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## A correlation between bradycardia during cold face test and heart rate recovery immediately after exercise

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Heart rate recovery immediately after exercise reflects a reactivation of the parasympathetic system, and is a powerful predictor of mortality. However, it is hard to apply heart rate recovery to epidemiological studies because the measurement of heart rate recovery needs physical load to participants by a maximal exercise test. In contrast, cold face test is a non-invasive and easy maneuver to assess vagal activity. Therefore, we investigated a correlation between bradycardia during the cold face test and heart rate recovery immediately after exercise.

Eight males (age:  $25.6 \pm 1.8$  years, body mass index:  $22.9 \pm 2.1$  kg/m<sup>2</sup>) performed the cold face test with face immersion in cold

water and apnea for 40 seconds before a graded exercise test. R-R intervals were recorded before and during the cold face test. Heart rate recovery was determined by the graded exercise test on a treadmill. The value for the recovery of heart rate was defined as the reduction in the heart rate from the rate at peak exercise to the rate one, two and three minutes after the cessation of exercise.

The latency of maximal bradycardia correlated well with the heart rate recovery, especially two minutes after peak exercise ( $R = -0.968$ ,  $P = 0.000$ ). The present study suggests that bradycardia during the cold face test are associated with heart rate recovery immediately after exercise.