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NEW COURSE BEING OFFERED – EGN 1949
Synopsis of Research Projects in EGN1949
(Reference #: 590601)

Assessing Endothelial Dysfunction Utilizing Calibrated Cuff Plethysmography (Project # 1)

This project will involve further independent research in addition to analysis of the data obtained on this protocol.

The purpose of this study is to assess endothelial dysfunction (ED) in patients who potentially have cardiovascular disease. ED is the earliest measure of the functional abnormality of the inner lining of a vessel's wall known as the endothelium.

Currently, there is no non-invasive, non-imaging device which can provide an actual measurement of ED. The objective of these studies is to perform calibrated cuff plethysmograph (CCP) on patients that have been diagnosed with cardiovascular disease. Diagnoses made with the current diagnostic standards will be observed against information obtained from CCP. The goal is the development of a method whereby the CCP device can be used to make objective early diagnoses of cardiovascular disease.

The Verification of ECG Lead Placement Accuracy (Project # 2)

This project will involve further independent research in addition to analysis of the data obtained on this protocol.

The electrocardiogram (ECG) is primarily a cardiovascular diagnostic tool used to rule out the presence of electrical abnormalities. The signal outputs can be used for diagnostic or monitoring purposes. General monitoring setups include three or five leads. The current gold standard is a twelve lead ECG used for diagnostic purposes. Other variations of this include fifteen lead, right-sided, and posterior lead configurations.

Currently, there is concern regarding the repeatability and consistency of lead placement. Our hypothesis is that the accuracy of lead placement affects the sensitivity and specificity of ECG diagnoses. Our goal is to quantify change in ECG output as precordial lead placement is varied.

A Comparison between Traditional Heat Stress Characterization and a Novel Approach (Project # 3)

This project will involve further independent research in addition to analysis of the data obtained on this protocol.

Excessive exposure to heat has been the root cause of 4,780 deaths in the United States between the years 1979-2002. The resultant elevation in body temperature resulting in hyperthermia has no standard safety measure to indicate an individual's degree of heat stress. Wet Bulb Globe Temperature (WBGT) is currently used to classify heat stress for a given activity performed over a given period of time. However, individualized factors are not taken into account pertaining to individualized risk for heat stroke. The purpose of this research is to gather preliminary data observing the relationship between evaporative losses and cardiovascular metrics which could become part of an algorithm allowing heat stroke susceptibility to be categorized based on individualized physiological data.

Our hypothesis is that changes in cardiovascular metrics such as heart rate, stroke volume, blood pressure, and vascular compliance will coincide with changes in the functionality of the body's evaporative process and the body's tissue fluid content providing an important insight toward the development of an algorithm using cardiovascular metrics to predict the onset of heat stroke. Future testing is planned where other metrics such as skin temperature, core body temperature and tissue hydration will be observed simultaneously towards the development of a complete mathematical model predicting heat stroke.