



TIMOTHY BUTTERFIELD, PHD, ATC

2012 RESEARCH GRANT RECIPIENT

“LOAD DEPENDENT EFFECTS OF MASSAGE ON IMMUNOMODULATION AND AFFERENT DENSITY”

Professional Research Grant: General 2012 - 2013
Funding: \$46,049

CLINICAL TAKE HOME MESSAGE

Massage is still used by many clinicians, and sought out by many people with pain and discomfort. It has long lasting positive effects on various cells and tissues, and the mechanisms of its efficacy are just beginning to be uncovered.

IMPACT

Manual mechanotherapy (massage) has significant and long lasting beneficial effects on damaged, injured, atrophied skeletal muscle. The effects are reproducible and robust at the cellular level, that can modify and improve muscle morphology and function. Interestingly, these cellular responses are also seen in skeletal muscles of the contralateral, unmassaged limbs. Massage has a systemic effect. We have found that the ability of massage to increase protein synthesis potentiates recovery from atrophy, and may be a promising intervention for sports populations.

"Without the exceptional comments from reviewers that strengthened our proposal, and the funds made available to acquire the preliminary data, our lab would be a very different place today." Dr. Tim Butterfield

PUBLICATIONS

Van Pelt DW, Lawrence MM, Miller BF, Butterfield TA, and Dupont-Versteegden EE (2021) Massage as a mechanotherapy for skeletal muscle. *Exerc Sport Sci Rev.* Apr;49(2):107-114. [PMID:33720912](#)

Waters-Banker C, Dupont-Versteegden EE, Kitzman PH, Butterfield TA (2014) Investigating the mechanisms of massage efficacy: the role of mechanical immunomodulation. *J Athl Train.* Mar-Apr;49(2):266-273. [PMCID:PMC3975781](#)

Waters-Banker C, Butterfield TA, Dupont-Versteegden EE (2014) Immunomodulatory effects of massage on non-perturbed skeletal muscle in rats. *J Appl Physiol.* Jan 15;116(2):164-175. [PMCID:PMC3921362](#)

"The NATA Foundation funding was leveraged to obtain more funding for massage over the past 9 years. Moreover it allowed us to disseminate 27 abstracts, and 13 published manuscripts."



Tim Butterfield, PhD, ATC, FACSM, FNATA completed his PhD at the University of Calgary, and post-doctoral training at the Ohio State University. He is currently a Professor in the College of Health Sciences, Department of Athletic Training & Clinical Nutrition, and is a member of the University of Kentucky Center for Muscle Biology. His area of research is muscle mechanics / physiology with a current focus on plasticity and the restoration of mechanical function following damage, injury, or atrophy in striated muscle.

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SUBSEQUENT GRANTS RELATED TO THE FUNDING PROVIDED BY THE NATA FOUNDATION

"The data acquired with the NATA Foundation research funding were used to write an R21 application to the National Institutes of Health and other funding mechanisms. Once funded, those studies provided preliminary data for more applications and so on. The research team is in their 9th year of continuous federal funding since the NATA Foundation funded study."

Dr. Tim Butterfield

Butterfield / Dupont-Versteegden (Co-PIs)
"Massage as an Intervention for Skeletal Muscle Atrophy and Impaired Regrowth in the Aged."
NIH/National Institute on Aging 1R21AG042699-01A1.
\$277,651. 2013 -2015.

The goal of this research is uncover the efficacy of cyclic compressive loading applied as a massage-mimetic, on attenuating disuse atrophy through the upregulation of hypertrophic pathways in young and aged skeletal muscle.

Butterfield / Dupont-Versteegden (Co-PIs)
"Mechanisms underlying anabolic effects of cyclic compressive loading in muscle". NIH/National Center for Complimentary and Integrative Health 1R01AT009268-01A1. \$1,664,968. 2017-2022

The goal of this project is to uncover the mechanisms whereby cyclic compressive loading (applied as a massage-mimetic) attenuates disuse atrophy and increases protein synthesis in skeletal muscle.

Butterfield and Dupont-Versteegden (Co-PIs).
"Sexual dimorphic anabolic effects of cyclic compressive loading in adult and aged rats". NIH/ National Center for Complimentary and Integrative Health & Office of Research and Women's Health 3R01 AT009268-02S1. \$65,000. 2018-2019.

This supplement to our existing R01 (1R01AT009268-01A1) was awarded through the NCCIH by the Office of Research on Women's Health (ORWH) of the NIH. The goal of this research supplement is to determine the effect of sexual dimorphism on the magnitude of disuse atrophy in unloaded skeletal muscle.

Dupont-Versteegden and Butterfield (Co-PIs)
"Massage as an Intervention for Muscle Atrophy".
Massage Therapy Foundation. \$30,000. 2019-2020

We have shown that massage is an effective intervention for preventing atrophy during disuse in animal models. Our pilot data to date have demonstrated translational efficacy of this intervention to human skeletal muscle undergoing atrophy. This study will investigate muscle atrophy and massage as an intervention in human subjects.

Butterfield/Dupont-Versteegden (Co-PIs). Jacobson Innovation Award. \$7,500. 2019-2020

Dupont-Versteegden/Butterfield (Co-PIs) 08/01/20-07/31/22 "Mechanisms underlying local and systemic effects of massage". NIH/National Center for Complimentary and Integrative Health R21AT010847-01A1. \$245,251. 2020-2022.

Our lab has shown that massage is an effective immunomodulatory mechanotherapy, capable of potentiating protein synthesis in skeletal muscle, effect ribosome biogenesis and attenuate atrophy during disuse in rabbits and rats. This study will measure the efficacy of massage as a mechanotherapy in human subjects.