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Proposal Title

Preventing death, cardiac arrest, and serious injury during ultra-endurance triathlon through real-time objective monitoring

Proposal Description

The physiologic rigors of ultra-endurance triathlon, one of the fastest growing sporting events over the past four decades, are extreme. Various anecdotal reports of death within this sport have long been made in the news, but only recently have gained minimal attention in the scientific literature. Death is certainly happening in triathlon competition, and more than 80% of the time it seems to occur during the swim (first) leg of the race. Significant physiology strain, coupled with harsh environmental conditions (humidity, air temperature, water temperature, wind) seem to dictate life-threatening situations for certain triathletes, with sudden cardiac arrest being more common during the swim leg, and other life-threatening conditions (e.g., heat stroke, hyponatremia, traumatic injury) being more common in the bike and run legs of the race. However, the specific physiologic and environmental factors causing life-threatening situations for ultra-endurance triathletes have only been superficially examined, and some only at cross-sectional timepoints during the race (e.g., transitions between legs). The aim of this study is to carefully monitor and track these factors associated with death and serious

injury throughout ultra-endurance triathlon competition in real-time. This information will allow our investigative team to geomap specific time points when physiologic and environmental strain interact significantly and map risk levels throughout the course for future races. We will also monitor several physiologic factors during the critically important preparation and recovery days, 3 days prior to and 3-5 days following competition, to determine potential predictors of acute cardiac events.

Our investigative team represents a strategic collaboration, made up of researchers from WSU's Kinesiology Program and the Elson Floyd College of Medicine as well as other academic institutions, is comprised of experts in the areas of sleep assessment, activity monitoring, endurance performance, and data mapping.

The Ironman World Championship race (Kona, HI) is the most prestigious ultra-endurance triathlon race in the world and will allow us to recruit elite level athletes (n=25) for participation. Participants will be fitted for wearable objective monitors multiple days prior to the race. Physical activity, energy expenditure, and intensity will be assessed throughout the competition via the Polar Vantage M2 device. This effort will be led by Dr. Christopher Connolly (Director, WSU Exercise Physiology & Performance Laboratory), Dr. Alexander Montoye (collaborator, Alma College), and their team. Sleep quality and duration will be assessed prior to and after competition via the Oura Ring, a premier instrument for sleep assessment. This effort will be led by Dr. Amanda Lamp (WSU Sleep and Performance Research Center) and her team. To understand cardiac strain prior to, throughout, and after triathlon competition, participants will additionally wear the Frontier Smart Heart wearable device, which will provide continuous heart rhythm and functionality data, including throughout the open-water swim. This is particularly important to observe critical points of cardiac strain and can be done effectively for extended periods of competition time. This effort will be led by Dr. Sandhya Venugopal (collaborator, UC Davis Cardiology). Cumulative data management, geomapping of elevated risk throughout competition, and post-competition data analysis will be led by Dr. Erin Griffin (WSU College of Medicine) and her team.

Budget

Transportation: Airfare to Kona, HI = \$1,950 (\$650 per person x 3 persons)

Food: Meal Per Diem rates for Kona, HI = \$1,032 (\$86 per person x 12 person days)

TOTAL REQUESTED: \$2,982

Justification: We are requesting travel assistance for the purpose of assessing cardiac risk throughout the Ironman World Championship competition. Economy class fare to Kona, HI from Pullman, WA (Dr. Connolly), Spokane, WA (Dr. Lamp), and Los Angeles, CA (Dr. Griffin) for the Ironman World Championship averages \$650-700 when purchased 10 months in advance through Alaska Airlines or Delta Airlines. These fares are necessary expenses for our team to travel to Kona, HI to administer in-person, real-time monitoring of elite level ultra-endurance athletes at a World Championship event in extreme environments. Funds are also requested for food via Per Diem rates. Dr. Connolly and Griffin

will be on site for two days each to oversee critical competition data collection. Dr. Lamp will be on site for eight days to ensure critical data is collected on preparation and recovery days for athletes. This results in the need for funds for food for 12 person days. Lodging for our visit will be covered via laboratory funds accrued over the past several years.

Certified Budget Administrator
Bev Rhoades

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