

The UCLA-CTSI provides many state of the art technology cores and specialized service cores available to investigators. The technology core described below is available at Lundquist/Harbor-UCLA. Applications for utilization of these resources are reviewed by the Scientific Advisory Committee of the UCLA-CTSI at Lundquist/Harbor-UCLA. Support for investigators using this core is provided through a voucher system. Please contact the UCLA-CTSI office at 310-222-2503.

PULMONARY FUNCTION AND CARDIOPULMONARY EXERCISE TESTING CORE LABORATORY (CPET CORE)

Description

The pulmonary function testing (PFT) cardiopulmonary exercise testing (CPET) core laboratory facility supports investigators in pulmonary function, muscle and cardiopulmonary exercise testing studies. PFT consists of an array of non-invasive tests of abnormality in lung volumes, lung mechanics and pulmonary gas exchange. These are standard tests used to detect the presence, and quantify the severity of a range of lung diseases. Muscle assessments include isotonic or isokinetic measurements of velocity or torque production across a wide range of joints. CPET provides a whole-body assessment of the integrative exercise responses involving the pulmonary, cardiovascular, hematopoietic, neuropsychological, and skeletal muscle systems, which are not adequately reflected through the measurement of individual organ system function. It is a noninvasive, dynamic physiologic overview, which permits the evaluation of both submaximal and peak exercise responses, providing the relevant information for clinical decision-making.

CPET is used in a wide spectrum of clinical and clinical research applications such as for the evaluation of undiagnosed exercise intolerance and exercise-related symptoms, the objective determination of functional capacity and impairment, assessment of pre-operative risk, or evaluation of intervention efficacy. The CPET Core Laboratory will provide consultation, training, and services for clinical research using PFT, muscle function and CPET. The Core Laboratory has a 40-year history in PFT, muscle function and CPET assessments and contributed to initial development of the technique as well as current international guidelines for its application and interpretation. The Core Laboratory is also highly-experienced in multicenter clinical trials using PFT, muscle function and CPET measurements.

CPET Core Lab Resources

The Core Laboratory suite of equipment was updated in March, 2021 with new equipment as detailed below. The old equipment (last updated in 2014) has been taken out of service.

Equipment for Pulmonary Function and Cardiopulmonary Exercise Testing:

Pulmonary Function

Platinum Elite DX Body Plethysmograph (Medical Graphics Corporation). This includes a 726 Liter Plethysmograph Chamber with Spirometry, Thoracic Gas Volumes, Airways Resistance, Nitrogen Washout & Real Time Diffusion Capacity. Software: BreezeSuite Software, Windows 10 Pro All-in-One

We have retained an Impulse Oscillometry System (IOS) for pulmonary impedance measurement (airways resistance R5, R20, and reactance X5, AX, fres).

In addition, we also have a Resmon Pro device (RESTECH, Italy) for measuring similar parameters using forced oscillation technique (FOT). Currently, the software of this system is only for research purposes as this version is not fully approved by the FDA.

Cardiopulmonary Exercise Testing

- Ultima Cardio2 System. This includes:
 - True Breath-by-Breath pulmonary gas exchange measurements during exercise testing ,
 - Digital Mixing Chamber,
 - Wireless ECG Mortara X-Scribe 4.0 Wireless Kit for Ultima Cardio2,
 - Spirometry,

- External Device Signal I/O Module for Ultima Cardio2 (to connect our TOSCA Transcutaneous PCO₂/Saturation monitor and Masimo Pulse Oximeter signals)
- Security Software,
- User Defined Predicted Equation Sets,
- Windows 10 Pro,
- Tango M2 Automated Blood Pressure Monitor,
- Exercise Flow Volume Loop Software Option for Ultima Cardio2,
- Bronchial Provocation Software Option for Ultima Cardio2,
- MultiUser Software Option for Ultima Cardio2,
- Masimo Pulse Oximeter Analog Signal Interface Cable for Ultima Series.

Ergometry

We have equipment and capability to run CPETs using either cycle ergometry or treadmill exercise. Electromagnetically-braked cycle ergometry with pedal force measurement, and 'zero watt' startup (Excalibur Sport, Lode BV, Groningen, NL). This ergometer can be used for measuring isokinetic force during pedaling.

- Programmable Medical treadmill ergometry (TMX428CP Trackmaster, Newton, KS)

Dynamometry

- Muscle force and velocity measurements during isotonic or isokinetic movement, using isometric, concentric or eccentric muscle contractions for a wide range of joints (Biodex System 4 Pro, Shirley, NY)

Blood analysis, electromyography, near-infrared spectroscopy, muscle biopsy, peripheral vascular ultrasonography, and muscle fatigue assessment methods are also available for research applications. The CPET Core Laboratory is equipped with a maintained crash cart and an automated defibrillator (AED).

Services Available

Consultation: The core laboratory is available for consultation to assist investigators with experimental design in single site or multicenter trials

PFT: Data collection, quality control, normal values for the pulmonary function tests, with pre- and post-bronchodilator testing and body plethysmography to determine lung volumes. Our equipment is capable of measuring Maximal Inspiratory (MIP) and Expiratory (MEP) Pressures as well as Diffusion Capacity (DLCO/TLCO) measurements.

CPET: Data collection, quality control, data processing and reporting during cycle or treadmill ergometry.

Training: Training is available to CTSI-supported fellows or any faculty on CTSI approved projects

Personnel

The CPET Core Laboratory principal investigators include 3 licensed physicians for assessment and reporting of clinical cases:

Carrie Ferguson, Ph.D. Core Laboratory Technical Director

Janos Porszasz MD, PhD, Core Laboratory Co-Director

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Location

CDCRC and RB3 Buildings, The Lundquist Institute at Harbor-UCLA, 1124 W. Carson Street, Torrance, CA 90502.