Novel strategies to limit exercise-associated dysglycemia in individuals with type 1 diabetes.

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Type 1 diabetes (T1D) is an autoimmune disease leading to the destruction of insulin-producing pancreatic beta cells. Regular physical activity is recommended for improving insulin sensitivity and overall health. However, diabetes management during exercise can be challenging and lead to fluctuations in blood glucose (BG) concentrations. The goal of our research is to determine insulin adjustment strategies to improve BG levels during exercise. The proposed research studies include (a) basal insulin suspension during continuous versus circuit exercise, (b) basal insulin adjustments and time spent in target BG range, and (c) daily activity levels with the usual diabetes care (i.e. an insulin pump that requires users to manually operate insulin delivery) versus a newly developed artificial pancreas (users no longer need to manually control insulin delivery). The first study demonstrated significantly lower BG levels with continuous versus circuit exercise. Therefore, despite lower exercise intensity and the suspension of basal insulin delivery at the start of exercise, continuous exercise resulted in a larger drop in BG compared with circuit exercise. The second study, currently underway, aims to increase the percentage of time spent in a normal BG range during exercise and in recovery in T1D individuals. Preliminary data suggests that basal insulin reductions 90-minutes before exercise may have the best efficacy on BG control during exercise. The third study is focused on overall daily activity levels with usual care versus the automated ‘bionic’ pancreas. Our research supports the need for increased vigilance around monitoring BG levels during exercise and implementing basal insulin adjustments prior to the onset of exercise to help reduce hypoglycemia.