

# Insulin Start Formulas

## BASAL INSULIN START

When basal insulin is added to non-insulin antihyperglycemic agents consider:

- 1. Diabetes Canada Guidelines: 10 units to start (individualized) or**
- 2. BBIT Guidelines: 0.1 to 0.2 units/kg**

- E.g. 100 kg X 0.1 or 0.2 = 10-20 units starting basal dose 100 kg client
- **Tip:** Take weight in kg and move decimal to the left for the LOWEST starting dose. Double that number for the highest starting dose.
- Actual needs can be significantly higher, particularly in those who are resistant, however start conservatively.

## BOLUS INSULIN START

- 1. Diabetes Canada Guidelines: 2 - 4 units per meal or**
- 2. BBIT Guidelines: 0.05 - 0.1 units / kg = units per meal**

- E.g. 100 kg X 0.05 or 0.1 = 5 -10 units
- **Tip:** Take weight in kg and move decimal to the left for the HIGHEST starting bolus dose per meal. Cut this in half for the lowest starting bolus dose per meal.
- When to start bolus: If on > 0.5 units basal insulin per kg and not at target, consider adding bolus soon (consider A1c, age, complexity, etc).
- Actual bolus needs can be significantly higher, particularly in those who are resistant, however start conservatively.

## BASAL & BOLUS INSULIN THERAPY (BBIT) START

- **Starting TDD = 0.5 - 1.0 units/kg/day**  
(0.3 - 0.5 u/kg/day if more sensitive to insulin; 0.5 - 1.0 u/kg/day if more insulin resistant)
  - Daily basal insulin = 50% of TDD
  - Daily bolus insulin = 50% of TDD (distributed amongst 3 meals)
  - Or, if mixed insulin (e.g. 30/70) loosely 2/3 of TDD pre-mix at breakfast and 1/3 at supper.
- **Tip:** If resistant consider this shortcut:
  - half the weight in kg = total daily basal units
  - half the weight in kg = total daily bolus units (distribute over 3 meals)
- Example for 100 kg resistant patient
  - 50 units basal
  - 50 units bolus  
(50 / 3 meals = 16 units per meal but preferable to individualize.  
e.g. if breakfast is small and supper large, then distribute it proportionately)
- Assessing % basal in BBIT
  - Total daily units basal / TDD x 100 = % of insulin as basal  
e.g. 45 units basal for the day / 90 units TDD x 100 = 50% of insulin as basal

- For most people on BBIT, approximately 40-60% of their total daily dose of insulin (TDD) is basal insulin. This varies for those on partial-closed-loop insulin pumps due to algorithms. For those with low carbohydrate diets, expect higher % basal.

## CORRECTION OR ISF CREATION

1. To create an Insulin Sensitivity Factor (ISF) for RAPID insulin:  
**100/TDD = number of mmol/L 1 unit rapid will lower glucose level.**  
 E.g. 100/50 units TDD = 2  
 1 unit will drop glucose by about 2 mmol/L
2. To create an Insulin Sensitivity Factor (ISF) for REGULAR insulin:  
**83/TDD = number of mmol/L 1 unit regular insulin will lower glucose level.**  
 E.g. 83/30 units TDD = about 3.  
 1 unit will lower glucose by about 3 mmol/L
3. To use an ISF:
  - (Current Blood Glucose – target) / ISF= units to give to correct high glucose reading
  - e.g. If current BG 13 mmol/L , ISF is 2 and target is 7 mmol then:  
 $13 \text{ mmol/L} - 7 \text{ mmol/L} = 6 / \text{ISF } 2 = 3 \text{ units for correction}$
4. To create correction/ISF tables: See the [related heading on the ISF webpage](#).

## INSULIN TO CARB RATIO (ICR)

1. Method 1: Assuming premeal and post-meal glucose results are reasonable  
**Usable meal carb/units bolus insulin = ICR**  
 e.g. 50 g carb eaten / 5 units rapid = ICR 10  
 Therefore, 1 unit of bolus insulin is given for every 10 g usable carb eaten (often written as ICR 1:10)
2. Method 2: The 500 Rule **500/TDD=ICR**  
 e.g. 500 / Total Daily Dose of insulin of 50 units = ICR 10  
 Therefore, 1 unit of bolus insulin is given for every 10 g usable carb eaten
3. Adjusting ICR:
  - If glucose readings are **too high after meal**, consider reducing the ICR number. Have the patient work through an example to see if the change is appropriate.
    - ICR = 20 consider new ICR = 15
    - ICR = 15, consider new ICR = 12
    - ICR = 12, consider new ICR = 10
    - ICR=10 consider new ICR = 9 or 8
    - ICR = 9, consider new ICR = 8
  - If glucose readings are **low after meal**, consider increasing the ICR number. Have the patient work through an example to see if the change is appropriate.
    - ICR = 8, consider new ICR = 9 or 10
    - ICR = 10 consider new ICR = 12
    - ICR = 12 consider new ICR = 15
    - ICR = 15 consider new ICR = 20

- Another option, if pattern of highs at a meal, take the units of correction dose and add to the previous meals' bolus dose. Recalculate ICR using Method 1, above.
  - e.g. Before bedtime snack patient needs 3 units of correction dose most days as high readings. Add 3 units to the supper meal bolus dose to prevent the highs. Supper ICR = 10, usual supper 60 g carb, usual meal bolus (not correction) 6 units then the new ratio is 60 g carb / 9 units (6 units usual + 3 units added to prevent highs at supper) = ICR 7 (approx)

**References and notes:**

- TDD = Total Daily Insulin Dose
- Diabetes Canada <https://guidelines.diabetes.ca>
- BBIT = Basal Bolus Insulin Therapy according to [www.bbit.ca](http://www.bbit.ca)
- Above is posted on <https://diabeteseducatorscalgary.ca/medications/insulin/insulin-formulas.html>