

HOW TO GET THE RIGHT MEAL TIME INSULIN DOSE WITH TYPE 1 DIABETES



INTRODUCTION & ABBREVIATIONS

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ABBREVIATIONS

AA = Amino Acid
ADP = Adenosine Di Phosphate
ATP = Adenosine Tri Phosphate
AUC = Area Under the Curve
BCAA = Branches Chain Amino Acids
Ca = Calcium
CGM = Continuous Glucose Monitoring
FFA = Free Fatty Acid
FPU - Fat and Protein Units
GDH = Glutamate Dehydrogenase.
GI = Glycaemic Index
GL = Glycaemic Load
GLP-1 = Glucagon-like peptide-1
GIP = Gastric Inhibitory Polypeptide
GPCR = G-Protein Coupled Receptor
I:G = Insulin to Glucagon ratio
ICR = Insulin to carbohydrate ratio
MDI = Multiple Daily Injections
MUFA = Monounsaturated Fatty Acids
KATP = ATP-regulated potassium channel
mTOR = mammalian target of rapamycin
SFA = Saturated Fatty Acid
TCA = Tri-Carboxyl-Acid cycle

INTRODUCTION

After being diagnosed with Type 1 diabetes, your first job is to get over the initial shock, because a month ago you felt in great shape.

You're then told your B-Cells has been attacked by your own immune system. Nobody knows exactly why, but your pancreas will never produce sufficient insulin again.

Then the big bomb. You need to inject or pump insulin into your body. Not just that, but in the exact amounts your B-Cells would have delivered, if they were working effectively!

Why?

To keep your blood glucose level between 3.5 - 7.0mmol/l (65 - 120mg/dl), so that you stay healthy now, and in the future.

Then it dawns on you:

"To deliver the right amount of insulin, my decisions must match that of my B-Cells."

This realisation seems daunting at first, but then you get a lot of education (hopefully) to help you make those decisions.

Education such as:

- Carbohydrate counting
- How to use an insulin to carbohydrate ratio (ICR)
- Exercise management
- Maybe some information of Glycaemic Index (GI)
- Maybe some information on meal planning

The education does the trick. Your blood glucose levels stay in target, and you are super motivated. Then Boom, reality hits! The remaining B-cells are killed off, and your motivation waivers. The honeymoon is over, and you start to notice a few things:

- Carbohydrate counting does not always work. Despite counting to the gram, your blood glucose goes really high when eating:
 - Pizza
 - Cheesy pasta dishes
 - Traditional English fry ups (toast, sausage, beans, bacon, egg)
 - Takeaways and fast foods meals
 - Three course meals with a big tasty dessert at the end
- When you have salad with a large protein source, your blood glucose level goes high despite having no carbohydrate on the plate.

When you have carbohydrate only meals, such as fruit, you go hypo

What do you do next?

Ask your diabetes team, Dr. Google, or the diabetes online community?

A mixture of all three most likely. This leads to a variety of different answers and solutions. Some of these sound familiar?

- You must not be counting your carbs correctly, get weighing again. Most often from your Diabetes Team. This is not disrespecting diabetes teams, as I am diabetes dietitian by trade, and I USED to say that all the time!
- You need to count every gram of protein and fat and adjust insulin according. Have you not heard of the Warsaw method?
- You need to match your insulin delivery to the insulin demand for the whole meal. Have you not heard of the Food Insulin Index (FII) and Food Insulin Demand (FID) system?
- Take the low carbohydrate approach, which comes in different guises:
 - Cut your carbohydrate to a lower amount, 50-200g per day, and up your protein and fat.
 - The Dr Bernstein approach. Cut your carbs right down to under 50g (ideally no more than 24g), up the protein considerably, and have moderate fat.
- Stop being a sugar burner, become a fat burner, Keto is the only way! Cut carbs to less than 50g per day, small to moderate protein, and fat should make up 70-80% of total energy intake.

What advice should you take?

This is the million dollar question. Unfortunately there is no simple answer that applies to everyone.

Some questions that are good to ask yourself;

- What impact will a certain type of diet have on my overall health in the long-term, even if it does improve my diabetes control?
- Does the diet provide my body with all the vitamins and minerals it needs to sustain my overall health?
- Can I honestly see myself sticking to the suggested food choices?
- Can I follow this when I socialise with friends?
- What insulin dosing strategy do I need use to get in target blood glucose levels with this type of diet?
- If I choose one diet today, does that mean I need to follow that for the rest of my life?
- Can I switch between different types of nutritional intake from meal to meal, day to day, week to week?

Today there is a wealth of information on the internet, and no shortage of people telling you there is only one way, THEIR WAY.

Some of the approaches are first class, some are money making scams, and others are promoted by people who have had enormous personal success, and think everyone should follow their approach.

The challenge is deciphering the Wheat from the Chaff.

I posed the above questions to myself nearly ten years ago. This led me to trying all approaches to see what works. It was a fun and challenging journey, but looking back, I realise I missed the most important questions:

- How much insulin do the B-Cells release after eating different combinations and amounts of carbohydrate, fat and protein?
- How much insulin is needed after eating for key metabolic processes, such as growth and repair?
- How much insulin is needed after eating to balance the effect of Glucagon, which is released from the A-Cells?
- Does it matter that I inject insulin, rather than having it delivered direct from the B-Cells?
- Are there any other hormones released from the B-Cells that need to be considered?

Answering these questions gave me the ability to match what my B-Cells would have done, if they were fully operational. If you invest the time to gain this knowledge, you can be very flexible with your dietary approach, whilst still achieving first class diabetes control.

Within these pages I have condensed ten years of research, clinical practice and experimentation to document:

- How the pancreas behaves after eating to keep blood glucose levels in target.
- What is different for people with Type 1 Diabetes.
- How the gap can be bridged with novel insulin dosing strategies.

Once you're comfortable with this, we will move on to critique the commonly used insulin dosing strategies.

Finally and most importantly, we will discuss which insulin dosing strategies best fit the different nutritional approaches. **This flips the current way of thinking on its head.** The traditional approach is;

"Here is your insulin dosing strategy, carbohydrate counting and an ICR, now fit your diet around it."

Imagine if it was the other way round;

"Choose the diet that best suits you and your goals, then select an insulin dosing strategy that matches it."

Before we get stuck in, I have to tell you there is some in-depth discussion regarding the physiology and nutritional biochemistry. If deep is not your thing, go straight to the summary sections for the highlights. If you love detail, you will love the full experience!

I hope you enjoy.

