Office of Research & Sponsored Projects

Research Equipment Capacity

INTRODUCTION

In August 2017, Rocky Mountain University of Health Professions established the Office of Research and Sponsored Projects (ORSP). The principal aim for the ORSP is to reduce barriers for faculty and students to conduct innovate research that will enhance knowledge and provide evidence for better clinical practice. Adding new equipment was one goal to help support faculty and student research. What sets RMU apart from other institutions is our capacity to bring the laboratory to the subject or patient.

The university operates numerous *pro bono* clinics for underserved residents in Utah County and beyond. Many of our residential faculty see patients and conduct research in these clinics. The addition of new equipment is enabling faculty to broaden their research inquiry.

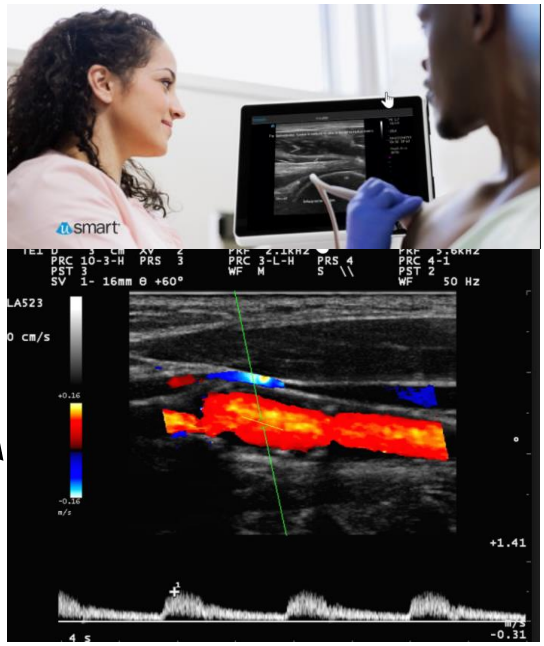
Building 561 – Home of ORSP

Inside the Lab at 561

Doppler Ultrasound Technology

Doppler ultrasound allows clinicians and scientists capture images of internal anatomical structures. At RMU, our system is set up for digitally record internal motions (e.g., internal joint kinematics). We have specialized software for quantifying vascular reflexes in response to a wide range of interventions (e.g., dynamic exercise, thermal modalities, resistance exercise with blood flow restriction). Finally, the cardiac probe provides an ability to conduct stress echogram testing.

Skeletal and soft tissue motion



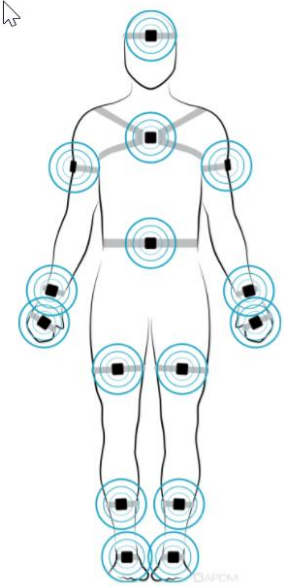
3rd party software with unique video capturing and autodigitizing features: joint motion analysis, vascular reactivity, etc.

Wireless Surface Electromyography

Surface electromyography (EMG) provides a measurement of motor unit activation, that when coupled with video (e.g., reaction time to a moving object) and/or direct limb and/or center of mass responses (see wireless inertial measurement unit below), timing of the neuromuscular system can be quantified. Changes in motor unit activation, as a function time and amplitude, also can be quantified in a free moving environment using radiofrequency communication within 30 foot radius.

Our EMG system has imbedded, proprietary software that produces data that is standard for publishing in peer-review journals. To reduce difficulties in electrode placement, we have highly sophisticated Ohm meter. Within the ORSP, our aim is to help investigators get the best data possible. We have a very unique EMG set up to gather the most valid data in realistic settings.

Inertial Measurement Unit (Wearable Kinematic Technology)



We possess a wearable inertial measurement unit (IMU) set up. Normal laboratory-based motion analysis assessments require data collection in a confined space, significant time for reflective marker placements, and expensive 3-D motion capture cameras and digitizing technology. Even then, limbs can cross reflective markers necessitating labor-intensive visual inspections of each video. Our IMU set-up tackles all of these barriers. The set-up of the sensors is time-efficient, data are retrieved from individual sensors, and can be routed into 3rd party data processing systems.

We have software that enables programming specific clinical tests that add precision to clinical outcomes research. Several tests require only three or four wearable sensors that allow for quantifying changes in balance or functional tasks (e.g., sit-to-stand). The system allows us to develop study-specific neuromuscular testing protocols, which simplifies logistics and inter-rater reliability issues.

Integrating Wireless EMG and Wearable Kinematic Technology

Without giving away our trade-secrets, we have an ability to integrate neuromuscular and motion (kinematic) data. With all technology being wearable, the research questions are limitless. We can quantify motion analysis and neuromuscular function, synced together, in virtually any environment.

Portable Metabolic Analyzer Technology

We possess a portable metabolic analyzer that allows for quantification of gas exchange parameters. Within the laboratory, we can conduct incremental and all-out exercise testing for determination of maximal oxygen uptake (VO_{2max}) or oxygen uptake kinetics during continuous exercise bouts. Concurrent measurements of heart rate and global positioning sensor (GPS) technology can be obtained.

SUMMARY

The majority of our technology is portable to help investigators conduct research in the most ecologically valid environments. By bringing the lab to the patient, child, or athlete, we are better able to evaluate the efficacy of interventions in any setting. Such an approach enables our faculty and students opportunities to explore research questions others simply are even imagining. That feature is just another way that Rocky Mountain University of Health Professions is distinguished from other universities.