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The Effects of High-Intensity Treadmill-Running on the Stomach in a Rodent Model

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PURPOSE: Exercise is known for beneficial effects it provides to systems of the body; improving cardiovascular and neural function, reducing adipose tissue, and lowering the risk of developing certain metabolic disorders. The effect of exercise on the gastrointestinal (GI) tract remains controversial; studies have reported increases, decreases, and no changes in gastric emptying (GE) rate following running. We evaluated the effects of high-intensity treadmill-training on GE rate in rats. We hypothesized that exercise increases autonomic activity and will contribute to increased vagal tone leading to increased GE. By developing an understanding of the relationship between exercise and GI function, exercise may be medicine in treating a number of GI health dysfunctions (e.g. gastroparesis). **METHODS:** Male Wistar rats ($n = 8$) ran on a treadmill at 23.0m/min, five days/week, for 4-weeks; controls ($n = 8$) were placed on the powered off treadmill. For GE measurements, fasted rats were placed in collection chambers, baseline air measurements collected, and rats received 1g of pancake containing 5 μ L of the stable isotope [13 C]-octanoic acid. Exhaled breath was collected and analyzed to determine the [13 C]- to [12 C]-CO $_2$ ratio. **RESULTS:** After 4-weeks, anthropometric factors remained similar between exercise and control: mean energy intake (29.92 ± 0.44 vs 29.59 ± 0.53 kcal/100g/day; $p > 0.05$), body mass (85% increase; 325.83 ± 3.30 vs 330.28 ± 3.48 g; $p > 0.05$), food intake (24.38 ± 0.29 vs 24.48 ± 0.35 g; $p > 0.05$). Cumulative percent recovery of the administered [13 C]-octanoic acid dose was reduced in exercise vs control 6-hours following GE testing (11.70 ± 0.83 vs 13.29 ± 0.60 ; $p > 0.05$). Peak fractional dose per hour of 13 CO $_2$ during the breath test was the same between groups (6.96 ± 0.89 vs 7.61 ± 0.40 ; $p > 0.05$), but there was a rapid reduction of [13 C] values following peak over several time points of the exercise group. **CONCLUSION:** We previously validated moderate-intensity treadmill running has no significant effect on gastric emptying. By increasing the intensity of running, we found a reduction in GE in the exercise group, contrary to what we hypothesized. We believe this reduction may be a result of reduced mesenteric blood flow, increased inflammation, or an alteration in the GI microbiome.

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