Carbohydrate Counting Introduction

This document has been created for people people on insulin therapy, using basal-bolus regime (i.e. once or twice daily long acting insulin and quick-acting insulin with meals).

Insulin to carbohydrate ratio (ICR)

All carbohydrate in food will turn into glucose in the bloodstream. Using an insulin to carbohydrate (CHO) ratio (ICR) is a good way to work out your mealtime insulin dose more accurately and prevent your blood glucose going too high or too low after meals. An insulin to carb ratio will tell you how much carbohydrate will be covered by 1 unit of insulin.

Example:
An insulin carb ratio (ICR) of 1:10 means that 1 unit of insulin is needed for every 10g of carbohydrate eaten:

ICR (1:10) — 1 unit of insulin → 10g of carbs

Because people have different sensitivities to insulin, ICRs can vary a lot between different people, and may even be different for different mealtimes.

Calculating your starting ICR

An insulin to carb ratio of 1:10 is a good start. This means taking 1 unit of insulin for every 10g of carbohydrate in your meal. But if you want to calculate a starting ICR more accurately, then follow the steps below:

1. Calculate your total units of injected insulin over 24 hours. If this varies day to day, take an average over 3-4 days. You can do this by combining your total bolus insulin injections and your basal insulin injections over a 24-hour period. Then add these two values together for your total daily dose (TDD).

Total dose over a 24 hour period (on average) → Bolus Insulin (quick-acting) + Total dose over a 24 hour period (on average) → Basal Insulin (long-acting) = TDD (total daily dose)

This means that 1 unit of insulin will be needed for every **Xg** of carbohydrate that you eat.

2. Divide 500 by your total daily dose i.e. **500 ÷ TDD**.

$$\frac{500}{TDD} = \text{'X' g of carbohydrate per single unit of insulin}$$

Example:
If the total daily insulin dose (TDD) is 35 units:

$$\frac{500}{35} = 14.28\text{g of carbohydrate per single unit of insulin}$$

This means that 1 unit of insulin will be needed for every 14.28g (e.g. to 15g) of carbohydrate eaten (you should round this up or down for ease of calculations).

Always check your ICR calculations with a health care professional before using them and be aware that your ICR may change over time. By regular glucose monitoring you can work out if your ICR is correct and make small adjustments to it if needed.

Calculating carbohydrates

You will need to accurately count the amount of carbohydrate in your food to work out your mealtime insulin dose. You can do this by closely looking at food labels, using lookup guides and using resources and apps like **Carbs and Cals**.

Mealtime insulin dose calculation

Example of a mealtime insulin calculation for 80g CHO meal in a person with an ICR of 1:10 & ISF* (insulin sensitivity factor) of 1:3, & a blood glucose of 14mmol/L.

Carbohydrate content = 80g
ICR is 1:10

Insulin units = **8**

Correction Dose*
As a quick reminder when calculating your mealtime dose, you can also take account of your glucose level at the time of the meal. If it is not in range, adjust your mealtime insulin dose using your correction factor.

Example:

ISF 1:3 =
1 unit of insulin will reduce blood glucose by 3 mmol/L

Current blood glucose: 14 mmol/L → Target blood glucose: 8 mmol/L

- 14 - 8 = 6 mmol/L blood glucose required to be removed
- 1 unit of insulin = 3 mmol/L
  therefore 2 units of insulin = 6mmol/L
- To correct the blood glucose
  2 extra units of insulin are required

Insulin pumps

If you use an insulin pump then you should consult your healthcare team and/or review advice on the insulin pump eLearning course, as the calculation for initial Insulin:CHO ratios (ICR) may be slightly different e.g. 400 ÷ TDD (rather than 500 ÷ TDD) is often used to calculate a starting ICR.

see Correction Dose and Insulin Sensitivity Factor (ISF) pdf for more detailed information on calculating your ISF and correction doses.

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