U of I SACNAS Chapter Receives National Recognition

By Ana Petracovici

The U of I Chapter of SACNAS—Society for the Advancement of Hispanics/Chicanos and Native Americans in Science—has been awarded the prestigious **SACNAS 2014 Outstanding Partnerships/Collaborations/Networks Award**. The U of I chapter competed against numerous, often larger, university SACNAS chapters from across the nation to receive one of thirteen Outstanding Chapter awards. The chapter was recognized for its achievements in October at the 2014 SACNAS National Conference in Los Angeles.

The local SACNAS chapter is composed of one undergraduate and eighteen graduate students pursuing degrees in the departments of biochemistry, chemistry, communications, microbiology, physics, and cell and developmental biology. The chapter is co-advised by Wilfred van der Donk, professor of chemistry, and Rochelle Gutierrez, professor of mathematics education and latina/latino studies.

Through its numerous professional and community outreach activities during the last year, the U of I chapter was able to build a strong network of support for its members and engage with local elementary school students. The chapter organized various professional workshops, invited Hispanic faculty members from other universities to share their experiences with students, and hosted bilingual science activities for elementary school students to encourage interest in STEM fields.

"Seeing kids enjoy science as much as we do and become interested in experiments gives us hope that in the future there will be more minorities in science," says club secretary and microbiology PhD student Madeline M. Lopez Muñoz.

SACNAS volunteers Maria A. Bautista and Ariana Bravo Cruz collaborated with Illinois Extension staff Alvarez Dixon and Lisa Bouillion Diaz, Leal School Dual Language Coordinator Dr. Amanda Harris and Professor Rachel Whitaker, in the Department of Microbiology, to develop the Cena y Ciencias (Supper and Science, CyC) program for the Dual Language students and families.

SACNAS leads hands-on activities to explain biological concepts in Spanish.

Each event is conceptualized and implemented in Spanish by 4-H Extention, Dr. Harris, and SACNAS volunteers, emphasizing the attainability of success in the sciences for Spanish speakers in the US. Funding from SACNAS, NSF, the Program in Ecology Evolution and Conservation (PEEC), and supplies provided by Illinois Extension allowed CyC to include a free dinner in addition to hands-on science activities, such as building simple machines and microscopes, in which children and their parents participate together.

"Partnering with SACNAS for Cena y Ciencias has allowed us to engage our Dual Language families in high-quality science activities that teach students core science concepts and collaboration skills designed and implemented in Spanish. The best part about this is that the SACNAS volunteers redefine the social stereotype of the word 'scientist' in a way that allows our students to see themselves in a bright future," says Dr. Harris.

SACNAS has also been actively reaching out to the Native American community on campus and hopes to increase Native American representation within the chapter.

Current president and microbiology PhD student Ariana Bravo Cruz hopes to build upon the chapter's successes in the coming year: "We would like increase our undergraduate membership, provide more professional development workshops, and continue our partnerships with campus outreach organizations and local elementary schools to serve as role models to Hispanic and Native Americans students." ■

Scientists Discover a New Role for Estrogen in the Pathology of Breast Cancer

By Diana Yates

Scientists have discovered a previously unknown mechanism by which estrogen prepares cells to divide, grow and, in the case of estrogen-positive breast cancers, resist cancer drugs. The researchers say the work reveals new targets for breast cancer therapy and will help doctors predict which patients need the most aggressive treatment.

The University of Illinois team reports its findings in the journal *Oncogene*.

Estrogen pre-activates the unfolded-protein response (UPR), a pathway that normally protects cells from stress, the researchers report. The UPR spurs the production of molecular chaperones that prepare cells to divide and grow. Without chaperone proteins to do the work of folding and packaging other proteins, cells—including cancer cells—cannot divide. For this reason, chaperones are a popular target for new cancer therapies.

Activation of the UPR is known as a normal response to stress—when a cell lacks adequate oxygen or nutrients, for example, or is exposed to cancer-killing drugs. UPR activation prepares the cell for major changes associated with cell growth, division and survival under stress.

It wasn't known before this study, however, that estrogen initiates this pathway before such stresses appear, said University of Illinois biochemistry professor David Shapiro, who led the new analysis with lead author, MD-PhD student Neal Andruska.

"This is a new role for estrogen in the pathology of cancer," Shapiro said. "Others have shown that stress activates this pathway, helping to protect some tumors. What is new is our finding that estrogen can pre-activate this pathway to protect tumors."

When estrogen binds to its receptor it sparks a cascade of molecular events in the cell. A key event occurs when a channel opens in the membrane of a compartment that stockpiles calcium, and calcium floods into the cell.

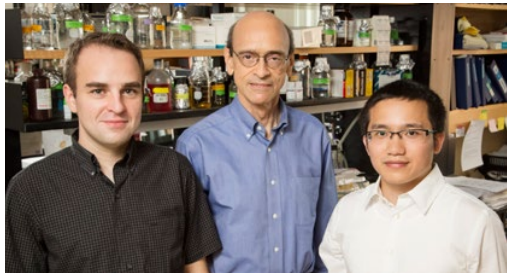
"That's a signal to activate the UPR pathway, the stress pathway," Shapiro said. "It's also a signal that many researchers think has something to do with cell proliferation. The calcium itself may be a proliferation signal."

The stress-response pathway induces the production of chaperone proteins.

"I like to think of this pathway as an assembly line," Shapiro said. "In order for cells to divide, you're going to have to produce a lot more proteins. The chaperones help you to package, fold up and ship all these proteins."

The UPR also is a mediator of cell death. If a normal cell is exposed to too much stress, the stress response spurs apoptosis, a kind of cellular suicide. In cancer, however, mild activation of the UPR by estrogen blunts this cell-death pathway, allowing cancer cells to survive and even resist drugs, the researchers found.

The team also looked at the expression of UPR-related genes in publicly available data from samples of breast tumors obtained from women who had been diagnosed up to 15 years prior.



Biochemistry professor David Shapiro (center), MD-PhD student Neal Andruska (left), graduate student Xiaobin Zheng and their colleagues discovered a new mechanism by which estrogen contributes to the pathology of breast cancer.

Photo by L. Brian Stauffer

"Andruska, who spearheaded the research and carried out the computer analysis of the breast cancer data, found that UPR activation is a very powerful prognostic marker of the course of a woman's disease," Shapiro said.

The analysis revealed that among women with estrogen-receptor-positive breast cancer who underwent tamoxifen therapy, breast cancer was 3.7 times more likely to recur in those overexpressing the UPR. Ten years after a breast cancer diagnosis, only 15 percent of those with the highest level of UPR-gene expression were disease-free, compared with 80 percent of women with minimal UPR expression.

"Our marker helps identify breast cancers that are likely to be highly aggressive and therefore require intensive therapy," Shapiro said.

U of I graduate student Xiaobin Zheng, postdoctoral researcher Xujuan Yang and food science and human nutrition professor William Helferich contributed to the research.

The National Institute of Diabetes and Digestive and Kidney Diseases at the National Institutes of Health funded the research. ■

FOR FURTHER READING

See the entire article in *Oncogene*:
http://www.nature.com/onc/journal/vaop/ncurrent/full/onc2014292a.html