



2026 IMPACT CIRCLE

Project Title: Understanding Early Cardiovascular Aging in Women: A New Opportunity for Prevention

Investigator(s) and collaborations: Vineeta Tanwar, PhD, Pankaj Kapahi, PhD, Brianna Stubbs, PhD, and John Newman, MD, PhD

Unmet Need/Primary Question:

After menopause, women experience a rapid rise in cardiovascular risk, yet we still do not fully understand the biological processes that drive this accelerated aging of the heart and blood vessels. This gap makes it difficult to detect risk early and develop effective prevention strategies. One emerging contributor is glycation stress caused by sugar-derived compounds that accumulate with metabolic dysfunction and aging, harming blood vessels. Whether targeting this process can improve early cardiovascular changes in humans remains unknown.

Background: The ongoing GRACE clinical trial is evaluating whether reducing glycation stress can improve metabolic and hormonal health in postmenopausal women. While GRACE trial measures traditional heart disease risk factors (e.g., blood pressure and lipids), permitting heart disease risk estimation, it does not assess early biological changes that occur before disease develops. As part of this study, we have established a unique biobank of longitudinal blood and urine samples, creating a rare opportunity to investigate the biological pathways underlying cardiovascular aging in humans. These samples allow us to move beyond standard clinical measures and directly study early biological signals of cardiovascular aging. (see attached Figure).

Novel Hypothesis:

We hypothesize that key biological pathways driving cardiovascular aging in women can be detected early and are modifiable before disease develops. By analyzing unique longitudinal biospecimens, we aim to uncover how these aging-related pathways change over time and whether they can be favorably influenced by reducing underlying glycation stress.

Project Proposal:

This project will leverage blood and urine samples longitudinally collected from participants in the GRACE clinical trial at 0, 3, and 6 months to analyze biological markers linked to early cardiovascular aging. We will measure indicators of vascular health, inflammation, oxidative stress, and cellular aging to determine how these pathways change over time and glycation lowering intervention. Because these biospecimens and clinical data are already being collected through the GRACE trial, this funding enables us to extract significantly deeper biological insight without the need for a new clinical study.

Description of Potential Impact:

This project will uncover early biological signals of cardiovascular aging in women and identify biomarkers that can detect risk before disease develops. By analyzing biospecimens collected in the GRACE clinical trial, we can determine how key aging-related pathways change over time and whether they improve with glycation lowering intervention. These insights could enable earlier detection and prevention of cardiovascular disease, particularly in women entering midlife. In addition, this work will significantly extend the value of the GRACE trial by transforming existing clinical samples into new biological discovery, positioning us to secure larger federal funding for deeper investigations into the mechanisms of cardiovascular aging in women.

