cancer in multiple organs of multiple species. The report also states that while no adequate human epidemiology studies have been reported that would indicate a human cancer risk specifically associated with exposure to IQ or other HCAs, there are published studies that provide some indication for an increased risk for breast and colorectal cancers related to consumption of broiled or fried foods that may contain IQ and/or other heterocyclic amines.

**2,2-bis-(Bromomethyl)-1,3-propanediol** (technical grade) - a flame retardant chemical used to make some polyester resins and rigid polyurethane foam is listed as *reasonably anticipated* based on long-term animal feeding studies. The RoC listing is based on findings from long term feeding studies of this chemical in laboratory animals where cancer was observed in multiple organs sites of multiple species of animals.

**Ultraviolet A (UVA), Ultraviolet B (UVB) and Ultraviolet C (UVC) Radiation** - Broad spectrum ultraviolet radiation contains wavelengths from 100 to 400 nm and is composed of individual components defined as UVA (315 to 400 nm), UVB (280 to 315 nm) and UVC (100 to 280 nm). The major sources of exposure to UVA and UVB are from natural solar radiation and artificial sources such as sunlamps, sunbeds and arc welding. UVC exists in the extraterrestrial solar spectrum, but is completely filtered out by the earth's ozone layer and does not reach the earth's surface. The major source of UVC exposure comes from artificial sources such as germicidal lamps, UV photography, and UV lasers. The RoC listing of UVA, UVB, and UVC is based on limited evidence of carcinogenicity from studies in humans and sufficient evidence of carcinogenicity from studies in experimental animals that indicate a causal relationship between exposure to UVA, UVB or UVC and skin cancer.

**Chloramphenicol** – is an antibiotic with restricted use in the United States because it can cause fatal blood disorders. The RoC listing is based on limited evidence of carcinogenicity from studies in humans showing an increased cancer risk for the occurrence of leukemia after chloramphenicol therapy.

**2,3-Dibromo-1-propanol** - a chemical used as an intermediate in the production of flame-retardants, insecticides, and pharmaceuticals. Formerly used in the production of TRIS-BP, a now banned flame retardant previously used in children's clothing and other products. The RoC listing is based on findings from skin painting studies of this chemical on laboratory animals that produced cancer in multiple organs of multiple species.

**Dyes metabolized to 3,3'-dimethoxybenzidine** - dyes that have been used to color leather, paper, plastic, rubber and textiles. The RoC listing is based on the fact that

3,3'-dimethoxybenzidine is carcinogenic in male and female rats, has been listed in the RoC since 1983 as *reasonably anticipated to be a human carcinogen* and that metabolism of these dyes to release free 3,3'-dimethoxybenzidine is a generalized phenomenon that occurs in all animal species studied.

**Dyes metabolized to 3,3'-demethylbenzidine** – dyes that have been used in printing textiles, in color photography and as biological stains. The RoC listing is based on the fact that 3,3'-dimethylbenzidine is carcinogenic in male and female rats, has been listed in the RoC since 1983 as *reasonably anticipated to be a human carcinogen* and that metabolism of these dyes to release free 3,3'-dimethylbenzidine is a generalized phenomenon that occurs in all animal species studied.

**Methyleugenol** - occurs naturally in oils, herbs and spices and is used in smaller amounts in its natural or synthetic form in flavors, insect attractants, anesthetics and sunscreens. The RoC listing is based on findings from oral studies of this chemical that produced cancer in multiple organs of multiple species of experimental animals.

**Metallic nickel** - used mainly in alloys with most exposures by inhalation or skin contact in the workplace. The nickel coin does not contain metallic nickel, but does contain a copper-nickel alloy. The RoC listing is based on findings from studies of this metal in multiple species of experimental animals that produced cancer at multiple organ sites.

**Styrene-7,8-oxide** - is used in the production of reinforced plastics and as a chemical intermediate for cosmetics, surface coatings, and agricultural and biological chemicals. The RoC listing is based on findings from oral studies of this chemical that produced cancer in multiple species of experimental animals.

**Vinyl bromide** - used in polymers in making fabrics for clothes and home furnishings, as well as in leather and metal products, drugs and fumigants. The RoC listing is based on findings from inhalation studies of this chemical that produced cancer in multiple organs of experimental animals.

**Vinyl fluoride** - used in making polyvinyl fluoride and related weather-resistant fluoropolymers. The RoC listing is based on findings from inhalation studies of this chemical that produced cancer in multiple organs of multiple species of experimental animals.

## **NTP Center for the Evaluation of Risks to Human Reproduction (CERHR)**

### **Review of Ethylene Glycol and Propylene Glycol**

The CERHR serves as an environmental health information resource. It provides timely and unbiased scientifically sound evaluations of human and experimental evidence for adverse effects on reproduction, including development, which may be caused by agents to which humans are exposed.

CERHR will hold an expert panel meeting February 11-13, 2003, in Alexandria, Virginia, to evaluate the potential reproductive and developmental toxicities of ethylene glycol and propylene glycol (Federal Register Vol. 67, No. 236, pages 72965 – 72967: December 9, 2002). This meeting is open to the public. Draft expert panel reports on ethylene glycol and propylene glycol are available electronically on the CERHR web site (<http://cerhr.niehs.nih.gov>).

Ethylene glycol is a high-production-volume chemical used chiefly in the production of polyester compounds. Widespread public exposure occurs through its common use as antifreeze for heating and cooling systems. Propylene glycol, similar in structure to ethylene glycol, is used as antifreeze, in de-icing solutions, and in various paints and coatings. Propylene glycol is also approved for use in various food additives, drugs, and cosmetics.

### **CERHR Workshop on Chemical-Induced Thyroid Dysfunction and Human Reproduction**

CERHR is planning a workshop to address how best to evaluate the potential for chemical-induced thyroid dysfunction to adversely affect human reproduction. Two primary issues for discussion at this meeting are: (1) the appropriate design of relevant toxicity tests for detecting adverse reproductive effects and (2) the appropriate use of rodent data for predicting effects in humans. This one *and* one-half day meeting is planned for late April 2003 in the Washington, DC area. Further details can be obtained from Dr. Michael Shelby, CERHR director (919-541-3455 or [shelby@niehs.nih.gov](mailto:shelby@niehs.nih.gov)).

## **NTP Interagency Center for the Evaluation of Alternative Toxicological Methods (NICEATM)**

### **Scientific Advisory Committee on Alternative Toxicological Methods (SACATM)**

The first meeting of the SACATM was held on December 5, 2002, at the Crystal Gateway Hotel in Arlington, Virginia. In response to the ICCVAM Authorization Act of 2000, the NIEHS established the new federally chartered advisory committee SACATM. This committee will provide advice on the statutorily mandated activities of the Interagency Coordinating Committee on the Validation of Alternative Methods (ICCVAM) and on activities of the NICEATM, including ways to foster partnerships and communication with interested parties. A copy of the charter is posted on the NICEATM/ICCVAM web site (<http://iccvam.niehs.nih.gov>) or available from the NTP Liaison and Scientific Review Office (919-541-0530 or [wolfe@niehs.nih.gov](mailto:wolfe@niehs.nih.gov)).

#### **Members of SACATM**

Daniel Acosta, Ph.D.  
University of Cincinnati

Steven Safe, Ph.D.  
Texas A & M University

Rodger Curren, Ph.D.  
Institute for In Vitro Sciences, Inc.

Jacqueline Smith, Ph.D.  
Private citizen

Jack Dean, Ph.D. (chair)  
Sanofi-Synthelabo, Inc.

Carlos Sonnenschein, M.D.  
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Nancy Flournoy, Ph.D.  
University of Missouri – Columbia

Martin Stephens, Ph.D.  
The Humane Society of the United States

Alan Goldberg, Ph.D.  
Johns Hopkins University

Katherine Stitzel, D.V.M.  
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Sidney Green, Ph.D.  
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Peter Theran, V.M.D.  
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Wallace Hayes, Ph.D.  
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Nancy Monteiro-Riviere, Ph.D.  
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