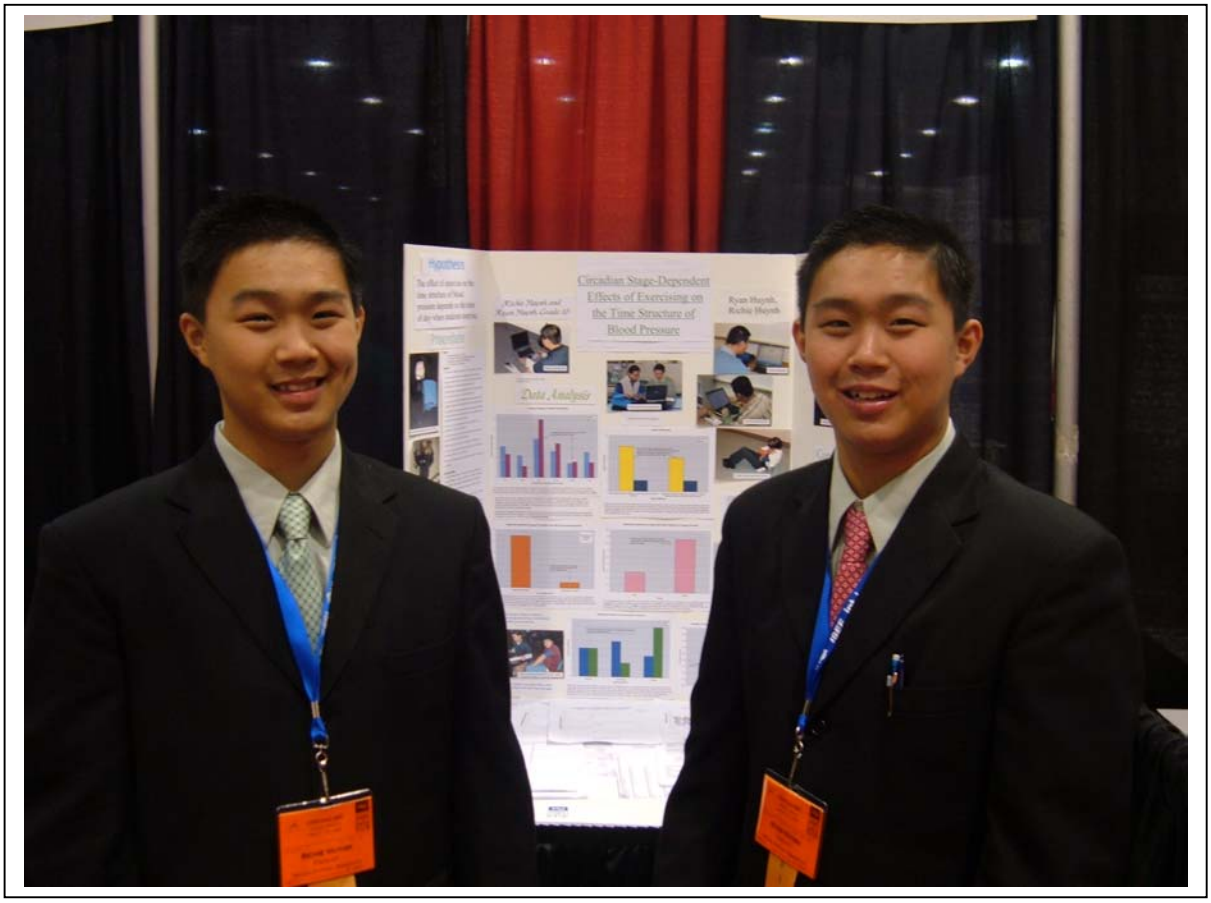
Richie and Ryan Huynh's Science Research 2004-2005

ABSTRACT

This study's purpose was to examine any circadian stage-dependent (time-of-day) effect of exercise on the time structures of blood pressure and heart rate. Chronobiological studies have shown that most variables vary as a function of time, and that abnormalities in blood pressure variability have an important diagnostic value. Among many factors affecting blood pressure, exercise is known to have beneficial long term affects on cardiovascular health. Fourteen students measured their blood pressure and heart rate automatically at half-hour intervals for five weeks with an ambulatory monitor. Students followed an exercising procedure (jump ropes, curl-ups, push-ups) daily at one of six different times of day during the last four weeks. Improvement in exercise performance was assessed by linear regressions. Student and paired t-tests compared endpoints between genders or values obtained before and after exercise. Circadian stage-dependence of any effect of exercise was tested by a one-way analysis of variance. Females were found to have a higher heart rate than males ($p=0.022$). The increase in performance of curl-ups and jump ropes tended to be greater among students exercising in the afternoon or in the morning, respectively. The extent of predictable daily change in systolic blood pressure changed to a larger extent among students exercising around noon ($p=0.038$). As anticipated, some effects of exercise were circadian stage-dependent, offering the possibility of optimizing its effects both for health benefits and performance. This is important for improving lifestyles and for the rehabilitation of cardiac and other patients, in addition to applications in sports medicine.

Synopsis

This research has shown that timing itself is a very important factor for consideration in all we do. Timing of exercises had shown different responses in blood pressure and different improvements of exercise. Different circadian stages for exercise may be biologically better for improvement of exercise activities and may put a person in a greater or lesser amount of risk for developing or preventing cardiovascular illness. (Such as CHAT, circadian-hyper-amplitude-tension, a condition when blood pressure "swings" abnormally. CHAT indicates risk for developing cardiovascular diseases.) Rehabilitation could be facilitated for a faster recovery if the beneficial effects of exercise could be optimized with timing. Overall, timing can lead to better prevention and treatment of disease. *The ambulatory blood pressure monitors were essential for the data collection that lead to these findings.*



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