

From: [Faculty Description of Research Project](#)
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Subject: New submission from Faculty Description of Research Project
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Project title:

Matrix Stiffness and Regulation of Vascular Smooth Muscle Cell Calcification Faculty Mentor

Faculty mentor name, email, department and phone number

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Research Project Description

Background:

Chronic Kidney Disease (CKD) is associated with increased vascular calcification and excess cardiovascular mortality. The dogma is that calcification leads to increased vascular stiffness and atherosclerosis. However our clinical and animal studies suggest that vascular stiffness is increased early in kidney disease and precedes hypertension and vascular calcification. We think the increased stiffness can predispose calcification of blood vessels and atherosclerosis.

Hypothesis:

We hypothesize that stiffness accentuates calcification of vascular smooth muscle cells.

Methods:

We will culture vascular smooth muscle cells on extracellular matrix of varying stiffness (soft gels: 5 kPA, stiff gels: 50 kPA and tissue culture plates 10,000 kPA), Calcification will be assessed by assaying calcium in cell culture supernatant, gene expression of osteoblastic markers (RUNX2, Osterix, Osteocalcin) and assessment of alkaline phosphatase activity.

Data Analysis:

Differences between groups will be compared by ANOVA. A p-value < 0.05 will be considered significant.

Funding: The funds for the project as well as publication/presentation will be provided by the NIH and VA grant support to the faculty member.

Role of Student: The student will be involved with all aspects of the project. The student will perform the cell culture as well as the assays described in the protocol. It is expected that the work will result in 1 publication in a reputable peer reviewed journal as well as several abstracts at scientific meetings.

References:

Matrix elasticity directs stem cell lineage specification.
Engler AJ1, Sen S, Sweeney HL, Discher DE. Cell. 2006 Aug 25;126(4):677-89