Pumping INSULIN

Fourth Edition

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Everything You Need For Success On A Smart Insulin Pump

Spot Patterns And Stop Lows

CHAPTER 18

Low blood sugars that occur in particular patterns can be analyzed to find their cause. Appropriate basal and bolus or other adjustments can then be made. Frequent lows are a sure sign that too much insulin is being given. Low blood sugars are addressed first because this stops unwanted lows and often reduces the number of highs caused by overtreatment or excess stress hormone release. This chapter shows how to recognize trends and patterns associated with lows and suggests adjustments to be made.

This chapter presents

- How to look for patterns
- How to correct unwanted low patterns to help you stop lows
    - Frequent lows
    - Lows after eating
    - Afternoon lows
    - Low to high
    - Overtreating nighttime lows
    - Lows that follow highs
    - Lows after exercise

A patterns is any consistent repetition in your blood sugar over several days' time. At least a week's worth of records are needed to spot a pattern. Recognition of unwanted patterns allows basal rates and boluses to be adjusted so they fit your lifestyle and improve control.

How To Look For Patterns

Some people avoid looking at their blood sugar readings because they want no reminder of how bad things are or they have little hope of understanding and changing it. Unfortunately, this may hasten the path to complications or increase the frequency and severity of hypoglycemia. A person's readings reflect what is going on with lifestyle and health and this is not changed if they are ignored.

It may help to pretend your own readings belong to someone else if that makes it easier to study them and make changes. Consider your blood sugars as a game to play

or a challenge to solve. Readings outside your target range are simply a learning device. Believe in your ability to tackle any blood sugar problem you may be having. For help, show your records to a friend, your spouse, or a family member and ask them to help you spot your patterns.

When your blood sugar is not as controlled as you want, review your readings once a week to identify any changes you may need to make in doses, carb intake, or activity. Unless the control problem is severe, wait for a week's worth of readings to find a pattern. Identify problem patterns and make one correction at a time until you have a better pattern.

Patterns may occur several days in a row or may be random and occur only occasionally. If patterns are random, try to connect them to certain events. Listing likely causes helps. For instance, if you often have a low or high reading after a particular food or exercise, you have a much better idea of how to correct it.

Steps To Find Your Patterns

- Collect or download a week's records to carefully review
- Identify readings above and below your target range and when they occur
- Find a sample pattern in the pages that follow that matches your pattern
- Try one of the changes recommended to improve that pattern

To make it easier to spot patterns, test often and write down your results. Use a detailed record system like *Smart Charts* or an *Enhanced Logbook*, (See Figures 8.3 and 8.9 for examples.). If possible, regularly download the data from your pump and meter and use software to analyze these readings. Good records help you identify and solve blood sugar problems. When you record your blood sugars, food, exercise, stress, and insulin, you also give your physician or diabetes educator the data they need to help you correct unwanted patterns. Give them a call if you can't understand your readings on your own.

Some control problems may be caused by unusual circumstances, such as an infection, or starting a new herbal weight-loss medication that contains ma huang or ephedra or insulin that has lost its potency. Highlighted records allow occasional problems like these to be remembered and corrected more easily. Patterns are considered occasional when they occur only in specific circumstances, such as eating bean burritos for dinner.

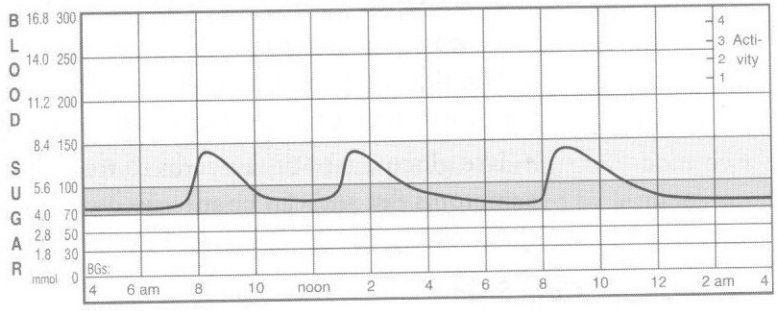
People who visually process information will see patterns quickly in a graphic record system like *Smart Charts* or the graphic display from a software program, whereas others who think in a more numeric or analytic way may see patterns best in a standard or enhanced logbook that lists numbers in columns. Any approach can work and both graphical and numeric are presented, though space allows only one graph and a simple rather than enhanced logbook to be illustrated. Use the method that fits your thinking process best.

A normal pattern, followed by common low blood sugar patterns throughout one day on a chart and several days on a logbook are shown in this chapter. Your own patterns may not stand out as clearly as the ones in these examples, but each example can assist you in recognizing patterns in general. Patterns for highs are shown in the next chapter. These patterns are ones you may encounter in your charts or logbooks. To spot a pattern on a chart or logbook, see if similar readings repeat several times over a few days in a row on your charts. Make lows and highs easier to spot on your charts or logbook by highlighting them in different colors or shapes.

The logbook that is used in the examples displays a simple logbook with only blood sugar readings and is not the most effective way to analyze patterns. However, they can be identified even with this simple tool. An enhanced logbook includes blood sugars, insulin doses, carb intake, exercise, and the time for each to help you find solutions more easily. For instance, if your breakfast carbs vary from 30 grams to 90 grams but you always take a 5 unit bolus to cover them, it is easy to see why your lunch readings are erratic. Simple logbooks do not allow you to record this detail, but an enhanced logbook does.

The blood sugar ranges on the left of the charts are given in both mg/dl for the U.S. and in mmol for Canada, Europe, and other countries. Suggestions to correct each pattern are given below them. For patterns that repeat regularly (i.e., high all the time or often low in the afternoon), insulin dose adjustments are usually needed. For occasional patterns, find a fix that can be reused whenever the circumstance that causes it arises.

Normal Blood Sugars



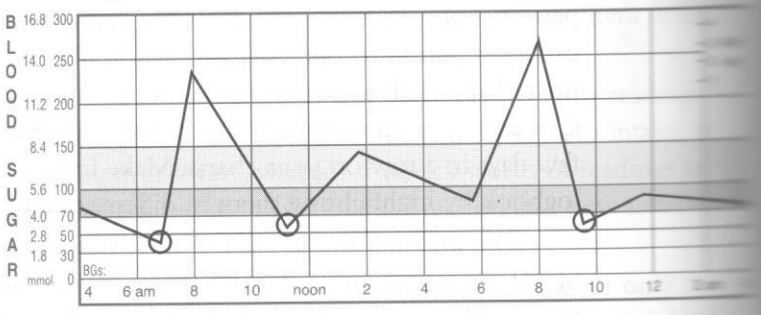
A normal blood sugar pattern is like the one shown here. It shows the normal rise and fall in the blood sugar before and after someone without diabetes eats. The blood sugar rises after eating, but the readings remain in a normal range. This is difficult with diabetes. If your readings come close to this graph, keep up the great work! Recording great readings becomes a reward of its own. A logbook of normal readings would show values in the shaded 70 to 150 mg/dl (4 to 8.4 mmol) range before and after meals, at bedtime and at 2 a.m.

How To Correct Low Patterns

Some low patterns occur often, while others tend to be random. Patterns of frequent lows, such as lows after eating, afternoon lows, or night lows, are usually easy to spot when highlighted with a colored marker. Other patterns, such as low-to-high, high-to-low, or exercise-related lows, occur less often. Some random low patterns are

easy to spot, while others require careful logging of associated events, such as changes in the time you exercise or eating unusual foods.

Frequent Lows



Frequent Lows

A pattern of frequent or severe lows requires a decrease in one or more insulin doses to prevent problems. When the insulin reduction is done carefully, the A1c will remain close to normal with less glucose variability. Try to prevent lows rather than having to treat them. A consistent blood sugar is what the body needs.

Frequent lows, such as the ones shown in the *Smart Chart* here, often cause high or erratic blood sugar readings. The chart and the accompanying logbook below show a pattern of lows that occurs when too much insulin is being given. The low blood sugar readings in this chart are circled.

What To Do

- Frequent lows are a sure sign of excess insulin. Lower your TDD by 5 to 10% as described in Chapter 10. Discuss how to reduce specific doses with your physician.
- Review your basal rates, bolus doses, and basal/bolus balance to determine where the excess insulin might be coming from. With your doctor's help, calculate new carb and correction factors after reducing your TDD.
- Use glucose tabs or fast carbs to treat all low blood sugars. Glucose tablets relieve symptoms fast and can be measured precisely to prevent overtreatment. Follow them with a cracker if you will not be eating right away.

Case Study

Frequent lows began to appear in Jeanine's logbook after she started a diet to lose an extra 15 pounds. Because she was eating fewer carbs, her doses at mealtime were lower but she had not lowered her basal rates.

When lows become frequent, the first thing to check is the basal/bolus balance to see which dose is greater. If either basals or boluses are considerably larger than the other, the larger one is likely the source for the lows. If they are close to each other, both may be contributing some of the excess insulin. Jeanine looked at a 7-day average of her doses and found that her TDD was 41.1 units, with 9.9 units a day (24.1%) used for carb boluses, 2.5 units (6.1%) for correction boluses, and 28.7 units (69.8%) a day for basal delivery. Her current basal rates make up 69.8% of her TDD, so this is most likely the source for the low readings she is experiencing.

In Jeanine's logbook, notice her blood sugar at bedtime on Wednesday night. This test was taken five hours after her dinner bolus so very little of her dinner bolus was still active. She took no correction bolus for this but her bedtime blood sugar fell anyway from 184 mg/dl (10.3 mmol) to 139 mg/dl (7.7 mmol) at 2 a.m. on Thursday and then to 73 mg/dl (4.1 mmol) at breakfast the following morning. This drop of 111 mg/dl (6.2 mmol) overnight is well beyond the 30 mg/dl (+0.8 to -1.7 mmol) rise or fall that is preferred during the overnight period. Other nights show a similar pattern and clearly indicate that Jeanine's overnight basal rates are too high.

Sugar	Breakfast Before	Breakfast After	Lunch Before	Lunch After	Dinner Before	Dinner After	Night Bed	Night 2 a.m.
Sun	(41)	163	(51)	147	90	196	(56)	92
Mon	(37)	186	89	121	(53)	203	128	132
Tues	63	119	(47)	174	66	163	(59)	177
Wed	94	131	63	110	(41)	237	184	139
Thurs	73	162	(38)	394	207	110	(48)	211
							65	70

Jeanine's logbook showing frequent lows

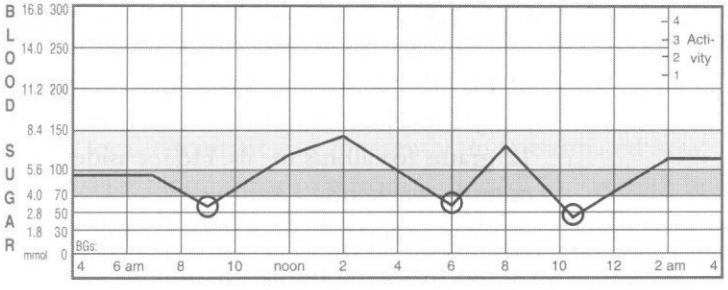
Her daytime basals are probably too high as well, given the high percentage of the TDD being used for basal delivery. It would be reasonable to lower the basal rates around the clock as a first step until further basal and bolus testing can be done. From Table 11.3, a basal reduction of about 1.3 total units overnight (a TDD close to 40 units with a drop of 111 mg/dl or 6.2 mmol overnight) and a reductions of about twice this amount for the 16 hours of her daytime basal will be needed.

When carb and calorie consumption is reduced at the start of a diet, there is an immediate need to lower carb boluses. Although the exact timing cannot be predicted, the basal rate usually needs to be reduced after a few days of successful dieting.

Jeanine had not told her doctor she was starting a diet, but when she finally called because of the lows, he recommended she lower her basal rates by 0.15 unit per hour around the clock right away. This equals 3.6 units over a 24 hour period. During the 8-hour overnight period, one third of this 3.6 units equals 1.2 units which multiplied by Jeanine's correction factor of 60 equals 72 mg/dl (4 mmol) less fall in her overnight blood sugar. This should bring her much closer to her target of falling no more than 30 mg/dl (1.7 mmol) overnight. Her doctor recommended that she test her new basals to validate them.

Lows After Eating

The pattern on the chart to the right looks similar to the previous pattern of frequent lows, but here the overnight basal appears to be fine because the blood sugar stays level overnight. The fall in the blood sugar is more likely caused by the excess carb boluses, especially if



Lows After Eating

the daytime basal rate is no higher than the overnight basal, or if daytime basal testing shows daytime rates to be appropriate.

What To Do

When lows occur after carb boluses, the solution is to increase the carb factor number to make carb boluses smaller. A check of the daytime basal rates would be needed to confirm that they are not the source of the excess insulin. Also check the basal/bolus balance. If carb boluses make up more than half of the TDD, raise your carb factor number to reduce carb boluses. For instance, if you use 1 unit for every 16 grams, try 1 unit for every 17 or 18 grams. If you are not certain about the accuracy of your carb counting, visit your dietitian and bring with you a detailed three-day diet diary to verify your carb counting.

Case Study

In Jeff's logbook to the right, his blood sugar goes low either right after a meal or before the next meal. He checked the history on his pump and found that his TDD averaged 40 units a day with 25.5 units (63.8%) for carb boluses, 0.8 units (2%) for correction boluses, and 13.7 units (34.2%) for his basal rates. He averaged 255 carbs a day in his diet and his basal/bolus balance was 34% for basal and 64% for boluses, suggesting his carb boluses were too high.

Sugar	Breakfast Before	Breakfast After	Lunch Before	Lunch After	Dinner Before	Dinner After	Night Bed	Night 2 a.m.
Sun	97	(60)	123	146	(53)	129	(42)	110
Mon	89	71	95	123	(37)	121	103	99
Tues	89	152	(45)	207	111	(56)	106	101
Wed	78	144	84	(41)	214	98	65	122
Thurs	100	137	92	151	83	141	107	154
							95	112

Jeff's logbook showing lows after eating

When his blood sugars go low only a couple of hours after eating, his carb boluses are obviously too large, especially since he uses such a low percentage of his TDD for his basal rates. His lows could also be caused by overcounting his carbs at meals, but this is unlikely because most pumpers undercount their carbs by about 30%.

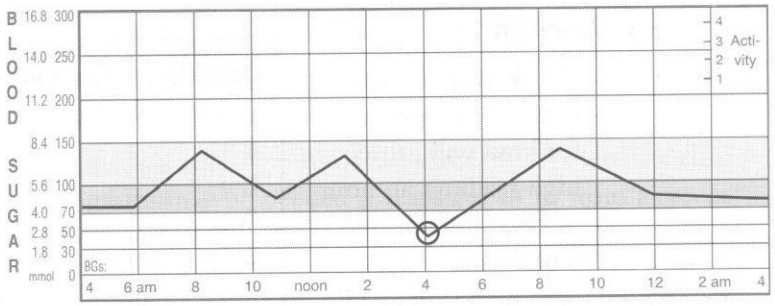
On Wednesday morning, Jeff's blood sugar was a bit low at 78 mg/dl (4.3 mmol), so he reduced his carb bolus from 7 units for 70 grams (1 unit for every 10 grams is his current carb factor) down to 5.8 units (or 1 unit for every 12 grams). That morning he did not have a low after breakfast. At lunch, he returned to using his normal carb factor of 1 to 10 but went low that afternoon and again at bedtime. On Thursday morning, Jeff decided it would be better to use the larger carb factor of one unit for every 12 grams for all his meals. He set aside time to recheck his daytime basal dose on the coming weekend.

However, he decided to call his doctor to discuss the situation. Jeff's doctor pointed out that even though he might have reduced the number of lows, he would continue to be getting a relatively high percentage of his TDD from carb boluses compared to his basal insulin. About six weeks earlier, Jeff had lowered his daytime basal rate from 0.8 u/hr to 0.5 u/hr because he was having so many lows. His doctor suggested he

lower his carb boluses even further by raising his carb factor number to 14 but then raise his daytime basal rates from 0.5 u/hr to 0.7 u/hr.

One way to determine whether the problem originates from basal or bolus insulin is to compare the contribution of each during a six hour period prior to the low blood sugar. For instance, when Jeff compared his basal rates and carb boluses prior to the low blood sugar of 45 mg/dl (2.5 mmol) at lunch on Tuesday, he found that he had gotten only 3.0 units of basal insulin over the previous 6 hours (0.5 u/hr times 6 hours) compared to the 6.5 units he had taken for 65 grams of carb for breakfast that morning. This suggests but does not prove that his carb boluses are causing the lows.

Afternoon Lows



Afternoon Lows

Low in the afternoon, shown on this chart, occurred 4 out of 7 days this week for Jody who works days as a parts picker in an automobile parts distributor plant. The late afternoon is a common time for many people to have lows, especially those who are physically active at work or school. An excess of insulin may accumulate at this time from the combination of the bolus dose given for lunch plus a basal rate that is too high in the morning and afternoon hours.

What To Do

To stop lows in the afternoon, lower the noon bolus or the late morning and afternoon basal.

Case Study

Sugar	Breakfast Before	Breakfast After	Lunch Before	Lunch After	Dinner Before	Dinner After	Night Bed	Night 2 a.m.
Sun	101	167	89	(43)	96	117	144	105
Mon	124	138	92	(51)	163	176	103	99
Tues	83	149	84	67	94	143	92	
Wed	88	241	143	103	(41)	139	107	93
Thurs	83	133	76	184	(52)	158	129	121
							115	100

Jody's logbook showing afternoon lows

Jody's readings on Sunday and Monday are typical of her problem with afternoon lows. On Wednesday morning, however, Jody stopped to eat breakfast at a local restaurant and apparently underestimated how many carbs were in her pancakes. Her blood sugar rose from 88 mg/dl (4.9 mmol) before breakfast to 241 mg/dl (13.4 mmol) afterward. She did not take a correction bolus for this high reading, so she was still high at 143 mg/dl (7.9 mmol) before lunch.

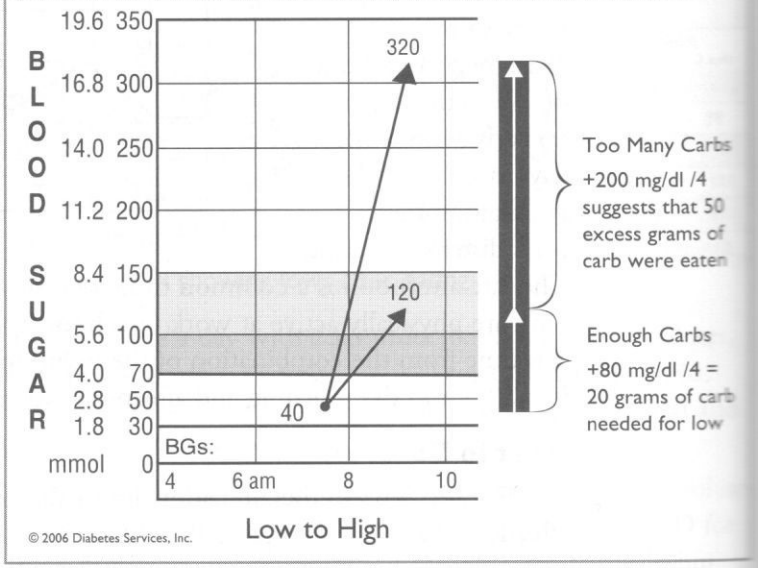
Because of her afternoon lows, she decided not to add any correction bolus for Wednesday's high lunch reading. Even though she took no correction bolus for lunch

that day, her blood sugar again went low before dinner. The low occurred just before dinner rather than in the middle of the afternoon because she started higher at lunch.

Jody checked her basal/bolus balance in her pump's history and found she had averaged 15.5 units (51 %) for basal and 14.7 units (49%) for boluses in the previous week. Because her basals and boluses are fairly even, she lowered her basal rates through the morning and afternoon hours from 8 a.m. to 4 p.m. by 0.05 u/hr and raised her carb factor for lunch from 1u/17 grams to 1u/19 grams. The combined dose reduction was enough to prevent all but one mild low over the next week. Jody felt better at work and safer on her drive home afterward.

Low To High

18.1 How Many Carbs Did You Eat To Treat A Low BG?



Eating too many carbs to compensate for lows will cause high readings an hour or two later. If your blood sugar often goes higher than 150 mg/dl (8.3 mmol) after lows, it is likely you are eating more than you need to treat these lows. Stress hormones released at the time of the low cause sweating and shaking and can raise the blood sugar, but will not cause a rapid rise over a short period of time as seen in the jump from 40 to 320 mg/dl (2.2 to 17.7 mmol) in Fig. 18.1 which is likely the result of overeating.

Look over your records or back through a download of your meter to see whether readings below 60 mg/dl (3.3 mmol) are followed by readings of 150 mg/dl (8.5 mmol) or higher. If highs often follow lows in your charts, you have a low-to-high pattern that is likely caused by overtreatment. One gram of carbohydrate raises the blood sugar between three and five points for most adults, so only 15 to 20 grams of quick carbohydrate is typically needed to stop most lows.

If a blood sugar is done when you are low, your pump can tell you how many carbs you need to treat that particular low (see Textbox 5.5). If you are too confused to do bolus tipping right away, eat 20 grams of carbs and check your pump for its suggestion once you can think clearly.

What To Do

18.2 How Much 1 Gram of Carbs May Raise Your BG	
If your weight is:	**1 gram will raise you about:**
50 lbs (23 kg)	8 mg/dl (0.44 mmol)
75 lbs (34 kg)	7 mg/dl (0.39 mmol)
90 lbs (41 kg)	6 mg/dl (0.33 mmol)
120 lbs (55 kg)	5 mg/dl (0.28 mmol)
160 lbs (73 kg)	4 mg/dl (0.22 mmol)
200 lbs (91 kg)	3 mg/dl (0.17 mmol)

Be patient when treating lows. Fast carbs require 15 or 20 minutes to raise the blood sugar. Once stress hormones have been released, they can make you feel hungry for much longer than this. Get in the habit of using only glucose tablets or fast-acting carbs for lows if you have been overtreating them. Do not eat more than 20 grams of fast carbs unless there is a clear reason to do so. More than 20 grams may be needed if you have BOB from a recent carb or correction bolus or if extra activity is the reason for the low.

If you do overeat, calculate how many grams of carb you actually consumed, and enter this amount as carbs to be eaten into your pump, along with your blood sugar reading, and let your pump calculate the bolus you need to cover these carbs. (Use this method only if your pump automatically discounts your BOB from your carb boluses, as discussed on page 48.) A slightly smaller bolus than the one recommended can be taken for safety if you wish. Taking a bolus may seem strange when you are low, but it's exactly what is needed to cover the excess carbs and prevent a high reading later. A test of your blood a couple of hours later will ensure you did not bolus too much.

Take time to think through what caused the low and whether any changes are needed in your basal doses, carb factor, or correction factor so that you will not encounter another one.

Case Study

Sugar	Breakfast Before	Breakfast After	Lunch Before	Lunch After	Dinner Before	Dinner After	Night Bed	Night 2 a.m.
Sun	193	287	212	127	(40)	320	273	142
Mon	132	125	(48)	219	171	152	107	91
Tues	84	73	216	(58)	248	(39)	211	71
Wed	(53)	347	227	184	132	63	188	142
Thurs	134	167	118	169	126	141	(53)	277
							95	110

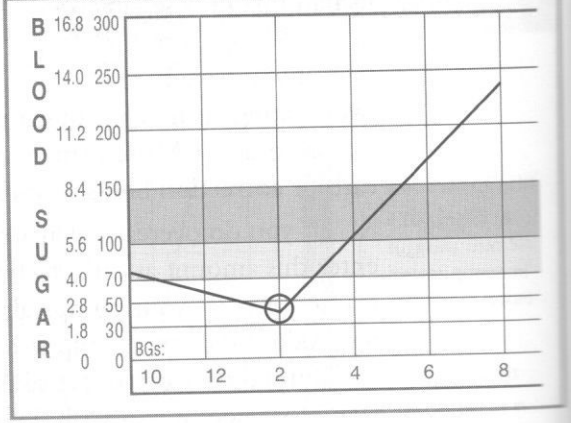
Joe's logbook showing low to high

Several times in the last couple of weeks Joe has had low to high readings. On Monday, Joe was low before lunch, ate two candy bars, and went high afterward even though he took his usual bolus for lunch. It took over six hours to bring his reading back down. The physical or emotional discomfort of being low can cause a person to overtreat it to try to feel better right away. Focus first on preventing lows, but remember it is important to not overtreat them and cause rebound highs.

Joe called his physician to review what to do about having so many lows. His doctor scanned the readings he had faxed and told him he needed an immediate reduction in his TDD from 38 units to 35 units a day. To do this, Joe raised his carb factor from 1/13 to 1/14 and lowered his basal rate by 0.05 u/hr from 5 a.m. through 9 p.m. On the way home from work that day, he stopped at his pharmacy and bought a large bottle of glucose tablets to have available whenever he goes low so he would not overtreat it. These steps helped smooth out his blood sugars and he felt a lot better. His A1c dropped from 7.4% to 6.6% four months later, and he felt much more capable of controlling his readings.

Overtreating Nighttime Lows

18.3 Overtreating Nighttime Lows



When the blood sugar goes low during the night and you awaken sweating and shaking, it is especially hard to be rational. You may not be thinking clearly and the fear and confusion plus extreme hunger that accompany a low makes emptying the refrigerator seem quite sane. Overeating, however, only makes your blood sugar sky-high the following morning and for several hours through the day. The graph shows a low during the night and the blood sugar as it climbs high before breakfast after excess carbs were eaten during the night to treat the low.

What To Do

When you have recovered, determine why your nighttime lows happen. If night lows occur often, reduce the evening basal rate or the dinner carb bolus as needed to stop them. If the low happens only after increased daytime activity, eating extra carbs at bedtime on active days may be the perfect solution. If nighttime hypoglycemia occurs only after a correction bolus is taken for a high blood sugar at bedtime, use a larger correction factor for the after dinner hours to make the correction boluses taken near bedtime smaller.

Keep glucose tablets or other fast-acting carbs at the bedside and use them routinely for all night lows. Even in the panic of a serious nighttime low, it is harder to overdose on glucose tablets than it is with cookies and candy. Once sufficient fast carbs are eaten, wait five or ten minutes for your appetite to ease. Then have a small amount of slow-acting carbs to ensure against another low.

Case Study

As can be seen in his logbook, Jared has been overtreating his night lows. He found he could stop the high breakfast readings by keeping glucose tablets on his night stand and using only three tablets. To stop the night lows, he reduced his basal rate between 6 p.m. and 2 a.m. by 0.1 u/hr. This stopped his night lows

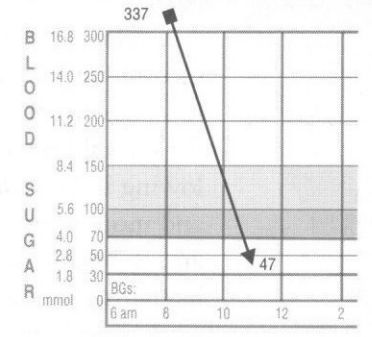
Sugar	Breakfast Before	Breakfast After	Lunch Before	Lunch After	Dinner Before	Dinner After	Night Bed	Night 2 a.m.
Sun	185	341	188	162	76	142	96	(37)
Mon	284	289	204	187	123	163	132	(53)
Tues	259	323	225	156	98	138	105	89
Wed	102	291	198	182	143	189	116	(46)
Thurs	287	284	233	142	107	154	93	(48)
							122	

Jared's logbook showing overtreating lows

Lows That Follow Highs

Plummeting from a high to a low blood sugar over a two- to-four hour period may be caused by a correction bolus that is too large, by two or more boluses that overlap, or by a duration of insulin action that is set too short in your pump. A high to low pattern is shown in the graph to the right. If this pattern is seen several times on your charts, you will need to discuss it with your doctor.

18.4 Lows Following Highs



What To Do

If you frequently go from highs to lows, the size of your correction boluses needs to be reduced. Even if it happens only occasionally, you want to be able to lower high readings safely. When lows follow highs, the most likely cause is a correction factor that is too small, which makes your correction boluses too large. Calculate and retest your correction factor. Raising your correction factor gives you less insulin in your boluses. For instance, if your correction factor is 50, use 55 or 60 instead. Recalculate by using your current TDD and the 2000 Rule in Table 13.1 to determine how many points you are likely to drop per unit. Stop these lows first, then work on any highs if this is still a problem.

Be sure that your duration of insulin action is set for a long enough time, usually 4.5 to 6.5 hours. A short duration of insulin action (DIA) makes residual insulin from previous boluses appear to be less than it actually is, causing high readings to be overtreated and excess insulin to be taken for any carbs eaten during this time. Once the DIA is correctly set, your pump will not give a correction bolus that is too large.

On a smart pump, only a single premeal target and a correct DIA are needed for the pump to accurately calculate boluses. However, if you ever need to calculate your own correction doses on a syringe, keep in mind that your postmeal target will be a higher one than what is used before meals. For example, if 100 mg/dl (5.6 mmol) is the premeal target, a realistic postmeal target would be 150 mg/dl or 180 mg/dl (8.3 or 10 mmol). Be sure to consider how long after a meal a blood test is taken when

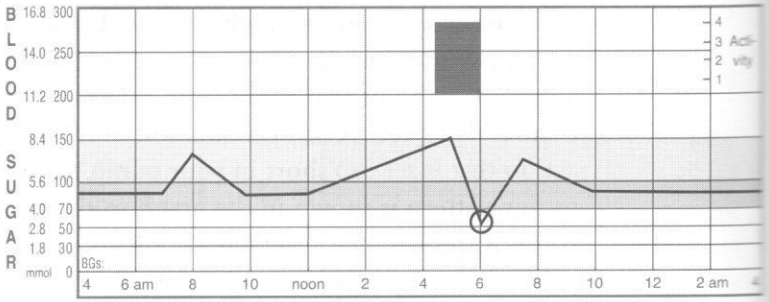
considering whether a reading represents an actual high.

Sugar	Breakfast Before	Breakfast After	Lunch Before	Lunch After	Dinner Before	Dinner After	Night Bed	Night 2 a.m.
Sun	96	127	82	337	(41)	168	129	128
Mon	137	179	138	162	107	171	141	125
Tues	119	284	(51)	117	84	136	91	84
Wed	73	121	87	148	121	345	(38)	167
Thurs	155	173	96	71	276	(53)	164	114
							95	110

Lows that follow highs

If you feel frustrated or uncomfortable when you are high and use boluses that are too large to lower highs quickly, start practicing some self-restraint. Letting it take a little longer for your blood sugar to come down can prevent many unnecessary lows. Focus on preventing the highs in the first place rather than overdosing to lower them too quickly.

Lows After Exercise



Lows After Exercise

Extra activity or exercise can cause lows during, after, and for several hours following it. The longer and more intense an activity, the more likely that immediate or delayed lows will occur. Use your *Smart Charts* or notes to record exercise and match it to your food or premeal bolus so that appropriate blood sugars will follow.

What To Do

As discussed in Chapter 23, the effect that extra activity has on your blood sugar depends on how strenuous it is, how long it lasts, and how much insulin you have in your blood at the time. Mild to moderate activity that lasts less than 30 to 45 minutes will not require as much extra carb intake or as much reduction in insulin doses as longer and more intense forms of exercise. Table 23.5 provides guidance for carb and insulin adjustments for the amount of activity.

First check that your basal and bolus insulin doses are balanced well during the time you exercise. If they are, Excarbs can be estimated using Table 23.6. Use this table to judge how many replacement carbs are needed for your particular activity.

Summary

It is very important to adjust basals and boluses to stop lows. When you encounter low readings, look for any patterns in your blood sugar readings and decide on a plan to stop them. Match your pattern of lows to one of these for suggestions on how to adjust insulin doses to solve the problem.