

(Basal Testing with MDI)

Basal Testing with Multiple Daily Injections

by diaVerge Diabetes, with info from <http://integrateddiabetes.com/basal-testing/>

Vocabulary Used:

MDI = Multiple Daily Injections

Basal insulin = long acting insulin = long-term insulin = continuous, small dose background insulin in a pump

Bolus insulin = fast-acting insulin for mealtime or correction insulin dose

BG = blood glucose level = blood sugar level

BG meter = blood glucose meter = glucometer

mg/dL = milligrams per deciliter. Standard measurement for BG meters in the USA & other countries

mmol/L = millimoles per liter. Standard measurement for BG meters in the UK, Canada & other countries

The purpose of basal testing is to determine the proper basal dose of insulin without the impact of any food or bolus insulin in your body. This is shown with a steady blood sugar reading that does not change by more than 10 mg/dL (0.5 mmol/L) while fasting. To test your current basal rate of insulin, you need to either fast for a full 24-hour period, or schedule times of fasting at various parts of the day over the course of a week in order to see results for a full 24-hour average day.

If you choose to schedule your fasting in increments, it's recommended to divide 24 hours into 4 timeframes: overnight, morning, afternoon and evening.

Although basal tests can be conducted in any order, it's advisable to test the overnight basal rates first, and then move on to daytime testing & fine-tuning. Determining a proper overnight basal insulin dose does not mean that the same dose is correct for the daytime. Each phase of the day (morning, afternoon, evening, and overnight) should be tested independently.

Target different times of the day:

Morning fasting: Skip breakfast and don't eat until noon. Many who use intermittent fasting already do this daily.

Afternoon: Eat breakfast, but nothing else until a later dinner

Evening: Eat breakfast and lunch then nothing else afterward until breakfast the next day (or a small midnight snack if needed)

Overnight: You're already fasting. Nothing needs to be done except for testing and documentation every couple of hours.

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Two possible schedules:

1. **Choose 2-3 days in a row to test each of the 4 fasting phases.** Example: Monday, is morning fasting. On Tuesday, fine-tune and test the morning again. On Wednesday, test the morning again to make sure it's steady. On Thursday, test the afternoon, then confirm your fine tuning on Friday and Saturday, maintaining 2-4 days in a row testing each one of the fasting phases.
2. **Choose one of the 4 fasting phase to test each day in a week,** then repeat the following week to confirm any fine tuning. Example: Monday, is morning fasting, Tuesday is afternoon, Wednesday is evening fasting, Thursday is overnight, etc. Then repeat for the next week to test your results and changes. This requires more documentation to remember what you ate beforehand, what changes you made, and your exact results.

GUIDELINES FOR ACCURATE BASAL TESTING:

1. **No food being digested**
 - a. Do not consume any calories for at least 4 hours leading up to the basal test
 - b. The meal/snack preceding the basal test should be low in fat
 - c. Do not consume any calories during the basal test, unless your blood glucose drops low
 - d. You may have water, diet beverages and other non-caloric foods during the test
 - e. No caffeinated beverages during the basal test
2. **No bolus insulin dose working during the basal test**
 - a. Start testing at least 4 hours after last meal bolus dose or last correction bolus dose
 - b. Do not bolus during the test, unless your blood glucose is above 150 mg/dL / 8.3 mmol/L
3. **No changes in the body's normal glucose output**
 - a. No hypoglycemic episodes for at least 6 hours preceding the basal test
 - b. No illnesses during the testing (fever, infection, virus)
 - c. No steroid medications being used
 - d. Avoid testing basal rates within a week of starting a menstrual cycle
4. **Take your normal basal insulin dose**
5. **Maintain normal daily activities during basal test**
 - a. You may perform light/moderate exercise soon after your last meal/snack if it is your normal time to do so
 - b. Do not engage in heavy exercise once the basal test begins
6. **Check blood glucose level every 1-2 hours during daytime tests & every 2-3 hours during overnight tests**

EVALUATING RESULTS:

If your BG levels drop by more than 10-15 mg/dl during the fasting test periods, your basal insulin dose is too high. If BG levels rise by more than 10-15 mg/dl, the basal insulin dose may be too low.

The basal insulin dose should be adjusted very slowly and conservatively (normally 1-2u at a time based on your needs) and tested again over the course of 2-3 days before another change is made.

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This basal adjustment process becomes complicated when there is an upward trend in BG readings during some testing periods, but a downward BG trend during other times of the day.

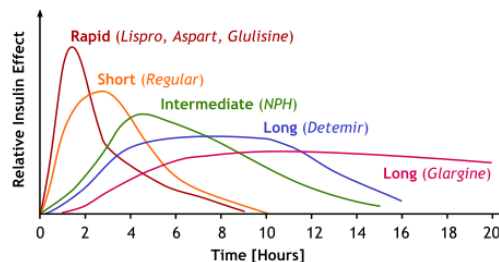
This means that the action profile for the basal insulin you're using doesn't match your basal insulin requirements. From the BG levels that you've recorded, you'll be able to see the nature and extent of the peaks and valleys in your current basal insulin regimen, then consider what to do.

Possible Options When Observing Multiple High/Low Basal Shifts:

1. Split the current basal insulin dose into 2 or more injections. Recommended splits are:
 - a. 2x per day for Tresiba, Lantus, Basaglar
 - b. 3x day for Levemir
 - c. 4x day for NPH
 - d. Please note, in my experience, Toujeo will last a full 24-hours and doesn't need to be split
2. Modify dosages to reflect the changes that need to be made. If you're experiencing lows overnight and high BG levels during the day, consider lowering your evening insulin dose slightly and raising your daytime dose slightly.
3. Switch to a different insulin that will better match your insulin requirements
4. Switch to an insulin pump instead of injections

Intermediate and long acting insulins have different duration of action:

- **Intermediate** = NPH, HumulinN, NovolinN, Protaphane
- **Long (Detemir)** = Levemir
- **Long (Glargine)** = Lantus, Toujeo, Abasaglar, Basaglar -- Although I've found these have much different action profiles, they are shown as one line on the chart below.



For more information, please contact diaVerge Diabetes www.diaVerge.com

**The information contained herein is to be used for educational purposes only and is not to be considered medical advice. Please consult your medical professional with all changes to your medication timing and dosage.*
