

Advanced Pumping

Diabetes Care Group

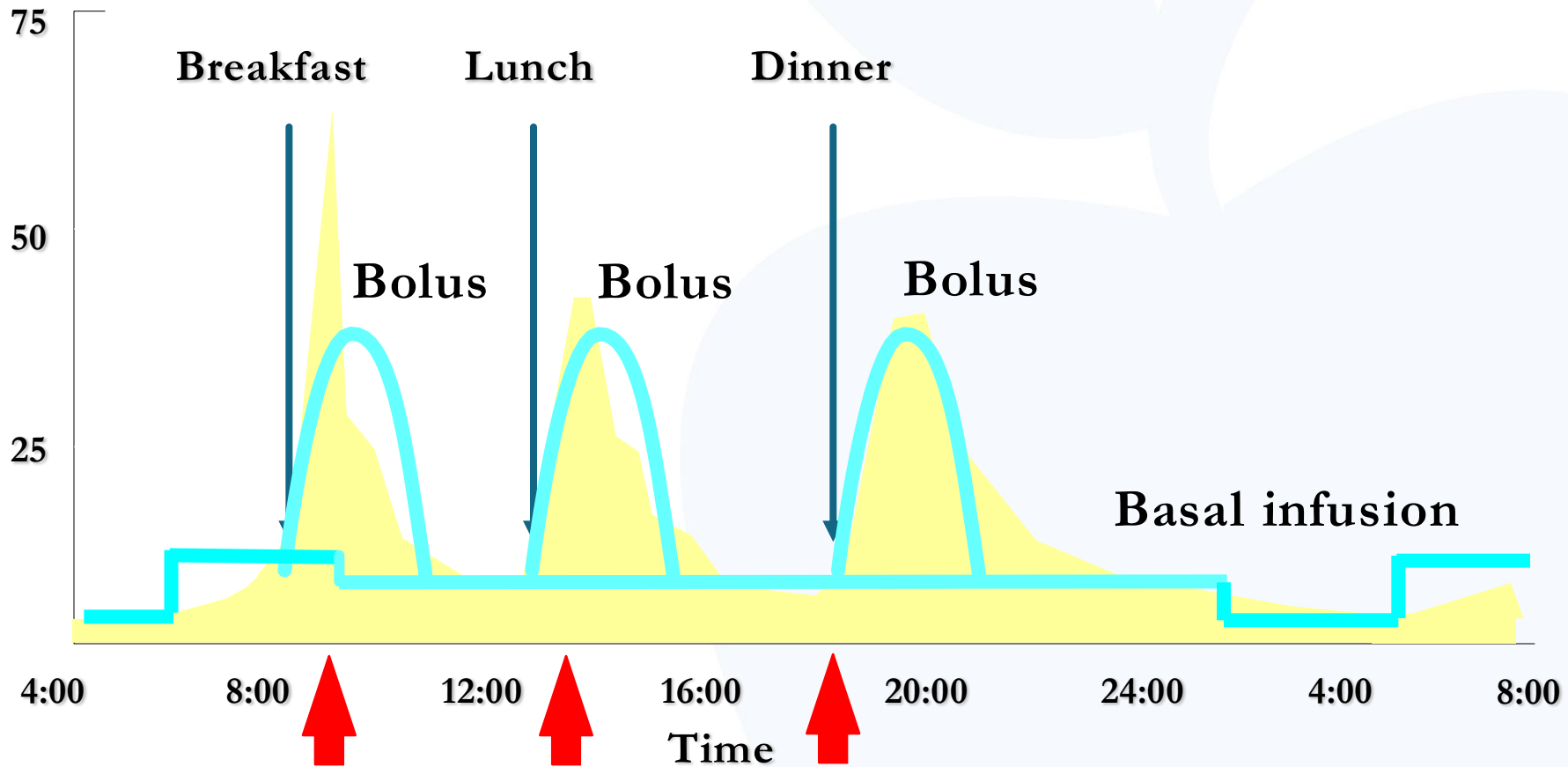
www.diabetescaregrp.com



Objectives

- To learn how to test basal rates for accuracy
- To learn how to test meal and correction bolus doses for accuracy
- To learn how to read nutrition labels and utilize books and websites for accurate carbohydrate counting
- To learn how to utilize the extended bolus feature for high fat meals and/or gastroparesis
- To learn how to utilize the temporary basal rate for activity, illness, and other special situations

Reviewing Basal & Bolus

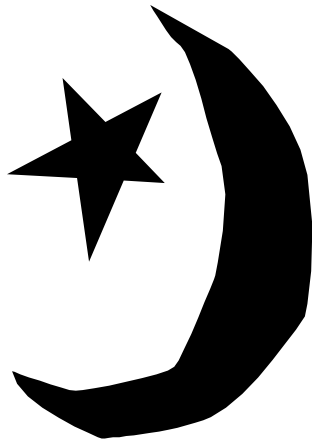


Basal Rate Testing Guide

- Basal rate tests are done by testing BG every 1 – 2 hours while fasting
- Basal rate tests can only be done if you have not had food or bolus insulin for the last 4 hours
- Basal rate tests must only be done if BG is in a normal range (about 80 – 150)
- Basal rate tests should be cancelled any time BG drops below 70 or goes above 240
- When conducting a basal rate test at the lunch or dinner time, choose a low-fat meal 4 hours before

Overnight Basal Rate Test

- Eat dinner at 6:00PM
- Bolus for dinner



✓ Blood Glucose

- 4 hours after dinner
- At midnight
- At 3 am
- Upon waking

- Only start the basal rate test if BG is within normal limits*
- Only cancel test if BG is less than 70 or greater than 240*

Breakfast Time Basal Test

- Check BG fasting
- DO NOT eat breakfast
- Check BG every 1 – 2 hours until lunch
- Only start test if BG is 80 – 150
- Only cancel test if BG is less than 70 or greater than 240

- EXAMPLE

Time	BG
6:00AM	106
7:30AM	118
9:00AM	132
10:30AM	167
12:00PM	162

Lunch Time Basal Test

- Eat breakfast and bolus
- NO food or bolus insulin for 4 hours
- Check BG at lunch time
- DO NOT eat lunch
- Only start test if BG is 80 – 150
- Only cancel test if BG is less than 70 or greater than 240

- EXAMPLE

Time	BG
11:30AM	136
1:00PM	131
2:30PM	108
4:00PM	82
5:30PM	69

Dinner Time Basal Test

- Eat lunch and bolus
- NO food or bolus insulin for 4 hours
- Check BG at dinner time
- DO NOT eat dinner
- Only start test if BG is 80 – 150
- Only cancel test if BG is less than 70 or greater than 240

- EXAMPLE

Time	BG
5:30PM	87
7:00PM	102
8:30PM	110
10:00PM	99

Insulin:Carb Ratio Testing Guide

- Check BG before eating
 - BG must be in target range (80 – 120) to conduct the test
- Count carbs and deliver bolus
 - You must count exact carbs for the test to be valid
 - You must choose a meal that is low-in fat
- Check BG 2 hours after eating
 - BG should go up about 40 – 80 points
- Check BG 4 hours after eating
 - BG should be back in target range

Evaluating your Insulin:Carb Ratio

- Check BG before eating; only start test if BG is 80 – 120
- Deliver carb bolus
- Check BG 2 hours after eating and bolusing
- Check BG 4 hours after eating and bolusing

- EXAMPLES

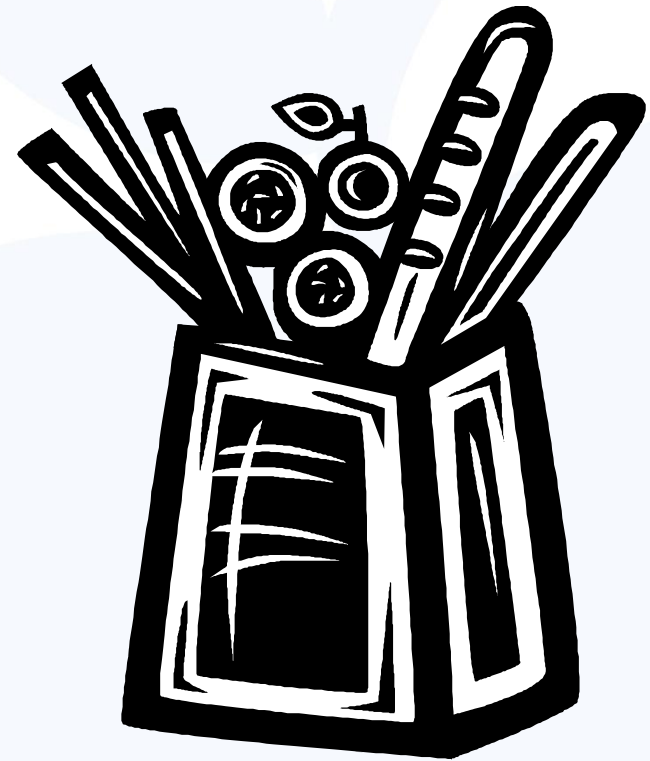
BG Before Eating	2hrs after	4hrs after
96	148	101
102	228	172
114	89	62
82	158	237
216	n/a	n/a

BG 2hrs after eating should be 40 – 80 points higher

BG 4hrs after should be back to normal

About the I:C Ratio

- Remember that there may be multiple ratios within a 24 hour period, so it is important to test each meal bolus
- Remember that you may be sensitive to certain foods, so it is important to repeat the test with different types of foods
- Typical initial changes range from 1-5 gm per adjustment



Evaluating your ISF/Correction

- Expect BG to return to target range 4 hours after a correction bolus.
- Expect BG to drop about 50 points in the first hour.
- Do not eat or take additional bolus insulin while conducting the test.

BG Before	2hrs after	4hrs after
275	198	114
301	248	187
263	101	52
199	108	86

RESOURCES FOR NUTRITION FACTS ESTIMATING CARB COUNTS

HYDRATE

ING



The Carbohydrate Facts

- What is carbohydrate?
 - The body's basic source of energy
 - Any food that contains sugar or that turns into sugar after eaten
- Which foods are considered carbohydrate?
 - Sweets and regular sugar beverages
 - Starches and starchy vegetables
 - Fruit
 - Milk

Carbohydrate Counting Resources

- Nutrition labels
- Internet Resources
 - www.calorieking.com
 - Restaurant Websites
- Books
 - The Complete Book of Food Counts by Corinne Netzer
 - Calorie King
- Pump food database

1 Starch = 15gm Carbohydrate

- Bread 1 slice
- Waffle/Pancake 1 small
- Taco/Fajita 1 small
- English Muffin 1/2 muffin
- Small Hamburger Bun 1/2 bun
- Small Bagel 1/2 bagel
- Cornbread 2" square
- Roll 1 small

1 Starch = 15gm Carbohydrate

- Potatoes/Sweet Potatoes $\frac{1}{2}$ cup
- Corn $\frac{1}{2}$ cup
- Dried Beans $\frac{1}{2}$ cup
- Peas $\frac{1}{2}$ cup
- Oatmeal/Grits $\frac{1}{2}$ cup
- Plain Cereal $\frac{3}{4}$ cup
- Rice $\frac{1}{3}$ cup
- Pasta $\frac{1}{3}$ cup

1 Fruit = 15gm Carbohydrate

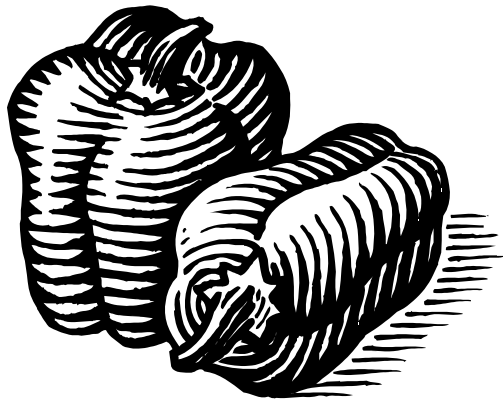
- Fresh Fruit 1 small
- Cantaloupe/Honeydew 1 cup
- Strawberries/Watermelon 1 $\frac{1}{4}$ cup
- Grapes 17 small
- Banana $\frac{1}{2}$ banana
- Canned Fruit $\frac{1}{2}$ cup
- Dried Fruit $\frac{1}{4}$ cup
- Juice (orange/apple/pineapple) $\frac{1}{2}$ cup

1 Milk = 12gm Carbohydrate

- 1 cup white milk
- 1/2 cup chocolate milk
- 1/2 cup evaporated milk



1 Vegetable = 5gm Carbohydrate



- 1 cup raw
- ½ cup cooked
 - Green Beans
 - Carrots/Beets
 - Broccoli/Cauliflower
 - Onions/Peppers
 - Squash/Zucchini
 - Cucumber/Tomato
 - Cabbage/Greens

Sweet Tooth Samples

- Brownie, unfrosted
 - 2” = 15gm carb
- Cake, unfrosted
 - 2” square = 15gm carb
- Brownie, frosted
 - 2” square = 30gm carb
- Cake, frosted
 - 2” square = 30gm carb
- Fruit pie
 - 1/6 of pie = 45gm carb



Facts on Fat

- Fat is more nutrient dense providing 9 calories per gram
 - Cutting out even a small amount of fat can significantly decrease total calorie intake
- Fat slows down the absorption of carbohydrate
 - BG may stay higher for longer if the meal contains a large amount of fat
- Fat causes the body to be more resistant to insulin
 - Insulin, produced in the body or injected, may not work as well since fat causes the cell to be more resistant

**TEMPORARY BASAL RATE
EXTENDED BOLUS**

UMP

What is a Temp Basal Rate?

- The temp basal feature allows you to adjust your basal rate temporarily without actually changing your basal rate program.
- The duration of temp basal can be adjusted from 30 minutes to 24 hours in 30 minute intervals
- Percent change and increments are pump specific

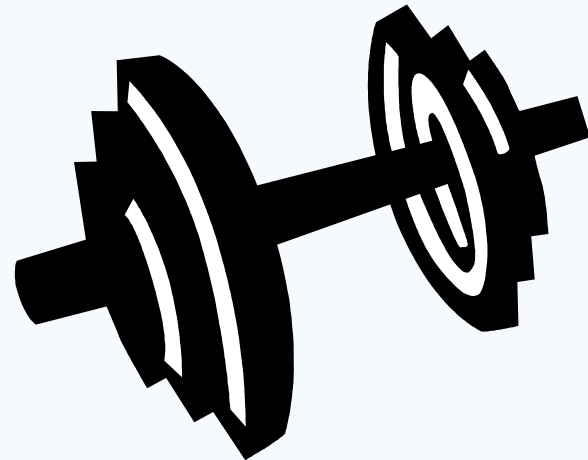
Reasons for Using Temp Basals

- Temp Increase:

- ✓ Illness
- ✓ Stress
- ✓ Pain
- ✓ Vacation/Travel
- ✓ Menstrual Cycle
- ✓ Steroid Therapy

- Temp Decrease:

- ✓ Exercise
- ✓ Vacation/Site Seeing



Are you Saying...

- If I don't eat a snack before exercise, I will go low.
- Every month before my cycle, my blood sugar runs high for a couple of days.
- I know when I ride in the car for at least an hour, my blood sugar will go up.
- Every time my mother-in-law comes over, my blood sugar runs high.

With Increased Activity

- Use a temp basal decrease
- Goal is to prevent hypoglycemia and avoid having to eat to keep up with the insulin
- Usually start at temp decrease of 30%, but this varies according to your own needs
- Start the temp rate $\frac{1}{2}$ to 1 hour before exercise and extend for at least twice the duration of the activity
- Test BG before, during, and after activity to troubleshoot the percent decrease and duration that is right for you

With Events that Raise Glucose

- Use a temp basal increase
- Usually start at temp increase of 20%, but this varies according to your own needs
- Goal is to prevent hyperglycemia and to avoid correction bolusing
- Rate determined by glucose level and your knowledge/comfort level with adjusting
- Use caution when setting a temp basal increase in overnight hours

Tips for Using Temp Basals

- Monitor your BG frequently when using a temp basal to evaluate the adjustment.
- If your BG is out of range due to the setting of a temp basal, you can cancel it at any time.
- If you set a temp basal increase in the overnight hours, be conservative, and check BG 1 – 2 times overnight
- If you are using a temp basal for most of the day, you may need a basal change or need to set an additional basal program.
- Practice setting and canceling a temp basal on a regular basis to keep up with the skill

What is an Extended Bolus?

- An extended bolus allows you to set a bolus to have a portion of the insulin delivered immediately and the other portion is delivered over an extended time period
- An extended bolus is used to better match carbohydrate digestion and absorption
- This feature is beneficial if you are eating a high fat meal or if you have gastroparesis

Using the Extended Bolus

- Calculate your meal bolus
- Choose the amount of insulin to be delivered immediately and the amount that you would like to extend
 - A good starting point is 40/60, 50/50, or 60/40.
- Choose the duration over which you would like to extend the second portion of the bolus.
 - A good starting point is 3 – 6 hours

Troubleshooting

- Check BG before the meal
- Check BG 2 hours after then 4 hours after the meal
- If BG is higher at 2 hours, you need more insulin on the front side
- If BG is higher at 4 hours, you need more insulin extended
- If BG is high at 2 hours and 4 hours, you need more insulin

What Would you Do?

- Consider that you have set an extended bolus of 50/50 over 4 hours
- What would you do?
 - Example 1
 - Example 2
 - Example 3
 - Example 4

BG Before	2 hours after	4 hours after
112	298	172
88	163	302
127	246	295
216	311	234

Tips for Using the Extended Bolus

- If BG is elevated before the meal, deliver a correction bolus first then set the extended bolus for the meal
- Note that you may need different percentages and durations for different foods
- Keep food, BG, and bolus information to track trends and troubleshoot the extended bolus
- If you deliver a normal bolus before considering an extended bolus, try using a temp basal increase for 4 – 6 hours instead

Summary

- Begin fine tuning your pump settings by testing your basal rates
- When testing your I:C ratio, be sure to choose foods with known carbohydrate that are low in fat
- Track trends of high and low BG to evaluate the need for a temp basal increase or decrease
- Keep detailed records when using an extended bolus to troubleshoot the percentage and duration for specific foods
- Download your pump to better recognize trends