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Intermittent Fasting in Diabetes

For those living with Type 2 diabetes the benefits of reducing calories in the diet, weight loss and lower blood sugar, are well known. While controlling diet is important, strict low-calorie diets can be difficult to maintain for long periods of time. Simply reducing calories may also not be the most effective way to lose weight and improve blood sugar control.

Recently there has been increasing interest in replacing low-calorie (or reduced-calorie) diets with intermittent fasting. A person undergoing intermittent fasting eats either nothing or a very low-calorie diet for specific intervals, alternating with their regular diet. The period of fasts and specific fasting diets vary. The best studied intermittent fasting regimens are 2:5 (2 consecutive days of fasting each week), alternate-day fasting (eating only every other day), and time-restricted feeding (for example eating only between 12:00 noon and 8:00 pm).   These three patterns are shown graphically here.

There is also evidence that a "fasting-mimicking" diet, in which a very low-calorie diet is eaten during fasting periods, can be effective.

Intermittent fasting is comparable to a continuous low-calorie diet for improving blood sugar control in people with Type 2 diabetes. In one study, an intermittent fasting group ate only 500-600 calories per day for 2 days, followed by their usual diets for 5 days each week. The control group ate a low-calorie diet of 1200-1500 calories every day. After 12 months, it was found that long-term blood sugar (A1c) was reduced equally in both groups. Weight loss and reduction of oral blood-sugar medications were also similar between the two groups.

Intermittent fasting has been shown to be superior to a continuous low-calorie diet for losing weight and reducing body fat. It is thought that including "rest periods" of normal caloric intake, interspersed with a restricted calorie diet may reduce metabolic compensation and improve the efficiency of weight loss.

Fasting-mimicking diets are a form of intermittent fasting in which a very low-calorie diet is eaten for a period of several days each month. The normal diet is replaced with very low-calorie meals that contain all required vitamins and other micronutrients. A commercial fasting-mimicking diet, Prolon® from L-Nutra Inc., has recently become available on the Canadian market.

Although only limited clinical evidence is available, fasting-mimicking diets may help to reverse diabetes. Both Type 1 and Type 2 diabetes are caused by a loss of function in insulin secreting cells in the pancreas. A fasting-mimicking diet has been shown to reverse this effect in diabetic animals, although it hasn't yet been tested in humans. The cycles of fasting and re-feeding appear to be required to induce this effect, so it is unlikely that the same effect could be achieved through a continuous low-calorie diet.

It has also been shown that an intermittent fasting-mimicking diet is effective for improving an array of characteristics associated with both aging and Type 2 diabetes. In a study of 100 people with no acute or chronic disease, consumption of an intermittent very low-calorie diet for five days each month for five months resulted in reduction of weight, body fat, blood pressure, and blood sugar. While this diet has not yet been tested on people with diabetes, BCDiabetes is designing a study with

a real-world diet looking at 5 consecutive days of 750 calories per day followed by 26 days of 2000 calories per day shown in this graphic.

Intermittent fasting is an appropriate alternative to long term low-calorie diets for control of weight and management of blood sugar. Currently there is not sufficient evidence to support one intermittent fasting regimen over others. However, fasting-mimicking diets may be the most acceptable option for many people who are seeking to manage their diabetes through diet.

Intensive insulin therapy and intermittent fasting

In patients on intensive insulin therapy (multiple daily shots or a pump) intermittent fasting offers special insights into basal and rapid (meal-time, bolus) insulin dosing.

Basal insulin dose: The best and simplest way to figure out basal insulin requirement is this: take your usual dose of basal insulin in the morning after an overnight fast of say 12 hours and then to continue to fast for another 12 hours or longer while staying at home relaxing. If the sugar stays in the target range it implies the usual dose of basal insulin is correct. If the sugar drops below target it implies the dose is too high - it should be reduced by 20% (or more) the next time. If the sugar goes above target the basal insulin dose should be increased by 10% (or more) the next time.

Insulin sensitivity factor and rapid insulin dosing: If your sugar is too high during a fast then you can take a correction dose of rapid insulin. To make a correction you need to have an idea of how much 1 unit of rapid insulin will drop you sugar ie how sensitive your body is to insulin. The term Insulin Sensitivity Factor (ISF) is widely used. Many people start by assuming their ISF = total daily dose of insulin (TDD, the sum of basal + bolus insulin from the previous day) divided into 100. Thus if your TDD = 50 then the ISF = 100/50 = 2. This implies that one unit of rapid (meal-time or bolus) insulin will reduce the sugar by 2 mmol/L after a certain amount of time (typically 2 hours). If during a fast 1 unit of insulin drops your sugar more than 2 mmol/L then you need to assume a higher ISF, say 3 or more. If 1 unit of insulin drops your sugar less than 2 mmol/L then you need to assume a lower ISF, say 1.5 or less.

Carb counting: To break your fast you need to give rapid insulin based on carb counting (and corrections, see above). Ideally this is done with your sugar within target range. By giving yourself a test meal of known carb quantity you can tell whether your carb ratio is correct. A common starting point for carb ratio (CR) is 500/TDD. If TDD = 50 then CR = 500/50 = 10. This implies that for every 10 grams of starch (carbs) you need 1 unit of rapid insulin. So if you are having a bagel and cream cheese (say 30 grams of starch) you need 30/3 = 3 units of rapid insulin. If your 2 hour post-meal sugar is above target you need more insulin per carb (you need to lower your carb ratio; instead of 10:1 try 8:1); if your sugar 2 hours after the meal is below the target you need to give less insulin per carb (you need to raise your carb ratio; instead of 10: 1 try 12:1).

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