



## What's New at the PVAMC Translational Musculoskeletal Research Center?

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Aches and pains are a part of daily life and normal aging. However, musculoskeletal (MSK) conditions can also arise as a direct consequence of military service, with associated trauma and accidents. In fact, MSK diseases and related disabilities are more prevalent in veterans than in the general population. Furthermore, while improvements in armor and “in theater” medical care has introduced incredible life-saving technologies, an increasing number of our wounded soldiers return home with damaged limbs and joints. Also, as with any population as veterans age there’s an increasing tendency to develop arthritis and various degenerative joint diseases each of which can significantly compromise one’s quality of life. In response, the Department of Veterans’ Affairs has focused research efforts to improve our understanding of the function of MSK tissues and injuries that occur to them, with the goal of developing novel technologies to enhance tissue repair, regeneration, and ultimately function.

In keeping with this goal, the last several years have witnessed a dramatic growth in VA-sponsored MSK research across the nation, with one of the largest increases occurring at

our Corporal Michael Crescenz VA Medical Center (CMCVAMC) in Philadelphia. Physician investigators, basic scientists, and engineers at the CMCVAMC, together with colleagues from the University of Pennsylvania, are currently carrying out research projects focused on the injury and repair of MSK tissues, including tendons, ligaments, disc, bone, meniscus, and cartilage. Additional studies are underway to develop new technologies that may one day aid in the replacement of these tissues and ultimately improve function and quality of life. In keeping with this research focus, the CMCVAMC established the Translational Musculoskeletal Research Center (TMRC) in 2013. This Center brings together investigators from Orthopaedic Surgery, Rheumatology, Physical Medicine and Rehabilitation, Neurosurgery, and Bioengineering all under one roof, in >9,000 sq. ft. of newly renovated research space. Drs. Robert Mauck and George Dodge co-direct this new enterprise with input, advice, and support from a joint PVAMC/Penn TMRC Advisory Committee.

The goal of the TMRC is to develop a focused, internationally recognized research center at the CMCVAMC and to emerge

Table 1. Current Funding at the TMRC.

Type	IP	Amount & Duration	Title
Merit	D. Steinberg	\$275,000 per year for four years (2012-17)	Cartilage Repair with Stem Cell Seeded Hyaluronic Acid Hydrogels
Merit	J. Bernstein	\$275,000 per year for four years (2013-17)	The Role of Local NSAID Administration and Inflammation on Tendon Healing
Merit	G. Dodge	\$275,000 per year for four years (2014-18)	Cartilage Response to Compressive Injury: A Platform for Therapeutic Discovery
Merit	R. Mauck/ L. Smith	\$275,000 per year years (2014-18) for four	Bioactive Injectable Implants for Functional Intervertebral Disc Regeneration
Merit	J. Esterhai/ R. Mauck	\$275,000 per year years for four (2014-18)	Engineered Multi-Functional Nanofibrous Meniscus Implants
CDA2	H. Smith	\$400,000 per year for five years (2014-19)	Tissue-Engineered Constructs for Treatment of Intervertebral Disc Degeneration
SPiRE	R. Mauck	\$100,000 per year for two years (2014-17)	Cartilage Repair with Synovial Joint Precursors
SPiRE	C. Scanzello G Dodge	\$100,000 per year for two years (2015-17)	The Impact of CC-Chemokine Receptor 7 (CCR7) on Synovitis and Osteoarthritis
SPiRE	A. Kuntz	\$100,000 per year for two years (2015-17)	Effect of Scaffold-Delivered Growth Factors on Rotator Cuff Repair
Merit	H. Smith/R. Mauck	\$275,000 per year for four years (2017-2012)	Tissue Engineered Total Disc Replacement in a Large Animal Model



as a VA Center of Excellence, bringing new resources and regenerative technologies to all service members, past and present. To date, more than 30 VA-based physicians, scientists, bioengineers, and research staff have co-localized to the newly renovated, state-of-the-art research space at the CMCVAMC Medical Research Building. Current VA funding to these investigators has increased to >\$2.2 million in direct costs per year (see table below). In addition, the VA has committed more than \$4 million in equipment to outfit

this new facility, including state-of-the-art devices such as vivo micro-CT, fluoroscopy, atomic force microscopy, super-resolution confocal, and multiphoton imaging. Over the past year, the TMRC has continued to grow, with a new Merit Award (R01 equivalent) issued to Dr. Harvey Smith and Dr. Robert Mauck. Additionally, TMRC postdoctoral fellow Dr. Sarah Gullbrand received an excellent score on her CDA 1 Award application—a two year career development award that will fund her transition into an independent investigator. Finally, Drs. Mauck and Dodge, along with the entire team, were awarded a Shared Equipment Grant to support the acquisition of a new high resolution microCT specimen scanner and associated computing resources (at a cost of ~\$500,000). This new system is now in place and being used by TMRC investigators and their collaborators across the Penn community. Overall, the TMRC is on an upward trajectory, with a vibrant multi-disciplinary team of investigators and significant new funding directed towards making possible new discoveries in musculoskeletal repair and regeneration. The TMRC is committed to our goal of translating this research into life changing improvements in patient care and quality of life for both Veterans and the general population.