

In This Issue:

Estrogen: Not just produced by the ovaries
Page 1

NTP Directorship
Page 2

New Faculty
Page 2

Dual-Sport Motorcyclists Support Cancer Research
Page 3

Recent Graduates
Page 3

Fall Outreach Recap
Page 4

Awards & Achievements
Page 4

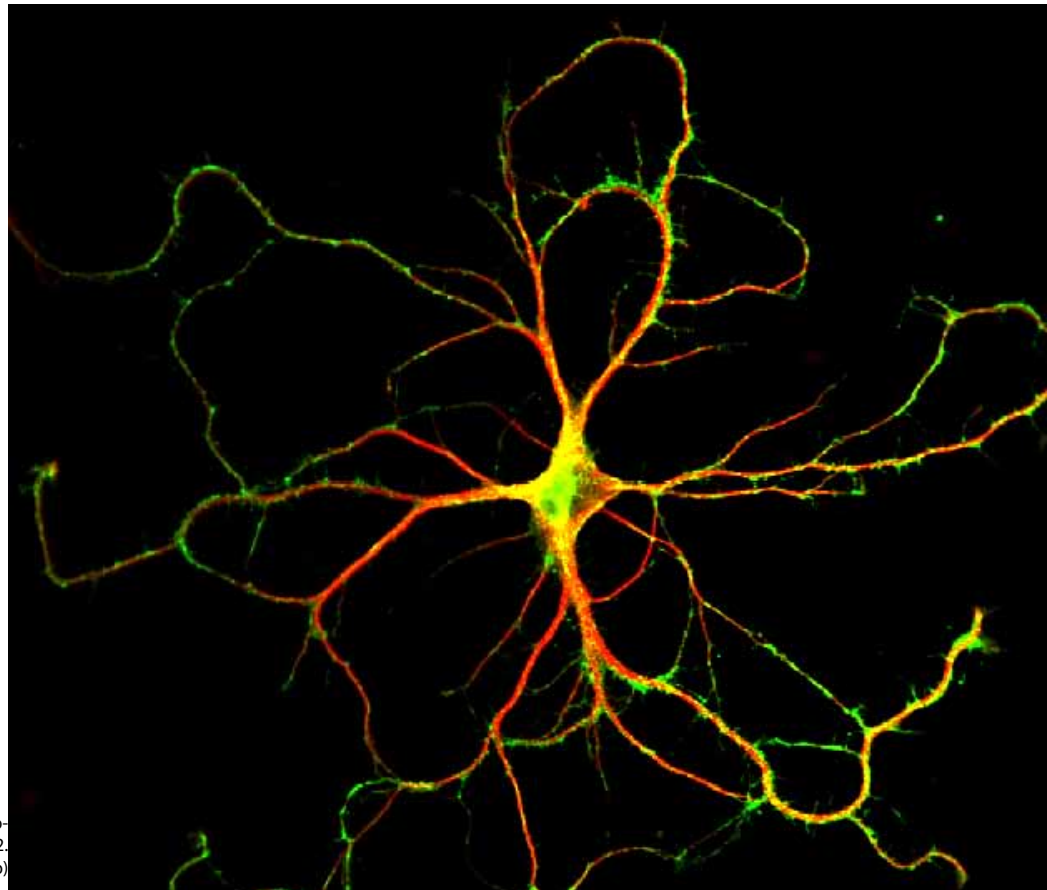


Image: 10 DIV(days in vitro) dissociated embryonic rat hippocampal autaptic neuron stained again for VAMP2 and MAP2. Submitted by Ewa Bomba (Chapman lab)

BRAIN WAVES

Estrogen: Not just produced by the ovaries

By: Jordana Lenon
WI National Primate Research Center
December 4, 2013

A UW-Madison research team reports today that the brain can produce and release estrogen — a discovery that may lead to a better understanding of hormonal changes observed from before birth throughout the entire aging process.

The new research shows that the hypothalamus can directly control reproductive function in rhesus monkeys and very likely performs the same action in women.

Scientists have known for about 80 years that the hypothalamus, a region in the brain, is involved in regulating the menstrual cycle and reproduction. Within the past 40 years, they predicted the presence of neural estrogens, but they did not know whether the brain could actually make and release estrogen.

Most estrogens, such as estradiol, a primary hormone that controls the menstrual cycle, are produced in the ovaries. Estradiol circulates throughout the body, including the brain and pituitary gland, and influences reproduction, body weight, and learning and memory. As a result, many normal functions are compromised when the ovaries are removed or lose their function after menopause.

"Discovering that the hypothalamus can rapidly produce large amounts of estradiol and participate in control of gonadotropin-releasing hormone neurons surprised us," says Ei Terasawa, professor of pediatrics at the UW School of Medicine and Public Health and senior scientist at the Wisconsin National Primate Research Center. "These findings not only shift the concept of how reproductive function and behavior is regulated but have real implications for understanding and treating a number of diseases and disorders."



For diseases that may be linked to estrogen imbalances, such as Alzheimer's disease, stroke, depression, experimental autoimmune encephalomyelitis and other autoimmune disorders, the hypothalamus may become a novel area for drug targeting, Terasawa says. "Results such as these can point us in new research directions and find new diagnostic tools and treatments for neuroendocrine diseases."

The study, published today in the Journal of Neuroscience, "opens up entirely new avenues of research into human reproduction and development, as well as the role of estrogen action as our bodies age," reports the first author of the paper, Brian Kenealy, who earned his Ph.D. this summer in the Endocrinology and Reproductive Physiology Program at UW-Madison. Kenealy performed three studies. In the first experiment, a brief infusion of estradiol benzoate administered into the hypothalamus of rhesus monkeys that had surgery to remove their ovaries rapidly stimulated GnRH release. The brain took over and began rapidly releasing this estrogen in large pulsing surges.

In the second experiment, mild electrical stimulation of the hypothalamus caused the release of both estrogen and GnRH (thus mimicking how estrogen could induce a neurotransmitter-like action). Third, the research team infused letrozole, an aromatase inhibitor that blocks the synthesis of estrogen, resulting in a lack of estrogen as well as GnRH release from the brain. Together, these methods demonstrated how local synthesis of estrogen in the brain is important in regulating reproductive function.

The reproductive, neurological and immune systems of rhesus macaques have proven to be excellent biomedical models for humans over several decades, says Terasawa, who focuses on the neural and endocrine mechanisms that control the initiation of puberty. "This work is further proof that these animals can teach us about so many basic functions we don't fully understand in humans."

Leading up to this discovery, Terasawa said, recent evidence had shown that estrogen acting as a neurotransmitter in the brain rapidly induced sexual behavior in quails and rats. Kenealy's work is the first evidence of this local hypothalamic action in primates, and in those that don't even have ovaries.

"The discovery that the primate brain can make estrogen is key to a better understanding of hormonal changes observed during every phase of development, from prenatal to puberty, and throughout adulthood, including aging," Kenealy says.



NTP Directorship

After 7 years as the NTP Director, Dr. Tom Yin has announced his decision to step down during the spring 2014 semester once a new director has been selected. Thank you Tom for your hard work and dedication to the Program's success!



WELCOME NEW FACULTY

Photo Not Available

Allyson Bennett
Assistant Professor, Department of Psychology
Biology of Brain & Behavior



Robert Dempsey
Chair and Professor, Department of Neurological Surgery
Cerebral ischemia and the repair of the injured brain.



Yuri Saalman
Assistant Professor, Department of Psychology
Neural dynamics of brain networks supporting (i) executive functions, such as attention and rule processing, as well as (ii) conscious awareness and anesthesia.



Umadevi Wesley
Senior Scientist, Department of Neurological Surgery
Molecular mechanisms of neuronal tumors/stem cell differentiation, survival, migration, and angiogenesis

Dual-Sport Motorcyclists Support Cancer Research

By: Kris Whitman
School of Medicine & Public Health
November 18, 2013

When people think of grassroots efforts to raise money for a cause, they may not envision the type of effort involved in hosting and riding in a dual-sport motorcycle event.

But the nearly 200 participants who gather for the annual Ride for Research - as well as the faculty and staff in the laboratory of Avtar Roopra, PhD, at the University of Wisconsin School of Medicine and Public Health (SMPH) - have redefined grassroots to include mud, gravel and forested trails. Dual-sport participants ride street-legal bikes and choose their challenge level from paved or unpaved roads, two-track and single-track trails through the woods and steep terrain ranging from mud to sand and rocks.

John Newton, a lifelong cycle rider who works at the UW-Madison Biotron, is the driving force behind the two-day, 250-mile Ride for Research and its sponsor, the Wisconsin Dual Sport Riders. While the event is not for the faint of heart, the benefits include intense camaraderie, he says, adding that riders get mud on their teeth because they're smiling. Newton proudly notes that, starting with the first annual Ride for Research in 2005, the club has donated its proceeds to breast and colon cancer research at the UW Carbone Cancer Center (UWCCC). The cumulative total exceeds \$100,000.

"We support the Carbone Cancer Center because it helps people from the entire Great Lakes region. Our event brings together riders from all over, but primarily from six nearby states, and they all benefit from this research," says Newton, adding that cancer has touched the lives of nearly all participants.

Following the 2009 race, Newton and his wife, Sue, were searching for ways to energize the riders and boost donations for the next year's race. "Sue saw a news story about some interesting breast cancer research being conducted by Matt Wagoner, a graduate student who worked in Avtar Roopra's neurology lab," explains Newton, of Fall River, Wisconsin. Specifically, the UW Carbone Cancer Center researchers identified a

change in a gene that normally suppresses tumor growth by producing a specific protein, known as RE1 silencing transcription factor (REST). "Sue thought we should send the article to the riders, but I thought it would be more inspiring if the researchers would talk directly with our club. I sent Matt an e-mail that said if he would do that, we would donate half of the ride proceeds to that laboratory," reflects Newton, explaining that the other half benefits colon cancer research.

"Matt came to our Christmas party, and the following spring, he and Avtar spent the ride weekend in Wabeno and gave a presentation," he says.

This spurred an ongoing relationship rich with good humor and ample laughter. Roopra invites Newton and others to the laboratory throughout the year, and members of the laboratory attend the ride.

"Being from Britain, I learned about America by watching TV shows like 'Starsky and Hutch' and 'The Dukes of Hazzard.' Wabeno is a lot like the small towns in those shows, and the people are incredibly friendly," exclaims Roopra, an associate professor in the Department of Neuroscience.

While his basic science laboratory primarily studies epilepsy, he notes that he and Wagoner were stymied to find that a molecule Roopra has studied since the mid-1990s plays a major role in breast cancer.

"This finding spawned several collaborations around the U.S., but we had no funding for breast cancer research, partly because government grants have diminished significantly in the struggling economy," says Roopra. "The bikers are the sole funding source for this line of our research," he states. "It's a lifeline in the leanest of times."

Newton saw a huge change in the ride's annual donations after the researchers became personally involved with the donors. "We went from raising about \$6,000 in the early years to raising almost \$20,000 this year, with the same number of riders," he notes. "Guys tell me it means a tremendous amount to them to hear about glimmers of hope in the effort to beat breast cancer."



Recognizing that club members work extremely hard to raise the money - such as clearing trails using chain saws in the cold, damp weeks before the ride, Roopra says his laboratory staff plan what experiments will use the "bikers' money" and spend it as efficiently as possible.

"A couple of years ago, using their funds, we were able to come up with a gene signature-based around REST - that could help predict breast cancer prognosis," says Roopra. "This year, we were able to take those findings and make inroads toward figuring out why these genes are so aggressive." He continues, "As a testament to this dedication, we have published the club's name as the funding source for three papers in world-renowned journals, and we have presented those papers to the club."

Newton shares, "Having them involved has been so much fun. The best part is the positive feedback from riders. A guy said to me, 'You're doing a great thing. When I got cancer 20 years ago, Paul Carbone was my doctor. I would not be here if it were not for him.'"

Roopra concludes, "Seeing the riders in Wabeno and sharing our findings is inspirational. Their energy and enthusiasm drive us to make a difference. After all, who would want to let down 200 guys on motorbikes?"

This article has been shortened for its use in Brain Waves, to read the complete article please visit: <http://www.med.wisc.edu/quarterly/dual-sport-motorcyclists-support-cancer-research/42412>

CONGRATULATIONS RECENT GRADUATES!

Sarah Baisley graduated from the Vaishali Bakshi and Brian Baldo labs.

Miguel Santiago-Medina graduated from Timothy Gomez's lab and is now working as a postdoc in the Gomez lab.

Congratulations to Yun Ding for passing her preliminary examination in fall 2013!

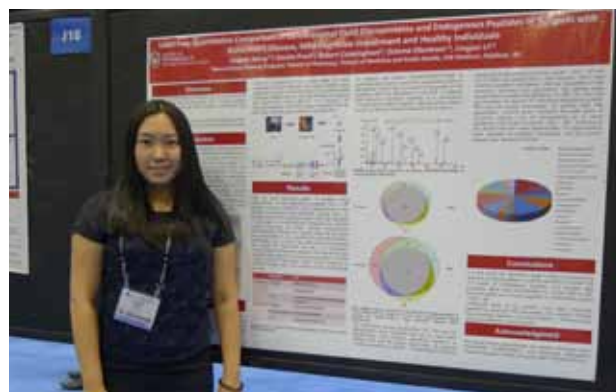


Photo:
NTP
Student
Jingxin
Wang
at SfN
2013.

FALL OUTREACH RECAP

We spent the fall semester revamping the Neuroscience Training Program Outreach Committee and have begun taking part in a lot of great new activities! We have also joined the UW Science Alliance to create connections with other science outreach coordinators on campus.

From participating in the Halloween event at the Madison Children's Museum to visiting Monona Grove High School, and attending a mixer with teachers and home school parents to share resources, we have been pretty busy this fall!

We look forward to a busy spring as well! We will be hosting two workshops associated with the Badger Science Olympiad, visiting classrooms throughout Madison, and coordinating a mini science festival in New London, WI. We're furthering the Wisconsin Idea by sharing our knowledge, resources, and most of all love of science with people both within and beyond Madison.

If you would like to follow our outreach activities and keep up-to-date on upcoming activities, check out our blog!
www.ntpoutreach.blogspot.com



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University Communications & School of Medicine and Public Health

AWARDS & ACHIEVEMENTS

Vaishali Bakshi has been elected as a full member to the American College of Neuropsychopharmacology (ACNP)

Baron Chanda received the 2013 Traditional Crane-field Award from the Society for General Physiologists.

Joshua LaRocque received the Ann E. Kelley Fellowship in Behavioral Neuroscience Travel Award.

Angela Navarrete Opazo has been selected to join the Phi Kappa Phi Honor Society.

Tom Yin received the inaugural William and Christine Harmann prize in Auditory Neuroscience from the Acoustical Society of America.

CONTRIBUTIONS TO THE PROGRAM

Funds given to the program are used to support recruiting activities, guest speakers, the graduate travel award for professional conferences and the annual program picnic. For additional information, please contact the program office at (608)262-4932. To contribute, please contact the UW Foundation at:

<https://secure.supportuw.org/MultiPage/processStep1.do?seq=17268>

Thank you to all those who have contributed and continue to support the Neuroscience Training Program and its students.

Introducing NTP's New Website!

If you have not seen it already, the new NTP website is officially live!

Check it out at

<http://ntp.neuroscience.wisc.edu/>

Connect with Us!



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