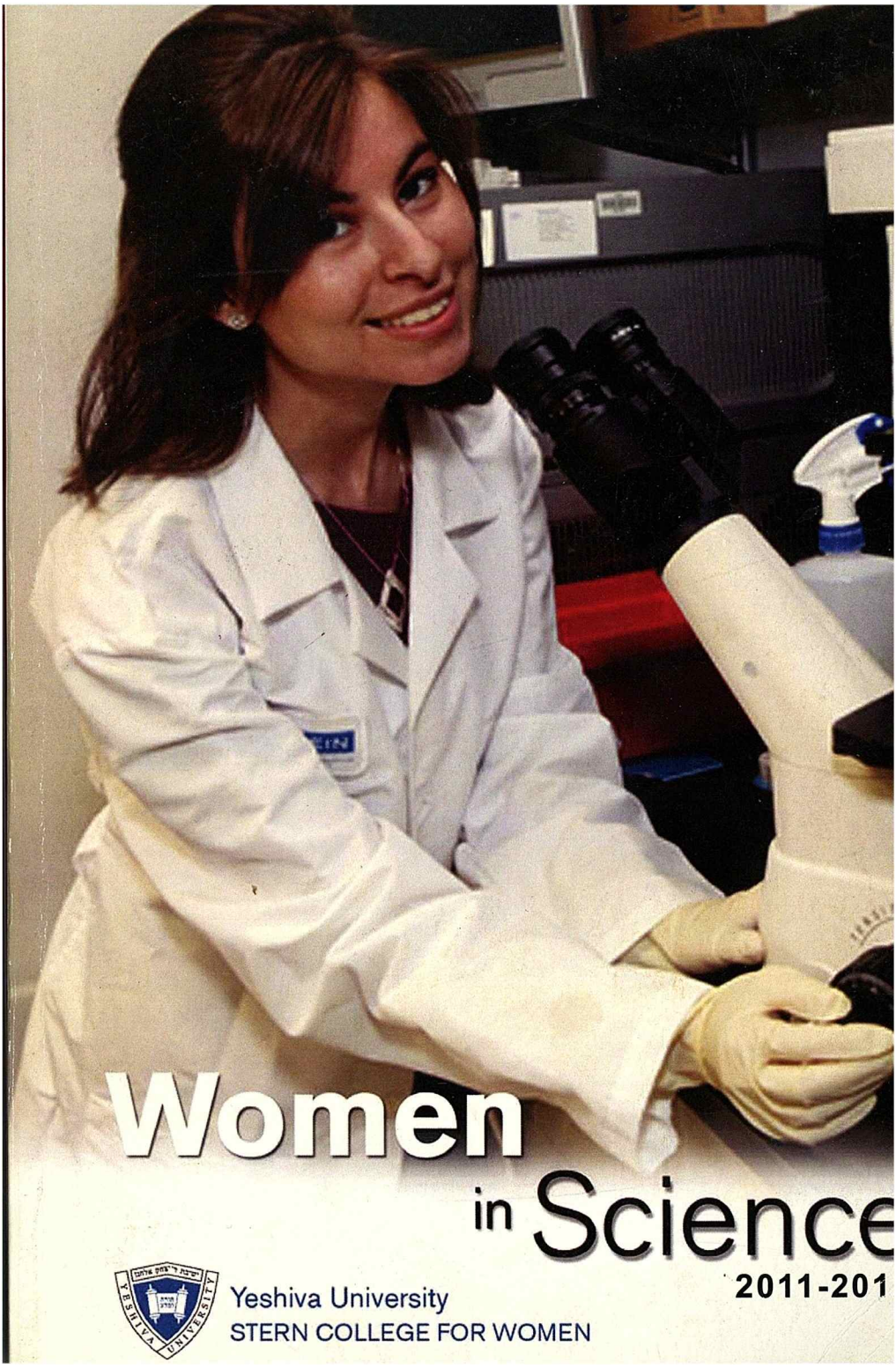

Women in Science

2011-201

Yeshiva University
STERN COLLEGE FOR WOMEN

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2011 - 2012

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Cover Photo: Leah Gutstein participating in the Summer Undergraduate Research Program at Albert Einstein College of Medicine of Yeshiva University Summer 2012.

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INTRODUCTORY REMARKS

The Departments of Biology, Chemistry/Biochemistry, Physics, and Psychology, each unique in its specific discipline, share a proactive approach to promoting the academic success of students at Stern College for Women (SCW) and in helping them achieve their career goals. The spectrum of career choices in the biomedical, health, natural sciences, physical sciences, and behavioral sciences is varied, with our students entering graduate programs in medicine, dentistry, osteopathy, optometry, veterinary science, psychology, physical therapy, occupational therapy, physician assistant, nursing, genetic counseling, pharmacy, nutrition, education, social work, and law; masters programs in biotechnology, public health, engineering, architecture, and bioinformatics; and doctoral programs in the biomedical sciences, chemistry, physics, neuropsychology, and clinical and school psychology. Education in biology, chemistry, physics and engineering sciences are stepping stones toward careers in research and education in technology-oriented fields, including nanoscience and nanotechnology.

The Departments of Biology, Chemistry and Biochemistry, and Physics direct students to stretch beyond the classroom experience by involvement in scientific research. Both in the academic year and the summer, students may work one-on-one with on-campus faculty. During the summer, laboratories at the Albert Einstein College of Medicine (Einstein) provide additional undergraduate research opportunities through the Roth Institute Program. Beginning in Summer 2011 and continuing in Summer 2012, a collaborative interaction between Bar Ilan University and Yeshiva University enabled SCW undergraduates to intern in research laboratories at Bar Ilan University and, thereby, to spend a summer in Israel. Summer internship opportunities for science students of all majors are available at the world-renowned facilities of the Brookhaven National Laboratory (BNL) and New Jersey Institute of Technology (NJIT), through collaborative research of YU, BNL, and NJIT. Furthermore, the science faculties actively encourage the science majors to apply for competitive undergraduate research internships, locally, nationally, and internationally. In the summer of 2012, more than 50 SCW students were involved in research, either at SCW, Einstein (see Summer Research at the Albert Einstein College of Medicine), or external research facilities, including at Fordham University, Montefiore Hospital, New York University Medical Center's Skirball Institute of Biomolecular Medicine, Sloan-Kettering Medical Center, Rutgers University's Biomedical Engineering Laboratory, Health Careers Opportunity Program at the Rusk Institute for Rehabilitative Medicine, Shaarei Tzedek Medical Center (Israel), The Rockefeller University, Toronto's Hospital for Sick Children's Developmental and Stem Cell Biology Program, and Emergency Medicine Research Department of University Hospitals (Cleveland, OH).

The Jewish Foundation for the Education of Women (JFEW) Science Fellowship Program was inaugurated in the 2009-2010 academic year, with ten participating students. In the 2010-2011 academic year, another nine students, and in 2011-2012 another ten students, all with interests in the sciences, joined the program. Highlights of the JFEW Science Fellowship Program include a partial scholarship, a stipend for a summer research internship, a stipend to support scientific conference attendance, one-on-one mentoring with a science faculty member, and an enrichment program, providing workshops to aid students in their professional development. This year, the JFEW Fellows have obtained internships, either in clinical or biomedical wet-lab research, in fields of research including oral cancer biology, reproductive cell biology, neurobiology, psychology, breast cancer research, developmental biology, anesthesiology, neurophysiology, and food chemistry. The Fellows have interned in prestigious institutions, including the The Rockefeller University, Albert Einstein College of Medicine, Johns Hopkins University, Harvard Medical School, and Rutgers University and in industry (Citromax). Several of the JFEW students have taken leadership roles in forming the Neurobiology Club, the Genetics Club, and the Optometry Club. The first cohort of JFEW Fellows graduated in May 2012, and all ten graduates plan to continue their education; their planned fields of study include food chemistry, biomedical engineering, epidemiology, medicine, and optometry.

The Department of Psychology offers an Honor's Research Seminar for upper-level psychology majors. As part of this seminar, students are involved in ongoing research projects, either at SCW or at off-campus sites, such as NYU Medical Center and Mt. Sinai School of Medicine, and are supervised by an on-site investigator for 8 hours/week for 12 weeks. The in class requirements for the course are a comprehensive literature review and/or scientific report of the students' research projects, as well as an oral presentation. The combination of internship and seminar allows the students to gain practical experience in literature review, data collection and management, and scientific writing and oral presentations. Students attending graduate programs in Clinical Psychology have identified the research seminar as being particularly helpful in preparing them for graduate school.

To meet growing student interest in the neurosciences, programs in neurobiology were instituted by a collaborative interaction between the Department of Psychology and the Department of Biology. In these programs, students complete a prescribed combination of courses in biology and in psychology (with each Department emphasizing its own requirements) and upon successful completion of the program, the designation "concentration in the neurosciences" is included on the college transcript. As part of this joint interactive program, a laboratory course in Neurobiology was developed which included laboratory experiences both at SCW and at The Rockefeller University.

A specific objective of the science departments at SCW, in addition to nurturing the highest level of academic achievement, is to provide students with opportunities for leadership roles. Upper level students may be appointed to positions as Teaching Assistants (TAs) for laboratory sections and as Recitation Instructors to review materials for the lecture sections of the science courses. Student-led clubs, such as the Biology Club, the Chemistry Club, the Physics Club, the Psychology Club, the PreMed Club, the PreDent Club, the Occupational Therapy Club, the Pharmacology Club, the Nutrition Club, the Bikur Cholim Club, etc., provide opportunities for students to gain skills in organizing events and in coordinating social functions. The 2010-2011 academic year saw the birth of four new Clubs: the PreNursing Club, the Genetics Club, the Optometry Club, and the Neuroscience Club. Our newest Club, the Public health Club, was launched in the 2011-2012 academic year. The Clubs actively recruit speakers. For example, the Genetics Club hosted Dr. Nicole Schreiber-Agus, scientific director to the Human Genetics Laboratory at Jacobi Medical Center, as well as the scientific director of the new Genetics Health Program at Einstein, and Dr. Richard Grazi, an *in vitro* fertilization physician, the Neuroscience Club hosted a joint lecture by Rav H. Schachter and Dr. Norman Adler, the PreMed Club organized a lecture by Dr. Edward Reichman, Emergency Medicine, Montefiore Hospital and head of YU's Medical Ethics Society. These student-run Clubs give the students opportunities to develop leadership and organizational skills.

Students engaged in behavioral research in Psychology, Biology, or Neuroscience are encouraged to present at the Annual Behavioral Sciences Student Research Conference held at the Ferkauf Graduate School of Psychology of Yeshiva University. The conference serves as a valuable opportunity for undergraduates to discuss their research in an academic setting and to meet other undergraduate and graduate students and faculty involved in research.

SURGE, the Student Undergraduate Research Group Exchange, is a faculty-sponsored, student-led club that gives students the forum to present their research as a seminar before their colleagues and the science faculty. The goals of this faculty-initiated club are to encourage and foster research and the exchange of research information. Meetings are held once a month, usually with two or three students making professional PowerPoint presentations. Faculty members also use these meetings to inform students of upcoming internships and fellowship opportunities. In the 2011-2012 academic year, the following students presented seminars at SURGE meetings:

Date	Presenter(s)	Title
Fall 2011		
September 14	Simone Fertel, Sarah Reiss, Bella Wolf	"The Effects of Ellagic Acid on Cancerous Cells"
	Gigi Ben David	"From Neuroblastoma to Neuron : A Differentiation Process"
	Elisa Karp	"Understanding the Role of Intronic Cis-acting Elements in the Splicing of MacroH2A1 Variants"
November 15	Helen Unger	"The Role of Oligoribonuclease in Formation of Biofilm in P. Aeruginosa."
	Sara Silvestri	"Humanin: A Protector of the Mitochondrial Membrane."
	Hannah Marmor, Leah Gutstein	"The Effects of Tobacco Smoke on Spermatogenesis."
December 14	Samantha Selesny, Chana Esan, Koral Dadon	"Clinical Outcomes and Evaluative Measures of Delirium in Elderly Patients"
	Tova Miller	"Circadian RNA Editing in Zebrafish"
Spring 2012		
February 22	Faygel Beren	"Making Genetic Sense of Autism."
	Miriam Steinberger	"Multisensory Processing in Children with Autism."
	Malki Zughaft	"Object Memory and Spatial Ability in Young and Aged Women."
March 28	Yosefa Schoor	"Liar Liar Brain on Fire: an fMRI-based Analysis of Lie Detection."
	Davida Kollmar	"Neuron Morphology and Development."

Each Fall semester, the science departments jointly sponsor a poster presentation contest. Students present their work and discuss the research with attending faculty. The posters, and more importantly the student's understanding of the project and the extent of her hands-on participation, are evaluated by the science faculty. Winners are selected to present at a national meeting of the American Chemical Society. The costs of attending the meeting, including transportation and hotel, are underwritten by the Dean's Office, SCW, and by faculty research grants. In the Spring semester of 2012, Ma'ayan Hachen (poster title: Stress modulates mitochondrial gene expression in the rat hippocampus), Elisa Karp, Hadassah Klerman (poster title: Understanding the role of intronic *cis*-acting elements in the splicing of macroH2A1 variants), Bella Wolf, Sarah Reiss, and Simone Fertel (poster title: Proapoptotic effects of ellagic acid, a metabolite of pomegranate extract, on human oral carcinoma HSC-2 cells) presented their research at the 243rd American Chemical Society meeting, San Diego, California.

SCW graduates attending Einstein for their medical education are eligible to apply for Anne Scheiber Fellowships. This unique award provides up to full tuition scholarships based on need for four years of medical training (see "Anne Scheiber Fellowship"). Students considering careers in various Allied Health fields (for example, occupational and physical therapy) or in engineering may wish to consider one of our several combined degree programs with other universities. In the spring term of 2009, Yeshiva University entered into a cooperative agreement with the NYU Steinhardt School of Culture, Education, and Human Development, designed to expand opportunities for students to prepare for a career in teaching math and science at the elementary and high school levels. During the past academic year, Stern College signed an articulation agreement to implement a combined program with the NYU College of Nursing. Students interested in this program will pursue a shaped major that will lead to the completion of the necessary prerequisites within five semesters for those who studied for a year abroad in Israel (or seven semesters for those who came directly to Stern College after high school). If they are accepted to the program, they will receive a B.A. from Stern College upon completion of their first semester at the NYU College of Nursing. Once they have successfully completed the 15-month accelerated program at NYU, they will then be awarded a BSN from the nursing school. Much interest has already been expressed in this exciting new program, which should be the start of a productive and long-term partnership between Stern College and the NYU College of Nursing" (see "Combined Programs"). For students interested in nutrition, a shaped major option exists. Students in their senior year may take up to 12 credits in approved nutrition courses at NYU towards their shaped major. These courses will also count toward the DPD sequence requirements at NYU should the student continue in that program after completing her BA degree.

An important focus of SCW is to educate the next generation of Jewish women for leadership positions in their professions and communities. Our commitment to the Yeshiva University mission of *Torah U'Madda* is mirrored in the daily lifestyles of our students and thereafter in their future roles as professionals. Stern College students have academic strengths in both general and Jewish studies; the fusion of these worlds is evident in the student publication, *Derech HaTeva, a Journal of Torah and Science*. This SCW publication is distributed nationally and internationally and has received much praise for its level of Torah/science scholarship. (see "*Derech HaTeva,*" for a listing of articles that appeared in volumes 1 through 16 and two sample articles).

Specific faculty have designated roles to provide an intensive involvement in guiding students with their career choices and specifically in assisting with the application process. Dr. Brenda Loewy, heading the office of PreHealth Advisement, has recently been joined by Dr. Chaya Rapp, to assist those students interested in careers in medicine, dentistry, and osteopathy. Mr. Jeff Mollin's focus is those students interested in careers in physical therapy,

physician assistant, and nursing, while Ms. Talia Forman concentrates on careers in occupational therapy.

In the Fall semester, 2012, SCW alumae, now medical students at Einstein , initiated the The Stern-Einstein Mentorship Program (affectionately known as the "Big Sister Mentor Program"). The intent of this program is to connect pre-med or pre-health undergraduates with SCW alumae at Einstein , who will guide the undergraduates in the medical school application and interview processes, as well to be available to answer simple questions that will save time and prevent unnecessary frustration. This program has met with much success.

In the 2011-2012 academic year, Dr. Loewy organized several seminars in which the guest speakers provided valuable insights into the various professions, as well as information on the admissions process to their graduate and professional programs. Examples of such seminars included presentations by Dr. Paul Alexander (Assistant Director of Admissions, Technion American Medical Student Program), Dr. Sara Sternglass (Coordinator, Ben Gurion University Medical School for International Health), Dr. Stephan Lazar (Executive Dean, Sackler School of Medicine, American Program), and Dr. Noreen Kerrigan (Associate Dean of Admissions, Einstein). Dr. Andrea Thau, O.D., presented the seminar "Optometry- a Profession with Vision." Dr. Thau is an associate clinical professor and former chair of Admissions at the SUNY State College of Optometry. She was elected to the Board of Trustees of the American Optometric Association, and served as the first woman president of the New York State Optometric Association, of the NY Academy of Optometry, and of the Optometric Society of the City of New York.

In the 2011-2012 academic year, Dean Karen Bacon initiated the "Deans' Scholars Academic Enrichment Program." This Program offers those outstanding students in Yeshiva University's undergraduate schools an opportunity to participate in one of two cooperative programs. The program of particular interest to science majors is the "Frontiers in Biomedical Science: Theory and Practice." This project is under the direction of Dr. Edward Burns, Executive Dean of the Albert Einstein College of Medicine. The seminar meets six Fridays during the semester at the Albert Einstein College of Medicine and features leading biomedical scientists and their research. The other program, "Law, Dispute, Resolution, and Justice," is under the direction of Edward Stein, Vice-Dean of the Benjamin N. Cardozo School of Law. The seminar meets six Fridays during the semester at the Cardozo School of Law with prominent members of the Cardozo faculty to explore selected issues related to constitutional law, civil rights, international law, public policy, and other topics.

Faculty: Harvey Babich, Ph.D.; Bill Bassman, M.S.; Joseph DeSantis, Ph.D.; Marina Holz, Ph.D.; Brenda Loewy, Ph.D.; Jeffrey Mollin, M.Phil.; Alyssa Schuck, Ph.D.; Margarita Vigodner, Ph.D.; Jeffrey Weisburg, Ph.D.; Richard Weiss, M.D.; Harriet Zuckerbraun, Ph.D.

The Department of Biology offers a wide range of courses providing students with a thorough grounding in the fundamentals of modern biology, as well as exposing them to the cutting-edge areas of biomedical research. Course offerings include Animal Diversity, Cell Biology, Developmental Biology, Ecology, Genetics, Histology, Human Anatomy, Human Physiology, Immunology, Invertebrate Zoology, Medical Biochemistry, Microbiology, Molecular Biology, Neurobiology, Pharmacology, Physiology, Reproductive Biology, Virology, and Women's Health.

Innovative courses within the past two years included Animal Diversity and Neurobiology Laboratory. Animal Diversity, taught by Dr. J. DeSantis, deals with the life sustaining interrelationships that human beings share with the myriad of other species on Earth. The course, Neurobiology Laboratory, was taught by Dr. Richard Hunter, adjunct faculty from The Rockefeller University and included laboratory experiences both in SCW and in The Rockefeller University. As Dr. Hunter is relocating, in the Spring semester, 2013, Neurobiology Laboratory will be taught by Dr. Elizabeth Waters, also from The Rockefeller University. Neurobiology Laboratory is but one component of a joint interactive program between the Department of Biology and the Department of Psychology to meet growing student interest in the neurosciences. The Department of Biology offers a B.A. in biology accompanied by the designation "concentration in the neurosciences" on the college transcript. This is the second such "concentration" designation, as for the past four years the Biology Department offered a B.A. in biology with the accompanying designation, "concentration in cell and molecular biology." Exciting 1-credit Journal Club courses included Neuroscience and Medicine (Spring semester, 2012) and Genetics and Epigenetics (Spring semester, 2011), taught by SCW graduates who are now medical students at the Albert Einstein College of Medicine (AECOM). Another innovative Journal Club course is planned for the Spring semester, 2013.

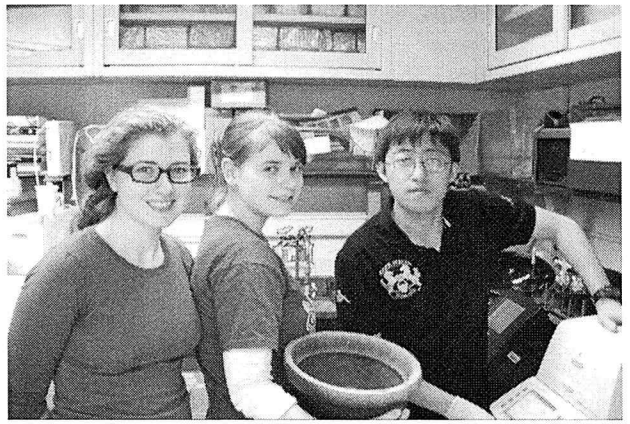
To accommodate the science requirements for non-science majors, the course Human Biology was introduced in the Fall semester, 2010. This course consists both of lecture (taught by Dr. R. Weiss) and of laboratory (taught by Dr. H. Zuckerbraun).

Dr. B. Loewy, a faculty member of the Biology Department and the recipient of the 2008, Dean Karen Bacon Award for a Senior Faculty Member, is the college's Pre-Health Advisor. Her directive is to guide students interested in

medicine, dentistry, and optometry through the application process. Dr. Loewy organizes a series of wide-ranging seminars. Because of the overwhelming number of students interested in medicine, dentistry, and optometry, Dr. Chaya Rapp, Department of Chemistry and Biochemistry, joined Dr. Loewy in advising students with these career goals. An important addition to the prehealth advisement staff was the appointment of Mr. J. Mollin, who guides those students with careers goals in nursing, physical therapy, and physician assistant. Four students were accepted into SCW's new joint nursing program with New York University and they began their studies at NYU in January, 2012. Talia Forman, a Stern alumnus and recent graduate of the occupational therapy (OT) program at NYU, was appointed the OT advisor in the Spring semester, 2012.

Dr. M. Vigodner and Dr. Holz have sky-rocketed the Biology department to new heights, attested to by their publications in prestigious scientific journals and their being the recipients of external funding. Both professors hold secondary appointments at the rank of Assistant Professors in the Developmental and Molecular Biology Department (Dr. Vigodner) and in the Department of Molecular Pharmacology (Dr. Holz) at AECOM.

Dr. Vigodner was awarded a prestigious NIH grant - Academic Research Enhancement Award 1R15HD067944-01A1; "Regulation of Spermatogenesis by sumoylation," $496,677; 09/01/2011 – 08/31/2014. This grant complements the extension of her Young Clinical Scientist Award from Flight Attendant Medical Research Institute (FAMRI), entitled "Second Hand Smoke as a Potential Cause of Spermatogenic Failures and Male Infertility;" $200,000; 7/31/2011-6/30/2013. Previously, she was awarded a $300,000 grant, "Second Hand Smoke as a Potential Cause of Spermatogenic Failures and Male Infertility," (7/1/2008 - 6/30/2011), from FAMRI. Dr. Vibha Shrivasatva, a post-doctoral fellow, participated in aspects of this research; more recently, Dr. Karl Xiao, a post-doctoral fellow, and Daniel Pollak, a research assistant and Yeshiva College graduate, joined the team.



Dr. Karl Xiao, postdoctoral fellow in the laboratory of Dr. Margarita Vigodner, teaching summer interns, Miriam Adrusier and Elisheva Markov, to analyze PCR samples.

In the May, 2012, Dr. Vigodner presented a talk on role of sumoylation in male reproduction to the Department of Developmental and Molecular Biology, AECOM. Approximately 6-7 weeks later, in June 2012, Dr. Vigodner served as a scientific grant reviewer in the study section, Cellular, Molecular and Integrative Reproduction, for the NIH Center for Scientific Review, Bethesda, MD.

In the Fall semester, 2011, Dr. Holz, on sabbatical leave, continued her research at AECOM. Dr. Holz is the recent recipient of the NIH grant, "Identification and characterization of S6K1 targets in mammary cell proliferation," NIH/NCI 2010-2013, $408,400, and of a $150,000 grant, entitled "The role of S6K1 in breast cancer," 6/01/08-5/31/2014 (renewed for 3 years in 2010) from the Elias, Genevieve, and Georgiana Atol Charitable Trust. Dr. Holz also was the recipient of a $30,000 grant, "S6K1 in breast cancer," 7/1/2009-6/31/2010, from the Wendy Will Case Cancer Fund. The Atol Charitable Trust provided a laboratory renovation grant of $100,000 to modernize Dr. Holz's research laboratory. Renovations were completed in the Fall, 2011 semester, when Dr. Holz returned from her sabbatical at AECOM. Dr. Holz was assisted in her research by Myriam Maruani (post-bac researcher, SCW graduate) and more recently by Dr. Anya Sedletcaia (a SCW graduate and post-doctoral fellow). Through the efforts of Dr. Holz, Dr. Sedletcaia was awarded a 2-year research fellowship through the National Cancer Center, and Helen Unger (a SCW junior and Biology major) was awarded a Thomas J. Bardos Science Education Award for Undergraduate Students. In August, 2012, Rose Snyder (a SCW graduate) joined Dr. Holz's laboratory as research assistant. In June, 2012, Dr. Holz, presented the talk, "Considering S6K1 as a therapeutic target in ER-positive breast cancer," at Einstein's Experimental Therapeutics Group meeting.

The publication record of the faculty of the Department of Biology is equally impressive. For the academic year 2011-2012 the following manuscripts were published or were accepted for publication. Names of the Biology faculty member are in **bold** and those of the undergraduate SCW science majors in *italics*.

- **Babich, H.,** *Bersson, A.R.*, and *Brander, T.E.*, 2012, Jews and genes, B'Or HaTorah, 22: (in press).

- **Holz, M.,** 2012, The role of S6K1 in ER-positive breast cancer, Cell Cycle (in press).

- **Vigodner, M.,** Shrivastava, V., *Gutstein, L.E., Schneider, J.*, Nieves, E., Goldstein, M., Feliciano, M., and Callaway, M., 2012, Localization and identification of sumoylated proteins in human sperm; excessive sumoylation as a marker of defective spermatozoa, Human Reprod. (in press).

- *Maruani, D.M., Spiegel, T.N., Harris, E.N., Shachter, A.S., Unger, H.A.*, Herrero-González, S., **Holz, M.K.**. 2012, Estrogenic regulation of S6K1 expression creates a positive regulatory loop in control of breast cancer cell proliferation. Oncogene. Jan 30. doi: 10.1038/onc.2011.657.

- **Babich, H.,** *Ickow, I.M.*, **Weisburg, J.H., Zuckerbraun, H.L.**, and **A.G. Schuck**, 2012, Cranberry juice extract, a mild prooxidant with cytotoxic properties independent of reactive oxygen species, Phytother. Res. Feb 1. doi: 10.1002/ptr.3735. [Epub ahead of print].

- **Babich, H., Zuckerbraun, H.L., Schuck, A.G.,** and **Weisburg, J.H.** 2012, *In vitro* studies on the responses of healthy and cancerous cells derived from tissues of the human oral cavity to tea theaflavins and catechins, In Tea in Health and Disease Prevention, chapter 73, pp. 871-882, Preedy, V.R. (editor), Elsevier/Academic Press, London, England.

- **Vigodner, M.**, 2011, Roles of small ubiquitin-related modifiers in male reproductive function. Int. Rev. Cell Mol. Biol. 288:227-59.

Postdoctoral fellow and Stern College alumnus, Dr. Anya Sedletcaia (standing), instructing research students, alumna Batsheva Rosen and Davita Wachsstock, in cell culture technique. They are working under the supervision of Dr. Marina Holz in her newly renovated laboratory.

Biology faculty and several undergraduate Biology majors have displayed scientific poster presentations of their research at professional meetings and symposia. The names of the Biology faculty member are in **bold** and those of the undergraduate SCW science majors are in *italics*.

- **Vigodner, M.**, 2012, Using confocal microscopy to examine proteins inside seminiferous tubules, given as a part of the Basic Science Workshop at American Society of Andrology (ASA) 37th Annual Conference, April 21 - 24, Hilton Tucson El Conquistador, Tucson, Arizona.

- **Holz, M.**, 2012, New targets of mTORC1 pathway in ER-positive cells. American Association for Cancer Research (AACR) Annual Meeting, Chicago, Il.

- **Vigodner, M.**, Nieves, E., Shrivastava, V., Callaway, M.B., *Marmor, H.*, and *Chernyak, S.-B.*, 2012, Identification of sumoylated proteins in human sperm, American Society of Andrology (ASA) 37th Annual Conference, April 21 - 24, Hilton Tucson El Conquistador, Tucson, Arizona.

- *Hachen, M.*, **Hunter, R.**G., Pfaff, D.W., and McEwen, B.S., 2012, Stress modulates mitochondrial gene expression in the rat hippocampus, 243rd American Chemical Society meeting, San Diego, California, Spring semester.

- *Karp, E.*, Novikov, L., *Klerman, H.,* and Gamble, M.J., 2012, Understanding the role of intronic cis-acting elements in the splicing of macroH2A1 variants, 243rd American Chemical Society meeting, San Diego, California, Spring semester.

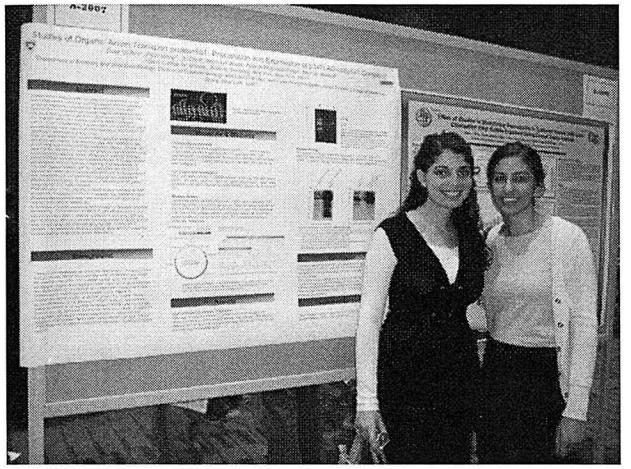
- *Wolf, B.J., Reiss, S.E.*, **Babich, H., Weisburg, J.H., Schuck, A., Zuckerbraun, H.,** and *Fertel, S.*, 2012, Proapoptotic effects of ellagic acid, a metabolite of pomegranate extract, on human oral carcinoma HSC-2 cells, 243rd American Chemical Society meeting, San Diego, California, Spring semester.

- *Hachen, M.*, **Hunter, R.G.**, Pfaff, D.W. and McEwen, B.S., 2011, Stress modulates mitochondrial gene expression in the rat hippocampus, Society for Neuroscience Abstracts, Washington, D.C.

Off-campus research placements abound, including the Roth Scholars Program at AECOM and other research internships sponsored by Yeshiva University (see the section, Student Research at the Albert Einstein College of Medicine). For additional information, see the following sections, Student Accomplishments, Student Publications and Presentations, and the Abstract Booklet.

Aware of the need to maintain state-of-the-art technology, the Department of Biology constantly upgrades equipment for use in courses and for on-campus research. . In the 2011-2012 academic year, the Biology Department purchased two PhotoDoc-It Imaging Systems, to photograph DNA gels, for use in the teaching laboratories and a BioTek Synergy HT Microplate Multimode Microplate Reade for use in research. In the 2010-2011 academic year, through monies obtained from her grant, Dr. Holz purchased a LiCor Odyssey near-infrared imaging system, a Promega 96-well plate dual-injector spectrophotometer and luminometer, and a Millipore Q3 water purification system. Pooling funding from their grants, Drs. Vigodner and Holz purchased a BioRad real-time PCR optical system. The following equipment was purchased within the prior five years: six VIS/UV spectrophotometers, five inverted microscopes, a Nikon TE2000S epifluorescent inverted microscope system with NIS-Elements research imaging software, a Guava EasyCyte benchtop microcytometry system, Protean II vertical gel electrophoresis system and Transblot cell with power supply for use with gels and western blots, a Glomax 20/20 luminometer, a photodocumentation center, and two laminar flow hoods were obtained. To enhance the laboratory experiences in the introductory Biology courses, both for Biology majors (Principles of Biology) and for non-majors (Human Biology), in the Summer, 2008 forty brightfield microscopes were purchased. In the Summer, 2009, Moticam microscope cameras, projectors, and screens were installed in the two laboratories in which the major and non-major introductory biology courses meet. The camera was interfaced with a computer, allowing the microscope image to be projected on the large screen in front of the room. Furthermore, the computer with projector and screen

was a valuable addition for instructors who use PowerPoint presentations as part of their lectures. Three thermocyclers, for use in polymerase chain reactions and purchased in the Summer, 2010, are housed in the Sussman laboratory, a state-of-the-art laboratory utilized for the advanced biology courses.



SCW students, Dina Golfeiz and Geulah Ben David, at the Society for In Vitro Biology Annual Meeting in Raleigh, North Carolina (June, 2011)

Dr. Jeffrey Weisburg and Dr. Alyssa Schuck with summer research interns, Ayelet Bersson, Channah Esan and Tova Lahasky, working on a joint project in conjunction with Dr. Harvey Babich.

The Biology Club organized a series of career workshops for SCW students majoring in Biology. One particularly nice and informative workshop included a panel of SCW graduates from a variety of professions who spoke about their particular fields of interest. This panel included Eliana Grosser (Biotechnology, Columbia University), Leah Fried (Genetic Counseling, Sarah Lawrence), Miriam Merzel Schachter (Ph.D. program, Mount Sinai School of Medicine), Shifra Liba Klein (Ph.D. program, Cornell University),Yael Saden Barach and Jenny Nachbar (Ph.D. programs, AECOM). Another workshop focused on instructing the protocol for formulating a resume and writing a cover letter for summer internship applications. A rather "fun" seminar was "Meet and munch with SCW Biology faculty," in which the biology faculty discussed their research and courses. The Biology Club held its annual fundraiser to raise awareness about breast cancer and to benefit "Sharsheret." Research seminars sponsored by the Biology Club included Dr. Margarita Vigodner (internal), Dr. Jeffrey Erickson (The College of New Jersey), and Dr. Marc Fink (LIU).

The Biology Department was extremely proud that two graduating seniors (both Biology majors) were accepted into Harvard Medical School and one graduating senior (also a Biology major) was accepted into Harvard Dental School.

DEPARTMENT OF CHEMISTRY AND BIOCHEMISTRY

Faculty: Lea Blau, Ph.D.; Lora Danley, M.S.;Cecily Dobin, M.S.; Donald Estes, Ph.D.; Chandrika Illandari, M.S; Evan Mintzer, Ph.D.; Chaya Rapp, Ph.D.; Firuzeh Victory, B.S.

In keeping with the approach to science education at SCW, the Department of Chemistry and Biochemistry offers a series of high level courses, opportunities for undergraduate research, and extracurricular programming to foster an enthusiasm for science and an interest in scientific research.

Research in computational chemistry, in the area of protein tertiary structure, is ongoing under the mentorship of Dr. Chaya Rapp. Dr. Rapp has recently been awarded a three year R15 AREA grant from the National Institutes of Health (NIH) for her proposal on "Computational Modeling of Post-translational Modification in Proteins". Students are involved in various aspects of this project. Recent graduates Hadassa Klerman and Emily Levine are co-authors on a manuscript entitled "HydrogenBond Strengths in Phosphorylated and Sulfated Amino Acid Residues." Talya Laufer is using implicit solvent models to study the effects of sulfation on electrostatic energies of protein complexes,and summer student Nassim Tishbi is studying the effect of sulfation on the entry of the HIV-1 virus into the cell via the sulfated CCR5 receptor. Rachel Kirshenbaum and Elizabeth Goldberger are using molecular and quantum mechanics to determine how the extent of methylation (mono, di, or trimethylation) affects binding in protein complexes. Sara Snow is conducting molecular dynamics simulations on methylated protein complexes to determine how methylation state affects protein structure, dynamics and function.

Experimental physical biochemistry is continuing at a high rate in the lab of Dr. Evan Mintzer. In collaboration with the pharmaceutical company Cubist and Dr. Michael Palmer (University of Waterloo, British Columbia, Canada), a new project was initiated in which the properties of the antibacterial drug daptomycin are being studied. SCW undergraduate Nasim Tishbi, a Kressel scholar and JFEW fellow, obtained exciting and novel calorimetry data for the drug's interactions with model membranes, while her colleagues Sarah Noble and Rachel Blinick further characterized daptomycin's solution and interfacial behavior. The work is continuing with several daptomycin analogs.

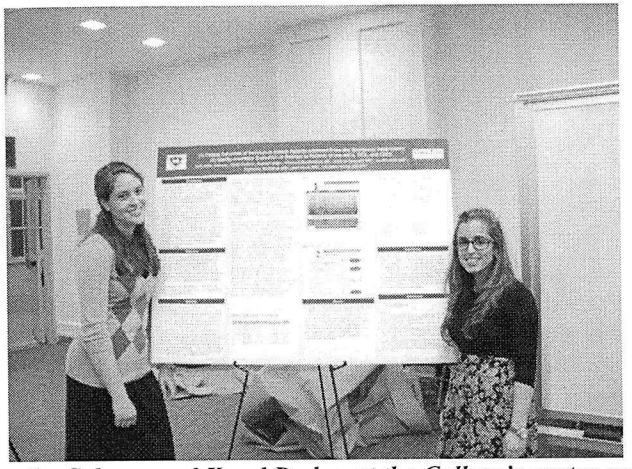
In the continuation of a productive collaboration with Dr. Kathryn Uhrich's lab (Rutgers University), the thermostability and physico-chemical properties of novel polymer-lipid complexes are being assessed for their feasibility in use as delivery vehicles for ss RNA. Nasim, Sarah, and Rachel are intimately involved in this project as well. Results from the initial effort resulted in a publication in the peer-reviewed journal Langmuir (2011 **27**, 9131-9138), with two SCW as student co-authors.

Additional data collected in the Mintzer lab during the study of phosphatidylcholines containing conjugated acyl chains in collaboration with Dr. P.V. Subbaiah (University of Illinois at Chicago) were published in the journal Chemistry and Physics of Lipids (2011 **164**, 811-818).

Finally, SCW student Mushky Pinson has been studying the interactions between cholesterol and sphingomyelin analogs to determine the role of i) the *trans* double bond at C4 of the sphingosine chain and ii) the hydroxyl group at C3. Her results are proving to be quite interesting and may have implications in the phenomenon referred to as lipid "rafts".

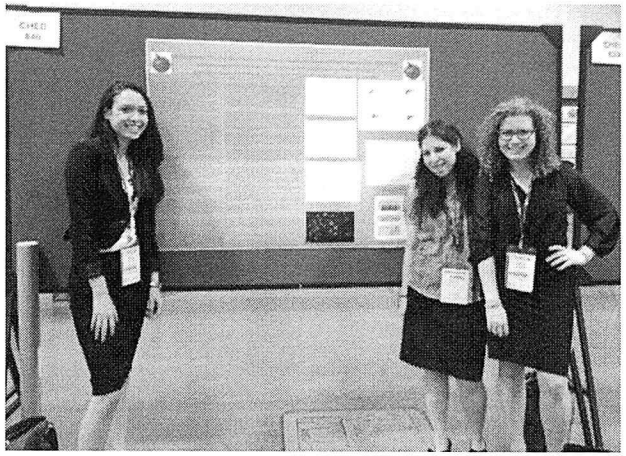
Under the mentorship of Dr. Don Estes and Dr. Lea Blau, former students Sarah Guigui and Nili Seleski participated in research on the effect of base stacking on the stability of deoxyoligonucleotides and in the development of a biophysical chemistry experiment on DNA stability for the *Physical Chemistry On-Line Consortium.* The results were published in the Journal of Undergraduate Chemistry Research (2012 11, 27-31). Another manuscript, to be submitted to the Journal of Chemical Education, is in progress.

The Stern College Chemistry club, advised by Drs. Estes and Rapp, is an award winning affiliate of the American Chemical Society (ACS), and has earned five Innovative Activities Grants and three Community Interaction Grants over the past six years. In addition, travel grants were obtained to support students' attendance at ACS meetings. Each year the club runs activities related to a particular theme; recent themes have included "Chemistry and Food", "Coloring the World in Chemistry", and "Chemistry and Outer Space". Activities include guest lectures, including Dr. Alon Gorodetsky from University of California at Irvine and Dr. Edyta Greer from Baruch College, field trips to pharmaceutical companies, the Food and Drug Administration, museums; and other cultural events. To interest the entire student body tie-dyeing and a magic show are also included in the Club's activities. The colorful magic show, directed by Mrs. Cecily Dobin and performed by members of the Club is the highlight of the year. The show is attended by Stern College students as well as local high school students. Over the past decade, in recognition of its various accomplishments, the Club has been presented with Outstanding, Commendable, Honorable Mention, and Green Chemistry awards at ACS national meetings.

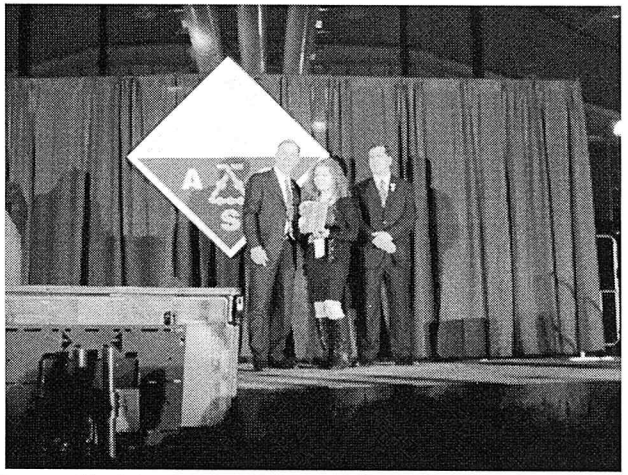


Samantha Selesny and Koral Dadon at the College's poster contest.

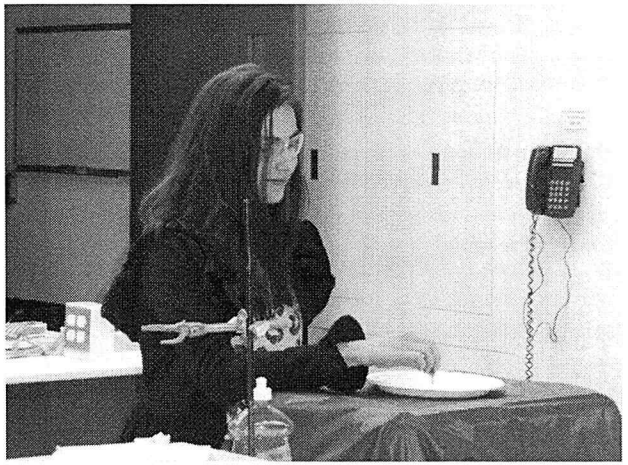
Dr. Blau's organic chemistry laboratory students take a break to celebrate Mrs. Victory's birthday. The ACS award plaques are mounted on the back wall.



Bella Wolf, Sarah Reiss, and Simone Fertel, the student presenters at the undergraduate poster session of the 2012 ACS meeting in San Diego.



Simone Fertel accepts a commendable chapter award at the undergraduate awards ceremony of the 2012 ACS meeting in San Diego.



Elizabeth Goldberger, a chemistry major, participates in the annual magic show.

Chana Meltzer, a student in the organic chemistry course, makes elephant toothpaste in the magic show.

In recent years, the number of students enrolled in chemistry courses has increased significantly. With grant support, new instrumentation has been purchased which has facilitated major lab instructional improvements. Incorporation of laboratory experiments in Analytical Chemistry and Biochemistry that are related to the instructors' research interests allows course content to be taught in the context of current, cutting edge and biologically relevant research. A course in medicinal chemistry dealing with the discovery and design of new therapeutic agents and their development into useful

medicines, was offered in the spring term. A chemistry course for non-science majors, examining chemistry as it relates to the world around us with emphasis on contemporary environmental issues, was taught.

In May 2009 four students received a bachelor degree in Biochemistry; and in May 2010, six students received a bachelor degree in Biochemistry and three students were awarded a bachelor degree in Chemistry. In May 2011, nine students received a bachelor degree in Biochemistry and three students were awarded a bachelor degree in Chemistry.

Chemistry and Biochemistry Graduates have gone on to medical, dental, optometry, and law schools; graduate programs in the sciences; and careers in science education.

DEPARTMENT OF PHYSICS

Faculty: Anatoly Frenkel, Ph.D., Professor; Emil Prodan, Ph.D. Assistant Professor; Lea Ferreira dos Santos, Ph.D., Assistant Professor; Mark Edelman, Ph.D., Clinical Assistant Professor.

The Physics Department at Stern College for Women (SCW) has been steadily attracting interest among incoming freshmen due to its "research and discovery approach" to education. Many talented students aspire to a degree in physics due to the opportunities that have been created in the department over the last few years. Students have access to the state of the art computational labs established at our Stern College and to experimental facilities in the National Laboratories and major research centers through collaborative research and education programs that the Physics Department has created. All of our faculty members pursue active research agendas, their articles are published in prestigious professional journals and their work has been highlighted on many occasions and supported by major research grants. The exposure to such first class science and the atmosphere of discovery in the department play a major role in shaping the career goals of our undergraduates.

The Physics Department faculty members have active research programs in both experimental and theoretical physics. Drs. Lea Ferreira dos Santos and Emil Prodan specialize in theoretical condensed matter physics. Dr. Santos' research interests include quantum entanglement, quantum chaos and control, random matrix theory, quantum computing, among many others. Her research is supported by a CAREER grant from the National Science Foundation. The grant also supports a postdoctoral research associate. Dr. Prodan's interests are in topological insulators, strongly correlated systems, bio-materials, charge and spin transport. His research is supported by two research grants from the National Science Foundation, one of which is also a CAREER grant. He also has support for one postdoctoral research associate. Dr. Edelman is a theoretical physicist who specializes in chaos theory, dynamical systems and astrophysics. His recent accomplishments include a position as an editorial board member at the Journal of Applied Nonlinear Dynamics. Dr. Frenkel is an experimental physicist who runs a federally funded research programs in nanoscience and nano-catalysis at Brookhaven National Laboratory on Long Island. He is a founding director of a recently (2005-2006) established Synchrotron Catalysis Consortium at Brookhaven National Laboratory where Stern College students are able to participate in the research activities. His other Department of Energy grant supports his research in multi-technique study of electronic and structural properties of nanomaterials. He supports a postdoctoral research associate.

In 2012, the Department reached a significant milestone: the New York State Department of Education granted its official approval of our new program, a B.A. in Physical Sciences. That program is in addition to our already established B.A. in Physics and B.A. in Pre-engineering. The B.A. in Physical Sciences has

five concentrations: Chemistry, Electromagnetism, Mechanics, Computer Science and Biology.

Stern College students who are interested in physics or engineering have an opportunity to actively participate in faculty research. They can choose from a variety of projects and work under the guidance of physics department members during the summer and throughout the year. They present their results at national and international science meetings and give seminar talks. They are also coauthors in refereed articles published in physics, chemistry, and materials science journals.

Physics students benefit from an intense and challenging curriculum. In the spring of 2012, the physics courses offered included General Physics (calculus based), Introductory Physics (algebra based), Classical Mechanics-II, Modern Physics, and Thermodynamics and Statistical Mechanics. The Department also runs a weakly seminar where scientists from other universities are invited to present their latest research findings in front of the students and the faculty members.

Recent graduates have gone on to Columbia University's graduate program in physics, Hunter College's graduate program in physics, as well as several graduate programs in engineering and architecture across the country and in Israel.

DEPARTMENT OF PSYCHOLOGY

Faculty: Joshua Bacon, Ph.D.; Terry DiLorenzo, Ph.D.; Robin Freyberg, Ph.D.; Aharon Hersh Fried, Ph.D.; Lauren Harburger, Ph.D.; Marcel Perlman, Ph.D.

As a discipline, Psychology is generally categorized as a Social Science together with other fields such as Social Work, Political Science, Economics, and Sociology. However, scientific methodology and empirical research have always been a critical component of the coursework and extra-curricular opportunities offered by our department. Experimental Psychology, as a prerequisite for the majority of other courses offered, highlights the fundamental importance that we place on understanding the subject matter of psychology in the context of rigorous empirical analysis, research methodology, and scientific thinking. The Research Seminar, a course taken by psychology majors who are interested in pursuing a doctorate in Psychology, provides students with research opportunities and classroom instruction that advance their understanding of the application of methodology to a "real life" settings. Some courses such as Cognition, Learning, and Psychobiology are rooted in the tradition of research and easily fit into the Science framework. Many other courses such as Social Psychology, Developmental Psychology, Psychology and Religion, Personality, Abnormal Psychology, and Cross-Cultural Social Development are brought into the arena of Science by faculty who are grounded in scientific methodology and all have active research programs.

This past year the Psychology Department was pleased to introduce a new Developmental Track option for the majors. This track offers a focused education to students who are interested in an in-depth examination of developmental research and theory throughout the lifespan. Aside from receiving a basic grounding in psychology through the core courses required for all majors, students in this track will take the Theories of Development course along with advanced electives in each of the three major developmental stages (childhood, adolescence, and adulthood).

The Department also offers a Neuroscience Track option providing a focused education to students who are interested in the biology behind human and animal behavior. Aside from the core courses that are required of all majors, further requirements and electives come from critical courses in Neuroscience, such as Cognitive Neuroscience, Behavioral Neuroendocrinology, and a Neurobiology lecture and lab.

Students who are planning to apply to Ph.D. or Psy.D. programs in Psychology or to pursue careers in the other health-related fields such as Physical, Occupational, or Speech Therapy, are encouraged to become actively engaged in research. Students have gained invaluable experience outside the classroom by learning about the fundamental role of research in theory and practice of psychology by working with faculty members in projects off-campus such as

with Dr. Joshua Bacon in the MS Care Center at NYU or with Dr. Aharon Fried on his research in Special Education in the Hebrew Schools. On campus, students have worked on research projects with Dr. Freyberg exploring the role of olfaction in social and emotional behavior, with Dr. Lauren Harburger in the neurobiology and psychology of sex differences, or with Dr. Terry DiLorenzo focusing on health-related attitudes and cognitions and their relations to health behaviors. Many of these students have coauthored presentations at both national and international conferences.

For students whose interests lie in areas outside of those of the department, opportunities are available in a number of academic, hospital, and clinical settings. In this case, a faculty member may serve as a supervisor to maintain continuity of the student's experience as an integrated part of her program in psychology.

Students engaged in research are encouraged to present their work at the Annual Behavioral Sciences Student Research Conference held at the Ferkauf Graduate School of Psychology of Yeshiva University. The conference serves as a valuable opportunity for undergraduates to discuss their research in an academic setting and meet other undergraduate and graduate students involved in research.

Below, we introduce the members of the Psychology Department and we look forward to the continued contributions of the Behavioral Sciences to Women in Science.

Dr. Joshua Bacon received his PhD from NYU in 1976. During this time, he also conducted research at Swarthmore College with Dr. Hans Wallach, one of the last remaining students of Wolfgang Kohler, the founder of Gestalt Psychology. In 1976, Dr. Bacon obtained a position as Assistant Professor at Tufts University in Boston and received tenure in 1984. At that time, he was recruited by Yeshiva University and joined the Department of Psychology in 1984 where he has been ever since. He teaches basic courses in Experimental Psychology, Cognition, Learning, Psychobiology, as well as advanced courses such as Mind, Language, and Consciousness. Dr. Bacon's area of research is perception and cognition and, in particular, cognitive impairment and rehabilitation in patients with Multiple Sclerosis. He holds an Adjunct Assistant Professor position in the Department of Neurology of the NYU Medical School and is a member of the clinical and research team in the Multiple Sclerosis Care Center of NYUHJD. He is currently working on a cognitive rehabilitation program for MS patients with cognitive impairments and is also the principle investigator of a project to develop a diagnostic battery that will measure subtle cognitive impairments that may emerge in the early stages of MS. Undergraduate students from Stern College have been and continue to be involved in this research and have been coauthors on a number of poster presentations at conferences of the Academy of Neurology and of the Multiple Sclerosis Consortium.

Dr. Terry DiLorenzo received a B.A. in psychology from Rutgers University and a Ph.D. in Health Psychology from Ferkauf Graduate School of Psychology of Yeshiva University. She completed a postdoctoral fellowship at Memorial Sloan-Kettering Cancer Center where she investigated anticipatory distress in women receiving chemotherapy for breast cancer. She was the Director of Research of the Multiple Sclerosis Comprehensive Care Center of New York Medical College until she joined the Psychology Department of Stern College for Women in 1999. Dr. DiLorenzo's research focuses on health-related attitudes and cognitions and their relations to health behaviors, as well as quality of life in women receiving radiation treatment for breast cancer. Dr. DiLorenzo has involved a number of Stern College students in her research projects and has supervised several others completing independent projects. Dr. DiLorenzo teaches the Honor's Psychology Research Seminar in which upper-level psychology majors complete psychology research internships and has recently developed and co-taught Fundamentals of Public Health, a graduate-level course open to both Stern College for Women and Yeshiva College students.

Dr. Robin Freyberg received a B.A. in Psychology from Columbia University and a Ph.D. in Social Developmental Psychology from Rutgers University – New Brunswick. She joined the Psychology Department of Stern College for Women in 2005. She also is an Adjunct Assistant Professor of Psychology in Psychiatry at Weill Cornell Medical College. Since opening her Social Development Laboratory at Stern, she has supervised over 40 students in a variety of lab projects and independent research. Dr. Freyberg's research explores how the olfactory environment influences social and emotional behavior as well as the role of narrative in psychiatric diagnosis and treatment. Aside from research, Dr. Freyberg teaches a wide variety of courses at Stern including Introductory Psychology, Developmental Psychology, Social Psychology, Cross-Cultural Social Development, Personality, Psychology of Women, and the Emotion Seminar. She also serves as the pre-psychology advisor where she advises students at all stages of the psychology major to help them prepare for careers in psychology.

Dr. Aharon Hersh Fried received his doctorate at the New School for Social Research. His research and his dissertation were in the area of Visual Perception. He taught at Hunter College and John Jay College, both of CUNY, before joining SCW where he is Associate Professor of Psychology and Education. Amongst the courses he teaches are, Psychology & Religion, Developmental Psychology, and Psychological Tests and Measurements. Outside of SCW he is best known for his work in developing programs in Special Education for the dual curriculum Hebrew Day Schools. Dr. Fried's research and writing interests are focused on the synthesis of Psychological and Educational research on cognition, education, and ethical and moral development with the source material of Judaic Studies. He has developed a widely used test of Hebrew Reading, and is currently involved in developing a

test of Hebrew Vocabulary, and of a program for teaching Talmud in the elementary schools. Dr. Fried also maintains a private practice in Psychology, evaluating children who have learning or behavioral problems in school and guiding their parents and teachers in working with them.

Dr. Lauren Harburger earned a B.S. from Cornell University in Human Biology, Health, and Society. She then attended graduate school in the Department of Psychology at Yale University where she earned her M.S., M.Phil., and Ph.D. During graduate training, Dr. Harburger investigated the effects of age, sex, and ovarian hormones on learning and memory. Her research has been published in *Behavioral Neuroscience, Neurobiology of Learning and Memory, Neurobiology of Aging, Behavioural Brain Research, and Journal of Neuroscience*. Dr. Harburger joined the SCW faculty in fall 2008 where she continues to examine the effects of age and sex on learning and memory. Several undergraduate research assistants have been involved in her research investigating the effects of aging on object memory and spatial abilities in men and women. She is also involved in a project examining the cognitive effects of exogenous and endogenous female sex hormones. Dr. Harburger enjoys teaching at Stern and offers a number of courses including Introductory Psychology, Developmental Psychology: Life Span, Psychobiology, and Behavioral Neuroendocrinology. Dr. Harburger is on leave of absence during the 2012-13 academic year.

Dr. Marcel Perlman earned his B.A., M.A., as well as his Ph.D. from Yeshiva University. He received his Doctorate in 1959. In 1958 he was appointed as an Instructor in Psychology at SCW, and in 1959 he was promoted to the rank of Assistant Professor. He became an Associate Professor in 1966 and attained his Professorship in 1979. Dr. Perlman became Chairman of the Division of Social and Behavioral Sciences in 2003. He has been a Clinical Supervisor at Ferkauf School of Psychology since 1982. As part of his Forensic Experience he has lectured for the Practicing Law Institute in the Area of Clinical Psychology and the Law. He is currently in limited Private Practice in Clinical and Forensic Psychology. Additionally, he has given numerous lectures and presentations, the latest of which was at the Oxford University (St. Anne's College) Annual Round Table on the topic of the Changing Paradigms of Contemporary Parenting.

The following are the basic elements of combined degree programs in the sciences available to Stern College students in cooperation with other universities. Students interested in these programs generally apply to the cooperating institution during their junior year. These programs are competitive and final admissions decisions are made by the cooperating institutions.

Engineering - B.A./B.S. or B.A./M.S.
Stern College offers several combined plans in Engineering with Columbia University (CU) and Stony Brook University (SBU). Students in the combined YU-CU B.A./B.S. plan usually attend SCW for a minimum of 3 years, fulfilling all the general requirements for SCW graduation, as well as CU's specific subject matter requirements, and, with the recommendation of the Pre-Engineering advisor, may be admitted to CU's School of Engineering and Applied Science (SEAS). After successful completion of 2 additional years at CU, SCW awards the B.A. in the major of the candidate's choice, and CU concurrently awards the B.S. in Engineering. Under the B.A./M.S. plan, the student completes a B.A. degree at SCW, while fulfilling prerequisites for SEAS. If admitted by the Graduate Department, after two additional years of study at CU, the student receives the M.S., bypassing the bachelor's degree in Engineering.

Students in the combined YU-SBU 3+2 program start their education at SCW and finish at SBU's College of Engineering and Applied Sciences (CEAS). After spending 3 years at SCW, students will have an option either to graduate with B.S. degree in Engineering from SBU or to take graduate level courses during their second year at CEAS and graduate with an M.S. degree, also in 2 years.

Nursing - B.A./B.S.N./M.S.N.
Stern College offers combined programs in nursing with Johns Hopkins University (JHU) and with New York University (NYU). For JHU, students spend three years at Stern College completing college requirements and pre-requisite courses for a total of 111 credits, followed by a 13½ month accelerated program at JHU. Upon successful completion of these studies, students earn a B.A. from Stern College and a B.S.N. from JHU. In the NYU program, students complete 7 semesters of required course work with a minimum of 119 credits at Stern College followed by a 15-month accelerated program at NYU College of Nursing (NYUCN). Students receive the BA degree after successfully completing one semester at NYUCN.

Occupational Therapy - B.A./M.S.
Stern College offers a combined program in Occupational Therapy with Columbia University (CU). During the first 3 years at SCW, students complete

college requirements and prerequisites for CU's OT program. They apply to the 2-year CU program during the fall semester of their junior year. Students are awarded the B.A. from Stern College after the first year at CU, and the M.S. upon completion of the program.

Optometry - B.A./O.D.
Stern College and the State University of New York (SUNY) College of Optometry offer an affiliation program to qualified students through which they can receive an undergraduate degree and a Doctor of Optometry degree in seven years. Students accepted into this program attend SCW for three years while they complete college requirements and prerequisites for the College of Optometry. After the first year at SUNY College of Optometry, students receive the B.A. degree. The O.D. degree is awarded after completing the four years at SUNY College of Optometry.

Physical Therapy - B.A./D.P.T.
Stern College offers combined programs in Physical Therapy with New York Medical College Graduate School of Health Sciences and the University of Medicine and Dentistry of N. J. During the first three years at Stern College, students complete college requirements and prerequisites for the Doctorate of Physical Therapy Program. Students are awarded the B.A. after completing the first year at the professional school, and the D.P.T. at the completion of the 3-year program.

Physician Assistant - B.A./M.P.S.
Stern College offers a combined program in Physician Assistant Studies with Mercy College. During the first three years, students complete college requirements and prerequisites for Mercy College's M.P.S. program. After completing 111 credits with a minimum GPA of 3.0, and with at least a "B" in prerequisite courses, qualified students continue at Mercy College. After the first year at Mercy College, students receive the B.A. degree from Stern College. The M.P.S. degree is awarded after completing two years and three months at Mercy.

Podiatry - B.A./D.P.M.
Stern College and the New York College of Podiatric Medicine offer a combined program in Podiatry. During the first three years, students recommended to the program complete college requirements and prerequisites for the NY College of Podiatric Medicine. After the first year at NYCPM, SCW awards the B.A. NYCPM awards the D.P.M. at the completion of the program.

Teaching, Math and Science - M.S.
Yeshiva University through an innovative agreement with the NYU Steinhardt School of Culture, Education, and Human Development, juniors and seniors may enroll in selected math or science education courses at NYU. These courses will count both toward the undergraduate degree at SCW and will reduce the number of credits needed for a M.S. degree in math education or in science education from NYU Steinhardt.

Nutrition - through a special agreement, SCW students may take selected courses in nutrition at NYU during their senior year at SCW and thus accelerate the time required to complete a subsequent degree in nutrition at NYU.

SUMMER RESEARCH AT THE ALBERT EINSTEIN COLLEGE OF MEDICINE

Every year, several of Stern College for Women's most talented sophomores and juniors apply for research internships in the Roth Scholars Program, sponsored by the Ernst and Hedwig Roth Institute of Biomedical Science Education. This prestigious internship, hosted by YU's Albert Einstein College of Medicine (AECOM), provides students with exposure to nine weeks each summer of intensive biomedical research. Under the guidance of AECOM's top scientists, these women participated in research projects, many of which are at the cutting edge of medicine. For the summer of 2009, four Stern College women were selected for this undergraduate research experience, having successfully passed the rigorous application and interview process. In addition, through the Office of the Vice Present for Academic Affairs, Dr. M. Lowengrub initiated a research internship, the University Undergraduate Research Scholar. For the summer of 2009, two Stern College women were awarded this internship. SCW graduates, currently medical students at AECOM, have established the undergraduate research internship, the Stern-Einstein Research Connection (SERC) Scholar. The University Undergraduate Research Scholar and the SERC Scholar also performed summer research at AECOM.

Summer, 2012

Roth Scholars
Rachel Blinick Batya Edelman Leah Gutstein Erica Hasten

University Undergraduate Research Scholars
Tova Miller Bella Wolf

SERC Scholar
Naomi Schwartz

Summer, 2011

Roth Scholars
Elisa Karp Miriam Steinberger

University Undergraduate Research Scholars
Faygel Beren Jordana Schneider

SERC Scholar
Nancy Shilian

Summer, 2010

Roth Scholars
Orli Haken Tsipora Huisman Hadassa Klerman Jennifer Kraut Danielle Lent

University Undergraduate Research Scholar
Rebecca Weiss

SERC Scholar
Dina Golfeiz

Summer, 2009

Roth Scholars
Fay Burekhovich Tirtza Spiegel Chava Ruderman Shoshana Zitter

University Undergraduate Research Scholar
Avital Bauman Emily Liebling

SERC Scholar
Rebecca Weiss

Summer, 2008

Roth Scholars
Judith Fischer Reena Gottesman Wendy Hosinking
Batya Herzberg Sarah Ariella Hollander Tehilla Raviv

University Undergraduate Research Scholar
Ellen Dinerman

SERC Scholar
Avital Bauman

Summer, 2007

Roth Scholars
Abigail Atlas Sarah Guigui Zahava Brodt Cheryl Schonbrun
Rachel Yamnik

University Undergraduate Research Scholar
Shifra Klein

SERC Scholar
Wendy Hosinking

Summer, 2006

Roth Scholars
Michelle Cohen Jessica Feig Elizabeth Ravkin Louisette Soussan

University Undergraduate Summer Research Scholar
Michelle Goldberg Yelena Kozirovsky

Summer, 2005

Roth Scholars
Yael Barak Frida Fridman Tamar Gold Sarah Weinerman
Helen Nissim Ilana Pister Tehilla Stepansky

University Undergraduate Summer Research Scholar
Suzanne Snyder

Summer, 2004

Roth Scholars
Esther Flaschner Eydie (Pesi) Porat Malkie Krupka Debbie Rybak
Reina Roth

Summer, 2003

Roth Scholars
Nomi Ben-Zvi Elisheva Douglas Chaya Gopin Dina Ohevshalom

University Undergraduate Summer Research Scholar
Tova Fischer

Summer, 2002

Roth Scholars
Caryn Gamss Julia (Tobi) Josovitz Meryl Sava Anna Sedletcaia

Summer, 2001

Roth Scholars
Shayna Aster Elena Sedletscaia Yehudit Weinberger

University Undergraduate Summer Research Scholar
Bracha Kenigsberg Hadassa Rutman Meredith Weiss

Summer, 2000

Roth Scholars
Shira Rivkin Shiry Wagner

Summer, 1999

Roth Scholars
Olga Dynina Rochelle Goldfisher

Summer, 1998

Roth Scholars
Jeniffer Feig Sivah Shifteh Malka Skiba

Summer, 1997

Roth Scholar
Sarah Friedman

Summer, 1996

None

Summer, 1995

Roth Scholars
Caren Gottlieb Lauren Insel Azita Simoni

Summer, 1994

Roth Scholars
Judy Ehrenberg Stacey Renee Rubel Brenda Wurzburger

Summer, 1993

Roth Scholars
Yaffa Cheslow Rashel Monhian Stacey Tuckman

Summer, 1992

Roth Scholars
Nava Goldman Marcia R. Palace Randi Kay Sasnowitz

Summer, 1991

Roth Scholars
Monica Kriger Aviva Rosenstein

Summer, 1989

Roth Scholar
Heather Rush

Summer, 1988

Roth Scholars
Bat Sheva Levine Tamar Silverstein

Summer, 1987

Roth Scholars
Miriam Berger Aviva Kahane

Summer, 1986

Roth Scholar
Deborah Bernstein

Summer, 1985

Roth Scholars
Shoshana Kahn Francine Anne Ziv Elana Unger

Summer, 1984

Roth Scholars
Michelle Small Susan Mandelbaum

THE ANNE SCHEIBER FELLOWSHIP PROGRAM

The Anne Scheiber Fellowship Program provides scholarship support to Stern College undergraduates, as well as graduates, pursing their advanced training at the Albert Einstein College of Medicine. The program, established by Ms. Scheiber through a twenty two million dollar bequest, seeks to support high-achieving women with financial need as they accomplish their academic and professional goals. Stern College graduates who attend the University's Albert Einstein College of Medicine may apply for awards up to full tuition for their four years of medical training. We proudly salute the Anne Scheiber Fellows who are fulfilling Ms. Scheiber's dream:

Chaya Abelow
Agnes Nathalie Abitol
Nechama Ackerman
Abigail Atlas
Miriam Ausubel
Rachel Aviv
Tamar Belsh
Nomi Ben-Zvi
Deena Blanchard
Yael Boyarsky
Zahava (Nilly) Brodt
Faigy Burekhovich
Aliza Charlop
Tzipa Chaim
Esti Charlop
Elana Clark
Barrie Cohen
Davida Cohen
Michelle Cohen
Jennifer Deluty
Ellen Dinerman
Esti Feder
Abigail Feldman
Tova Fischer
Aliza Forman
Rena Frankel
Tamara Freiden
Ahuva Freilich
Caryn Gamss
Julie Gilbert
Avigayil Ginsberg
Aviva Ginsburg
Ariella Glueck
Sharon Gordon
Reena Gottesman
Jessica Gross
Orli Haken
Rebecca Herskovitz
Batya Hertzberg
Ariella Hollander
Wendy Hosinking
Tsipora Huisman
Julia Josowitz
Chava Kahn
Hadassah Klerman
Lea Kozirovsky
Aimee Krausz
Malka Krupka
Yosefa Lerner
Elisheva Levine
Emily Liebling
Elizabeth Lobell
Esther Mizrachi
Ariella Nadler
Helen Nissim
Chana Gila Ovitz
Yardanna Platt
Tehilla Raviv
Yael Raymon
Tamar Riegel Weinberger
Shuli Roditi-Kulak
Shira Roszler
Rachel Rubinstein
Chava Ruderman
Debbie Rybak
Esther Leah Schoenbrum
Chana Schonbrun
Naomi Schneider

Eliana Shaul
Necahma Mina Shoshani
Malki Silverman
Michelle Simpser
Shani Snyder
Tirtza Spiegel
Tehilla Stepansky

Temima Strauss
Jessica Tugetman
Yehudit Weinberger
Amanda Weiss
Meredith Weiss
Rebecca Weiss
Sahar Zaghi

STUDENT ACCOMPLISHMENTS ACADEMIC YEAR 2011-2012 AND SUMMER 2012

Department of Biology, Department of Chemistry and Biochemistry, Department of Physics, and Department of Psychology

Allopathic medical school	AECOM (8); Harvard Medical School (1); UMDNJ (2); Univ. of Illinois Medical School (1); Downstate (1); Univ. Pittsburg Medical School (1); Univ. of Sherbrooke, Quebec (1); Technion American Medical School, Israel (2); Sackler, Israel (1); SABA University School of Medicine, Caribbean (1)
Dental school	UMDNJ (1); NYU (3); Boston University (1); Baylor (1): Case Western Reserve (1)
Optometry school	SUNY (4)
Podiatry school	NY College of Podiatric Medicine (1)
Veterinary school	University of Illinois (1)
Psychology (Ph.D.)	St. Johns (Clinical psychology) (1); Suffolk Univ. (neuropsychology) (1)
Physical therapy (doctorate)	Columbia Univ. (2); Hunter (2); Touro (1): Northwestern University - Chicago (1)
Physician assistant	Touro (2); Hofstra (1); Pace (1); Northwestern Univ. – Chicago (1); Pace University (1)
Pharmacy (doctorate)	Rutgers (1)
Engineering (M.S.)	Columbia (1)
Architecture (M.S.)	Pratt (1)
Genetic counseling (M.S.)	Sarah Lawrence (1)
Biological sciences (M.S.)	Fordham University (with fellowship) (1)
Nutrition (M.S.)	NYU (1)

Psychology (M.A.)	Queens College (school psychology) (1); Columbia Univ. Teacher's College (social organizational psychology) (1); NYU (counseling for mental health and wellness)(1)
Social work (M.S.)	Wurzweiler School of Social Work (3)
Education (M.S.)	Columbia Univ.Teacher's College (neuroscience and education) (1)
Occupational therapy	NYU (5); Kean Univ. (2); Temple Univ. (1); Towson Univ. (1)
Nursing	NYU (9); Columbia (4); Downstate (1); Emory (1); Univ. of Maryland (1) University of Washington (1)
Engineering program (B.S.)	Columbia University (1)

Awards:

Helen Unger (a biology major) was awarded a Thomas J. Bardos Science Education Award for Undergraduate Students.

Kira Joel (a physics major) was awarded a Kressel Scholar (Dr. Lea Santos as a mentor)

Davida Kollmar (a physics major) was awarded a Kressel Scholar (Dr. Lea Santos as a mentor)

Summer Undergraduate Internships:

Elisheva Aeder: Bar Ilan University - Yeshiva University Summer Research Internship

Judy Alper: Bar Ilan University - Yeshiva University Summer Research Internship

Miriam Andrusier: Department of Biology, SCW (Dr. Vigodner)

Lotem Atzmon: AECOM (Dr. N. Barzilai)

Aviva Azar: Health Careers Opportunity Program (physical therapy), Rusk Institute

Rebecca Benhaghnazar: Montefiore Hospital (Dr. R. Stein)

Ayelet Bersson: Department of Biology, SCW (Drs. Babich & Schuck)

Rachel Blinick: Roth Scholar, AECOM

Aliza Bram: Rutgers University, Biomedical Engineering Laboratory (Dr. Schloss)Tehilla Brander: Laboratory for Familial Dysautonomia Research, Department of Biological Sciences, Fordham University

Ionit Cohen: MRRC Department, AECOM

Koral Dadon: Bar Ilan University - Yeshiva University Summer Research Internship

Batya Edelman: Roth Scholar, AECOM

Bracha Einzig: Health Careers Opportunity Program (physical therapy), Rusk Institute

Channah Esan: Department of Biology, SCW (Drs. Babich & Schuck)

Elizabeth Goldberger: AECOM (Dr. David Shechter)

Batya Gounder: New York University Medical Center, Skirball Institute of Biomolecular Medicine

Leah Gutstein: Roth Scholar, AECOM

Erica Hasten: Roth Scholar, AECOM

Shani Hirsch: Health Careers Opportunity Program (rehabilitation medicine), Rusk Institute

Rebecca Jacob: Montefiore Hospital, AECOM (Dr. Benenson)

Judith Jacobson: Bar Ilan University - Yeshiva University Summer Research Internship

Kira Joel: Department of Physics, SCW (Dr. Santos)

Tova Joseph: Health Careers Opportunity Program (occupational therapy), Rusk Institute

Rachel Kirschenbaum: Department of Chemistry and Biochemistry, SCW (Dr. Rapp)

Davida Kollmar: Department of Physics, SCW (Dr. Santos)

Zeeva Levine: Citromax Flavor

Tova Lahasky: Department of Biology, SCW (Dr. Weisburg)

Aliza Loshinsky: Bar Ilan University - Yeshiva University Summer Research Internship

Elisheva Markov: Department of Biology, SCW (Dr. Vigodner)

Sarina Miller: Bar Ilan University - Yeshiva University Summer Research Internship

Tova Miller: University Undergraduate Summer Research Scholar; AECOM

Sara Mizrachi: Bar Ilan University - Yeshiva University Summer Research Internship

Dahlia Pasik: Bar Ilan University - Yeshiva University Summer Research Internship

Esther Robin: Department of Biology, SCW (Dr. Weisburg)

Batsheva Rosen: Department of Biology, SCW (Dr. Holz)

Kimberley Samet: Health Careers Opportunity Program (nursing), Rusk Institute

Shoshana San Solo: Bar Ilan University - Yeshiva University Summer Research Internship

Elle Schiff: Yavneh Olami internship, neonatal unit, Shaare Zedek Medical Ctr., Jerusalem

Naomi Schwartz: SERC Scholar, AECOM

Malka Sigal: Bar Ilan University - Yeshiva University Summer Research Internship

Sara Snow: Department of Chemistry and Biochemistry, SCW (Dr. Rapp)

Miriam Steinberger: Bar Ilan University - Yeshiva University Summer Research Internship

Chana Stern: AECOM (Dr. B. Goilav)

Leah Tauber: Montefiore Hospital (Department of Anesthesiology)

Rena Thomas: Stanford Medical School (Dr. L. Nadauld)

Nasim Tishbi: Department of Chemistry and Biochemistry, SCW (Dr. Rapp)

Helen Unger: Sloan-Kettering Medical Center

Rachel Victor: Emergency Medicine Research Department, University Hospitals, Cleveland, OH

Davita Wachstock: Department of Biology, SCW (Dr. Holz)

Rachel Weinberger: Health Careers Opportunity Program (nursing), Rusk Institute

Anna Weinstein: The Rockefeller University (Dr. Richard Hunter)

Laura Weiss: Toronto's Hospital for Sick Children, Department of Developmental and Stem Cell Biology (Dr. Sean Egan)

Rivki Weiss: AECOM (Dr. Peter Cole)

Jordana Wietschner: Department of Biology, SCW (Dr. Weisburg)

Bella Wolf: University Undergraduate Summer Research Scholar; AECOM

Publications

(Undergraduate names are in **bold** type)

Vigodner, M., Shrivastava, V., **Gutstein, L.E., Schneider, J.,** Nieves, E., Goldstein, M., Feliciano, M., and Callaway, M., 2012, Localization and identification of sumoylated proteins in human sperm; excessive sumoylation as a marker of defective spermatozoa, Human Reprod. (in press).

Maruani., D.M., Spiegel, T.N., Harris, E.N., Shachter, A.S., Unger, H.A., Herrero-González, S., and Holz, M.K., 2012, Estrogenic regulation of S6K1 expression creates a positive regulatory loop in control of breast cancer cell proliferation. Oncogene Jan 30. doi: 10.1038/onc.2011.657.

Frenkel, A.I., Vasic, R., **Dukesz, B.**, Li, D., Chen, M., Zhang, L., T. and Fujita, T., 2012, Thermal properties of nanoporous gold, Phys. Rev. B 85: 195419

Babich, H., **Ickow, I.M.**, Weisburg, J.H., Zuckerbraun, H.L., and Schuck, A.G., 2012, Cranberry juice extract, a mild prooxidant with cytotoxic properties independent of reactive oxygen species, Phytother. Res.. Feb 1. doi: 10.1002/ptr.3735. [Epub ahead of print]

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Dinerman, J. and Santos, L.F, 2010, Manipulation of the dynamics of many-body systems via quantum control methods, New Journal of Physics (in press)

Shrivastava, V., **Pekar, M.**, **Grosser, E.**, Im, J. and Vigodner, M. 2010, SUMO proteins are involved in the stress response during spermatogenesis and are localized to DNA double-strand breaks in germ cells, Reproduction (in press).

Yamnik, R.L. and Holz M.K., 2010, mTOR/S6K1 and MAPK/RSK signaling pathways coordinately regulate estrogen receptor alpha serine 167 phosphorylation. FEBS Lett. 584:124-128.

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Hathaway, F., **Burns, E.**, and Ostrer, H., 2009, Consumers' desire towards current and prospective reproductive genetic testing, J. Genet. Couns. 18:137-146.

Vigodner, M., Weisburg, J.H., Shrivastava, V., **Marmor, R., Fathy, J.,** and Skop, N., 2009, Differential expression patterns of SUMO proteins in HL-60 cancer cell lines support a role for sumoylation in the development of drug.resistance, Cell Tiss. Res. (in press).

Rivera, T., Birnbaum, B., Izmirly, P., Byrne, P., Brauth, J., Katholi, M., Kim, M., **Fischer, J.**, Clancy, R., and Buyon, J., 2009, Disease progression in mothers of children enrolled in the research registry for neonatal lupus, Ann. Rheumat. Dis. 68a;828-835

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Guffanti,E., Kittur, N., **Brodt, Z.N.**, Polotsky, A.J., Kuokkanen, S.M., Heller, D.S., Young, S.L., Santoro, N., and U.T. Meier, 2008, Nuclear pore complex proteins mark the implantation window in human endometrium, J. Cell Sci. 121:2037-2045..

Babich, H., **Gottesman, R.T., Liebling, E.J.**, and A.G. Schuck, 2008, Theaflavin-3-gallate and theaflavin-3'-gallate, polyphenols in black tea with prooxidant properties, Basic Clin. Pharmacol. Toxicol. 103:66-74.

Flores, R.M., Routledge, T., Seshan, V.E., Dycoco, J., Zakowski, M., **Hirth, Y.**, Rusch, V.W., 2008, The impact of lymph node station on survival in 348 patients with surgically resected malignant pleural mesothelioma: implications for revision of the American Joint Committee on Cancer staging system. J.Thorac. Cardiovasc. Surg. 136:605-610.

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Babich, H., **Pinsky, S.M., Muskin, E.T.**, and H.L. Zuckerbraun, 2006, *In vitro* cytotoxicity of a theaflavin mixture from black tea to malignant, immortalized, and normal cells from the human oral cavity, Toxicol. In Vitro 20: 677-688.

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Dow, G.S., Caridha, D., **Goldberg, M.**, Wolf, L., Koenig, M.L., Yourik, D.L., and Z. Wang, 2005, Transcriptional profiling of mefloquine-induced disruption of calcium homeostasis in neurons *in vitro*, Genomics 86:539-550.

Frenkel, A.I., **Nemzer, S., Pister, I., Soussan, L., Harris**, T., Sun, Y., and M.H. Rafailovich, 2005, Size-controlled synthesis and characterization of thiol-stabilized gold nanoparticles, J. Chem. Phys. 123:184701.

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Presentations at Scientific Conferences

(Undergraduates names are in **bold** type)

Amram, R., and DiLorenzo, T., 2012, Prevalence and pedictors of academic dishonesty. Poster to be presented at the Annual Meeting of the American Psychological Association, 2012, Orlando, Fl.

Freyberg, R., and **Bart, M**., 2012, Olfactory environment influences close relationships through multiple methods of measurement. Poster presented at the 2012 Annual Conference of the Association of Chemoreception Sciences, Huntington Beach, CA.

Gofine, M., and Dilorenzo, T., 2012, How are we doing? A review of assessments within writing centers. Ferkauf Graduate School of Psychology, Behavioral Sciences Student Research Conference.

Michalowksi, A., and Freyberg, R., 2012, The effect of directed writing on depression and anxiety. Ferkauf Graduate School of Psychology, Behavioral Sciences Student Research Conference.

Pasternak, E., and Bacon, J., 2012, Demystifying insight: A review. Ferkauf Graduate School of Psychology, Behavioral Sciences Student Research Conference.

Zughaft, M., Taylor, D.J., and Harburger, L.L., 2012, Effects of endogenous and exogenous sex hormones on object memory and spatial ability in young and aged women. *16th Annual N.E.U.R.O.N. Conference Program.*

Zughaft, M., Taylor, D., and Harburger, L., 2012, Effects of endogenous and exogenous sex hormones on object memory and spatial ability in young and aged women. Ferkauf Graduate School of Psychology, Behavioral Sciences Student Research Conference.

Gharagozloo, P., Arcasedda, F., Khatamee, M., Gutierrez-Adan, A., Drevet J., Krey, L., **Mandelbaum, M.,** Smith, M., Kramer, Y., Sanchez, X., Lu, L., McCaffrey, C., and Grifo, J., 2012, Age, sperm, & oocyte stress and infertility, American College of Obstetricians and Gynecologists, May 8th, San Diego, CA

Vigodner, M., Nieves, E., Shrivastava, V., Callaway, M.B., **Marmor, H.,** and **Chernyak, S.-B**.,2012, Identification of sumoylated proteins in human sperm, American Society of Andrology (ASA) 37th Annual Conference, April 21 – 24, Tucson, Arizona.

Hachen, M., Hunter, R.G., Pfaff, D.W., and McEwen, B.S., 2012, Stress modulates mitochondrial gene expression in the rat hippocampus, 243rd American Chemical Society Meeting, San Diego, California, Spring semester.

Karp, E., Novikov, L., **Klerman, H.**, and Gamble, M.J., 2012, Understanding the role of intronic cis-acting elements in the splicing of macroH2A1 variants, 243rd American Chemical Society meeting, San Diego, California, Spring semester.

Wolf, B.J., Reiss, S.E., Babich, H., Weisburg, J.H., Schuck, A., and Zuckerbraun, H., and **Fertel, S.** 2012, Proapoptotic effects of ellagic acid, a metabolite of pomegranate extract, on human oral carcinoma HSC-2 cells, 243rd American Chemical Society meeting, San Diego, California, Spring semester, 2012.

Hachen, M., Hunter, R.G., Pfaff, D.W. and McEwen, B.S., 2011, Stress modulates mitochondrial gene expression in the rat hippocampus, Society for Neuroscience Abstracts, Washington, D.C.

Shrivastava, V., **Marmor, H.**, **Gutstein, L.**, Chernyak, S.-B., and Vigodner, M., 2011, SUMO proteins may regulate multiple functions in human sperm which can be significantly affected by cigarette smoke, FAMRI Web Symposium.

Bart, M., and Freyberg, R., 2011, Fragrance change impacted interactions of close female friends. Chemical Senses, 36, A100-101.

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Harburger, L.L. and **Taylor, D.J.,** (2010). The effects of age on object memory and spatial ability in women. Society for Neuroscience Abstracts, Program # 605.2.

Huisman, T., Chatterjee, S., Volpi, S., and Birshtein, B., 2011, AID and Gadd45a: Involved in active DNA demethylation of the 3'RR and in class switch recombination? 241st American Chemical Society National Meeting, Anaheim, CA, March.

Rogawski, R. and Mintzer, E., 2011, Elucidating the interaction of LPA with model membranes, 241st American Chemical Society National Meeting, Anaheim, CA, March

Rosenblatt, K., Avogadri, F., Li, Y., Murphy,J., Merghoub, T., Houghton, A., and Wolchok, J., 2011, Detection of TRP-2 antibodies in the serum of TRP-2 immunized mice, 241st American Chemical Society National Meeting, Anaheim, CA, March.

Schuck, A.G., **Cohen, S.S., Lerman, L.T., Haken, O.,** and Weisburg, J.H., 2011, Pomegranate and olive fruit extracts, prooxidants with antiproliferative and proapoptotic activities towards HSC-2 carcinoma cells. Society for *In Vitro* Biology Annual Meeting, Raleigh, NC, June

Hasten, E., Lazaros, J., and Schuck, A.G., 2011, Pro-oxidant and pro-apoptotic activities of olive fruit extract toward oral carcinoma cells. Columbia University Undergraduate Research Symposium, April.

Hirth, Y.A., Zuckerbraun, H.L., and Weisburg, J.H., 2011, Decrease in intracellular glutathione and induction of apoptosis in HSC-2 carcinoma cells from the human oral cavity due to pomegranate juice extract. Society for In Vitro Biology Annual Meeting, Raleigh, NC, June

Schneider, J., Gutstein, L., Shrivastava, V., and Vigodner, M., 2011, SUMO proteins may regulate head reshaping, capacitation, and stress response in human sperm, Columbia University Undergraduate Research Symposium, Spring, April.

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Maruani, M., **Harris, E., Shachter, A.,** and Holz, M.K., 2011, Co-regulatory relationship between estrogen receptor alpha and the mTOR/S6K1 signaling pathways, American Association for Cancer Research 102nd Annual meeting, Orlando, FL, April.

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Marinkovic, N., Wang, Q., Barrio, **Cooper**, C., and Frenkel, A.I., 2010, Synchronous XAFS/DRIFTS Study of CO adsorption on Al2O3-supported Pt clusters The First North American Core Shell Spectroscopy Conference, Denver, CO.

Donington, J.S., Blasberg, J.D., Goparaju, C.M.V., **Hirsch, N.**, and Pass, H.I., 2010, Molecular heterogeneity of osteopontin Isoforms in non-small cell lung cancer, American Association of Cancer Research, International Association for the Study of Lung Cancer Joint Conference on Molecular Origins of Lung Cancer, Coronado, CA.

Goparaju, C., Donington, J., **Hirsch, N.**, Harrington, R, and Pass, H.I., 2010, EphB2 expression parallels malignant behavior in mesothelioma, American Association of Cancer Research, 101st Annual Meeting, Washington, D.C.

Donington, J.S., Goparaju, C.M.V., Blasberg, J.D., **Hirsch, N.**, Harrington, R, Pass, H.I., and Neubert, T., 2010, Extracellular mediation of divergent impact of OPN splice variants in non-small cell lung cancer. Osteopontin Biology, FASEB Summer Research Conference, Steamboat Springs, CO.

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Gross, J., Ennis, R.D., Homel, P., Evans, A., Gliedman, P., Choi, W., Hu, K., Shasha, D., Harrison, L.B., and S. Fleishman, 2010, The rapid increase in radiation oncology consultation and treatment of the extreme elderly and its independence from population growth, America Society for Radiation Oncology (ASTRO) Annual Meeting.

Horowitz, D. and Dilorenzo, T., 2010, The efficacy of hypnosis in pediatric cancer care, Ferkauf Graduate School of Psychology, Behavioral Sciences Student Research Conference.

Stiefel, E. and Freyberg, R., 2010, Trying to remember: A literature review about improving eye-witness testimony, Ferkauf Graduate School of Psychology, Behavioral Sciences Student Research Conference.

Rollhaus, E. and Freyberg, R., 2010, An analysis of the effects of altering directives in narrative therapy, Ferkauf Graduate School of Psychology, Behavioral Sciences Student Research Conference.

Scholl, C. and Dilorenzo, T., 2010, The issue of "faking good" on self report personality measures in personnel selection, Ferkauf Graduate School of Psychology, Behavioral Sciences Student Research Conference.

Zitter, S., Bryk, D., Fox, A., Narlieva, M., Pan, Q., Chang, T., Cloherty, G., and Lucic, D., 2010, Swine influenza or seasonal influenza? The first clinical adaptation of an automated open platform for swine influenza. The Montefiore experience, Young Research Investigators Symposium at Montefiore Medical Center, Bronx, NY, third place winner.

Shrivastava,V., **Miller, R., Lazaros, S.H.,** and Vigodner, M., 2010, Sumoylation as a sensitive marker of a tobacco-induced oxidative stress in the testis, FAMRI meeting, Miami, Florida (May)

Deluty, J., Seto, J., and Sealfon, S., 2010, Elucidating the signaling pathways of the immune response in monocytes, Columbia University Undergraduate Research Symposium, Spring.

Dinerman, J. and Santos, L.F., 2010, Controlling the Evolution of a Quantum System with Dynamical Decoupling Methods, Oral presentation, March Meeting, American Physical Society, Portland, OR.

Holz, M.K., **Seligman F.F., Spiegel T.N.,** and **Maruani D.M.,** 2010, Estrogenic regulation of S6 kinase 1 expression creates a positive feed-forward loop in control of breast cancer cell proliferation, AACR 101st Annual Meeting, Washington, DC.

Huisman, T. and Hodgson, L., 2010, Spectral modification to genetically encoded single-chain RhoA biosensor, 239th National Meeting, American Chemical Society, San Francisco, CA

Liebling, E.J., Asenjo, A.B., De Paoli, V.M., Rath, U., Sharp, D. J., and Sosa, H., 2010, Interactions between microtubules and kinesin-1,3, 239th National Meeting, American Chemical Society, San Francisco, CA

Mintzer, E., and **Rogawski, R.,** 2010, Elucidating the interaction of LPA with model membranes, Columbia University Undergraduate Research Symposium, Spring.

Solodokin, L.J., Canter, A., Freilich, A., Haken, O., Ovits-Levy, C.G., Schuck, A.S., and Babich, H., 2010, Anticarcinogenic and prooxidant properties of pomegranate juice extract and olive fruit extract, Columbia University Undergraduate Research Symposium, Spring.

Weiss, R.S., Zhang, C., and Cuervo, A.M., 2010, Identification of markers for autophagy in serum, 239th National Meeting, American Chemical Society, San Francisco, CA

Yamnik, R.L. and Holz, M.K., 2009, mTOR/S6K1 and MAPK/RSK signaling pathways coordinately regulate estrogen receptor alpha serine 167 phosphorylation, Cancer Res., 69:A31S

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Bellman, A. and DiLorenzo, T, 2009, The association between feminism, religiosity, and psychological well-being in Jewish women, Yeshiva University Behavioral Sciences Student Research Conference.

Ganz, D, and DiLorenzo, T, 2009, Comorbid suicidality and alcohol abuse in adolescents: Etiologic factors, Yeshiva University Behavioral Sciences Student Research Conference.

Hanau, T. and DiLorenzo, T, 2009, Etiology and treatment of bulimia nervosa, Yeshiva University Behavioral Sciences Student Research Conference.

Hazan, R. and DiLorenzo, T, 2009, Prolonged/imaginal exposure in PTSD: A literature review, Yeshiva University Behavioral Sciences Student Research Conference.

Hazan, R. and R. Freyberg, 2009, Victim of the act or the offender? Exploring the emotional and psychological responses of sexual assault and rape victims based upon the victim-offender relationship, Yeshiva University Behavioral Sciences Student Research Conference

Miller, R. and Harburger, L, 2009, Does Ben Franklin Effect Increase with Effort? Yeshiva University Behavioral Sciences Student Research Conference

Reichman, D. and DiLorenzo, T, 2009, Influence of family support on PTSD in children, Yeshiva University Behavioral Sciences Student Research Conference.

Rollhaus, E., and R. Freyberg, 2009, Directives in Narrative Therapy, Yeshiva University Behavioral Sciences Student Research Conference

Sonenberg, R. and DiLorenzo, T, 2009, A review of the literature on the psychological effects of 9/11 in children, Yeshiva University Behavioral Sciences Student Research Conference.

Spiegel, T. and DiLorenzo, T, 2009, Does MRI screening have a negative psychological effect on women who carry the BRCA gene? Yeshiva University Behavioral Sciences Student Research Conference.

Stiefel, E. and R. Freyberg, 2009, The multi-faceted Jew: A study on the integration of the interdependent self and the independent self in Jews in America, Yeshiva University Behavioral Sciences Student Research Conference.

Dinerman, C., Keller, and B. Herold, 2009, Genital secretions confer anti-*E. coli* activity, Montifiore Pediatric Research Day, 1St prize for a student poster.

Dukesz, F., Zilbergerts, M., and L. F. Santos, 2009, Interplay between interaction and (un)correlated disorder in Heisenberg spin 1/2 chains, March Meeting of the American Physical Society, Pittsburgh

Ackerman, N.J., Burekhovich, F., Schuck, A.G., Zuckerbraun, H.L., and H. Babich, 2009, Gingko biloba leaf extract induces oxidative stress in HSC-2 carcinoma cells, Columbia University Symposium of Undergraduate Research, Spring. (abstract and oral presentation).

Ruderman, E., Zack, E., and A.G. Schuck, 2009, Antitumorigenic and prooxidant activities of blueberry extract to human oral cancer cells, Columbia University Undergraduate Research Symposium, Spring. (abstract).

Bromberg, M.R., Patolla, A., Wang, O., Segal, R., Han W.-Q., Feldman, I., Zypman, F.R., Iqhal, Z., and A.I. Frenkel, 2009 , Platinum nanoparticles on SWNT nanopaper support: Synthesis, characterization, and application in electrocatalysis, The 237th American Chemical Society Meeting, Salt Lake City, Utah, March (abstract)

Charles, G., and E.A. Mintzer, 2009, Comparison of the behavior of native cholesterol and two oxidized cholesterol derivatives, The 237th American Chemical Society Meeting, Salt Lake City, Utah, March (abstract)

Charles, G. and E.A. Mintzer, 2009, Oxysterols alter the propensity of lipid raft formation in model membranes, Columbia University Undergraduate Research Symposium, Spring. (abstract).

Herzberg, B.M., Ting, L.-M., Mwakingwe, A., Croken, M.M., Madrid, D., Hochman, S., and K. Kim, 2009, Genetic studies of adenosine deaminase in the rodent malaria parasites, *Plasmodium yoelii* and *Plasmodium berghei*, The 237th American Chemical Society Meeting, Salt Lake City, Utah, March (abstract)

LeVee, A.J., and E.V. Prodan, 2009, Molecular electronics: Tunneling devices with semiconducting leads, The 237th American Chemical Society Meeting, Salt Lake City, Utah, March (abstract)

Liebling, E., Burger, R.F., Zuckerbraun, H.L., Schuck, A.G., and H. Babich, 2009, Protective effects of pyruvate through mediation of oxidative stress, Columbia University Symposium of Undergraduate Research, Spring (abstract).

Merzel, M., Grace, M., and M. Balwani, 2009, Development and validation of a dried blood spot assay for chitotriosidase, an important biomarker for Gaucher Disease, The 237th American Chemical Society Meeting, Salt Lake City, Utah, March (abstract).

Pekar, M., Grosser, E., Goodfriend, G., Im, J. and M.Vigodner, 2009, Stress-induced response and apoptosis in germ and somatic testicular cells: involvement of SUMO proteins, Columbia University Symposium of Undergraduate Research, Spring (abstract).

Schiffmiller, A., Rapp, C., Kalyanaraman, C., and M. Jacobson, 2009, Theoretical ranking of a congeneric series of protein kinase inhibitors, Columbia University Symposium of Undergraduate Research, Spring.(abstract)

Holz, M.K., **Digilova, A., Yamnik, R., Davis, D.**, Murphy, C., and **N. Brodt,** 2008, The role of S6 kinase 1 in breast cancer, San Antonio Breast Cancer Symposium

Atlas, A., McCarthy, J.W., and M. Feldmesser, 2008, *Aspergillus fumigatus* proteins bound by a germination-inhibitory monoclonal antibody, National Meeting of the American Chemical Society, New Orleans, LA.

Bellman, A. and T. DiLorenzo, 2008, Gender Identity Disorder: A review of the literature. Ferkauf Graduate School of Psychology Behavioral Sciences Student Research Conference.

Blau, L., Estes, D., **Seleski, N.** and **S.A.Guigui,** 2008, Stabilizing of deoxyoligonucleotide duplexes by base stacking, National Meeting of the American Chemical Society, New Orleans, LA.

Clark, E., Seideman, J., Silverman, J., Gardner, J., Scheinberg, D.A., and J.H.Weisburg, 2008, P-Glycoprotein independent resistance to oxidative stress in leukemia cells, National Meeting of the American Chemical Society, New Orleans, LA.

Dukesz, F., Frenkel, A.I., Bromberg, M.R.,Wang, O., Asherie, N., Blass, S., Rafailovich, M.H., Sun, Y., and J. Kang, 2008, Comparing various methods of synthesis and analysis of gold nanoparticles, National Meeting of the American Chemical Society, New Orleans, LA.

Fathy, J., Seleski, N., Dinerman, E., and M.Vigodner, 2008, Expression of SUMO protein in normal testicular cells and germ cell tumors, Columbia University Spring Undergraduate Research Symposium.

Feldman, A., Benichou, C., Skop, N., and M.Vigodner, 2008, Heat-induced stress response in germ and somatic testicular cells: involvement of SUMO proteins, Columbia University Spring Undergraduate Research Symposium.

Freyberg, R., and **M.Bensoussan,** 2008, The impact of fragrance on social relationships. Poster presented at the 2008 Biannual Conference on Human Development, Indianapolis, IN.

Freyberg, R., **Bensoussan, M.,** and A. **Silver,** 2008, Disruption of olfactory environment impacts close relationships in young women. National Meeting of the International Symposium of Olfaction and Taste, San Francisco, CA.

Greer, D. and R. Freyberg, 2008, Personality type as a predictor of religious identity and conflicts, Yeshiva University Behavioral Sciences Student Research Conference.

Guigui, S.A., House, R., Dulyaninova, N. and A. Bresnick, 2008, Characterization of a scfv to non-muscle myosin-II, National Meeting of the American Chemical Society, New Orleans, LA.

Hazan, R., and T. DiLorenzo, 2008, Treatment methods for PTSD: A literature review, Yeshiva University Behavioral Sciences Student Research Conference.

Herzberg, B.M., Ramjeawan, R., Sun, Y., Frenkel, A.I., and M. Rafailovich, 2008, Characterizing protein and folate coated nanoparticles and analyzing their toxic effects on cancerous and normal keratinocytes, National Meeting of the American Chemical Society, New Orleans, LA.

Liebling, E.J., Gottesman, R.T., Citrin, N.S., and H. Babich, 2008, Prooxidant ability of black tea flavin monogallates: studies with carcinoma and normal cells, Columbia University Spring Undergraduate Research Symposium.

Oxman, H., and T. DiLorenzo, 2008, Validity of MMPI-2 L scores in Orthodox Jewish undergraduate females. National Meeting of the American Psychology Association, Boston, MA.

Raviv, T., Digilova, A., and A. Schuck, 2008, Synergistic interactions between black tea theaflavins and chemotherapeutics in oral cancer cells, Columbia University Spring Undergraduate Research Symposium. (Note: **Tehilla Raviv and Alla Digilova** also gave this research as an oral presentation).

Reichman, B., and R. Freyberg, 2008, The unique developmental issues and challenges of children with incarcerated mothers, Yeshiva University Behavioral Sciences Student Research Conference.

Rollhaus, E., and R. Freyberg, 2008, Effects of written disclosure on mental health, Yeshiva University Behavioral Sciences Student Research Conference.

Segal, L., and R. Freyberg, 2008, Social aspects of religious influence on youth, Yeshiva University Behavioral Sciences Student Research Conference.

Silver, A., and R. Freyberg, 2008, Unfamiliar fragrances and their effects on nonverbal communication, Yeshiva University Behavioral Sciences Student Research Conference.

Stiefel, E., and R. Freyberg, 2008, To co-sleep or separate sleep that is the question: Reasons and developmental effects of co-sleeping vs. separate sleeping, Yeshiva University Behavioral Sciences Student Research Conference.

Bacon, J., Fromm, J.T., **Adelman, M., Neuhaus, R.**, and J. Herbert, 2007, Targeted cognitive interventions improve cognitive functioning in patients with MS. Int. J. MS Care. 9:P13.

Bacon J, Fromm J, **Neuhaus R**, and J. Herbert, 2007, Cognitive interventions to improve cognitive functioning in patients with multiple sclerosis, Mult. Scler. (Suppl 2). 13:S232.

Fromm, J.T., Bacon, J., **Adelman, M.**, Steinberg, C., Weiss, B., Vendola, M., **Neuhaus, R.**, Haus, J, Pham, V., Hawkins, A., Paul, T., and J. Herbert, 2007, Improving quality of life through participation in self-management interventions. Int. J. MS Care. 9: S41.

Fromm, J.T., Bacon, J., **Adelman, M.**, Steinberg, C., and J. Herbert, 2007, Clutter management in MS: Integrated occupational therapy approach. Int. J. MS Care. 9: S40.

Balk, E. and T. DiLorenzo, 2007, Risk factors for attrition in intervention programs for conduct disorder, Yeshiva University Behavioral Sciences Student Research Conference.

Oxman, H. and T. DiLorenzo, 2007, Associating word meaning to their ink color in an adaptation of the Stroop Effect, Yeshiva University Behavioral Sciences Student Research Conference.

Seidenwar, L. and T. DiLorenzo, 2007, The effects of ADHD on parental functioning, Yeshiva University Behavioral Sciences Student Research Conference.

Weiser, A. and R. Freyberg, 2007, The interplay between self-esteem, marital satisfaction, and perceived peer rejection in middle adulthood, Yeshiva University Behavioral Sciences Student Research Conference.

Krupka, C.B., and R. Freyberg, 2007, The impact of Judaism and SES on substance use, Yeshiva University Behavioral Sciences Student Research Conference.

Glaser, E., and R. Freyberg, 2007, The effects of religious service attendance on well-being, Yeshiva University Behavioral Sciences Student Research Conference.

Bensoussan, M., and R. Freyberg, 2007, The nature of fragrance preferences in young women, National Meeting of the Association of Chemoreception Sciences, Sarasota, FL.

Bensoussan, M. and R. Freyberg, 2007, The nature of fragrance preferences in young women. Chem. Senses. 32:A115.

Zimmerman, R. and R. Freyberg, 2007, Effects of Ken Doll on body image of preadolescent males, Yeshiva University Behavioral Sciences Student Research Conference.

Marmor, R.A., Fathy, J., Vigodner, M., and J.H. Weisburg, 2007, Differential expression pattern of SUMO proteins in normal and drug-resistant HL-60 cancer cell lines, Proceedings of the Columbia University Spring Undergraduate Research Symposium (poster presentation/abstract).

Guigui, S.A., Estes, D., and L. Blau, 2007, DNA's stability: composition vs. sequence, 233rd American Chemical Society National Meeting, Chicago, IL. (poster presentation/abstract).

Bursky-Tammam, N., Platt, Y., Bram, A., Kanner, L., Simpser, M., Zhou, J., Zhao, S., Rafailovich, M., and A. Frenkel, 2007, EXAFS analysis of hydrogenation effects on the structure of Pd nanacatalysts, 233rd American Chemical Society National Meeting, Chicago, IL. (poster presentation/abstract).

Brodt, N., Yamnik, R.L., Blenis, J., and M.K. Holz, 2007, Increased S6K1 protein expression confers proliferative advantage and rapamycin sensitivity to human mammary cancer cells, 233rd American Chemical Society National Meeting, Chicago, IL. (poster presentation/abstract).

Eisner, R., Schonbrun, C., Huang, N., and C. Rapp, 2007, Force field based receptor ligand rescoring, Mid-Atlantic Regional Meeting of the American Chemical Society (poster presentation/abstract).

Frenkel, A.I., Menard, L.D., Northrup, P., Rodriquez, J.A., Zypman, F., **Glasner, D.**, Gao, S.-P., Xu, H., Yang, J.C., and R.G. Nuzzo, 2006, Geometry and charge state of mixed-ligand Au13 nanoclusters , XAFS XIII Conference, Stanford, CA.

Bacon, J., **Riber, L.**, Fromm, J.T., **Safier, M.**, and J. Herbert, 2006, Motivational style as a predictor of adherence to injection therapy for multiple sclerosis. Mult. Scl. (Suppl 1) 12:S117.

Weller, I. and R. Freyberg, 2006, Application of a learning theory framework on to improving self-esteem and treatment outcomes of substance use disorders, Yeshiva University Behavioral Sciences Student Research Conference

Etengoff, C., and R. Freyberg, 2006, Judeo-Christian values and the female body image, Yeshiva University Behavioral Sciences Student Research Conference

Bensoussan, M., and R. Freyberg, 2006, Understanding fragrance preferences in young women.Yeshiva University Behavioral Sciences Student Research Conference.

Glasner, D., and A.I. Frenkel, 2006, Geometrical characteristics of regular polyhedra: Application to EXAFS studies of nanoclusters, XAFS 13 Conference, Stanford, CA.

Ackerman, R., Weiss, T., and T. DiLorenzo, 2006, CBT: Modification of dating habits: A case study, Yeshiva University Behavioral Sciences Student Research Conference.

Dickstein, D. and T. DiLorenzo, 2006, Relationship status as a predictor of caregiver burden in traumatic brain injury, Yeshiva University Behavioral Sciences Student Research Conference.

Goldmintz, E. and T. DiLorenzo, 2006, Risk factors for maladjustment in children from divorced families, Yeshiva University Behavioral Sciences Student Research Conference.

Harris, T., Soussan, L., Isseroff, R., Sun, Y., Rafailovich, M.H., and A.I. Frenkel, 2006, EXAFS studies of palladium nanoparticles: Size control and hydrogenation, XAFS13 Conference, Stanford, CA.

Pease, D.M., Frenkel, A.I., Shanthakumar, P., Huang, T., Balasubramanian, M., Budnick, J.I., Brewe, D., **Abitbol, N.**, and O. Odom, 2006, Performance and improved design of the log spiral of revolution monochromator, XAFS13 Conference, Stanford, CA.

Frenkel, A.I., Pease, D.M., Budnick, J., Shanthakumar, P., Huang, T., **Abitbol, N.**, and P. Metcalf, 2006, X-Ray Absorption Fine Structure study of the metal-insulator transition in Cr doped V2O3, March Meeting of the American Physical Society, Baltimore, MD.

Sun, Y., Frenkel, A.I., Isseroff, R., **Shonbrun, C.,** Forman, M., Shin, K., Koga, T., White, H., Rafailovich, M., and J. Sokolov, 2006, Characterization of Palladium and Gold nanoparticles using x-ray reflectivity, EXAFS and electron microscopy, March Meeting of the American Physical Society, Baltimore, MD.

Zaghi, D., Jacobson. M., and G. Barreiro, 2006, pH Sensitivity in talin, 232nd National Meeting of the American Chemical Society, San Francisco, CA.

Feig, J.L., Ha, S., Rudoff, R., and S.K. Logan, 2006, ART-27: a novel coactivator with tumor suppressor function in the prostate, 231st National Meeting of the American Chemical Society, Atlanta, GA.

Fridman, F., Erika, A., Ringia, T., and V.L. Schramm, 2006, Inhibitor screening for human nucleoside phosphorylase, bovine xanthine oxidase, and *E. coli* thymidine phosphorylase, 231st National Meeting of the American Chemical Society, Atlanta, GA.

Goldberg, M.S., Gerke, J.P., and Cohen, B.A., 2006, Correlation of gene expression and sporulation efficiency in *Saccharomyces cerevisiae*, 231st National Meeting of the American Chemical Society, Atlanta, GA.

Levine, E., Mandell, D., Jacobson, M.P., and C.S. Rapp, 2006, An implicit solvent study of phosphorylation in protein molecules, 231st National Meeting of the American Chemical Society, Atlanta, GA.

Soussan, L.L., Harris, T., Isseroff, R., Sun, Y., Rafailovich, M., and A.I. Frenkel, 2006, Thiol-stabolized palladium nanoparticles: size control and hydrogenation, 231st National Meeting of the American Chemical Society, Atlanta, GA.

Estes, D.W, **Ben-Zvi, N.,** and L. Blau, 2006, The DNA melt, 19th Biennial Conference on Chemical Education, West Lafayette, IN, July.

Edelblum, R. and T. DiLorenzo, 2005, Aging: Natural buffer against the effects of multiple sclerosis, Yeshiva University Behavioral Sciences Student Research Conference.

Galian, L. and T. DiLorenzo, 2005, Pain and gender: The underlying difference, Yeshiva University Behavioral Sciences Student Research Conference.

Sweet, R. and T. DiLorenzo, 2005, Sociotropic cognitions and levels of spirituality, Yeshiva University Behavioral Sciences Student Research Conference.

Estes, D.W., **Ben-Zvi, N.,** and L. Blau, 2005, The DNA melt: Composition, sequence, and thermodynamics, Gordon Research Conference on Chemistry Education Research and Practice, Connecticut College, New London, CT, June.

Frenkel, A.I.,Pease, D.M., Shanthakumar, P., Huang, T., **Abitbol, N., Soussan, L.,** and J. I. Budnick, 2005, X-ray absorption fine structure study of the metal-insulator transition in Cr doped V2O3, Fall Meeting of the Materials Research Society, Boston, MA.

Sun, Y., Isseroff, R., **Shonbrun, C.**, Forman, M., Frenkel, A.I., Shin, K., Koga, T., White, H., Rafailovich, M.H., and J.C. Sokolov , 2005, Characterization of palladium nanoparticles using x-ray reflectivity, EXAFS and electron microscopy, Fall Meeting of the Materials Research Society, Boston, MA.

Nissim, H.A., Krupka, M.E., Zuckerbraun, H.L., and H. Babich, 2005, Differential *in vitro* cytotoxicity of (-)-epicatechin gallate to cancer and normal cells from the human oral cavity, 229th National Meeting of the American Chemical Society, San Diego, CA.

Roth, R., Ozelius, L., and L. Liu, 2005, Explanation of alternative splicing in SGCE gene, 229th National Meeting of the American Chemical Society, San Diego, CA.

Nemzer, S., Harris, T., Pister, I., Soussan, L., Sun, Y., Rafailovich, M., and A. Frenkel, 2005, Characterizing nanoparticle size using EXAFS and TEM, 229th National Meeting of the American Chemical Society, San Diego, CA.

Nemzer, S., Harris, T., Pister, I., Soussan, L., Sun, Y., Rafailovich, M., and A.I. Frenkel, 2005, Size control of thiol-stabilized gold nanoparticles: combined EXAFS and TEM characterization, 229th National Meeting of the American Chemical Society, San Diego, CA.

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1995: **Lauren Insel** and **Judy Ehrenberg**
1994: **Yaffa Cheslow**, **Debbie Friedman**, and **Stacey Tuckman**

DERECH HATEVA, A JOURNAL OF TORAH AND SCIENCE

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A Blessing for Health

by Miri Mandelbaum

As a student of biology, my days are filled with the study of the human body. Biology is a fascinating subject, while at the same time quite a complex one. The number of tissues and organs we must identify is intimidating. The task of memorizing the mechanisms and pathways the body uses in its daily activities is daunting.

In the context of a college course, the intricacies of the human body are overwhelming. However, without the pressure of exams, the wondrousness of the human body is astounding and mind-boggling. Each organ system, with all its complexities, is only a small piece of the overall workings of the body. *Yad Hashem* is so clearly evident. It is no wonder that the Rambam, in discussing the commandments to love and fear G-d, says that the way to attain these emotions is through the contemplation of nature (*Hilchot Yesodei HaTorah* 2:2).

We have the opportunity to stop and focus on these miracles of nature multiple times each day, when we recite the blessing of *asher yatzar. Chazal* instituted this special *bracha* to be said after a person relieves himself. At first, we may tend to overlook or even belittle this "bathroom *bracha.*" However, with proper concentration, this blessing can be a tool to elevate our relationship with G-d, as the Rambam described. Every time we use the restroom, we acknowledge the miracle of our health, and thank G-d for this gift. The fact that our bodies work properly, despite the complexities of their functioning, truly is a wonder.

The text of the *asher yatzar* blessing is noted in the Talmud *Berachos* (60b). The blessing begins, "*Baruch...asher yatzar es ha'adam b'chachma,*" "Blessed are You, G-d...who fashioned man with wisdom." Immediately in the first line of the blessing, we acknowledge G-d's wisdom in creating the human body. It then continues, *"He created within him many openings and cavities. It is obvious and known before Your Throne of Glory that if one of them should rupture or one of them should be blocked, it would be impossible to exist and to stand before You."* The openings of the body are those that have contact with an outside environment, such as the nose and mouth. The cavities are the internal organs, such as the heart and intestines. If any of these were to stop working properly, our bodies would not be able to function (*Shulchan Aruch, Orach Chaim* 6:1).

The most common case of a cavity being blocked is heart disease, which is the leading cause of human death in the United States. The most prevalent heart disease is coronary heart disease (CHD), which often leads to heart attack [1]. In a healthy person, the arteries provide a path for blood to travel throughout the body, delivering oxygen and other nutrients to the cells. In CHD, plaque builds up in the coronary arteries, which are responsible for supplying the heart with oxygen. Over time, the plaque can rupture, causing blood clots to form. If the

clots are large enough, they can completely block blood flow to the heart. Myocardial infarction, commonly known as heart attack, occurs when heart cells are deprived of oxygen because of the obstructed blood flow, and heart muscle begins to die. With the heart not working properly, consequences can be fatal [2]. This is only one example of a cavity whose proper function is vital to our survival.

Asher yatzar ends by blessing G-d who is *"Rofei chol basar u'maflee la'asos"* "Who heals all flesh, and acts wondrously." There are many explanations for what this ending means. The *Shulchan Aruch* noted that our bodies getting rid of waste is in itself a form of healing. If the waste were to remain in the body, it would build up and become very dangerous. According to Rav Shimon Schwab, the phrase, "Who heals all flesh," praises G-d for maintaining our health. The greatest healing, he said, is the prevention of disease [3]. We are constantly exposed to microbes and viruses, yet most of the time our bodies fight them off without our even noticing.

The words *"umaflee la'asos"* come from *Tehillim* 139:14, *"od'cha al ki noraos nifleisi, niflaim ma'asecha"* "I thank You because I am awesomely fashioned; wondrous are Your works" [3]. If an inflated balloon has the tiniest hole, all the air will escape. The human body, on the other hand, has so many openings, yet the soul miraculously remains inside (*Shulchan Aruch*). The fact that the body exists as a combination of both a physical and a spiritual entity, the two of which cannot naturally exist together, is also a wonder (*Rema*). The *neshama*, which is called *"chelek Eloka mima'al,"* a piece of G-d Himself, exists in harmony with the substandard physical body, which produces and expels waste, and will one day decay itself. This blessing specifies the creation of man, in particular, as being *"b'chachma,"* with wisdom, because he lives this paradox [3].

"Kol atzmosai tomarna, Hashem mi kamocha!" "All my limbs proclaim, 'G-d, who is like You!'" (Psalms 35:10). In this familiar passage, quoted in the *Nishmas* prayer on *Shabbos* and *Yom Tov*, *David HaMelech* praised G-d by means of his physical body. The verse continues, *"matzil ani me'chazak mimenu v'ani v'evyon mi'gozlo,"* "Who saves the poor from one mightier than he, and the poor and the destitute from the one who robs him." Rav Schwab shed light on the connection between the two halves of this verse. He explained that the "poor and destitute" refer to the smaller organs, while the "one who robs" is the larger organs. G-d ensures that all organs are provided with the nutrients they need to function. The more demanding needs of the larger organs do not prevent nutrients from reaching the smaller organs [3]. Our digestive systems are such that they distribute nutrients to each part of the body in exactly the amounts necessary for proper function. The teeth physically crush the food. The food then travels down the esophagus, into the stomach, and then the small intestine, while digestive juices produced by the body chemically break it down. Once in the small intestine, the nutrients are ready to be absorbed into the bloodstream. The lining of the small intestine contains many folds with projections called villi. The villi, in turn, contain fingerlike projections called microvilli. These formations allow for increased surface area for efficient absorption. The nutrients are then passed into the bloodstream. The blood transports these nutrients to the exact places where the body needs them. Carbohydrates are taken to the liver, where they are either used for energy or stored for future use. Proteins are brought to where they are needed to build the structural elements of the cells. Fats and fat-soluble vitamins are brought to storage areas throughout the body. When needed, these nutrients are sent to the appropriate organs via the bloodstream [4].

Unfortunately, it is only at the times when things go wrong that we fully appreciate the gift of health. It is in this vein that R' Yerucham Levovitz, *mashgiach* of the *Mir Yeshiva* from 1910-1936, used to humorously tell his students that they ought to write home every time they used the restroom to let their parents know that, thank G-d, they are healthy. He recognized the miracles that are constantly taking place in the maintenance of our health [3].

The *bracha* of *asher yatzar* makes us stop and recognize these daily miracles. Dr. Kenneth M. Prager of Columbia University Medical Center described how he came to realize the meaning of this special blessing. He wrote, "It was not until my second year of medical school that I first began to understand the appropriateness of this short prayer. Pathophysiology brought home to me the terrible consequences of even minor aberrations in the structure and function of the human body. At the very least, I began to no longer take for granted the normalcy of my trips to the bathroom. Instead, I started to realize how many things had to operate just right for these minor interruptions of my daily routine to run smoothly. I thought of Abayei and his blessing. I recalled my days at yeshiva and remembered how silly that sign outside the bathroom had seemed. But after seeing patients whose lives revolved around their dialysis machines, and others with colostomies and urinary catheters, I realized how wise the rabbi had been." [5]

Many *rabbonim* have said that taking the time to say *asher yatzar* slowly and clearly and focusing on its meaning is a *segulah* for good health [6]. We must recognize G-d as the source of our health and thank Him for the miracles He performs on our behalf daily. With proper thought and *kavanah*, saying *asher yatzar* can be a transformative experience.

Acknowledgments
I would like to thank Dr. Babich for his constant guidance, and for supporting me in all I do. A special thank you to my parents, whom I credit for all my accomplishments.

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Vampires and Werewolves

by Batya Edelman

Mythical creatures such as vampires and werewolves have been popular subjects in recent literature and media. Today's portrayal of these creatures is vastly different from the original tales dating back to prehistoric times. Almost all societies told legends about blood drinkers and humans that could transform into wolves [1, 2]. According to many *Ka'abbalistic* leaders, there are parallels of these creatures within Judaism. These stories were accepted as truth when the world was a mystery to man, but as medicine and science became more understood by man, so too these legends were understood to be fictional. The only question that remains is which natural occurrence ancient humanity was trying to explain through these myths.

There are several Jewish commentators that describe blood-drinking creatures and humans that morph into wolves. The *Sefer Chassidim* discusses a creature referred to as the *estrie*, which resembles the vampire [3, 4]. The *estrie* was a creature that *Hashem* created at twilight on the first Friday, but its creation had not been completed before *Hashem* rested on the first *Shabbos*. Several stories are also related, in which the *estrie* is described as an evil being. One story relates the tale of an ill female *estrie* who was guarded by two innocent women. When one of the women fell asleep, the *estrie* unraveled its hair and tried to suck the blood out of the sleeping woman. The second woman cried out, awakening the sleeping woman, and together they stopped the *estrie* from carrying out its evil act. The *estrie* needed the blood of the woman to survive because "a being who was created from blood needs to swallow blood from flesh." Without this blood the *estrie* would die [3, 4].

Rabbi Menachem Zioni states that the builders of the tower of *Bavel* were transformed into vampires, werewolves, spirits, and monsters. He also writes about people who anointed themselves with specific oils, which enabled them to fly. However, these people, with their new capability to fly, had to return home before dawn [3]. *Rabbi Ovadiya Sforno* also discusses blood-drinking demons. He states that the *Torah* prohibited Jews from drinking the blood of animals to prevent them from associating with these demons. He also includes the reason why the demons must drink blood: since they are made from vapor they must consume the vapor of blood [5]. *Rabbeinu Ephraim* states that *Binyamin* had sons that resembled the species of the wolf. He also tells of a human who turned into a wolf, whose legs protruded from the shoulders [6, 7]. These creatures that are discussed in Jewish commentaries are inherently different from the mythical vampire and werewolf, but similarities still remain.

There are a variety of different diseases that may have led to the creation of the mythical creatures of vampires and werewolves, though only three will be

discussed. Patients with rabies, porphyria, and hypertrichosis exhibit symptoms that are similar to the characteristics associated with vampires and werewolves. Rabies is a viral disease that is usually transmitted through animal bites from affected mammals. The rabies virus is a single-stranded RNA virus that first reproduces in muscle cells. It then binds to the nicotinic acetylcholine receptors at the neuromuscular junction, which is where nerve cells relay messages to the muscle cells. The RNA virus then replicates within the neurons. Next, the virus enters the central nervous system and invades the brain neurons leading to neuronal dysfunction. Once the brain is infected, the virus can travel through the nerves to affect the salivary glands, skin, heart, and other organs. The advancement of the virus can take weeks or even months after the virus first enters the body. The disease leads to a variety of terrible effects. These include slight paralysis, cerebral dysfunction, anxiety, insomnia, confusion, agitation, paranoia, terror, hallucinations, and delirium. The production of large amounts of saliva coupled with the slight paralysis of the jaw leads to the inability to swallow and the characteristic foaming of the mouth. Encephalomyelitis (inflammation of the brain and spinal cord) causes the affected individual to enter a coma, and death follows shortly thereafter [8, 9]. Vampire and werewolf myths can be associated with these symptoms. The foaming of the mouth, insomnia, and abnormal behavior coupled with the fact that the affected individual may feel an intense need to bite (as has been documented in some cases) is where vampire and werewolf stories may have originated from. Transformation into vampires and werewolves through saliva and bites from these mythical creatures is a common thread in many legends. Additionally, many cases of rabies transmitted via bats and wild carnivores, including wolves, have been documented [8, 9]. This may be the origin of the legends in which vampires turn into bats and humans turn into wolves.

Hereditary porphyrias are a group of eight diseases, the symptoms of which are very similar to characteristics of vampires and werewolves. These diseases occur due to the malfunction of the heme biosynthesis pathway. Heme is comprised of porphyrin rings and is produced in every cell of the body, though mainly by erythropoietic cells and liver cells. Erythropoietic cells are involved in red blood cell production, and produce heme as a precursor to hemoglobin, the protein that transports oxygen to tissues in the body. Liver cells are involved in the production of cytochromes and haemoproteins. Cytochromes are part of the electron transport chain that is necessary for ATP formation. Heme production involves eight enzymes that convert glycine and succinyl CoA into the porphyrin rings. Three steps of heme production take place in the cytosol of the cell, while the rest of heme production takes place in the matrix of the mitochondria. The first enzyme, 5-aminolevulinic acid synthase (ALAS), converts glycine and succinyl CoA into D-aminolevulinic acid. ALAS is coded by two genes, one on chromosome X (ALAS2) and one on chromosome 3 (ALAS1). ALAS1 is the rate-limiting step in the production of heme in the liver, while heme production in erythrocytes is related to iron availability and is not limited by the enzymes in heme production. A mutation of ALAS1 leads to X-linked dominant

protoporphyria. In the second step, ALA dehydrogenase converts ALA into porphobilinogen (PBG), and is associated with ALA dehydratase porphyria. Porphobilinogen deaminase then converts PBG into hydroxymethylbilane, though a mutation can cause acute intermittent porphyria. Following this, uroporphyrinogen III synthase produces urophorphyrinogen III. If the enzyme is not functional, this leads to congenital erythropoietic porphyria. Porphyria cutanea tarda has been linked to the fifth step, in which UPIII decarboxylase forms coproporphyrinogen III. CPIII oxidase then produces protoporphyrinogen IX, which, if nonfunctioning, leads to hereditary coproporphyria. In the seventh step, protoporphyrin III oxidase (associated with variegata porphyria) generates protoporphyrin IX, which ferrochelatase (FECH) finally converts to heme. A nonfunctional FECH is linked to erythropoietic protoporphyria. In porphyria a mutated enzyme may be somewhat functional, but will catalyze reactions at much slower rates. Because of this, the substrate for the reaction will build up causing a variety of deleterious effects in the cell, and heme production will be dramatically slowed [10, 11, 12].

Patients with porphyria may present with a variety of symptoms that have been attributed to vampires. The symptoms vary with the type of porphyria and the patient. Some experience skin fragility and blisters and/or a burning sensation when exposed to sun. Others experience severe photosensitivity. If the central nervous system is affected, then insomnia, anxiety, hallucinations, depression, and convulsions may occur. Red teeth and red urine is another indication of porphyria. These symptoms are very similar to the medieval myths of vampire appearance and behavior. The legend that vampires suffer skin burns from the sun, and therefore only come out at night, explains the photosensitivity, skin blisters, insomnia, and the burning sensations. The strange behavior of the vampire can be attributed to the anxiety, hallucinations, and depression. The myth that vampires drink blood may have originated from the red teeth and urine observed in people afflicted with porphyria. Interestingly, the link between vampires and werewolves is also explained through porphyria, as some patients with porphyria grow excessive hair on their bodies [10, 11, 12].

Hypertrichosis is a rare disease in which afflicted individuals produce excessive hair due to larger amounts of hair follicles. The excessive hair growth causes affected individuals to appear wolf-like. There are over fifty different variations of the disease, including one called congenital generalized hypertrichosis (CGH). One mutated gene that can cause this syndrome is found on the X chromosome, and has been associated with gingival hyperplasia, a flattened nose, and elongated ears. Gingival hyperplasia leads to thickening of the gums of the mouth and can cause the appearance of a malformed mouth. Since affected individuals present with these wolf-like features, the syndrome has been nicknamed the "werewolf syndrome" [13, 14]. The wolf-like characteristics may have led to the werewolf myths.

Vampires and werewolves may be mythical, but there are diseases that resemble these legendary creatures. Hypertrichosis, porphyria, and rabies all exhibit similar symptoms to the fictional vampires and werewolves. There are Jewish commentators that discuss creatures with similarities to the vampires and werewolves, although the essence is different in these commentaries. Although presented differently in Jewish commentaries, parallel creatures to vampires and werewolves exist in Jewish tradition.

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ABSTRACT BOOKLET OF STUDENT RESEARCH 2012

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Gold Nanoparticles Crossing the Blood Brain Barrier

By: Elisheva Aeder,[1] Shoshana San Solo,[1] Anat Sharon,[2] and Prof. Rachela Popovtzer[2]

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In recent years, studies have been conducted showing the benefits of using nanoparticles as passive and active targeting agents as well as contrast agents for molecular imaging. Gold nanoparticles (GNPs), specifically, have been selected for this purpose due to their higher atomic number, resulting in a sharper contrast and decreased radiation dose requirement, and due to their low toxicity, which ensures a higher degree of safety during the imaging process. Linking the GNPs with antibodies, peptides, and other ligands produces active targeting agents which can selectively accumulate on specified cells with receptors for those substances. This process improves precision and accuracy in brain imaging when GNPs are targeted to specific cell receptors, and can allow for drug delivery across the Blood Brain Barrier which protects the brain from external substances.

The blood brain barrier (BBB) is a protective membrane of endothelial cells surrounding the brain with specific receptors that prevent unwanted substances in the blood from penetrating and entering the brain. In order to use GNPs for imaging and drug delivery purposes in the brain, they must be disguised and linked with molecules that will be receptive by the endothelial cells, thus allowing passage of the GNPs through the BBB which would otherwise be impossible. Our project is to test GNPs attached to three different molecules, 2-(4-aminophenyl)benzothiazole (APBT), glucose, and barbiturate, to ascertain which of the three permits the greatest absorption by brain endothelial cells in vitro. These three molecules were chosen: APBT, due to previous verification that compatible receptors exist on the BBB, glucose, because it provides food for the brain and has good transport capacity via transport proteins, and barbiturate which is used for anesthesia and thus is assumed to have receptors on the BBB as well. Barbiturate is also a promising coating option as it improves lipophilicity, a necessary property for crossing the BBB via transcellular lipophilic pathways.

We synthesized GNPs 30 nm in diameter: large enough for efficient detection via imaging modalities and long body retention time, and small enough to permeate cell membranes via receptor-mediated endocytosis. Particles must also be larger than 10 nm because smaller particles are toxic to cells as they can enter nuclei and alter DNA. The particles are prepared using HAuCl4 and sodium citrate. 12-Mercaptododecanoic acid (MDDA) is a linker with a thiol molecule on one end that binds with the gold and prevents the particles from aggregating. On the other end there is a carboxyl molecule which is activated by 1-ethyl-3-[3-dimethylaminopropyl]carbodiimide (EDC) and *N*-hydroxysuccinimid (NHS), and then conjugated with the desired coating.

Additionally, we tested various incubation times of brain endothelial cells injected with GNPs bound with APBT, glucose, and barbiturate to verify the optimum absorption time of the gold into the brain cells. The concentration of gold is determined using a Flame Atomic Absorption Spectrophotometer.

Though it has been previously determined that all three molecules can permeate the blood brain barrier, the purpose of this project is to determine which particles have the fastest penetration and the optimum absorption time, and to eventually test larger particles which can be more easily detected via imaging, and thus can be tracked as they deliver drugs to the brain in a non-invasive way.

In vivo studies are also being conducted in mice to ensure consistency between in vitro and in vivo results. In vivo tests are also necessary to test other molecules such as insulin whose receptors only exist in vivo and not in vitro.

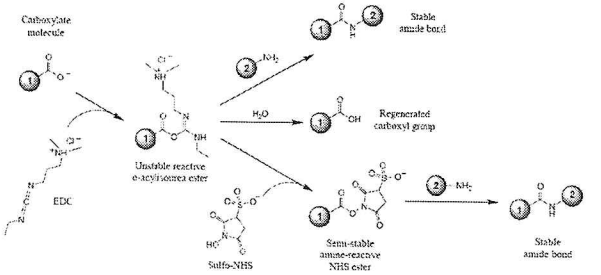

Figure 1. Reactions involving EDC including activation as an NHS ester (taken from thermo scientific)

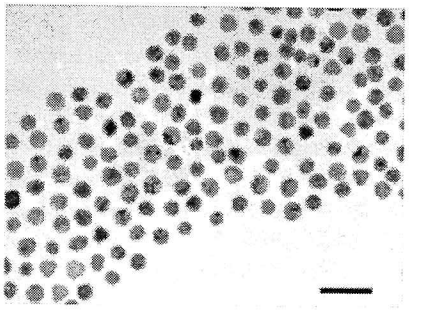

Figure 2. Characterization of GNPs: transmission electron microscopy image of 30 nm GNPs (scale bar 100 nm)

Neuronal Growth and Regeneration

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The nervous system is one of the most pivotal systems in the body in that it determines all other forms and functions. Nevertheless, knowledge of the cellular and molecular mechanisms by which the mammalian nervous system operates, develops, and regenerates still needs thorough investigation. Dr. Orit Shefi's lab attempts to gain a better understanding of how neurons acquire their morphology and use these mechanisms to manipulate neuronal growth. This research has the potential to provide insights which may help enhance neuronal recovery.

I have joined a graduate student, Michal Markus, in a project which tests the effect of iron oxide nano-particles on the neurite outgrowth in rat pheochromocytoma cells (PC12) in the presence of neuron growth factor (NGF). This entailed the seeding of PC12 cells in vitro together with NGF and iron oxide nano-particles. We followed the neurite outgrowth in six different concentrations of nano-particles, from 0 μg/ml (control) to 40 μg/ml, over a period of three days. We analyzed the data collected using the NeuronJ program. The parameters for analysis of the outgrowth included number of neurites from the soma, number of branches, and average total neurite length. Although we expected to see an increase in neurite outgrowth with increased concentrations of nano-particles as well as with time, the results have been inconsistent. The experiment needs to be repeated in order to establish the verifiability of these results.

In addition to measuring neurite outgrowth in vitro, I have joined my lab manager, Dr. Hadas Schori, in a project which involves the analysis of neuronal growth in vivo. To this end, we use a simple model of the nervous system- that of the medicinal leech, *Hirudo medicinalis*. Inspecting neuronal regeneration in the leech involved dissection, so as to expose, remove, and pin the ganglions. The ganglions, which encase the neurons, can then be subjected to experimentation. We have also attempted to perform leech skin transplantations in order to follow the recovery of the skin and the parallel neuronal contact created. Currently, we are working on setting up the technique for skin transplantation.

Both of the projects discussed have allowed us to gain increased knowledge in both the morphology and function of neuronal development and recovery. The results yielded thus far serve as preliminaries to further examinations and can contribute to uncovering new mechanisms by which neurons can grow and develop.

Prevalence and Predictors of Academic Dishonesty in Religious Undergraduates

By: Raquel Amram and Terry DiLorenzo
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Problem: Research has found that 70% to 90% of college students report having cheated at least once in college. Among business students, the prevalence is even higher, with up to 95% admitting to cheating. Given the high prevalence of cheating, identification of factors associated with cheating behaviors is of importance to researchers and educators.

The aims of the present study were to assess the prevalence and identify predictors of cheating in a sample of undergraduates in a religious Jewish university. Based on prior literature, we proposed that religiosity and learning orientation (with mastery of the material as a primary learning goal) would be negatively correlated to cheating, while grade orientation (with obtaining good grades as a primary learning goal) would be positively correlated to cheating. Additionally, we proposed that students' perceptions of rates of cheating among the student body, as well as familiarity with the university's Academic Integrity Policy, would be related to cheating behaviors.

Subjects: The sample included 234 students who were recruited from 3 undergraduate colleges (a women's college (n=104), a men's college (n=74), and a business college (n=53)) from the same university. The sample consisted of 41.0% freshman, 24.79% sophomores, 23.50% juniors, and 10.68% seniors. Females comprised 58.1% of the sample.

Procedures: Students completed the following measures in a classroom or research lab in the university: a cheating scale, measuring the frequency of cheating on tests, papers, and homework on a 5-point response scale, the LOGO II, which assess learning and grade orientations, the religious practices subscale of the Katz's Religiosity Measure, which assesses the level of observance of 12 practices in the Jewish Religion (e.g., observance of dietary laws), on a 5-point scale, a single item assessing perceived prevalence of cheating in the college (percent of students who cheat regularly), and a single item assessing familiarity with the university's Academic Integrity Policy (not at all familiar to very familiar).

Results: A total of 87.2% of students reported having cheated at least once. Chi Square analyses indicated that more business students reported having ever cheated than students from the men's college ($p<.01$), while rates of cheating in the women's college were not different from those of the other colleges. An examination of types of cheating behaviors found that 55.9% had cheated on tests, 76.7% had cheated on homework or labs, and 45.8% had cheated on papers.

Mean frequencies of cheating were 7.49 (s.d=3.10, possible range, 0– 35) for tests, 9.14 (s.d.=3.93,possible range, 0– 25) for homework/labs, and 6.51 (s.d.= 2.3,possible range 0– 25) for papers. Overall frequency of cheating did not differ by college attended or gender. Cheating frequency did vary by number of semesters in college, ($F(8, 197)=2.50$, $P<.01$); however post hoc comparisons revealed significant differences only between those in their first semester (who reported less cheating) than those in their fourth semester ($p<.05$). As predicted, bivariate analyses supported previous findings that cheating is associated with religiosity ($r=-.22$, $p<.001$), learning orientation ($r=-.30$, $p<.001$), grade orientation ($r=.45$, $p<.001$), and perceived prevalence of cheating among peers ($r=.34$, $p<.001$). Contrary to our hypothesis, familiarity with the academic policy was not correlated with cheating behaviors. Since year in college was related to cheating frequency, we examined whether predictors of cheating were similar in students in their first semester in college ($n=148$) as compared to those who had more experience in college (i.e., second semester freshmen, sophomores, juniors and seniors). The results obtained for the total sample were replicated, with one exception: the association between religiosity and cheating was not significant in students beyond their first semester in college.

Conclusions: Results indicate that cheating is prevalent even among religious undergraduates. Religiosity was negatively associated with cheating only in students who had been on campus for less than 1 year. This finding may suggest that if the environment is conducive to cheating, religiosity no longer acts as a deterrent. The association between religiosity and cheating should be examined longitudinally in future investigations. Being grade orientated was associated with a higher frequency of cheating. Given the current level of competition to get grades necessary to be accepted to graduate schools, it is possible that cheating is seen as a reasonable option to achieve good grades.
While our study was limited to a religiously-affiliated institution, and should be replicated in secular universities, our results do indicate that interventions to decrease cheating should focus less on threats of punishment (since Academic Integrity Policy was not associated with cheating) and more on fostering learning orientations in students.

Poster presented at the American Psychological Association Annual Meeting, August, 2012, Orlando, FL.

Separation of Different Types of Testicular Cells from Mouse Testis; Studies of Sumoylation

By: Miriam Andrusier, Elisheva Markov, Yuxuan Xiao, and Margarita Vigodner
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Background and Introduction

Spermatogenesis consists of divisions of spermatogonia, meiosis of spermatocytes and differentiation of spermatids. This process is supported by hormones and growth factors produced by testicular somatic cells such as Sertoli and Leydig cells.

In humans, infertility affects many couples worldwide and in the US. The male partner is responsible for infertility in at least half of all cases and about half of infertile men have idiopathic infertility (infertility with an unknown cause or origin.) Therefore, it is important to study new previously non-characterized proteins during spermatogenesis in order to better understand normal spermatogenesis and possible causes of infertility.

Sumoylation (a recently discovered type of covalent modification by Small Ubiquitin-like Modifiers or SUMO proteins) is an important regulatory event in cell function; however, its role during spermatogenesis is largely unknown. The aim of the project in Dr. Vigodner's laboratory is to identify and initially characterize specific targets of sumoylation in different types of testicular cells. Because testicular tissue is complex and multi cellular in nature, to achieve the aim of the project, populations enriched for specific cell types need to be obtained from mouse testes.

Materials and Methods

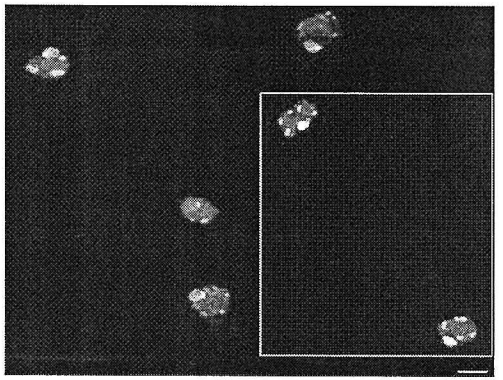
Mice were sacrificed and their testes were removed and de-capsulated. The testes then underwent two enzymatic digestions to isolate interstitial Leydig cells and to obtain cell suspension. The cells were separated using STAPUT technique which is based on separation of different cell types by using gravity sedimentation. A density gradient was created by a gradual mixing of 2% and 4% BSA solutions. The testicular cells were loaded on top of the density gradient and allowed to sediment. Different cells migrated through the gradient and stopped at the point at which the density of the BSA solution equaled to their own. After several hours, 12 ml fractions were collected into tubes and analyzed microscopically using accepted morphology criteria and antibodies specific for different cell types.

Once immunofluorescence has been done and the fractions were determined to be pure, immunoprecipitation is performed using anti-SUMO antibodies followed by a Mass spectrometry analysis to identify the SUMO-modifying proteins.

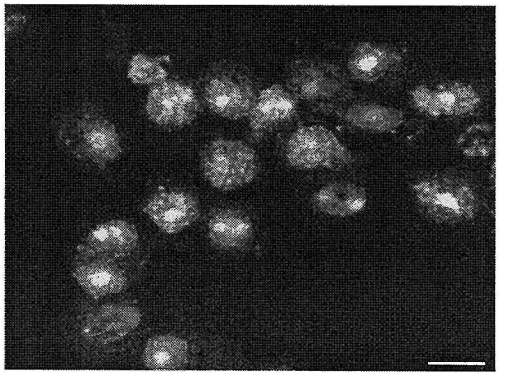
Results

STAPUT was determined to be a good method of separating cells and immunofluorescence proved that the samples were indeed enriched for specific cell types. Using those techniques, we succeeded to separate fractions of meiotic spermatocytes and spermatids (figures below) which may be very important in future studies of meiosis and spermatid differentiation.

One of our concerns was a possible loss of sumoylated proteins from the cells following a prolonged separation procedure. However, immunofluorescent staining of the fractions using anti-SUMO antibodies revealed a bright SUMO signal in spermatocytes and spermatids. The SUMO localization pattern was similar to that previously reported for those cells (please see the figures below). Fractions from different separations are now being collected in order to have enough protein lysates for successful immunoprecipitation experiments.



Spermatocyte fraction after STAPUT separation. Gamma H2AX (red) is a marker of spermaticytes and is localized to the XY body. SUMO (green) is concentrated in the centromeric heterochromatin and XY body, as previously described; DNA is stained by DAPI (blue);
Insert is another microscopic field from the same slide; Scale bar is 10 microns.



Round spermatid fraction after STAPUT seapration. SUMO (green) is concentrated in the centromeric heterochromatin and is also seen throughout the nucleus, as previously described; DNA is stained by DAPI (blue); Scale bar is 10 microns.

Investigation of a lipid signaling pathway in Drosophila germ cell development

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In humans, male sterility accounts for half of infertility cases, on average. A chromosomal translocation that disrupts human MBOAT1 results in a condition described by male sterility and brachydactyly. *Drosophila* homologues of MBOAT1, Oysgedart (Oys) and Nessy (Nes), are lysophospholipid acyltransferases that act in the evolutionarily conserved Lands cycle. The Lands Cycle regulates the balance between membrane phospholipids, which contain two fatty acid chains, and single fatty acid chain lysophospolipids, which can act as intercellular signals. Membrane-bound O-acyltransferase (MBOAT) enzymes such as Oys and Nes convert lysophospholipids to phospholipids by adding fatty acid chains to them. Oys and Nes act redundantly in *Drosophila* germ cell development. Embryos mutant for *oys* and *nes* show significant deficiencies in germ cell migration, a process that is directed by lipid signaling. Adult male *oys nes* mutants show defects in spermatid individualization and are sterile. Several lines of evidence suggest that Oys and Nes function in the somatic cells but not the germline cells, suggesting that Oys and Nes are critical for a signaling event between soma and germline. This role of Oys and Nes may be conserved in humans and may be the mechanistic basis for the sterility associated with the human MBOAT1 mutation.

Using RNA in situ hybridization, we have found that *oys* and *nes* are expressed in the testis during the mitotic and meiotic spermatocyte stages (Figure 1). We are generating fly lines to confirm our previous observations that Oys and Nes function in the somatic cells and not the germline. We also are investigating whether other components of the Lands cycle are expressed in the testis and required for spermatogenesis. In the Lands cycle, phospholipase A_2 enzymes (PLA_2s) remove fatty acid chains from phospholipids, acting in opposition to Oys and Nes. We are investigating whether any of the nine *Drosophila* PLA_2s have a similar expression pattern to *oys* and *nes* in the testis. We will generate PLA_2 knock-out mutants in order to test whether PLA_2s are required for spermatogenesis. Because Oys and Nes appear to act in the somatic cells of the testis, we are investigating whether the development of these somatic cells occurs normally in the *oys nes* mutant, using immunofluorescence for molecular markers of somatic cell development. We expect our experiments to establish *Drosophila* as a model system for investigating the roles of lysophospholipid signals in cell communication and fertility.

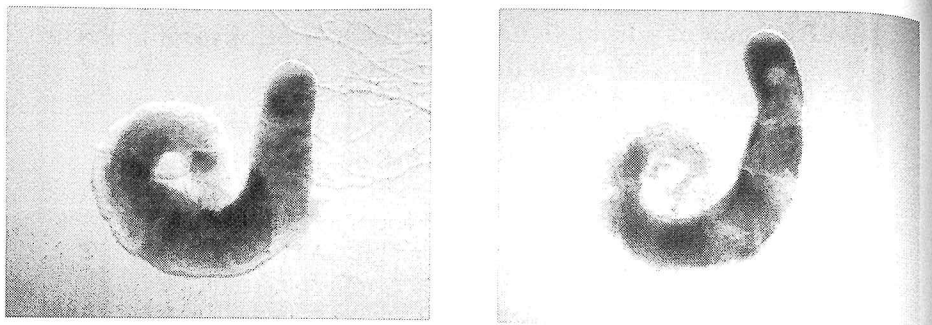

Figure 1. A) RNA in situ hybridization showing *oys* expression in the *Drosphila* testis. B) RNA in situ hybridization showing *nes* expression in the *Drosophila* testis.

Assessing Developmental Delays in School-Aged Children and Early Childhood

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A Pediatrics article from 2005 that surveyed FAAPs (fellows of the American Academy of Pediatrics) conveyed that only a few pediatricians successfully conduct developmental screenings. Once admitted to the hospital, it is key that every child is screened for behavioral and developmental delays. The executed study targeted children between the ages of 1 to 33 months to assess if there are a significant number of children with speech/language and social/emotional developmental delays which have not been brought to attention. The focus is to assess if doctors are finding developmental delays in children upon hospitalization.

Parents or patients' guardians were asked to answer a questionnaire about their child's health and development. Patients' charts were also examined to determine if there is any noted developmental delay recorded by the resident and attending. Subsequent to the interviewed questionnaire, parents were asked to fill out an "Ages and Stages Questionnaire" which questions their children's developmental milestones. Each of these questionnaires were scored based on each child's age. In the event that there is a clear indication that the child is lagging in two or more areas of development the child was referred to the social worker or attendee to follow up with the parents with a possible referral for Early Intervention.

The preliminary results indicate that of the patients whose parents participated in the study and completed the "Ages and Stages" questionnaire, 60% of the patients had been referred, while 40% did not need to be referred. 8% of the residents noted a developmental delay in the patients' charts of those patients who had been referred.

The results convey it is imperative that a detailed developmental assessment is performed upon hospitalization so that if the child may be referred for Early Intervention if need be.

Autooxidation of Gallic Acid, a Nutraceutical in Pomegranate and Tea, Induces Oxidative Stress in Oral Carcinoma HSC-2 Cells

By: Ayelet R. Bersson, Hannah Esan, Tova Lahasky, Aliza Y. Loshinsky, Sarina H. Miller, Amy L. Nathan, Alyssa G. Schuck, Jeffrey H. Weisbug, and Harvey Babich

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Nearly half of cancers diagnosed in the United States are caused by unnecessary life choices including smoking, drinking, and unhealthy eating. The lack of consumption of fresh vegetables and fruits is a major factor contributing to an elevated risk of cancer development. This potential chemopreventive effect is related to the high levels of numerous non-nutritive phytochemicals, termed nutraceuticals, in fruits and vegetables. This study evaluated the anticancer potential of gallic acid, a polyphenol common in many foods (*e.g.*, pomegranate) and plant-derived beverages (*e.g.*, green and black teas).

Human oral carcinoma HSC-2 cells were more sensitive than normal gingival HF-1 fibroblasts to a 24-hr exposure to gallic acid (GA), as assessed by the neutral red cytotoxicity assay. Midpoint cytotoxicity (NR_{50}) values were approximately 75 μM GA for the HSC-2 cells, and approximately 140 μM GA for the normal fibroblasts. As shown with the FOX assay, gallic acid was a strong generator of hydrogen peroxide (H_2O_2), suggesting that its mode of cytotoxicity may be through the induction of oxidative stress. Reduced glutathione (GSH) is the cell's main protector against damage by oxidative stress. The cytotoxicity of GA to HSC-2 cells was potentiated by a co- or pre-exposure of GA with the GSH depleters, D,L-buthionine-[*S,R*]-sulfoximine (BSO), 1-chloro-2,4-dinitrobenzene (CDNB), and bis(2-chloroethyl)-*N*-nitrosourea (BCNU), each inhibiting a different enzyme in the recycling of glutathione (Fig. 1).

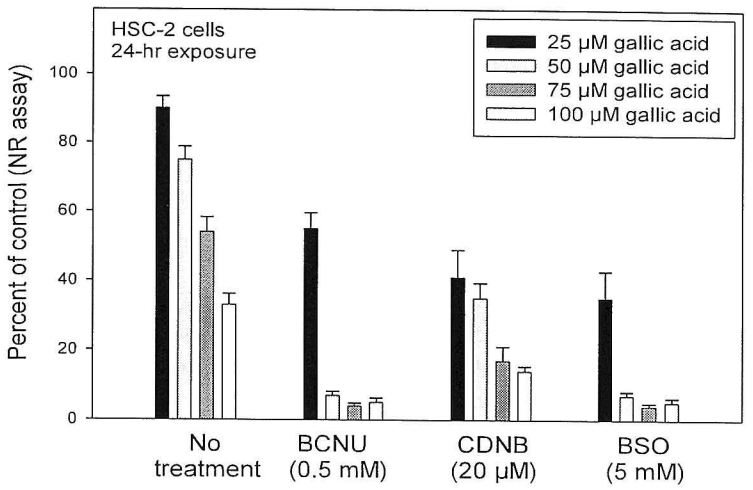

Figure 1. Potentiation of the cytotoxicity of gallic acid to HSC-2 carcinoma cells by co- and pre-exposures to glutathione depleting gents.

To further corroborate data implicating oxidative stress as the mode of cytotoxic action by GA, the HSC-2 carcinoma cells were treated with GA in the presence of catalase, pyruvate, and divalent cobalt, all scavengers of H_2O_2. The 24-hr cytotoxic potency of GA to the HSC-2 cells was greatly lessened upon exposures in the presence of these scavengers of H_2O_2 and parallel studies with the FOX assay showed greatly reduced levels of H_2O_2 in GA-containing medium co-amended with these scavengers. Apparently, GA cytotoxicity was due, in a large part, to the induction of oxidative stress within the cells.

Oxidative stress has been implicated in cell death via apoptosis. To demonstrate GA induction of apoptotic cell death, HSC-2 cells were treated with GA and after a 24-hr exposure were analyzed with a Guava Easycyte Miniflow Cytometer, using the Guava Viacount reagent to distinguish between viable, nonviable, and apoptotic cells (Figure 2). Significant levels of apoptotic cells were noted at 100 μM GA and greater. Immunoblot analysis of an apoptotic marker, namely, cleavage of poly(ADP- ribose) polymerase (PARP), also demonstrated GA induction of apoptosis and alleviation of apoptotic cell death in the presence of scavengers of H_2O_2, such as divalent cobalt. (Fig. 2).

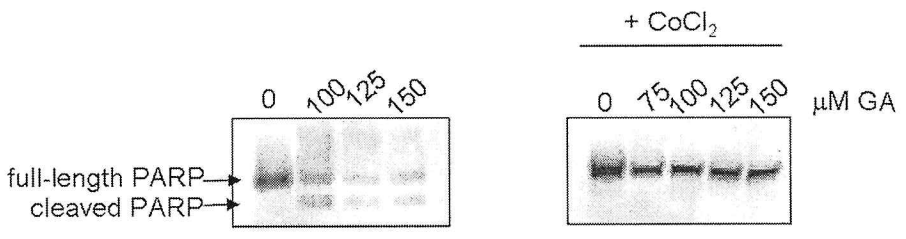

Figure 2. Western blot analysis of PARP cleavage induced by gallic acid in the absence and presence of cobalt, a scavenger of H_2O_2.

Identification of an Osteosarcoma Progenitor Cell by Analysis of Differential Expression of Cell Surface Receptors of Human Mesenchymal Stem Cells and Mature Chondroblasts

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Osteosarcoma, the most common malignant bone tumor in children and young adults, is thought to originate from a cell at some point along the differentiation pathway of human mesenchymal stem cells (hMSC) to specific cells such as chondroblasts, osteoblasts, and adipoblasts. These three cell types are believed to differentiate from a single cell of origin along the differentiation pathway of hMSCs to specific cell types. Identifying changes in surface marker expression throughout the process of differentiation may help characterize the cell of origin as well as the intermediate stages in the differentiation pathway which is crucial to understanding the molecular pathogenesis of osteosarcoma. Looking at the differentiation pathways of hMSC to osteoblasts, chondroblasts and adipoblasts may help in identifying the cell of origin that unites all three pathways.

In this study, RNA was extracted from hMSC and mature chondroblasts, and gene expression was measured using microarray on the Affymetrix Gene 1.0 ST array. A list of differentially expressed genes was generated but only genes for cell surface proteins were analyzed for this experiment. hMSCs and chondroblasts were cultured and chondroblasts were characterized using an Alcian Blue Stain. The gene list derived from the microarray will be corroborated with flow cytometry to confirm the differential expression of those surface markers. hMSCs will then be differentiated into chondroblasts, which will be harvested every few days to check for changes in surface marker expression to determine the intermediate stages of the differentiation pathway.

Optimization of the Creation of Alginate Gels and Their Mechanical Properties

By: Aliza Bram,[1] Chris Liu,[2] Shivem Shah,[3] Joseph Szydlo,[4] Dr. Devandra Verma,[5] Dr. Rene Schloss,[5] and Dr. Noshir Langrana[5]
[1]Stern College for Women, NY, NY; [2]Rutgers University, Piscataway, NJ; [3]Boston University, Boston, MA; [4]Queens College, Flushing, NY; [5]Department of Biomedical Engineering, Rutgers University, Piscataway, NJ

In the study of encapsulated human mesenchymal stromal cells (hMSC) and their treatment of secondary inflammatory responses post-spinal cord injuries in rat models, the mechanical properties of the alginate encapsulation must be evaluated in order to establish its possible effect on hMSC functioning. The purpose of this study was to classify the mechanical properties of hydrogels before and after the addition of nanoparticles in alginate encapsulated hMSC in an attempt to understand its role in the proliferation and functioning of hMSC.

The first objective of this study was to optimize the creation of sodium alginate hydrogels for mechanical testing in the Kinexus rheometer. This goal was ultimately achieved through the creation of the 'thin double stack mold' (see Fig. 1). We placed 1 mL of 2.2% sodium alginate in a 1 mm PDMS mold in the center of a cell culture dish. A cloth is then placed on top of this with another mold filled with 3 mL of .1 M calcium chloride. We allowed the calcium chloride to diffuse through the cloth for approximately 22 hours, followed by punching out ¾ mm of sodium alginate gel for rheological testing. Samples then soaked in an addition 6 mL of .1 M calcium chloride for another night. Ultimately, this provided us with the necessary sized sample of sodium alginate gel for mechanical testing of the sodium alginate samples, as well as fully polymerized samples.

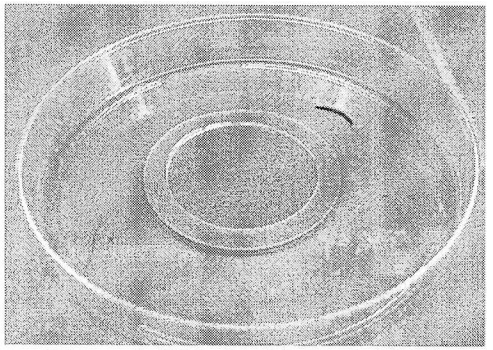
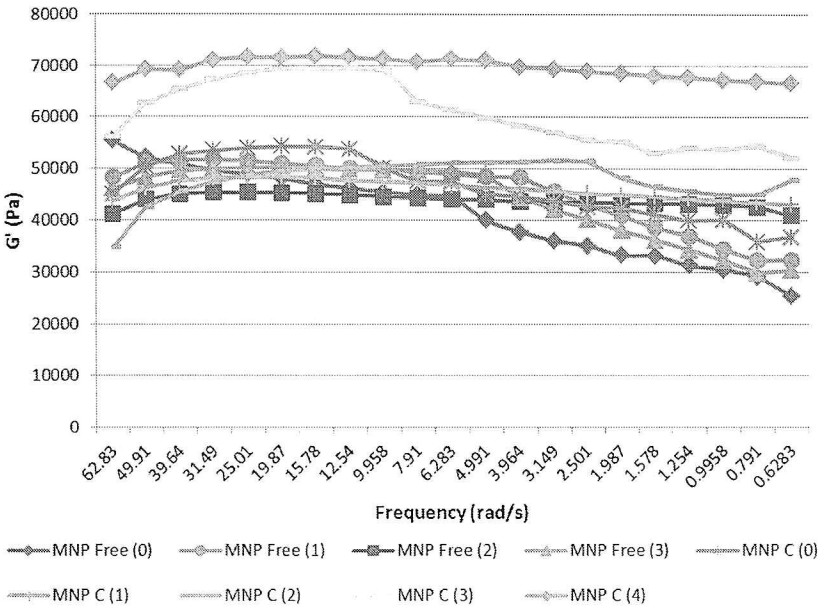


Figure 1. 'Thin Double Stack Mold'

Once we obtained consistent results on the rheometer through the 'thin double stack model,' we began testing the mechanical properties of the alginate with and without magnetic nanoparticles (MNP). Thus, in addition to optimizing the process of making the 2.2% sodium alginate gel, we also accomplished creating samples that would replicate the gel encapsulation of hMSC. By diluting 600μL of 3% sodium alginate gel with 340μL of media (DMEM), we created MNP-Free samples that would ultimately be 1.98%, the proper concentration that the gel would be with hMSC as found in the spinal cord. We then proceeded to create samples with the addition of MNP. In order to maintain the 1.98% concentration, we prepared the samples with 600μL of alginate, 180μL of DMEM, and 160μL of Chitosan MNP. These samples were then tested in order to compare their mechanical properties with and without the addition of MNP. As seen in Figure 2, while the results of MNP are quite greater than those samples without MNP, the average kPA of the MNP-Free samples remains lower at 32.2 kPA, than the Chitosan MNP samples, which have an average of 49.27 kPA. The Chitosan-coated MNP simply created more variable results and also created a higher shear modulus from the alginate samples without MNP. Ultimately, our results show that the mechanical properties of the alginate are slightly altered with the introduction of magnetic nanoparticles. Further research will reflect if this difference will have a profound impact on the effectiveness and overall functioning of hMSC as anti-inflammatory agents in spinal cord injuries.

Figure 2. G* versus Frequency



Obstruction of the Upper Airway Analysis Utilizing Magnetic Resonance Imaging

By: Ionit Cohen,[1] and Mark E. Wagshul[2,3]
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Obstructive sleep apnea syndrome (OSAS) is a highly prevalent sleep disorder affecting children and adolescents. OSAS is a condition in which an insufficient amount of air flows into the lungs through the airway. Normally when one is awake or asleep the throat muscles keep the throat open and air flows into the lungs but in people with OSAS the throat briefly collapses while they are asleep. Temporary upper airway obstruction during sleep will result in cardiovascular and cognitive morbidity in children with OSAS. In some cases, adenotonsillectomy (surgical removal of the tonsils and adenoids) and weight loss decreases the clinical manifestations of OSAS but their effectiveness remains unclear and it is still a challenge to identify those likely to benefit. Regardless of the major health consequences of OSAS, there is not an adequate amount that is known about its pathogenesis or the anatomic risk functions. Imaging techniques have equipped us with an in depth understanding of the biomechanical foundation of obstructive sleep apnea. Such techniques have demonstrated that the size and shape of the upper airway structures such as the tongue, soft palate, adenoid tonsils, lingual tonsils, pharyngeal tonsils and mandible are an important determinant of upper airway quality in sleep apnea. However, the result of these techniques is an inadequate characterization of the actual three-dimensional structure and therefore can result in an inaccurate measurement of the dynamic changes in the upper airway over the respiratory cycle. To acquire a more thorough understanding of OSAS, we need to examine the volume of upper airway structures utilizing a three-dimensional approach. The purpose of the present work is to pursue such an analysis using advanced computer programs to reconstruct a sophisticated model of the airway. The ultimate goal is to be able to provide software which can compute and determine precisely what the tissue is doing and can predict the affect on the amount of airflow and pressure in the airway if a certain part of the tissue is removed, for example. The primary goal is to discover what triggers the collapse of the airway in these patients.

Magnetic Resonance Imaging (MRI) is unique in that it is an imaging method that is primarily used to construct pictures from the Nuclear Magnetic Resonance signal of hydrogen atoms in an object. This is ideal because it can collect dynamic images in any orientation without the use of radiation. There are certain elements (such as hydrogen) that possess a positively charged proton that spins (or precesses around an axis) this 'spinning' generates a magnetic field. When the hydrogen atoms in our body are placed under a powerful magnetic field like the one from the MRI, the axes of the protons realign with the magnetic field. Half of the protons align in one direction and the other half in the other—well more precisely a few more atoms align in the low energy configuration. These few left over protons are the ones that the MRI machine will use to detect a signal. The respiratory gated-technique that will be created for measuring dynamic changes in the airway over the respiratory cycle works by synchronizing the imaging with a phase of the respiratory cycle. In order to watch the motion of the airway most effectively the imaging data is collected retrospectively and is associated with different phases of the respiratory cycle. A chunk of the image is collected at specific points in the respiratory cycle for a couple of different respiratory cycles. This will result in a clear movie of the airway over time. Currently all of the data processing occurs after the fact, often hours after the patient has left the imaging center. This is problematic because if the data are poor quality we will only find this out later when the patient is no longer able to re-scan. The focus is to develop a software that will run on the MRI machine so that the technologist will have the option to immediately evaluate the images and gating quality while the patient is still in the MRI scanner. The software will be comprised of efficient tools for processing of images of the pediatric upper airway, to provide automated segmentation of the airway and calculations of changes in airway size over the respiratory cycle. Thus far, a graphical user interface (GUI) has been developed in MatLab that allows for the option of opening any dataset and displaying the three orientations (sagittal, axial and coronal) in three separate panels. Features include controls that can update the images and display the desired slice and frame, an option that allows for cropping of the airway in any of the panels and color information so that the desired portion will appear in a different color. Future improvements will allow for the immediate assessment of image and gating quality, while the patient is still in the MRI scanner.

Photonic Crystal Biosensor Device

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The purpose of this project is to demonstrate biodetection using a biosensor, which is sensitive to the shifts in the refractive index (RI) of the medium surrounding the sensor. Refractive index change can be due to changes in the bulk fluid, or due to binding of analytes to the functionalized sensor surface. The goal is to ultimately create a quick method of diagnosis through using an unprocessed blood sample.

A biosensing chip is cut from a silicon wafer, which will later hold photonic crystals made up of mesas. Using a Plasma Enhanced Chemical Vapor Deposition (PECVD), a 20nm oxide layer is deposited onto the silicon surface in order to allow adherence of the polymer layer. The polymer will not adhere to the nitride because the nitride lacks hydroxyl groups. An ellipsometery measurement is used to confirm that the oxide has been deposited. To prepare for the functionalization of the APTMS polymer, the silicon chip is placed in a dichloromethane (CH_2Cl_2) solution. RCA 1 cleaning, consisting of NH_3, H_2O_2, and deionized H_2O in a ratio of 1:1:5, will create a clean and even oxide surface. The APTMS polymer is then dissolved in toluene and is deposited onto the chips using a reflux system. The goal is to obtain a monolayer coating of APTMS. The coating properties will depend on reaction conditions such as time, temperature, and the concentration of reagents. In order to determine whether a monolayer was obtained, the surface must be characterized. To that end, we used FTIR (Fourier Transform Infrared Spectrometry) to determine the functional groups on the surface, AFM (Atomic Force Microscopy) to give a topological view of the surface, and XPS (X-ray Photoelectron Spectroscopy) to determine the elemental and chemical composition. After the functionalization of the APTMS, microfluidic PDMS (Polydimethylsiloxane) channels are made to allow the solutions to flow over the chip.

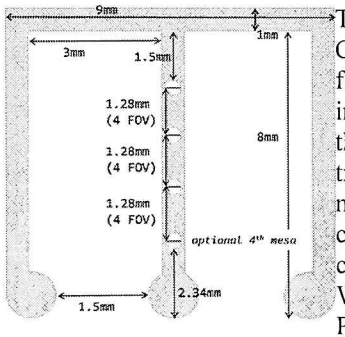

Figure 1. T-JUNCTION

This biosensor uses a PDMS T-junction (figure 1, Courtesy of Ryan Schilling), which has openings for inlets and outlets so that the solutions can be inserted via ferrules and needle tips to flow over the mesas. PDMS is used because it is optically transparent and therefore has no effect on laser measurements. PMMA (Polymethyl methacrylate) clamps are used to hold the PDMS and the silicon chip tightly together to avoid solution leakages. When screwed together, the clamps squeeze the PDMS and the silicon chip tightly together. The screws also allow for the entire device to be

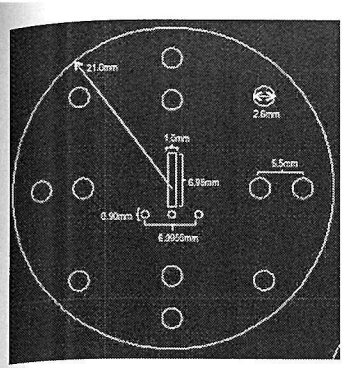

Figure 2. PMMA CLAMP DESIGN

attached to the optical holder. The window of the clamp reveals the mesas, which allows the solution to flow between the PDMS and the crystals. This window also allows the detection laser to be shone through the photonic crystal mesas. Our focus has been to use this method, as it is reversible, allowing for the reuse of the PMMA clamps, the PDMS microfluidic channel, and the silicon chip. An AutoCAD design of the PMMA clamp can be seen in figure 2. A sample of a PDMS T-junction attached to a SiO_x chip is displayed in figure 3.

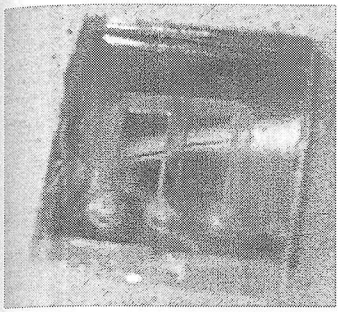

Figure 3. SiO_x & PMMA

Once the lasers are aligned and the silicon samples are functionalized, the desired testing solutions can be introduced into the microfluidic channel through the inlets, allowing the fluid to flow over the mesas. A Peltier cooler is used to prevent the temperature form fluctuating. Measurements of the refractive index shift are taken and the results will determine if binding has occurred. A clamped sample between the PMMA, which is attached to the optical holder with inlets and outlets can be seen in figure 4.

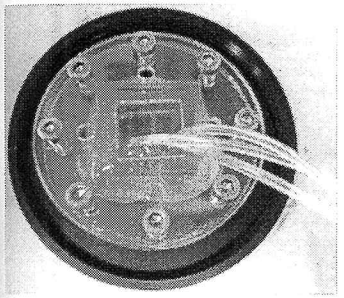

Figure 4.

After APTMS is functionalized on the surface, a 10 mM gluteraldehyde, 10 mM sodium cyanoborohydridein 1xPBS is used to treat the surface in order to immobilize the proteins. Streptavidin is added to the surface. Biotin then binds to the streptavidin and BSA is added in order to avoid binding between other proteins and the remaining aldehydes. An outline of the production process of the biosensor chip can be seen in figure 5. A similar procedure in functionalizing the silicon chip can be used for fluorescent biosensors where fluorescent biotin is added to the surface. These completed samples are analyzed using a fluorescent microscope (In Vitro Imaging System IVIS). Presence and uniformity of fluorescence is used to qualitatively determine goodness of functionalization.

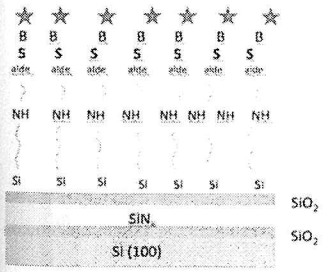

Figure 5. SURFACE CHEMISTRY

Do married couples match on the Wisconsin Card Sorting Test?

By: Koral Dadon,[1] Hilla Golan-Smooha,[2] Revital Naor-Ziv,[2] and Joseph Glicksohn[2]

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The Wisconsin Card Sorting Test is a clinical neuropsychological assessment instrument that is used as a means of testing executive or frontal lobe functioning. [1]

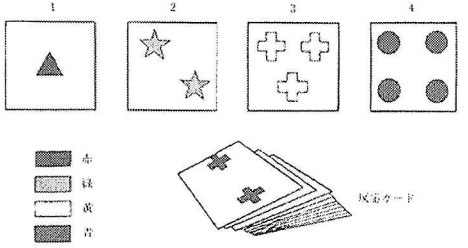
One of the objectives of Professor Glicksohn's lab was to utilize a meticulous way of analyzing the performance of a normal population of married couples with the Wisconsin Card Sorting Test (WCST) by closely reading the WCST Manual in order to find whether there was a similarity between couples on perseverative error scores. The participants of the study included thirty-one married couples, part of a larger sample, selected randomly with normal intact families. The research was carried out at the couples' homes where the couples answered the computerized version of the WCST along with other 'pencil and paper' cognitive tasks.

Using the Wisconsin Card Sorting Test Manual, the participant responses are scored based on three dimensions: Correct-Incorrect, Ambiguous-Unambiguous, and Perseverative-Nonperseverative. Responses that match the sorting principle in effect are scored as correct, while incorrect responses are scored as errors. When the client matches a response card to a stimulus card based on only one stimulus characteristic, the principle that is used is obvious and unambiguous to the examiner. For example, a response card with three green circles is matched to the stimulus card with two green stars, which indicates that color is the stimulus characteristic. Additionally, any response that matches a stimulus card on two or more stimulus characteristics such as Color and Form is scored as an ambiguous response. Furthermore, a client that continues to respond to a stimulus characteristic that is incorrect, the response matches the "perseverated-to" principle and is scored as perseverative. Responses that do not match the perseverated-to principle are nonperseverative. [2]

There are three situations that define the perseverated-to principle for scoring perseverative responses. Initially, the first unambiguous error the client makes at the beginning of the test establishes the perseverated-to principle, but is not scored as perseverative. Any subsequent unambiguous error that matches the perseverated-to principle is scored as an "unambiguous perseverative error". Also, an ambiguous response whether it is correct or incorrect can be scored as perseverative when it matches the perseverated-to principle that is currently in effect and is sandwiched between a preceding and following unambiguous responses. Secondly, all responses between the two unambiguous perseverative errors must match the perseverated-to principle in effect for an ambiguous

response to be scored as perseverative error or perseverative response. Finally, when the client makes three unambiguous errors to a sorting principle that is incorrect and all responses between the first and the third unambiguous error match this sorting principle, this sorting principle becomes the new perseverated-to principle. However, scoring based on this new perseverated-to principle begins with the second unambiguous error. [2]

Wisconsin Card Sorting Test:



The total number of perseverative errors of the husbands and wives were calculated and plotted on a Scatter Plot. Using SPSS Software, a correlation of 0.436 was obtained, indicating that married couples' perseverative error scores match. This finding supported similarity or assortative mating between married couples. With regards to perseverative responses, although women scored a little higher than men on perseverative responses, no significant differences between husbands and wives were observed.

References:

[1] Stano, J. (2002). Wisconsin Card Sorting Test. *Rehabilitation Counseling Bulletin, 45*(4), 250-251.

[2] Heaton, Robert K. *Wisconsin Card Sorting Test Manual: Revised and Expanded.* [S.l.]: Psychological Assessment Resources, 1993. Print.

The Role of Tyrosine O-Sulfation in the Chemokine Receptor Complexes

By: Gabriela E. Dobkin and Dr. Chaya Rapp
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Chemokine receptors are activated by chemokines to induce chemostaxis, cell migration along a gradient of increasing chemokine concentration. CXCR4 receptor, one of 19 known human chemokine receptors, is activated exclusively by the chemokine CXCL12, also known as stromal cell derived factor-1 (SDF-1). The CXCR4-SDF-1 complex mediates cancer cell migration and metastasis; CXCR4 is found in cells from more than 20 types of cancer which metastasize to tissues that secrete SDF-1. CXCR4 is the major co-receptor for X4 strains of HIV-1, and SDF-1 inhibits HIV-1 infection.

When the N terminal domain of CXCR4 is sulfated at three tyrosine residues, residues 7, 12 and 21, there is a high affinity binding between CXCR4 receptor and the SDF-1 chemokine. Based on this we can speculate that incomplete sulfation plays a role in moderating chemotactic response by creating receptors with different affinities for a given chemokine. It is difficult to study the role of individual tyrosine residues in vivo because sulfation at one site affects sulfation at neighboring sites, hence theoretical simulation is a useful complement to experimental studies. The question we addressed in this study is whether the models used to simulate sulfated systems are a realistic representation of the effects of sulfation?

The Protein Databank contains experimental structures for the CXCR4-SDF-1 complex in both the unsulfated (PDB id: 2k04) and sulfated state (PDB id: 2k05). We created a third system in which we started with the unsulfated models (2k04), and then added sulfates to sites 7, 12, and 21 using a side chain prediction program in the Maestro molecular modeling program. We then conducted molecular dynamics simulations on all three systems, and compared the occurrence of hydrogen bonding and the torsional motions within each system (using Kullback-Leibler divergence).

Results show that in the unsulfated simulation (2k04) hydrogen bonding interactions occur between CXCR4 and SDF-1 in less than 7% of the frames, while in the sulfated simulation (2k05) multiple hydrogen bonds between the sulfated tyrosine residues and several SDF-1 residues appear with a frequency of up to 22% of frames. Bidentate interactions with sulfated tyrosine and arginine residues are also commonly observed. The sulfated 2k04 simulation similarly shows a high occurrence of hydrogen bonding and bidentate interactions with arginine. KL divergence is used to show differences in motions in two simulations by making a picture; white indicates that the systems are similar and brighter color indicates where the systems differ. Figure 1 shows two figures: KL divergence of 2k05 as compared to 2k04 (a), and KL divergence of 2k04 sulfated as compared to the original 2k04 (b). The figures show color in similar regions indicating that the effects of sulfation can be accurately reproduced using our simulation models.

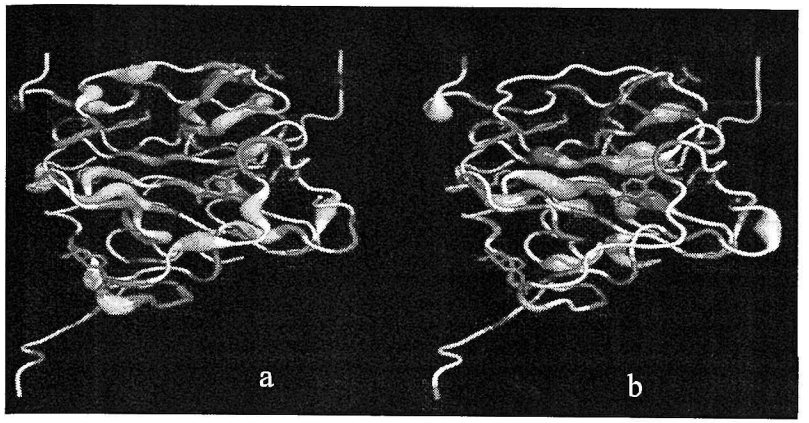

Figure 1. KL Divergence in simulation of a) 2k04 as compared to 2k05 and b) 2k04 as compared to 2k04 sulfated.

Narrative Intervention Aids in the Transition to Motherhood

By: Hannah Esan, Daniela M. Goldstein, and Robin Freyberg, Ph.D
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The transition into parenthood is critical for most marriages. Research has shown that couples normally experience lower levels of marital satisfaction after the birth of their first child (Cox, Paley, Burchinal, & Payne, 1999; Rollins & Feldman, 1970). Many marriages are at risk of experiencing increases in conflict, as well as decreased satisfaction, during the early years of child rearing. Cowan and Cowan (1995) suggests that this may happen because the transition into parenthood causes normative changes in marital relationships that require couples to make inherent changes and accommodations. Therefore, how couples respond and adapt to changes that occur after childbirth will have important public health implications that can help determine the long-term health of their future marital relationship and their children's future development. While this research impacts both parents, some research has found that, for mothers specifically, there may be additional significance (Miller & Sollie, 1980; Rollins & Feldman, 1970). As wives deal with their new identities as mothers, they tend to experience decreases in happiness, negative feelings of self-worth, increased fatigue, and feelings of being overwhelmed and tied down (Miller & Sollie, 1980; Rollins & Feldman, 1970). Consequently, it might be necessary to provide an intervention program that targets the transition into motherhood because a mother's perception of marital satisfaction seems to be extremely significant in shaping the quality of her marriage.

In order to effectively ease the transition into motherhood, studies have explored a mother's mental state prior to and post childbirth. Research has shown that about 10%- 15 % of women experience postpartum depression [PPD] after childbirth (Boath, Bradley & Henshaw, 2005). A large portion of mothers (50% to 80%) experience postnatal blues, which have the same symptoms of PPD such as depression, anxiety, and transient psychological or emotional problems in milder form lasting for a shorter period of time (Boath & Henshaw, 2001). Different treatments for PPD and postnatal blues include psychological intervention, interpersonal therapy, postnatal debriefing, information discussion, reconfiguration of midwifery and other services, hormonal prevention, and antidepressant prescription have been tested with varying success and effectiveness (Boath et. al 2005).

Narrative or journaling intervention programs have also been proven successful in assisting with various life transitions particularly the transition into the college lifestyle. Research has indicated that college students who participate in narrative writing received better grades, fewer visits to the health center, and overall better emotional health (Pennebaker & Seagal, 1999). The effectiveness of narrative interventions can be explained by the inhibition theory, which theorizes that by not disclosing important psychological experiences, people inhibit normal psychological processes. Thus, by enabling people to write about their problems they can disinhibit psychological processes and focus more attention and faculties on themselves (Graybeal, Sexton & Pennebaker, 2002).

As a result, our future study will use narrative interventions to help ease the transition into motherhood. Participants of this study will be new mothers who will be journaling a few times a week on an online website. The participants' physical and mental health will be evaluated at the beginning and end of the study as well as periodically throughout the course of the their disclosure. This study will be instrumental in understanding possible treatments for postnatal blues and ultimately ensuring a more positive family dynamics.

How Are We Doing: A Review of Assessments within Writing Centers

By: Miriam Gofine and Terry DiLorenzo
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The primary focus of writing centers is to strengthen students' writing and composition skills using peer tutoring. This paper reviews the literature on assessments of writing centers. The most common assessment goals include generating data for annual reports, examining attainment of goals in mission statements, and assessing student outcomes and satisfaction. Literature on discipline-specific writing is sparse, and, to our knowledge, no published investigation has assessed tutors' familiarity with APA format or the effect of tutorials on students using APA. While many qualitative investigations have been published, few quantitative investigations exist, and the literature suffers from methodological limitations including ethical preclusions to experimental design, administrators' limited quantitative research training, and a lack of cohesion in lines of inquiry. We argue for standardized assessments examining common concerns as well as discipline-specific concerns. Without discipline-specific instruction and assessment, tutoring may undermine students' abilities to write for specific disciplines, such as psychology.

Poster presented at the Yeshiva University Behavioral and Social Sciences Research Day, May, 2012

Does a specific reader protein bind methylated arginine?

By: Elizabeth Goldberger,[1] Carola Wilczek,[2] and David Shechter[2]
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According to the schematic of epigenetic control, a given amino acid within a histone can be covalently modified or unmodified, allowing for the subsequent actions of a reader protein that recognizes the particular change in structure. Arginine methylation is just one instance of a posttranslational modification that can recruit epigenetic effector proteins. To ascertain whether a novel suspected effector protein* binds to methylated arginine, both qualitative and quantitative assays were performed.

To validate the hypothesized protein-peptide interaction, several peptide pulldown assays were performed. First, unmodified and methylarginine-containing biotinylated peptides were bound to magnetic streptavidin beads. Subsequently, recombinant target protein was incubated with the immobilized peptides. Western blot analysis confirmed or denied the suspected interactions. After these initial qualitative results were obtained, kinetic studies were conducted in order to quantitatively validate the prior results. In this method, biotinylated peptides were bound to a streptavidin sensor attached to the BLItz (biolayer interferometry) instrument by ForteBio, and the accumulated mass of the protein analyte was measured to produce an association and a dissociation curve. Comparing the KD of two peptides that were shown to bind the effector protein in pulldown experiments would indicate relative binding strengths.

Initial results from the pulldown experiments suggest that the protein under study binds more strongly to dimethylated arginine on histone H4 than to unmodified H4, but that the monomethylated form does not bind the protein to a significant extent. A quick analysis of the quantitative binding studies indicated that dimethylated H4 did indeed bind the protein analyte more strongly than the unmethylated form. However, further kinetics experiments are necessary in order to ascertain the hypothesis.

Confirmation of the hypothesis would suggest that the protein under study binds to histones, a notion that has yet to be ascertained. Moreover, since the protein of interest is implicated in a number of physiological contexts, ranging from tumorigenesis to embryological development to transcriptional regulation, an understanding of its binding behavior would be invaluable.

The Effect of Cation-Pi Interactions on Lysine Methylation

By: Elizabeth Goldberger and Dr. Chaya Rapp
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A large part of protein diversity stems from post-translational modifications, whereby chemical groups such as phosphates, sulfates, methyl groups, and acetyl groups are covalently added to existing amino acids. These sites of structural modification then serve as sites of interaction with other proteins. Lysine is one amino acid that regularly undergoes modifications, and lysine methylation is a particularly common modification in histone proteins. The basic amino group on the lysine side chain can undergo various degrees of methylation, ranging from monomethylation to dimethylation to trimethylation, each of which has a unique effect on the binding affinity of the protein towards other proteins and may result in different physiological consequences.

The occurrence of lysine methylation in histone proteins has epigenetic implications in that it directs transcriptional regulation via recruitment of specific reader proteins that bind only to specifically methylated lysine residues. Also, as a direct consequence of the increased bulkiness that results from additional methyl groups, histone packing is often altered. In terms of pathologies, many tumor-suppressing proteins bind selectively to proteins modified by lysine methylation.

Methyl binding specificity, or the affinity of a binding protein to a particular methylation state, is a result of several factors. These include hydrophobic desolvation, hydrogen bonding, steric strain, and cation-pi interactions. The cation-pi interaction refers to interactions between the positively charged methyl lysine side chain and the pi electrons of aromatic residues, such as tyrosine, phenylalanine and tryptophan. Our study focused on cation-pi interactions and how the strength of these interactions vary with differing methylation states and different orientations of the methylated group with respect to surrounding residues.

To study cation-pi interactions, we performed quantum mechanical calculations on representative systems in which benzene was used as a model for an aromatic residue, and an ammonium ion with one, two, three, or four attached methyl groups was used to model unmodified lysine, mono-, di-, and tri-methyl lysine respectively. As a starting point, the cation was placed directly above the center of the benzene ring, on the perpendicular line from the ion to the benzene plane, and then subsequently moved away from the perpendicular in increasing 30° increments. Calculations were also performed using increasing distances between the center of the benzene ring and the cation. These alterations of structure served to yield insight into the influence of angles and distances on cation-pi interaction energy trends, which were quantified via quantum mechanics using Jaguar software.

Results showed that for all five cations, the most energetically favorable orientation was the one in which the cation was directly above the center of the benzene ring (referred to as the 0_0 geometry); a sample plot showing interaction energy vs. geometry for the dimethylated state is shown in Figure 1. Cations of higher methylation states formed weaker interactions than those with lower methylation states. Also, interactions in systems having the cation in the plane of the benzene ring were relatively unfavorable. In most cases the structures in which the cation was placed between two benzene carbons had lower interaction energies than those structures with the cation directly above a benzene carbon. It is hoped that our results will lead to a greater understanding of methyl-lysine binding interactions, and the development of more accurate models to simulate lysine methylated systems.

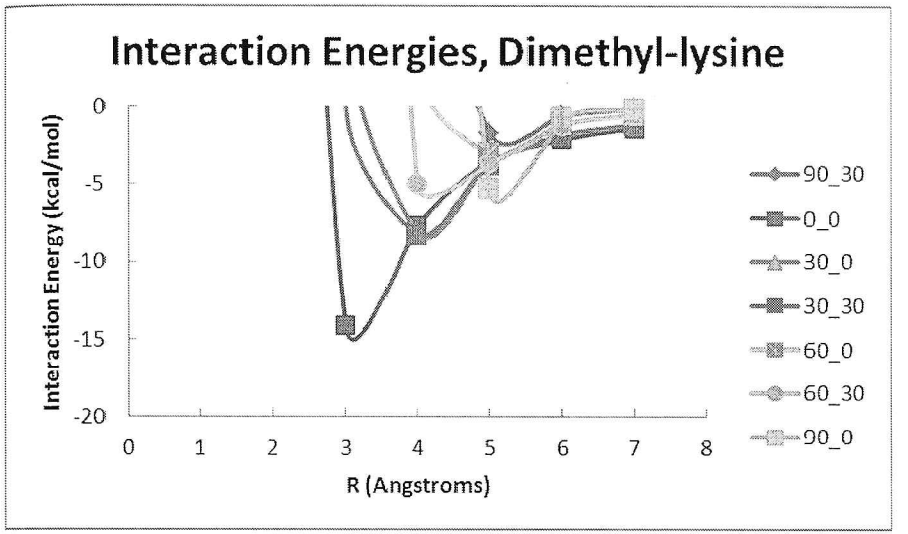

Figure 1. Interaction energies of seven different model systems as functions of the distance of the dimethylammonium cation from the center of a benzene ring. The 0_0 structure represents a cation directly above the ring's center; the 30_0 structure represents a cation at an angle of 30° from the vertical and in line with a benzene carbon, while the 30_30 structure represents a cation at the same vertical angle but in line with the midpoint between two benzene carbons, and so on.

Optimizing an Experimental Design to Study PXR Interactions with mRNA using HITS-CLIP

By: Leah Gutstein,[1] Madhukumar Venkatesh,[2] and Sridhar Mani,[2]
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The Nuclear Pregnane X Receptor, PXR, is an essential component of the body's ability to eliminate toxic xenobiotics and endogenous metabolites. Its canonical mode of action occurs through binding DNA at discrete nuclear receptor repeats, thus promoting gene induction/repression. More recently, our laboratory has uncovered a possible new association of this receptor with RNA. Preliminary evidence suggests that PXR binds the 3' UTR of TLR4 mRNA in a region that is AU-rich and likely interactions with other RNA stabilizing protein (e.g., HuR). Since this was unexpected for PXR, and the possible role of mRNA binding in xenobiotic metabolism, cancer, drug resistance and inflammation is not known, we designed a more extensive (high- throughput) project to decipher the extent of binding to RNA by PXR. The first step entailed transfecting cells with a plasmid construct that contains both Green Fluorescence Protein (GFP) and PXR and then sorting for only the cells that express GFP. The next step employed the novel method for studying RNA Binding Proteins, High Throughput Sequencing Crosslinked Immunoprecipitation (HITS-CLIP). Thus far, the immunoprecipitation protocol for isolating PXR from live cells has been optimized. GFP-Trap®, followed by Western Blotting with anti-PXR and GFP primary antibodies, has yielded clear, distinct bands at molecular weights corresponding to the PXR and GFP proteins. In the near future, cells transfected with PXR will be treated with xenobiotics and studied with HITS-CLIP, in an attempt to identify any PXR-RNA associations, and its role in pathophysiology.

Acknowledgements:
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Resolving Inflammation in Acute Respiratory Distress Syndrome

By: Jennifer Herskowitz,[1] Jack Timmons,[2] and Dr. Bruce Levy MD[2]
[1]Stern College, Yeshiva University, New York, NY; [2]Harvard Medical School, Boston Massachusetts

This summer, we worked on two translational research projects regarding the acute respiratory distress syndrome (ARDS)—a devastating condition of excess inflammation in lung that has a mortality rate of about 40%. The onset of ARDS involves vascular endothelial dysfunction and increased permeability of the alveolar-capillary barrier, both of which are associated with an inflammatory state. As a result of these changes, edema fluid and inflammatory cells accumulate in the alveoli of the lungs. As alveoli fill, less oxygen is exchanged between alveoli and the bloodstream leading to hypoxemia (low oxygen levels in the blood) and frequently, organ failure, and death. There are no clinically proven therapies for ARDS and therefore we are involved in translational research to test novel approaches.

Recent studies suggest that mesenchymal stem cells (MSC) have shown promise in pre-clinical testing and it appears that rather than differentiating into new lung cells, their benefits are derived from the release of mediators. In a collaborative project, we are looking to determine if these protective cells can generate protective mediators. Previously, the lab has helped to lead the identification of a new class of pro-resolving mediators in the lung. The protective mediators are enzymatically derived from essential fatty acids, including arachidonic acid (C20:4). In a separate trial based on its protective actions in cardiovascular disease, the effects of aspirin are being determined in ARDS. Aspirin is known to have anti-inflammatory and pro-resolving properties, in part via regulating the metabolism of C20:4. Importantly, this early observation was recognized by a Nobel Prize. As part of a multicenter randomized controlled clinical trial, we began to investigate whether aspirin can significantly reduce the development of ARDS and if so, what are the effects of aspirin on the blood levels of important C20:4 metabolites, namely the pro phlogistic mediator thromboxane (aspirin-inhibited) and the pro-resolving mediator 15-epimer lipoxin A_4 (aspirin-triggered.)

To measure levels of these lipid mediators in biological samples, procedures of extracting these lipid mediators and then for measuring their levels via immunoassay were performed. The nin-mamalian compouind prostaglandin B_2 ($PGB_{2)}$ was added to each sample as an internal standare. Samples from tissue culture or plasma were loaded onto C18 silica column (SepPak) and were then acidified to a pH of about 3 using 0.1 N HCl. After the sample was loaded onto the column, the sample was neutralized with water to elute hydrophilic, polar compounds. Hexane was added next to elute neutral hydrophobic compounds, such as cholesterol. Methylformate was added next to elute the compounds of

interest, thromboxane B_2 (a stable metabolite of the bioactive thromboxane A_2) and 15 epi-lipoxin A4. To be certain that the compouns of interest were not still bound to the column, methanol was used as a final mobile phase to remove all remaining materials from the column. The methlyformate elutions were brought to dryness under a gentle stream of nitrogen and re-suspended in a small volumne of methanol. HPLC was performed to determine the amount of PGB2 with 10% of each sample to correct for recovery losses during extraction. The levels of TXB2 and 15 epi-LXA4 were determined by immunoassay (ELISA) following the manufacturer's recommended procedures. Samples were brought to dryness under nitrogen and re-suspended in ELISA buffer. Data was collected for each ELISA and analyzed. The amount of compound in the samples was determined by interpolation from a standard curve fore each compound that was run in Parallel.

The Levy Lab is continuing to conduct these studies and I am looking forward to following up on their progress.

Infrared-Emitting Organic LEDs

By: Judith Jacobson,[1] Yaakov R. Tischler[2]
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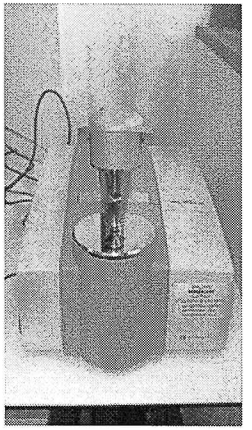
Organic Light Emitting Diodes (OLEDs) are part of a new generation of lighting and display technology. They consist of thin layers of organic materials with unique optical and electronic properties sandwiched between two electrodes. These materials can be deposited on numerous substrates and are thus easily stored and carried around[1]. When an OLED is electrically excited, the organic molecules vibrate and their electrons get excited, jumping up to higher energy levels. Eventually, the excitons (excited electrons) relax from their high energy states and fall back to lower levels, emitting radiation.

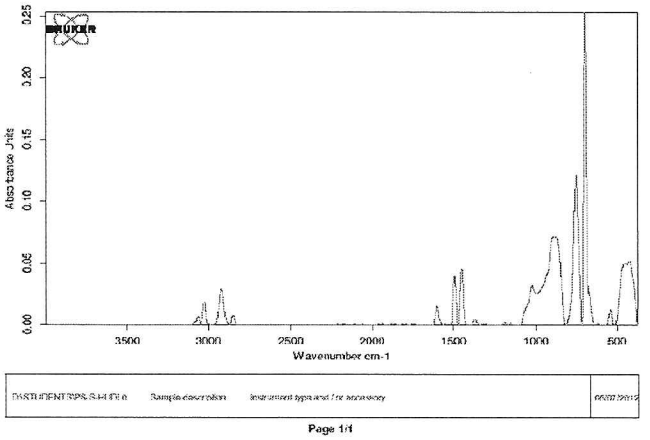
The cavity in an OLED is comprised of the film of organic material in between the two electrodes. The focus of our experiment was to design the cavity structure for Infrared-Emitting OLEDs by determining which material should be used and how thick the layer should be. An ideal material is one that absorbs and emits in the IR. We test IR absorbance using an FTIR (Fourier Transform Infrared) spectrometer (see Figure 1).



We spin-casted thin films of Polystyrene and Polymethyl Methacrylate with varying concentrations in order to achieve a thickness similar to the size of a wavelength of infrared light. The data showed that Polystyrene displayed good absorbance peaks in the IR at wavenumbers which are multiples of 700 cm^{-1} (see Figure 2), similar to what we found in the literature[2]. We therefore decided to

[1] The Road to High Efficiency Organic Light Emitting Diodes. Stephen R. Forrest. *Organic Electronics.* Volume 4, Issues 2-3, September 2003, Pages 45-48
[2] Structural and thermal behavior of polystyrene thin films using ATR–FTIR–NanoDSC measurements. Paul Bernazzani, Rachel F. Sanchez *J Therm Anal Calorim* (2009) 96:727–732

work with Polystyrene and to concentrate on making a film that was thick enough for our cavity.
We made several solutions of Polystyrene in Chloroform and constructed a spin curve (see Figure 3) to decide which speed and which concentration yield a film that of optimal thickness for our experiment.



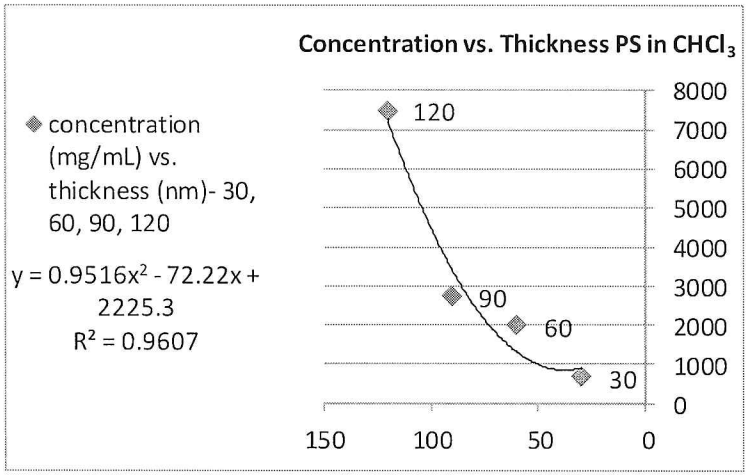


Figure 1. Spin curve for various concentrations of Polystyrene in Chloroform

The ideal film thickness was determined to be approximately 4.6 microns, based on Bragg's Law, $\mathbf{d=\lambda/2n}$, where d is the film thickness and n is the index of refraction of our material.

Current work involves constructing diodes using Potassium Bromide as a substrate, since this material is almost completely transparent in the IR wavelength range of interest. Our diode will be composed of a round disk of KBr, two 20 nm-thick silver electrodes and an optimally thick organic layer of Polystyrene spin-casted from Chloroform with a ratio of 105mg/mL. We plan to test the IR emission of the diodes using a SPEX 270M monochromator and an IR detector.

Eventually, we hope to use this model to create inexpensive IR-emitting OLEDs which can be used for chemical sensing, as well as in solid state IR lasers.

An introduction to the spectrum and dynamics of Heisenberg Spins-1/2 chains

By: Kira R. Joel, Davida J. Kollmar, and Lea F. Santos
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Quantum particles have an intrinsic property called spin, which is a type of angular momentum. In this project, we worked with a one-dimensional system of sites, with each site containing a spin-1/2 particle. Initially, each particle had a spin in one of two directions, up or down, because we had a magnetic field in the positive z direction. Our goal was to study the dynamics of this system: that is, how this state would change in time. The interpretation of the results was based on our analysis of the eigenvalues, eigenstates, and symmetries of the system.

The energy of a system is described using the Hamiltonian, which in our case includes an Ising interaction term and a flip-flop term. The Ising interaction in the z direction is like the potential energy of the system, while the flip-flop term is like the kinetic energy transporting the up spins, or the excitations, through the chain. If the Hamiltonian is represented in the form of a matrix, the available quantized energies of the system correspond to the eigenvalues of the diagonalized matrix.

We made histograms of the energies of the system to allow us to make predictions about its dynamics. First we looked at the histogram of the energy values of the system with no flip-flop term. It had distinct bands with gaps in between the different bands. We then made histograms for the whole Hamiltonian. Their shapes were determined by the ratio between the strengths of the two coupling terms. When the Ising interaction was strong relative to the flip-flop term, the histogram of energies retained the gaps between the different bands. This suggests that if the system has an initial state in one band, it will remain in that state or in a superposition of states from that band, and the system will barely evolve over time. Such a system should behave as an insulator. However, as the relative strength of the flip-flop term increased and exceeded the strength of the Ising interaction, these gaps disappeared, suggesting that in the dynamics the initial state will be able to evolve more quickly into various other states. The system should behave as a good conductor (metal).

We also studied the eigenstates of the system to support these predictions. With a strong flip-flop term, the eigenstates were spread in the basis states, but with a weaker flip flop term, the eigenstates were localized. This suggests that because of the energy gap, the system is restricted to states with similar energies.

We also graphed the dynamics of the system by starting our system with an initial state and plotting the probability that it would evolve into each of the possible configurations. For the cases in which the Ising term was weak relative to the flip-flop term, in time the states with the highest probabilities of being observed

matched the states with the same energy as the initial state. The intermediate states that appeared in the process of getting from one state to another also had non-zero probabilities of being observed, but the probabilities were much lower than those of the states with the correct energy. As the relative strength of the Ising term was increased, it took much longer to get from one state to another, with the time difference several magnitudes larger. In this case the intermediate states were only virtual steps. An example of these plots is given below. It shows how the initial state with a single up-spin on site 1 evolves in time. The only state in resonance with this initial state is the configuration where the up-spin is on the last site of the chain. In the left panel, where the Ising interaction is weak, the excitation visits all sites and quickly reaches the last site of the chain. In the right panel, where the Ising interaction is strong, the excitation takes a very long time to finally move to the last site and no participation of the other states is seen.

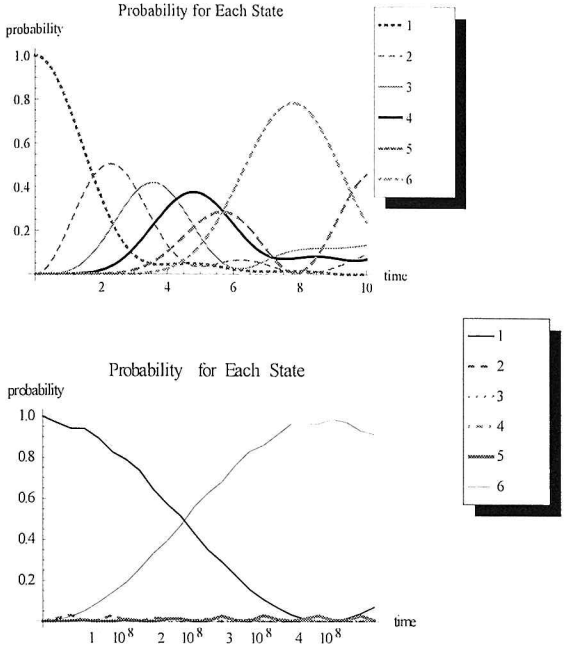

Figure 1. Both panels show the probability of finding each possible configuration as time evolves, beginning with a system with 6 sites and an excitation only on site 1. In the left panel the ratio of the strength of the Ising to that of the flip-flop is 0.5. In the right panel the ratio is 10.

The symmetries of the system also play a key role in its dynamics. For our system, we saw that the total spin in the z direction was conserved. We also examined symmetries such as parity and rotation. When we projected our initial state onto the eigenvectors, we verified that the only eigenvectors which contributed were the ones with the same type of symmetry as the initial state. We also plotted the dynamics of the system to see if the symmetry is conserved in

time. The graphs showed that in time, the system continued to exhibit the same types of symmetries as it did in the initial state, which confirms that symmetries have conserved quantities associated with them.

The spin systems that we studied can be realized with cold gases in optical lattices, which have been used to investigate quantum phase transitions. They can be used as models for quantum computers, and have been used to explain anomalous transport of heat in magnetic compounds. Understanding the behavior of spin systems is essential to the advance of research in these fields.

The effect of lysine methylation on affinities of histone binding proteins[1]

By: Rachel Kirshenbaum and Dr. Chaya Rapp
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Lysine methylation may enhance binding of other proteins involved in regulating transcription and epigenetic silencing by creating favorable docking surfaces. In this study, we assessed whether theoretical models could accurately represent the energetics of lysine methylated protein systems by predicting the more favored methylation state. Our study involved three pairs of histone-protein complexes (PDB entries 1kna/1kne, 2rhy/2rhi and 3mp1/3mp6) in which the histone proteins were modfied by either mono, di or tri-methylation. Energies of the methyl lysine residue in each system were calculated (Table 1) and electrostatic maps were generated to indicate positive and negative regions of the methyl-lysine binding pocket (Figure 1 for 1kna and 1kne). Our findings are consistent with binding constants and affinities reported in the literature.

Table 1. Energy terms generated in this experiment

PDB entry	Energy of the methyl lysine residue
	(kcal/mol)
1kna	-125.5
1kne	-130.9
2rhi	-89.73
2rhy	-96.30
3mp6	-41.97
3mp1	-80.68

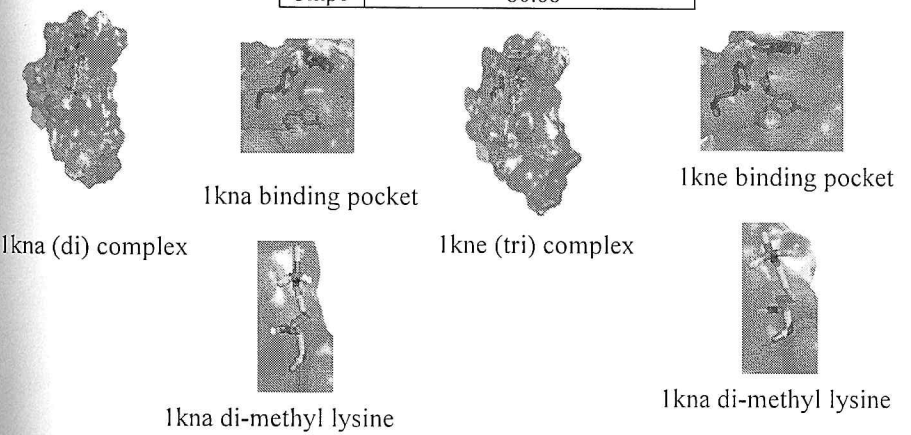

Figure 1. Electrostatic potential maps for 1kna and 1kne (red is negative and blue is positive)

The role of matrix metalloproteinase and gamma-secretase in PSD95 transport

By: Melissa Kramer,[1] Edward Ziff, Ph.D,[2] Sophie.Restituito, Ph. D,[2] Jainne Ferreira, Ph.D,[2] Latika Khatari[2]
[1]Stern College for Women, Yeshiva University, New York, NY 10016; [2]New York University Langone Medical Center, 550 First Avenue, New York, NY 10016

Prior studies have shown that when hippocampal neurons are treated with MMP inhibitor and γ-secretase inhibitor, which block proteases that cleave the adhesion molecule cadherin, there is a resultant increase in the mini-frequencies that travel through the post-synaptic neuron. However, it is unclear whether these mini-frequencies are caused by an increase in synapses with AMPA receptors or an increase in the number of vesicles holding neurotransmitter that fuse with the pre-synaptic membrane. By analyzing immunofluorescent images of neurons treated with MMP and γ-secretase inhibitors, I found that levels the δ-catenin associated scaffolding protein, PSD95, decrease when neurons are exposed MMP inhibitor and increase when neurons are exposed to γ-secretase inhibitor. These results indicate that PSD95 is transported into the synapse by the actions of MMP and out of the synapse by the actions of γ-secretase. As δ-catenin associated proteins are involved in the anchorage AMPA receptor subunits, the results also suggest that the increase in mini-frequencies is caused by an increase in AMPA receptors.

Effects of Tyrosine Sulfation on Binding Energy of CXCR4-SDF1 Complexes

By: Talya Laufer and Chaya Rapp
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Certain secreted proteins in a number of biological systems undergo the post-translational modification of tyrosine sulfation, wherein a given number of TYR residues are sulfated at their hydroxyl groups, resulting in what is referred to as a TYS residue. The current study investigates the effects of tyrosine sulfation on the strength of protein-protein interactions, as attested to by the binding energies of the CXCR-4 chemokine receptor in complex with SDF-1. The Protein Databank includes three distinct dimeric CXCR4 structural complexes: 2k04, 2k03, and 2k05. 2k04 is the un-sulfated protein complex; 2k03 is sulfated once in each monomer—on residues 121 and 321; 2k05 has three sulfated tyrosine residues in each monomer—on residue 121 and 321, 107 and 307, and 112 and 312. A software program called APBS was used to determine the binding energies of the various complexes. APBS utilizes the Poisson-Boltzman equation to incorporate the solvation energies and coulomb electrostatics in the calculation of binding energies. The results of APBS calculations of the binding energies of 2k04, 2k03, and 2k05 showed that as the degree of tyrosine sulfation increased, the binding energies of the proteins decreased. This indicates that tyrosine sulfation contributes to binding affinity, which strengthens the molecular interactions within the protein.

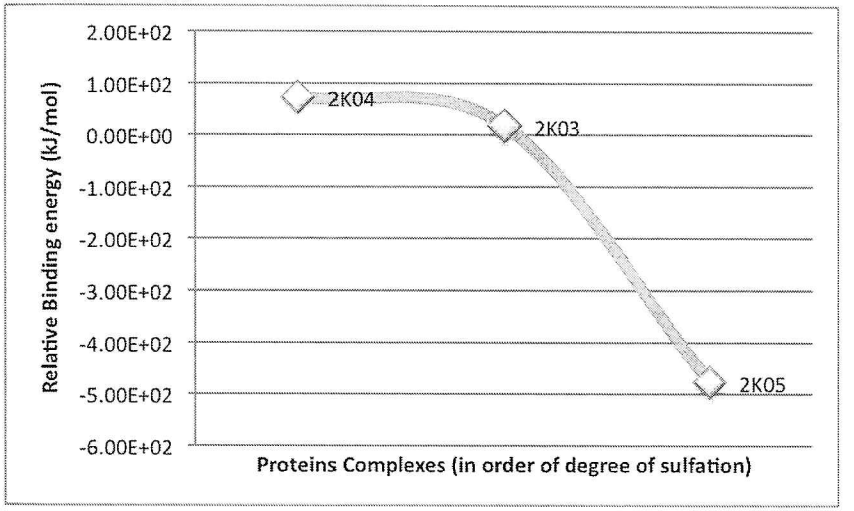

Figure 1. Binding energies of proteins 2K04, 2K03, and 2K05, in order of increasing degree of tyrosine sulfation.

The Role of the De-ubiquitinase UBP10 in DNA Double Strand Breaks Repair in Saccharomyces Cerevisiae

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Chromosomal Instability, the loss or gain of large chromosomal segments, leading to aneuploidy or gross chromosomal rearrangement has been discovered in the vast majority of malignancies and tumors. Gross chromosomal rearrangements can be caused by double strand breaks (DSBs) in the DNA that are not repaired.

Evidence has shown that proteasome-mediated degradation is involved in the repair of DSBs. Previously, a screen was carried out in the lab to find the proteins that need to be degraded by the proteasome for a successful completion of the repair process. One of the hits was Ubp10, a deubiquinase that de-ubiquitinates histone H2B. Although Ubp10 was not found to be a target of the proteasome, the overexpression of Ubp10 in media containing DNA damaging agents caused severe growth defects. Previous studies have shown a direct link between the ubiquitilation of histone H2B and the timely and successful repair of DSBs in human cells. The goal of this project is to further understand how the over production of de-ubiquininases, which results in their gain of function, will affects the repair of a specificly induced DSB. The baker yeast Saccharomyces cerevisiae is used as a model system.

A homologous recombination assay was performed using two samples of cells from the MK203 strain, one sample of the wild type cells and one sample of cells that was transformed with a *GAL1- UBP10* plasmid. The MK203 strain contains two alleles of the *URA3* gene. One allele, on chromosome V, contains a cut site for the galactose-induced HO endonuclease. Thus, transferring the cells to a galactose media induces a single DSB in chromosome V. The cells then use the mechanism of homologous recombination to repair the DSB, using the other allele of the *URA3* gene, on chromosome II, as a template for repair. The allele of the *URA3* on chromosome II differs slightly from the allele on chromosome V in that it does not have a HO endonuclease cut site and it does contains restriction sites for the restriction enzymes E*co*RI and B*am*HI. Thus, the repaired chromosome will not have an HO cut site and but will include restriction sites for B*am*HI and E*co*RI.

After the yeast cells were induced with a DSB, a sample of cells was taken every 30 minutes. When all the samples were obtained, the region of the DNA were the DSB was induced was amplified. The samples were then treated with the restriction enzyme B*am* HI to discover the extent which DNA repair occurred by homologous recombination and gene conversion. The cells that did successfully repair the DSB are expected to show two smaller bands of DNA when run on a gel, compared to the cells that did not undergo DNA repair and gene conversion and are expected to show one large band. If the overexpression of Ubp10 does inhibit timely DSB repair, it is expected that the cells overexpressing Ubp10 will show one large band for more samples, indicating that the cells require a longer period of time to undergo DNA repair and gene conversion. At this time, the results of the study are not yet conclusive.

The Effect of Directed Writing on Depression and Anxiety

By: Alexandra Michalowski and Robin Freyberg
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Previous research has explored how directed writing can have a positive impact on mental health. This study is investigating the effect of directed writing on reducing depression and anxiety among college students. Participants were randomly assigned to a directed goal-writing group or past event writing group and wrote for 20 minutes twice a week for two weeks. Levels of depression and anxiety were measured using the Beck Depression Inventory II and the Beck Anxiety Inventory, and the Linguistic Inquiry Word Count examined writing content. Preliminary results suggest a reduction in depression and anxiety levels from pre to post-writing in both groups. This may indicate the effectiveness of any meaningful, personal writing as a tool for reducing levels of depression and anxiety. Implications for implementing directed writing as an effective and efficient supplement to other forms of therapy will be explored.

Calibration of Primary and Secondary Antibodies for Ideal Immunofluorescence Staining in Neurons and Other Cell Types

By: Sarina Miller,[1] Anna Sloutskin,[2] and Prof. Ronald S. Goldstein[2]
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Illnesses caused by human neurotrophic viruses have been difficult to study because of the limited availability of human neurons for experimentation. Human embryonic stem cells (hESC) are pluripotent cells that can be differentiated into neurons, thereby providing a potentially unlimited source of this previously difficult to obtain cell type. Since cultures of differentiating hESC contain many cell types, it is important to be able to identify which cells are neurons. In addition, it is important to know which subtypes of neurons are produced by the differentiation method developed in our lab.[1]

hESC-derived neurons were recently shown to be a useful tool for the study of Varicella Zoster virus (VZV), the cause of Varicella Zoster (chicken pox) and Herpes Zoster (shingles). VZV is a human specific neurotrophic virus that infects peripheral neurons. In order to use these neurons as a model to study VZV, we must confirm that they (as well as other types of cells) were infected with VZV. While antibodies often stain specifically antigens in non-neuronal cells (such as in MeWo and Arpe cells), the same antibodies often react with neurons in a non-specific manner, requiring additional testing.

Indirect immunofluorescence staining is a technique using antibodies to detect specific molecules found in a cell and to thereby identify and characterize its phenotype. Our work involved determining ideal dilutions of primary and secondary antibodies to produce strong staining that is easily visible and has minimal non-specific background staining. Antibodies can be raised against antigens that indicate different stages of neural development or viral infection. Primary antibodies added to cells bind to the antigen, and are detected with a fluorophore-tagged secondary antibody for visualization with a fluorescence microscope.

24-well plates containing coverslips with various cell lines[2] were fixed with 4% paraformaldehyde when they reached approximately 80% confluence. These coverslips were blocked to prevent non-specific antibody binding, and exposed to

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[1] Pomp O., Brokhman I., Ben-Dor I., Reubinoff B., Goldstein R. S.. 2005.Generation of peripheral sensory and sympathetic neurons and neural crest cells from human embryonic stem cells. Stem Cells 23:923–930.

[2] Cell lines used for experiments included MeWo (human melanoma line), Arpe ARPE-19 (human retinal pigmented epithelial cells), Vero (green monkey kidney epithelial cells), PA6 (mouse stromal cells), and human neurons derived from the H9 cell line.

primary antibodies at varying dilutions for 1 hour (room temperature) to overnight . The coverslips were subsequently exposed to various[3] dilutions of a secondary antibody for 40 minutes, counterstained with Hoechst (specific to nuclei), mounted on slides, and analyzed using a fluorescence microscope. The dilutions tested ranged from 1:5 to 1:50,000.

Primary antibodies calibrated included antibodies specific for neurofilament-m subunit (polyclonal, 1:1000), E7 specific to microtubules (1:100), Tau specific to axons (polyclonal 1:350, monoclonal 1:100), Brn3a specific to transcription factors in the nuclei of peripheral sensory neurons (polyclonal and monoclonal, 1:250), and a monoclonal IgM antibody specific to actin (1:5). Antibodies to VZV proteins that we calibrated included polyclonal ORF62, ORF63, and ORF4 regulatory proteins, the gE membrane protein (1:10,000), and monoclonal ORF61, ORF62 and ORF63 (1:10,000). The VZV antibodies were kindly provided by Prof. Paul Kinchington (University of Pittsburgh, USA).

Secondary antibodies calibrated included 488 donkey anti mouse (green fluorescence, 1:250), 488 streptavidin (green, 1:1000), Cy2 goat anti mouse (green, 1:500), and Texas red IgM anti mouse (red, 1:100).

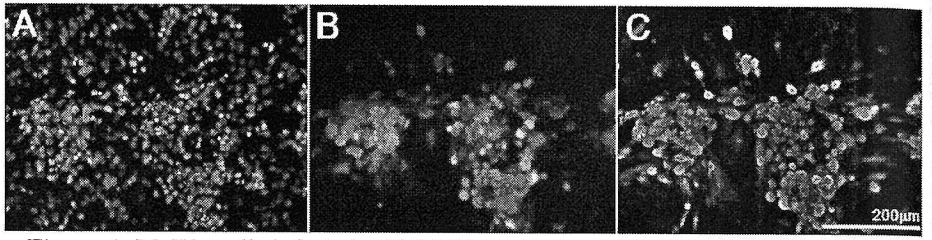

Figure 1. MeWo cells infected with VZV expressing ORF66-bound RFP (B) and stained with antibody against ORF62 (C) at a dilution of 1:10,000. Nuclei are stained with Hoechst (A). The figure shows the specific staining of the ORF62 antibody to the membranes of the infected cells.

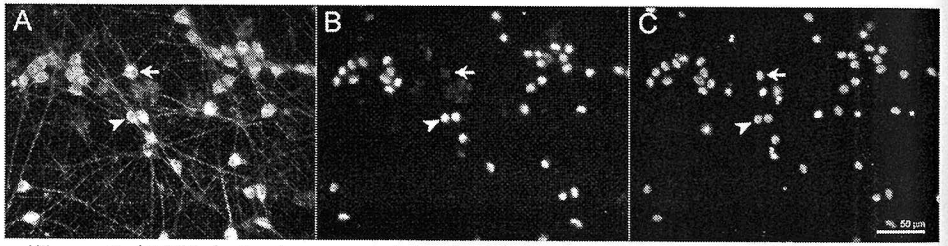

Figure 2. hESC derived neurons stained with the axonal marker Tau (A) and Brn3a (B) primary antibodies. The nuclei of the neurons are stained with Hoechst (C). Brn3a detects a transcription factor and can therefore be seen prominently in the nuclei of the cells. The presence of a Brn3a stain indicates that the neuron may be a sensory neuron. The arrow is pointing to a neuron lacking Brn3a, in contrast to the neuron indicated by the arrowhead that was stained by Brn3a.

[3] For most experiments, only one antibody was calibrated, and the other was maintained at a constant previously tested dilution.

Attention Effects on Auditory Processing of a Multiple Feature Pattern

By: Tova C. Miller,[1] Sufen Chen,[2] and Elyse S. Sussman[2]
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People are constantly inundated by a vast array of sensory input, including auditory input. As such, not only must the brain distinguish between different sounds, but it also must differentiate between properties of the sound features. Another study conducted by the Sussman laboratory analyzed the processing of multiple sound feature patterns in the absence of attention. Results indicated that the brain can track up to three feature patterns of auditory input. In this follow-up study, we asked whether attention would influence the brain's ability to process the unattended features. This study was conducted using electroencephalography (EEG) recordings of 11 healthy adults without hearing problems. Subjects were tested in three different conditions. Their task was to listen to the four-tone frequency pattern and respond whenever a pattern reversal was detected in all three conditions. Changes occurred *only* along the frequency dimension in the "frequency alone" (FA) condition and along duration and intensity dimensions in the "frequency duration" (FD) and "frequency intensity" (FI) conditions. Behavioral and ERP results demonstrated that unattended duration and intensity feature patterns were not tracked. In fact, the presence of more than one feature pattern hindered the subject's ability to track the frequency pattern. These results, when applied in a broader sense may suggest limitations in the extent to which people are able to process and accomplish multiple things at once.

Antibacterial Properties of In Situ Generated and Simultaneously Deposited Nanocrystalline Zinc Oxide, Magnesium Oxide, and Calcium Oxide on Fabrics

By: Sarah Mizrachi,[1] Aharon Gedanken,[2] Nina Perkas,[2] and Ilana Perelshtein[2]
[1] Department of Physics, Stern College for Women, Yeshiva University, New York, NY; [2] Department of Chemistry, Bar-Ilan University, Ramat Gan, Israel

The coating of fabrics with certain types of nanocrystals can impart the fabrics with resistance to bacteria. This research has many potential applications, especially in hospitals. A material's resistance to bacteria can be maintained without the medical problems induced by systemic antibiotic administration, such as immune suppression and micro-organisms forming resistance. In these experiments, Zinc Oxide, Magnesium Oxide, and Calcium Oxide nanocrystal combinations were synthesized and distributed onto cotton fabrics to impart them with antibacterial properties.

Ultrasound irradiation is a technique used to stimulate the formation of nanoparticles and their application onto a substrate. The effect of sonication comes from the cavitation process that involves bubble formation, growth, and collapse, producing high energy microjets. This process stimulates the formation of anti-bacterial nanoparticles and homogenous coating of the fabric. The nanocrystals, reacting from combinations of Zn-acetate, Mg-acetate, and Ca-acetate, were formed *in situ* and deposited onto a cotton fabric bandage. Techniques, including X-ray Diffraction, Scanning Electron Microscopy, and Inductively Coupled Plasma (ICP) Analysis, were then applied to better understand the crystal structure of the nanoparticles that formed.

The Scanning Electron Microscope images below show how the ZnO nanoparticles were found to be more round in nature, and better embedded into the fabric than the nanoparticles containing both ZnO and MgO.

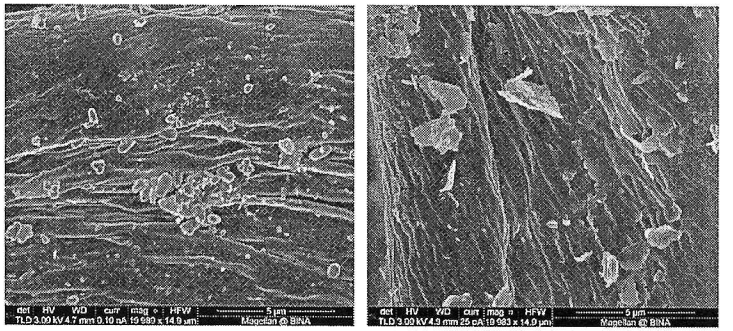


Figure 1. Scanning Electron Microscope Images of ZnO-Coated Fabric (Left) and ZnO/MgO-Coated Fabric (Right)

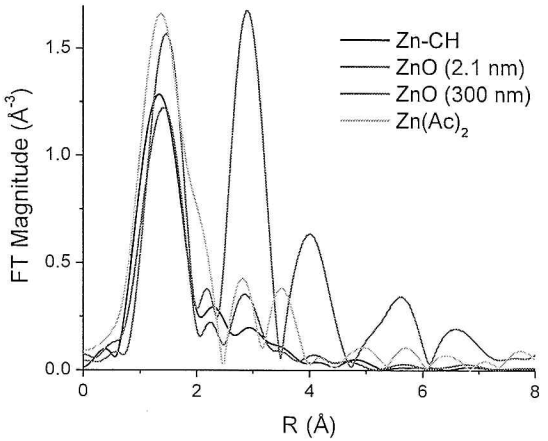
The anti-bacterial properties of fabrics coated with various combinations, ratios, and concentrations of ZnO, MgO, and CaO were then measured and analyzed. The fabrics were tested against both Gram-negative and Gram-positive bacteria. The nanoparticles were found to generate free radicals and hydroxyls that damage bacterial cells when coming in contact with them. Antibacterial tests on the samples are still in progress, and conclusions regarding which combinations, ratios, and concentrations of these nanocrystals have the greatest antibacterial properties can impact the future of antibacterial nanotechnology.

X-ray Absorption Spectroscopy Analysis of Chitosan Nanoparticles and Chitosan-Zn-based Complex

By: Sarah Mizrachi,[1] Anatoly Frenkel,[1] Aharon Gedanken,[2] Ilana Perelshtein,[2] Elena Ruderman,[2] Nina Perkas,[2] Tzanko Tzanov,[2] Jamie Beddow,[2] Eadaoin Joyce,[2] Timothy J Mason,[2] María Blanes,[2] Korina Mollá,[2] and Anitha Patlolla[2]
[1] Department of Physics, Stern College for Women, Yeshiva University, New York, NY; [2] Department of Chemistry, Bar-Ilan University, Ramat Gan, Israel

Extended X-ray Absorption Fine Structure (EXAFS) is the bombardment of atoms with an X-ray beam at a range of photon energies. An absorption coefficient is measured and plotted as a function of the photon energy. The absorption edge, a large peak in absorption, is then analyzed, along with the pre-edge and post-edge. The analysis of this EXAFS data provides information about atoms and their neighboring interactions within nanoparticles.

In this experiment, EXAFS analysis was performed on a combination of Chitosan and Zinc. Chitosan (CH) is a polysaccharide organic compound known to have anti-bacterial properties. The interactions between Chitosan and Zinc Oxide in the nanocrystalline structure were better understood through this EXAFS analysis.



The figure above shows the X-ray absorption near-edge structure of the Zn-Chitosan complex, and compares this to the known structures of ZnO (2.1nm), ZnO (300nm), and $Zn(Ac)_2$. In this figure, the absorption peak in CS-Zn is very similar to the peak of ZnO (2.1nm). This data supports the conclusion that the Zn in the Zn-CH complex is mostly nanocrystaline ZnO (2.1nm). The antibacterial properties of the CS-Zn nanoparticles have been found to be greater than that of pure CS nanoparticles. This greater understanding of the interactions between ZnO and CS within the nanocrystals is important progress towards the goal of producing antibacterial materials with greater functional properties.

Identifying the Aging Gene in Yeast through the Use of a Microfluidic Device

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The budding of yeast serves as an important model organism for aging research. However, it is difficult to observe the aging pattern in yeast through the classical approach of micromanipulation. The development of the microfluidic system has enabled us to track individual mother cells throughout their lifespan allowing direct observation of cell cycle dynamics and various other molecular markers. The purpose of the microfluidic system is to retain the mother yeast cells in the device while the budding daughter cells are flushed away. The mother yeast cells adhere to the device by chemically modifying the yeast cells and the glass surface of the device. Sulfo-NHS-LC-biotin is added to the yeast cells and biotinylated-BSA, followed by neutravidin, is added to the glass surface. Through the formation of the biotin-avidin complex between the mother yeast cells and the device, the mother cells stay on the device while the daughter cells flush away. The device is made up of two layers. The first layer, the flow layer, connects the network of reaction chambers. The second layer, the control layer, controls the flow of the liquid within the reaction chambers. During the experiment, we found that yeast flow is sensitive to the height of the chamber. When using the microfluidic device with a chamber height of 14 μm, the yeast cells aggregated within the inputs. However, when the height of the chamber was enlarged to 25 μm, we succeeded to obtain a continuous flow of yeast within the microfluidic device. With the view of a light microscope, we were able to observe a sufficient amount of yeast cells within all of the reaction chambers. Next, we checked the immobilization of the mother yeast cells to the device through the biotin-avidin complex. When yeast was attached to Sulfo-NHS-LC-biotin, it adhered to the avidin that was present on the device. However, yeast aggregates did form when the concentration of 10^6 was used. This perhaps was due to a high yeast concentration or of the concentration of the NHS attached to the yeast. The next step will be to optimize the concentration, supply food for the yeast, and visualize the budding process of the yeast. Although we currently can only screen yeast sequentially, the long-term goal that can be achieved with the microfluidic device is the screening of a library of yeast in parallel[1].

[1] Molecular Phenotyping of Aging in Yeast Cells Using a Novel Microfluidic Device. Zhengwei Xie, et. al. *Aging Cell*, (2012) 11, pp599-606.

Assessment of Cognitive Processing in Multiple Sclerosis

By: Eliana Pasternak[1] and Dr. Joshua Bacon[1,2]
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Multiple Sclerosis (MS) is a progressive autoimmune disease that effects the Central Nervous System in which the axons of the brain and spinal cord become demyelinated, resulting in a broad spectrum of physical signs and symptoms. In addition to the physical disability, MS also causes significant cognitive impairment, specifically with deficits in attention, working memory, short-term and long-term memory, and executive function. Research has shown that information processing speed (IPS) may be the 'common denominator' that underlies these cognitive deficits and may emerge even earlier than the more overt and clinically meaningful physical symptoms. Subtle changes in processing speed may therefore provide a subclinical marker of impending cognitive and physical decline. The purpose of this study is to 1) develop a battery of test that measures slowing of processing speed in multiple cognitive domains (with a sensitivity of less than 100 milliseconds) and 2) to compare the sensitivity of the standard measures used to test IPS, the PASAT and SDMT, as markers of cognitive impairment in individuals with MS.

The study tested Individuals ages 19-55 with relapsing-remitting and secondary-progressive MS, comparing their performance on the cognitive battery to healthy controls. The tests administered included a visual hemisphere test, designed for the present study, to assess corpus callosum function; Sternberg's High Speed Memory Scan (1966); a test of rapid serial visual processing (RSVP) to assess front brain function; and a sound localization test to assess midbrain function. The PASAT and SDMT were also administered to test their efficacy as measures of IPS. Tests were administered at a baseline visit, and a follow up visit 1-3 months later. Preliminary evidence indicates that each of the tests are significantly correlated with level of disability and the sound localization test, in particular, may be sensitive to patients with minimal disability.

Demystifying Insight: A Review

By: Eliana Pasternak[1] and Dr. Joshua Bacon[1,2]
[1]Stern College for Women, Yeshiva University, New York, NY; [2]Multiple Sclerosis Comprehensive Care Center, NYU Langone Medical Center, New York, NY

Insight has been defined by Cognitive Psychologists as the sudden awareness of the solution to a problem with little or no conscious access to the process leading up to that solution. Classically, insight has been investigated by comparing performance on insight and non-insight problems and the use of imprecise measures of feelings-of-knowing, and warmth. Recently, both behavioral and neurocognitive approaches have incorporated more objective measures. Behavioral studies indicate that factors including positive mood, environment, and self-initiated breaks can facilitate insight. Neurocognitive approaches have revealed that preparatory brain state modulates insight occurrence, and have begun to expose distinct neural pathways involved in insight including gamma and alpha bands, and ACC and right aSTG activity. Although substantive inconsistencies in the literature remain to be resolved, the combination of behavioral and neurocognitive methodologies has provided exciting, new insights into the psychological moment of insight.

The Attenuation of Second Generation Antipsychotic Induced Weight Gain in Children, Adolescents, and Young Adults Using Betahistine: A Double-Blind Placebo-Controlled Study

By: Eliana Pasternak[1] and Dr. Lawrence Maayan[2,3]
[1]Stern College for Women, Yeshiva University, New York, NY; [2]Nathan Kline Institute for Psychiatric Research, Orangeburg, NY; [3]Child Study Center, NYU School of Medicine, New York, NY

With the prevailing use of second-generation antipsychotics (SGA's) over first-generation antipsychotics (FGA's) for various psychiatric conditions, concern for adverse side affects has shifted from extrapyramidal side effects associated with FGA's to weight gain and metabolic abnormalities associated with SGA's. These SGA have become indispensable, but the iatrogenic obesity and metabolic derangement associated with them pose a serious public health problem, along with additional problematic sequelae including noncompliance (arguably one of the most vital facets of treatment), quality of life issues, and cardiovascular morbidity and mortality. The present study evaluated the efficacy of betahistine, a histamine analog, in reversing the antihistaminergic effects thought to be involved in antipsychotic induced weight gain. The study was a 12-week, randomized, double-blind, placebo controlled trial of betahistine as an augmentation of ongoing SGA treatment. Participants included 40 children, adolescents, and adults ages 12-39 that have been psychiatrically stabilized on Clozapine, Olanzapine, Risperdal, Seroquel, or Abilify, and have gained at least 7% of there weight since treatment on one of the above antipsychotics, and have a BMI of 85% or above.

Results from the preliminary clinical trial showed no significant differences between placebo and betahistine in any side effect subcategories. Overall betahistine was well tolerated. Although both groups lost weight, betahistine trended towards losing more weight than placebo. Though these results did not yet reach statistical significance, completion of the trial with 40 subjects should be adequately powered to demonstrate efficacy.

Gallic Acid, an Inducer of Apoptosis to Human Oral Carcinoma HSC-2 Cells, as Mediated Through Oxidative Stress

By: Robin, Esther F., Wietschner, Jordana R., Weisburg, Jeffrey H., Zuckerbraun, Harriet L. & Schuck, Alyssa G.
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Gallic acid (3,4,5-trihydroxybenzoic acid), a polyphenol common in many plants, *e.g.* pomegranate, tea, and grape, has pharmaceutical properties with potential health benefits. As with most polyphenols, gallic acid exhibits both antioxidant and prooxidant properties. *In vitro* studies with human cells in culture have shown that gallic acid is preferentially cytotoxic to cancer, as opposed to normal, cells, and acts as a prooxidant to induce cell death via apoptosis. As such, gallic acid may be described as a nutraceutical or a natural food product with positive health effects and may be a suitable adjunct to chemotherapeutics in the treatment of cancer.

The connection between gallic acid acting both as a prooxidant and as an apoptosis-inducing agent is ill-defined. The research herein clearly demonstrates a cause-and-effect relationship between gallic acid's production of hydrogen peroxide (H_2O_2) and its subsequent induction of apoptosis to human oral carcinoma HSC-2 cells. Using the FOX assay in a cell-free system, it was shown that gallic acid is a strong generator of H_2O_2. The diacetate ester of 2',7'-dichlorofluorescein (DCFDA) is a colorless, nonfluorescent, nonpolar molecule that passively diffuses into cells. Within the cell, esterases cleave the two acetates to form DCF, a nonpermeable, polar molecule, which, upon oxidation by intracellular oxidants, principally, H_2O_2, yields a fluorescent product. Intracellular fluorescence, an indication of potential oxidative stress, was noted in HSC-2 cells exposed for 4 hrs. to 100 and 200 μM gallic acid, but not in untreated cells.

Reduced glutathione (GSH), a thiol-containing tripeptide, is the main intracellular antioxidant in a cell's repertoire of defenses against oxidative stress. Depletion of intracellular GSH, a sign of impending oxidative stress, was observed in HSC-2 cells exposed for 4 hr to increasing levels of gallic acid (Figure 1). Studies were also performed with gallic acid in the presence of divalent cobalt (as $CoCl_2$). The divalent cobalt cation, acting as a catalyst, decomposes H_2O_2 to water and molecular oxygen. The decrease in intracellular GSH in HSC-2 cells attributable to gallic acid was greatly reduced by coexposure with 250 μM $CoCl_2$. By scavenging the H_2O_2 generated by gallic acid, Co^{2+} protected the cells from oxidative stress.

Flow cytometric analyses of HSC-2 cells, both untreated and treated with gallic acid, showed that as the concentration of gallic acid was increased, the number of viable cells decreased and the number of apoptotic and dead cells progressively

increased. However, in the presence of Co^{2+}, the cells were essentially rescued from apoptotic death. (Figure 2).

These studies showed that the mechanism of apoptotic cell death of cancerous HSC-2 cells exposed to gallic acid is via the induction of oxidative stress.

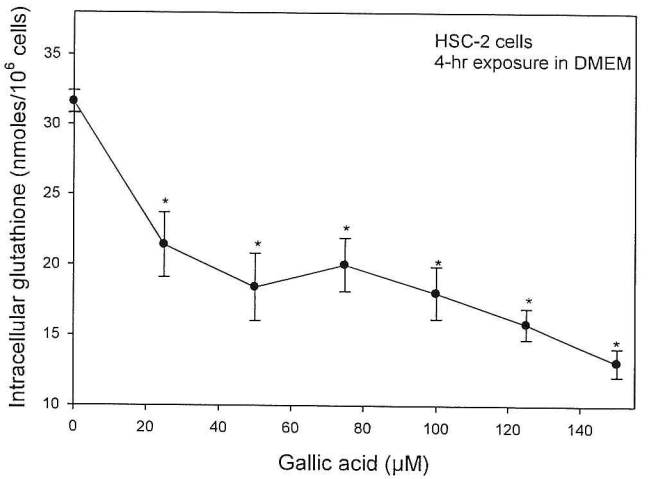

Figure 1. Effect of gallic acid on intracellular reduced glutathione in HSC-2 cells

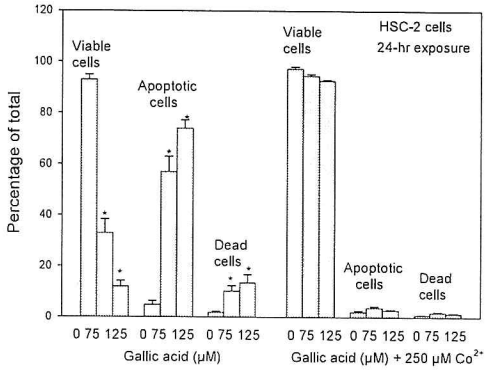

Figure 2. Apoptotic-inducing ability of gallic acid in the absence and presence of Co^{2+}, a scavenger of H_2O_2.

S6K1 Regulation in ER-Positive Breast Cancer

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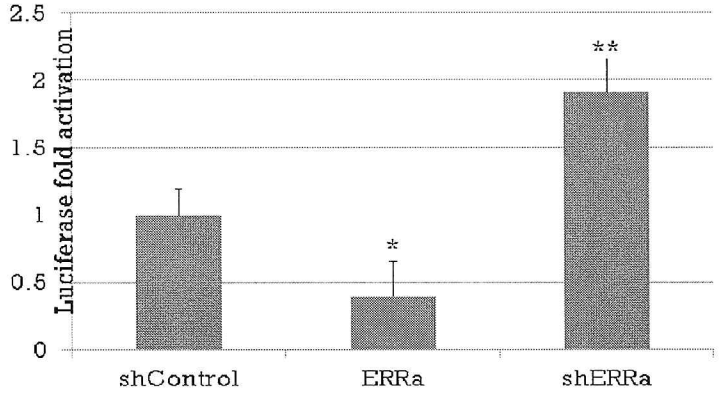
Clinically, up to 60% of breast cancers are Estrogen Receptor (ER)-postive. However, only about half of ER-positive breast cancers respond to endocrine treatments, and resistance often occurs. While mechanisms of resistance are not clear, increased signaling via growth factor pathways such as mTOR (mammalian target of rapamycin) have been observed in these cases. The mTOR pathway regulates such key processes as cell proliferation, growth, survival, and transcription. The current study investigates the molecular mechanisms of escape from endocrine therapy. Elucidating the mechanisms of resistance can lead to better therapies by relying on a combination of targets. One key protein in the mTOR pathway is S6-kinase 1 (S6K1), which is an important regulator of cell proliferation. S6K1 may be important for endocrine sensitivity as it was observed that over-expression of S6K1 occurs in up to 10-30% of breast cancers. Understanding S6K1 regulation may allow it to function as a specific target in combination with endocrine therapy.

Two transcription factors, estrogen-related receptor alpha (ERRα), an estrogen receptor alpha activity modulator, and GATA-3, a T-cell development regulator, are possible regulators of S6K1 expression. This study thus far focused primarily on ERRα. Two assays were used to determine the role of ERRα in S6K1 expression: Luciferase reporter assay and western blotting.

Luciferase assay was used to measure S6K1 promoter activity. In MCF7 and HEK293 cell models, ERRα expression was modulated by knockdown or overexpression. As shown in Figure 1, overexpression of ERRα resulted in a two-fold downregulation of S6K1 expression. Knockdown of ERRα resulted in a two-fold upregulation of S6K1 levels.

Figure 1. S6K1 promoter activity



Western blotting provided validation for the data from the luciferase assay by confirming that the knockdowns and overexpression of ERRα indeed resulted in corresponding protein level changes of S6K1 (data not shown).

Future studies will employ RT-qPCR to measure mRNA levels of endogenous S6K1.

Acknowledgements:

We would like to thank Yeshiva University, the Elias Genevieve and Georgiana Atol Charitable Trust, National Cancer Center, and National Institutes of Health for providing funding for our research.

Different Route of Administration for Melanocortin Receptor Agonist, Melanotan II, in the Model of Cryptogenic Infantile Spasms

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In studies which examined agonists for Melanocortin receptors, MC3 and MC4, in a model of cryptogenic infantile spasms Melanotan II displayed the most potent effect against spasms after systemic, intraperitonea, administration. To understand its true potential as an anti-epileptic drug for IS in humans, further investigations into this candidate must be implemented. Therefore, a different route of administration which is less stressful then IP and prevents the peripheral effects seen in drugs like ACTH, is the aim of this experiment . Due to its small size and previous efficacy on IS, Melanotan II which is composed of a cyclic ten amino acid polypeptide was tested for its effect in intransal delivery. A validated model for cryptogenic IS was utilized and a concentration of 10 micrograms per 6 micro-liters per animal was administered through the nostrils. An experimental group which included more than six liters of rats at the age of p15 was tested and did not yield a p-value of significance. This data suggests that MEL II either is too large to penetrate the blood brain barrier or this mode of administration is not effective for transportation and an intranasal spray may be necessary instead. Finally, the effects of Melanotan II may have been diminished because of peptide decomposition after several months of storage. Future studies which quantify the level of Melanotan II delivered into the brain tissue after administration will aid in deciphering how to proceed forward. In either case the mechanism for Melanotan II's effect in the treatment of IS still requires further investigations and understanding.

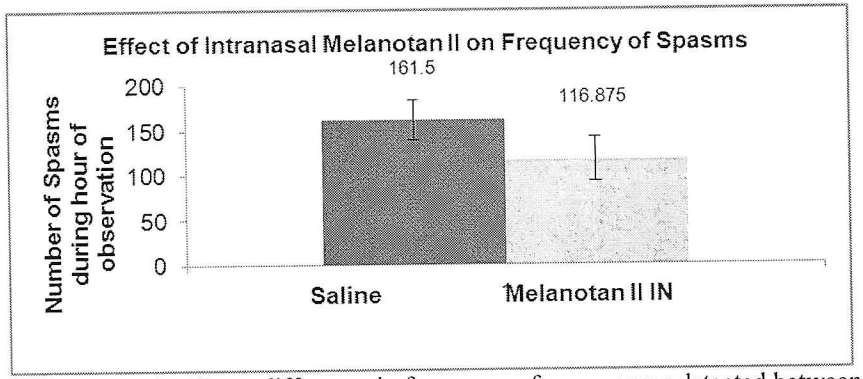

Figure 1. No significant difference in frequency of spasms was detected between saline and intranasal Melanotan II treated groups.

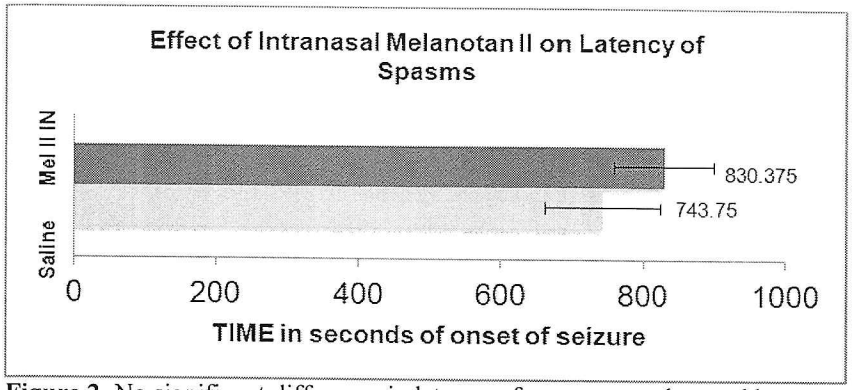

Figure 2. No significant difference in latency of spasms was detected between saline and intranasal Melanotan II treated groups.

Exploring Extra Pericentromeres and Telomeres

By: Naomi Schwartz,[1] Yinghui Song,[2] Jidong Shan,[2] Tae Moon Kim,[4] Paul Hasty,[4] and Cristina Montagna[2, 3]

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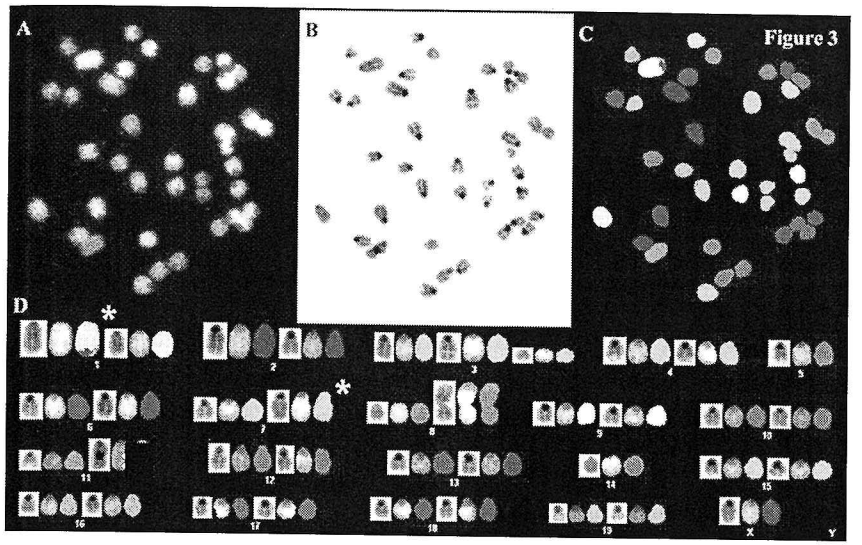
Inefficient DNA repair is a major cause of genetic instability and chromosome abnormalities, common characteristics of cancer cells. Proper genome maintenance is critical to the cell's well-being, and thus, several repair pathways have evolved to cope with DNA damage. One of such pathways includes the homologous recombination protein RAD51, a RecA recombinase important for replication fork maintenance. Proper ATP binding is critical for RAD51 function: when RAD51's lysine K133 (an important ATP binding factor) is mutated into its defective K133A form, chromosomal rearrangements occur within the cell. Previous research identified a hitherto undescribed chromosomal abnormality, Extra Pericentromeres and Telomeres (EPTs), that appears within these mutated cells, yet there has been no further study of these novel rearrangements. This study focuses on EPTs specifically: how many occur, which chromosomes they affect, and whether they affect single chromosome duplication or multi-chromosome fusion. Mouse metaphases derived from K133A cells were visualized using Spectral Karyotyping. Of the 33 spreads analyzed, 63 EPTs were located, as well as a multitude of other structural rearrangements. The majority of the EPTs visualized affected three specific chromosomes: 1 and 11 (mostly duplicated), and 8 (mostly fused to chromosome 11). In order to ensure that these results are accurate, and to further explore the complexity of EPTs, additional experiments are necessary. These include using chromosome-painting probes to visualize chromosome 11 specifically, and specific probes to visualize the centromeres and telomeres. EPTs are formed by mutated RAD51 proteins, and are far more complex than originally thought, requiring much additional study.

Acknowledgements:
I would like to thank the Molecular Cytogenetic Core at Albert Einstein College of Medicine for assisting me with the execution of the SKY hybridizations, image acquisition, and analysis. I would also like to thank the members of the Montagna and Hasty labs for providing support and sharing reagents. Additional thanks go to the Summer Undergraduate Research Program at Albert Einstein College of Medicine, for the funding allowing me the opportunity to carry out this research summer project, as well as to NIH CA013330-38 to I.D. Goldman and ACS 120025 to C. Montagna for additional funding.



Spectral Karyotyping of HsRAD51 K133A mouse metaphases.
(A) Metaphase spreads visualized in red, blue, and green through spectral pixel analysis
(B) DAPI staining of the chromosome bands
(C) Metaphase spreads visualized in their computer assigned pseudo-colors to help the classification process
(D) Karyogram containing the spectral, DAPI, and pseudo-color classifications

Note the EPTs common in chromosomes 1, 8, and 11 (see asterisks), which can be identified through their distinctive stacked arrangements (telomere-to-centromere attachments).

The Role of Tyrosine Sulfation in the CXCR4-SDF-1 Chemokine Receptor Complex

By: Sara Snow and Chaya K Rapp
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The CXCR4-SDF-1 complex plays an important role in multiple processes in the body, including proper fetal development and regulation of cancer cell migration and metastasis. High affinity binding between CXCR4 receptor and the SDF-1 chemokine requires that the N terminal domain of CXCR4 be sulfated at 3 tyrosine residues (7, 12 and 21). To study the role of tyrosine sulfation in the structure and dynamics of the CXCR4-SDF-1 complex, we conducted molecular dynamics simulations on the following CXCR4-SDF-1 complexes from the Protein Databank (PDB): 2k04, unsulfated conformers; 2k05, fully sulfated conformers; and 2k03 conformers sulfated at position 21 only. We also conducted molecular dynamics simulations on monomeric forms of 2k04 and 2k05 (the experimental structure is a dimer). Simulation trajectories were analyzed to address the following questions: (1) Can the utilized force fields reliably model the effects of sulfation? (2) How do multiple sulfation sites affect receptor affinities? (3) The CXCR4-SDF-1 monomer is known to activate chemotaxis while the dimer inhibits this response. How is the behavior of CXCR4-SDF-1 monomer different from that of the dimer, leading to distinct functional roles?

To verify our molecular dynamics trajectories against experimental data, we compared nuclear Overhauser enhancement (NOE) restraints used in the determination of the experimental structures with proton-proton distances in our trajectories. The trajectories for the 2k03, 2k04 and 2k05 simulations showed less than 5% of restraint violations above 2 A, demonstrating that the simulations realistically represent the actual behavior of both the modified and unmodified protein complexes.

Hydrogen bond analysis of the unsulfated (2k04), partially sulfated (2k03), and fully sulfated (2k05) conformers showed that the number of hydrogen bonds increased as the degree of sulfation increased, indicating a role for each additional sulfation site in stabilizing the complex. Additionally, when studying the 2k04 and 2k05 monomers in comparison to the dimers, it was found that dimerization stabilizes the interaction between CXCR4 and SDF-1 through interactions across the dimer interface (i.e. between each CXCR4 chain and both SDF-1 chains). Dimerization also generates stronger hydrogen bonding on each side of the dimer (i.e. between each CXCR4 chain and the SDF-1 chain in the same side).

Plots of RMSD vs. time for monomeric 2k04 and 2k05 (Figure 1) show significant deviation for 2k05 from its original conformation in the experimental dimer. Root mean square fluctuation (RMSF), measures the fluctuation of a protein's residues about their average position and also shows greater flexibility for 2k05. This is consistent with our findings that the sulfated complex is stabilized by dimerization.

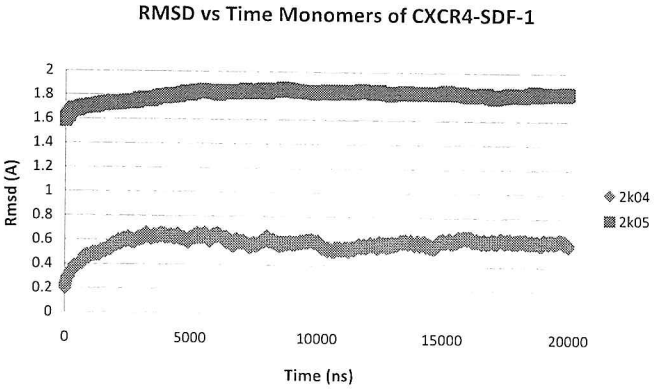

Figure 1. RMSD vs. time for monomeric form of 2k04 (unsulfated) and 2k05 (sulfated).

Kullback-Leibler (KL) Divergence is a method used to compare motions of residues in simulations of similar systems. Figure 2, in which white indicates no divergence and increasing brightness (blue to red) shows greater divergence, is a shows the extent of divergence from the unsulfated simulation for simulation of the sulfated dimer (left, half of dimer is shown) and simulation of the sulfated monomer (right). The figures show greater divergence in the dimer due to interactions across the dimer interface.

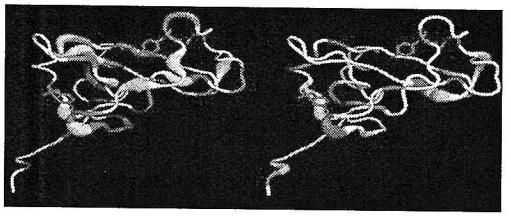

Figure 2. KL Divergence from unsulfated simulation for half of dimer and monomer confomers.

In conclusion, our studies demonstrate that sulfation plays a role in dimer stabilization and that each additional sulfation site adds to the stability of the dimeric complex. Interactions of sulfated residues are shown to be weaker than those of phosphorylated residues. Future studies will help further elucidate the role of sulfation in biological systems.

Regulation of the adaptor protein LAT in Natural Killer immune cells

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Natural killer (NK) cells are innate immune cells that have highly specific target cell recognition mechanisms which cause secretion of cytokines and trigger target cell cytotoxicity. NK cells are activated without prior exposure to antigens and rather depend on germline-encoded receptors for their activation. They play an important role in early protection against viral infections, prevention of tumor proliferation and development of autoimmunity. However, the exact mechanisms of how NK cells are positively and negatively regulated remain unknown.

LAT is a scaffold protein which binds to and thus transports activating proteins toward the cell synapse, serving as a linker between activating receptor engagement and downstream signaling cascades. LAT is known to be crucial for the activation, and thus for the function, of both T and NK-cells as knockout of LAT render the cells hypo responsive. In addition, LAT was shown to undergo ubiquitylation dependent degradation upon T cell activation, which facilitates in the attenuation of T cell function, thereby preventing the development of autoimmune disorders. However, while the mechanisms that negatively regulate LAT in T cells were thoroughly investigated, those mechanisms in NK cells, and their effect on NK cell function, are yet to be characterized. Thus, in this study we focused on the investigation of LAT negative regulation. We found, using a combination of molecular biology and biochemical approaches, that upon NK cell interaction with target cells LAT is down regulated.

Acknowledgements:
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The Role of microRNAs in Lupus Nephritis

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MicroRNAs are short noncoding RNAs which bind to specific messenger RNAs and regulate their stability and translation. Each microRNA can regulate multiple targets. MicroRNAs are usually between 19 and 24 nucleotides and can be found in virtually all cell types. Changes in microRNA expression are associated with disease. Systemic lupus erythematosus (SLE) is a devastating autoimmune disease affecting multiple organs with lupus nephritis (LN) being the cause of significant morbidity and mortality. While the majority of patients with SLE are young adult women, about 30% of the cases begin in childhood, and children and adolescents are more likely to develop renal involvement.

Mice with nephrotoxic nephritis (a model for lupus) were sacrificed and their kidneys were frozen. RNA was extracted from different tissue samples using Qiagen's miRNeasy kit and protocol. Tissue samples were grinded; cells were then lysed and homogenized. The addition of chloroform allowed for separation into aqueous and organic phases. The aqueous phase containing RNA was isolated and washed to elute microRNA. RNA concentrations were measured using the Nanodrop 2000, a low volume spectrophotometer that is used to quantify the amount of RNA in a given sample. The results indicate that this method of extraction allowed for good yields of RNA, which in the future will be sequenced in order to identify new pathogenetic pathways, biomarkers, and therapies.

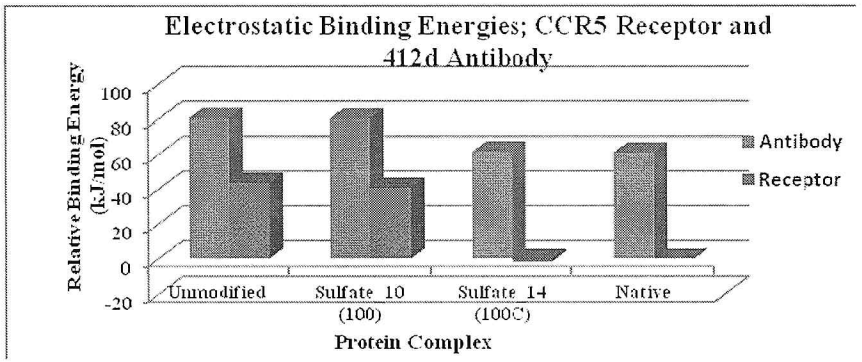
The Role of Sulfation in the CCR5 Chemokine Receptor Complex

By: Nasim Tishbi and Chaya K. Rapp
Stern College for Women, Yeshiva University, New York, NY

Post-transitional modification of proteins plays a critical role in expanding the diversity of protein activities; it occurs by covalent addition of a functional group on the side chain of a protein. These modifications trigger changes in protein structure and dynamics that can affect enzyme activity, protein-protein interaction, and ligand affinity. Tyrosine sulfation is a post-transitional modification in which a tyrosine residue is sulfated at its hydroxyl group position; this modification has been predicted or observed in the N terminal extracellular domain of most chemokine receptors. Our study involves the role of sulfation in the CCR5 chemokine receptor which plays a critical role in HIV-1 infection. HIV-1 entry into the target cell is initiated when the HIV-1 envelope glycoprotein 120 (gp 120) binds to the CD4 receptor and either a CCR5 or CXCR4 co-receptor. The interaction between the gp 120 envelope glycoprotein and the CCR5 co-receptor depends on two sulfated tyrosine residues (positions 10 and 14). Our study also involves Antibody 412d (positions 100 and 100C), a sulfated HIV neutralizing CD4 induced antibody, in complex with gp120 and CD4.

The structures used for our study were obtained from the Protein Databank (412 antibody complex; entry 2qad), and a theoretical model by Huang et al. (for the CCR5 receptor complex). To investigate the role of sulfation in complex stabilization, we used the Adaptive Poisson-Boltzmann Solver (APBS) program to calculate electrostatic binding energies for each complex. Moreover the effects of deletion of one and both sulfate groups were investigated.

A summary of results is shown in the graph below. These results suggest that for the CCR5 co-receptor, TYS14 has a favorable effect on binding energy whereas TYS10 shows almost no effect. Similarly for the 412d antibody, TYS100C has a favorable effect on binding energy and TYS100 shows no effect.



In addition to APBS calculations, molecular dynamics simulations of the CCR5 complex were performed to shed light on the relative strengths of hydrogen bonds between sulfotyrosine residues and neighboring residues in the complex. Analysis of the simulation trajectories shows higher percentage occupancies for hydrogen bonds with TYS14; that is, much stronger hydrogen bonding interactions. These results are consistent with our APBS results in that TYS14 plays a more siginificant role than TYS10 in stabilizing the sulfated CCR5 complex.

Further studies, including molecular dynamics simulation of unsulfated CCR5 complexes are in progress to further elucidate the role of sulfation on the structure and dynamics of the CCR5 chemokine co-receptor complex.

Characterizing the immunosuppressive role of Interleukin-10 on Natural Killer cell proliferation and function

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Natural Killer (NK) cells are lymphocytes which play an integral role in bridging the innate and adaptive immune responses, and respond to a plethora of cytokine signals within an inflammatory environment. For example, it is known that Interleukin (IL)-2 and IL-15 are necessary for optimal NK cell proliferation and survival both *in vivo* and *in vitro*; additionally, pro-inflammatory cytokines IL-12 and IL-18 promote NK cell activity. Upon activation by these extracellular signals, NK cells kill target cells by release of lytic molecules (e.g. perforin and granzyme B) and effector cytokines (e.g. IFNγ and TNFα) that further stimulate the immune response. IL-10 is an immunosuppressive cytokine also produced by monocytes and lymphocytes during an inflammatory response, and the role of this cytokine on NK cell proliferation and function has not been previously established. In this study, we aimed to characterize the role of IL-10 on NK cell growth and function *in vitro*. When IL-10 was added at the beginning of NK cell cultures in the presence of activating cytokines, NK cells proliferated minimally compared to controls lacking IL-10. When IL-10 was added to proliferating cultures at day 3 post-activation by IL-12 and IL-18, absolute NK cell numbers decreased dramatically. These data suggest that IL-10 immediately and potently inhibited NK cell proliferation *in vitro*. Interestingly, the addition of IL-10 to cultures did not decrease NK cell-mediated cytotoxicity, as measured by chromium release assay and intracellular granzyme B staining, compared to controls. However, addition of IL-10 did result in a reduction in IFNγ production by NK cells in cultures receiving IL-10 at day 3 post-activation, but not cultures receiving IL-10 at day 0, suggesting that IL-10 inhibits the production of new IFNγ (but not pre-formed protein) following NK cell activation. Taken together, these findings demonstrate previously unknown effects of IL-10 on NK cells *in vitro*.

The International Growth of Emergency Medicine: Submissions and Acceptances of Manuscripts from Non-U.S. Countries to Three American Emergency Medicine Journals

By: Rachel Victor,[1] Vicken Y. Totten, MD, MS,[2] Apoorva Chandar, MD, MPH,[3] Karolina Mlynek, MD, MBA,[3] Matthew Wollerman,[3] Vashti Aguilar,[3] and David C, Cone, MD.[4]
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Emergency Medicine (EM) has been a recognized, primary specialty in the United States since 1979. The establishment of an independent category generally implies that there is sufficient quantity and quality of studies in that field. By the year 2000, EM Journals were separately categorized by the Thompson Reuters Journal Citation Reports.

Continuous research in a specific field can be instrumental in demonstrating the field's academic standing, improve the current methods and practices, and help secure grants and funding for future projects. The very existence of EM's robust literature enhances its credibility as a field and is helpful to countries struggling to achieve specialty status. The literature currently demonstrates that, as a distinct specialty, EM contributes to safe, efficient and cost-effective patient care. Additionally, recent epidemiologic and demographic public health data highlight the growing need for EM, trauma, and acute care development in all countries across the socioeconomic spectrum.

The United States, Canada, Great Britain and Austrilasia are among the English speaking countries which have long established EM as a specialty. These countries have contributed the bulk of EM literature. However, international contribution is continuously increasing.

To evaluate the increase in journal submissions from non-US countries between the years 2007 and 2011, this observational study examined submissions to 3 leading English-language EM publications: Academic EM, Annals of EM and Journal of EM. Each journal provided the number of articles submitted, accepted and rejected from each country on record by year. The quantity of EM research was measured by recording the number of articles submitted, accepted and rejected, to the three journals. The quality could not be measured directly, but rejection and acceptance rates were examined as proxy measures. The journals did not submit their data in identical formats.

We hypothesized that the world-wide emergence of EM would be paralleled by an increase in submissions to the top three English-language EM journals. Data analysis showed that our hypothesis proved correct as there was a steady increase

in non-US country contribution to each journal. The study is ongoing and holds the potential for future expansion by analyzing data from other EM journals as well.

Evidence for the Role of a Novel Histone Mark in Hippocampal Neurogenesis

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Epigenetics is the study of processes that regulate gene expression without altering the actual DNA sequence. Entailed in such processes are various modifications, which impact the genome while preserving nucleotide sequence. At the molecular level, DNA methylation, covalent histone modification, and non-coding RNA are examples of influences on phenotype that operate above the level of the genetic code itself. There is evidence that adverse life experiences, particularly those involving stress also play a role in the regulation of gene expression. Since epigenetic information is often contingent on something as transient as stress, it is said to be susceptible to environmental conditions, making it an important link in broadening our understanding of how the environment impacts physiological function.

In this study, we examined the impact of chronic stress on hippocampal neurogenesis in the subgranular zone (SGZ) of the dentate gyrus. Studies have shown that stress decreases neurogenesis, the brain's ability to generate new neurons, in the hippocampal region of the brain. We observed the difference in the presence of the novel histone mark, H3 S57-phos, between wild type and stressed mouse hippocampal sections; since mitosis is often used as an index for neurogenesis, our objective was to determine whether H3 S57-phos is a mitotic marker indicating the decrease of neurogenesis.

A group of mice underwent a 21-day chronic restraint period, after which the mice were transcardially perfused and sliced on the sliding microtome at -20° C, as were the control group of unstressed mice. A series of Light Immunocytochemistry (ICC) protocols were performed on the hippocampal sections from each animal, wherein a known mitotic marker, H3 S10-phos, was set as a control to test the novel modification H3 S57-phos. Both the control and experimental proteins that we used as primary antibodies were histones: packaging proteins for DNA. The primary antibodies were developed with goat anti-rabbit secondaries. This was then visualized by diaminobenzidine (DAB) to help us analyze the levels of H3 S57-phos in the particular area of interest: the dentate gyrus.

The results so far indicated that there was a lower level of the H3 S57-phos mark in the stressed hippocampal sections than in the wild type. Since a mitotic marker enables us to quantify levels of mitosis, a lower level of a mitotic marker implies less division of cells that could have produced new neurons. These findings were not only consistent with previous research that demonstrated stress decreasing hippocampal neurogenesis, but they also indicated the possibility that H3 S57-phos is indeed a mitotic marker affected by chronic restraint stress.

Identification of DNA Repair Genes Required During Denucleation of Lens Fiber Cells

By: Bella Wolf,[1] Jian Sun,[2] Tiphaine Chevalier,[2] and Ales Cvekl[2,3]
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The mammalian ocular lens is a structure that refracts light on to the retina. In order to achieve this it is of crucial importance that lens transparency is maintained. Subcellular organelles such as the nucleus reduce transparency of the lens fiber cells and hinder refraction of light. Therefore, one critical step in ocular lens development is the degradation of the nucleus in lens fiber cells in a process called denucleation. Failure to execute denucleation leads to abnormal lens fiber cell differentiation and cataract formation.

As the denucleation process occurs, double stranded DNA breaks form and chromatin degrades. Therefore previous research in our laboratory has indicated that in order to counteract this and ensure that apoptosis, which would produce optical irregularities and scattering of light, does not occur DNA repair enzymes are mobilized.

The purpose of this experiment is to identify the functional DNA repair enzymes participating in the denucleation process. The mRNA levels of embryonic stage 15.5 mice lens, which have not yet undergone denucleation in the lens fiber cells, is compared through the use of real time PCR to that of embryonic stage 17.5 mice lens, the approximate stage in which denucleation occurs.

Results show that most DNA repair enzymes do not show a significant change from E15.5 to E17.5; however, several DNA repair pathway genes (eg. Nbn (Nbs1), Mlh1, Xpa, Mpg) show a considerable up-regualtion. These results encourage the current hypothesis that there is a significant participation of certain DNA repair enzymes during the denucleation process.

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Improving Health Knowledge Among Orthodox Women

By: Frieda Wrotslavsk,[1] Rifky Tkatch, Ph.D.,[2] Lisa Berry Bobovski, MA,[2] Susan Eggly, Ph.D.,[2] Louis A. Penner, Ph.D.,[2] Karoline Puder, M.D.,[2] Michael Simon, M.D., MPH,[2] and Terrance L. Albrecht, Ph.D.[2]
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Ashkenazi Jewish women are at higher risk for cancer-related genetic mutations compared to women from other groups. Limited data among Orthodox (i.e. Chareidi) Ashkenazi women shows lower screening rates compared to other groups of women. The Orthodox Jewish community is a community whose religious practices distance them from much of secular life. As such, previous attempts at health education from health institutions outside of this community have had little success.

The overall objective of this project is to better understand the cancer-related health needs of Orthodox Jewish women in the Detroit Metropolitan area and to develop an intervention that will benefit them with regard to cancer screening practices, knowledge of health and genetic risks, and health behaviors. The goal of this study is to gain a deeper understanding of health issues in this community through focus groups. Specifically, we want to understand the experiences, attitudes, beliefs, and health behaviors of cancer survivors, their family members, as well as women across broad age ranges who are neither survivors nor close relatives of survivors, but are appropriate candidates for cancer screenings. This study is the first phase of a three phase proposal, the goal of which is to develop an effective program of interventions to improve cancer related health knowledge and health practices (including screening and health behaviors) in the Orthodox Jewish community.

We conducted a series of 6 focus groups, each with 3-5participants (n= 23) and 4 interviews. Specifically, there was one group of women over the age of forty who have had cancer. There were 3 groups of women who had a family history of cancer, 2 of those groups comprised of women over the age of 40 and one of women under the age of 40. There were 2 groups of women who had no family history of cancer; one comprised of women under 40 and one of women under the age of 40. The 4 interviews were each with women from the community over the age of 40 who have had cancer. During these groups and interviews, a moderator guided the conversation to cover many topics related to health. These included the participants' perceptions of general health concerns in the community, then more specifically cancer concerns, and from there the moderator lead the conversation to thoughts about cancer screening in the community. The moderator also lead the discussion to the participants' perceptions on what causes cancer, and what they thought the health care system should do about cancer.

From these focus groups, we identified themes that explain health behaviors and health practices that are unique to that community.

The next phase of the project is to utilize the findings from the focus groups to develop educational interventions, the goals of which are to improve cancer related health knowledge, behavior, and practices.