

Dynamic R&D leader with demonstrated success advancing interdisciplinary programs from discovery through late-stage preclinical development in medtech and biotech environments. Deep technical expertise in biomaterials, regenerative medicine, combination products, and drug delivery. Direct experience with biologic, medical device, and combination product development and regulatory environment.

SUMMARY OF QUALIFICATIONS AND EXPERTISE

- 10+ years' experience in R&D leadership roles in pharma and biotech environments
- Thorough understanding and direct experience with drug, device, and combination product development and regulatory pathways
- Substantial experience establishing and maintaining relationships with external CRO's and CDMO's in biologics and biomaterials space, including serving on multiple JDCs
- Extensive experience designing and implementing small and large animal *in vivo* studies for preclinical pharmacology and toxicology programs
- Advanced understanding of tissue remodeling and regeneration processes in musculoskeletal systems

PROFESSIONAL EXPERIENCE

Bioventus, LLC
Boston, MA

Senior Director, BMP Program

2016 - 2019

- Led interdisciplinary R&D team in developing a novel engineered protein therapeutic combination product for bone repair in orthopedic applications through late-stage preclinical development
- Provided scientific and strategic leadership for all preclinical program activities (pharmacology, toxicology, assay development, design controls, CMC, regulatory)
- Directed preparation and presentation of scientific materials for multiple in-person pIND meetings with FDA
- Oversaw product & process development activities leading to successful pre-GMP/GMP campaigns for drug substance, drug product, and medical device implants
- Responsible for all scientific and technical aspects of extensive asset out-licensing effort
- Led technical due diligence efforts for multiple acquisition/partnering opportunities for pipeline development in orthobiologics space
- Member of Design Review and Design Controls team for a successfully commercialized surgically implanted medical device

Director, Biomaterials Research

2013 - 2016

- Directed biomaterial carrier development efforts internally and with external collaborators and CDMOs to invent and develop a biodegradable implant for delivery of a novel osteoinductive protein therapeutic
- Developed and managed preclinical *in vivo* pharmacology program to evaluate efficacy of protein therapeutic combination product with CRO partners
- Led early activities to establish and stand-up new laboratory and office infrastructure for satellite R&D location in Boston, MA

Pfizer, Inflammation and Remodeling Research Unit
Cambridge, MA

Principal Scientist/ Sr Principal Scientist

2011 - 2013

- Directed internal research efforts and managed multiple external collaborations to develop and evaluate novel biomaterials using state of the art technologies and orthopedic *in vivo* models
- As the Research Project Leader, implemented an aggressive strategy to provide a robust data package on a very tight timeline allowing for a clear Go/No-Go decision that required interfacing with and matrix management of business and scientific colleagues across the organization
- Served as biology or project lead on preclinical and clinical stage programs for therapeutic antibody and antisense oligonucleotide technologies in inflammation disease areas
- Led scientific due diligence efforts for acquisition of technologies in area of tissue homeostasis and remodeling (e.g. chronic wound healing)

Wyeth Research, Tissue Repair (acquired by Pfizer)
Cambridge, MA

Senior Research Scientist

2009 - 2011

- Led a team investigating biomaterial carriers for localized delivery of protein biotherapeutics across multiple disease areas
- Designed and implemented *in vitro* and *in vivo* screening paradigms for efficient characterization and selection of candidate materials

Massachusetts Institute of Technology, Center for Biomedical Engineering

Postdoctoral Research Fellow

2006 - 2009

Research Advisor: Dr. Alan Grodzinsky, ScD.

- Developed technologies to enhance delivery of TGF- β proteins using self-assembling peptide hydrogels for mesenchymal stem cell differentiation in chondrogenic applications
- Investigated using natural ECM proteins as signaling molecules to promote mesenchymal stem differentiation in 3-D scaffolds

Georgia Institute of Technology, Woodruff School of Mechanical Engineering

Graduate Research Assistant

1999 - 2006

Parker H. Petit Institute for Bioengineering and Bioscience

Georgia Tech/Emory Center for the Engineering of Living Tissues

Research advisor: Dr. Marc Levenston, PhD.

- Designed, built, and validated a novel bioreactor system capable of applying well-controlled oscillatory tensile strains to tissue engineered constructs
- Developed immunofluorescent imaging techniques for confocal and multi-photon microscopy to assess extracellular matrix structure and organization of the knee meniscus

EDUCATION

- Ph.D. Mechanical Engineering, Georgia Institute of Technology, Atlanta, GA** **2006**
Thesis Title: Mechanotransduction in Engineered Cartilaginous Tissues:
In Vitro Oscillatory Tensile Loading
- M.S. Mechanical Engineering, Georgia Institute of Technology, Atlanta, GA** **2003**
- B.S. Mechanical Engineering, Calvin College, Grand Rapids, MI** **1999**

PROFESSIONAL MEMBERSHIPS

Orthopaedic Research Society, Tissue Engineering International & Regenerative Medicine Society, Biomedical Engineering Society, American Society of Mechanical Engineers

RESEARCH PUBLICATIONS

- 1) Seeherman HJ, Berasi SP, Brown CT, Martinex RX, Juo ZS, Jelinsky SA, Cain MJ, Grode J, Tumelty KE, Bohner M, Grinberg O, Orr N, Shoseyov O, Eyckmans J, Chen, CS, Morales PR, Wilson CG, **Vanderploeg EJ**, Wozney JM. "A BMP/activin A chimera is superior to native BMPs and induces bone repair in nonhuman primates when delivered in a composite matrix", *Sci Transl Med.* 11 eaar4953 (2019).
- 2) Kopesky PW, Byun S, **Vanderploeg EJ**, Kisiday JD, Frisbie DD, Grodzinsky AJ. "Sustained delivery of bioactive TGF- β 1 from self-assembling peptide hydrogels induces chondrogenesis of encapsulated bone marrow stromal cells", *J Biomed Mater Res A.* 102(5): 1275-85 (2014).
- 3) **Vanderploeg EJ**, Wilson CG, Imler SM, Ling CH, Levenston ME. "Regional variations in the distribution and colocalization of extracellular matrix proteins in the juvenile bovine meniscus", *J Anat.* 221(2): 174-86 (2012).
- 4) Kopesky PW, **Vanderploeg EJ**, Kisiday JD, Frisbie DD, Sandy JD, Grodzinsky AJ. "Controlled delivery of transforming growth factor β 1 by self-assembling peptide hydrogels induces chondrogenesis of bone marrow stromal cells and modulates Smad2/3 signaling", *Tissue Eng Part A.* 17(1-2): 83-92 (2011).
- 5) Miller RE, Grodzinsky AJ, **Vanderploeg EJ**, Lee C, Ferris DJ, Barrett MF, Kisiday JD, Frisbie DD. "Effect of self-assembling peptide, chondrogenic factors, and bone marrow-derived stromal cells on osteochondral repair", *Osteoarthritis Cartilage.* 18(12): 1608-19 (2010).
- 6) Kopesky PW, Lee HY, **Vanderploeg EJ**, Kisiday JD, Frisbie DD, Plaas AH, Ortiz C, Grodzinsky AJ. "Adult equine bone marrow stromal cells produce a cartilage-like ECM mechanically superior to animal-matched adult chondrocytes", *Matrix Biol.* 29(5): 427-38 (2010).
- 7) Connelly JT, **Vanderploeg EJ**, Mouw JK, Wilson CG, Levenston ME. "Tensile loading modulates bone marrow stromal cell differentiation and the development of engineered fibrocartilage constructs", *Tissue Eng Part A.* 16(6): 1913-23 (2010).
- 8) Kisiday JD, **Vanderploeg EJ**, McIlwraith CW, Grodzinsky AJ, Frisbie DD. "Mechanical injury of explants from the articulating surface of the inner meniscus", *Arch Biochem Biophys.* 494(2): 138-44 (2010).
- 9) Kopesky PW, **Vanderploeg EJ**, Sandy JS, Kurz B, Grodzinsky AJ. "Self-assembling peptide hydrogels modulate in vitro chondrogenesis of bovine bone marrow stromal cells", *Tissue Eng Part A.* 16(2): 465-77 (2010).
- 10) Wilson CG, **Vanderploeg EJ**, Zuo F, Sandy JD, Levenston ME. "Aggrecanolytic and *in vitro* matrix degradation in the immature bovine meniscus: mechanisms and functional implications", *Arthritis Res Ther.* 11(6): R173 (2009).
- 11) Sui Y, Lee JH, DiMicco MA, **Vanderploeg EJ**, Blake SM, Hung HH, Plaas AH, James IE, Song XY, Lark MW, Grodzinsky AJ. "Mechanical injury potentiates proteoglycan catabolism induced by interleukin-6 with soluble interleukin-6 receptor and tumor necrosis factor alpha in immature bovine and adult human articular cartilage", *Arthritis Rheum.* 60(10): 2985-96 (2009).
- 12) **Vanderploeg EJ**, Grodzinsky AJ. "Can the meniscus affect the nature of a chondrocyte?", *Osteoarthritis Cartilage.* 17(8): 969-70 (2009).

- 13) **Vanderploeg EJ**, Wilson C., Levenston ME “Articular chondrocytes derived from distinct tissue zones differentially respond to *in vitro* oscillatory tensile loading”, *Osteoarthritis and Cartilage* 16(10): 1228-36 (2008).
- 14) **Vanderploeg EJ**, Imler SM, Brodtkin KR, Garcia AJ, & Levenston ME “Oscillatory tension differentially modulates matrix metabolism and cytoskeletal organization in chondrocytes and fibrochondrocytes”, *Journal of Biomechanics* 37(12): 1941-1952 (2004).
- 15) Connelly JT, **Vanderploeg EJ**, & Levenston ME “The influence of cyclic tension amplitude on chondrocyte matrix synthesis: experimental and finite element analyses”, *Biorheology* 41(3-4): 377-387 (2004).

GRANTED PATENTS

- 1) **Vanderploeg**, Seeherman, Wilson, Wozney, and Brown. “Matrix for enhanced delivery of osteoinductive molecules in bone repair”, U.S. Patent 10,300,172 issued May 29, 2019.
- 2) **Vanderploeg**, Seeherman, Wilson, Wozney, Brown, and Kambouris. “Systems and methods for improved delivery of osteoinductive molecules in bone repair”, U.S. Patent 10,130,678 issued November 20, 2018.
- 3) DeGasparo, Van Garderen, Bohner, Seeherman, and **Vanderploeg**. “Method for producing porous calcium deficient hydroxyapatite granules”, U.S. Patent 10,131,543 issued November 20, 2018.

* Co-inventor on 4 other pending patent applications/families