



Boston Pepper OAIC

Preclinical Discovery Core (PDC)

- Core Leader: Ravi Jasuja, PhD
- Core Manager: Daniel Spencer

PDC Goal

The Preclinical Discovery Core serves as a focal point for interdisciplinary collaboration by Boston OAIC investigators in the application of existing and new tools to assess muscle impairments, metabolic alterations and physical function.



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PDC Operations

- Provide standardized, state-of-the-art methods and instruments to assess body composition (lean body mass, whole body and regional fat mass, skeletal muscle mass, functional microscopy of the muscle) in animal models of aging and to quantitate response to FPTs.
- Provide standardized equipment and operating protocols for the assessment of muscle performance and physical function in preclinical models of aging.
- Develop novel non-invasive imaging modalities for longitudinal proof-of-concept and mechanistic studies of muscle loss and regeneration in the preclinical studies of FPT.
- Implement rigorous quality control by personnel training and certification in standardized procedures for assessment of muscle performance and physical function, and by maintaining equipment calibration.



PDC Services

Services available through the core:

1. Longitudinal Assessment of Body Composition by NMR and MicroCT Scanner.
2. Measures of Muscle Performance and Physical Function
 - 2a. Grip strength
 - 2b. Ex-vivo Muscle Mechanics.
 - 2c. Aerobic capacity.
 - 2d. Physical Activity.
3. Metabolic Outcomes Assessment
 - 3a. Energy Expenditure and Basal Metabolic Rate.
 - 3b. Core Body Temperature.



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Innovation

New Method Development:

In collaboration with the Biophysics and Radiology departments, PDC worked on a design of new electrical stimulation platform with a ^1H and ^{31}P MR studies of non-invasive muscle stimulation.

Preliminary data from the Diffusion Tensor Imaging and Arterial Spin Labeling sequences. The 7T bore available at BWH could not accommodate the custom assembly. Optimization of hardware/MRS and Helmholtz imaging coils would require significantly more time and resources that available through the developmental project.

Innovative addition to the PDC services:

The PDC is working with Aurora Scientific to make a **novel setup available to provide longitudinal measurement of isolated leg muscle force generation *in-vivo* to the complement the current *ex-vivo* (terminal) muscle mechanics system.**

The new, customized system is re-using most of the control/gating electronics and integrate the pressure transducer coupled footplate interchangeably.



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PDC Usage

PI	Title	Services Provided
Sinha, I	Increased cyclooxygenase-2 activity mediates aging-associated decrease in skeletal muscle regeneration.	Continued support to the Beeson Award. Physical function, Exercise capacity Neuromuscular coordination, Spontaneous activity, NMR imaging
Garza, A	Role of Striatin in Age-associated Limitations	Scientific consultation, NMR imaging, Physical Function and exercise capacity
Lustgarten	Role of gut microbiome in regulating physical function.	Continued support to the NIH funded grant. Scientific consultation, NMR imaging, Physical Function and exercise capacity
Giatsidis, G	Skeletal muscle regeneration after Volumetric Muscle Loss injury	Continued support to the DOD funded grant. Scientific consultation, NMR imaging, Physical Function and exercise capacity
Christou, H	Preclinical models of Pulmonary Hypertension and the effect of a novel intervention	Continued support to the NIH funding (R21). Scientific consultation, NMR imaging, Physical Function and exercise capacity
Neppl, R	Loss of lncRNA exacerbates aging associated function decline of skeletal muscle	Continued support to the revised submission of (R01) Scientific consultation, NMR imaging, Physical Function and exercise capacity
Singh, R	Mechanisms of prostate sparing, muscle anabolic effects of combined administration of ornithine decarboxylase inhibitor and testosterone	Continued support to the revised submission of (R01) Scientific consultation, Metabolic and physical function characterization
Romero, JA	Mineralocorticoid Receptor Activation and Physical Function in Aging: Role of Striatin	Scientific consultation, Metabolic and physical function characterization
Bastarrachea, RA	Engineering brown fat into skeletal muscle using UTMD Gene Therapy in baboons	Scientific consultation
Lessard, S	Investigation of SNARK as a novel regulator of age-induced muscle atrophy	Scientific consultation, NMR imaging, Physical Function and exercise capacity
Wen Guo	Mechanisms of Testosterone's Effects on Erythropoiesis	NMR imaging, Physical Function, and exercise capacity



PDC Accomplishments

A total of 8 OAIC projects (previously funded through Pepper Center and currently supported) are utilizing the Scientific consultation and PDC resources.

The investigators at UTHSCA and at Mount Sinai Pepper centers sought consulting advise from Dr. Jasuja, scientific review of translational research applications and support for NIH grant submissions.

The PDC core has been instrumental in supporting submission of several grants, on which 4 projects have successfully obtained funding in this year (DOD, NIH, Beeson grant award).



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