ENDOCRINOLOGY & DIABETES UNIT
Diabetes Clinic: 604-875-2868
Toll-free Phone: 1-888-300-3088, x2868
Fax: 604-875-3231
http://endodiab.bcchildrens.ca

OPTIMIZING YOUR BOLUS: INSULIN FOR PROTEIN AND FAT

How Do Protein and Fat Affect Blood Glucose?

Carbohydrates are the primary nutrient responsible for raising blood glucose levels. However, even meals with the same number of grams of carbohydrates can produce varying effects on blood glucose levels. Along with the timing of insulin and glycemic index, a key factor influencing this variation is the presence of fat and protein in the meal. Fat and protein slow the digestion of carbohydrates, which if consumed in larger amounts than a typical balanced meal, can lead to a delayed rise in blood glucose, sometimes occurring several hours after a meal.

Giving a full insulin dose before a high-fat or high-protein meal, can result in a 'mismatch' between the action time of insulin and the rate at which digestion occurs.

Some children may experience a low blood glucose level 1–2 hours after eating; this results from the insulin taking effect before the food has been fully digested.

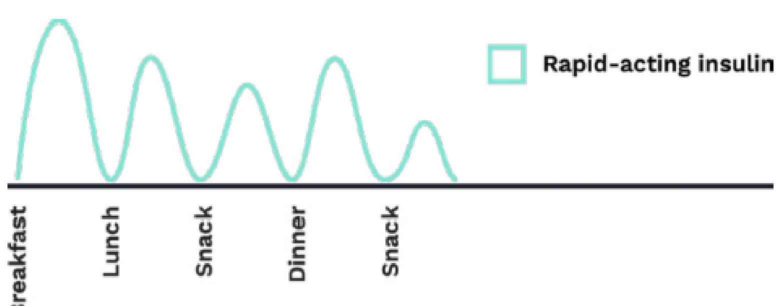
Additionally, some children will experience a high blood sugar 3–6 hours after eating, when the food has finally been digested but the insulin's effect has worn off.

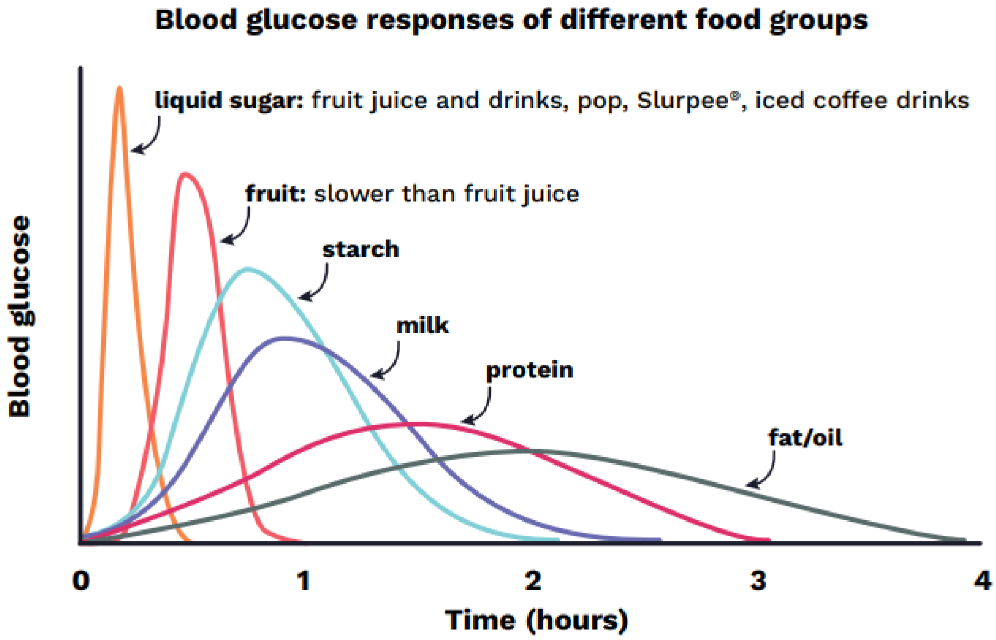
Remember: protein and fat are both important and necessary for healthy growth and development in your child.

Reminder on Insulin Action Times and Food Digestion:

Rapid-acting insulin:

- Also known as bolus insulin.
- Given before meals. By giving insulin before the meal, you are allowing time for the insulin to start working before the food is broken down into sugars.
- Works to manage the expected rise in blood glucose when you eat food.
- The amount of rapid-acting insulin given depends on how much you eat and what your blood glucose level is.





Optimizing Your Child's Bolus:

Whenever possible, give your child's insulin 15–20 minutes before a meal for improved blood glucose levels after meals.

When your child is eating high-fat and/or high-protein meals, like cheesy pizza, lasagna or deep-fried chicken with fries, pay close attention to patterns in their blood glucose levels. Particularly, low blood sugars 1–2 hours after eating and high blood glucose levels 3–6 hours after eating (with no other food consumption).

One strategy to address the "mismatch" in insulin action and blood glucose response is to do a **split bolus.**

Before introducing a split bolus, double check the following:

- **Is the Insulin-to-Carbohydrate Ratio (ICR) correct?** If your child is having high blood glucose levels after meals at a particular time, then look at adjusting the ICR.
- **Is the carb count accurate?** This may be the reason why your child's blood glucose levels are high after a meal; double check your calculation.
- **Is it a repeatable pattern when your child eats this type of meal?** If this happens most every time after your child eats that meal and you know it is high in fat and protein, then it is likely your child requires additional insulin.

Split Bolus for Multiple Daily Injections (MDI)

Split Bolus for MDI works by giving **two insulin injections** for the meal instead of one.

1. Calculate the number of carbohydrates in the meal, then increase this by **10–20%**. Calculate your correction. **Do not increase the correction (if giving with food).**
2. Give **correction** (if needed) and administer half (50%) of the increased **food bolus** as a pre-meal bolus.
3. Administer the second half (50%) of the increased **food bolus** as a post-meal bolus 1½ to 2 hours after the meal.

Example: Your child is eating a high-fat and high-protein meal that contains 80 grams of carbohydrates. Their current blood glucose level is 12, their ICR is 5 and their ISF is 2:

1. 80 g carbohydrates + 10% = 88 g carbohydrates = **17.5 units for increased food bolus**
2. **3 units for correction** + **8.5 units for 50% increased food bolus** = **11.5 units** will be giving as a pre-meal bolus
3. **8.5 units for remaining 50% increased food bolus** will be giving 1.5 to 2 hours after meal

This is a starting point for managing blood glucose levels after high-fat and high-protein meals. Everybody is different, and it may require some adjustments to find the right plan for different meals. Evaluate your child's blood glucose response and the pattern of fluctuations following this meal. Based on the results, adjust the split bolus accordingly. Potential adjustments may include the following ratios:

- 60:40
- 40:60
- 30:70