

# AgaMatrix®

Advanced Blood Glucose Monitoring



## PATTERN MANAGEMENT

From the makers of

WaveSense JAZZ™



# WHAT IS PATTERN MANAGEMENT?

Pattern Management is a technique where patterns of blood glucose results that fall out of range are identified and lifestyle factors and or treatment regimen are modified to bring the blood glucose readings back into range.

If an out-of-range result occurs three times or more and a pattern can be identified, i.e. it occurs at the same time every day, or the same time every week, or the same time after an event that reoccurs, then this would indicate a change in regimen is required.

For example, John usually walks his dog after dinner every evening. On Thursday evening, his wife did, therefore explaining the one-off higher than usual reading and so no change is required. However, the sequence of high pre-lunch readings, as below, indicate a change in regimen is required.

## ► John's Target: 4-7 mmol/L

	Pre-B'fast	Post-B'fast	Pre-Lunch	Post-Lunch	Pre-Dinner	Post-Dinner	Night
<b>Tues</b>	5.4	6.7	<b>8.1</b>	6.9	4.5	6.1	6.3
<b>Wed</b>	7.0	6.8	<b>7.6</b>	7.0	5.9	5.4	5.7
<b>Thurs</b>	6.3	5.7	<b>8.9</b>	6.7	4.9	4.5	<b>8.4</b>
Change Required ↑				No Change Required ↑			



# WHAT IS REQUIRED FOR EFFECTIVE PATTERN MANAGEMENT?

- A personalised blood glucose target range.
- Effective blood glucose monitoring.
- An understanding of the variables that affect blood glucose.

## ► A personalised target range

Your individual circumstances will determine the blood glucose level target you are given in collaboration with your healthcare professional (HCP). Write your blood glucose level target/s in the table to the right if you wish. You may have been given more than one target to aim for.

If you are unsure of the target ranges you should be aiming for, ask your HCP.

Blood Glucose Level Targets		
<b>Fasting*</b>	–	mmol/L
<b>Pre-meal</b>	–	mmol/L
<b>Post-meal</b>	–	mmol/L
	<input type="text"/>	hours after eating
<b>Other</b>	–	mmol/L

\* First test of the day on waking, before eating or drinking anything.

## ► Effective blood glucose monitoring

Use the same type of meter where possible and always wash your hands in warm soapy water, rinse and dry thoroughly to encourage consistency and accuracy.

Whether handwriting or downloading results to an app or software on your PC, the more information you can record will aid your ability to get a full picture of your blood glucose control and the variables that affect it.

Recording of readings, the mealtime occasion, insulin dose, carbohydrate intake, and any notes on other factors such as meal choice, activity or wellbeing to give context to out-of-range results is helpful.

## ► An understanding of the variables that affect blood glucose

Medication, food intake, exercise, stress, illness and hot weather are all factors that affect blood glucose levels. Some of these make levels go up, while some make them go down. Exercise is the exception because it can do one or the other or even both. Each of these variables are discussed in more detail next.

# Variables that affect blood glucose

## 1. Medication for Diabetes

People with **Type 1** diabetes will always be prescribed insulin as there is a total absence of insulin production. There are different types of prescribed insulin which perform at different speeds and for different lengths of time. Understanding how your insulin/s works will go a long way to helping you manage your blood glucose levels.

People with **Type 2** diabetes may be able to manage their diabetes with diet and lifestyle alone. Some may need the help of tablets, non-insulin injectables or insulin injectables all of which vary in how they work. Again, understanding how your medication works will help you identify the changes that could be made to better manage your blood glucose levels.

Always consult your HCP before making a change to your medication unless you have been on a carbohydrate counting training course (such as DAFNE) which is designed to enable self adjustment of rapid-acting (mealtime) insulin.

## 2. Food Intake

All carbohydrates break down into glucose during the digestion process. The glucose then enters the blood stream.

The rate at which a carbohydrate will convert to glucose and absorb into the bloodstream will vary depending on the type of carbohydrate. Carbohydrates come in two forms;

- **Sugary carbohydrates** found in sweets, soft drinks, fruit, cakes and biscuits are quick to convert to glucose and cause a fast spike in blood glucose.
- **Starchy carbohydrates** found in flour, rice, potatoes and pasta can have a slower conversion and release over a longer period of time resulting in a more stable blood glucose profile.

Fibre slows down the conversion of carbohydrate to glucose so choosing foods with higher fibre content such as brown rice and wholemeal pasta and bread over the white variants will help. Fat also slows down the conversion rate of carbohydrate to glucose although fat should only be eaten in moderation as part of a balanced diet.

Fibre and Fat content are linked to the Glycaemic Index (GI) of a food. GI is the ranking on a scale of 0 - 100 on the rate at which blood glucose rises. Glucose has a GI of 100. Low GI food will raise blood glucose levels slower and without the peak experienced with high GI foods. The chart on the next page has examples of food products and their corresponding GI levels.

## GI Values of Certain Foods

	Low		Medium		High	
Breakfast Cereal	All-Bran™	42	Special K™	69	Cornflakes	93
Bread	Chapati	50	Granary Bread	62	White Bread	72
Vegetable	Broccoli, boiled	45	Beetroot, boiled	64	Parsnip, boiled	97
Fruit	Cherries	22	Banana	52	Melon	72
Snack	Peanuts	14	Low Fat Potato Crisps	54	Plain Popcorn	72

For information on more food items, visit <http://www.diogenes-eu.org/GI-Database/Default.htm><sup>1</sup>

A low GI diet is a healthy choice for everybody, not only people with diabetes. A low GI diet has shown to improve blood glucose levels in people with diabetes and can help to control weight as it helps to delay hunger and reduce appetite.

### 3. Exercise

Exercise can be a little more unpredictable. For many people, exercise lowers blood glucose as working muscle needs more glucose than resting muscle. For some people, exercise can increase blood glucose levels due to the release of stress hormones during exercise.

Regular exercise will reduce stress on your body as fitness improves and therefore reduce the release of these hormones and subsequent raised blood glucose levels. Overall, exercise and fitness is important for medium- to long-term good health, weight management, emotional well-being and improved blood glucose levels.

Regular blood glucose testing, before during and after exercise, will help you understand your body's typical response to exercise and help you to plan any required intervention.

### 4. Stress

Unfortunately, stress is a part of everyday life and is experienced at different intensities and comes from many sources such as work, family life, relationship issues, financial worries and larger life-events such as bereavement.

When experiencing emotional stress, the body's response is to release "fight or flight" hormones which raise blood glucose levels. Being aware of your stress levels will help you to make appropriate decisions to better manage your diabetes.

### 5. Illness

Illness puts increased stress on our body which results in the possibility of stress hormones being released. As previously mentioned, these hormones

can increase blood glucose levels. For this reason, always take your medication even if you are eating less.

In the event of loss of appetite try to eat something that is easy to digest, such as soup and drink plenty of fluids. Aim for 4-6 pints of sugar-free drinks per day. It is important to prepare a plan for sick-days in advance. Agree with your HCP the frequency of testing and what to do if your blood glucose levels are high.

## 6. Hot Weather

Metabolism increases during hot weather as our bodies expend more energy trying to stay cool. Couple this with the fact that most people increase their activity during summer as we get out and about more, then a lower blood glucose level is a real possibility. This increases the risk of a hypoglycaemic episode for people on hypo-inducing medication.

Drink more fluids and test your blood glucose level more frequently. Some people may mistake the symptoms of a hypo for the effects of hot weather such as sweating and tiredness. Be extra cautious when driving and make sure you carry hypo treatment wherever you go.

## PATTERN MANAGEMENT IN PRACTICE

Read on for examples of pattern changes and possible solutions.

### ▶ Emily (Type 1, on insulin) – Target Range: 4 - 7 mmol/L

	Pre-B'fast	Post-B'fast	Pre-Lunch	Post-Lunch	Pre-Dinner	Post-Dinner	Night
Mon	6.9		7.6		6.5	7.1	
Tues	8.1		6.5		7.0	8.0	8.4
Wed	7.1		8.8		7.3		7.5
Thurs	8.4	8.9	8.0	8.2	7.9	8.9	9.0
Fri	7.6	9.0	6.9		8.0	7.8	8.5

Emily's usual good control has seen a large shift this week and consistently high results are being recorded.

Emily recognises that her stress levels are high and understands that stress can increase blood glucose. As she is approaching her A-Level exams and revision is at its height, Emily talks to her HCP and together they decide that she needs to increase her long-acting (basal) insulin to see her through the next 6 weeks of revision and exams and reassess once they are over.

### ► James (Type 1, on insulin) – Target: 4 - 8 mmol/L

	Pre-B'fast	Post-B'fast	Pre-Lunch	Post-Lunch	Pre-Dinner	Post-Dinner	Night
Mon	5.6	8.0	6.8	11.2	6.4	4.7	6.1
Tues	7.9	6.9	5.4	7.6	5.4	6.1	5.4
Wed	6.1	7.5	4.7	10.3	5.9	4.9	7.8
Thurs	6.6	7.1	6.1	8.0	6.1	6.1	5.9
Fri	6.8	7.9	4.9	10.5	7.2	6.6	8.1

James noticed his post-lunch readings were above his target range on a few occasions. After thinking about his weekly routine James worked out that the days his blood glucose results were in range were the two days of the week (Tuesday and Thursday) that he went to the gym at lunchtime. James didn't want to go to the gym everyday or reduce the amount of carbohydrate he ate at lunch so after discussion with his HCP, James increased his lunchtime rapid-acting (bolus) insulin dose by one unit on non-gym days.

### ► David (Type 2, Diet Controlled) – Target: 4 - 7 mmol/L

David's blood glucose readings were generally in range. However, occasionally his pre-breakfast (fasting) blood glucose would be very high. After giving the situation some thought, David realised that it was on the morning after social meetings with friends over dinner that was causing the increases.

To counteract high blood glucose after these social dinners, David started walking to and from the town centre which was a mile away, instead of driving. This made a significant difference to his "morning-after" readings.

### ► Susan (Type 2, on Metformin) – Target: 5 - 8 mmol/L

Susan sometimes feels shaky and weak. On running a blood glucose test when she feels like this, it becomes clear that her blood glucose level is low.

Susan spoke to her HCP about reducing her medication but her HCP was reluctant to agree to this as Susan's blood glucose levels mostly hover around the top end of her target range.

After further questioning about events prior to low blood glucose levels the HCP realises it's after Susan has exerted herself more than usual. Events that were causing the low blood glucose levels were a surprise to Susan: Events such as looking after her two young grandchildren one day a week or shopping. Susan's HCP advised her to increase food intake by introducing a healthy snack between meals on the days she's moving more.

## IN SUMMARY

With regular testing and good record keeping you should be able to get a feel for the factors that are affecting your blood glucose control, in which way, and to what extent. With practice, you should be able to identify a pattern and understand your options.

Remember, one or two results outside of your target range is a nudge to think about what might have caused that out-of-range result. A pattern of 3 or more out-of-range results is the trigger to make a change.

Only ever change 1 variable at a time and give the change a chance. It might take a couple of days for the change you make to show as a new pattern.

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*This guide is intended to help you achieve better control of your diabetes. The information in this guide is not intended to replace the advice of your healthcare professional. Always consult with your healthcare professional for further information, recommendations, and treatment decisions.*

## For other leaflets in this range go to [www.agamatrix.co.uk](http://www.agamatrix.co.uk)

### **AgaMatrix Europe Ltd**

Harwell Innovation Centre, 173 Curie Avenue

Harwell Oxford, Oxon, OX11 0QG

Tel. 0800 093 1812

Email. [info@agamatrix.co.uk](mailto:info@agamatrix.co.uk)

[www.agamatrix.co.uk](http://www.agamatrix.co.uk)

<sup>†</sup> Aston, L. M., Jackson, D., Monsheimer, S., Whybrow, S., Handjieva-Darlenska, T., Kreutzer, M., Kohl, A., Papadaki, A., Martinez, J. A., Kunova, V., Van Baak, M. A., Astrup, A., Saris, W. H. M., Jebb, S. A., and Lindroos, A. K. (2010). *Developing a methodology for assigning glycaemic index values to foods consumed across Europe*. Obesity Reviews, 11: 92-100. doi:10.1111/j.1467-789X.2009.00690.x