

BIOMEDICAL & VETERINARY SCIENCES GRADUATE PROGRAM



ANNOUNCES

The Doctor of Philosophy Seminar
and Examination of

Anne E.C. Nichols

**“Scleraxis-mediated regulation of
tendon and ligament cell
mechanobiology”**

Monday, April 30, 2018

1:00 pm

VMIA Classroom 220

Bio

Anne E.C. Nichols grew up in Abingdon, Virginia. In 2008, she graduated from James Madison University with a bachelor's degree in Studio Art. In the summer of 2008, she joined Dr. Thurl Harris' lab at the University of Virginia as a research technician where she worked on the molecular mechanisms involved in insulin resistance. In the fall of 2011, she came to Virginia Tech and joined Dr. Linda Dahlgren's lab as a research technician



working on the trophic effects of adipose derived stem cells for treating equine tendinopathy. In Fall 2012, she received a scholarship from the Stamps Family Charitable Foundation and began her PhD in Dr. Dahlgren's lab. Her research has focused on the tendon and ligament-related transcription factor scleraxis and its role in both stem cell differentiation into ligament cells for tissue engineering and adult tendon cell homeostasis. Anne hopes to pursue an academic career in musculoskeletal regenerative medicine in the future.

Funded by

Stamp Family Charitable Foundation, Inc.
NIAMS, National Institutes of Health
Virginia Tech Graduate School
VMCVM Office of Research and Graduate Studies

Lay Language Abstract

Tendon and ligament injuries are very common, but current treatments are unable to completely repair the damaged tissue. It is well known that exercise plays an important role during the embryonic development of tendons and ligaments and in keeping them healthy during adulthood. Despite this, exactly how either of these processes occur is not well understood. A tendon and ligament related protein called scleraxis (Scx) appears to be important in translating mechanical stimulation into a cellular response. The work presented here demonstrates that Scx combined with mechanical stimulation enhances the differentiation of stem cells into ligament-like cells that may be useful for making engineered replacement tissues. Moreover, Scx appears to play an important role in tendon cell function by affecting the cell's ability to interact with its local environment. Combined, these findings enhance our understanding of how mechanical stimulation influences cell behavior and provide new research directions and methodologies for studying tendon and ligament biology.

Publications

Nichols AC, Gilkerson ML, Werre SR, Dahlgren LA. Effects of high extracellular glucose on NADPH oxidase isozyme expression and tenocyte behavior. *PLOS ONE*. *Under consideration*.

Nichols AC, Settlage RE, Werre SR, Dahlgren LA. Novel roles for scleraxis in regulating adult tenocyte function. *BMC Cell Biology*. *Under consideration*.

Nichols AC, Werre SR, Dahlgren LA. Transient scleraxis overexpression combined with cyclic strain enhances ligamentous differentiation. *Tissue Eng Part A*. 2018. Epub ahead of print: <https://doi.org/10.1089/ten.TEA.2017.0481>.

Sawyer DM, Lanz OI, Dahlgren LA, Barry SL, **Nichols AC, Werre SR.** Cytokines and growth factors in canine autologous conditioned serum. *Vet Surg* 2016;45:582-586.

Presentations

Nichols AC, Dahlgren LA. A novel role for scleraxis in regulating mechanotransduction in adult tenocytes. VMCVM Research Symposium. Blacksburg, VA. March 2018. Poster.

Nichols AC, Settlage RE, Dahlgren, LA. RNASeq analysis of scleraxis-mediated gene targets important in maintaining tenocyte fate. Annual Meeting of the Orthopaedic Research Society. March 2017. Poster.

Nichols AC, Settlage RE, Dahlgren LA. Identification of Novel Scleraxis-Mediated Genes Important in Tenocyte Mechanotransduction. VMCVM Research Symposium. Blacksburg, VA. March 2016. Poster.

Nichols AC, Weise RB, Dahlgren LA. Scleraxis Overexpression and Mechanical Strain Improve Tensile Properties of 3D Collagen Gels. VMCVM Research Symposium. Blacksburg, VA. March 2015. Poster.

Nichols AC, Inman DJ, Dahlgren LA. Scleraxis overexpression improves organization of mesenchymal stem cell-seeded collagen gels. Bio-based Material Research Center Symposium. Blacksburg, VA. April 2014. Poster.

Nichols AC, Inman DJ, Dahlgren LA. Scleraxis overexpression improves organization of mesenchymal stem cell-seeded collagen gels. Virginia Tech Graduate Student Association Research Symposium. Blacksburg, VA. March 2014. Poster.

Nichols AC, Inman DJ, Dahlgren LA. Scleraxis overexpression improves organization of mesenchymal stem cell-seeded collagen gels. VMCVM Research Symposium. Blacksburg, VA. March 2014. Poster.

Awards and Academic Achievements

Stamps Family Charitable Foundation, Inc. Scholarship 2012-2018

Virginia Tech Graduate Association Travel Award 2017

Virginia Tech Graduate Association Research Development Award 2016

Outstanding PhD Poster Presentation, VMCVM Annual Research Symposium 2014

Examination Graduate Committee

Major Advisor/Chair

Linda A. Dahlgren, DVM, PhD, DACVS
Associate Professor
Department of Large Animal Clinical Sciences

Graduate Advising Committee Members:

Abby R. Whittington, PhD
Associate Professor
Departments of Chemical Engineering and Materials Science and Engineering

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Paul Mellon Distinguished Chair of Agriculture
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Albert J. Banes, PhD

Founder and President of Flexcell® International
Professor Emeritus, Department of Biomedical Engineering
UNC Chapel Hill

Seminar:

“Out of Academia: Entrepreneurship, Some Guidelines”

Monday, April 30, 2018

10:00 am

VMIA Classroom 220



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