The Effects of Caffeine Consumption on Core Body Temperature in the Physically Active during Exercise

1. The study population will consist of at least 15 healthy males (18-30 years of age) subjects that are physically active yet not involved in competitive sports. In addition the subjects will not be over weight or obese and be nonsmokers as this may limit their exercise participation. Subjects who consume less than 25 mg/day of caffeine will be classified as caffeine naive. Subjects who consume greater than 300 mg/day will be classified as habitual caffeine consumers. Subjects will be recruited by word of mouth and announcements made in Athletic Training and Physical Education classes here on the campus at Texas State University (Appendix A). Subjects will be involved in a cross over study performing in both a caffeine exercise group and non-caffeine exercise group.
2. Participation in the study will require three visits to the laboratory. During the first visit the subject will complete a health history questionnaire (Appendix B), read and sign the consent form (Appendix C), and if deemed eligible to participate, will perform the graded exercise test. During the second and third visits, the subjects will perform an endurance exercise bout (as described below) with and without caffeine supplementation.
3. The following methodology will be used: All participants will be instructed to forgo strenuous exercise and to abstain from caffeine consumption for at least 48 hours prior to each exercise bout.

*Visit 1- Graded Exercise Test:* Subjects will perform a graded exercise test on a cycle ergometer for the determination of maximal oxygen consumption (VO2max) utilizing an automated metabolic measurement cart. Heart rate will be monitored via polar heart monitors and blood pressure via an automated blood pressure cuff during the graded exercise test.

*Visit 2/3 - Endurance Exercise Bout:* Subjects will randomly be given 6mg/kg of body weight of caffeine or a placebo. They will swallow a core temperature pill prior to the beginning of the test. Subjects will perform a 40 min exercise bout on a cycle ergometer in a hot environment (37°C-33% RH) at a workload that corresponds to 55 -60% VO2max as determined from the graded exercise test. A minimal rest period of 48 hours between the graded exercise test and the endurance ride will occur. Heart rate will be monitored via polar heart monitors and blood pressure via an automated blood pressure cuff during the graded exercise test. Water will be provide as need with the amount consumed documented. A core temperature data recorder will be used to record any changes in core body temperature.

*Statistical Analysis:* The data will be analyzed via a paired sample t-test. Statistical analyses will be conducted using ESS. The level of significance will be set at P < 0.05

1. Injuries to young healthy subjects during exercise testing are uncommon. However, the chance for injury is acknowledged and precautions will be taken to prevent injuries and for handling injuries if they occur. There exists the possibility of adverse physiological changes during the exercise performances. These changes could include abnormal blood pressure, fainting, disorders of heart rhythm, stroke, and very rare instances of heart attack or even death. There is the possibility of dizziness and nausea immediately following the exercise performances. Also, there is the possibility of muscle strain, particularly during the resistance exercise performances. Muscle soreness may be present for 24-48 hours following the exercise performances. Additional risks of caffeine consumption include but are not limited to the following: restlessness, irritability, anxiety, heartburn, headaches (sometimes severe), high blood pressure, sleeplessness, rapid heartbeat, nausea. Potential risk of an increase in core body temperature to the upper safe limit of approximately 100°F (39° C) could result in a hyperthermic state.
2. Standard precautionary measures as set forth by the America College of Sports Medicine (ACSM) will be strictly adhered to during all testing. All subjects will complete a health history questionnaire prior to any testing. Also, CPR/AED trained personnel will be available on site during all testing. Emergency phone numbers are posted within the laboratory and all personnel have been trained to execute emergency procedures. Testing will be terminated immediately in response to chest pain suggestive of angina, fainting, or increases of core body temperature beyond the upper safe limit of approximately 100°F (39° C).

Regarding confidentiality, all personal information will be kept private. A file containing the consent form, results from the health history questionnaire and all collected data will be kept in a locked cabinet for five years, after which, it will be destroyed. The professors and staff will use this information for research, but the subjects name will not be revealed in any reports. The information gathered will never be revealed to anyone other than the researchers and will only be reported in aggregate, that is, on average.

1. Potential benefits relate to this study include subject knowledge of exercise capacity in relation to the general population, understanding fitness levels for certain sports and recreational activities, the planning of a future physical conditioning program, or evaluating the effects of recent physical activity habits. Benefits of caffeine consumption include but are not limited to the following: increase mental awareness, increase muscle strength, reduce asthma symptoms, increase pain relief medication affects, and increase metabolism. Results of this study will also expand our knowledge of the effects of caffeine on core body temperature during exercise and could possibly influence guidelines and recommendations for the physically active population.
2. No form of compensation will be utilized for this study.
3. Risks associated with exercise in young, health and physically active individuals are minimal. The benefit to society will be directly related to expanding our knowledge of the effects of caffeine on core body temperature during exercise in the physically active population.

Both researchers Amy Menzies and Amanda Martinez are nationally certified athletic trainers, state licensed athletic trainers, CPR/AED and First Aide certified. They have both been trained to identify emergency situations and how to properly offer emergency treatment if such occurrences should arise. Both researchers will be present during each experimental trial.

1. This proposed study has not been reviewed nor approved by another IRB
2. As athletic trainers we are in contact with the physically active population daily. Caffeine consumption is on the rise and has been shown to increase physiological effects on the body, mainly core body temperature. Caffeine consumption when applied to the physically active evokes a concern of the potential inability to maintain thermoregulation. In addition, external factors such as temperature and relative humidity also need to be taken into account. Taking into consideration the possible physiological effects of caffeine, it is important to determine if a limitation of its use with the physically active population is needed.

The supervising faculty members consist of Dr. John Ransone, Professor (512-245-8176), Dr. James Williams, Associate Professor (512-245-2561), and Dr. Luzita Vela, Clinical Education Coordinator and Assistant Professor of Athletic Training (512-245-1971).

1. Our project chair, Dr. Jack Ransone, is member of this investigative team and named on this Institutional Review Board Application. He is in support of this thesis project titled The Effects of Caffeine Consumption on Core Body Temperature in the Physical Active during Exercise to be completed by Amy Menzies and Amanda Martinez. As the faculty advisor for this project he has reviewed the idea, methodology and IRB application.

1. Amy Menzies, Amanda Martinez, Dr. John Ransone, Dr. James Williams, and Dr. Luzita Vela will have access to the results.