Cardiovascular Disease
Estrogen Signaling

The Lindsey Lab:
Estrogen Signaling in Cardiovascular Health

Cardiovascular disease is fundamentally different in women vs. men – due in large part to the contribution of estrogen to female physiology. While the cardiovascular protection provided by endogenous estrogen is well established, menopausal estrogen therapy has largely fallen out of favor due to adverse effects. The lab of **Dr. Sarah Lindsey** is discovering the secrets behind estrogen's protective effects on cardiovascular health, with the ultimate goal of harnessing the results to develop novel therapeutic treatments.

The lab studies the G protein-Coupled Estrogen Receptor (GPER) signaling pathway and its downstream effects on cardiovascular function. A variety of model systems are employed to study this receptor, including cell culture, *ex vivo* analysis of arterial segments, and whole animal models. This holistic approach is relatively rare in the field, and coupled with the lab's numerous collaborations with other Tulane faculty enables clinically relevant insights into this important area of women's health.

GPER and Cardiovascular Health

Data from the Lindsey Lab has implicated GPER signaling in the protective effects of estrogen on women's cardiovascular health in a variety of systems. In mice, genetic deletion of this receptor increases vascular remodeling and stiffness. In cells, perturbing this signaling pathway leads to an increase in oxidative stress. The precise mechanisms for these beneficial effects remain an area of speculation and study.

Expression of this receptor declines with age in rodent models, and the lab is looking for potential upstream regulators of the receptor that are modulated during aging. The Lindsey Lab is also interested in the impact of environmental estrogens and estrogen-like compounds on cardiovascular health, including whether they act through GPER.

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Innovation and Collaboration

Advanced ultrasound techniques will allow noninvasive measurements in mice longitudinally, while experiments in isolated arteries will validate the *in vivo* data and assess its translational impact. In collaboration with biomedical engineers at Tulane, the lab is also using a computational approach to better understand how GPER impacts extracellular matrix remodeling. These techniques are complemented with cell culture experiments to dissect signaling mechanisms at the cellular level.

This combination of techniques is exemplary of the lab's overall scientific process, as they not only employ the most innovative methodologies and technological advances but also combine them with other approaches to answer a question from multiple perspectives. By doing so, they are best able to translate their basic research breakthroughs into clinical utilization.

The lab is one of many at Tulane focusing on cardiovascular disease and/or estrogen signaling, allowing for many active inter-lab collaborations. This is how Tulane, and the Lindsey Lab, are excelling in the study of this vital area of women's health – as all science in this space leverages a unique constellation of lab-specific assets within our university environment.

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