Research highlights

- Select septate junction proteins direct ROS-mediated paracrine regulation of Drosophila cardiac function
  (Dr. Hui-Ying Lim’s lab)

- Role of estrogen and stress on the brain-gut axis
  (Dr. Beverley Greenwood-Van Meerveld’s lab)

Research funding
- Dr. Raju Rajala
- Dr. Beverley Greenwood-Van Meerveld

Adjunct Assistant Professor of Research
- Dr. Anthony Johnson

Graduate student Achievement
- Harminder Singh
  (Dr. Jian-xing Ma’s lab)

Interesting read in Physiology News Magazine
- Towards gender equality in scientific careers: Are we there yet?...Are we there yet?...Are we there yet?
  (by Kim E Barrett)

Cell Reports
Select Septate Junction Proteins Direct ROS-Mediated Paracrine Regulation of Drosophila Cardiac Function

Graphical Abstract

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In Brief
Lim et al. report a non-barrier function of two select septate junction proteins, Cora and Kune, in Drosophila pericardial cells (PCs). Cora and Kune serve as effectors of physiological reactive oxygen species signaling in PCs to direct paracrine regulation of proper cardiac function.

Highlights
- Cora and Kune are septate junction proteins with a non-barrier role in Drosophila
- Cora and Kune levels are controlled by ROS-p38 signaling in pericardial cells (PCs)
- Cora and Kune mediate ROS-p38 signaling in PCs to maintain proper heart function
- Kune regulates its expression between adjacent cells in the heart but not in epithelia
Symptoms of functional gastrointestinal disorders (FGIDs), including fullness, bloating, abdominal pain, and altered gastrointestinal (GI) motility, present a significant clinical problem, with a reported prevalence of 25%–40% within the general population. More than 60% of those affected seek and require healthcare, and affected individuals report a significantly decreased quality of life. FGIDs are highly correlated with episodes of acute and chronic stress and are increased in prevalence and reported severity in women compared with men. Although there is evidence that sex and stress interact to exacerbate FGID symptoms, the physiological mechanisms that mediate these sex-dependent disparities are incompletely understood, although hormonal-related differences in GI motility and visceral sensitivity have been purported to play a significant role in the etiology. In this mini review, we will discuss brain-gut axis control of GI motility and sensitivity, the influence of estrogen on GI motility and sensitivity, and stress modulation of the brain-gut axis.
Dr. Raju Rajala was awarded an R01 grant from the NEI/NIH entitled “Neuroprotection for photoreceptors” for the period of 2019-2023.

Dr. Beverley Greenwood-Van Meerveld

Source: EA Pharma LLC
Title: Studying a novel compound for the treatment of stress-induced visceral pain
Grant Total: $210,250
Duration: August 2019- July 2020
Role: PI Beverley Greenwood-Van Meerveld
Congratulations to Dr. Anthony Johnson on his appointment as an **Adjunct Assistant Professor of Research in the Department of Physiology**

Anthony C. Johnson, Ph.D., is a Career Development Awardee with the Department of Veterans Affairs. He has co-authored 29 publications and 5 book chapters in the fields of neurogastroenterology and neuroscience. His research, using a combination of optogenetic and behavioral techniques in rat models, investigates how stress remolds limbic circuits to maintain chronic visceral pain in an effort to identify novel therapeutic targets. In addition to his VA fellowship, Dr. Johnson was a fellow with the Neuroscience Scholars Program through the Society for Neuroscience, received the NIH Pain Consortium Mitchell Max Award for Research Excellence, and was named a Young Investigator by the American Neurogastroenterology and Motility Society.
Graduate student achievement

Graduate student in Dr. Jian-xing Ma’s laboratory awarded a PHF Research Support Grant

Harminder Singh has been awarded a Presbyterian Health Foundation (PHF) Research Support Grant entitled “Identification of roles of co-receptors in aberrant activation of Canonical Wnt signaling” $15,000 from October 1 2019 through September 30 2020.

(Harminder Singh)
Interesting read in *Physiology News Magazine*

(Many thanks to Dr. Greenwood-Van Meerveld for sharing the read with us!)

Towards gender equality in scientific careers: Are we there yet? ... Are we there yet? ... Are we there yet?

Many moons ago, when I was a PhD student at University College London, I was standing next to my Head of Department at a party. Somewhat in his cups, he turned to me and said, apropos of nothing, “Over my dead body will I ever appoint a woman to my academic staff”. And indeed, there were no female faculty members in the department, and hardly any female students at either the undergraduate or postgraduate level. I still remember how shocked I was by his
comment, as well as how determined I was to show him that I would succeed in an academic career. Thankfully, over the almost forty years that have elapsed since I heard those words, such overt sexism has largely vanished in most science, technology, engineering and mathematics (STEM) fields. And for much of the early part of my career I felt that being a female scientist often brought me advantages, such as when efforts by the US National Institutes of Health (NIH) to increase the representation of women brought me an earlier-than-usual appointment to a grant review panel. However, with the benefit of hindsight, as well as a growing body of research, I have come to believe that women are systematically disadvantaged as they seek to develop their careers in science, and this likely accounts for the fact that the overall representation of women in academia, and especially representation at the higher ranks, has stalled at a disappointingly low level despite parity in many fields amongst the numbers of men and women seeking STEM doctoral degrees.

Implicit bias – imposter syndrome – microaggressions. These terms from social science reflect the daily onslaught that taxes the efforts of minority groups, including women, in competitive fields such as research. I have lost count of the number of times I have been assumed to be “Professor Barrett’s secretary” when making travel arrangements by phone. I once received an invitation to a reception for new faculty addressed to “Dr. and Mrs. Barrett” (my mum sent her
regrets). And with a relatively gender-neutral first name, and before the days of Google Image, I was almost left behind at the airport when arriving to speak at a conference in Asia because the student sent to collect me assumed I would be a man. These relatively minor irritations nevertheless take a considerable collective toll over time.

Figure 1. Schematic of how the known challenges that women face in getting their work published (fewer submissions to top tier journals [Shen et al., 2018], publication delays and apparent higher standard required [Hengel, 2019]) set off a vicious cycle of impacts that stymie their progression in an academic career.
More importantly, moreover, there is significant evidence, both from STEM and other academic fields, that women (as well as other under-represented minorities) do not receive equal treatment in the activities vital for progression up the academic career ladder such as publishing, receiving invitations to speak at meetings, or obtaining research support – or in landing a faculty position in the first place.

Women are consistently held to a higher standard to reap equivalent rewards, experience more delays in the acceptance of their papers, are paid less than their male counterparts with similar experience and accomplishments, and have their qualifications and abilities routinely under-estimated (Reuben et al., 2014). For example, a study published earlier this year revealed that first-time female grant awardees received significantly lower amounts of funding, on average, from the NIH than their male counterparts (by almost 25%) despite no difference in their baseline publication or citation rates (Oliveira et al., 2019). A working paper presented this year by Hengel at the meeting of the American Economic Association showed that papers written by women are delayed an extra 3 – 6 months in peer review despite being better written than those authored by men (Hengel, 2019); in addition to this women represent only ~25% of first authors and ~15% of senior/last authors in journals like Nature and Science (Shen et al., 2018). Women physicians and basic scientists in US medical schools are paid 77 – 90 cents per $1 earned by men, even after accounting for age, experience, rank, specialty and research productivity and
Despite better outcomes and survival rates of their patients (Jena et al., 2016; Tsugawa et al., 2017; Wallis et al., 2017; Paturel, 2019). These factors all contribute to a vicious cycle of structural sexism that limits opportunity for female scientists (Figure 1). Women are also more likely to be found amongst the ranks of non-tenure-track faculty or as full-time educators, or to exit employment in higher education altogether (for example, see van den Besselaar and Sandström, 2016). And lest anyone thinks that this is a male conspiracy to keep us down, women themselves also hold implicit biases that negatively impact their evaluation of more junior women in, for example, hiring decisions (Reuben et al., 2014).

Women are also much more likely to be subjected to the spectrum of adverse behaviours that make up sexual harassment. A highly visible report recently published by the US National Academies of Science, Engineering and Medicine (NASEM, 2018) found that 58% of female academics reported being harassed, second only to harassment of women in the US military (69%). At the Experimental Biology meeting earlier this year where the NASEM report was discussed, none of the women present (but several of the men) were surprised by this statistic. In fact, I would venture the percentage is actually higher, because I don’t think I know a single female colleague who doesn’t have at least one war story to tell. Early in my own career, I experienced a number of such incidents that ranged from mildly amusing to downright scary. Women deserve to be able to do their work, as well as attend conferences, without
having to fend off unwanted advances from colleagues. These situations are really all about upholding a power differential, and the psychological effort required to navigate them (or even to suffer the effects of retaliation should one be brave enough to report them) has been amply demonstrated by the recent #MeTooSTEM movement (visit metoostem.com for some sobering stories). They add yet another hurdle for the career success of many women.

So what is to be done? First, we need to be aware of the implicit biases we all hold as well as strategies to short-circuit them when serving on search committees or as the reviewers of manuscripts or grant proposals. I was pleased, upon getting involved with The Physiological Society in a leadership capacity, that I was required to complete implicit bias training – more societies should be doing this. We also need to be vigilant about ensuring representation of women as speakers at our meetings, members of committees, and in editorial roles, and in setting measurable goals for progress. In fact, a recent study showed that as more women rise to positions of journal leadership, editorial boards become more diverse (Ioannidou & Rosania, 2015) – a phenomenon we have also gladly experienced at The Journal of Physiology. It’s also wonderful that we finally have our first female president in Bridget Lumb. Within our institutions, targeted interventions can improve the climate for, and retention of, women and other minorities (as shown recently at my own [Wingard et al., 2019]). But we still need to ensure that women feel safe to conduct their work in
laboratories, at meetings and in the field – and that perpetrators of sexual harassment are held accountable for their actions while their victims receive restitution from their employers, rather than retaliation, for the impacts on their lives and careers.

The outlook for women in STEM has changed over the course of my career, but I am far from sanguine about the prospects for equity any time soon. This is society’s loss, given evidence that diverse teams have the greatest potential to deliver robust solutions to scientific problems. For this reason, I plan to redouble my commitment to work that boosts the status of women in all facets of academic life, and I hope that readers will join me.

References


Wingard D, Trejo J et al. (2019). Faculty equity, diversity, culture and climate change in academic medicine: A Longitudinal Study. Journal of the National Medical Association 111, 46 – 53.

About the newsletter

We hope you have enjoyed reading the OUHSC Physiology newsletter. This publication is intended to share with everyone the latest events and developments within the Department. We welcome articles, thoughts and suggestions for our future issues. Please do so by emailing Dr. Hui-Ying Lim (hlim@ouhsc.edu).