ABSTRACT

Exposure to research opportunities in toxicology and environmental sciences is key to the development of the next generation of scientists. The Community Outreach and Engagement Core of the NIEHS Center for Environmental Exposures and Disease at the University of Medicine and Dentistry of New Jersey-Robert Wood Johnson Medical School and the Rutgers University has developed a summer research fellowship program to promote toxicology and environmental sciences as careers in biomedical research. The program consists of 10-week basic science and translational research experiences for undergraduates and was also designed to include weekly events including laboratory safety and responsible conduct of research training, a field trip to a pharmaceutical company, career development and research seminars and student presentations. Participants of the 2012 summer research program ranked the field trip as the most valuable weekly activity followed by presentations from toxicologists and environmental health scientists. Based on pre- and post-survey results, over 60% of respondents reported that a career as a scientific researcher was most appealing based upon satisfaction from doing research, the perceived benefit of scientific knowledge to the community, and an overall interest in science. In addition, 87.5% of respondents will continue to pursue research after completion of the summer research program. This includes five students pursuing Ph.D. degrees beginning in 2012 or 2013. A summer research program engages undergraduate students in full-time research experiences and provides unique opportunities to promote toxicology and environmental sciences as research areas for the next generation of scientists and enhance career development skills. Supported by ES020721, ES005022, and ASPET SURF.

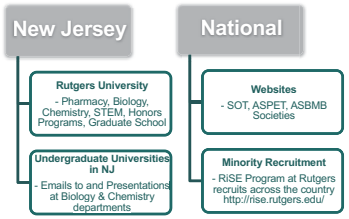
DEVELOPMENT OF SUMMER PROGRAM

Objective

Promote toxicology and environmental health sciences as careers in biomedical research to undergraduate students

Administration

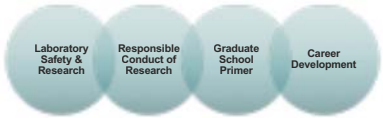
Recruitment



Funding

Institutional	• Department Support • Dean of School of Pharmacy • Graduate School
Societies	• American Society for Pharmacology and Experimental Therapeutics (ASPET) • Society of Toxicology (SOT)
Extramural	• NIH R25 Summer Training Grant • NIEHS Center Community Outreach and Education Core (COEC)

Training



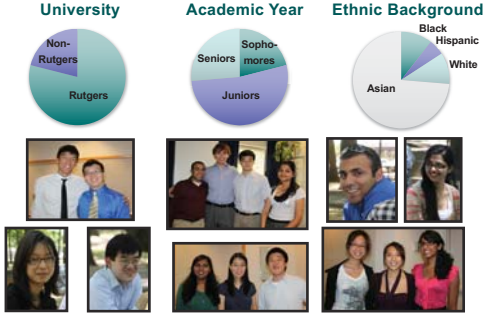
Outcomes

Internships	Graduate School	Awards	National Meetings	Publications
• Bristol-Myers Squibb Summer Interns	• 3 students in joint Pharm.D./Ph.D. Programs at Rutgers University	• SOT Pfizer Awards (2012) • SOT Minority Award (2013) • Aresty Grants	• Society of Toxicology • ASPET • New York Academy of Sciences	• 3-4 students with publications

LinkedIn group is used to monitor long-term outcomes

2012 SUMMER RESEARCH PROGRAM

Participants



Weekly Meeting Schedule

Week	Event	Week	Event
1	Laboratory safety training and welcome session	6	Toxicology in the News and Networking event
2	Dr. Michael Gallo, Toxicology Research	7	Field Trip to Bristol-Myers Squibb
3	Dr. Mark Robson, Environmental Health Sciences Research	8	Research Symposium
4	Career Development and Networking	9	Final Oral Presentations
5	Responsible Conduct of Research training	10	Final Oral Presentations

Field Trip to Bristol-Myers Squibb

Discussions and tours with scientists were centered on General Toxicology, Operations, Veterinary Sciences, Histopathology, Clinical Pathology, Immunotoxicology, Reproductive Toxicology, and Genetic Toxicology

Research Topics

Student	Mentor	Research Area	Topic
Katterin Colon	Richardson	Toxicology	Activation of Inflammatory Pathways by DDT and its Derivatives
Michael Little	Aleksunes	Pharmacology/Toxicology	Regulation of Liver and Kidney Efflux Transporters during Inflammation
Woo Young Choi	Fang	Toxicology	Mechanisms Causing Upper Respiratory Disease by World Trade Center Dust
Amna Jamil	Gow	Pharmacology/Toxicology	Effect of Oxygen Tension on S-Nitrosylated Myoglobin in the Trout Heart
Alex Tang	Gerecke	Pharmacology/Toxicology	Neutrophil Infiltration During Skin Wound Healing After Nitrogen Mustard
Maria Xu	Joseph	Pharmacology/Toxicology	Mouse Skin Models of Mustard Injuries
Gaby Ghobrial	Reuhl	Pharmacology/Toxicology	Recruitment of Neural Stem Cells in Response to Brain Injury
Ogugua Oseloh	Laskin	Pharmacology/Toxicology	Reactive Nitrogen species in Nitrogen Mustard-Induced Lung Injury
Purnima Verma	Velsmo	Pediatrics/Toxicology	Metabolic and Transport Genes in Human Placenta and Fetal Membranes
Amishi Desai	Laumbach	Environmental Medicine	Hair Cortisol Levels and Chronic Stress Measurement
Diana You	Yang	Chemical Biology	Different Forms of Tocopherols on RNA and Protein Levels of Cytochrome P450s
Andriy Kuzmov	Minko	Pharmaceutics	Nanostructured Lipid Carriers for the Co-delivery of Paclitaxel and siRNA
David Cheng	Kong	Pharmaceutics	Pharmacodynamics of Ginsenosides: Antioxidant Activities and Activation of Nrf2
Lefan He	Sinko	Pharmaceutics	Synthesis and Development of LvP-1 Peptides for Targeted Drug Delivery
Edward Lin	Michniak	Pharmaceutics	Drug Dissolution of Fenofibrate and Griseofulvin
Cindy Kui	Kimball	Medicinal Chemistry	Imidazopyrimidine Derivatives as Probes of the Bmi-1 Pathway in Cancer
Thant Ko Ko	Hu	Medicinal Chemistry	Small Molecule Inhibitors for Keap1-Nrf2 Interaction
Victoria Huang	Reilly	Pharmacy Practice	2012 Beers Criteria of Potentially Inappropriate Medications in Older Adults
Aparna Nanduri	Wagner	Pharmacy Practice	Evaluation of New Jersey's Project Healthy Bones

Program Evaluation

- The Survey Monkey website was used to evaluate student satisfaction.
- All 19 students were invited to participate – 17 students participating in the survey.
- Rating-based questions were as follows:
  1, Poor; 2, Fair; 3, Good; 4, Very Good; 5, Excellent
- Data regarding student satisfaction are shown in Figure 1.
  - 94% of students reported that they would recommend the summer program to their friends.
  - 87.5% of students reported that they would like to continue their research beyond the summer program.
  - 100% of students reported that the weekly seminars enhanced the summer research experience

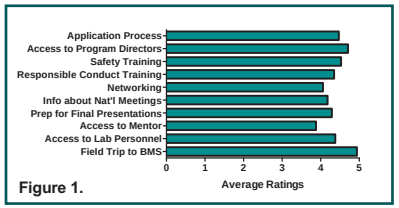


Figure 1.

ACKNOWLEDGEMENTS

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