At the event, we also honored professors Michelle Callegan, John Campbell and David Sherry, with distinguished service awards for playing a key role in OCNS. We also acknowledged the OCNS graduate students who were crucial in the organizing of the symposium, Amanda Brock, Dawn Kennedy and Alaina Reagan. And finally, we acknowledged our program coordinators Laura Blackburn and Rebecca Schiedel.

During the summer, I headed an OCNS strategic planning session with the OCNS leadership team and we reviewed our mission to advance the research, education and outreach programs related to neuroscience. I wish to thank all who helped make our strategic planning meetings a success, including professor Michelle Callegan, OCNS associate director of research; professor Calin Prodan, OCNS associate director of clinical affairs; professor John Campbell, OCNS associate director for special programs; and professor James McGinnis, OCNS associate director for student affairs. We look forward to rolling out great new programs to help the careers of our graduate students and junior faculty within OCNS. Of note, we plan to do the following, amongst other initiatives: • Build on the early success of the OCNS Translations seed grant program and make new grants available for faculty and students. • Provide increased research funding dollars for seed grants to faculty and students who are working toward translational research and the Obama BRAIN Initiative. • Develop programs that welcome trainees to the OCNS program.

Once again, it is an honor to serve as the director of OCNS and I appreciate all your hard work and look forward to your thoughts and input. Have a wonderful holiday season!
**Research Highlights**

**Early Life Stress as a Risk Factor for Poor Adult Health**

A history of early life adversity has health-related consequences that persist beyond the initial maltreatment and into adulthood. This is a topic that has been the focus of two researchers at OUHSC and both members of OCNS. Specifically, professors William Lovallo and Beverley Greenwood-Van Meerveld have each published papers that address this important problem. Professor Greenwood-Van Meerveld and her laboratory are focusing on understanding how ovarian hormones cause sex differences in visceral pain in response to various forms of adverse early life stress. In a recent paper, her goal was to investigate the mechanisms by which the context of the early life stress can affect nociception in adulthood.


**Background.** Can stressful events in early life alter the response characteristics of the human stress axis? Individual differences in stress reactivity are considered potentially important in long-term health and disease; however little is known about the sources of these individual differences. We present evidence that adverse experience in childhood and adolescence can alter core components of the stress axis, including cortisol and heart rate reactivity.

**Methods.** We exposed 354 healthy young adults (196 women) to public speaking and mental arithmetic stressors in the laboratory. Stress responses were indexed by self-report, heart rate, and cortisol levels relative to measures on a nonstress control day. Subjects were grouped into those who had experienced 0, 1, or 2 or more significant adverse life events including Physical or Sexual Adversity (mugged, threatened with a weapon, experienced a break-in or robbery; or raped or sexually assaulted by a relative or nonrelative) or Emotional Adversity (separation from biological mother or father for at least 6 months prior to age 15).

**Results.** Experience of adversity predicted smaller heart rate and cortisol responses to the stressors in a dose-dependent fashion (0 > 1 > 2 or more events; (Fs  = 5.79 and 8.11, ps < .004) for both men and women. This was not explained by differences in socioeconomic status, the underlying cortisol diurnal cycle, or subjective experience during the stress procedure.

**Conclusion.** The results indicate a long-term impact of stressful life experience on the reactivity of the human stress axis.

Funding by: NIAAA R01 AA012207 and the Department of Veterans Affairs


Visceral pain is the hallmark feature of irritable bowel syndrome (IBS), a gastrointestinal disorder, which is more commonly diagnosed in women. Female IBS patients frequently report a history of early life adversity (ELA); however, sex differences in ELA-induced visceral pain and the role of ovarian hormones have yet to be investigated. Therefore, we tested the hypothesis that ELA induces visceral hypersensitivity through a sexually dimorphic mechanism mediated via estradiol. As a model of ELA, neonatal rats were exposed to different pairings of an odor and shock to control for trauma predictability. In adulthood, visceral sensitivity was assessed via a visceromotor response to colorectal distension. Following ovariecotomy and estradiol replacement in a separate group of rats, the visceral sensitivity was quantified. We found that females that received unpredictable odor-shock developed visceral hypersensitivity in adulthood. In contrast, visceral sensitivity was not significantly different following ELA in adult males. Ovaricectomy reversed visceral hypersensitivity following unpredictable ELA, whereas estradiol replacement reestablished visceral hypersensitivity in the unpredictable group. This study is the first to show sex-related differences in visceral sensitivity following unpredictable ELA. Our data highlight the activation effect of estradiol as a pivotal mechanism in maintaining visceral hypersensitivity.

**PERSPECTIVE:**

This article directly implicates a critical role for ovarian hormones in maintaining visceral hypersensitivity following ELA, specifically identifying the activation effect of estradiol as a key modulator of visceral sensitivity. These data suggest that ELA induces persistent functional abdominal pain in female IBS patients through an estrogen-dependent mechanism.

Funding by: The Department of Veterans Affairs: 2011-2015
How the Brain Modulates Different Types of Facial Expressions

Most clinical research aimed at understanding how the brain modulates facial expressions has focused on differences between the left and right hemiface. For spontaneous rather than posed expressions, the left hemiface is more expressive than the right hemiface. This has been interpreted to suggest that the modulation of facial expressions is a lateralized function of the right hemisphere. However, the statistical differences are rather weak, explaining on average only 4% of the data variance, which implies that the observed behavioral responses and conclusions regarding hemispheric lateralization may not be warranted. Part of the problem may relate to research methods that are based on the assumption that the motor control of facial expressions is organized across the right and left hemiface because hemispheric brain lesions result in contralateral facial paralysis that mainly affects the lower face. In contrast, social psychology and recent clinical research has suggested that the control of facial expressions is organized predominantly across the upper-lower hemiface and secondarily across the right-left lower face. In addition, over the last decade, basic anatomical research has established that there are multiple areas in cortex that control facial movements with contralateral lower facial control located primarily in the lateral-posterior-inferior frontal lobes and upper facial control located in the medial-posterior frontal lobes.

Using high-speed videography (600 frames/second), Drs. Elliott Ross and Vinay Pulusu at the VA Medical Center, University of Oklahoma Health Sciences Center, assessed movement onset asymmetry in 20 strongly right-handed subjects as a means to determine which hemisphere initiated a particular facial expression. The results were robust, explaining up to 70% of the data variance. For posed expressions, the movement overwhelmingly started on the right-side of the face. For spontaneous expressions, the movement overwhelmingly started on the left-side of the face. This dichotomy was most extreme for upper facial expressions (frown, surprise) and less so for lower facial expressions (smile). The results support the following concepts: 1) posed expressions are modulated predominantly by the left hemisphere, 2) spontaneous expressions are modulated predominantly by the right hemisphere and 3) motor control of facial expressions is organized primarily across the upper-lower hemiface and only secondarily across the right-left lower face.

This work was supported in part by the Oklahoma City VA Medical Center and the Department of Neurology, University of Oklahoma Health Sciences Center, Oklahoma City, Oklahoma, USA.

We would like to congratulate Kathryn Klump on successfully completing her graduate studies in neuroscience! She was acknowledged at the symposium dinner reception by her mentor “Professor James McGinnis” and our director Beverley Greenwood-Van Meerveld.
and Best Poster Presentation.

- 2 awards from the OCNS Symposium; Best Oral Presentation

Hopiavuori, Blake

Johnson, Anthony

- OCNS Symposium Best Poster Presentation Award.

Larabee, Chelsea - was awarded the John and Mildred Carson Scholarship.

Sherry, David:


3. National Science Foundation IOS 1052394 (2013-2016), Cellular mechanisms of rapid hormonal modulation in vertebrate communication signals.

Greenwood- Van Meerveld, Beverley-

1. Renewal of: Department of Veterans Affairs. Merit Review Grant Title: Central Mechanisms Modulating Visceral Hypersensitivity T101BX002188-01 2013- 2017

2. Invited Speaker: University of Cork, Ireland “Visceral Hypersensitivity in Brain-Gut Disorders” October 2013

3. Invited Speaker: University of Texas Medical Branch Galveston “Irritable Bowel Syndrome- A Common Mystery” September 2013

4. Chair: VA Study Section Neurology C / B (June / December)


Markham, Michael:


Hershey, Linda:


Benson, Susan - Was presented with the Honors of the Association Award by the Oklahoma Speech-Language-Hearing Association at the Association’s Annual conference that was held in Tulsa on October 5.