



STRAIGHT TO THE POINT

**A Guide For Adults Living
With Type 1 Diabetes**



JDRF IMPROVING
LIVES.
CURING
TYPE 1
DIABETES.

Jane Overland Michael Sluis Rachel Reyna

ACKNOWLEDGEMENTS

This book was written by:

Dr Jane Overland NP CDE MPH PhD

Michael Sluis

Rachel Reyna

The third edition of this book also contains contributions from:

Dr Carmel Smart APD BSc PostGradDipNutrDiet PhD

Dr Kirstine Bell APD CDE PhD

Lucy Casson RN NP DIP HE BA (Hons), MA (Nurs Prac) CDE

Lisa Engel D. Psych (Health) CDE

We're grateful to the following people for sharing their personal stories:

Bree Hafsteins

Lee Howard

Dania Ibrahim

Lara McSpadden

Piers Nelson

Dr Jeremy Robertson

This book is dedicated to Rachel Reyna

Editor – Gayle McNaught

Graphic Design – Melissa Rohozynsky

Copyright 2008 Juvenile Diabetes Research Foundation Australia. First Edition 2008.
Reprint 2010. Second Edition 2013. Third Edition 2019. ISBN 978-0-9805681-0-3

JDRF Australia PO Box 183, St Leonards NSW 1590.
P: (02) 9020 6100 W: www.jdrf.org.au E: info@jdrf.org.au

ABOUT JDRF

JDRF was founded in 1970 by a group of parents dedicated to improving the lives of their children by finding and funding the most promising research into type 1 diabetes (T1D).

The mission of JDRF is to cure, treat and prevent type 1 diabetes and its complications through the support of research.

DRIVING RESEARCH PROGRESS

JDRF is the world's leading not-for-profit supporter of type 1 diabetes, investing more than \$1.7 billion into research globally since 1970 and more than \$160 million into Australian research.

Our support has been behind nearly every major advance in type 1 diabetes over the last forty years as well as making significant improvements to day-to-day disease management and quality of life.

The research we support has three objectives: cure the body's inability to control glucose, reversing insulin dependence; prevent the progression of the disease in those at risk or recently diagnosed; and treat people living with type 1 diabetes with new drugs, therapies and devices that make it easier to stay healthy until the cure comes.

SUPPORTING THE COMMUNITY

JDRF exists purely for the benefit of people with type 1 diabetes.



In addition to supporting cutting-edge research, JDRF Advocates play a key role in advising and influencing health policy and research funding across all levels of government.

We help newly diagnosed people with educational support through the distribution of our newly diagnosed packs to hospitals and clinics nationally. JDRF Peer Support can connect you to mentors living with type one diabetes who can share their experiences and provide practical advice and also connect the community through the JDRF T1D Connect Facebook groups. Members offer support and advice



in a safe and non-judgmental way, helping break down the feeling of isolation that a diagnosis of type one diabetes can sometimes bring.

JDRF provides up-to-date information on the latest in diabetes research outcomes, and treatment strategies through our free online newsletter 'Path to a Cure'. You can also access the latest treatments by joining research trials through the T1D Gamechangers program. You can even chat with other JDRF supporters on the JDRF Blog, Facebook and Twitter pages.

GET INVOLVED!

JDRF coordinates a diverse range of activities and events throughout the year to raise funds for type 1 diabetes research and to encourage friendship within the community.

Find out more about JDRF activities in your local area at www.jdrf.org.au



Important



Did You Know

HOW TO USE THIS BOOK

By Dr Jane Overland – Nurse Practitioner and Diabetes Educator

SO YOU HAVE TYPE 1 DIABETES

Living with type 1 diabetes can sometimes be hard work. Whether you've just been diagnosed, or you've been living with it for a while, there are often hurdles that need to be overcome and many questions that need to be answered.

We created Straight to the Point to help people with these challenges. It will provide you with a credible source of practical help, written and fact-checked by diabetes experts. We've written it in such a way to give you a realistic expectation of what life with type 1 diabetes is really like and hopefully to give you some comfort that you are not alone.

We've included lots of links to further information as well as some places you can go to connect with other people who are just like you.

Don't feel like you have to read it in full from front to back, you might prefer to dip into it as you need. Keep it on your shelf at home so you have somewhere to go when you have questions that just can't wait until your next clinic appointment.

So whether you have a little bit of experience with type 1 diabetes... or a lot... we hope that this book will provide you with all the information, advice and support that you need to live life to the full.

“*Diabetes isn't something to be tackled alone. Surround yourself with a team of family, friends and health care professionals you feel comfortable with and you can achieve whatever your heart desires.*
- Dr Jane Overland



| | |
|--|-----------|
| SECTION 1: | |
| DIAGNOSIS - GETTING TO GRIPS WITH TYPE 1 DIABETES | 10 |
| DIABETES? WHAT THE...? | 11 |
| Feelings You May Experience | 11 |
| Dealing With The Diagnosis | 12 |
| Telling People About It | 13 |
| Adjustment And Acceptance | 14 |
| DIABETES EXPLAINED | 16 |
| Why Me? | 16 |
| What Is Type 1 Diabetes? | 16 |
| What Causes Type 1 Diabetes? | 16 |
| I Thought Only Kids Got Type 1 Diabetes? | 16 |
| How Long Have I Had Type 1 Diabetes? | 16 |
| Why Do I Have It When No One Else In My Family Does? | 18 |
| How Is Type 1 Diabetes Different From Other Types Of Diabetes? | 18 |
| Types Of Diabetes | 19 |
| MANAGING BLOOD GLUCOSE LEVELS | 20 |
| Why Treating Type 1 Diabetes Is Important | 20 |
| Aiming For 'Normal' Blood Glucose Levels | 20 |
| Blood Glucose Targets | 21 |
| How To Know If Your Diabetes Is Under Control | 21 |
| Be Realistic About Your Blood Glucose Levels | 22 |
| Keeping A Record Of Your Blood Glucose Levels | 24 |
| Haemoglobin A1c (HbA1c) | 25 |
| HbA1c Measurements: The Old Versus The New | 26 |
| HbA1c Conversion Chart From HbA1c % To SI (System International) Units | 26 |
| Diabetes Management Involves More Than Just Blood Glucose | 27 |
| Goals For Optimal Diabetes Management | 28 |
| The 'Honeymoon Period' | 29 |
| A HELPING HAND FROM HEALTH PROFESSIONALS | 30 |
| Your Health Care Professional Team | 30 |
| Checklist Of Examinations And Tests | 32 |
| Finding The Right Health Professionals For You | 33 |
| 'MUST HAVE' EQUIPMENT | 34 |
| Must Have Equipment - In Your Bag | 34 |
| Must Have Equipment - In Your Home | 37 |

| | |
|--|-----------|
| THE FINANCIAL IMPACT - WHAT TO EXPECT | 39 |
| Professional Healthcare | 39 |
| Medication And Consumables | 40 |
| THE NATIONAL DIABETES SERVICES SCHEME (NDSS) | 42 |
| CONNECTING WITH OTHER PEOPLE WITH TYPE 1 DIABETES | 43 |
| MANAGING OTHER PEOPLE | 44 |
| How To Tell Your Partner Or Family | 44 |
| Telling Friends And Colleagues | 44 |
| Meeting New People | 45 |
| Telling Potential Employers | 45 |
| COPING WITH THE IGNORANT AND RUDE THINGS PEOPLE SAY | 46 |
| DIABETES REPORTING IN THE MEDIA | 48 |
| Just Because It Is On TV Doesn't Mean It Is True | 48 |
| The Cure You Have When You're Not Having A Cure | 48 |
| Media And Public (Mis)Understanding | 49 |

SECTION 2: LEARNING TO LIVE WITH TYPE 1 DIABETES **50**

| | |
|---|-----------|
| Insulin | 51 |
| Buying And Storing Insulin | 51 |
| How To Inject Insulin | 52 |
| Pumps | 52 |
| Continuous Glucose Monitoring (CGM) | 52 |
| Sensor Augmented Pumps | 53 |
| Getting Used To Injections | 54 |
| Calculating How Much Insulin You Need | 54 |
| Calculating How Much Insulin To Take With Food | 55 |
| Managing High Or Low Blood Glucose Levels Before A Meal | 56 |
| Getting Your Background Insulin Levels Right | 56 |
| What To Do If You Make A Mistake | 57 |
| Unexplained High Glucose Levels | 60 |
| EVERYTHING YOU WANTED TO KNOW ABOUT HYPOS | 61 |
| Getting Help In An Emergency | 62 |
| Preventing And Improving Hypoglycaemia Unawareness | 63 |
| FOOD | 65 |
| There Is No Such Thing As A 'Diabetic Diet' | 65 |
| How Much Carbohydrate Do You Need? | 65 |
| Counting Carbohydrate | 67 |

CONTENTS

| | |
|--|-----------|
| Sugar | 68 |
| Glycemic Index | 69 |
| Gluten Free Diets | 70 |
| Protein And Fat | 70 |
| Vitamins And Minerals | 71 |
| Fibre | 72 |
| Determining What Is In Foods | 72 |
| De-Mystifying Food Claims | 72 |
| Reading Food Labels | 73 |
| Eating Out | 74 |
| Alcohol | 76 |
| Weight | 76 |
| Building A Healthy Relationship With Food | 78 |
| EXERCISE | 79 |
| Types Of Exercise | 80 |
| How Do I Know The Effect Of Exercise On My Blood Glucose Levels? | 81 |
| Getting Started | 81 |
| Exercise And Carbohydrate Requirements | 82 |
| Carbohydrate Requirements Before Exercise | 84 |
| Carbohydrate Intake During Exercise | 84 |
| After Exercise | 84 |
| Exercising For Weight Loss | 85 |
| MANAGING SICK DAYS | 86 |
| What To Do When You're Unwell | 86 |
| Tips For Managing Sick Days | 88 |
| A Trip To Hospital | 89 |
| TYPE 1 DIABETES & WORK | 91 |
| To Tell Or Not To Tell? | 91 |
| Tips To Help You Manage Your Diabetes At Work | 92 |
| Job Interviews | 93 |
| Dealing With Discrimination | 93 |
| Managing Shift Work | 94 |
| Healthy Eating For Shift Work | 94 |
| Tips For Healthy Eating At Work | 95 |
| Managing School And University Exams | 96 |
| Diabetes & Driving | 96 |
| Unconscious Hypos Require Licensing Authority Notification | 97 |
| Steps For Managing A Hypo When Driving | 98 |
| Diabetes And Commercial Driving | 98 |

| | |
|--|------------|
| SECTION 3: | |
| STAYING HEALTHY AND ENJOYING LIFE | 100 |
| FUTURE HEALTH AND COMPLICATIONS | 101 |
| Why Do They Occur? | 101 |
| Checking For Complications | 102 |
| Be Alert, Not Alarmed | 104 |
| Thyroid And Coeliac Disease | 104 |
| KEEPING YOUR SPIRITS UP | 106 |
| Living With Diabetes Is Tough | 106 |
| Keeping An Eye Out For Depression | 108 |
| Avoiding Diabetes 'Burn-Out' | 109 |
| When The Going Gets Tough The Tough Get Support! | 110 |
| REST AND RECREATION – PARTYING THE NIGHT AWAY | 112 |
| Alcohol – Avoiding The 4am Hangover Hypo | 112 |
| Smoking | 114 |
| Illicit Drugs And Diabetes | 114 |
| TRAVELLING WITH TYPE 1 DIABETES | 116 |
| Before You Leave | 116 |
| Essential Items To Pack | 118 |
| At The Airport | 119 |
| In The Air | 120 |
| Adjusting Insulin For Changing Time Zones | 121 |
| At Your Destination | 121 |
| DIABETES AND ISSUES FOR WOMEN | 123 |
| Menstruation | 123 |
| Contraception | 123 |
| Sexuality | 124 |
| Pregnancy | 124 |
| Managing Weight And Body Image | 128 |
| Menopause | 128 |
| Osteoporosis | 129 |
| DIABETES AND ISSUES FOR MEN | 131 |
| Self-Esteem | 131 |
| Body Image | 131 |
| Erectile Dysfunction | 132 |
| Thrush And Balanitis | 132 |
| Fertility And Inheritance | 133 |
| Seeing A Doctor/Specialist | 133 |

| | |
|---|------------|
| DIABETES AND ISSUES FOR ADOLESCENTS | 134 |
| Who Is Responsible For What? | 134 |
| Transitioning To Adult Care – When Is The Right Time? | 134 |
| SECTION 4: LOOKING TO THE FUTURE | 136 |
| RESEARCH FOR THE FUTURE | 137 |
| Driving Research Progress | 137 |
| Research Focus – Cure, Prevent, Treat | 138 |
| Type 1 Diabetes Clinical Research Network | 139 |
| Joining A Clinical Trial | 139 |
| JOIN THE TEAM AND MAKE A DIFFERENCE | 141 |
| AND A FINAL WORD – DON'T LET TYPE 1 STOP YOU! | 143 |
| SECTION 5: RESOURCES | 144 |
| WEBSITES | 145 |
| Diabetes Organisations | 145 |
| Government Agencies | 145 |
| Online Forums And Communities | 145 |
| Diet (Food) | 146 |
| Exercise | 146 |
| Emotional Health | 146 |
| Diabetes Technology | 146 |
| Pregnancy And Birth | 146 |
| Research | 146 |
| Transitioning Adolescents And Young Adults | 146 |
| DIABETES DICTIONARY | 148 |
| ACKNOWLEDGEMENTS | 156 |



SECTION ONE

**DIAGNOSIS –
GETTING TO GRIPS
WITH TYPE 1 DIABETES**

DIABETES? WHAT THE...?

When you were told you had type 1 diabetes you probably felt as if your world had been turned upside down. You may have felt like screaming or just curling up in a ball – all of this is perfectly normal. Unfortunately diabetes isn't going away but over time you will learn how to fit diabetes into your life.

You may find the first couple of weeks are the worst as you come to terms with injecting insulin and pricking your fingers to do blood checks. There is also a lot you need to learn about how to manage your diabetes, such as counting carbohydrates, understanding the precautions you should take when you exercise, how to recognize and treat a hypo... the list goes on.

If it is all too much for you, let your endocrinologist or diabetes team know; they are there to help you. And don't be embarrassed to ask them to slow down if they provide you with too much information at once. You will only remember a quarter of what is said to you in a 10 to 20 minute conversation; it's even less when you are stressed.

You may also be too busy learning how to manage your diabetes to think about how you are feeling about your diagnosis. The realisation that diabetes is for life may not hit you for several weeks or months. This is often the time people assume you are coping and yet this may be the time you feel the worst.

FOLLOWING YOUR DIAGNOSIS YOU MAY EXPERIENCE FEELINGS SUCH AS:

Shock: 'What the ...?'

**Denial: 'No – this isn't real!
I want a second opinion!'**

**Fear: 'How am I going to cope?
This is going to destroy my life!'**

**Grief: 'This is so unfair. I feel
so unhappy.'**

**Loss: 'I wish things were how
they used to be.'**

**Hopelessness: 'Life is never
going to get better for me.'**

Despair: 'Why me?'

**Relief: 'At least I know
now why I have been
feeling like this.'**

FEELINGS YOU MAY EXPERIENCE

Being diagnosed with type 1 diabetes as an adult can be difficult. There is a lack of understanding about diabetes in the community and people often do not expect an adult to be diagnosed with type 1 diabetes.

As an adult you already have responsibilities and tasks that you need to perform each day and you may be feeling that diabetes will get in the way of what you want to do.

A diagnosis of type 1 diabetes is like starting a journey on a road that is new and unfamiliar. It is not chosen and not wanted, you still carry all the other parts of your life with you.

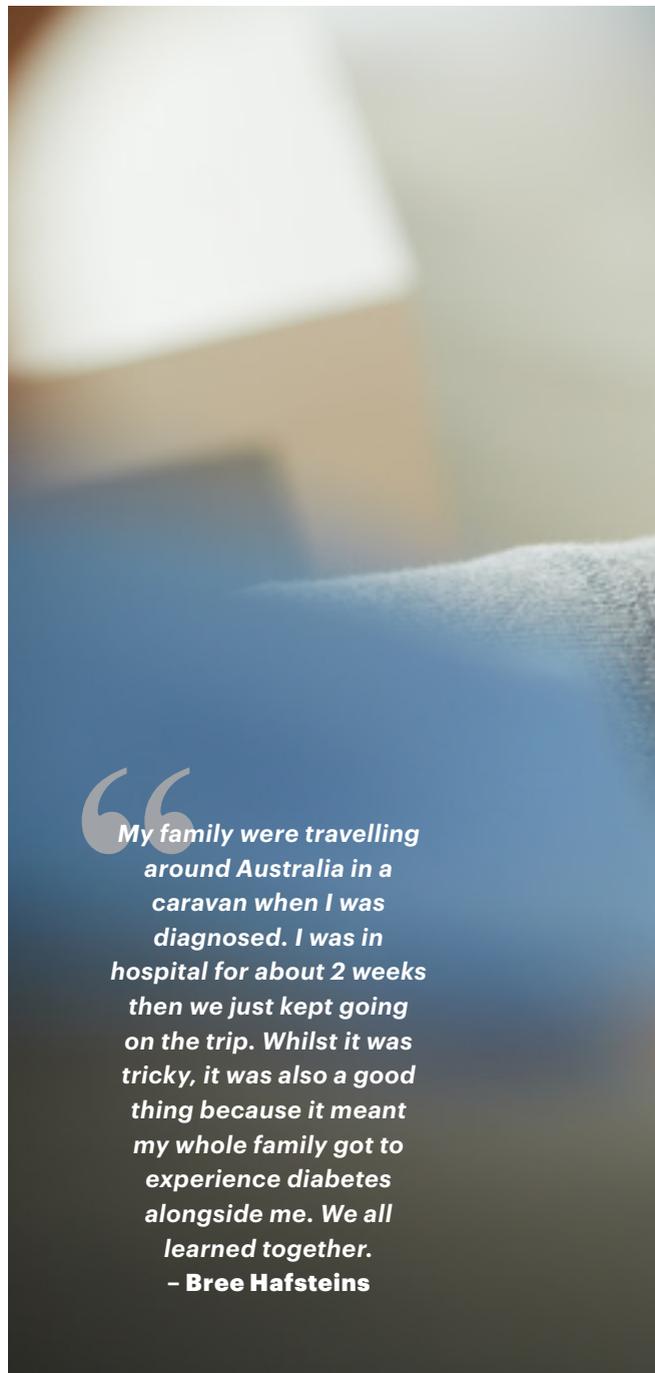
DEALING WITH THE DIAGNOSIS

After learning of your diagnosis, you may find it hard to accept you now have type 1 diabetes. Most people go through some kind of denial when they are first diagnosed – it can be like a voice inside repeating, ‘Not me... I don’t believe it... There must be some mistake.’ This is a natural reaction and is so common that it’s accepted as part of the process of dealing with the diagnosis.

Initially this response serves a purpose; it is a way of coping with bad news. It can keep you from getting overwhelmed and depressed and allows you to accept information little by little, when you are ready. As you do this, feelings of denial should slowly be replaced by acceptance.

If denial seems to be hanging around and is destructive – such as leading you to miss insulin injections – it is serious and you need to seek some support to get back on track. Ask someone in your diabetes care team for help or make an appointment with an experienced counsellor or psychologist.

Long-term denial can stop you from keeping yourself healthy. Denial may stay around for weeks, months or even years for some people. It may also come and go depending on what else is happening in your life. Sometimes when we have too much on our plate, it can seem easy



“My family were travelling around Australia in a caravan when I was diagnosed. I was in hospital for about 2 weeks then we just kept going on the trip. Whilst it was tricky, it was also a good thing because it meant my whole family got to experience diabetes alongside me. We all learned together.”
– Bree Hafsteins

to let diabetes care go. However, this usually adds to our stress as in the back of our minds we know the damage this could do. It is important to know you don’t have to do diabetes



all by yourself. Family, friends and your diabetes care team are there to support and help you when you need it.

TELLING PEOPLE ABOUT IT

Keeping your diabetes 'secret' and not telling people about it can make it harder to move on and accept your diagnosis. One thing that can really

help is to make sure people around you know about your diabetes – this will make it a lot harder for denial to take hold in the longer term. Work out who are the important people to tell and involve them as much or as little as you would like; but make sure they are aware of your diabetes.

While you may not want to tell anyone about your newly acquired condition, it won't be long before family and friends figure out that you have diabetes – why else would you be injecting insulin? It's okay to tell them you need space to process your thoughts, but they will be there to help you when you are ready.

At times, talking to family and friends may not be enough. If this is the case you should talk to your doctor or diabetes team about finding a counsellor or psychologist to talk to if you feel this would help.

Another strategy for moving away from denial is to have a support network of other people with diabetes who you can unload on when you have a bad day.

For more information see the section titled 'Connecting with Other People with Type 1 Diabetes'.

ADJUSTMENT AND ACCEPTANCE

Most people will eventually travel the road from what they know, and what was familiar to them, to diabetes being an accepted part of life. The time to do this varies. Some find it a short journey, others a long one. And sometimes we go backwards and forwards between being OK with

diabetes and not being OK. This is all part of the process.

During this journey there are emotional ups and downs and some people say it is like being on a roller coaster ride! The 'downs' can bring feelings of grief, fear, denial and hopelessness. During the 'ups' you start to feel more comfortable with diabetes and then you might go on a downer again for a time – this is okay too! At some point you start to have more ups and fewer downs, which don't last as long. You start to incorporate diabetes into life. In a way you 'get-back on track' with your life, with just a new chapter added to it.

But be aware that living with diabetes 24/7 leads to some ongoing ups and downs. Again, this is normal – we all have a bad day or moment with diabetes!



Diabetes is a disease that requires you to take charge. Once you know, understand and feel comfortable with your diabetes, you are more likely to have less stress and be better able to manage your diabetes over the long term.



Just because you've lived with diabetes for a long time doesn't mean you'll get it right all the time. Life changes and it is important to remember that your goals for treatment will also change.

- Dr Jane Overland

“*Looking back at my experience, I think there should definitely be more awareness of the symptoms of type 1 diabetes. Despite having an uncle with diabetes, I didn't even know that you could be diagnosed as an adult. I would've found help much earlier if I had known what the symptoms were and that I was at risk.*”

DANIA IBRAHIM

Dania Ibrahim was 21 years old and living her best life when she was diagnosed with type 1 diabetes during a university exchange overseas.



Looking back, I started experiencing T1D symptoms a few months before I was diagnosed. I had visited my GP for some routine blood tests before heading off overseas and my blood glucose level was elevated. I didn't really think much of it at the time. I was so excited about my new adventure that I was subconsciously dismissing other early symptoms like weight loss, excessive thirst and needing to go to the toilet constantly.

By the time I ended up in a Spanish emergency department, my blood glucose levels were sitting at around 600 and I was extremely unwell. Despite this, there was still quite a bit of confusion amongst the clinical staff about whether I had type 1 or type 2 diabetes. The language barrier certainly didn't help! They referred me to a local diabetes clinic where thankfully I finally received the correct diagnosis and started a new management regimen.

Interestingly, this wasn't the most stressful time for me. I learnt how to manage my condition and my diabetes stabilised quite quickly. It was when I returned home from my exchange a few months later that I really struggled. I don't think I had processed the fact that I had a life-long condition until that point and some of my personal relationships became a little strained. Coming home initially destabilised my sugar levels. I also struggled with the autoimmune nature of my condition, it took me a long time to reconcile that I didn't cause the diabetes.

I've had to learn to think a bit differently than your average 21 year old. It's taken a while, but I've learnt to adjust the way I approach my studies and work commitments. I used to push myself to the limit but now I try to be a little more disciplined. I listen to my body and try to act on anything that makes my diabetes unstable. I find that when I take care of my body, I feel better emotionally as well as physically.

DIABETES EXPLAINED

WHY ME?

If you have just been diagnosed with diabetes you are probably wondering, 'Why me?' It is important to know it is not your fault that you have type 1 diabetes and there was nothing you could have done to prevent it. It is not associated with a poor diet or an unhealthy lifestyle.

WHAT IS TYPE 1 DIABETES?

Type 1 diabetes is an autoimmune disease. For reasons we don't yet understand, your immune system, which is meant to protect you from foreign bodies, such as viruses and bacteria, mistakenly attacks and destroys the beta cells in your pancreas that produce insulin.

Insulin is crucial to life. Without it, glucose cannot move from your bloodstream into the cells of your body to provide them with energy to function. When your pancreas fails to produce insulin, glucose levels in your bloodstream start to rise and your body can't function properly. Over time this high level of glucose in the blood may damage nerves and blood vessels and the organs they supply.

WHAT CAUSES TYPE 1 DIABETES?

There is an enormous amount of research into what causes type 1 diabetes, but so far there are no clear answers.

WHAT IS KNOWN IS THAT IN MOST CASES:

- **Failure of the pancreas** is due to damage inflicted by your immune system.

- Something triggered your immune system to **attack your beta cells**.
- **Certain genes put people at a greater risk** for developing type 1 diabetes, but are not the only factors involved.
- While there are **no proven environmental triggers**, researchers are looking for possible culprits, such as viral infections and toxins within our environment and foods.

I THOUGHT ONLY KIDS GOT TYPE 1 DIABETES?

While most people associate type 1 diabetes with children, half of the people diagnosed with type 1 diabetes are adults. You are not alone in developing type 1 diabetes at your age.

HOW LONG HAVE I HAD TYPE 1 DIABETES?

Just because you are older, that doesn't mean you have been walking around with diabetes for many years. In type 2 diabetes, the most common form of diabetes, blood glucose levels tend to climb slowly and people develop very subtle symptoms over time. People may not notice these subtle symptoms, so they can have high blood glucose levels for many years before type 2 diabetes is diagnosed.

However, in type 1 diabetes, your immune system rapidly destroys your beta cells, so your blood glucose level is likely to rise much more quickly. This rapid rise produces obvious signs and symptoms, such as significant weight loss, fatigue, excessive thirst, and frequent urination. As a result, your type 1 diabetes is unlikely to go undiagnosed for long.



DID YOU KNOW

- Approximately **120 000 Australians** are currently living with type 1 diabetes and **6 new cases are being diagnosed every day**.
- Although it is often referred to as '**juvenile diabetes**', around half of newly diagnosed cases are in people **over the age of 18**.
- Australia has one of the **highest incidence rates of type 1 diabetes** for reasons that are currently unknown.
 - JDRF is currently **supporting a number of clinical trials internationally** into promising new treatments and therapies.

Source – Australian Institute of Health and Welfare Diabetes Snapshot.

WHY DO I HAVE IT WHEN NO ONE ELSE IN MY FAMILY DOES?

Whilst the siblings and children of people with type 1 diabetes have a slightly increased risk of developing it themselves, most people who develop type 1 diabetes have no family history of the disease.

There are known genetic links to type 1, but having these genes doesn't mean you will definitely develop the condition. It's important to note that whilst genes can play a role in type 1, they're not the whole story.



Researchers believe that your environment – starting all the way back to when you were in utero – can also influence your risk and there are currently a number of research groups around the world who are looking into this.

HOW IS TYPE 1 DIFFERENT FROM OTHER TYPES OF DIABETES?

Diabetes mellitus is the medical name given to a group of conditions in which people have too much glucose in their blood. Glucose comes from the food we eat, and is the major source of energy for the body. After we eat our body breaks food down into glucose and other nutrients, which are then absorbed into the bloodstream from the gastrointestinal tract. The glucose level in the blood rises after a meal, which triggers the pancreas to make insulin and release it into the bloodstream.

Insulin works like a key that opens the door to cells and allows the glucose in. In diabetes, the pancreas is unable to produce sufficient amounts of insulin. Without insulin, glucose is unable to get into the cells, so it stays in the bloodstream. As a result, the level of blood glucose remains higher than normal. High blood glucose levels create a number of symptoms and health problems with time. There are three major types of diabetes: type 1, type 2, and gestational diabetes. All types of diabetes cause blood glucose levels to be higher than normal. However, they do this in different ways.

TYPES OF DIABETES

TYPE 1 DIABETES

(Formerly called 'insulin-dependent diabetes' or 'juvenile diabetes') occurs when the **person's immune system recognises its own tissue as foreign**. Evidence of this reaction is the presence of antibodies in the blood. **The body attacks and destroys the beta cells** in the pancreas that produce insulin. Insulin injections are then needed to control blood glucose levels. The illness and symptoms typically develop quickly (over days or weeks), however the **destructive process has been going on for a much longer time**. Type 1 diabetes represents around 10% of adults with diabetes.

TYPE 2 DIABETES

(Formerly called 'non-insulin-dependent diabetes' or 'adult-onset diabetes') results when a person **does not make enough insulin and/or their bodies don't properly utilise the insulin that is available**. Type 2 is often referred to as a lifestyle disease because it is more common amongst people who are older, sedentary and overweight. This is not the entire explanation however, as it is more likely to occur in people with a family history, women who had gestational diabetes and people of Native American, Asian, Pacific Islander, African-African, or Latin American ancestry. It is **usually managed by diet, exercise and oral medication, but type 2 diabetes is a progressive condition and most people will need to take tablets and/or inject insulin** after living with it for five to 10 years. Around 85-90% of adults with diabetes have type 2 diabetes.

LADA

Up to one third of people who were initially diagnosed as having type 2 diabetes actually have latent autoimmune diabetes of adults (LADA). This is sometimes referred to as type 1.5. People with LADA have **features of both type 1 and type 2 diabetes** in that their **immune system attacks the cells of the pancreas that produce insulin but they may also have insulin resistance**. The destruction of the insulin producing cells is much slower in LADA than in type 1 diabetes. People with LADA cannot be easily distinguished between people with type 2 diabetes. A blood test is needed to check for antibodies against insulin producing cells. Some people with LADA can be managed on diet, exercise and tablets in the initial months or years following diagnosis. However, most people with LADA will require insulin therapy within the first year.

GESTATIONAL DIABETES

Gestational diabetes refers to **diabetes that is first detected during pregnancy**. Pregnant women produce **large amounts of hormones** such as oestrogen and progesterone, which can **cause the body to become resistant to the effects of insulin**. By the time a woman reaches the end of the third trimester, her insulin requirements have tripled. If the pancreas is unable to match this increased demand, blood glucose levels start to rise. In general, blood glucose returns to normal after pregnancy. However women diagnosed with this type of diabetes are at **significantly higher risk of developing type 2 diabetes** later in life.

MANAGING BLOOD GLUCOSE LEVELS

WHY TREATING TYPE 1 DIABETES IS IMPORTANT

Before you developed diabetes your pancreas would produce a low level of insulin across the day to help move glucose from your bloodstream into the various cells of your body to provide them with energy. When you ate, your blood glucose would rise and your pancreas would respond by producing a surge of insulin. This would help move excess glucose into your muscles and liver to be stored as glycogen. If your blood glucose level dropped during the day, this glycogen would be broken down and released back into the blood stream as glucose. By constantly sensing how much glucose was in the bloodstream, and adjusting how much insulin it secreted, your pancreas kept your blood glucose level between 4 and 8mmol/L at all times.

Without a functioning pancreas, your body cannot move glucose from the bloodstream into the cells of your body, leaving them without the energy to function. If your body can't use glucose for fuel, it starts to break down fat to use for energy instead. When fat is broken down, the body produces chemicals called ketones which are released into the bloodstream. While small amounts of ketones in the blood (<0.6mmol/L) can be healthy, high levels cause the blood to become more acidic and can lead to a condition known as ketoacidosis. Symptoms of ketoacidosis include nausea, vomiting,

abdominal pain and rapid breathing. In severe cases it is life threatening.

In addition to your body burning fat, your bloodstream accumulates the glucose that would normally be used by cells or stored. High blood glucose levels also result in serious health complications.

(For further information on health complications, see Section 3: Future health and complications.)

By replacing insulin through injections, your body can resume using glucose for energy and you will remove your risk of harm from ketoacidosis and high blood glucose in the short term.

THE MAIN AIMS OF DIABETES TREATMENT

- To live a fulfilling and healthy life.
- To keep your blood glucose level as near to normal as possible.
- To reduce any other 'risk factors' that may increase your risk of developing complications such as maintaining a healthy blood pressure and cholesterol level.
- To detect any health problems related to your diabetes (i.e. complications) as early as possible.

AIMING FOR 'NORMAL' BLOOD GLUCOSE LEVELS

To maintain 'normal' blood glucose levels, you now need to do the job of your pancreas. This means injecting

insulin several times a day, regularly monitoring blood glucose levels and making constant decisions about how much insulin to inject to keep your blood glucose as close to the normal range as possible. One of the reasons to do this is to help you feel your best and give you more energy. Aiming for 'normal' blood glucose levels will also help prevent or delay the development of the long-term health complications of diabetes.

Constant high blood glucose is toxic to the body. Cells in your brain, nerves, eyes, kidneys and blood vessels readily absorb glucose without insulin being present – these organs in particular are vulnerable to complications

BLOOD GLUCOSE TARGETS

| | |
|-----------------------|--|
| When you wake up: | 5 to 7mmol/L |
| Before meals: | 5 to 7mmol/L |
| 2 hours after meals: | 7 to 9mmol/L |
| Before exercise: | Greater than 5mmol/L and less than 15mmol/L |
| Before you go to bed: | 7 to 9mmol/L |

HOW TO KNOW IF YOUR DIABETES IS UNDER CONTROL

Checking the level of glucose in your blood and keeping a record of the levels is an important part of taking care of your diabetes. This allows you to identify the patterns of high or low blood glucose levels. The information will also help you and your doctor or diabetes team to balance food, exercise and insulin doses.

Ideally you should aim to do at least four blood glucose checks a day. To get the most out of monitoring, your diabetes team may advise you to check your blood glucose levels before and then two to three hours after food. It is also a good idea to monitor before and after exercise.

If your blood glucose level is high, such as at the time of diagnosis, or when you are unwell, you should also monitor for ketones. You can do this by checking your blood using a blood glucose meter that also measures for ketones or by checking your urine. Ketones in the blood or urine can also indicate that your insulin levels are too low and that additional insulin needs to be taken as a matter of urgency so that your body can use glucose for energy rather than fat.

There is no avoiding the fact that pricking your finger can be painful. Today we have ways of checking glucose levels using sensors inserted just under the skin, however you will still need to prick your finger from time to time to calibrate or check the accuracy of these systems.

There are various finger pricking devices on the market and you may find one more comfortable than another. Most devices allow you to adjust the depth of the needle if you are not getting a large enough drop of blood. The tips of your fingers can be more sensitive so try pricking

TIPS TO MAKE MONITORING EASIER

- Instead of using alcohol wipes, just wash your hands prior to pricking your finger.
- Use a fresh lancet every time as they hurt more when they're blunt.
- Once you've pricked your finger, hang your hand down and let gravity do the work for you. You could try gently 'milking' your finger prior to using the lancet.
- Look at different blood glucose monitors, some need less blood than others.
- Try different lancets. Some are thicker than others so look for a shorter and finer variety and ask your educator if they have any free samples you could try before you purchase.
- Try setting your lancet to a shorter puncture. The deeper the finger prick, the more tissue you damage.
- Spread your sites and don't just use the one finger.

your finger off to one side. Also be careful how vigorously you pump your finger for blood once your finger is pricked. This can squeeze blood into the surrounding tissue, causing bruising and discomfort. It might be encouraging to know that monitoring your blood glucose becomes less painful over time!

Keeping your blood glucose levels within the normal range of 4 to 8 mmol/L sounds easy. But even with your best efforts, trying to keep your blood glucose level within this range all the time is impossible.

BE REALISTIC ABOUT YOUR BLOOD GLUCOSE LEVELS

Living with diabetes can be incredibly frustrating. Over the course of a couple of days you eat the same amount of food, take the same amount of insulin and do the same amount of exercise, but your blood glucose levels from day to day can be completely different. While food and exercise are important determinants of how much insulin your body needs each day, there are other factors that play an important role – not all of these are completely understood or within your control.

For example, on some days the injected insulin is less well absorbed. This means the insulin will be less effective. Some women also report that their blood glucose levels are higher several days before their period, and then drop once their period commences. This is caused by high pre-menstrual oestrogen levels which make the body resistant to insulin.

TIPS TO IMPROVE YOUR BLOOD GLUCOSE CONTROL

- Keep a good record of your blood glucose levels.
- Review your blood glucose records regularly to look for patterns of highs/lows.
- Work with your doctor or diabetes educator to make adjustments to your insulin intake, diet and exercise until your control improves.
- Learn what causes highs and lows for you. The more you recognise what triggers highs/lows, the better you will be able to adjust your insulin, carbohydrate intake or exercise to avoid problems.
- Don't expect perfection! Just aim to get more of your readings within target.
- Ask for help from your doctor or diabetes educator when you need it!

You may also find that your blood glucose levels run high for many hours after an episode of hypoglycaemia (hypos or low blood glucose levels). Some of this may be the result of overeating to correct the low blood glucose level. However, if your blood glucose has been low for some time, your body will make and release stress hormones to try to protect you from having a serious low blood glucose. These hormones can trigger a release of the stored glucose from your liver and interfere with the action of insulin. Stress hormones are also produced when you are stressed or unwell, so this can also impact on your day-to-day blood glucose control.

The insulin preparations used today are much better than in years gone by, but they are still not perfect. So until there is a cure for diabetes, you need to know that there will be

times when your blood glucose level is too high, and other times when it is too low. If your blood glucose is outside the normal range, try not to think of it as being 'bad'. Have a look to see if there is a pattern and talk to your diabetes team about developing strategies to improve your blood glucose level.

“*Managing diabetes is about playing the long game. Don't let the incessant stream of data overwhelm you. Just keep your eyes on the bigger picture and do the best that you can.*

– Dr Jeremy Robertson

KEEPING A RECORD OF YOUR BLOOD GLUCOSE LEVELS

Someone very wise once said, "Sometimes you can't see the forest for the trees." This is true of managing type 1 diabetes when over time, little by little, your blood glucose control may change in ways you can't determine by just looking at one or two days of blood glucose results. By keeping a record of your blood glucose levels over time, you can often see trends which will help you make changes to improve your blood glucose levels, reduce hypoglycaemia and manage your diabetes better.

There are a few ways you can keep track of how your blood glucose levels are going.

DIABETES RECORD BOOKS

You can keep track of your blood glucose levels over time using a small record book to record your blood glucose levels, food, insulin and activity levels. Your diabetes educator or doctor may have a supply, or you can purchase them online.

YOUR BLOOD GLUCOSE METER

One benefit of the blood glucose meter is that it automatically stores your results, with the limitation that scrolling through the historic data on the screen can make it difficult to see recurring patterns throughout the day/week/month.

COMPUTER SOFTWARE AND MOBILE PHONE APPS

Most blood glucose meters and insulin pumps have the ability to download

their data onto a computer so you can view your blood glucose and/or insulin history. The software is available from the pump/meter manufacturer (do a quick search online for the manufacturer's website to see what they have available) and generally gives you the ability to see graphs and statistics which can help you spot trends and make adjustments to your management plan in consultation with your diabetes team.

There are also a number of apps you can download to your mobile phone that can record and track your blood glucose levels, as well as your activity, food intake, illness and so on. Many of the apps are free to download so you can give several a try and see what works best for you.



DID YOU KNOW

Blood glucose levels are measured in units called mmol/L (pronounced millimoles-per-litre) everywhere in the world but in the USA. That's why you'll occasionally see strange blood glucose readings like 140 or 220 in books or on the internet.

To convert the USA scores (mg/dl) back to mmol/L simply divide the USA figure by 18.



HAEMOGLOBIN A1c (HbA1c)

In addition to monitoring your blood glucose levels at home, your doctor or diabetes team will arrange for you to have a special blood test, known as a haemoglobin A1c (or HbA1c for short), every three months. When you check your blood glucose level you are measuring how many molecules (or mmol) of glucose are in your blood stream at the time of monitoring. However, your HbA1c result looks at your overall blood glucose control for the preceding two to three months.

Glucose in your bloodstream will attach itself to the haemoglobin part of your red blood cell. If there is a lot of glucose in your blood stream, this will result in a higher number of haemoglobin with glucose attached.

The haemoglobin with attached glucose is referred to as HbA1c or glycated haemoglobin. As your blood cells, and therefore your haemoglobin, live for around 120 days, the HbA1c test gives you an idea of how your blood glucose levels have been tracking over the same time period.

Ideally you should aim to keep your HbA1c as close to 53mm/mol (or 7%) as possible, as long as this can be achieved without significant episodes of hypoglycaemia. Research has shown that keeping your HbA1c near this can significantly reduce your risk of developing the long-term complications of diabetes.



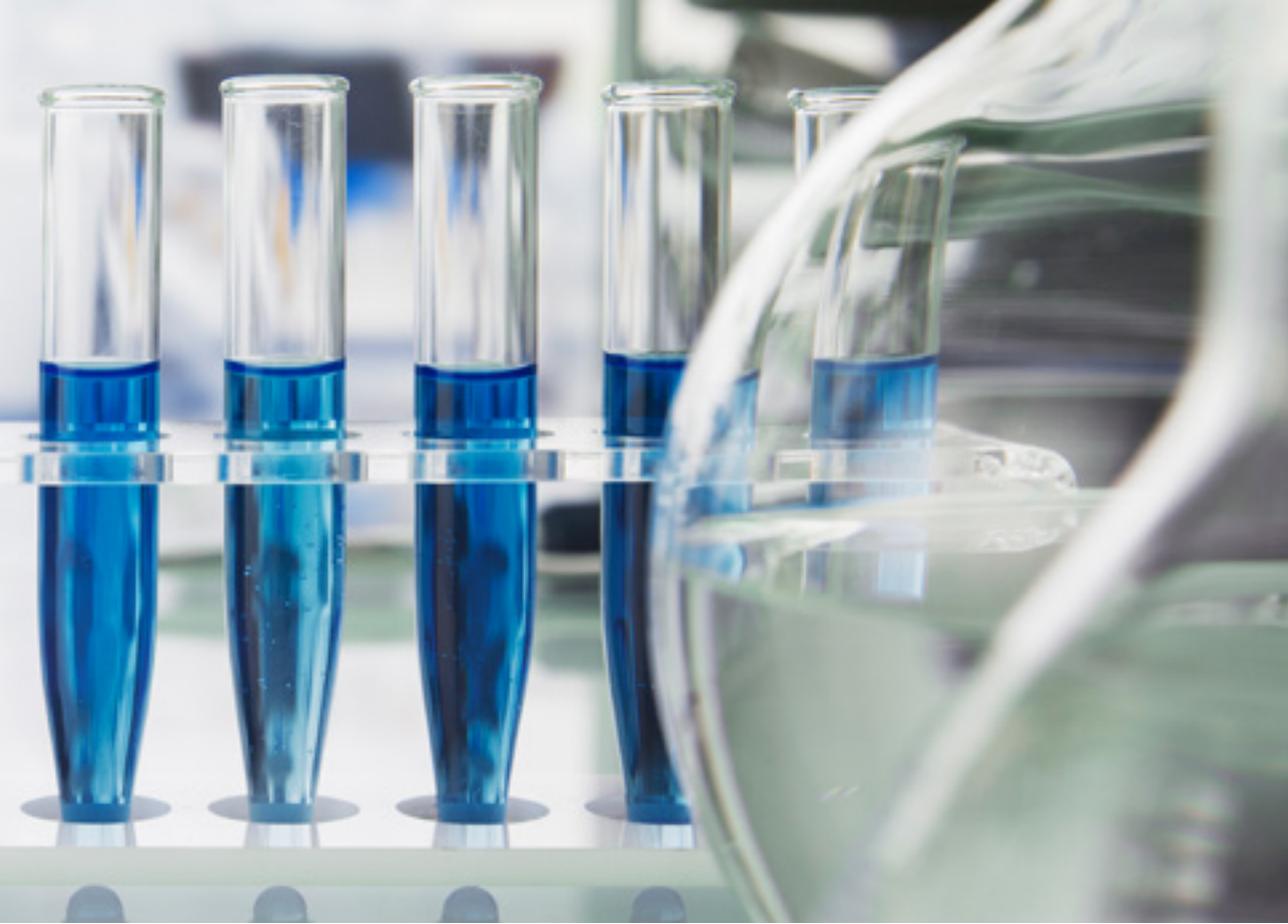
HbA1c MEASUREMENTS: THE OLD VERSUS THE NEW

HbA1c measurements can be reported as percentages (HbA1c as a percentage of total haemoglobin) or the scientific unit of mmol/mol (millimoles HbA1c per mole of total haemoglobin). In general, you should aim to keep your HbA1c less than 7% or 53mmol/mol. Over time, this target may need to change so make sure you discuss what your target should be with your diabetes team.

HbA1c CONVERSION CHART FROM HbA1c % TO SI (SYSTEM INTERNATIONAL) UNITS

| HbA1c (%) | HbA1c (mmol/mol) | HbA1c (%) | HbA1c (mmol/mol) |
|-----------|------------------|-----------|------------------|
| 5.0 | 31 | 8.0 | 64 |
| 5.5 | 37 | 8.5 | 69 |
| 6.0 | 42 | 9.0 | 75 |
| 6.5 | 48 | 10.0 | 86 |
| 7.0 | 53 | 11.0 | 97 |
| 7.5 | 58 | 12.0 | 108 |

Adapted from www.mja.com.au/journal/2011/195/1/change-hba1c



DIABETES MANAGEMENT INVOLVES MORE THAN JUST BLOOD GLUCOSE

You may be surprised that your endocrinologist and general practitioner do not focus exclusively on blood glucose levels. Optimum management of diabetes also requires a focus on blood pressure and cholesterol levels. This is because the risk of diabetes-related complications is reduced when blood glucose levels, blood pressure and blood fats are kept as close to normal as possible.

IN ADDITION TO BLOOD GLUCOSE TARGETS, YOU NEED TO:

- Have your **blood pressure checked regularly** (at every visit to the doctor) and treated if necessary. For someone with diabetes the **target blood pressure reading is 130/80mmHg or lower**.
- Have your **cholesterol checked every year**. The target for **total cholesterol is 4mmol/L**, with target LDL (bad) cholesterol of <2mmol/L; HDL (good) cholesterol >1mmol/L and triglycerides of <1.8mmol/L.

GOALS FOR OPTIMAL DIABETES MANAGEMENT

| | | |
|---------------------------|-------|---|
| HbA1c | ..... | ≤53mmol/mol or 7% |
| LDL Cholesterol | ..... | <2.0mmol/L |
| Total Cholesterol | ..... | <4.0mmol/L |
| HDL Cholesterol | ..... | >1.0mmol/L |
| Triglycerides | ..... | <1.8mmol/L |
| Blood Pressure | ..... | ≤130/80mmHg |
| Body Mass Index (BMI) | ..... | <25kg/m ² where practicable |
| Urinary Albumin Excretion | ..... | <p><20g/min (timed overnight collection)</p> <p><20mg/L (spot collection)</p> <p><3.5mg/mmol: women (albumin creatinine ratio)</p> <p><2.5mg/mmol: men (albumin creatinine ratio)</p> |
| Cigarette Consumption | ..... | Zero |
| Physical Activity | ..... | <p>At least 30 minutes walking (or equivalent)</p> <p>Five or more days/week (Total ≥150minutes/week)</p> |

Source: Diabetes Australia. Diabetes Management in General Practice 2009/10 15th Edition



THE 'HONEYMOON PERIOD'

If you have only had diabetes for a few weeks or months you may find you start to experience a 'honeymoon period' where your diabetes may appear to go away for a period of time, ranging from a few weeks to a year or so. During this time you will find that the amount of insulin you need to inject decreases and you're able to keep your blood glucose levels within the normal or near normal range taking little or no insulin at all.

Sadly, this does not mean your diabetes has gone away. By the time you developed symptoms of diabetes the majority of your insulin-producing cells had been destroyed by your immune system.

Depending on your health situation at the time of diagnosis, you may have enough functioning beta cells left to provide you with insulin for a short period of time. Whilst research is progressing into ways to protect these remaining cells, it is not currently possible to stop the autoimmune processes and you will eventually lose the cells and your ability to produce your own insulin.

The amount of insulin you need to inject each day depends on your age, your weight and how long you have had diabetes. As an adult, once all your beta cells have been destroyed, you will probably need to inject around 0.6 to 0.7 units of insulin per kg of body weight each day to keep your blood glucose levels in the near normal range.

A HELPING HAND FROM HEALTH PROFESSIONALS

YOUR HEALTH CARE PROFESSIONAL TEAM

Living successfully with type 1 diabetes requires you to be fully in control of your diabetes management. Self-management means having a daily management plan, setting goals, solving problems, and taking responsibility. But it certainly doesn't mean that you are on your own. Clear and ongoing communication between you and your diabetes team is essential for effective self-management.

The foundation for success is diabetes education. A thorough

knowledge of diabetes and how to best manage it will give you the confidence and motivation to keep on top of your disease.

Everyone is different, and decisions need to be made on a daily basis. This means your management plan must be tailored to suit your medical needs and goals, taking into account your resources and lifestyle.

There are various health care professionals who can help you manage your diabetes.

ENDOCRINOLOGIST:

An endocrinologist is a doctor who specialises in the endocrine system, which includes the pancreas and diabetes. You should see an endocrinologist at regular intervals – every three months at first, then



less frequently when your diabetes is under control. You will have been treated by an endocrinologist if you were admitted to hospital and you can choose to see them or find a different specialist. As this will be a long-term relationship, it is a good idea to find an endocrinologist you like, who is conveniently located and who you can contact for help when you are sick.

DIABETES NURSE PRACTITIONER:

Diabetes Nurse Practitioners fall somewhere between an endocrinologist and a diabetes educator. In addition to helping you learn about managing your diabetes in the real world, they can order or help arrange the routine investigations you need as well as commence or adjust your treatment as required.

DIABETES EDUCATOR:

Credentialed diabetes educators are a mine of information on diabetes and how to manage it in the real world. They can help you learn about taking insulin, blood glucose monitoring, foot care, physical activity, shift work adjustments and more.

GENERAL PRACTITIONER (GP):

Your GP will focus on your overall health. They can also provide you with referrals to other specialists.

DIETITIAN:

A specialist diabetes dietitian can provide you with information on food

choices, portion sizes, glycaemic index (GI) and menu planning, taking into account your own preferences. Dietitians are a particularly useful resource if you also suffer from other conditions related to type 1 diabetes such as coeliac disease.

COUNSELLOR OR PSYCHOLOGIST:

Learning how to manage with type 1 diabetes can be a difficult and, at times, daunting experience. A counsellor can provide you and your partner or family with support as you adjust to living with type 1 diabetes.

OPHTHALMOLOGIST OR OPTOMETRIST:

Eye damage from diabetes is very manageable with early intervention, so make sure you have an annual eye check-up to help keep eye damage at bay.

PHARMACIST:

Make friends with your local pharmacist! They will keep a record of the medications you take and can inform you of any side effects or interactions. It might be a good idea to check out discount pharmacies too, to keep your pharmacy bill to a minimum.

PODIATRIST:

As diabetes can affect circulation and sensation, feet are particularly vulnerable and need careful attention.

EXERCISE PHYSIOLOGIST:

An exercise physiologist is a university trained professional who can help you in developing an exercise plan taking into consideration your diabetes.



CHECKLIST OF EXAMINATIONS AND TESTS

FROM THE TIME OF DIAGNOSIS

| Time Interval | Examinations & Tests | Health Professionals to See |
|----------------|---|---|
| Immediately | <ul style="list-style-type: none"> • HbA1c • Blood pressure • Cholesterol • Coeliac disease • Thyroid function | Physical examination and blood test referral from your endocrinologist or physician |
| Every 3 months | <ul style="list-style-type: none"> • HbA1c • Blood pressure • Weight | Physical examination and blood test referral from your endocrinologist or physician |
| Every 6 months | <ul style="list-style-type: none"> • Dental exam | Dentist |
| Every year | <ul style="list-style-type: none"> • An influenza shot • Cholesterol blood test • Thyroid function • Coeliac disease | GP blood test referral from your endocrinologist or physician |

ADDITIONAL TESTS AFTER HAVING TYPE 1 DIABETES FOR MORE THAN 3 YEARS

| Time Interval | Examinations & Tests | Health Professionals to See |
|---------------|---|--|
| Every year | <ul style="list-style-type: none"> • Dilated eye examination • Foot examination | Optometrist / Ophthalmologist Podiatrist |

ADDITIONAL TESTS AFTER HAVING TYPE 1 DIABETES FOR MORE THAN 5 YEARS

| Time Interval | Examinations & Tests | Health Professionals to See |
|---------------|--|--|
| Every year | <ul style="list-style-type: none"> • Microalbumin urine test (spot urine test) • Serum creatinine blood test | Blood and urine test referral from your endocrinologist or physician |



FINDING THE RIGHT HEALTH PROFESSIONALS FOR YOU

Now you have diabetes you should be under the ongoing care of a diabetes specialist or diabetes team. In all areas of your life you will come across people you click with and others you don't. The same is likely to happen with diabetes health care professionals.

It is important to find a doctor or team you feel comfortable with and with whom you can discuss your diabetes and concerns. You also need to like and trust them. If you don't, you have the right to seek care elsewhere. Be proactive about this, otherwise you are likely to stop going to your appointments and this may affect your long-term health.

It might take some time and a few false starts before you find the diabetes health professionals that suit you, but it's definitely worth persisting. You can use the Yellow Pages or visit websites such as the Australian Diabetes Educators Association www.adea.com.au or Dietitian Association of Australia www.daa.asn.au to locate health care professionals in your area, or talk to your GP or friends who also have diabetes to see who they recommend. You can also seek advice from other people with diabetes through support sites such as the JDRF T1D Connect Facebook sites.

Your next step would be to ring around to inquire about what type of services people provide, waiting lists and cost of appointments. The final step is to try them out.

'MUST HAVE' EQUIPMENT

MUST HAVE EQUIPMENT

- **Insulin**
- **Insulin pen or insulin pump**
- **Pen needles, syringe or infusion sets**
- **Blood glucose monitor and strips**
- **Blood glucose monitor batteries and pump (if used) batteries**
- **Ketone strips (blood or urine)**
- **Lancing device and lancets**
- **Book to record blood glucose levels, food, activity, insulin doses**
- **Sharps container**
- **Hypo food**
- **Glucagen hypokit™**
- **Identification**

MUST HAVE EQUIPMENT – IN YOUR BAG

There are some key items you should not be without and should replace when supplies run low. While you may feel that carrying some of these items around is tedious, they give you flexibility – if you're out and decide to stay overnight at a friend's place, you'll be glad you took your overnight insulin with you. Carrying your meter with you will let you eat unfamiliar foods confident you can check your blood glucose level afterwards to see whether you've taken the right amount of insulin.

It's good to have a bag that looks stylish, yet contains enough pockets so you can quickly find what you're looking for, and protects items from being damaged. Bags can be found by typing 'diabetes bag' into your favourite internet search engine.

YOUR INSULIN (PLUS YOUR PEN/SYRINGE/PUMP)

You should always carry insulin with you plus the means to deliver it, even when you don't expect to eat. You never know when you might be out longer than you expect.

Be careful to regularly check the amount of insulin left in your vial/pen cartridge/pump as there's nothing worse than running out of insulin. Insulin pump users should also carry a spare infusion set and inserter as a back-up. Pumpers should also carry some rapid acting insulin and an alternate way of giving it, i.e. a syringe or pen.

If you use intermediate or long-acting insulin, you should take it with you when you go out at night. If you end up sleeping over at someone's place, you won't miss your evening or morning injection.

It is also a good idea to keep a spare pen and extra insulin in the fridge at work in case you accidentally leave your insulin at home.

Insulin can be damaged by low (freezing) or high temperatures (over 30°C), so don't leave your insulin in your glove box, in direct sunlight or anywhere that gets extremely hot or cold. Insulin can be kept at room

temperature for one month, after which it should be thrown out. Some types of insulin are more sensitive than others to high and low temperatures.



Most people won't even notice if you're using an insulin pen in public. If you're shy you can inject through a layer of clothing.

BLOOD GLUCOSE METER, STRIPS AND LANCING DEVICE

It might be tempting to leave your meter at home, however, knowing what your blood glucose levels are doing will help you avoid hypos and reduce your risk of high blood glucose levels which can leave you feeling tired and emotional. Of course you can't check your blood glucose levels without a lancing device, so make sure you pack that too! Carrying spare lancets for your lancing device (or using one of the new lancing devices which store multiple fresh lancets inside them) will reduce any 'blunt lancet' pain.

There are various types of lancing devices. Some allow you to select how deep the lancet will go. Others use a fresh lancet each time. Look at your options and find one that is most effective for you.

If your meter is taking up too much space in your kit, have a look at the different meters available. Some are quite small while others store the strips inside the meter so you don't have to carry them around separately. Other monitoring systems such as the Libre sensor or continuous glucose monitoring also allow you to check

your glucose levels using your phone, although it is a good idea to still carry a meter as back up.

Keeping a spare meter and strips at work or in a frequently-used bag can avoid the stress of forgetting and then spending a day wondering if your blood glucose levels are going high or low.

Many meters have software that enables you to download your blood glucose results onto your computer and view graphs of your levels to help identify trends. Discuss with your diabetes educator, inquire at your pharmacy or visit the meter company's website for more information.

FINGER WIPES – OPTIONAL BUT HANDY

It's important to have clean fingers when you check your blood glucose levels, as the accuracy of your result can be impacted by the presence of food on your fingers. Usually you will be able to wash your hands, but for those times you can't, you may want to carry some finger wipes with you.

HYPO FOOD

Always carry at least one 'hypo fix' with you at all times. If your blood glucose level is low you will need to consume food or drink which contains around 15g of carbohydrate to help bring your blood glucose level back into the normal range. Six to eight large jelly babies or jelly beans should do.

If you find it hard to walk around all day with your favourite lollies in your pocket, try a hypo fix that you don't like so much to reduce the temptation to snack when you're bored or hungry. Glucose tablets (available in supermarkets or pharmacies) can be a great option.

Your hypo fix will often be in your bag (or pocket) for a while so you need something with resilient packaging or store it in a small airtight plastic container to keep it safe from opening or getting squashed. It is also a good idea to carry an extra hypo fix so you can treat yourself if you go low again or need more glucose.

A LOG BOOK – KEEP TRACK OF YOUR BLOOD GLUCOSE LEVELS, FOOD AND EXERCISE

Managing type 1 diabetes involves balancing your insulin, blood glucose levels, food and activity, so having some way to keep track of everything is very helpful. You may like to use a log book, or there are many free phone apps that you can download and use.

Recording a series of readings will make it easier for you to see what may have caused a particular low or high reading. Over time, patterns tend to emerge which will help you and your health professionals make long-term improvements in the way you manage your diabetes.

Recording your blood glucose levels and sharing your results with your doctor and diabetes educator (even the 'bad' days) will help you control your diabetes more effectively.

Companies that manufacture insulin or blood glucose meters often provide blood glucose record books free of charge. Your diabetes educator or doctor may have a supply, or you can purchase them online. Books come in different formats for people using a pump, or insulin pens. As mentioned above, there are also a number of apps available. Most of the apps are free so you can give several a try before deciding which one is right for you.

INFORMATION THAT IDENTIFIES YOU AS A PERSON WITH TYPE 1 DIABETES

It's a good idea to keep a card in your wallet that:

- identifies you as a person with type 1 diabetes
- provides your doctor's contact details
- includes a brief description of the medication you are taking and dosage.

In the (hopefully unlikely) event you have a severe hypo, this identification will enable health professionals to quickly provide the care you need. Organisations like MedicAlert® Foundation provide a wallet card as part of its membership, or you can purchase one by visiting the website Emergency ID Australia www.emergencyid.com.au.



Emergencies usually don't happen during office hours so make sure you know who to contact if you become unwell overnight or on the weekend.



I sat my girlfriend down after a few dates and gave her my version of diabetes 101 – What it is, how I got it, this is what might happen and this is what you might need to do. I have always found that humour is a good way to manage some of the ways that diabetes can impact your relationships but just keeping the lines of communication open is the most important thing.

– Piers Nelson

MUST HAVE EQUIPMENT – IN YOUR HOME

SHARPS CONTAINER

A medical sharps container is essential for the safe storage and disposal of used pen needles, syringes and lancets.

Sharps containers are available from pharmacies or online diabetes suppliers. In some states a sturdy plastic bottle with a screw-on lid will be accepted for disposal.

Containers are available in various shapes and sizes – even very small ones for use while travelling.

Check with your local council, hospital or pharmacy about the rules for sharps disposal as these vary from state to state. Used sharps must not be included in household rubbish.

KETONE STRIPS

Ketones are the break-down product of fat. They accumulate in the blood as a result of inadequate insulin (often due to illness) or inadequate kilojoule intake. Having some way to check for ketones, either using urine strips or blood strips, will enable you to identify whether you are at risk of ketoacidosis.

GLUCAGEN HYPOKIT™

Glucagon is a hormone released by the alpha cells in the pancreas to help raise blood glucose levels. They do this by telling the liver to release glucose stored in the form of glycogen.

The GlucaGen HypoKit™, which is available on prescription, contains an injection which is used to quickly raise blood glucose levels when someone has lost consciousness due to a severe hypo or is unable to take glucose orally.

It comes in a small case containing a syringe with sterile water and a small container of the hormone glucagon. The instructions in the kit describe how to mix and draw up the injection. It is a good idea to teach someone you live with how to use it (you can practice with an out-of-date kit).



Living with a chronic illness is hard work and I don't think we get enough recognition for that.

– Lara McSpadden



Finding the right diabetes healthcare provider is so important. It's a long term relationship so you need to make sure they not only have the right expertise, but also make you feel like you could tell them anything without judgment.

DR JANE OVERLAND

Dr Jane Overland is a Diabetes Educator and Nurse Practitioner who has worked with people living with Type 1 Diabetes for over 30 years.

It really is phenomenal just how much type 1 diabetes management has changed over my career. When I first started, there was basically a choice of short, intermediate or long acting insulin and that was it. People had to give themselves 6-7 injections every day using a scarily long needle and keep a paper blood glucose diary to calculate their long term measurements!

Thankfully the advances in what we know about type 1 diabetes and also how we treat it, means diabetes doesn't need to hold any one back. The new pump and sensor technologies aren't quite as good as a functioning pancreas but they have been an absolute game changer. Complications used to be par for the course but these days we have so many new ways to find and treat them early, slowing down progression to minimise their impact. Diabetes is no longer seen as a disability, so people have virtually the same opportunities in life as anyone else.

Whilst treatment and technology has changed, the role of the diabetes educator hasn't changed as much. We still place focus squarely on giving people with diabetes the best life they can possibly lead. In some cases that means we will help people obtain access to the most appropriate technology for their needs. Other times we work with people to adapt their diabetes management programs around life events like weddings or new jobs. Sometimes we may even ignore blood glucose levels in order to help someone boost their mental state. That is what is so rewarding about working in diabetes, you get to help people feel as good as they possibly can.

THE FINANCIAL IMPACT - WHAT TO EXPECT

There is no doubt that living with diabetes will impact your budget but there are ways you can minimize its effect.

PROFESSIONAL HEALTHCARE

When you have type 1 diabetes, it is important to see a variety of health professionals regularly to keep your health on track. The cost of seeing a diabetes health professional will depend on who you see and where they work.

Most major public hospitals provide free public diabetes services. While services vary, you will generally have access to a range of diabetes health care professionals, including endocrinologists, diabetes educators and dietitians.

You may choose to seek care through the private health system. In this case, you may find that different diabetes health care professionals charge varying levels of fees (depending on location and specialty), however, you should be partially reimbursed through Medicare or your health fund if you are insured.

You will be required to have regular blood tests and other pathology tests throughout each year. Most, if not all, of these tests can be provided free of charge through Medicare, provided your doctor requests bulk billing.

The Medicare Safety Net provides financial assistance if you have high costs for out-of-hospital medical services that attract a Medicare benefit. Once you reach the Medicare Safety Net threshold, visits to your doctor and pathology tests will cost less for the rest of the calendar year.

For more information, contact Medicare on www.humanservices.gov.au or phone 132 011.



People with a chronic condition (like type 1 diabetes) are able to access allied health services like podiatry, psychology and optometry through Medicare. A **rebate is available through a 'GP Management Plan'** for a maximum of five services per patient each calendar year. Your GP can provide further information.

MEDICATION AND CONSUMABLES

INSULIN

Insulin is available on the Pharmaceutical Benefits Scheme (PBS). This means if your doctor provides you with a prescription, and you are eligible for Medicare, the cost of the insulin will be subsidised by the Federal Government

For each prescription you will receive either:

- **5x10ml vials of insulin (if you use syringes or an insulin pump), or**
- **5 boxes of 5x3ml pen fills (if you use an insulin pen).**

This amount of insulin should last for three to six months. Your doctor can

also include a repeat prescription, which means you can purchase a further supply of insulin without having to see your doctor.

However, it is important to note that the repeats are only valid for 12 months after the date the original prescription was written. Also, pharmacies won't necessarily stock the type of insulin you use and may need to order it, so don't leave getting supplies until you're already out of spare vials/cartridges.

GLUCAGEN HYPOKIT™

Glucagon is a medication used to treat severe hypoglycaemia if you are unable to take anything to eat or drink by mouth. It is given by an injection into the fat or muscle. You should have glucagon at home and someone you

“I find other people are genuinely interested and feel comfortable asking me questions about my type 1. I feel happy that I can educate people and possibly help to save someone's life tomorrow.

- Piers Nelson



live with should know how to use it. The GlucaGen Hypokit™ can be purchased on prescription at the chemist. You will need to check the expiry date of your GlucaGen Hypokit™ regularly.

OTHER MEDICATIONS

Your doctor may prescribe additional medications, such as cholesterol lowering tablets, or blood pressure lowering tablets. These are sometimes taken by people with diabetes as a precaution to reduce the likelihood of complications in the future. You may need to factor the cost of such medications into your budget.

BLOOD GLUCOSE MONITORS

Blood glucose monitors vary in price but are usually less than \$100. There are a number of different

types available – there is no 'right' or 'wrong' meter, just choose one that suits you.

CONTINUOUS GLUCOSE MONITORING SYSTEMS

There are a number of continuous glucose monitoring systems available in Australia. The annual cost of using one of these systems varies between around \$2,500 and \$5,000 a year.

LANCING DEVICES

Lancing devices are usually provided with blood glucose meters, and replacement packets of lancets are available through online diabetes stores or your local pharmacy. Once again, there are different types of lancets. If you have sensitive finger tips you may prefer to purchase a lancing device that allows you to adjust the depth of the needle, or one with finer needles. Some are less painful than others!

IDENTIFICATION

A bracelet or necklace that identifies you as a person with type 1 diabetes can be purchased for as little as \$20 from a pharmacy or through specialist providers such as MedicAlert® Foundation. Other attractive options are available online, for example beaded or leather bracelets. Membership of MedicAlert® Foundation is free for the first year and approximately \$30 each year thereafter.

SHARPS CONTAINERS

Used syringes or pen needles should not be put in the household bin so you will need to buy an approved sharps container. These can be purchased through your local pharmacy or online diabetes stores for a small cost.





THE NATIONAL DIABETES SERVICES SCHEME (NDSS)

Blood glucose and urine ketone strips, insulin syringes, insulin pen needles and pump consumables are subsidised by the National Diabetes Services Scheme (NDSS).

To qualify for NDSS benefits you must be eligible for Medicare. You also need to complete a registration form, have it signed by your GP, endocrinologist or diabetes educator and return it to Diabetes Australia (GPO Box 9824 in your capital city).

There is no cost to register for the NDSS and you do not need to be a member of Diabetes Australia to be eligible. Once you have registered, an NDSS card will be issued to you. Keep this card in your wallet, as you will need it when ordering your diabetes products.

NDSS products can be purchased through an NDSS-registered pharmacy. These pharmacies have a sign displayed stating their affiliation.

While you can generally purchase diabetes supplies at non-NDSS pharmacies, be aware that the cost will not be subsidised by the Federal Government so these items will be significantly more expensive.

For more information visit,
www.ndss.com.au

ndss
national diabetes services scheme

CONNECTING WITH OTHER PEOPLE WITH TYPE 1 DIABETES

The value of talking to other people with type 1 diabetes cannot be overestimated. There is something comforting in knowing that you are not the only one living with the condition. While everyone is different, and your diabetes is unique to you, hearing the experiences of other people and learning what has worked for them in different situations can help you to develop management strategies.

There are various ways to get in contact with other people with type 1 diabetes. Once you tell people about your diabetes, you may be surprised how many people have connections to others with the condition.

You can:

- Talk to your diabetes educator about upcoming meetings or education sessions where you could meet people in your situation
- Talk to your doctor and other members of your diabetes team or
- Contact organisations such as JDRF at www.jdrf.org.au or Diabetes Australia at www.diabetesaustralia.com.au for a support group in your area.

FINDING SUPPORT ONLINE

There are many websites and groups online where you can seek support from other people with diabetes.

Some examples include:

- JDRF has two closed Facebook pages where people can share their experiences and ask for advice –
 - For people aged 14-25yrs www.facebook.com/groups/T1DConnect
 - For people aged 25yrs+ www.facebook.com/groups/T1DConnect25
- The 'Australians Living with T1D' Facebook group www.facebook.com/groups/ALWT1D
- MyD is a Facebook discussion site run by Diabetes Australia for adults aged under 25yrs www.facebook.com/groups/23022682401

You may like to become more involved with the type 1 community through JDRF.

By liking us on Facebook www.facebook.com/jdrfoz following us on Twitter www.twitter.com/JDRFAus and attending our community events, you have the opportunity to meet and network with other people living with type 1 diabetes. You can also sign up for 'Path to a Cure', our monthly e-newsletter, or become a member of JDRF.

MANAGING OTHER PEOPLE

HOW TO TELL YOUR PARTNER OR FAMILY

It is not easy being diagnosed with type 1 diabetes. It is also not easy telling your partner or family. Family members, particularly parents, may be distressed and blame themselves for your diagnosis, and you may not feel up to dealing with their emotions too. However, it is often easier telling people you are close to, sooner rather than later. It's OK to tell them you need space to process your thoughts but they will be there to help you when you are ready.

Although you were born with the genetic risk that pre-disposed you to develop type 1 diabetes, **over 80% of people with type 1 diabetes have no family history** of the disease. It is important that your parents know type 1 diabetes is not their fault, nor is it yours.

You may find that your partner or family show their concern for you in ways you find irritating. For example, they may constantly ask how you feel or whether you need to have something to eat, check your blood glucose or take your insulin. While they are likely to be doing this out of concern for you, it can place pressure on your relationship. It can help to explain how this makes you feel.

Find a good time to talk about it calmly and openly. Misunderstandings about type 1 diabetes and how it is managed can also cause friction, so you may also like to consider taking your partner or family members with you when you next see your endocrinologist or diabetes team.

TELLING FRIENDS AND COLLEAGUES

If you choose to tell your friends and colleagues, you should be prepared for them to ask questions or make comments, which at times may seem inappropriate. This is usually because they don't understand what having type 1 diabetes means. Talking about how you developed diabetes and how it is treated can be helpful. Friends who know about your diabetes can be a source of support. Having friends who are willing to listen to how you are feeling, even if they don't have diabetes themselves, may help you better adjust to living with diabetes.

If you have only recently been diagnosed with diabetes, family and friends may ask you questions you don't know the answers to, so you may like to take them along to see your endocrinologist or diabetes educator.

Chances are you didn't know a great deal about type 1 diabetes before your diagnosis – and your friends, family and colleagues are probably the same. Being open with them about your experience will make it easier for them to understand what type 1 diabetes is all about.



It is **against the law** to discriminate against you because you have diabetes. Contact the Fair Work Ombudsman in your state or territory if you feel your employer (or potential employer) is doing so.

Friends and colleagues can also offer practical help. For example, they will be able to help you if you have a low blood glucose level and don't have any food immediately available to treat it.

MEETING NEW PEOPLE

Once you have lived with diabetes for some time, knowing the right time to tell new friends and colleagues can be difficult. While it can seem embarrassing to bring your diabetes into the conversation, not doing so may be more so. For example, new friends and colleagues may misinterpret signs of hypoglycaemia, and assume you are drunk or being rude if they are unaware you have diabetes. While you may not want to disclose your condition on your first meeting, it is often easier to do so, sooner rather than later. Depending on how you feel, you might want to

simply explain that you have type 1 diabetes and that you need to inject insulin. You might consider letting them know about hypos and what to do if you have one.

TELLING POTENTIAL EMPLOYERS

One of the big questions when applying for a job is whether you should tell potential employers that you have diabetes. It's understandable if you don't want to tell anyone. Your decision about whether or not to disclose your diabetes is personal and will depend on your unique circumstances and what you are comfortable with.

This topic is covered in detail in the section 'Type 1 diabetes and Work'.

COPING WITH THE IGNORANT AND RUDE THINGS PEOPLE SAY

One thing nobody warns you about with type 1 diabetes is the ignorant and rude things people will say or ask. It's best to be prepared, so the following section gives you some idea of what people will say and suggestions about what you should and should not say in reply.

DO YOU HAVE TO INJECT IN PUBLIC?

What you could say

"This is the most practical and hygienic place for me to do this. If you prefer, I'll let you know in advance so you can look away for a moment."

What you wish you could say

"I'm sorry it offends you so much being forced to stare at what I have to do each day to stay alive. Why don't I take my sterile insulin pen into the filthy toilet and have my injection there for your convenience."

OH, MY AUNTIE HAD TYPE 1 DIABETES BUT SHE CURED HERSELF

What you could say

"Type 1 diabetes is an autoimmune disease not connected to diet or lifestyle and which has no cure yet. It sounds like your Auntie had type 2 diabetes, a different form of diabetes that is often found in older people and which can often be controlled by changes to diet and lifestyle."

What you wish you could say

"As there is currently no known cure for type 1 diabetes, I'm surprised I missed the edition of Time Magazine where your Auntie made it to the front page for her miraculous recovery. It's odd I have never heard of the company that even now must surely be bringing her miracle cure to market."

SHOULD YOU BE EATING THAT TIM TAM?

What you could say

"When I eat a Tim Tam, all I need to do is take a little bit of extra insulin to cover the carbs. People with type 1 diabetes eat Tim Tams for the same reason other people do, the only difference is that we add the insulin manually. All things in moderation."

What you wish you could say

"Eating this Tim Tam is nowhere near as dangerous to me as being mistaken for the food police is to you."

YOU MUST HAVE EATEN A LOT OF SUGAR WHEN YOU WERE LITTLE

What you could say

"The type of diabetes I have is called type 1 diabetes. It is caused by the immune system attacking the insulin-producing cells in the pancreas. It is not caused by diet or lifestyle. Type 2 diabetes, a different type of diabetes to the one I have, is the one which is sometimes caused by diet or lifestyle."



What you wish you could say

“You must have swallowed a lot of unreliable information when you were little.”

HOW COME YOU HAVE TYPE 1 DIABETES? AREN'T YOU A LITTLE OLD?

What you could say

“Around six Australians are diagnosed with type 1 diabetes every day. Half of them are adults.”

What you wish you could say

“It’s funny you should say that

because all this happened a day after I started using one of those new creams which make you look years younger.”

YOU MUST HAVE IT REALLY BAD TO NEED INJECTIONS

What you could say

“All people with type 1 diabetes have to inject insulin because their immune system has destroyed the cells in their pancreas which produce it.”

What you wish you could say

“Oh I don’t really need injections, I just enjoy having them.”

DIABETES REPORTING IN THE MEDIA

Now that you have a connection to diabetes, you will find you are faced with it almost every day in the media. Even if you don't see the stories yourself, it is likely that some well-meaning person will point them out for you! Here are a few points that you need to keep in mind.

JUST BECAUSE IT IS ON TV DOESN'T MEAN IT IS TRUE

While there are some news outlets that specialise in hard-hitting investigative journalism, most media stories are provided to reporters by organisations looking for coverage. Every day, teams of editors and producers sort through hundreds of these and select the ones they think will be of most interest and relevance to their audience.

As you can imagine, competition for media coverage is fierce. In the case of health stories, it is often those with the best visuals, the cutest patients, the most qualified spokespeople and the simplest yet most significant message that are chosen. Even the distance from the journalist's desk can be important!

To get the edge over the competition, some organisations will possibly enhance their story a little bit to stand out. Sometimes journalists build up the story to get a front page. Often, media outlets may concentrate on something that is the exception rather than the norm because of the shock value.

So what does this mean for you? Put simply – just because it is reported in the media doesn't mean it is true. If you see, hear or read something that you think is interesting but you're not entirely convinced about the accuracy, contact someone you trust such as your endocrinologist or diabetes educator to find out the real story. JDRF will usually make a statement on its website if something is really relevant to the type 1 diabetes community, so make that a regular check point.

THE CURE YOU HAVE WHEN YOU'RE NOT HAVING A CURE

You open the newspaper and there is yet another news story about a diabetes breakthrough. Is it a real cure this time or just another bit of interesting science?

The truth is probably somewhere between the two. Researchers face the constant challenge of publicly explaining complicated research results in the simplest way possible. They are often pressured to emphasise the importance of their breakthrough, but also to explain their findings in 200 words or a 30 second sound-bite.

The reality of the research process is that the average 'breakthrough' can take years to be translated from a laboratory bench to a therapeutic treatment. That's not to say that a cure won't suddenly be found, but it's important to recognise that most research reported in the media is more likely to be an important step towards finding a cure, but not

necessarily signalling the end of type 1 diabetes in our community.

Keep an open mind and if you have any questions about a research finding contact JDRF for more information. As a JDRF member you will always be the first to know if something big happens in diabetes research.

MEDIA AND PUBLIC (MIS)UNDERSTANDING

Diabetes is a condition that features heavily in the media. This has been driven by a number of factors – dramatic increases in incidence of type 2 diabetes, government focus on preventative health and a spotlight on obesity, to name a few. Whilst diabetes is always in the news, it's not always portrayed accurately and sadly this can have a significant effect on public understanding and awareness.

The most common misunderstandings are caused by confusion between

type 1 and type 2 diabetes. Journalists will often generically refer to 'the risk of diabetes' when writing a story about obesity or include images of overweight children when showing a TV story about type 1 diabetes. Understandably, this can result in feelings of frustration, anger or victimisation by members of the type 1 diabetes community.

If all else fails, try using some of the comments from the 'Managing other people' section of this book.

JDRF places a strong focus on **correcting these misconceptions** but there are actions you can take to make a difference. If you see an incorrect story, write a letter or email to the editor or journalist that politely outlines the mistake they have made. Volunteer to tell your story to the media during special awareness times (such as National Diabetes Week) or become a JDRF advocate to help change perceptions of those people who are in charge of setting the political agenda.





SECTION TWO

**LEARNING TO LIVE
WITH TYPE 1 DIABETES**

Before you developed diabetes your pancreas would release a low level of background insulin across the day and also produce surges of insulin in response to food. Now that you have diabetes, you need to do the job of the pancreas yourself.

This means injecting the appropriate type and amount of insulin at the appropriate time and managing your lifestyle to try and maintain a hold on fluctuating blood glucose levels.

INSULIN

There are five main types of insulin available in Australia. Each type differs with respect to how quickly it begins to act and how long its effect persists. Most people with type 1 diabetes need to use more than one kind of insulin preparation to mimic the role of the pancreas as closely as possible.

THE FIVE TYPES OF INSULIN ARE:

- **Rapid acting insulin analogues**
- **Short acting insulin**
- **Intermediate acting insulin**
- **Long acting insulin analogues**
- **Pre-mixed insulin**
- **Co-formulations**



REMEMBER

- Always **check the expiry date** before opening a new bottle or pen fill of insulin.
- Make sure you have at least **one spare bottle** of each type of insulin you are using in case of accidental breakage.
- Pharmacies won't necessarily stock the type of insulin you are using. They may need to order it in, so **don't leave getting supplies until you're already out of spare vials**.
- Extreme **heat and cold will affect your insulin** so keep any spare bottles or pen fills in the fridge.

BUYING AND STORING INSULIN

Different insulin preparations are available on the Pharmaceutical Benefits Scheme (PBS). This means the cost of insulin is subsidised by the Federal Government.

For each prescription you will receive either 5x10ml bottles of insulin, five boxes of 5x3ml pen fills or five boxes of pre-filled pens, depending on whether you are using syringes, pens or a pump. This amount of insulin should last you three to six months. Your doctor can also include a repeat on the prescription. However, it is important to note that repeats are only valid for 12 months after the date the original prescription was written.

Spare bottles or pen fills of insulin are best stored in the refrigerator between 2°C and 8°C as insulin stored between these temperatures

has a longer storage life. Be careful not to freeze your insulin as it will lose its effectiveness and will need to be thrown away. Heat will also affect the effectiveness of your insulin. When transporting your insulin, don't leave it in your car or where it may get too hot. If you're going camping or travelling, you can buy special packs from your diabetes supplier which can keep your insulin cool even on hot days or long flights.

HOW TO INJECT INSULIN

Insulin needs to be injected into the fatty layer under your skin. Rapid-acting or short-acting insulin is best injected into the abdomen as insulin is absorbed more quickly from this site. Your outer thigh and upper buttocks can be used as alternate sites for your longer-acting insulin.



Lipohypertrophy is an abnormal build-up of fat under the skin which can occur in areas of repeat injection. These lumps can be unsightly and are thought to affect insulin absorption. It can be avoided by rotating your injection sites; for example, use a different part of your stomach for each injection across the day.

PUMPS

An increasing number of people with type 1 diabetes are using insulin pumps for insulin delivery. These are small computerised devices, about the size of a pager, that deliver a slow continuous level of rapid-acting insulin throughout the day and night. The user can program the pump to deliver a surge of insulin when eating a meal. They can be programmed to give more

or less insulin when and if required. The insulin is delivered through a tiny plastic tube (cannula) under the skin that is changed every three days.

Insulin pumps are covered by some private health insurance policies so do your research. You need to serve a waiting period of 12 months to qualify to claim for a pump from your health fund but most pump manufacturers will loan you a pump to use during this waiting period. The cost of the pump itself is around \$7000 to \$10,000 to purchase outright. The consumables required for the pump are subsidised by the NDSS and cost around \$30 a month.

When using pumps, care is needed to ensure that the tube delivering the insulin does not become dislodged or kinked, as this may cause the blood glucose level to rise and ketones to develop. If you are using a pump, you should be especially vigilant about checking blood glucose levels regularly.

CONTINUOUS GLUCOSE MONITORING (CGM)

It is now possible to measure glucose levels 'continuously'.

At present, there are two systems of Continuous Glucose Monitoring (CGM):

1. Real time CGM
2. Flash monitoring.

Each system requires a sensor or a tiny electrode to be inserted under the skin. This is attached to either a transmitter or small disc. The electrode measures the level of glucose in the fluid in the tissue

every 3 to 5 minutes. Depending which system is used, the sensor should be replaced every 6 to 14 days.

Real time CGM actively sends the glucose readings to a device, such as a mobile phone or insulin pump, and alarms can be set to alert when the sensor glucose level is too high or too low. As measurements are taken every 3 to 5 minutes, the direction in which the glucose level is trending can be seen and some systems can alert up to 20 to 30 minutes before the sensor glucose is expected to be too high or too low, allowing some action to be taken beforehand.

Flash monitoring systems store the readings on the disc which is attached to the sensor. To see the collected information, you need to swipe the disc with a phone or meter to 'pull off' the data. The disc has limited memory space so if you don't swipe the disc regularly, every 8 hours, some data will be missed. This type of CGM is good at identifying day to day glucose patterns but it cannot warn of impending highs or lows.

With all CGM systems, finger pricks are still required from time to time, either to calibrate the sensor or check the accuracy of a reading before taking extra insulin.

CGM is not a cheap monitoring option and can cost between \$2,600 and \$5,000 a year. At time of publication, only certain high-risk groups such as children or pregnant women can claim reimbursement for CGM through the NDSS.



JDRF and other diabetes organisations are committed to continuing their work with the Federal Government to make CGM more accessible to everyone who needs it.

SENSOR AUGMENTED PUMPS

Some insulin pumps now come with the capacity to be augmented with CGM. The pump receives the glucose data which can then be accessed via the pump screen. Most pumps can't automatically change rates based on the data received but they will alarm at pre-set levels so the wearer can change rates to avoid very low or very high blood glucose levels.

One pump currently available in Australia has the capacity to suspend the flow of insulin for up to two hours if the sensor glucose drops below a programmed level or if it is predicted to reach a programmed level within the next 20 to 30 minutes (predictive low glucose suspend). Basal insulin delivery is resumed after 2 hours or earlier if the sensor glucose has risen above a safe level.

Since early 2019, a hybrid closed loop pump has also been available in Australia. This system uses feedback to and from the pump and CGM but the process is not fully automated, hence the name 'hybrid' closed loop pump. People using this system still need to actively engage with it (for example inputting food intake to enable delivery of the correct bolus or making corrections when sensor glucose rises too high) but otherwise the pump is programmed with a

complex algorithm that uses data such as the average insulin usage from the last 24 hours and sensor glucose readings to adjust basal insulin every 5 minutes with the aim of keeping the sensor glucose level at 6.7mmol/L. It is likely that additional closed loop systems will become available in the coming years.

Some people within the diabetes community have developed their own closed loop systems, using currently available devices. While safety is a major concern of people building these devices, they have not gone through the rigorous testing required by Australia's strict regulatory processes which look to large scale studies to ensure a device is both safe and efficient before its approved use.

GETTING USED TO INJECTIONS

Giving your first injection can be a daunting experience. However, over time, you will probably become more relaxed about injecting yourself. If the injections hurt, you may be injecting the insulin just under the skin where you have an abundance of nerve endings. The needles are best given at a 90° angle using a 4 to 6mm needle but your diabetes team may personalise this for you. Using different insulin preparations or injecting insulin straight from the fridge may also cause slightly more discomfort.

You may also experience occasional bruising at the site of your injections. This usually occurs because you have pierced a tiny blood vessel while injecting. Although bruising can

look unsightly, it will not affect the absorption of your insulin. You may also bruise if you withdraw the needle too quickly.

Your diabetes educator and team can help you refine your injection technique.

CALCULATING HOW MUCH INSULIN YOU NEED

Your endocrinologist or diabetes team will help decide on how much insulin you need. As mentioned previously, you are likely to need a couple of different insulin preparations to best manage your diabetes. Your team will also help you decide on what combination of insulin is right for you. A common approach is to use one of the longer-acting insulin preparations once or twice a day to provide your body with background (basal) insulin. This is supplemented by rapid-acting or short-acting insulin given at meals to move the extra glucose entering your blood stream after food. This is often referred to as bolus insulin.



A carbohydrate portion or exchange is a serve of food which contains 10 or 15 grams of carbohydrate. A third of a cup of cooked rice or a sandwich slice of bread, are both examples of a 15 gram carbohydrate exchange.

CALCULATING HOW MUCH INSULIN TO TAKE WITH FOOD



To try to mimic the meal time release of insulin you may be asked to count how much carbohydrates you eat and take a dose of rapid-acting or short-acting insulin to cover the total number of carbohydrate in each meal or snack. Your endocrinologist or diabetes team will help you decide how much insulin to give for each carbohydrate and they may refer to this as your 'insulin- to-carb ratio'.

An initial insulin-to-carb ratio is usually calculated using the '500 rule'. The '500 rule' states that you can estimate your insulin-to-carb ratio by dividing 500 by your total daily insulin dose. For example, if you need around 50 units of insulin a day, your initial insulin to carb ratio would be 1 unit of insulin per 10 grams of carbohydrate ($500 \div 50 = 10$).

Using the same calculation, if you are counting in exchanges of carbohydrate instead of grams your insulin to carb ratio would be 1.5 units per 15 gram carbohydrate exchange.

For example, if you have a ham and cheese sandwich and a large apple for lunch (containing approximately 60 grams of carbohydrate or 4 exchanges), injecting yourself with 6 units of rapid-acting insulin should result in your blood glucose level returning to 1 to 2mmol/L of your pre-meal blood glucose within two to three hours.

It probably sounds daunting to be making these decisions yourself, but learning how to count carbohydrates and understanding your insulin-to-carb ratios will give you more freedom to decide how much you want to eat at each meal.

MANAGING HIGH OR LOW BLOOD GLUCOSE LEVELS BEFORE A MEAL

If your blood glucose level is high before you eat, your blood glucose level will also be high after the meal if you only take enough insulin to cover the carbohydrate in your food. Taking some 'extra' insulin with your meal will help get your levels back close to the normal range in about three to five hours, depending on the type of insulin you're using.

Just as your diabetes team will help you determine your insulin-to-carb ratio, they will also help you to determine your 'sensitivity or correction factor'. The goal of the sensitivity factor is to give you a personal estimate of how much a single unit of insulin will lower your blood glucose level and how much extra insulin you will need to take to return your blood glucose levels to normal if they are high.

It is important to remember that your sensitivity factor is just an estimate so there will be times when 1 unit of insulin will lower your blood glucose level by more than this and others where it will lower your blood glucose level less. Monitoring your blood glucose levels will help you see if this sensitivity factor is right for you (most of the time) or if it needs modifying.

Your insulin sensitivity factor can also be used if your blood glucose level is too low before a meal. In this case you would subtract an amount of insulin from your meal time or bolus injection.

CALCULATING YOUR 'INSULIN SENSITIVITY OR CORRECTION FACTOR'

An initial sensitivity or correction factor is often calculated using the '100 rule'. The '100 rule' states that you can **estimate your sensitivity factor by dividing 100 by your total daily insulin dose.**

For example, if you usually take a total of around 40 units of insulin a day, your initial sensitivity factor would be 2.5mmol/L ($100 \div 40 = 2.5$). To put it another way, an **extra 1 unit of insulin will generally lower your blood glucose level by 2.5mmol/L.**

In this instance, if your blood glucose level was 12mmol/L before a meal and your goal blood glucose was 7mmol/L, taking an extra 2 units of insulin with the meal would help bring your blood glucose level close to target within three to five hours. Conversely, if your blood glucose level was 4.5mmol/L before a meal, you would subtract 1 unit of insulin from your meal time bolus.

GETTING YOUR BACKGROUND INSULIN LEVELS RIGHT

The amount of insulin you need to inject each day is influenced by your age, your weight and how long you have had diabetes.

As an adult, once all your beta cells have been destroyed, you will probably need to inject around 0.6 to 0.7 units of insulin per kg of body weight each day to keep your blood glucose levels in the near normal range, around half of which is given as background insulin. Intermediate or long-acting insulin is often given once or twice a day to mimic the background (or basal) insulin profile of people without diabetes. Monitoring your blood glucose levels before meals will help you and your diabetes team determine whether your basal insulin levels are right. Ideally, your blood glucose level should be around 6 to 7mmol/L on waking and before meals. Blood glucose levels consistently above these targets usually indicate that your basal insulin dose needs to be increased. Conversely, blood glucose levels consistently below these targets indicate that your basal insulin dose needs to be decreased.

In general, it is safe to adjust basal insulin by 2 to 4 units every few days until your blood glucose levels are at target, but you should talk to your diabetes team to determine safe dose adjustment. If you are injecting basal insulin twice a day, the morning injection should be adjusted if your blood glucose levels before lunch or dinner are not within target, whereas the evening dose of insulin should be adjusted if you are concerned about your blood glucose levels overnight or on waking.

WHAT TO DO IF YOU MAKE A MISTAKE

Like everything in life, taking your insulin regularly will become a habit over time and if you are not concentrating or you are in a hurry, you may make a mistake with your insulin dose.

No single regimen, or combination of insulin, works well for everyone. The type of insulin, how much is used and how often will depend on the individual. The right insulin regimen for you is the **one that helps maintain your blood glucose level as close to normal as possible** without hypoglycaemia.



If the mistake has been that you have taken too much rapid-acting or short-acting insulin you will need to keep an eye on your blood glucose level for the next three to six hours and balance the extra insulin by eating carbohydrates every hour or so if needed to prevent your blood glucose level from dropping too low.

If you haven't taken enough insulin with your meal, or if you have forgotten to take insulin with the meal, you can compensate by taking 'extra' rapid-acting or short-acting insulin if you realise your mistake within half an hour of eating. The extra dose of insulin should be based on how many extra grams or exchanges of carbohydrate you have eaten.

Taking extra insulin more than half an hour after food may increase your risk of hypoglycaemia before the next meal, so it may be safer to leave your high blood glucose level untreated, unless you realise you haven't taken any meal time insulin at all. In this case you should check your blood glucose and use your sensitivity or correction factor to decide how much insulin to take.

If you take intermediate or long-acting insulin more than once a day, a common mistake is to confuse the morning and evening doses. A larger dose of intermediate or long-acting insulin places you at risk of hypoglycaemia for many hours. You will need to continue to monitor your blood glucose level every few hours and balance your blood glucose with extra food. Generally, one to two

exchanges of carbohydrate every two to three hours is sufficient to prevent hypoglycaemia in these circumstances. You should also set your alarm clock so you can check your blood glucose levels every two to three hours if you have accidentally taken extra insulin at night.

Talk to your diabetes team if you have trouble remembering if you have taken your insulin dose. There are several insulin pens on the market that allow you to check your last insulin dose – how much you took and when. These pens are easy to use and can help you avoid under or double dosing your insulin.

CAUSES OF HIGH BLOOD GLUCOSE READINGS

- Too little insulin
- Taking insulin after your meal
- Eating too much carbohydrate
 - Being less active than usual
 - Illness
 - Infection
- Emotional or physical stress
 - Other medications
- Out-dated or bad insulin
- Menstruation or pregnancy

CAUSES OF LOW BLOOD GLUCOSE READINGS

- Too much insulin
- Eating insufficient carbohydrate
- Being more active than usual
 - Illness
- Drinking alcohol without eating sufficient carbohydrate



Having your career impacted by a T1D diagnosis doesn't have to be the end of the world. When one door closes, another will open. Take time to think about what you love doing and how you can adapt to your new situation.



DR JEREMY ROBERTSON

Dr Jeremy Robertson didn't always want to be a medical doctor. After a type 1 diabetes diagnosis prevented him from continuing his career as a commercial pilot he had to start from scratch.

I was diagnosed with type 1 when I was 31 years old and working as an international airline pilot for Qantas. I was in LA on a training course when I became extremely thirsty and experienced blurred vision. A high blood glucose result at a local GP indicated I had some form of diabetes and sent me straight home to Australia. I knew enough to know I probably had type 1 diabetes which meant my flying career was over. I was on the opposite side of the planet, six weeks out from my wedding and facing a brand new future.

Luckily, my new wife and family were extremely supportive and I was able to take the time to get back on track – both with my health and my career. I decided I wanted to become a doctor, not an easy choice as I hadn't studied any life sciences subjects since high school.

Today, I work as an aviation medicine doctor which means I can integrate my flight experience with my new skills. Since my diagnosis, the rules have changed and I'm now able to work as a pilot with certain limitations. These days I occasionally work as a flight instructor and sky diving pilot.

I often think about how life may have been different if I hadn't been diagnosed with type 1. Whilst it was a big loss in my professional life, I learnt that I had to also see the opportunity. Today, I am home every night with my kids and that wouldn't have been possible in my former career. I believe when one door closes, another will open.



UNEXPLAINED HIGH GLUCOSE LEVELS

If you have ongoing unexplained high blood glucose levels, you should check if your insulin is still OK to use. Check the expiration date and visually check that the insulin looks as it should. Turn your insulin vial or pen fill upside down – if you see any tiny particles your insulin has probably gone bad. If your high blood glucose levels coincide with a new batch of insulin, the insulin may have been damaged due to issues with storage.

If you are using a pump, check your line isn't kinked and that your infusion set is properly attached. If everything

is ok there is a high probability that the cannula is kinked. You should give yourself a correction dose of insulin using a syringe or insulin pen and re-site your cannula.

If using CGM, you should check that your sensor glucose is correctly calibrated and reading correctly.

IMPORTANT NOTE: Dexcom CGM can read falsely high following ingestion of paracetamol. DO NOT give insulin based on your Dexcom CGM if you have taken Panadol or other preparations containing paracetamol in the previous four to six hours. You will need to rely on finger prick blood glucose checks.

EVERYTHING YOU WANTED TO KNOW ABOUT HYPOS

When you have diabetes and inject insulin, there will be times when you have too much insulin in circulation. This may be because you accidentally injected more than you needed. Or it may be because you have been more active than you anticipated, your meal is delayed or your meal has less carbohydrate than you thought. It may also be because the insulin preparations you use aren't perfect and don't work exactly the same each day.

No matter what the cause, there will be times when you have too much insulin and your blood glucose level drops below 4mmol/L. This is known as hypoglycaemia or a 'hypo' for short.

Having a hypo can be a frightening experience. Symptoms are different for different people, but they may include:

- Shaking
- Sweating
- Dizziness
- Hunger
- Blurred vision
- Difficulty concentrating
- Feeling anxious and
- Changes in behaviour

If you feel like this, you should check your blood glucose level. If it's low, you will need to eat or drink something that contains carbohydrate to bring your blood glucose back up into the normal level.

How much carbohydrate you need will depend on how low your blood glucose has dropped. In general, one exchange or 15 grams of carbohydrate will bring your blood glucose level up by about 3mmol/L. The amount of carbohydrate you need will also depend on the timing and cause of your hypo. For example, if it's due to increased exercise or taking too much insulin, you may also need to eat a snack to prevent a further episode of hypoglycaemia.

EXAMPLES OF A QUICK HYPO FIX (OR 15 GRAMS OF CARBOHYDRATE) ARE:

- Six to eight large jelly beans
- Three Glucodin tablets
- 150ml of normal (not diet) soft drink or fruit juice

You should always check your blood glucose 10 to 15 minutes after you have treated your hypo. If your blood glucose level is still low, you should eat a further 15 grams of carbohydrate and recheck your blood glucose in a further 10 to 15 minutes.

Foods that includes fat or protein, such as chocolate, biscuits or a muesli bar, take time in your stomach to digest. These foods can be used to stop your blood glucose dropping low again if you have some regular meal-time insulin still working or you are going to be more active, but they are not a good hypo fix. Fluid and sugar lollies don't hang around

in your stomach so they are likely to bring your blood glucose up faster than other hypo treatment.

You can't always predict when your blood glucose is going to drop too low so you need to carry a hypo fix with you at all times.

If you or your kids can't resist sneaking some of your hypo fix when it's not needed, you can purchase glucose tablets from the chemist to keep in your pocket, car or bag. These tablets taste pretty ordinary so you are unlikely to snack on them! They also have the advantage that they don't melt or become sticky in hot weather.

SOME USEFUL PLACES TO KEEP A HYPO FIX INCLUDE:

- **The glove box of your car**
- **Your handbag or backpack**
- **Beside your bed**
- **In your desk drawer**
- **In your back pocket**

You may find that your blood glucose levels run high for many hours after a hypo. Some of this may be related to overeating to try to correct the low blood glucose level. However, if your blood glucose has been low for some time, your body will make and release hormones, often referred to as stress or counter-regulatory hormones, to try to protect you from having a more serious hypo.

These hormones can trigger a release of the stored glucose from your liver. They also interfere with the action of

insulin. To stop the highs you have to stop the lows. Checking your blood glucose levels across the day will help you and your endocrinologist or diabetes team work out where you need less insulin and where you might need more. It may seem counter intuitive, but it is possible to lower your HbA1c with less insulin in a day rather than more.

Hypo symptoms are possible at **different blood glucose levels** and often depend on recent blood glucose fluctuations.

If your blood glucose levels have been high you may get symptoms of a hypo at a blood glucose level between 4 and 5mmol/L (or higher) and if you have been having a lot of lows you may lose your warning signs altogether. It is important to **treat your hypo if your blood glucose level falls below 4mmol/L**, even if you don't have symptoms.

GETTING HELP IN AN EMERGENCY

If you are not able to recognise signs and symptoms of low blood glucose levels or you ignore them, there is a risk that your blood glucose will drop so low that you are unable to treat the hypo yourself.

For this reason it is a good idea to teach your family, friends and work colleagues how to recognize and treat a hypo if you cannot.

They should only give you something to eat or drink if you can respond to their commands. If you can't, they need to call an ambulance by dialling 000 or they could give you an injection of glucagon. Glucagon is a hormone which triggers a release of stored glucose from your liver. This injection (called GlucaGen™) is available on the PBS through a prescription from your doctor. Talk to your endocrinologist or diabetes team about this injection and whether you should have one at home just in case.

It is important to let your diabetes team know if you have had an episode of hypoglycaemia needing treatment with a GlucaGen™ injection or ambulance assistance. It is likely that you will need your insulin reduced. Having a recent severe hypo means you are at risk of further episodes, especially in the following few weeks. If you have a hypo while driving, you could cause an accident. For this reason, you should not drive for 6 weeks following an episode of severe hypoglycaemia.

PREVENTING AND IMPROVING HYPOGLYCAEMIA UNAWARENESS

Being unable to recognise hypoglycaemia can be a serious complication of insulin therapy.

The major counter-regulatory hormone that causes glucose to be released by the liver to raise the blood glucose level is glucagon.

HYPOGLYCAEMIA UNAWARENESS

If you start having too many low blood glucose levels, you will find it **harder to recognise the signs and symptoms of a hypo**.

The obvious signs of shaking and sweating seem to go and a feeling of vagueness or a change in your behaviour may be your only sign. This is often referred to as **hypoglycaemia unawareness**. To avoid this from happening, it is important to **let your doctor or diabetes team know if your blood glucose level is dropping below 4mmol/L** regularly (more than three to four lows in a week or less if you are newly diagnosed).

Glucagon secretion is reduced in most people who have type 1 diabetes within the first two to 10 years after onset. This means that your blood glucose levels will drop faster, giving you less time to recognise hypoglycaemia.

Your body will also release other hormones in response to a low blood glucose level, such as adrenalin and cortisol. Adrenalin is responsible for the early warning symptoms of hypoglycaemia, such as shaking and sweating. Like glucagon, the adrenalin response to hypoglycaemia diminishes over time. It is further diminished if you have repeat episodes of hypoglycaemia.

These factors make symptoms milder and harder to recognise. This can be exacerbated by drinking alcohol because your mind becomes less capable of acknowledging the situation and your liver is blocked from releasing glucose needed to raise the blood glucose level.

The good news is that research has shown that awareness of hypoglycaemia can be improved by reducing the frequency of low blood glucose levels.

This usually involves reducing your overall insulin dose and raising your blood glucose targets for a period of several weeks. Ideally, avoid any blood glucose level less than 5-6mmol/L by adjusting your insulin dose or food

intake accordingly. You should also avoid drinking alcohol during this period. If you are able to achieve this for two to three weeks, your hormone response that helps alert you to low blood glucose levels should return to near normal.

TIPS FOR REVERSING HYPOGLYCAEMIA UNAWARENESS

- **Reduce the frequency of low blood glucose levels** for at least two to three weeks
- Check your blood glucose levels closely and **treat them before they become too low**
 - Set blood glucose targets **higher**
 - Avoid any blood glucose level **less than 5 to 6mmol/L**
 - **Avoid** excessive alcohol
 - **Talk** to your doctor or diabetes team



FOOD

THERE IS NO SUCH THING AS A 'DIABETIC DIET'

For many years, people with diabetes were told that they needed to eat three meals and three snacks a day to keep their blood glucose levels from swinging too high or too low. Thankfully, with the advent of modern insulin analogues that allow for more flexible insulin dosing, most people with type 1 diabetes no longer need to live with such a regimented diet.

Healthy eating is still important for everyone with type 1 diabetes, just as it is for everyone else. The food you eat provides your body with the fuel for energy and nutrients for overall health.

Your diabetes care team can help you tailor your insulin treatment around your lifestyle. To make sure you are getting the correct amount of insulin, you will need to consider what you eat and how much you eat, so you can match the glucose entering your bloodstream with the insulin dose you take. Your blood glucose level after you eat will depend most on the amount of carbohydrate contained in your meal or snack.

HOW MUCH CARBOHYDRATE DO YOU NEED?

How much carbohydrate you need to eat depends on your energy & nutrition needs and your preferences. The general recommendations are to eat about 45-50% of your total energy intake as carbohydrate.

WHAT IS CARBOHYDRATE?

Carbohydrates (carbs) are the body's **main and preferred energy source**. There are two major types of carbohydrate: starches such as potatoes and pasta; and sugars such as fruit (fructose), milk (lactose), and table sugar (sucrose). **All carbohydrates are made up of chains of glucose.**

When you eat any type of carbohydrate, it is **broken down into glucose and absorbed into your bloodstream** where it can be used for energy. It's important to have a good understanding of how much, and what type, of carbohydrate is in the foods you eat as this will **help you to determine how much insulin** you need to give with meals.

This is so you can fit in all your serves of the different nutritious carbohydrate foods like grains, dairy and fruit.



Remember – Making any significant changes to your diet will influence your diabetes management so make sure you inform your diabetes team and consider seeking the advice of an accredited dietitian. A dietitian can help you plan a healthy eating plan that suits your preferences and meets your nutrition needs.



LOW CARB DIETS

Some people with type 1 diabetes report finding it **easier to manage their blood glucose levels with a low carb diet**. Whilst research into adults with type 2 diabetes has shown that it may help in the short term, there has been very limited research looking at the risks and benefits for people with type 1 diabetes. If you are **considering a low carb diet**, you will need to take note of the following –

- As with any diet, it is important to **plan meals and snacks carefully** to ensure you meet your nutrition needs.
- Reducing carbohydrate and increasing dietary intake of protein and fat will **influence your insulin requirements** so it is important to regularly check blood glucose and change dosage accordingly with your health professional.
- Low carb diets often mean increased fat intake, make sure you choose foods that are **rich in healthy fats including nuts, eggs and seafood**.
- Low carb diets are **not recommended** for children, pregnant or breastfeeding women, people with kidney failure, or those with a history of disordered eating. If you decide to undertake a lower carb diet with any of these conditions please keep in close contact with your team.
- Athletes choosing to follow a low carb diet should seek specialised advice from a dietitian to ensure **capacity for high intensity exercise is not compromised**.
- An accredited practicing dietitian can provide you with **essential advice and support**. Find someone close to you here <https://daa.asn.au/find-an-apd>.



same times each day to 'match' the insulin and keep your blood glucose levels in the target range.

However, if you would like more freedom with your diet, your endocrinologist or diabetes team may suggest you use an 'insulin-to-carb ratio', which tells you how many units of insulin to take for each 'carbohydrate exchange' or gram of carbohydrate you eat. Using an individualised ratio means you can vary the amount of carbohydrate you eat and still calculate the right dose of rapid-acting insulin to cover the expected rise in your blood glucose level.

A carbohydrate exchange is generally considered to be 15 grams of total carbohydrate and a carbohydrate portion is generally considered to be 10 grams of total carbohydrate.

COUNTING CARBOHYDRATE

Knowing how to count the carbohydrates you eat (known as carb counting), can give you a greater understanding of how your meals or snacks will impact your blood glucose levels. This is because research has shown that the total amount of carbohydrate matters most to your blood glucose control.

In other words, you may choose to eat a bowl of pasta or a sandwich for lunch and it won't affect your insulin needs, if the two meals are fairly equal in total carbohydrate.

If your insulin therapy includes set doses of rapid-acting insulin with your meals, you will need to be able to count carbs to ensure you eat the same amount of carbohydrate at the

Adding up how many exchanges you eat will help you to decide how much insulin to take with each meal. For example, if someone's insulin-to-carb ratio is 2 units of insulin for each carbohydrate exchange and they eat a sandwich and drink a glass of milk for lunch (containing approximately three exchanges), they would need 6 units of rapid-acting insulin with their meal.

Monitoring and recording your blood glucose levels before and after each meal will tell you and your diabetes team if your carb counting, insulin-to-carb ratio, and your calculations are correct. Assuming all is well, your blood glucose level should be back down to within 1 to 2mmol/L of your pre-meal blood glucose within two to three hours of eating.



A half cup of cooked pasta, a medium apple, 250ml of milk or a sandwich slice of bread all contain around 15 grams of carbohydrate and are examples of **a carbohydrate exchange**.

To help you accurately estimate how much carbohydrate you eat, it is a good idea to weigh and measure your food for a while until you can visualise the amount of carbohydrate they contain. You don't need to keep weighing food for the rest of your life, but it is a good idea to repeat these measures from time to time. For example, if you think you usually eat a cup of rice, which is approximately three exchanges of carbohydrate, use a cup measure when you serve the rice to confirm your estimate.

All this probably sounds daunting, but measuring your food and learning to count carbohydrate will help give you freedom to decide how much you want to eat at each meal. Being confident at recognising portion sizes will also make it easier to estimate carbohydrate when eating out.

SUGAR

It is a common myth that people with diabetes need to avoid all sugar. This is not true!

As part of general healthy eating and to avoid large blood glucose rises, it is recommended to limit foods containing large amounts of added

Consider using similar plates and bowls to help you visualise your portion sizes. As you get more comfortable, try **measuring the amount of food found in different sized plates, bowls or takeaway food containers to make it easier to estimate the carbohydrate amount** when you are not at home. For example, measure how much rice is normally included in your Asian lunch takeaway to help you keep on track at work.

sugar (e.g. table sugar, lollies and regular soft drinks) because they have little nutritional value and won't satisfy your appetite. This doesn't mean they are banned from your diet. Small amounts of sugar as part of a healthy diet are fine, for example a teaspoon in hot drinks or added to your morning porridge. Of course, sugary foods that are fast sources of glucose are important to have on hand in case of low blood glucose events.

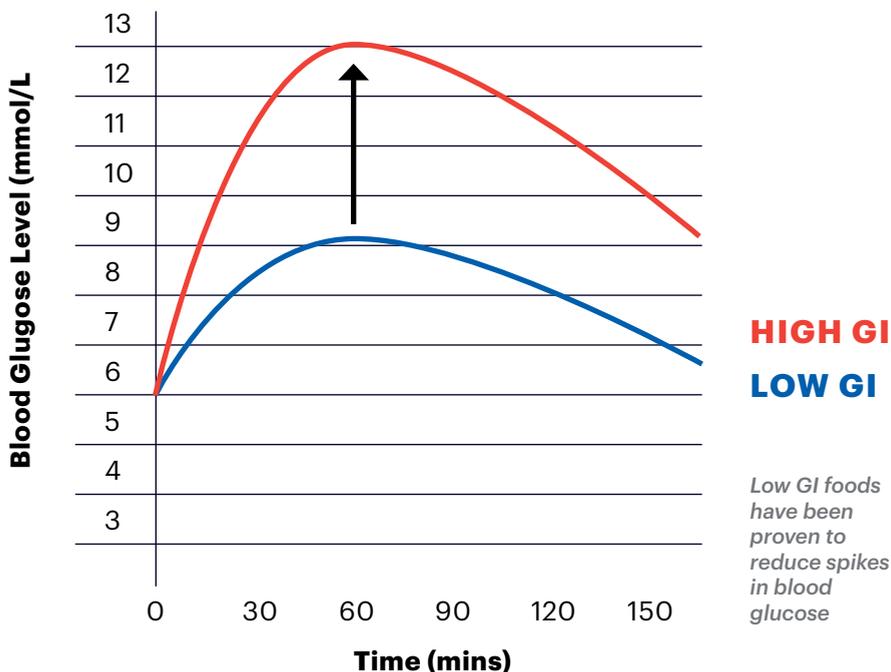
Fruit and milk products contain naturally occurring sugars but, unlike sucrose, these foods do offer significant nutritional value and play an important role in a healthy diet.

GLYCEMIC INDEX

Different types of carbohydrate foods are digested at different rates and therefore can have different effects on your blood glucose level. The

effect of different carbohydrate foods on blood glucose levels is known as the Glycemic Index (GI). High GI carbohydrate foods are quickly digested, for example jasmine rice, which results in a sharp rise in your blood glucose level soon after you eat. Foods with a low GI, such as pasta, take longer to digest and therefore it takes longer for the glucose to enter the bloodstream. This causes less of a spike in blood glucose immediately after the meal than those with a high GI.

Research has shown that the GI is a useful tool for managing blood glucose levels in people with type 1 diabetes. Low GI diets have shown to improve blood glucose control while reducing the risk of hypoglycaemia, and have been found to reduce spikes in blood glucose levels after meals in those on multiple daily injections and insulin pumps.



It can be helpful to swap high GI carbohydrates for low GI alternatives to lower the overall GI of your diet. But remember – the amount of carbohydrate you eat is still important. A small serve of a high GI carbohydrate won't raise blood glucose levels substantially. Conversely, eating a large amount of a low GI carbohydrate food will provide a lot of glucose into the blood stream and so may have a large impact on blood glucose levels.



Foods or recipes that display the GI Symbol have been assessed by researchers to meet certain nutritional criteria around

kilojoules, fats, carbohydrates, sodium, protein and fibre. Find out more about the GI Symbol and a low GI diet at www.glycemicindex.com.

GLUTEN FREE DIETS

People with type 1 diabetes have a higher risk of also developing coeliac disease, an autoimmune condition where the body reacts abnormally to gluten. Coeliac disease can result in gastrointestinal symptoms, fatigue and malnutrition. A strict and lifelong gluten free diet is currently the only recognised medical treatment for coeliac disease.

Gluten is present in many carbohydrate-rich foods so it is important to select the right foods to maintain both your blood glucose levels and a healthy diet. Gluten can also be in meats such as sausages and dairy foods such as yoghurts.

It is important to check the nutrition information panel and a dietitian can show you how to do this.

Examples of gluten-free sources of carbohydrate include –

- Grains such as rice, polenta (cornmeal), buckwheat, millet and quinoa
- Starchy vegetables such as new potatoes, sweet potatoes, yams, cassava (tapioca) and plantains

Most supermarkets stock a range of gluten-free breads, pasta, breakfast cereals and crackers. Eating out may pose more of a challenge but many restaurants provide gluten-free alternatives – you may just have to telephone in advance. The Coeliac Australia website can help you to identify restaurants that have been endorsed as gluten-free www.coeliac.org.au.

Your blood glucose may change after you start a gluten-free diet so keep a close eye on your levels and talk to your diabetes team about your insulin requirements. You should also seek advice from an accredited practising dietitian as iron deficiency and osteoporosis can result if your diet is not nutritionally balanced.

PROTEIN AND FAT

Protein and fat are vital components of a healthy diet. Protein is important for growth and repair of cells. It also plays a role in producing antibodies that help fight infection and creating hormones to keep your body working well. The best sources of protein in the diet are meat, poultry, fish, eggs, dairy products and legumes (lentils,

chickpeas and dried/canned beans), soy foods and nuts and seeds.

Fat is a rich source of energy and is important for carrying fat soluble vitamins A, D, E and K, as well as antioxidants. Certain types of fat (such as those found in fish, nuts, seeds and some oils such as olive and canola oils) supply the essential fatty acids that play a role in regulating many body functions.

While carbohydrate foods have the largest and most direct effect on blood glucose levels, proteins and fats in the diet can influence blood glucose levels too.

Protein and fat don't directly raise blood glucose levels the way that carbohydrates do, but instead compete with glucose for the insulin at meal time and have indirect ways of raising blood glucose levels later. The more fat and protein in your meal and the more sensitive you are to these nutrients – the more noticeable the effect.

In the first few hours after a meal, eating fat and protein with carbohydrate can mean blood glucose levels rise slower and not as high compared with eating carbs alone. This can increase the risk of hypoglycaemia if you were expecting your blood glucose levels to rise straight away and gave yourself insulin accordingly. This is because these nutrients delay the rate at which the stomach empties, which slows down the absorption of glucose from digestion.

From about three hours after the meal, fat and protein can make your blood glucose levels rise.

There are a couple of main reasons for this – partly because fat and protein tell your liver to release extra glucose and partly because they make your body temporarily more resistant to insulin. This makes it more difficult for your insulin to work well, resulting in your blood glucose level after your meal being higher than expected. The effect on your blood glucose levels can last for several hours after eating.

Not everyone will notice the **effects of fat and protein on their blood glucose levels** and carbohydrate will still have a bigger impact than these nutrients. If you find your blood glucose levels **harder to manage after certain high fat and/or protein meals**, talk to your diabetes team to find an insulin dosing solution that works for you. It might mean using your insulin pump to deliver your insulin using a different bolus type (i.e. a dual-wave or combination wave) with additional insulin or it might mean a second insulin injection an hour or so after the meal. For either option, the goal is to ensure your **insulin is dosed to match when your body needs it.**

VITAMINS AND MINERALS

Micronutrients are essential in your diet but cannot be used for energy the way other nutrients can. Micronutrients are used all over the body. For example, calcium and vitamin D are used for building strong bones, B-vitamins for brain function and iron and zinc are used in muscles. Ensuring that you eat

a diet which includes a wide variety of foods is the easiest way to make sure you are meeting your vitamin and mineral needs. A dietitian will be able to discuss in more detail your individual nutrient requirements and the types and amounts of different foods to eat.

FIBRE

Fibre is a plant material that is not absorbed by your body. It helps keep your digestive system healthy and can improve control of both blood glucose and cholesterol levels. Fibre is contained in vegetables, fruit, legumes, nuts, seeds and wholegrains. Following a high fibre diet can also be helpful for healthy gut bacteria and weight management, as high fibre foods help fill you up without providing you with excess energy.

DETERMINING WHAT IS IN FOODS

In Australia, all packaged foods have a nutrition information panel and you can use this to ensure you know what you are eating. Read through the next few sections for some tips on how to read food labels and make healthy food choices.

DE-MYSTIFYING FOOD CLAIMS

Sugar-free does not mean carbohydrate-free. Compare the total carbohydrate content of a sugar-free food with that of the standard product. If there is a big difference in carbohydrate content between the two foods, you may want to choose the sugar-free food as it will have less of an impact on your blood glucose levels (e.g. regular vs diet soft drink).

If there is little difference in the total grams of carbohydrate between the two foods, choose the one you want based on price and taste.

Watch out though – some sugar-free foods, such as sugar-free lollies are sweetened with sugar alcohols, which can have a laxative effect if eaten in excess. Make sure to read the label carefully to make the best choice.

‘No sugar added’ foods do not have any form of sugar added during processing or packaging, but may contain naturally-occurring sugars. For example, some fruit yoghurts may not contain added sugar but are naturally sweet due to the sugars from lactose in the yoghurt and fructose in the fruit. These foods may still be high in total carbohydrate, so you have to check the nutrition label.

Fat-free foods can be higher in carbohydrate and contain almost the same kilojoules as the foods they replace. Fat-free foods are not always a better choice than the standard product, so read your labels carefully.

Not all food comes in a packet. Using resources such as the **‘The Pocket Traffic Light Guide to Food Carbohydrate Counter’** book in your JDRF T1D pack or **downloaded as a phone app**, can help you assess the carbohydrate, fat and energy (measured in kilojoules) content of these foods. Check out the Resources section of this book for some more helpful websites.

READING FOOD LABELS

NUTRITIONAL INFORMATION

SERVINGS PER Package: 11

SERVING SIZE: 23g (4 biscuits)

| | Per Serve | Per 100g |
|---------------------|-----------|----------|
| Energy | 385kJ | 1650kJ |
| Protein | 2.7g | 11.7g |
| Fat | | |
| Total | 2.4g | 10.2g |
| Saturated | 0.7 | 3.0g |
| Carbohydrate | | |
| Total | 13.4g | 57.8g |
| Sugars | 0.4g | 1.6g |
| Dietary Fibre | 2.7g | 11.6g |
| Sodium | 132mg | 530mg |

PER 100G

Use the per **100g column to compare similar products**. For example, which product is lower in fat or salt.

SERVING SIZE

This is determined by the manufacturer and can vary from product to product.

The **information in the first column tells you about what's in one serve of the food**. Your job is to decide if this is the same amount as you are planning to eat. If you are going to eat more or less you may need to recalculate how much carbohydrate and other nutrients you are going to consume.

CARBOHYDRATE TOTAL

This **includes both sugars and starches**. Your blood glucose level after you eat will depend on the total carb amount you eat.

Check out the total carbs per serve listed but be sure to take into account how much of the food you are going to eat.

In the example above, if you were only going to eat two biscuits you would need to divide the total carb amount per serve by two.

SUGARS

This tells you how much of the **total carbohydrate is sugar**. This includes added sugar as well as naturally occurring sugars like lactose (milk sugar) and fructose (fruit sugar). This is less important than the total amount of carbs and the GI of the food.

FAT

Generally try to **aim for less than 10g total fat per 100g**.

It is the saturated fat that is unhealthy for your heart. When

comparing products, choose the one with the lower amount of saturated fat. For dairy products or other items (such as frozen meals) where you consume more than 100g, look for products with less than 3g of total fat per 100g.

DIETARY FIBRE

Use the per serve column and **pick food with the most fibre**. More than 3g per serve is a good goal. Try to have at least 30g of fibre a day.

SODIUM (SALT)

Choose, where possible, **products with reduced or no added salt**. Low salt foods contain less than 120mg of sodium per 100g. In general, look for foods which contain less than 450mg sodium per 100g. Higher salt foods should be eaten in small quantities and/or less often. Compare different products by looking at the per 100g column.

EATING OUT

Lots of people choose to eat out at restaurants or buy takeaway – it's quick, it's easy and can be a great way to catch up with colleagues and friends. The good news is that this doesn't have to change now you have diabetes, although you will need to think a bit more about what you eat and how to dose your insulin.

Today many chain fast food restaurants have nutrition information about their foods in store and on their website.

Using these websites you can look up your favourite menu items and record how many carbohydrate exchanges (and other nutrients) these items contain. If it's a popular chain, the nutrition information may also be available through nutrition websites and smartphone apps.

Nutrition information can be harder to come by when eating at a friend's house or at a restaurant. In this case you need to make your best estimate, taking into account the size of the serving and the amount of carbohydrate you think is in the food. Checking your blood glucose before you eat and then several hours after eating will help 'test' whether your estimate was right. If your blood glucose has risen by more than 2 to 3mmol/L, you have probably underestimated the amount of carbohydrate in your meal. Use this as a learning experience and next time you will know you need more insulin.

Obviously, when eating out, there are other nutrition goals. For example,



if you are trying to lose weight, cutting down on energy (measured as kilojoules) is important. For overall health you should also consider how much fat and salt foods contain, particularly if you eat out regularly. Choosing food that is lower in kilojoules, fat and salt doesn't have to be hard.

When you eat out, your meal may be served later than usual. To avoid a hypo, it's an idea to wait until the meal has arrived to have your insulin.

 Remember the occasional splurge won't hurt you. If your favourite dessert is crème brulee or chocolate mud cake, save it as a treat and savour it. It tastes better that way!



TIPS TO HELP YOU CHOOSE WELL WHEN EATING OUT

- Know the nutritional value of the foods you order. Although there are some good choices, **most fast food items are high in fat and kilojoules**, including food items advertised as healthy choices.
- If you're having fast food for one meal, try to ensure that the other meals you eat that day contain healthier foods, like **lean meat, grains, vegetables and fruit**, and think about how your food will be cooked. Chicken and fish can be good choices, but not if they are deep fried.
- When choosing from menus, **avoid dishes described as sautéed, fried or crispy** as they are likely to be high in fat.
- Ask for an **entrée sized meal as a main course**, particularly for carb-rich options like pasta and risotto.
- Ask for sauce or salad dressings to be **served on the side**.
- **Beware of extras** such as bread with butter.
- Choose lean meats like cuts of beef and pork that **end in 'loin'**, such as pork loin and sirloin.
- Watch out for words like deluxe or super-sized. **Larger portions mean more kilojoules**. They also mean more fat and salt. If you have a hamburger, have a plain burger with salad rather than a burger with the lot (bacon, egg, cheese).
- Pizza can be a **good fast food choice**. Go for thin crust pizza with vegetable or seafood toppings or one meat without extra cheese.
- Many Asian food options can be **fresh and light**. Try seafood or vegetable sushi rolls, Vietnamese rice paper rolls, a noodle soup or a tasty Thai salad.
- If you are choosing sandwich fillings, **avoid high fat meats** such as salami, schnitzel or devon.
- Always add plenty of **salad to get extra fibre, vitamins and minerals** and choose avocado rather than butter and mayonnaise.

ALCOHOL

Although alcohol is not a food as such, it does provide kilojoules and the amount you drink is also important to consider when you have diabetes. You will hear people talk about alcohol in terms of 'standard drinks'. A standard drink contains 10g of alcohol (ethanol). Some examples of a standard drink include a middy (285ml) of regular strength beer, a nip (30ml) of spirits or a glass (100ml) of wine.

LOW CARB VERSUS LOW ALCOHOL

Different alcoholic beverages contain **different amounts of carbohydrate**. For example, spirits and wine don't contain carbohydrate whereas beer does. In general, it is the **amount of alcohol in a drink rather than the amount of carbohydrate that is important**.

In Australia, it is recommended that you drink no more than two standard drinks per day if you are male, or one standard drink per day if you are female; and include one to two alcohol-free days each week. Levels above this may increase the risk of high blood pressure and heart disease, as well as a number of different cancers. In the short-term, alcohol can cause you to gain excess weight because of its high energy content.

For people with type 1 diabetes, excess alcohol can also increase the risk of hypoglycaemia. When you

drink alcohol (which is considered a toxin to your body), the liver prioritises breaking the alcohol down and remove it. While your liver is doing this it can't do all the other jobs it normally would such as releasing stored glucose if your blood glucose level starts to fall. This effect can last for many hours after you have been drinking and may increase the risk of hypo's overnight and into the next day.

To avoid hypoglycaemia, it's best to avoid drinking large amounts of alcohol in one session and make sure you always have some carbohydrate to eat before and while you drink. You should also test your blood glucose level before you go to bed and eat a snack if your level is normal to low. It is also recommended that you don't include the carbohydrate content of alcoholic beverages in your carbohydrate counting calculations.

On occasion, you may find that your blood glucose level rises too high after drinking an alcoholic beverage which contains carbohydrate, such as spirits mixed with regular soft drink or cordial, sweetened liqueurs or large amounts of beer. You may also find that you eat more when your drink alcohol. Where possible, choose a diet soft drink as a mixer and keep an eye on your food intake.

Read more about managing alcohol intake in the "Rest and Recreation" part of Section 3.

WEIGHT

Prior to being diagnosed with diabetes you probably lost a considerable amount of weight over a very short period of time. Some of this weight loss was due to fat loss

as your body burned fat for energy rather than burning glucose (since the glucose was not available for energy without insulin). However, around half this weight loss would have been due to dehydration. As your blood glucose levels rose, your kidneys started to work overtime to filter the 'excess' glucose.

It is normal to regain several kilograms over the first week after commencing insulin therapy as your body becomes rehydrated, the excess glucose is taken up by the cells of the body and your kidney function returns to normal. In the longer term, your body will also replace the fat stores lost leading up to the time of your diagnosis.

Unfortunately, excess weight gain is a potential side effect of intensive blood glucose control with insulin. This may occur if you have recurrent hypoglycaemia and/or need to eat excessively to prevent hypoglycaemia. High levels of insulin can also make you feel hungrier and prompt your body to store excess energy as fat, meaning you can still gain weight whilst eating only 'healthy foods'.

Ideally you should eat to your own appetite and energy needs. If you regularly need to eat extra foods to avoid your blood glucose level dropping too low, you probably need your insulin regimen adjusted. Talk to your endocrinologist or diabetes team for further advice.

If your blood glucose levels are normal or high, and you are gaining excess weight, chances are you are



eating more than your body needs. Surprisingly, the extra kilojoules from servings that are just a 'little' too large can add up quite quickly. Certain foods and drinks, such as cakes and alcohol are also very energy dense, so small amounts can throw your energy balance out. While you can still eat and drink these foods in moderation, they need to be balanced with the rest of your daily or weekly intake.

The amount of kilojoules your body needs to maintain weight, decreases as you get older. If you are in your forties, you can no longer eat the same amount of food you did when you were in your twenties and expect to maintain your weight. How active you are during the day will also affect your energy requirements. If you work in a sedentary job, you need less kilojoules than if you are performing manual labour.

Some people with type 1 diabetes may restrict or miss insulin doses to induce weight loss (similar to the weight loss just prior to diagnosis). Over a period of time, the resulting consistently high blood glucose levels increase the risk of serious complications of diabetes such as diabetic ketoacidosis and eye, kidney and nerve damage. Asking for help early can prevent this becoming a problem for you.



If you want to lose weight you should talk to your endocrinologist or diabetes

team for advice. You should aim for a realistic weight loss goal of 1 to 2kg a month. This can be achieved by being careful with your diet, increasing your exercise levels and adjusting your insulin accordingly.

BUILDING A HEALTHY RELATIONSHIP WITH FOOD

Our relationship with food is about so much more than eating to satisfy our hunger or to nourish our bodies. Food is a social part of our lives – we share meals to connect with loved ones, catch up with friends over a coffee or a beer, relax with comfort foods after a long, hard day and celebrate special events with special foods & drinks.

Diabetes adds a layer of complexity to this relationship with food, as foods have such an immediate and substantial impact on blood glucose levels and insulin dosing decisions. It can be easy to start thinking of foods as ‘good’ or ‘bad’ depending on their effect on your glucose levels or how much insulin you’ll need for them. But there are no ‘evil’ foods.

There are certainly foods that, ideally, make up a bigger proportion of our meals, e.g. fruits and vegetables, and those best saved for ‘sometimes’ or special occasions as part of an overall healthy eating plan. There are also foods that you’ll find trickier to dose insulin for and might need to work alongside your diabetes team to find insulin dosing solutions for. Having type 1 diabetes puts you at a higher risk of developing an eating disorder or disordered eating, so it’s important to check in with yourself and see how you’re relating to food.

The secret to building and maintaining a healthy relationship with food is to not let food be something you judge yourself for or let dictate how involved you can be at social events. Find a sustainable healthy eating plan that is easy to follow and fits with your lifestyle, your preferences, your diabetes and your body’s natural cues. But ensure it’s still flexible enough to adapt to changes in your day or special occasions. Try to avoid being too restrictive or rigid in your plan, so that you find yourself banned from certain foods or holding yourself back from joining in at events. Allow yourself to vary the plan and remind yourself you’re not there for the food, you’re there to join in, have a good time and enjoy the moment without the guilt.



Managing diabetes is about playing the long game. Don't let the incessant stream of data overwhelm you. Just keep your eyes on the bigger picture and do the best that you can.

- Dr Jeremy Robertson



EXERCISE

There is no doubt that exercise is good for you. It can help reduce stress, assists with weight management, increases your insulin sensitivity and is good for your overall health. Everyone should try to be active for at least 45 minutes per day 3-4 times per week.

Being more active may affect your blood glucose levels. To manage activity you need to understand a bit about how different activities

affect your glucose levels, how to adjust insulin, and when and how much to eat. Remember these guidelines are a starting point – contact your diabetes team for individual advice.



To learn more about how to exercise with type 1 diabetes visit www.ext1d.com.au. It

delivers a comprehensive educational resource for people with type 1 diabetes, their families and diabetes health care professionals.

TYPES OF EXERCISE

Different types of activity will have different effects on your blood glucose levels.

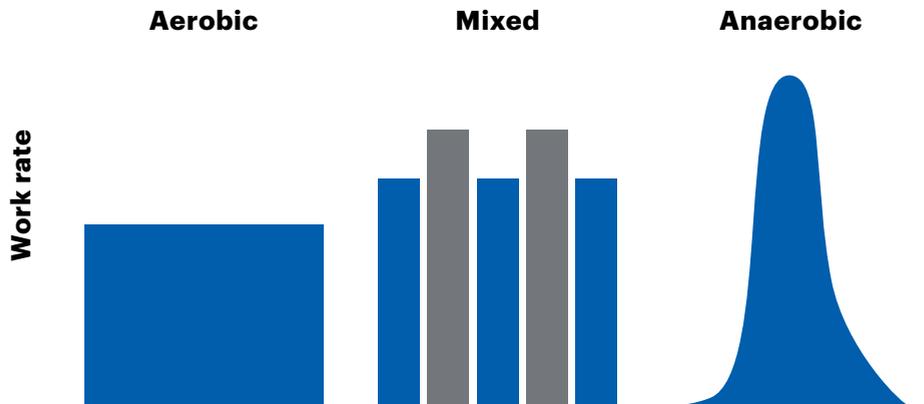
Aerobic exercise includes activities such as swimming, jogging, cycling and walking usually lasting a longer time and **lowering blood glucose levels during and after the activity.**

Anaerobic exercise includes activities such as sprinting, weight lifting, strength and power sports which are usually short duration and make your heart beat very fast. These types of activities usually **push glucose levels**

up initially but can still lower blood glucose levels afterwards. This occurs because your body releases high levels of adrenalin that trigger your liver to break down stored glucose and release it into your bloodstream.

Mixed exercise includes team sports such as soccer, basketball, and hockey. These activities may **result in no change to blood glucose levels or blood glucose levels may increase or decrease** during the activity, but can still lower blood glucose levels afterwards.

BLOOD GLUCOSE EFFECTS OF DIFFERENT TYPES OF EXERCISE



Variability in blood glucose responses to different forms of exercise in people with type 1 diabetes.

In general, aerobic exercise decreases glycaemia, anaerobic exercise increases glycaemia, and mixed activities are associated with glucose stability.

Figure adapted from Riddell M, et al. *Lancet Diab Endo.* 2017;5:377-90.

HOW DO I KNOW THE EFFECT OF EXERCISE ON MY BLOOD GLUCOSE LEVELS?

Checking blood glucose levels before, every 30 minutes (if possible) during exercise, after exercise and then every couple of hours after exercise will help you know your body's response to exercise. Continuous glucose monitoring is a great tool to help identify patterns with exercise and reduce the number of finger pricks. Being aware of your glucose levels around exercise will make it easier to see trends and will guide you and your diabetes team in developing an individualised insulin and food management plan.

What happens to blood glucose levels during and after activity will depend on the balance between –

- Type of exercise (aerobic or anaerobic)
- Timing of exercise (when it is and how long it is for)
- Blood glucose level before activity
- The amount of insulin on board
- Your food and fluid intake.

GETTING STARTED

Before an activity, aim for the blood glucose level to be in a safe target range (around 5-10mmol/l).

If the blood glucose level is below 5mmol/L and you are doing aerobic or mixed activity have a 10-20g carbohydrate snack before you start.

If the blood glucose level is above 15mmol/L, check for ketones. If ketones are high, a corrective dose

of insulin should be given and it is recommended you delay exercising.



HYPOS BEFORE EXERCISE

If you have a hypo in the hours before you exercise you are more likely to have a low blood glucose level during exercise. Monitor your blood glucose levels closely during exercise.

EXERCISE AND INSULIN ADJUSTMENTS

The key things to consider when exercising are the type of exercise you plan to do, the duration of the activity, the action and timing of your insulin, and your carbohydrate requirements. The overall goal is to begin exercise with just the right amount of active, circulating insulin. Having too much active insulin at the start of exercise reduces the amount of glucose the liver can add to blood, thereby increasing the risk of hypoglycaemia. Conversely, exercising with too little insulin stimulates glucose production from the liver which can cause hyperglycaemia.

INSULIN ADJUSTMENTS BEFORE EXERCISE

To reduce the risk of hypoglycaemia and the need for insulin adjustments, you may like to try exercising at the time you are at the tail-end of your long-acting insulin dose, or after the peak action of your rapid acting insulin; for example, before breakfast, lunch or dinner.

If your exercise is planned within 1-2 hours after a meal with insulin, reduce the mealtime insulin dose by about 50% to prevent low blood glucose levels during exercise.

This is just a starting point and should be based on your individual blood glucose responses and advice from your diabetes team.

If you are using a pump, basal insulin dose reduction by 50-80% may be useful up to 90 minutes before exercise to prevent hypoglycaemia. Suspending your pump at exercise onset has not been shown to be helpful in preventing hypos during exercise.

INSULIN ADJUSTMENTS AFTER EXERCISE

Insulin adjustments may be necessary to avoid the risk of early and delayed hypoglycaemia that can occur up to 12 hours after exercise. To prevent hypos following exercise, it is recommended you reduce your bolus of insulin with your meal after exercise by 50% of the normal dose.

Exercising in the late afternoon or evening may increase the risk of hypoglycaemia overnight, often around 2am to 3am. This risk can be reduced by reducing your evening insulin by 20% and eating a meal containing low GI carbohydrate and protein after exercise. If you use an insulin pump, reducing the basal rate by 20% for up to 6 hours after exercise can help prevent overnight hypoglycaemia.

As you get more experienced you will be able to fine-tune insulin adjustments to your individual responses. Adjusting your insulin dose for exercise is just like any other component of diabetes management – getting it right requires practice and more blood glucose monitoring!

If you are doing very strenuous activity or competition sports, your blood glucose levels may climb during the exercise and stay high for some time afterwards.

TIPS TO MANAGE HIGH BLOOD GLUCOSE LEVELS AFTER EXERCISE

- **Do a 15-minute cool down after the exercise**
- **Give a correction bolus. Start with 50% of your normal correction**

EXERCISE AND CARBOHYDRATE REQUIREMENTS

The need for carbohydrate intake prior to exercise depends on the timing of activity in relation to insulin delivery and the type and purpose of activity.

For athletes, a pre-activity meal containing both carbohydrate (approx. 1g/kg ideal body weight) and protein (20-30 grams) is recommended to maximise muscle and liver glycogen stores.

“*I've had to learn to be a bit more disciplined with my life and read my body better which is not something that most 21 year olds have to worry about. I used to push my body to the limit but now I can identify what will cause me to become unstable and act on it.*
– **Dania Ibrahim**



Living with diabetes doesn't stop you doing what you want to do but it does make things more complicated. I think we all deserve recognition for what we achieve despite living with a chronic illness.

LARA MCSPADDEN

Playing the Centre position for a professional sports team is a tough gig at the best of times, but Lara McSpadden has to juggle more than just a basketball.

I was always a pretty sporty kid, and to be honest my diagnosis of type 1 when I was about 8 didn't really slow me down at first. It was when I decided to take my sport more seriously when I was in high school that things did become a lot more complicated. The combination of increased training and hitting the teenage years resulted in me becoming a little lax with my diabetes management and this did have an effect on my health and also my sporting performance.

Playing a lot of sport is tough on the body, but having type 1 really amplifies things and makes it more difficult to bounce back. The good news is there are things you can do to minimise its impact. Type 1 diabetes is not always predictable but I focus on managing the things that affect it. To minimise blood glucose fluctuations, I'm very strict with my diet, training regimes and sleep. I eat virtually the same thing every day for breakfast and lunch so I know what my blood glucose levels are going to do. Whilst an insulin pump isn't appropriate for me to wear whilst playing a contact sport, I do use CGM which is really helpful for predicting blood glucose trends and allowing me to intervene before it starts impacting my performance.

I learnt early on that it's really important to have support. My team mates at the Sydney Uni Flames all know about type 1 and what to do if something goes wrong. If I drop a ball or awkwardly trip over, they will remind me to check my blood glucose levels. Of course, that's not always caused by my diabetes, sometimes I'm just having a bad day on the court!



TIPS FOR SAFE EXERCISE

- Always wear/carry **diabetes ID**
- Always have a **blood glucose meter and hypo treatment** with you
- **Check blood glucose levels often** or wear a continuous glucose monitor
- If blood glucose is below 5mmol/L, have **10-20 grams of carbohydrate**
 - Drink plenty of **fluids**
 - If the activity lasts longer than 60minutes, consider a **sports drink for carbs and fluids**
- Always eat something containing both **carbohydrate and protein after exercise**. This may be at your next meal
- Always check blood glucose levels **overnight after exercise**
- **Do not drink alcohol** after exercise as it increases the risk of delayed hypoglycaemia.

CARBOHYDRATE REQUIREMENTS BEFORE EXERCISE

Even when exercise is timed well with insulin action, you may need to eat extra carbohydrate immediately before exercise. This depends on your blood glucose level, the type of exercise you intend to do, its duration and if it is aerobic or anaerobic activity. Ingest 10-20g of carbohydrate as glucose or as low fat carbohydrate drink/snack 10-15 minutes before starting exercise if your blood glucose level is < 5mmol/l or you are doing aerobic

activity for more than 30 minutes. Checking your blood glucose before, during and after exercise will then help you develop your own plan. Be careful not to consume too much carbohydrate as this will make your blood glucose levels high.

CARBOHYDRATE INTAKE DURING EXERCISE

During exercise you may need additional carbohydrate to prevent low blood glucose levels. How much carbohydrate you need will differ depending on the timing of exercise relative to the action of the insulin you have injected. As a guide, it is recommended that you include 15g-30g carbohydrate/hour of exercise if you are exercising without prior insulin reductions. Exercise snacks need to be easy to eat and low in fat so you don't get too many extra calories, for example, a banana or low fat cereal bar. Remember to drink during exercise – water is the fluid of choice for activity lasting less than 1 hour.

AFTER EXERCISE

After exercise it is important that you eat enough carbohydrate and protein to replace the fuel used by your muscles. Eating well will help prevent low blood glucose levels after exercise.

Try to eat within 1-2 hours of activity. Food eaten up to 4-6 hours after any type of exercise usually needs 25-50% less insulin than usual.

EXERCISING FOR WEIGHT LOSS

Being active is an essential part of losing weight, along with a healthy diet. If you are trying to lose weight it is important to minimize any additional carbohydrate intake to prevent hypos during or after exercise.

Reductions in your insulin dose both at meal-times and to your basal insulin are needed as you exercise and lose weight. Exercising and weight loss will make your body more sensitive to insulin, so your correction doses may also need to be decreased. A diet higher in protein and lower in carbohydrate, with a focus on low GI carbohydrates, may be helpful for satiety and meet your activity needs.



CARBOHYDRATE INTAKE FOR PERFORMANCE

If you do more than one hour of exercise then you are more likely to need **additional carbohydrate to fuel your performance**. This may be up to 30g-60g carbohydrate/hour, however an individualised plan is needed from your dietitian. For activities lasting longer than 1 hour, a drink with carbohydrate may be useful, for example a sports drink. Just be careful **not to over consume**. If you are training or competing and the exercise is longer than 1 hour, aim for 20-25 grams protein and 1g carbohydrate/kg ideal body weight in the recovery meal to **replenish glycogen stores**.

MANAGING SICK DAYS



The impact of illness on your blood glucose levels is very much dependent on the illness you have.

Being stressed or unwell can affect your blood glucose levels.

During times of mental or physical stress, especially if you have the flu or a serious bacterial infection, your body will make and release stress hormones. These hormones can trigger a release of stored glucose from your liver and interfere with the action of insulin. On these days your body will need significantly more insulin.

Before you had diabetes your pancreas did this automatically for you. However, if you get sick now you may not be taking the right amount of insulin your body will need. Too little insulin and your body will start to burn fat as an alternative energy source, producing ketones which can build up and make you even more unwell. In fact, this situation can be life-threatening.

This is the worst-case scenario. You are less likely to produce stress hormones if you have a gastro-type bug. In this case your blood glucose levels are more likely to be low because you're not eating or not absorbing the food that you are eating – the food is going straight through you. There are other illnesses, such as chicken pox, that seem to have little or no effect on your blood glucose.

If it's after hours or late at night and your doctor is not available, take a trip to the emergency room. If you can't get to the emergency room you may need to call an ambulance service. It's also a good idea to keep handy an **updated list of all medications you take and a schedule of when you take them**, so healthcare providers can quickly review your medication history.

WHAT TO DO WHEN YOU'RE UNWELL

If you have a relatively minor viral illness (eg. a cold), there is probably not much you can do except take symptomatic relief such as paracetamol. You should probably keep an eye on your blood glucose level a couple of times a day, but your blood glucose probably won't be that affected.

If you've got a serious viral or bacterial infection you will need to keep up your fluids, especially if your blood glucose levels are high or you have a fever, as this makes you especially prone to becoming dehydrated.

If you have a tummy bug it is important to keep up your fluids. You should aim to drink about one to two glasses of fluid every hour or so. Whether you need to drink low calorie or sugar-based drinks depends on what your blood glucose level is doing, so you are going to need to check your blood glucose level every few hours. If your

blood glucose is normal to low, you should drink regular soft drink or some other drink with kilojoules. You may also need to take less insulin. However, if your blood sugar is high, all you need is the fluid, so water or a diet drink is a far better choice.

As mentioned earlier, your insulin requirements can be significantly increased with these illnesses, so you need to monitor your blood glucose

levels closely. How often you need to check your blood glucose will depend on how unwell you feel. You should also be monitoring either your blood or your urine for ketones. If you have ketones, you will need to take extra insulin so that your body can use the glucose in your blood for energy rather than burning fat. You should develop a plan with your diabetes team that covers how much extra insulin to take in case of illness.



TIPS FOR MANAGING SICK DAYS

- **Monitor blood sugar levels more frequently** – How often depends on the seriousness of the illness, but a general target is around every four hours.
- **Don't stop taking insulin** – Never completely stop taking insulin, even if you're not eating anything. Insulin is critical for normal metabolism – without it, the body starts to burn fat which can cause diabetic ketoacidosis. To determine the proper dose, use your blood glucose level to guide you, or call your doctor for help.
- **Check urine for ketones** – The presence of ketones in the urine, regardless of blood glucose level, shows that the body needs insulin. If you find ketones in your urine, take additional insulin and lots of fluids.
- **Drink plenty of fluids** and try to eat small amounts of food every three to four hours to keep your blood glucose levels as normal as possible.
- **Be careful with over-the-counter medicines.** Over-the-counter remedies for colds, allergies, upset stomachs, etc., may contain ingredients that raise or lower blood glucose levels, or that imitate the symptoms of high or low blood sugar. Read the labels before you take any over-the-counter medication and ask the pharmacist for advice if you are unsure.
- **Have a 'game plan'** and don't hesitate to ask for help – Ideally,



you and your doctor should develop a strategy for managing sick days before you get sick. Put it in writing and then make adjustments as you gain experience with sick days.

- **Seek medical advice if:**

- Your illness lasts longer than two days.
- Vomiting or diarrhoea lasts more than eight hours.
- Your blood glucose is over 15 mmol/L and you can't bring it down.
- You have ketones in your blood or urine and they don't go away within a few hours.
- You can't keep any food or liquid down.



A TRIP TO HOSPITAL

Having to go into hospital, whether it's planned or an emergency, can be a stressful and uncomfortable experience for anyone. It shouldn't be more difficult for someone with type 1 diabetes, provided you are properly prepared.

The key is to be well-informed, take an active role in managing your diabetes while in hospital and plan well before the event.

BEFORE

- Consult with your doctors before you go into hospital. Make sure everyone involved in your care has accurate and consistent information about you.
- When you make your surgery appointment, request that your procedure is scheduled first on the morning list so your routine is disrupted as little as possible.
- Check your blood glucose levels often – at least six to eight times per day.
- Talk with your diabetes team about the surgery/procedure and what to expect. Discuss any concerns you have about managing your diabetes before, during and after surgery.
- If you use an insulin pump, check hospital staff are familiar with this therapy.

- Each hospital has a protocol for managing patients with diabetes having surgery. However, it is still advisable to ensure the surgical team is aware of your individual management plan.
- Ask a family member or friend to be your advocate while you are in hospital so you have someone to speak on your behalf if necessary, and provide support throughout the process. Talk to this person about how you manage your diabetes and any concerns you have going into hospital. Give the hospital staff your advocate's name and contact numbers when you are admitted.

DURING

- Take all important medical information with you, such as your medical history, including allergies and previous procedures/surgeries, names and doses of all the medications you are taking and if it applies to you, make sure you tell hospital staff of any dietary requirements (such as gluten-free meals).
- Check when meals will be served so you can time your insulin injections
- Be prepared for the possibility of having a hypo in hospital – check with your diabetes educator about what precautions you can take and what treatments can be used.
- When you go into hospital make sure you take all your medications. You should also take your blood glucose monitoring equipment, including strips, spare lancets, hypo kit, your medical ID bracelet, personal hygiene items (hospitals don't supply these), and your slippers!

AFTER

- When you are discharged, make sure you have written instructions about changes to medication or insulin injections, instructions about meal plans and activity levels during your recovery. You will also need information on who and when to call for medication adjustments or other medical problems.
- While you are in hospital your blood glucose levels may be higher than your usual readings.
- The stress of your illness, lack of activity, different medical procedures, even infections may cause your blood glucose levels to rise. While this can be frustrating, it is quite common.
- Don't expect all the hospital staff to understand type 1 diabetes. If you are concerned about the care you are receiving, stay calm and keep asking until you receive the help you need.

“*Managing diabetes adds another level to your life that ends up being brought through to everything else you do. In my job I've always been very on track with projects because I'm so used to being focussed and being able to manage lots of things at one time*
- Bree Hafsteins



TYPE 1 DIABETES AND WORK

TO TELL OR NOT TO TELL?

Your medical information is confidential unless you work in a position where your diabetes may have safety implications for your work colleagues or the general public (e.g. if you drive public transport or are a police officer). Otherwise your employer does not need to be informed about your diabetes unless you wish to disclose it or you need them to make some accommodation to your work situation to help you manage your diabetes, such as ensuring meal breaks.

Your decision about whether or not to disclose your diabetes to your work colleagues, rather than your employer, is personal and will depend on your work circumstances and what you are comfortable with. If you choose to tell your colleagues, you

should be prepared for them to ask questions or make comments, which at times may seem inappropriate. This is usually because they don't understand what having type 1 diabetes means. Talking about how you developed diabetes, and how it is treated, can be helpful.

While it can seem embarrassing to bring your diabetes into the conversation, not doing so may be more so. For example, colleagues may misinterpret signs of hypoglycaemia, and assume you are drunk or being rude, if they are unaware that you have diabetes. While you may not want to disclose that you have diabetes on your first meeting, it is often advisable to do so sooner rather than later. You might want to simply explain that you have type 1 diabetes and that you need to inject insulin. You should also let them know about hypos and what to do if you have one.



TIPS TO HELP YOU MANAGE YOUR DIABETES AT WORK

- You may need to adjust your insulin dose depending on the type of work you do; for example, **if you are more or less active at work.**
- Keep a well-stocked **hypo kit handy** at all times.
- **Don't skip meal breaks** – stop when you need to eat.
- If you are unable to eat regularly, or you are going into a long meeting, **keep a drink containing carbohydrate**, such as an orange juice, a glass of milk or café latte on hand, that you can slowly sip to reduce your risk of hypoglycaemia.
- **Don't ignore a hypo** – treat it immediately and re-treat if necessary.
- Check your blood glucose level **before you give a work presentation or go into an important meeting.** Adrenalin and nerves can make it hard to know if you're having a hypo or are just nervous.

While being diagnosed with type 1 diabetes **does not impact employment** in most industries, **some roles may be restricted.** For example:

- Defence forces
- Full-time or volunteer fire brigade
- Police force
- Aviation industry – Commercial and private
- Careers that involve high risk activities (e.g. underwater or solo in nature)
- Bus and truck driving



I find other people are genuinely interested and feel comfortable asking me questions about my type 1. I feel happy that I can educate people and possibly help to save someone's life tomorrow.

– Piers Nelson

JOB INTERVIEWS

Both disclosure and non-disclosure of your diabetes during a job interview have their drawbacks and merits. While people with diabetes successfully perform all types of jobs, some employers may be reluctant to employ someone with diabetes in particular positions because of misconceptions about diabetes. For example, they may wrongly assume that people with diabetes can't hold a position that requires regular driving. If you choose to tell your potential employer about your diabetes you need to be prepared to help dispel these myths.

It is possible to turn your diabetes into a positive. People with diabetes have to be aware of the time, keep to a routine, follow a healthy lifestyle and attend for regular diabetes review. These are all qualities which demonstrate responsibility, self-discipline and organisational skills – traits that employers seek when recruiting. Emphasising this at an interview can be to your advantage. Being open and honest about your diabetes can also prevent you from experiencing trouble once you are employed.

DEALING WITH DISCRIMINATION

Discrimination can come in many forms. It's possible that an employer may refuse to hire you after an employment medical, limit your job responsibilities or promotions, or fire

you. They may also be unwilling to accommodate your need for regular meal or snack breaks or to provide a private location where you can check your blood glucose or inject your insulin.

Often, discrimination in the workplace occurs because employers and co-workers don't understand type 1 diabetes and how it is managed.

Your employer may be concerned about loss of work time and productivity, and this may influence their willingness to hire or support you within the workplace. However, workplace laws require employers to take reasonable steps to accommodate your needs. For instance, if you need to take a short break to have a snack or check your blood glucose level, your employer would be legally obliged, in the majority of cases, to allow such a break. If you believe you are being discriminated against contact the Fair Work Ombudsman for advice.

Despite all the advances in managing diabetes, there are certain jobs that may no longer suit you. If you have foot problems for instance, wearing steel-toed boots on a cold concrete floor for twelve hours a day may not be for you. Similarly, if you have retinopathy or a heart condition, you should not be performing tasks such as heavy lifting.



Speak with your doctor or diabetes educator if you have concerns about the possible health risks associated with the demands of your current job.

MANAGING SHIFT WORK

Even if you don't have diabetes, shift work can put a strain on health. There is no medical evidence indicating you shouldn't perform shift work; however, you should be aware that managing diabetes may be more difficult, especially if you are working a rapidly changing shift pattern. Even if your diabetes is well managed, shift work may increase your risk of high or low blood glucose levels due to changes in your body's 'circadian rhythms' which regulate daily processes such as hunger and fatigue. When you start eating and sleeping at different times, your body's internal clock is disrupted and this can affect blood glucose control.

Different insulin regimens, such as taking long-acting insulin analogues at the same time once or twice a day, supplemented by rapid-acting or short-acting insulin when you eat, and regularly monitoring your blood glucose levels during and after shifts, can help reduce day-to-day fluctuations in blood glucose levels. For this reason, it's essential that you speak to your endocrinologist or diabetes team about your job so that they can assist you to develop a management plan that works for you.

HEALTHY EATING FOR SHIFT WORK

During shift work, meal times are often disrupted and occur at irregular times. Food may not always be available when expected. These issues can pose a challenge for controlling diabetes. However, with some careful planning, successful management of diabetes can be achieved through healthy eating, no matter what hours you work.

WHEN SHOULD YOUR INSULIN DOSE BE ADJUSTED FOR WHEN WORKING SHIFTS?

Insulin adjustments are often necessary when working shifts. Basal insulin can be delayed for up to two hours without affecting your blood glucose control. This may be all that is required when working an afternoon shift. If extra food is consumed later in the day, a slight increase in the bedtime insulin may be needed. The goals for adjusting insulin over a night shift are to provide the right amount of insulin to match the change in food consumption and activity undertaken.

Any adjustment you make to your insulin dose needs to be based on –

- Your blood glucose measurements
- Your planned activity and expenditure of energy
- The food you eat

TIPS FOR HEALTHY EATING AT WORK

- Include **regular meals and regular carbohydrate intake**. No matter what working hours you have, try to eat two to three meals with some carbohydrate foods, and spread your meals across the day (or night)
- Keep a **supply of carbohydrate foods nearby**. If you are working unusual hours of the night or day, be aware that shops and cafeterias may not be open, so ensure you have a supply of long-lasting (non-perishable) carbohydrate foods on hand (e.g. in your desk or locker at work). Examples of long-lasting carbohydrate foods include dried fruit, cereal bars, baked beans and canned spaghetti
- **Keep up your fluids**. Many people don't drink enough water. Even slight dehydration can contribute to tiredness, headaches and possibly reduced alertness. Try to include six to eight glasses of water a day.



MANAGING SCHOOL AND UNIVERSITY EXAMS

Preparing for school exams can be difficult at the best of times – it can be even harder if your diabetes is out of control. Your ability to concentrate can be affected by having high or low blood glucose levels, so it is a good idea to monitor your blood glucose levels closely when you are studying. If you are not sure what to do to ‘smooth’ your blood glucose levels out, remember to contact your endocrinologist or diabetes team for advice.

It is also a good idea to keep a close eye on your blood glucose levels while you are sitting your exams. Most schools will allow you to take your blood glucose meter and strips into the class, as well as small amounts of carbohydrate food or drink, such as dried fruit or juice, so that you can top up your blood glucose levels if needed. You are also entitled to an extra 20 minutes to complete an exam if you have had to treat a hypo, or an extra 5 minutes if you have had to go to the toilet because of high blood sugars. So remember to let the teachers know that you might need to stop and eat or go to the toilet before you start the exam.

You are entitled to apply for special provisions if you are sitting for your final year or university exams. For example, if you have a hypo while you are doing your school exams you can apply to be treated as an ‘illness or misadventure case’.

If this happens, you can usually receive a mark based on a school assessment instead of the exam. Your school should be able to provide you with the appropriate paperwork that you need to complete. You can also contact the Department of Education in your State or Territory.

Universities also offer special provisions. Most institutions have some kind of scheme for applicants who have experienced long-term educational disadvantage such as may happen with type 1 diabetes.



Contact the student office at your institution or visit www.uac.edu.au for more information.

DRIVING AND DIABETES

The main concern of the licensing authorities is the possibility of hypoglycaemia while driving. Diabetes complications, like eye problems, are also a concern.

All states and territories use a set of national guidelines of medical fitness to assess people with diabetes who wish to begin or continue driving. These guidelines – ‘Assessing Fitness to Drive’ – can be found on the internet and are intended to protect your safety and the safety of the community as a whole. The guidelines attempt to balance the safety of all concerned and any unfairness against you.

You should immediately inform the relevant licensing authority that you have developed type 1 diabetes.

If you fail to notify your licensing authority and continue to drive and have an accident, you could be charged with driving offences. There may also be problems with insurance claims if your diabetes has not been reported.

Once you have notified your licensing authority they will forward you a report form for your doctor to complete to say you are fit to drive. A medical review must be completed at least every two years and annually if you hold a commercial driver's license. Planning ahead for your medical review is important, such as having an eye check beforehand, and taking along other results including records of your recent home blood glucose results.

You should check your blood glucose level before driving, as getting behind the wheel with low blood glucose levels can impair your ability to drive safely. You should also ensure that you always have a hypo fix and a long acting carbohydrate snack available in your car.



Your blood glucose level should be 'Above 5 to drive'. If you are driving long distances, check your blood glucose before driving and every two hours, and plan for regular meal breaks.

UNCONSCIOUS HYPOS REQUIRE LICENSING AUTHORITY NOTIFICATION

If you experience a hypo that results in you losing consciousness, do not resume driving until you have medical clearance to do so. In most cases

you will have your license temporarily suspended. You will need to undergo a medical review with your diabetes specialist to determine your fitness to safely resume driving before your license is restored.

It is important to know that if you have a hypo while driving and cause an accident, you may be charged with reckless or negligent driving. The onus is on you to prove beyond a reasonable doubt that you were having a hypo at the time and not legally responsible for your actions. However, if it can be shown you knew you were having a hypo and neglected to treat it, the charges may still stand.

If you ever feel that your blood glucose level is low, **STOP driving** as soon as it is safe to do so and remove the key from the ignition. Even a **mild hypo can affect your reactions and concentration**. Do not attempt to treat the hypo while driving. Check your glucose level and treat your hypo. After 15 minutes, **recheck the blood glucose and eat some long acting carbohydrate**. You shouldn't restart the car until you have treated your hypo and feel absolutely normal. It is recommended that you resume driving 30 minutes after symptoms have completely gone. While this may seem a nuisance, **it is better to arrive late** than not at all!



STEPS FOR MANAGING A HYPO WHEN DRIVING

Before you drive:

- Be sure to keep plenty of hypo treatments in your car
- Check your blood glucose level before driving.

If you do experience a hypo while driving, you should always:

- Pull over as soon as it is safe to do so and stop the car
- Remove the ignition key – treat your hypo
- Wait 30 minutes to ensure full recovery
- Check your blood glucose levels before driving again to ensure it is above 5 mmol/L.

In case of an accident, you should always have something on you that identifies you as having type 1

diabetes such as a MedicAlert® emblem (bracelet or necklace).

There are also some other attractive options now available on the Internet, for example, wrist bands, beads or leather bracelets as well as cards for your wallet or glove compartment.

DIABETES AND COMMERCIAL DRIVING

As with private vehicle drivers, the law requires commercial drivers to advise their State Driver Licensing Authority of any illness that affects his or her safe driving ability. This law can impose penalties for failure to report this information. Unconditional heavy vehicle licenses are not issued to people with type 1 diabetes. However, a conditional license may be given if good diabetes control can be demonstrated.

The licensing authority in your state will decide your license status, considering the report from your doctor and other factors such as your accident history and the type of vehicle you drive.



If you require a heavy vehicle license, your doctor will need to assess your health based on the driver medical standards for commercial vehicles.

You can access these standards at static.diabetesaustralia.com.au/s/fileassets/diabetes-australia/17bc68dd-2414-496c-86fe-dcd5d689882e.pdf

| | | | |
|-------------------------------------|---|--|--------------|
| Australian Capital Territory | ACT Road Transport Authority | www.accesscannberra.act.gov.au/app/home/transport | 13 22 81 |
| New South Wales | Transport, Roads and Maritime Services | www.rms.nsw.gov.au | 13 22 13 |
| Northern Territory | NT Transport Group | nt.gov.au/driving | 1300 654 628 |
| Queensland | Department of Transport and Main Roads | www.tmr.qld.gov.au | 13 23 80 |
| South Australia | SA Department of Planning, Transport and Infrastructure | www.sa.gov.au/topics/driving-and-transport | 13 10 84 |
| Tasmania | Department of State Growth | www.stategrowth.tas.gov.au/vehicle_registration_and_licensing | 1300 851 225 |
| Victoria | Vic Roads | www.vicroads.vic.gov.au | 13 11 71 |
| Western Australia | Department of Transport WA Licensing Services | www.transport.wa.gov.au | 13 11 56 |



SECTION THREE

STAYING HEALTHY AND ENJOYING LIFE

FUTURE HEALTH AND COMPLICATIONS

Here comes the part none of us like to think about... complications.

The long-term health problems related to diabetes – otherwise known as complications – are linked to having higher blood glucose levels over a long period of time.

The most common complications can be classified broadly as:

- Damage to the large blood vessels of the heart, brain and legs (called macrovascular complications)
- Damage to the small blood vessels causing problems in the eyes, kidneys, feet and nerves (called microvascular complications)

WHY DO THEY OCCUR?

Certain cells do not require insulin for glucose to move into them. Such cells are found in the brain, nerves, eyes, kidneys and blood vessels. If your blood glucose levels are high, the cells that do not require insulin will absorb large amounts of glucose. In the long-run, this can be toxic to the cells, and these organs will be vulnerable to damage. Research has shown some ways in which excess glucose is toxic.

If there is too much glucose, the amount of sorbitol (a type of alcohol) in the cells increases,

causing damage through swelling and chemical reactions. Too much glucose can lead to increased production of advanced glycation end products (AGEs). These accumulate in the blood vessel walls, making them thicker and less flexible. The blood vessels can also become more permeable (leaky). AGEs can accumulate in the cells too, disturbing important cell functions. Too much glucose leads to excess levels of an enzyme called protein kinase C (PKC), which can damage the cells that line the blood vessels.

While complications are clearly linked to higher blood glucose levels, blood glucose control isn't the only factor that determines whether a person will develop diabetes complications. Other factors, like genes, also play a role.

 Once you have lived with diabetes for a couple of years you are at risk of developing some subtle changes to the organs containing non-insulin requiring cells but many of the complications won't show up until you've had it for many years, sometimes decades.

Complications usually develop silently and gradually over time, which makes regular check-ups a must. If changes to your organs are found early, there are strategies to stop or delay the progression of diabetes-related complications. For this reason, it is recommended that you are screened for diabetes complications two to five years after being diagnosed with diabetes, and annually thereafter.

CHECKING FOR COMPLICATIONS

HEART AND BLOOD VESSELS

People with diabetes have a higher risk of developing problems with the heart and large blood vessels.

This can lead to –

- Heart attack caused by a blockage of the blood supply to the heart.
- Stroke caused by a blockage of the blood vessels supplying the brain.
- Foot ulcers and infections caused by a blockage of blood vessels supplying the legs and feet. Unfortunately this can lead to loss of a toe, foot or lower leg.



Regular monitoring of blood pressure, cholesterol levels, and the pulse in your feet are important for ensuring the health of your large blood vessels.

KIDNEY DISEASE

Prolonged high blood glucose can damage the blood vessels in the kidneys and lead to kidney disease (nephropathy).

In early stages, kidney disease doesn't cause symptoms but if it isn't addressed, it can result in kidney failure. This means the kidneys stop working and dialysis is required to clean the blood as the kidneys normally would.

If kidney disease is picked up early, there are treatments that will stop and possibly reverse the damage. Doctors can also prescribe medications to lower your risk of developing kidney damage over the long term.



The health of your kidneys can be easily tested by measuring how much protein (or microalbumin) is passed by your kidneys into your urine. This can be measured at your GP or diabetes clinic using a spot sample of urine.

You should also have the levels of creatinine in your blood checked at least once a year. A high level of creatinine may mean your kidneys are not functioning well and further investigation is required.

EYE PROBLEMS

People with diabetes have a greater risk of developing eye problems, including cataracts, glaucoma and retinopathy.

A cataract is a thickening and clouding of the lens of the eye which blurs vision or makes it hard to see at night.

In glaucoma, the pressure builds up inside the eye which can decrease the blood flow to the retina and optic nerve and damage them. If left untreated, glaucoma can lead to vision loss.

Diabetic retinopathy involves changes in the retina, (the light-sensitive layer of tissue that lines the back of the eye) due to damage or growth problems in the small blood vessels of the retina.



A regular visit to your ophthalmologist or optometrist can detect any changes in your eyes. They will look at the back of the eye using a special instrument called an ophthalmoscope, as well as measuring eye pressure and checking the overall health of the eye.

If retinopathy is detected, laser treatment, injections or implants can be used to prevent vision loss. Cataracts and glaucoma are also manageable when caught in the early stages.

NERVE DAMAGE (NEUROPATHY)

Diabetic neuropathy is a type of nerve damage which can affect nerves in many parts of the body.

The most common early symptoms are numbness, tingling or sharp pains in the feet or lower legs.

If untreated, nerve damage can cause a number of problems such as ulcers. It is also a contributing factor in the development of impotence and can lead to problems with your gut, heart rate and blood pressure.



Your doctor or diabetes team should check your feet at least once a year to see if there are any changes to your nerves.

GUM (PERIODONTAL) DISEASE

People with diabetes are more likely than others to develop gum disease because they may have higher blood glucose levels, more plaque, less saliva, loss of collagen in the gum tissue and poor blood circulation in the gums.

Signs of gum disease include bleeding, sensitive and painful gums, receding gums or discoloured teeth.



Make sure you have regular dental check-ups.

BE ALERT, NOT ALARMED

Talking or thinking about long-term complications can be difficult and upsetting. It can also be hard to make changes in how we live today to decrease the risk of potential health problems that may not show up for decades. But managing your diabetes by taking your insulin, checking your blood glucose level regularly, eating properly and getting regular exercise, is the best way to reduce the risk of developing complications in the future. It is also essential that you don't smoke.

Now we have an understanding of how glucose can be toxic to the cells, leading researchers in Australia and around the world are working to develop treatments to prevent this damage.

What can you do to lower the risk of complications?

- Aim to keep your blood glucose levels between 4–10mmol/L as much of the time as possible
 - Don't smoke
 - Drink alcohol in moderation
 - Be physically active – at least 30 minutes of moderate physical activity most days of the week
 - Eat a healthy, balanced diet
 - Keep your blood pressure and cholesterol levels down and
 - Have regular check-ups of your feet, eyes, teeth and gums.

THYROID AND COELIAC DISEASE

Type 1 diabetes is an autoimmune disease, which means that your own body's immune system has mistaken the beta cells in your pancreas for a foreign body and has worked to destroy these cells. If your immune system has turned on you once, you are at increased risk of it doing so again. This means you are at increased risk of other autoimmune diseases such as thyroid and coeliac disease.

While some people develop obvious symptoms of thyroid or coeliac disease, others do not. For this reason it is recommended that you take a simple blood test every two to three years to screen for these conditions.

The thyroid is a small gland located at the front of the neck. It manufactures the hormones that help control metabolism and growth. If the thyroid is overactive, it releases too much thyroid hormone into the bloodstream, resulting in hyperthyroidism. Hyperthyroidism causes the body to use up energy more quickly than it should, and chemical activity (like metabolism) in the cells speeds up. An under-active thyroid produces too little thyroid hormone, resulting in hypothyroidism. When the amount of hormone released into the bloodstream is below normal, the body uses up energy more slowly, and chemical activity (metabolism) in the cells slows down. Both hyperthyroidism and hypothyroidism can have a negative impact on your

blood glucose levels, so if your blood glucose levels go out of control for no obvious reason to you, it may be worthwhile being tested for thyroid disease.

Coeliac disease is a digestive disease that damages the small intestine and interferes with absorption of nutrients from food. People who have coeliac disease cannot tolerate a protein called gluten, which is found in wheat, rye and barley. When people with coeliac disease eat foods containing gluten, their immune system responds by damaging the small intestine. This affects the absorption of essential nutrients, such as glucose, as well as vitamins and minerals.

The treatment for coeliac disease is a strict gluten-free diet, which cuts out most grain-based foods and foods made from these grains. This can make managing diabetes more challenging as most gluten-free foods tend to have a higher GI. Fortunately there are also a number of foods which are gluten-free and have a lower GI including legumes, quinoa, buckwheat grain and many fruits and dairy products.



A dietitian with knowledge of both diabetes and coeliac disease will be able to help you with an eating plan to manage both conditions.



KEEPING YOUR SPIRITS UP

While physical health is emphasised with diabetes, the emotional, social and psychological effects are often overlooked. Living with diabetes can be frustrating and unforgiving. A lot of energy is put into diabetes targets and managing physical health, but managing wellbeing and mental health is just as important in the overall management of diabetes and prevention of diabetes complications.

 Many people with diabetes find it hard at times. Things like depression, anxiety and burn out are common. Talking to other people who understand and seeking counselling and support can be very helpful for people in working through any problems.

LIVING WITH DIABETES IS TOUGH

Diabetes is different to other chronic diseases. It requires you to make multiple decisions every day with guidance from your health care team. It can be easy to be overwhelmed. It is also tied up with so many physical targets and tests, which can result in less focus placed on day-to-day living.

Diabetes is a sensitive creature! It can be affected by stress, activity/exercise, illness, excitement, travel, work and routine changes, hormones, age/stage of life, food and drink, insulin type/dose/ site of injection, or for no reason at all. This lack of control can lead to lowered motivation. Holding on to motivation can be tough, especially when results

are not as we would like them to be. Managing something for the rest of your life is tough for anyone.

It is very common to feel guilt when your results are not as good as you, your family or health professional expect them to be.

Feeling like people are blaming you for your diabetes being out of whack can lower your motivation to get back on track. It is important to work out early if people hassling you, is helpful or unhelpful – it might be both! Talk to them about how their involvement affects you.

Blaming yourself will also lower motivation – often people berate themselves when things go wrong. It is important to remember it is not an easy job. Sometimes you can make changes, sometimes you need support to do so; other times, it is not within your ‘control’ and it is just the way diabetes is. It is helpful to have realistic goals and good understanding of what diabetes is about, and how you can manage it personally.

Motivation will also be higher in your life, if problems that get in its way are dealt with. Identifying that there might be problems in your life that impact your diabetes is important. It is also important to tell your health care team about your needs and priorities, to feel that you are listened to and are comfortable approaching them with any concerns.

“

I consider type 1 diabetes as a craft to be mastered. Find what works for you then go out and live your life to the full.

LEE HOWARD

When Lee Howard was diagnosed with type 1 diabetes, she had to use glass syringes and stainless steel needles.



I've lived with type 1 diabetes for almost 45 years and I can still remember how demanding life was when I was first diagnosed. The hypos, finger pricks and appointments felt incessant. For many years I felt like maybe my diabetes was self-inflicted and that I should be doing better and trying harder. Like many people who have lived with diabetes for a long time, I'm now experiencing health complications in the shape of vascular damage and retinopathy.

But the good news is that things have definitely got much better. My day-to-day diabetes management has evolved to be so much simpler and more effective. Whilst I am living with complications, I'm lucky that I have the treatment and support available to help me keep them managed and under control. New technology like Continuous Glucose Monitoring systems will improve life even more so I really hope that it becomes more accessible and affordable in the future.

Diabetes can be constant and demanding. It can be the cause of much worry and concern, but trust me, you can live with it. I have been fortunate enough to maintain consistent full time employment and have enjoyed more than my fair share of the things we all enjoy – good times with friends and family, travel and, dare I say it, romance. These days, I see diabetes as more of an obstacle than a barrier. With common sense and determination, you will be able to get over, under or around them. Just keep going!

DIABETES AND YOUR MOOD

What the textbooks forget to tell you is that **your mood and actions can be closely linked to your blood glucose levels.**

As you have probably already noticed, you may **feel short-tempered and out of sorts when your blood glucose levels are high. Hypoglycaemia also has its problems** – you may find that your anti-personality comes out when your blood glucose level is low. If you are usually loud and gregarious, you may **become quiet and withdrawn.** If you are naturally a serious person, you may find yourself laughing at silly things. If you are normally even-tempered, you may become argumentative. At times this may cause you embarrassment but it is **OK to tell people that your blood glucose is low** and that you will be your 'normal' self once you have had something to eat. You are not using your diabetes as an excuse, you are stating a fact!

KEEPING AN EYE OUT FOR DEPRESSION

In the past it was believed that adults living with type 1 diabetes were 2-3 times more likely to experience major depressive disorder (MDD) compared to adults living in the community without diabetes. We know now that this was an overestimation, with current research suggesting MDD is about 60% more common in those with diabetes. It is important to be aware of the signs and symptoms so that you know when to seek help.

Symptoms of depression can include extended periods (more than two weeks) of:

- Feeling sad, down or miserable most of the time
- Losing interest or pleasure in most of your usual activities
- Becoming withdrawn, not going out
- Stopping doing things you used to enjoy
- Thoughts about being a failure, being worthless, life is not worth living

- Feeling overwhelmed, tearful, guilty, irritable
- Having physical symptoms such as feeling tired all the time, having a churning gut, disturbed sleep and poor appetite.

Most people recover from depression with or without treatment. However, talking therapy with a psychologist or counsellor is important to learn how to reactivate your life, manage negative thinking and solve problems which is likely to help you to recover more quickly and learn strategies to prevent a depressive relapse.

Anti-depressant medication may be prescribed by your doctor but is not usually the first line of treatment. If you suspect you are experiencing symptoms of depression, speak to a trusted health care professional, family member or friend. If this is difficult, organisations such as Beyond Blue www.beyondblue.org.au and the Black Dog Institute www.blackdoginstitute.org.au have a lot of information, resources

and personal stories that can be accessed online.



Depression is treatable and most people recover with the right treatment. It is important to seek help sooner rather than later.

AVOIDING DIABETES 'BURN-OUT'

Diabetes is like a 'job' and the day-to-day effort to manage can become too hard and frustrating, especially when the results are not what you would like. Studies have shown that many people living with diabetes experience worries, fears and negative feelings like these at some stage. When this way of being is prolonged it can lead to diabetes 'burn-out'.

Diabetes 'burn-out' is specific to diabetes. The rest of your life might be ticking along well, but when it comes to caring for your diabetes you just don't have the energy or the will to do what you need to. Signs might include not checking blood glucose levels, stopping or reducing insulin injections, not worrying about your eating habits or exercise, and ignoring or trying to forget your diabetes most of the time. Diabetes 'burn-out' is real and can lead to other serious physical and psychological problems as a result of prolonged high blood glucose levels. Most people get tired of doing everyday tasks and diabetes just adds to those tasks!

You need realistic expectations and practical strategies for managing the emotional side of diabetes. One simple strategy that can help is to change the way you think about your blood glucose levels. After you experience your initial (and normal!) emotional

reaction to a high or low blood glucose, don't dwell on it, rather try to look at your blood glucose results as information to help you decide what to do next. Don't waste time punishing yourself over a high or low number. Use what you know to plan ahead and make positive adjustments. Use blood glucose monitoring as a tool – a guide to working out what to do. Of course, this is easier said than done! Using words like 'high' and 'low' blood glucose instead of 'good' and 'bad' can really help.

It is also important for all of us to take care of our wellbeing. Using the 4Rs as a guide can help you remember that rest, 6-8 hours of sleep a night, recreation, regular exercise and relationships that are nurturing are not optional extras but essential components of mental health. Paying attention to these aspects of your life may help to prevent diabetes burn-out.

If you think burn-out has happened or you are at risk of it happening, it can **help to ask yourself:**

- What **particular areas** of diabetes are causing you problems?
- What's **happening in your life** that might be conflicting with diabetes care, making it harder?
- What **problems outside of diabetes** could be addressed?
- What are **your expectations for your diabetes management** – what do you want?
- Are your **goals realistic right now?** Perhaps they are too high or too low?

WHEN THE GOING GETS TOUGH THE TOUGH GET SUPPORT!

If things are not going so well with your diabetes it is important to work out why, but it's also important to be kind to yourself and acknowledge that living with diabetes can be hard.

If your diabetes management is off track, then there are problems getting in the way. This does not diminish your responsibility, but opens up possibilities for change.

These problems might be directly related to your diabetes, such as a need for a management change; or they might be problems unrelated to your diabetes, such as depression or issues at work.

At the end of the day, all the things that happen in our lives are connected. You need to give yourself a break and tackle problems by getting the support you need to identify and address them. Talking to other people who understand is very important.



DO MORE THAN JUST WORRY ABOUT DIABETES – TAKE ACTIVE STEPS TO CARE FOR IT!

- Be an active participant in your own health care and talk to your health care team about your needs. Learn everything you can about diabetes and your body
- Visit your doctor, diabetes educator and/or dietitian to get up-to-date information about diabetes management, or reset your diabetes management goals
- Prepare for your visits to any health professionals by listing items you want to discuss
- You may want to consider asking your doctor to send you a copy of your blood results such as your HbA1c, so that you can prepare properly for your visit
- Seek information from a trusted book, website or person
- Be pro-active, find out your options and do what you can.

BUILD A SUPPORT NETWORK

- Seek counselling and peer support/ advice from other people with diabetes via organisations, such as JDRF Peer Support Program www.jdrf.org.au
- Talk with others about your fears of diabetes complications. Remember there are no certainties in life (barring death and taxes), you can only increase or decrease the risk of developing complications.

BE GENTLE ON YOURSELF

- Make realistic goals and approach them in manageable steps
- Remember you are much more than your diabetes

- Develop the spiritual side of yourself in accordance with your own beliefs
- Rely on your sense of humour
- Continue with or develop a variety of passions and interests – there’s a lot more to your life than diabetes
- Avoid personalising other people’s stories. We are all different and what happened to someone else will not necessarily happen to you.
- Offer yourself self-compassion whenever you need. That is learning to be your own best friend (www.self-compassion.org)

Your general practitioner can refer you to a psychologist or mental health social worker for counselling. This is more affordable if your GP fills out a ‘GP Mental Health Care Plan’ under the Better Access Scheme. This allows you to claim part of the cost of the counselling sessions through Medicare. If you are privately insured, you may also be covered for part of the cost of attending counselling but will need to check with your particular fund.

 *There’s quite a bit of mental pressure associated with keeping tight control and it’s important to not get into that negative mindset of pass or fail. Congratulate yourself if you find a high blood glucose level - it means you can do something about it.*
– Dr Jane Overland

REST AND RECREATION – PARTYING THE NIGHT AWAY

Type 1 diabetes shouldn't prevent you from doing things you enjoy. You can still enjoy a glass of wine with friends, a cool beer on a hot day – or even more than one, if you like! You'll still be able to do everything you used to do. It just may require more planning.

Even before you were diagnosed with type 1 diabetes, going out required thought. What will I wear? Will I drive or am I going to be drinking? How will I get home? Who will rescue me if I get stuck talking to someone really boring?

Now you have type 1 diabetes, you also need to think about carrying your diabetes supplies.

- Pack your blood glucose meter and strips. Whether you're out for a day's hiking, seeing a movie with friends or drinking and dancing the night away, you need to keep track of your blood glucose levels. Walking, kayaking, dancing and other physical activities can lower your blood glucose level, whereas most drinks and food will raise it, so it's important to keep track of what's going on
- Pack a hypo kit: If you are out and have a hypo, you don't want to be stuck looking for a waiter or queuing at the bar for an emergency lemonade
- Carry lollies in a container or packaging that doesn't get squashed in your pocket
- Don't forget to pack your insulin: If you're going camping or travelling, you can buy special Frio® packs

which can keep your insulin cool even on a hot day or a long flight.

ALCOHOL – AVOIDING THE 4 AM HANGOVER HYPO

While the risk of hypoglycaemia is increased by alcohol, there are strategies to reduce this risk. For example, if you are going out drinking, make sure you eat some carbohydrate at the beginning of the night. A snack containing two to three exchanges of carbohydrate is probably ideal. You should also eat some carbohydrate every few hours while you are drinking and before you go to bed.

If you have previously experienced problems with low blood glucose levels over night, it may be worthwhile reducing your evening dose of insulin by 10 to 20%. This reduction may need to be even greater, especially if you are planning a very active night, such as dancing, or if you have played sport during the day. However, you should discuss this with your diabetes team first.



Your body gets rid of alcohol via your liver, and your liver usually releases a small amount of glucose into the blood stream which your slow-acting (basal) insulin balances. While it's busy eliminating the alcohol from your system, your liver stops releasing the glucose, which places you at risk of hypoglycaemia overnight. Scientists still don't know if this is the reason why a hot-dog or kebab at the end of the night tastes so good!

The morning after a night out can also be a challenge. Delaying or missing your morning insulin can result in

your blood glucose levels rising too high. To avoid this, set your alarm clock to wake you within an hour or so of your usual waking time. If you are hung over and don't feel like eating, take your normal or a slightly reduced dose of your intermediate or long-acting insulin and go back to bed. If you are vomiting from overindulging you should treat this

like any other occasion of vomiting and keep a close watch on your blood glucose levels and ketones. Make sure you put your usual sick plan into action. You should set your clock to wake you again in two hours so that you can check that your blood glucose level is not too low.

TIPS FOR DRINKING ALCOHOL SAFELY

- In general, guidelines on the level of alcohol consumption for people with diabetes are the same as that for the general population. The Dietary Guidelines for Australian Adults advise **men to drink no more than two standard drinks on any day, and women no more than one**, with both men and women having at least two alcohol-free days each week.
- Of course we're all human and on occasion you may wish to ignore the guidelines! If you are planning on having more than a couple of drinks, **a bit of extra thought can ensure you have a great night** and don't alarm any of your friends.
- **Check your blood glucose regularly.** It can be easy to have a hypo when you're out, particularly if you have been dancing or more active than usual. It can also be easy to end up feeling sick from high blood glucose levels, especially with sugary drinks and mixers. The good news is that it **hurts less to check your blood glucose levels after a couple of drinks.**
- **When you've had a few drinks, it can be difficult for you to detect if you're having a hypo.** You may miss the symptoms, or be very deep into the hypo before you notice it. When you've had a few drinks, other people may not be able to tell you're having a hypo because they'll just think you're drunk.
- Make sure at least **one of the people you're with knows you have type 1 diabetes and how to treat a hypo.** You can even ask them to remind you to check your sugars, depending on how you feel about people asking you about checking.
- You may find your **blood glucose level rises too high after drinking an alcoholic beverage which contains carbohydrate, such as spirits mixed with regular soft drink or cordial, sweetened liqueurs or large amounts of beer.** You may also find that you eat more when you drink alcohol. Where possible, choose a diet soft drink as a mixer and keep an eye on your food intake.

SMOKING

While everyone but the tobacco companies have known for a long time that smoking is extremely addictive, expensive and harmful to your body, people still smoke. People with type 1 diabetes smoke for the same reasons that people who don't have type 1 diabetes smoke, but they face much more serious health consequences.

For a person with type 1 diabetes, smoking significantly increases the risk of complications such as eye disease, heart disease, stroke, nerve damage and kidney disease.

It also increases the risk of impotence in men. If you don't smoke, you shouldn't start. If you already smoke, it's going to be tough to quit, but there couldn't be a better time to give it up. You should talk to your endocrinologist or diabetes team about strategies you can use to help you become a non-smoker. Alternatively, look up the number for your local QUITLINE.

Smoking causes insulin resistance so you may need to reduce your insulin if you stop smoking or on days you don't smoke, otherwise you may be at increased risk of hypoglycaemia.

ILLICIT DRUGS AND DIABETES

Taking any type of drug other than what has been prescribed by your doctor can be risky for anyone, but even more so if you have diabetes. Things get even more complicated if you mix different drugs or

combine them with alcohol. These combinations can increase the risk of shortness of breath, vomiting, fainting, impulsive or dangerous behaviour, accidents, as well as overdose. Add diabetes to this and it can quickly become a deadly situation, especially if you forget to take your insulin or you forget to eat and drink.

If you do decide to take an illicit drug, you should always **do so in the presence of someone who knows what type of drug you have taken** and who knows to call for help at the first sign of you becoming unwell. Emergency health workers, such as paramedics, nurses and first aid providers, will not report you to the police, but **they can save your life** if you present to them early enough.

One of the problems with illicit drugs is that you never quite know what you are going to get – both in terms of its strength and whether the drug contains additional harmful substances. It may be safer to start with a smaller rather than larger dose. For example, some experts suggest you take a ¼ of a tablet to see what effect it has.

Remember to keep up your fluids, keep an eye on your blood glucose levels and don't stop your diabetes medications. High blood glucose levels as well as some illicit drugs tend to dehydrate you. In a severe form, it can lead to diabetic ketoacidosis and/or cause your internal organs to shut down.

You should always wear some form of medical ID, such as a bracelet or necklace, or even a well-placed tattoo, as this assists people to identify that you have diabetes and can help save your life in an emergency.

Most importantly, find ways to avoid peer pressure and stand up to people who may pressure you to take drugs. True friends do not pressure each other to put their health at risk.

| TYPE OF DRUG | EFFECTS INCLUDE |
|--|--|
| <p>Stimulants Stimulants are substances that speed up processes in the body. Examples:</p> <ul style="list-style-type: none"> • Speed • Crystal meth • Ecstasy (MDMA) • Cocaine | <ul style="list-style-type: none"> • Increased blood pressure • Increased body temperature • Rapid, slow or irregular pulse • Increased risk of hypoglycaemia • Reduced hypoglycaemia awareness • Breakdown of muscle which can lead to kidney damage or failure (MDMA) • Loss of appetite • Changes to insulin action and hormone production leading to high blood glucose levels |
| <p>Depressants Depressants are substances that slow down processes in the body. Examples:</p> <ul style="list-style-type: none"> • Alcohol • Marijuana • Benzodiazepines • Methadone • Codeine • Morphine • Heroin | <ul style="list-style-type: none"> • Altered eating habits and changes to hormone production leading to low or high blood glucose levels • Forgetfulness • Drowsiness and confusion • Slowed breathing which can lead to death |
| <p>Hallucinogens Hallucinogens are substances that cause hallucinations. Examples:</p> <ul style="list-style-type: none"> • PCP • LSD • Ketamine • Magic mushroom | <ul style="list-style-type: none"> • Paranoia • Abnormal behaviour • Panic attacks |

TRAVELLING WITH TYPE 1 DIABETES

Type 1 diabetes shouldn't stop you from doing the things you want to do – and this includes travel.

For any traveller, planning ahead is the key to a successful trip. This is particularly true for people with type 1 diabetes. Preparing ahead will take you a long way and help keep you healthy once you're there – as well as help to avoid unnecessary stress!



The Australian Government has arrangements with some countries, so they provide benefits similar to Medicare if needed. Remember to take your Medicare card with you.

Be sure to **get any required vaccinations at least four weeks before you travel** so you have time to deal with any possible side-effects. Information on vaccinations is available from your doctor or the Australian Department of Health at <https://beta.health.gov.au/health-topics/immunisation/immunisation-throughout-life/immunisation-for-travel>

BEFORE YOU LEAVE

HEALTH

Visit your GP or endocrinologist for a check-up several weeks before you leave for a holiday.



Discuss your itinerary with your diabetes educator and work out a plan for meals and medication, especially if you are travelling through different time zones. It's also important to plan ahead and work out a strategy for sick days and how to adjust your insulin dose if required.

INSURANCE

Travel insurance is a must. All travellers are prone to infectious illnesses as they travel through new countries. You are also more likely than usual to have problems with unexpected low or high blood glucose levels.



It's very important that you can access good quality healthcare if you need it. Make sure your travel insurance covers type 1 diabetes, as not all policies do.

DOCUMENTATION

It is very important to have a letter from your doctor that states you have type 1 diabetes. The typed letter should outline the type of insulin you take, your dosage regimen, the devices you use, the related prescription medications you take, the importance of carrying your medication/s with you, and

instruction that your insulin pump (if used) must not be removed. Ask your GP or pharmacist for a list of your medications, including the generic names and doses.

IDENTIFICATION

Take identification that explains you have type 1 diabetes in case you are unable to give instructions yourself. Consider getting a MedicAlert® emblem (bracelet or necklace) that indicates you have type 1 diabetes.

SECURITY

Before you head for the airport, review your airline's latest security



ESSENTIAL ITEMS TO PACK

MEDICATION, DIABETES SUPPLIES AND FOOD

Take extra medication, checking supplies and hypo food with you in case of theft, loss or accidental destruction. Make sure your strips and medication are in date!

Insulin and other medication must display a pharmaceutical label clearly identifying the medication and your name. Since the prescription label is usually on the outside of the box, it is recommended that you carry your medications in their original, labelled boxes.

If you use insulin pens, pack a spare one. If you use an insulin pump take a back-up option, such as syringes or a pen with needles and a short and long acting insulin.

Work out with your doctor what dose of insulin to take and how to take it should the worst-case scenario happen; and your insulin pump breaks down or insulin pen breaks.

information (usually available online) to check for any special policies or guidelines. Consider registering your details with the Australian Department of Foreign Affairs & Trade at **www.dfat.gov.au**.

Insulin is affected by extreme temperatures and should never be stored in the baggage area of the aircraft. The temperature in the hold is too low and the insulin will freeze and lose its effectiveness.

Divide your medicines and diabetes supplies and pack them in more than one place, in case you lose one of your bags. Most importantly, make sure that you have your insulin, checking supplies and hypo fix in your carry-on luggage. If you use a pump, make sure you have a spare infusion set, inserter and batteries with you as well.

And pack plenty of snacks in your carry-on luggage in case your flight or in-flight meal is delayed, or the meal provided does not have enough carbohydrate.

There are a variety of ways to keep your insulin cool while you are travelling, even in hot climates. **Insulin must be stored properly**, as it will spoil if left in temperatures that are too hot or too cold. Insulin retains its potency at room temperature for 30 days. However, some of the newer insulin preparations are more sensitive to changed storage conditions. **Two options include a Frio Wallet® or Medicool® Insulin Protector.** Speak to your local diabetes stockist or look on the internet to research available options.

DOCUMENTATION

Aside from your passport, ticket and itinerary, there are a few other important documents to pack.

Make sure you take several copies of the letter from your doctor and your list of medications in your travel documents. You should also take the actual prescriptions for all the medications you are carrying. They must include your name, the name of the medication and contact details of the medical practitioner.

Other information to pack is your:

- Medicare card

- Travel insurance details (for overseas travel)
- National Diabetes Services Scheme (NDSS) card (for domestic travel)
- Health insurance card/details (for domestic travel)
- Details of emergency contacts (e.g. endocrinologist, diabetes educator, family member).

SHARPS CONTAINER

If your trip is short, you may want to keep your used needles and sharps and dispose of them on your return home. For longer trips, you can purchase small containers that store or disintegrate needles and syringes.

AT THE AIRPORT

Airport security regulations are strict for everyone, but especially so for people with type 1 diabetes. Allow extra time to check in before your flight, should your items be thoroughly searched by airport screening officers. Security scanners and metal detectors used at airports should not damage your insulin, insulin pump or blood glucose meter.

People with a genuine medical condition are allowed to carry syringes, lancets, insulin pens, insulin pumps and insulin medication through security screening points on the condition the items are not accessible to the public.

All diabetes supplies must be carried in your hand luggage. Keep the letter from your doctor handy as you may need it to pass through Customs.

Insulin pumps and blood glucose meters may be examined using a combination of x-ray, physical inspection and possibly explosive trace detection. You may be asked to demonstrate how your meter or pump works. Airport screeners should only visually inspect the pump—they should not remove it from your body to inspect it.

Packaging for syringes should be unopened or the syringes capped and empty. There is no limit on the number of empty syringes that may be carried through a security checkpoint, but you must also be carrying insulin medication. The only exception is syringes containing Glucagon, as they are pre-filled for emergency supply.

 If you are denied permission to board a flight or faced with any other unforeseen diabetes-related difficulty while passing through security checkpoints, speak to the Security Checkpoint Supervisor.

IN THE AIR

Checking your blood glucose regularly is very important. Check it before you leave home and then again every four hours during your journey.

Be aware of time zone changes and try to schedule your meals and insulin around them. Having two watches (or a watch and mobile phone) can help to keep track of time zone changes. If you keep one watch on the time of the country you have just left, it will be easy to tell when your next dose of insulin would have been due. You can also accurately judge how much time has passed since you had your last dose of insulin if you record your insulin doses against this time.

If you choose to sleep while you're onboard, ask the flight attendant to wake you at mealtimes. Airlines usually offer special meals for people with diabetes, but these often do not



REMEMBER!

- When **travelling east**, your travel day will be shorter. If you **lose more than two hours**, you may need to take **fewer units of intermediate or long-acting insulin**.
- When **travelling west**, your travel day will be longer. If you **gain more than two hours**, you may need to take **extra units of short-acting insulin** and more food. No adjustment is required travelling north or south because of little difference in time.

provide sufficient carbohydrate. The regular airline meals are generally OK but wait until you see your food coming down the aisle before you take your injection. Otherwise, a delay in receiving the meal could lead to a hypo.

Try to do some form of activity during your journey, such as simple stretching exercises in your seat or moving your ankles in circles and raising your legs occasionally.

Make sure you drink plenty of water throughout the flight.



While you certainly aren't required to do so, you may wish to make the cabin staff aware of your diabetes in case any problems arise.

ADJUSTING INSULIN FOR CHANGING TIME ZONES

Long journeys often cross several time zones, so a regular 24-hour day can be extended or shortened, depending on the direction of travel. Either way, keeping your blood glucose close to target levels can be a challenge.

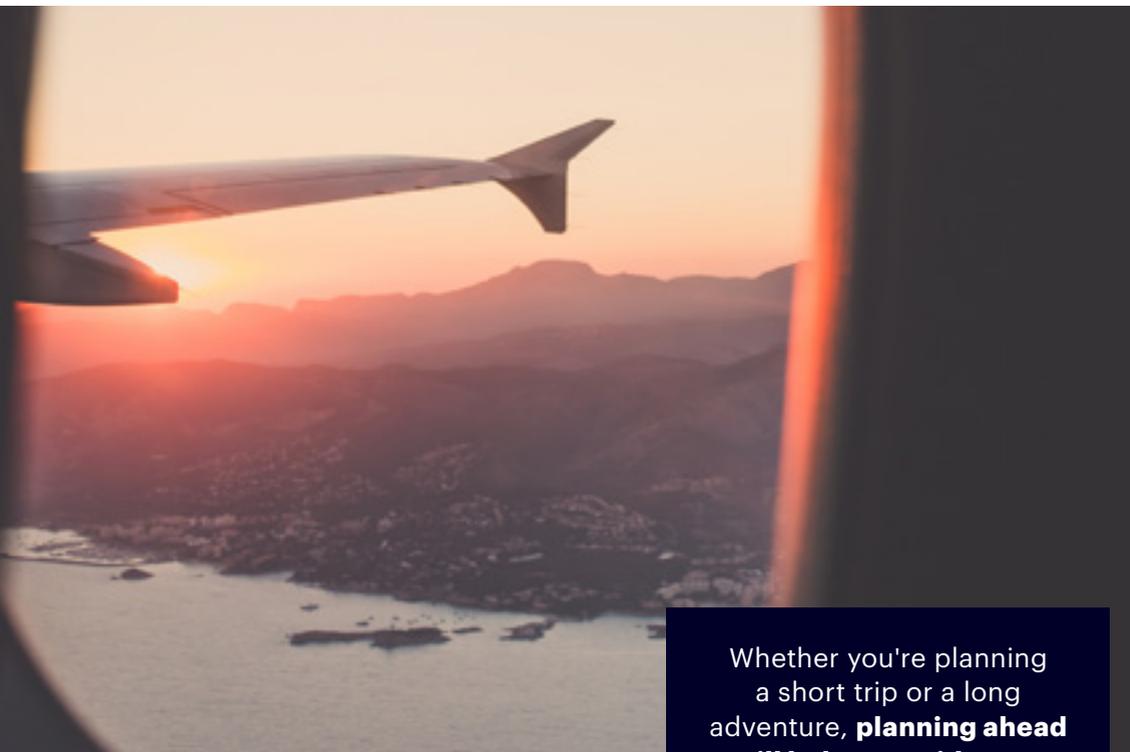
You can change the time of your injections and meals by up to two hours in a day without adjusting your insulin dose or your meal plan. If you are crossing more than two time zones, you will need to prepare a meal and insulin schedule with your endocrinologist or diabetes educator.

It may be easier to keep to your usual insulin routine while travelling and then adjust on arrival. In this case, it's important to have your own supply of food, rather than relying on airline meal times.

A pump is an ideal way to deliver your insulin across time zones as you can pump and dose for meals in the normal way with no real change to your insulin regimen.

AT YOUR DESTINATION

Plan ahead for situations that will dramatically alter blood glucose levels, such as significantly more intense physical activity than usual so you need to make sure you eat and drink enough to meet your needs. If you are going to be extremely active you may need to decrease your insulin, so be sure to discuss



this with your diabetes educator or endocrinologist before you head off.

In some countries you will need to be careful to ensure your food and water are not contaminated. In particular avoid tap water (including ice cubes made from tap water).

 Trying different foods is all part of the experience of travelling to a different country. Make sure you know the approximate level of carbohydrate in your meal, monitor your blood glucose levels regularly and carry extra food, water, medication and sugar so you're prepared for the unexpected.

Wear comfortable shoes and don't go barefoot. Check your feet for problems like blisters, cuts, and

Whether you're planning a short trip or a long adventure, **planning ahead will help to avoid many potential problems**, not to mention a lot of stress!

Although travelling with type 1 diabetes does require a bit of extra preparation, you will find you can do virtually any trip you want!

swelling, and seek medical care at the first sign of infection. Try to avoid sunburn and insect bites.

If your luggage and diabetes supplies are lost in transit or stolen, the best solution is to attend a major hospital's emergency room. They should be able to provide you with sufficient supplies to last until you can access insulin, syringes etc locally. Alternatively, you can phone the local diabetes organisation and ask someone to explain how to obtain diabetes supplies in their country.

DIABETES AND ISSUES FOR WOMEN

Men and women face different challenges managing type 1 diabetes. Issues women may need to consider are outlined in the following section.

MENSTRUATION

We all know how powerful hormones can be in controlling our menstrual cycles, so it's no surprise that they can also affect blood glucose levels. These changes are due to two hormones, oestrogen and progesterone. When these hormones are at their highest level just before your period, they affect insulin, which may cause blood glucose levels to rise.

Some women find their blood glucose rises considerably, while others do not notice a difference. In others, blood glucose levels are lower before and during their periods. You need to discover your own pattern so you can adjust your insulin accordingly. Often it is the fasting blood glucose before breakfast that tends to fluctuate the most. Being physically active in the week before your period, can help control fluctuations in your blood glucose levels.

CONTRACEPTION

Birth control is an important issue for women with type 1 diabetes because there are greater risks for a woman with diabetes and her baby when pregnancy is unplanned.

The contraceptive options for women with diabetes are the same as for any woman and are based on individual preferences. This is a decision that should be made between you, your partner and your doctor.

The effectiveness of various birth control options is the same for women with or without diabetes. In the past, women with diabetes were advised to avoid taking the birth control pill because of an effect on blood glucose and the risk for heart disease and stroke. However, changes to the level of hormones in the pill in the last few decades have greatly decreased the risk of these problems (however, the risk of heart disease and stroke remains high for women with type 1 diabetes who also smoke). Blood glucose fluctuations are more likely with combination pills and some doctors may suggest progestin-only ('mini') pills to avoid this issue.

In the past, there was concern that IUDs might pose an increased risk of pelvic infection or trauma to the uterine wall, and that women with diabetes might be particularly vulnerable to these infections. The new generation of IUDs appear to be safe in this respect. Using a diaphragm does not affect blood glucose levels but there may be an increased risk of yeast infections for women who have diabetes. Speak with your doctor and diabetes educator about suitable contraception options.

SEXUALITY

Living with type 1 diabetes can influence your sexual experiences, both physically and emotionally.



Your sexual health is important to your overall health and it is important that you discuss any concerns with your doctor and/or diabetes educator.

INFECTIONS

Vaginal infections and urinary tract infections are more common in women with diabetes, especially if your blood glucose is generally too high. Vaginal infections, such as yeast infections, can lead to itching, unusual discharge and pain during intercourse; but they are easily treated. A urinary tract infection can lead to cloudy or bloody urine, a burning sensation and/or a constant feeling that you need to urinate. This should be treated immediately to decrease the chance of subsequent kidney infection. Your doctor will prescribe an antibiotic and your pharmacist can provide over-the-counter remedies to reduce any associated pain.

LIBIDO

Persistently high blood glucose levels can influence your energy level and cause significant fatigue. Not surprisingly, this in turn may decrease your interest in sex. Achieving a good blood glucose level can improve mood and libido.

REDUCED LUBRICATION

After having type 1 diabetes for many years, a complication called neuropathy (nerve damage) can

reduce vaginal lubrication in some women. This can make sex uncomfortable. A decrease in, or lack of lubrication can occur for many other reasons such as menopause, the use of birth control pills and stress. Water-based lubricants are effective in improving dryness and sensitivity. For severe dryness, a vaginal suppository can be used.

PREGNANCY

In the past, women with type 1 diabetes were discouraged from becoming pregnant because they faced increased risk of complications, including miscarriage, stillbirth and birth defects. Thankfully, this is no longer the case and women with type 1 diabetes can expect to have a healthy baby. The key, as with all aspects of diabetes management, is planning.

Women with type 1 diabetes must plan their pregnancies and be prepared to put in a little extra work during pregnancy to ensure a healthy baby.

Planning with your doctor before you become pregnant is vital. Speak to your doctor about your plans at least three months before trying to conceive. However, if like many women you fall pregnant without planning, don't panic! Make an urgent appointment with your doctor to review your diabetes and general health and put a plan in place from there.

You will need the support of a team of health professionals who will help you plan a healthy pregnancy, including an:

- **Endocrinologist**
- **Specialist obstetrician**
- **Midwife**
- **Diabetes educator**
- **Dietitian**

PREPARING FOR PREGNANCY

You should start working on the following goals about three months before conception:

- Achieve an HbA1C below 53mmol/mol (7%) and if possible, below 48 mmol/mol (6.5%) if this can be achieved without increased episodes of hypoglycaemia. The first eight to 12 weeks are when a baby's major organs develop, so it is important to gain tight blood glucose control before you fall pregnant. Persistently high blood glucose levels dramatically increase the risk of abnormal development of your baby. Work with your doctor and educator to achieve the best blood glucose level you can. It might be time to consider an insulin pump
- Have a medical exam. You will need a medical examination by an endocrinologist prior to and during your pregnancy. They need to check blood pressure, immunity to rubella and chicken pox and conduct a complications screen (particularly for your eyes and kidneys)
- Start taking a folic acid supplement and daily multivitamin. Discuss an appropriate dose with your doctor

- Visit your dietitian. They can advise you on the most appropriate foods for you during your pregnancy
- If you smoke or drink alcohol, stop!

Women can now access NDSS funded CGM if they are actively trying to fall pregnant or are already pregnant. Talk to your diabetes team to learn more.

DURING PREGNANCY AND BIRTH

Achieving very tight blood glucose control throughout your pregnancy can be extremely stressful and demanding. Your insulin requirements will change as you battle morning sickness and your pregnancy progresses. You might find your usual early warning signs for hypos change or disappear completely. Persevere though – it will be worth it! Seek the support and understanding of family, friends and your health professionals.



When you are pregnant, you will need to visit your endocrinologist and obstetrician more regularly than women without diabetes.

Your doctor will provide you with a schedule of check-ups and tests. Certain complications are aggravated by pregnancy (e.g. nephropathy (kidneys) and retinopathy (eyes)). Your doctor will closely monitor you during pregnancy.

The growth of your baby also needs to be closely monitored. Babies of women with diabetes are at risk of developing a condition known as 'macrosomia', which means 'large body'. If your blood glucose level is high during pregnancy, extra glucose crosses the placenta.

Your baby will produce its own insulin from around 15 weeks gestation. The extra glucose stimulates your baby's pancreas to make increased levels of insulin. This in turn, makes the baby grow faster and store extra glucose as fat. The baby may also have problems with low blood glucose levels at birth as it continues to make extra insulin for a day or two. Keeping your blood glucose levels within target will significantly reduce the risk of these problems occurring. However, some babies still have problems, as do babies of women without diabetes.

There is no reason for you not to expect a normal birth.

Many women with type 1 diabetes carry their baby to full-term and go into labour on their own. Some women are advised to have their baby early for various reasons, including diabetes control or the baby becoming too large. Most women have a vaginal delivery, although it is slightly more common for women with type 1 diabetes to have a caesarean section. You will be able to discuss all options with your obstetrician and make a plan for your baby's birth towards the end of your pregnancy.

If you wish to breastfeed, there is no reason why you will not be able to.

You will just have to watch for fluctuations in your blood glucose levels and plan ahead as you will need additional carbohydrates when feeding, especially in the early months. Try to attend breastfeeding classes when you are pregnant, as it is a learned skill for both you and your baby.

Women with type 1 diabetes may find their milk slower to 'come in'. It is important to get good support from a midwife or lactation consultant. The best advice is to feed as early and as often as possible to stimulate your supply and if baby requires special care, get support to use a breast pump to express milk to begin with. Breastfeeding is rewarding for both of you and worth the effort.

Make sure you are sitting comfortably, and your baby well supported when you are breastfeeding. You also need to have some form of hypo treatment close at hand. The last thing you want to do is walk around looking for food and carrying your baby when you are having a hypo!

WILL MY BABY BE BORN WITH DIABETES?

It is natural for people with type 1 diabetes to worry about passing the disease on to their children. It is important to remember that 80% of people with type 1 diabetes have no family history of the disease. Your baby will not be born with diabetes and the chance of your baby developing type 1 diabetes in the future is only five percent (or seven percent if the father has type 1 diabetes).

You have to have very good management when you're pregnant. My first point of call was to find a good endocrinologist, who sat down and explained all the risks and how we could address them. He reassured me that if we managed it right, my future baby and I would be fine.
– **Bree Hafsteins**



For more information on pregnancy...

All large teaching hospitals in Australia have a diabetes service, which provides information sessions regarding pregnancy. Similarly, most women's hospitals have a specialised diabetes and pregnancy clinic.

The Australian Diabetes in Pregnancy Society (ADIPS) can provide more detailed information, visit www.adips.org.

The NDSS and Diabetes Australia have a range of information on pregnancy and diabetes www.ndss.com.au/diabetes-and-pregnancy.

MANAGING WEIGHT AND BODY IMAGE



Many factors affect our body image and one of them is the presence of an illness or chronic condition.

When managing type 1 diabetes, the constant focus on diet and weight management can impact body image.

Weight and diabetes are intertwined. Some women find injecting insulin causes significant weight gain, while others find weight gain difficult to achieve, particularly when blood glucose is elevated. Sometimes our lifestyles are unhealthy because of the time demands we face in our daily lives. Sometimes we use food to relax, for comfort or to help us cope with negative feelings such as anger, boredom, fear, loneliness or a sense of inadequacy.

If you struggle with maintaining a healthy weight, it may be helpful to separate the issue of how much you weigh from the behaviours you want to adopt to stay healthy.

It may help if you work with a dietitian to develop a plan of action that will help you to stay healthy. Then try to focus on this and not just your body size. Are you able to meet your goals for eating and activity? Let this be the measure of your success, not how your body looks.

You may feel you need more help and support to deal with these concerns. It can be useful to have professional

counselling to help you examine the barriers to your health and how you can change your thinking and behaviours.

If this is the case for you, talk to your doctor or the diabetes health care team and ask them to recommend a therapist to help you resolve some of these issues.

MENOPAUSE



Women with type 1 diabetes may experience menopause earlier than other women.

Like menstruation, menopause will cause your hormone levels to change, and this can also cause blood glucose levels to fluctuate. In fact, hypoglycaemia or hyperglycaemia can be one of the first signs of menopause for a woman with type 1 diabetes.

In the years leading up to menopause, surges and reductions in oestrogen and progesterone can affect women in various ways, such as mood changes, increased PMS signs, menstrual periods that are more or less frequent, and heavier or lighter blood flow during menstruation. For some women the hormonal changes are scarcely noticeable; however, for others, fluctuations in blood glucose levels can mean that they need to monitor more frequently and adjust their insulin intake.

One of the major difficulties is that some symptoms of diabetes and menopause can be very similar. Both menopause and low blood glucose can cause dizziness, elevated body temperatures, moodiness and short-term memory loss.



Find the right clinician that fits with you. Whilst it's important to find someone that knows about type 1 diabetes, you also need to find someone that you can tell anything too. It's a long term relationship so choose wisely.

- Dr Jane Overland

High blood glucose, like menopause, can cause fatigue. The only way to tell if your symptoms are diabetes-related or menopause-related is to check your blood glucose.

During menopause it is important to maintain an active lifestyle. Some women stop exercising and begin to gain weight, which in turn affects their ability to absorb insulin and control their blood glucose.

Sometimes during menopause, women find they have negative sexual side-effects, such as vaginal dryness, an increase in yeast infections and urinary tract infections. See your doctor to discuss how you can

manage these side-effects, with possible hormone replacement therapy or changes to your insulin.

OSTEOPOROSIS

Osteoporosis is a condition in which bones become thinner and more porous, making fractures more likely. Although osteoporosis is common in women as they age because of the reduction of oestrogen after menopause, women with type 1 diabetes have a higher incidence of osteoporosis if blood glucose levels have been high for a prolonged period. They may also develop osteoporosis prior to menopause. As you approach your 50s, make sure your doctor tests you for signs of osteoporosis.

The key to staying healthy after menopause for women with type 1 diabetes is the same as for women without diabetes. Try to eat regular, well-balanced meals, stay as physically active as possible, have regular check-ups with your doctor and ensure that you manage your diabetes as well as you can. While there may be times when you ignore some (or all!) of these recommendations, remember that it's what you do most of the time that counts.



When I was first diagnosed with type 1 as a teenager, I didn't think about how much it could impact me. I just thought about the needles every day, I didn't really understand it was a lifelong thing.

- Lara McSpadden



Diabetes can only control your life if you let it. Put yourself into a good mindset and take what you can from it.

PIERS NELSON

Piers had just started high school when he was diagnosed with Type 1 Diabetes. Today he is graduating from university and ready to step into the workforce.

I was 13 and in year 7 when I was diagnosed with diabetes. It was all a bit of a blur at the time, but I was lucky in a way. My uncle had lived with type 1 for years so I was prepared for what it was going to involve. Of course, nothing can really prepare you for being a little bit different in high school! I certainly found that kids could be unkind, particularly those that didn't understand what type 1 diabetes involved.

These days, as I split my time between university study and work, I've found that diabetes doesn't really make me different at all. Nearly all the people I've met have been genuinely interested and very happy to help if I need it. University is obviously a time to let loose and have a bit of fun and I've been able to do that just as much as anyone else. Whilst I certainly don't make a habit of getting plastered, I do like to have a drink with friends. When I do go out for a big night, I make sure my blood glucose levels are good before I go and I don't go to sleep until they are back in the right place. For me, this means I can go out and have fun for a few hours without worrying about my diabetes.

As I celebrate my ten year 'diaversary', I can look back and see that the impact of diabetes on my life has been mostly positive. I'm a lot more responsible, a lot less judgmental and a lot more accepting of difference and diversity than I may have otherwise been. I try to think of diabetes as something I can learn from. If you're able to look at things in the right way, diabetes has really helped me grow as a person.

DIABETES AND ISSUES FOR MEN

There are several aspects of living with type 1 diabetes which are particularly relevant to men.

SELF-ESTEEM

In Australian culture the 'ideal man' is often portrayed as being fit, self-reliant and invincible. Living with type 1 diabetes can make you feel far from this ideal. It's easy to become too focused on taking charge of your diabetes and keeping your blood glucose levels within the normal range at all times.

When you are unable to achieve this you can quickly become overly critical of yourself and lose self-confidence or become depressed. Fluctuations in your blood glucose levels can also make you vulnerable. For example, you may experience an episode of hypoglycaemia during a sporting event or an important meeting, and perform at a level below your expected standard. Such episodes can serve to dent your self-esteem.

To maintain a healthy self-esteem you need to accept that you don't have total control over your diabetes, or any other area of your life, and still accept and value yourself unconditionally.

This means being able to realistically acknowledge your strengths and limitations.

BODY IMAGE

Body image is what you think you look like and has no bearing at all on your actual appearance.

Around one in four Australian men in the healthy weight range believe themselves to be fat; while others worry they are not muscular or big enough. Bruises or marks left by injections, or wearing an insulin pump, can also have a negative impact on your body image by being physical reminders of diabetes.



It is a misconception that poor body image is a female issue. Weight loss prior to diabetes being diagnosed, or subsequent weight gain once insulin treatment is commenced, may have a significant effect on the self-esteem of both men and women.

There may also be times when your lifestyle is unhealthy because of the time demands you face in your daily life. You may use food or alcohol to relax, for comfort or to help you cope with negative feelings such as anger, boredom, fear, loneliness or a sense of inadequacy. You may also overindulge to keep up with your peers. Over time this may lead to excessive weight gain.

If you struggle to maintain a healthy weight, it may be helpful to separate the issue of how much you weigh from the behaviours you want to adopt to stay healthy. It may help if you work with a dietitian or personal trainer to develop a plan of action that will help you to stay healthy. Then try to focus on the plan and not just your body size.

Are you able to meet your goals for eating and activity? Let this be the measure of your success, not how your body looks.

At times you may need more help and support to deal with self-esteem or body image concerns. It can be useful to have professional counselling to improve your perceptions of self, or to identify ways to change your thinking and behaviours. If this is the case for you, talk to your doctor or the diabetes health care team and ask them to recommend a counsellor to help you resolve some of these issues.

ERECTILE DYSFUNCTION

Erectile dysfunction, or impotence, means you cannot have an erection sufficient to have sexual intercourse. Impotence is a common problem for all men but it is more common in men with diabetes. Many men experience short-term episodes of impotence, but for about one in 10 men the problem may continue. Men with diabetes can also experience problems with their libido.

The reasons why men with diabetes are more prone to problems with impotence are not fully understood. Some people with diabetes suffer from hardened arteries and this may contribute to impotence by restricting the flow of blood to the penis. Nerve damage may also play a role. Keeping your blood glucose levels close to the normal range can help reduce the chance of these problems occurring.

There are many treatment alternatives for decreased libido and impotence,

Impotence can be caused by physical and psychological reasons, such as:

- Stress
- Performance anxiety
- Work and family pressures
- Problems in relationships
- Drinking too much alcohol
- High blood pressure
- High cholesterol
- Some medications
- Some operations such as prostatectomy
- Low levels of the male hormone testosterone
- Chronically high blood glucose levels.

ranging from counselling, oral or injectable drugs to surgery. Your general practitioner or endocrinologist would be happy to discuss these options with you.



If you do experience problems with your sexual function you should speak with your endocrinologist or general practitioner.

THRUSH AND BALANITIS

Thrush is a yeast infection caused by excessive growth of a fungus (known as candida albicans) which lives on and in the body. Although thrush is usually associated with vaginal infections, men can also get thrush, both orally and on the penis. Symptoms of oral thrush

include redness and white spots coating the surface of the tongue. Symptoms of penile thrush include inflammation of the head of the penis. This inflammation is often referred to as balanitis. In this condition the head of the penis becomes red and sore. Irritation and itching are also common. Small red spots may appear and a penile discharge can occur.

High blood glucose levels can lead to outbreaks of thrush.

Antibiotics and asthma inhalers can also increase the risk of infection. Your pharmacist can provide over-the-counter remedies to treat both oral and penile thrush. Your partner should also be treated to prevent re-infection. However, if the infection persists, you should see your general practitioner for further advice.

FERTILITY AND INHERITANCE

While there are no specific fertility issues concerned with type 1 diabetes in men, it is natural for men with type 1 diabetes to worry about passing the disease on to their children. It is important to note that 80% of people with type 1 diabetes have no family history of the disease. As a male, the chance of your children developing diabetes is only seven percent.

SEEING A DOCTOR/SPECIALIST

Australian men are famous for their reluctance to see a doctor, and have a reputation for only seeking help once a limb has actually fallen off. However, now you have diabetes, it is very important that you are under the

ongoing care of a diabetes specialist or diabetes team, not doing so may affect your long-term health. Many complications of type 1 diabetes, such as retinopathy, can be prevented or reversed if they are caught early enough, so regular check-ups, even if you feel well, are vital.

It is also important that you are honest with your health care team. Other commitments, including family and work demands, may mean that areas of your diabetes management, such as blood glucose checking and regular attendance at appointments, take a lower priority at times. Your diabetes team will be better able to support you knowing these commitments. Also remember that if you don't feel comfortable with your health care professional, it's okay to see someone else.

 Keep looking until you find a diabetes healthcare professional that you connect with and trust, as this will be a very important and long-term relationship.

 *I try and think of diabetes as something I have, it's not great but the very most I can do is make something good come out of it. Otherwise it's just all about having an illness for the rest of your life.*
- Piers Nelson

DIABETES AND ISSUES FOR ADOLESCENTS

Diabetes control often deteriorates during adolescence and this can be a trigger for family arguments and disruption.

This deterioration happens for many reasons. For example, the hormones responsible for rapid growth during your teenage years can interfere with the action of insulin. Adolescence is also the time when you may want to assume greater responsibility for your own care. To do so, you will need to master the intricacies of diabetes management. Don't assume that because you have lived with diabetes for many years you have this mastery.

If you got diabetes before you were a teenager, chances are that your parents were the ones who were taught how to manage your diabetes, and not you.

WHO IS RESPONSIBLE FOR WHAT?

It can be difficult to tell your parents you want to start taking over control of your diabetes management. It can also be difficult to tell them you don't want to take on all the responsibility for your diabetes just yet. Negotiating who is responsible for what is essential, and negotiations need to be ongoing.

You will probably do better if your parents stay involved in your diabetes care in some way until you reach your early adult years.

For example, you might like your parents to make sure you don't run out of blood glucose monitoring and insulin supplies, to book your clinic appointments, to help you work out how many carbohydrates you are eating or how much insulin to take with your meals, or to be responsible for sensor or infusion set changes.

On the other hand, you might be keen and able to give your own injections or manage your insulin pump independently, without your parents help. If it all gets too hard, and you want to hand back some of the responsibility, remember to talk to your parents or diabetes team.



Don't be afraid to tell your endocrinologist or diabetes team if there are some things about treating your diabetes you don't fully understand or want to learn more about.

TRANSITIONING TO ADULT CARE – WHEN IS THE RIGHT TIME?

Life can get pretty busy and stressful during your teenage years, so it may be best to continue to see your familiar paediatric team until you have finished high school. However, if you feel uncomfortable sitting in a waiting room with young children, transferring to an adult focused endocrinologist or team may be the better option, especially if the adult team has experience with young people with type 1 diabetes.

It is important that you find a doctor or team you feel comfortable with. You also need to like and trust them.

It might take a few false starts before you find new diabetes health care professionals that suit you, but it is worth persisting. If the hospital system does not suit your needs, then there is also the option of having private diabetes care. There are now a number of health care professionals in private practice who work in a variety of settings. Some may even offer home visits for your diabetes appointments. The important thing is that if your team are based in different locations, that there are good lines of communication in place between the various members.

 Seeing an adult focused health care professional is likely to feel strange at first – they will be working with you, not your parents. But keeping your parents informed and involved is a good idea. They will worry less, and support your decisions if they know you are looking after yourself.

Your new doctors or team will also expect you to know things about your diabetes, such as when you were diagnosed with diabetes, the name and dosages of any medications you are taking including what insulin you are using, who your prior specialists were and so on. Remember to have all this information available when you go for your first appointment.

 *It would be wrong to say my life has not been impacted however looking back I feel that in terms of work, relationships and even socialising, the overall impact has not been as great as one might expect.*
– Lee Howard





SECTION FOUR

LOOKING TO THE FUTURE



As someone who first injected insulin using glass syringes and stainless steel needles, I can assure you that people with type 1 diabetes live life far more easily these days.

- Lee Howard

RESEARCH FOR THE FUTURE

Whilst a type 1 diabetes diagnosis may make you fear for the future, it's important to remember that scientific progress towards a cure is advancing at a rapid rate.

Life for people with type 1 diabetes has improved dramatically over the past few decades, with new treatments and a greater understanding of the disease process meaning people stay healthier for much longer. The advent of new technology has also meant day to day life with type 1 is much simpler, meaning you can spend less time on disease management and more time on living.

DRIVING RESEARCH PROGRESS

JDRF is the world's leading not-for-profit supporter of type 1 diabetes research globally, investing over \$1.7 billion since 1970, including nearly \$160 million into Australian research.

JDRF research is focused on improving the lives of people with diabetes today and in the future. Whilst the ultimate aim is to cure type 1 diabetes, we recognise the need to keep people healthy enough to fully benefit from the cure when it is found, as well as achieving the goal of preventing disease onset in future generations.

JDRF evaluates the global landscape and support research programs from learning, to lab, to life-changing. We support therapies through each stage of the research pipeline and work to ensure these treatments reach those who need them as quickly as possible.

As well as directly funding research, we use our expertise to steer the scientific agenda and engage to brightest scientific minds to identify research gaps and accelerate progress in the most promising research areas.

Key to this is the development of relationships with a range of partners involved with making research progress and delivering it to those who can benefit. This includes speeding up the translation of laboratory research into clinical trials and facilitating regulatory approval and reimbursement of new therapies.



I never felt the need to hide my diabetes as my family were all very supportive and never balked at what needed to be done. I just sort of got on with it and I think that attitude has meant it hasn't limited what I felt I could achieve.

- Dr Jeremy Robertson

RESEARCH FOCUS – CURE, PREVENT, TREAT

JDRF research funding is prioritised towards the scientific areas most likely to achieve three main objectives – Cure, Treat and Prevent.

CURE the body's inability to control glucose by replacing or renewing insulin-producing cells and stopping the body from attacking them.

RESEARCH IN FOCUS

Insulin is produced in the islet cells for the pancreas, and these are the cells destroyed by immune attack in type 1 diabetes. Transplanting healthy islet cells into people with type 1 would therefore provide a functional cure, but there are some obstacles preventing its widespread use. A particular challenge is protecting transplanted islets from existing immune attack, and that is why scientists are working to develop a protective capsule that can be safely implanted into people with type 1 diabetes. JDRF is leading the world in this field, supporting encapsulation research and driving partnerships with industry to take the technology from the lab to the clinic. More info about this exciting field of research can be found here www.jdrf.org/impact/research/beta-cell-replacement.

PREVENT the onset or progression of the disease using vaccines, screening tests and earlier diagnostic testing.

RESEARCH IN FOCUS

In order to prevent type 1 diabetes we need to understand the cause and the early development of the disease. We know that type 1 develops in stages with the disease beginning before symptoms appear. We know that the rates of type 1 cannot be explained by genetics alone, which means that the environment must have a role. The ENDIA (Environmental Determinants of Islet Autoimmunity) is a world-first Australian study that is collecting information such as exposure to bacteria and viruses, body growth and nutrition to determine if any of these might contribute to or protect against type 1 development starting from pregnancy. Find out more at www.endia.org.au.

TREAT people living with type 1 diabetes with new drugs, therapies and devices like the artificial pancreas to optimize glucose control, reduce the risk of complications and make it easier to stay healthy until a cure is available.

RESEARCH IN FOCUS

A closed loop system, or 'Artificial Pancreas' is the ultimate tech treatment goal for glucose control. The system consists of an insulin pump, CGM and a complex calculation that matches insulin dosing to blood glucose levels — much like a normal pancreas would do naturally. The JDRF Artificial Pancreas Program is working to develop new technologies that are small, user-friendly and accurate, with the ultimate aim of delivering a system that will let anyone with type 1 get through the day without having to check blood glucose levels or dose extra insulin. In addition to driving the research, JDRF is also working to ensure that these technological advances are accessible to those who need them by encouraging government to subsidise costs and accelerating research progress through industry partnerships. Find out more here www.jdrf.org/impact/research/artificial-pancreas.

TYPE 1 DIABETES CLINICAL RESEARCH NETWORK

Clinical research is the critical final step in making new technologies and treatments a reality for Australians living with type 1 diabetes. The Australian Type 1 Diabetes Clinical Research Network (CRN) accelerates this process and encourages collaboration and shared learning on an unprecedented scale.

Supported by the Australian Government and led by JDRF, the CRN connects Australians with type 1 to the latest treatments and technologies and connects researchers to each other. The program nurtures emerging research leaders through funding and mentoring which will ultimately help to secure the future of type 1 diabetes research in Australia. The potential of this network to improve the lives of those living with type 1 both in Australia and globally, and ultimately find a cure, is remarkable. Find out more at www.t1dcrn.org.au.

JOINING A CLINICAL TRIAL

Clinical trials are the way that research discoveries are developed into real world solutions, and the important final step before new therapies can be made available to those who need them.

Advances in treatments and technology for type 1 diabetes are only made possible by the willingness of volunteers to take part in clinical research. Research volunteers, whether patients or healthy subjects, play a vital role in clinical research. Without research volunteers, clinical

trials for exciting and cutting-edge new treatments cannot go ahead.

By volunteering for clinical research, you can participate in discovering new treatments and therapies to treat, prevent and ultimately cure type 1 diabetes.

WHY IS IT IMPORTANT TO PARTICIPATE IN A CLINICAL TRIAL?

- **You could get access to new therapies as they are tested and progressed with the possibility of going to market**
- **You'll learn more about your own type 1 diabetes and how to manage it best**
- **You'll help to speed research progress from bench to bedside**
- **You'll contribute to making new therapies accessible to others with type 1 diabetes**
- **You could help find a cure for more than 120,000 Australians and millions of people worldwide living with type 1 diabetes**

There has never been more cutting-edge type 1 diabetes research happening in Australia and people with and without T1D are urgently needed to join clinical trials to ensure these trials are successful. Find out more about the clinical trials happening near you at www.t1dcrn.org.au.

RESEARCH UPDATES

The following websites provide links and plain English summaries of research progress –

- JDRF Australia – blog.jdrf.org.au
- JDRF International – www.jdrf.org/impact/research
- T1D Clinical Research Network – www.t1dcrn.org.au
 - Diabetes Australia Research Trust – www.diabetesaustralia.com.au/diabetes-australia-research-program
- Type 1 Diabetes TrialNet – www.trialnet.org
- American Diabetes Association – www.diabetes.org/research-and-practice
- Joslin Diabetes Centre – www.joslin.org

JOIN THE TEAM AND MAKE A DIFFERENCE

With the help and commitment of a wide range of supporters, JDRF has been able to improve the lives of people living with type 1 diabetes and drive progress towards a cure. But there is still more work to do and that is where you can help. So get involved!

MAKE AN INVESTMENT – There are a number of different ways that you can financially support type 1 diabetes research and the work of JDRF. Every little bit counts. www.jdrf.org.au/get-involved

SHARE YOUR STORY – JDRF originated as a volunteer led organisation and the passion

and dedication of those who provide time, resources and their experience is the key to our growth and continued progress. Share your experiences for the benefit of others by becoming a JDRF advocate, ambassador or volunteer. www.jdrf.org.au/volunteer

JOIN THE TEAM – JDRF holds a range of state and national events to help raise funds and awareness. These events are a great opportunity for people with type 1 and their supporters to connect with each other, support research progress and educate the wider community. Join an existing event or set up your own! www.teamcurediabetes.org.au

BE A GAMECHANGER!

JDRF's T1D Game Changer is a **community of like-minded people** committed to doing their part to achieve the **next type 1 diabetes breakthrough**. Becoming a T1D Game Changer means you'll be the first to learn about **innovative research programs** and opportunities to participate in **Australian clinical trials**. There is no cost involved to sign up and participate and all ages and backgrounds are welcome.

You can read more here www.jdrf.org.au/research/game-changer





“
Taking part in a clinical trial really keeps you in touch with what is happening in the world. It gets me so excited about what the future may hold for me and my kids.

BREE HAFSTEINS

Bree was worried that her diabetes may be passed on to her future children, so she joined a research trial and discovered the many benefits of getting involved.

I've always been pretty lucky with my diabetes, in my eighteen years of living with it I really hadn't experienced many complications or ongoing worries. But that did change when I met my partner and we started to think about starting a family. Pregnancy isn't always an easy process for people with type 1, so I did all the research and got all the help I could to make sure my pregnancies were as healthy as they could be. The one thing I knew I couldn't control was the risk of my children developing type 1 diabetes themselves.

Through the hospital clinic I was attending, I was put in contact with a local coordinator for the ENDIA trial. ENDIA is a world first research trial that aims to identify how lifestyle and our surrounding environment can contribute to type 1 diabetes development. After learning everything I could about it, I decided to enrol both myself and my unborn son. The research team were very accommodating and made the process as quick and simple as possible. There was never any pressure to do anything I didn't want to do, they were happy to receive any help I could provide. I was also impressed by how quickly the study evolved, including new ideas to make sure it was maximising the outcomes it could generate.

Fast forward a few years, and I'm now a Mum to three beautiful kids and all of them are enrolled in ENDIA. Joining a clinical trial wasn't something I had thought about before getting pregnant, but it really has provided some great benefits. For me, the most important one was being able to find out whether my kids were at increased risk of type 1 and gaining the ability to intervene earlier should they start showing symptoms. I've also been able to connect with the other ENDIA families and we are now all sharing advice and supporting each other. I love that I'm participating in something for the greater good, that my contribution will improve someone's life in the future. One day we may have a cure because of the research trials that are happening right now and I'm excited to be part of it.

AND A FINAL WORD – DON'T LET TYPE 1 STOP YOU!

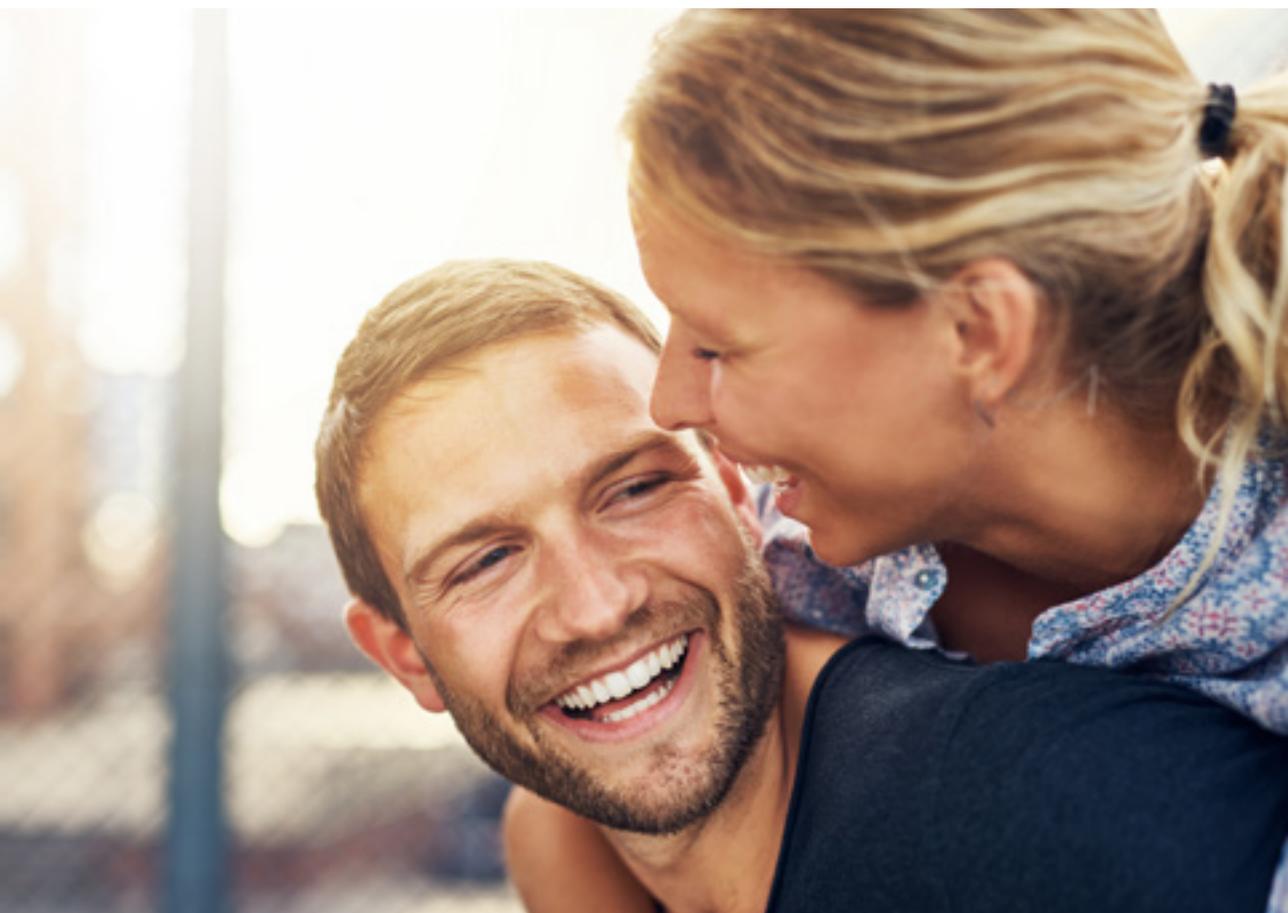
Being diagnosed with type 1 diabetes should not prevent you from doing the things you enjoy. Follow your dreams – you can go anywhere in life your imagination, talent and dedication can take you.

Adults with type 1 diabetes do some pretty amazing things – and we're not just talking about having insulin injections and checking blood sugars every day! Throughout this book we have included stories from people

just like you – dealing with type 1 diabetes but still living their best life.

You might be surprised to learn that, for some people, getting type 1 diabetes gives them a sense of greater purpose in their lives, a cause they passionately support and a sense of being a part of an important journey. For others, type 1 diabetes strengthens their determination and makes them even more focused on achieving their goals.

There are over 120,000 people in Australia with type 1 diabetes. Most of them are adults, all of them are inspirational.





SECTION FIVE

RESOURCES

WEBSITES

The chances are that by the time you read this book you have already surfed the Internet for information about type 1 diabetes. While the Internet can be an excellent source of information, you shouldn't believe everything you read and finding good information can take time. In general, you shouldn't rely on just one site for your information. Be careful when looking at a site developed by an individual rather than an institution or professional organisation. If in doubt, check the information with your doctor or diabetes team. Listed below are just a few you can start with.

DIABETES ORGANISATIONS

JDRF Australia

1300 363 126
www.jdrf.org.au

Diabetes Australia

www.diabetesaustralia.com.au

International Diabetes Federation

www.idf.org

T1 Diabetes Network

www.t1dn.org.au

Australian Diabetes Society (ADS)

www.diabetessociety.com.au

National Diabetes Services Scheme

www.ndss.com.au

GOVERNMENT AGENCIES

National Disability Insurance Agency

www.ndis.gov.au

Australian Department of Health

www.health.gov.au/internet/main/publishing.nsf/Content/chronic-diabetes

Health Direct

www.healthdirect.gov.au/type-1-diabetes

Australian Government – Smart Travel

www.smartraveller.gov.au

Australian Private Health Insurance Ombudsman

www.privatehealth.gov.au

ONLINE FORUMS AND COMMUNITIES

There are many online communities that you can join and find great positive support. Take your time to search and find the ones that resonate to you and you are comfortable being part of. Below list are only a few where you can start with.

JDRF Australia online peer support

www.jdrf.org.au/peer-support-program

JDRF T1D Connect group 25+

www.facebook.com/groups/T1DConnect25

JDRF T1D Connect group 14-24yrs

www.facebook.com/groups/T1DConnect

Type One Diabetes Support Group Australia

www.facebook.com/groups/241146419416439

MyD (NDSS website developed specifically for people aged 16 to 25 years living with diabetes)

www.myd.ndss.com.au

Type One Nation

www.typeonenation.org

Beyond Type One

www.beyondtype1.org/about-beyond-type-1

DiaTRIBE

www.diatrIBE.org

DIET (FOOD)

Dietitians Association of Australia (DAA)

www.daa.asn.au

Calorie King Australia

www.calorieking.com.au

Glycemic Index

www.glycemicindex.com

Traffic Light Carbohydrate Counter

www.trafficlightguide.com.au

EXERCISE

Ext1d

www.ext1d.com.au

Exercise & Sports Science Australia (ESSA)

www.essa.org.au

Diabetes UK – Sports nutrition and type one diabetes

www.diabetes.org.uk/guide-to-diabetes/enjoy-food/eating-with-diabetes/out-and-about/sports-nutrition-and-type-1-diabetes

EMOTIONAL HEALTH

Beyond Blue

www.beyondblue.org.au

Black Dog Institute

www.blackdoginstitute.org.au

SANE Australia

www.sane.org

eHeadspace

www.headspace.org.au/eheadspace

DIABETES TECHNOLOGY

Overview of Available Technology

www.diabetesaustralia.com.au/diabetes-technology

NDSS Continuous Glucose Monitoring access

www.ndss.com.au/cgm

JDRF Insulin Pump Subsidy Program for Australians Aged Under 18yrs

www.jdrf.org.au/living-with-t1-diabetes/insulin-pump-program

PREGNANCY AND BIRTH

Australasian Diabetes in Pregnancy Society

www.adips.org

NDSS Diabetes and Pregnancy website

www.pregnancyanddiabetes.com.au/en

RESEARCH

JDRF International

www.jdrf.org/impact/research

JDRF Australia T1D Clinical Research Network

www.t1dcrn.org.au

Diabetes Australia Research Trust

www.diabetesaustralia.com.au/diabetes-australia-research-program

Type 1 Diabetes TrialNet

www.trialnet.org

American Diabetes Association

www.diabetes.org/research-and-practice

Diabetes Centre at the Mayo Clinic

www.mayoclinic.org

Joslin Diabetes Centre

www.joslinresearch.org

TRANSITIONING ADOLESCENTS AND YOUNG ADULTS

NDSS MyD for under 25s

www.myd.ndss.com.au

Reach Out

www.reachout.com.au

Trapeze

www.trapeze.org.au



DIABETES DICTIONARY

ACE inhibitor is an oral medicine that lowers blood pressure. ACE stands for angiotensin converting enzyme. For people with diabetes, especially those who have protein (albumin) in the urine, it helps slow down kidney damage.

Adrenalin is a counter-regulatory hormone released by the body in reaction to stress. One of adrenalin's roles is to trigger the liver to break down stored glucose and to release it into the bloodstream.

Aerobic exercise is a form of physical activity that causes your heart rate and breathing to increase. Examples include brisk walking, swimming or running.

AGEs stands for advanced glycosylation end products. AGEs are produced in the body when glucose links with protein. They play a role in damaging blood vessels, which can lead to diabetes complications.

Albuminuria is a condition in which the urine has more than normal amounts of a protein called albumin. Albuminuria may be a sign of nephropathy (kidney disease).

Alpha cell is a type of cell in the pancreas. Alpha cells make and release a hormone called glucagon. The body sends a signal to the alpha cells to make glucagon when blood glucose falls too low. Then glucagon reaches the liver where it tells it to release glucose into the blood for energy.

Anaerobic exercise is a form of physical activity that causes lactate

to form in muscles and involves short exertion, high-intensity movement. Examples includes weight lifting and High Intensity Interval Training (HIIT).

Antibodies are proteins that the body produces to fight off foreign substances such as bacteria, viruses and transplanted organs.

Atherosclerosis is the clogging, narrowing and hardening of the body's large arteries and medium-sized blood vessels. Atherosclerosis can lead to stroke, heart attack, eye and kidney problems.

Autoimmune disease is a disorder in which a person's own antibodies destroy body tissues, such as the beta cells in the pancreas.

Basal insulin controls blood glucose levels between meals and overnight. It controls glucose in the fasting state.

Beta cells make insulin and are found in areas of the pancreas called the islets of Langerhans.

BGL is an acronym for blood glucose levels.

Blood glucose is the main sugar that the body makes from food. Cells cannot use glucose without the help of insulin.

Blood glucose meter is a small, portable machine used by people with diabetes to check their blood glucose levels. After pricking the skin with a lancet, one places a drop of blood on a strip in the machine. The meter displays the blood glucose level as a number on the meter's digital display.

Blood glucose monitoring is how people with diabetes determine how much glucose is in their blood.

Blood pressure refers to the pressure exerted by blood flow on artery walls. Blood pressure is expressed as a ratio (e.g. 120/80, read as '120 over 80'). The first number is the systolic pressure, or the pressure when the heart pushes blood out into the arteries. The second number is the diastolic pressure, or the pressure when the heart rests. People with diabetes should aim for a blood pressure of 130/80 mmHg or lower. High blood pressure (hypertension) can cause health problems such as heart attack, stroke and kidney problems.

Blood sugar is a term used interchangeably with blood glucose.

Bolus is an extra amount of insulin taken to cover an expected rise in blood glucose, often related to a meal or snack.

Carbohydrate is one of the major sources of kilojoules in the diet. It comes primarily from sugar (found in refined fruits and vegetables) and starch (found in grains and legumes). Carbohydrate breaks down into glucose during digestion and raises blood glucose levels.

Carbohydrate counting is a method of meal planning for people with diabetes based on counting the number of grams of carbohydrate in food.

Carbohydrate exchange is a way of measuring carbohydrate. Most diabetes centres around Australia use 15 grams of total carbohydrate as a carbohydrate exchange. A half cup of cooked pasta, two taco shells,

250ml of milk or a sandwich slice of bread all contain around 15 grams of carbohydrate and are examples of a carbohydrate exchange.

Capillary is the smallest blood vessel. Capillary walls are so thin that oxygen and glucose can pass through them and enter the cells. Waste products, such as carbon dioxide, pass back into the bloodstream via the capillaries to be carried away and expelled from the body.

Cholesterol is a type of fat which occurs naturally in our bodies and is also found in animal fats. Too much saturated fat and dietary cholesterol may be associated with heart disease and stroke.

Continuous Glucose Monitoring or CGM is a means of measuring glucose levels continuously. It is inserted under the skin and worn separately to a pump.

Chronic refers to a disease or disorder that is present over long periods of time, often the remainder of a lifetime of an individual.

Coeliac disease is a digestive disease that damages the small intestine and interferes with absorption of nutrients from food. People who have coeliac disease cannot tolerate a protein called gluten, which is found in wheat, rye and barley.

Complications are harmful effects of diabetes such as damage to the eyes, heart, blood vessels, nervous system, teeth and gums, feet and skin, and kidneys. Studies show that keeping blood glucose, blood pressure and LDL cholesterol levels close to normal can help prevent or delay these problems.

C-peptide stands for 'Connecting peptide', a substance the pancreas releases into the bloodstream in equal amounts to insulin. A test of C-peptide levels shows how much insulin the body is making.

Creatinine is a waste product from protein in the diet and from the muscles of the body. Creatinine is removed from the body by the kidneys; as kidney disease progresses, the level of creatinine in the blood increases.

Counter regulatory hormones are hormones that oppose the action of insulin. They include glucagon, adrenaline, cortisol, and growth hormone. Counter regulatory hormones raise the level of glucose in the blood by promoting glycogenolysis, gluconeogenesis, ketosis and other catabolic processes. In healthy people, counter regulatory hormones constitute a principal defence against hypoglycemia, and levels are expected to rise as the glucose falls. Persistent elevation of a counter regulatory hormone can reduce a person's sensitivity to insulin.

Dawn phenomenon is the early-morning (4am to 8am) rise in blood glucose level.

Diabetes control and complications trial (DCCT) was a study of people with type 1 diabetes by the National Institute of Diabetes and Digestive and Kidney Diseases, conducted from 1983 to 1993. The study showed that intensive therapy compared to conventional therapy significantly helped prevent or delay diabetes complications. Intensive therapy included multiple daily insulin injections or the use of an insulin

pump with multiple blood glucose readings each day. Complications followed in the study included diabetic retinopathy, neuropathy and nephropathy.

Dehydration is a state in which there is excessive loss of water from body tissues. It can occur when the blood sugar levels are high for long periods of time. It can also result from inadequate water intake, or excessive sweating, vomiting or diarrhoea. Symptoms of dehydration can include extreme thirst, irritability, confusion and flushed, dry skin.

Diabetes is a condition in which the body either cannot produce insulin or cannot effectively use the insulin it produces.

Diabetes educator is a health care professional who can help people learn about taking insulin, blood glucose monitoring, foot care, physical activity, shift work adjustments and more.

Dietitian is an expert in nutrition who can assist people plan the kinds and amounts of food that promote a healthy lifestyle.

Endocrine gland is a group of specialised cells that release hormones into the blood. For example, the islets in the pancreas, which secrete insulin, are endocrine glands.

Endocrinologist is a medical doctor who specialises in treating people who have problems related to the endocrine system, which includes diabetes.

Erectile dysfunction (also called impotence) refers to the inability to have an erection sufficient to have sexual intercourse.

Euglycemia is a normal level of glucose in the blood.

Fasting blood glucose test is a check of a person's blood glucose level after the person has not eaten for 8 to 12 hours (usually overnight).

Fat is the most concentrated source of kilojoules in a diet. Saturated fats are found primarily in animal products and unsaturated fats come from plants. Excess intake of fat, especially saturated fat, can increase the risk of heart disease and stroke.

Fibre is a type of material within foods mainly found in vegetables, fruits and cereals that adds bulk to the diet, aiding digestion.

Gestational diabetes develops during pregnancy due to a deficiency of insulin during pregnancy that disappears following delivery. Women who have had gestational diabetes are at a high risk of developing type 2 diabetes later in life.

Glucagon is a hormone produced by the pancreas that stimulates the liver to break down glycogen and release it into the bloodstream as glucose. It can be given by injection to treat hypoglycaemia. An injectable form of glucagon, available by prescription, may be used to treat severe hypoglycemia.

Glucose is a simple form of sugar that acts as fuel for the body. It is produced during digestion of carbohydrate and carried to the cells in the blood.

Glycemic index is a ranking of carbohydrate-containing foods, based on the food's effect on blood

glucose compared with a standard reference food.

Glycogen is the main carbohydrate storage material, which is stored in the liver and muscles for use when energy is required.

Glycosuria is the presence of glucose in the urine.

Haemoglobin in the red blood cells carries oxygen and glucose to the cells of the body.

Haemoglobin A1c (HbA1c) is a test that reflects the average amount of glucose in the blood over the previous three months.

HDL cholesterol stands for high-density-lipoprotein cholesterol, a fat found in the blood that takes extra cholesterol from the blood to the liver for removal. HDL cholesterol is sometimes called 'good' cholesterol.

Honeymoon period is the period of time after the diagnosis of type 1 diabetes when the dose of insulin may need to be reduced due to remaining or recovered insulin secretion from the pancreas. This period can last weeks, months or years.

Hyperglycaemia is a condition caused by greater than normal levels of glucose in the blood. Symptoms include thirst, frequent urination and fatigue.

Hypoglycaemia is a condition in which blood glucose levels drop too low. Symptoms may include sweating, trembling, hunger, dizziness, moodiness, confusion, blurred vision and hunger.

Hypoglycaemia unawareness is a state in which a person does not feel or recognise the symptoms of hypoglycemia. People who have frequent episodes of hypoglycaemia may no longer experience the warning signs of it.

Hormones are the substances released into the bloodstream from a gland or organ. Hormones control growth and development, reproduction, sexual characteristics, blood glucose levels and influence the way the body uses and stores energy.

IDDM stands for insulin-dependent diabetes mellitus – former term for type 1 diabetes.

Impotence (also called erectile dysfunction) refers to the inability to have an erection sufficient to have sexual intercourse.

Injection site rotation is changing the places on the body where insulin is injected. Rotation prevents the formation of lipodystrophies.

Insulin is a hormone manufactured by the pancreas, which helps glucose leave the blood and enter the muscles and other tissues of the body.

Insulin-dependent diabetes (also known as type 1 diabetes) is a condition in which the body's immune system destroys the cells in the pancreas that produce insulin. Insulin allows glucose to enter the cells of the body to provide energy. Persons with type 1 diabetes must take daily insulin injections.

Insulin pen is a device for injecting insulin that looks like a fountain pen and holds replaceable cartridges of insulin.

Insulin pump is a small computerised device that delivers a slow continuous level of rapid-acting insulin throughout the day. A pump can be programmed to give more insulin exactly when it's needed or less insulin to help prevent the blood glucose level dropping too low if you are more active. The pump can also be used to give a surge of insulin with food or if your blood glucose level is too high.

Insulin-resistance partially blocks the effect of insulin.

Insulin-to carb-ratio refers to the number of units of rapid or short-acting insulin to take to cover each carbohydrate exchange eaten at a meal or snack.

Intensive insulin therapy is a treatment for diabetes in which blood glucose is kept as close to normal as possible through frequent injections or use of an insulin pump; meal planning; adjustment of medicines; exercise based on blood glucose check results; and frequent contact with a person's health care team.

Intermediate-acting insulin is a type of insulin that starts to lower blood glucose within 1 to 2 hours after injection and has its strongest effect 6 to 12 hours after injection, depending on the type used.

Islets are groups of cells located in the pancreas that make hormones that help the body break down and use food. For example, alpha cells make glucagon and beta cells make insulin. Also called islets of Langerhans.

Islet cell autoantibodies (ICA) are proteins found in the blood of people

newly diagnosed with type 1 diabetes. They are also found in people who may be developing type 1 diabetes. The presence of ICA indicates that the body's immune system has been damaging beta cells in the pancreas.

Islet transplantation is an experimental procedure in which islets are moved from a donor pancreas into a person with type 1 diabetes. Beta cells in the islets make the insulin that the body needs for using blood glucose.

Juvenile diabetes is the former term for insulin-dependent diabetes mellitus (IDDM), or type 1 diabetes.

Kilojoule is a measurement of energy. The sources of kilojoules in a diet are carbohydrate, protein, alcohol and fat.

Ketoacidosis is a condition in which ketones accumulate in the blood, making the blood acidic. Symptoms of ketoacidosis include nausea, vomiting, abdominal pain and rapid breathing.

Ketones are the breakdown product of fat that accumulates in the blood as a result of inadequate insulin or inadequate kilojoule intake.

Ketonuria is a condition that occurs when ketones are present in the urine, a warning sign of diabetic ketoacidosis.

Lancet is a spring-loaded device used to prick the skin with a small needle to obtain a drop of blood for blood glucose monitoring.

LADA is an abbreviation for latent autoimmune diabetes of adults, sometimes refer to as type 1.5. People with LADA have features of both type

1 and type 2 diabetes in that their immune system attacks the cells of the pancreas that produce insulin but may they also have insulin resistance.

LDL cholesterol stands for low-density lipoprotein cholesterol, a fat found in the blood that takes cholesterol around the body to where it is needed for cell repair and also deposits it on the inside of artery walls. LDL cholesterol is sometimes called 'bad' cholesterol.

Lipohypertrophy is the build-up of fat below the surface of the skin, causing lumps. Lipohypertrophy may be caused by repeated injections of insulin in the same spot.

Long-acting insulin is a type of insulin that starts to lower blood glucose within 4 to 6 hours after injection and has its strongest effect 10 to 18 hours after injection.

Macrovascular disease is disease of the large blood vessels, such as those found in the heart. Lipids and blood clots build up in the large blood vessels and can cause atherosclerosis, coronary heart disease, stroke and peripheral vascular disease.

Microvascular disease is disease of the smallest blood vessels, such as those found in the eyes, nerves and kidneys. The walls of the vessels become abnormally thick but weak—they bleed, leak protein and slow the flow of blood to the cells.

mmol/L is the abbreviated form of millimoles per litre, a term used to describe how much glucose is present in a specific amount of blood.

Macrosomia is a term meaning 'large body' and refers to a baby that is considered larger than normal.

Nephropathy refers to diabetic kidney disease.

Neuropathy refers to diabetic nerve damage.

NIDDM stands for non-insulin-dependent diabetes mellitus, which is the former term for type 2 diabetes.

Non-insulin-dependent diabetes (also known as type 2 diabetes) is a condition in which the body either makes too little insulin or cannot properly use the insulin it makes to convert blood glucose to energy. Type 2 diabetes may be controlled with diet and exercise, but may require oral medications and/or insulin injections.

Nutrients include proteins, carbohydrates, fats, vitamins and minerals provided by food and are necessary for growth and the maintenance of life.

Ophthalmologist is a medical doctor who specialises in the treatment and care of the eyes.

Optometrist is a non-medical health care professional who specialises in care of the eyes.

Pancreas is a fish-shaped gland that secretes various substances such as digestive fluid, insulin and glucagons. It is divided into a head, a body and a tail, and is about 13cm long in adults.

Periodontal disease is disease of the gums, a potential complication of diabetes.

Peripheral neuropathy is nerve damage that affects the feet, legs or hands. Peripheral neuropathy causes pain, numbness or a tingling feeling.

Photocoagulation is a treatment for diabetic retinopathy. A strong beam of light (laser) is used to seal bleeding blood vessels in the eye and burn away extra blood vessels that should not have grown there.

Podiatrist is a health professional who diagnoses and treats disorders of the feet.

Post-prandial blood glucose is the blood glucose level taken one to two hours after eating.

Pre-mixed insulin is a commercially produced combination of two different types of insulin.

Pre-prandial blood glucose is the blood glucose level taken before eating.

Proliferative retinopathy is a condition in which fragile new blood vessels grow along the retina and in the vitreous humor of the eye.

Protein is one of the major sources of kilojoules in a diet. Found in meats, eggs, milk and some vegetables and starches, protein provides the body with material for making blood cells, hormones and body tissue.

Proteinuria is the presence of protein in the urine, indicating that the kidneys are not working properly.

Rapid-acting insulin is a type of insulin that starts to lower blood glucose within five to 10 minutes after injection and has its strongest effect

30 minutes to 3 hours after injection, depending on the type used.

Rebound hyperglycaemia is a swing to a high level of glucose in the blood after a low level. Also called the Somogyi effect.

Renal means having to do with the kidneys. A renal disease is a disease of the kidneys. Renal failure means the kidneys have stopped working.

Retina is the light-sensitive layer of tissue that lines the back of the eye.

Retinopathy is a disease in which the small blood vessels (capillaries) in the back of the eye (retina) may bleed or form new vessels. There are three kinds of retinopathy – background retinopathy, proliferative retinopathy and diabetic retinopathy. This condition usually occurs in people with long-standing diabetes.

Sensor Augmented Pump is an insulin pump that can be augmented with CGM sensors to create a closed loop system, however some user engagement is still required.

Sharps container is a special container for disposal of used needles and syringes; they are made of hard yellow plastic so needles cannot poke through.

Short-acting insulin is a type of insulin that starts to lower blood glucose within 30 minutes after injection and has its strongest effect two to five hours after injection.

Sugar is a simple form of carbohydrate that provides calories and raises blood glucose levels.

Somogyi effect is when the blood glucose level swings high following hypoglycaemia. The Somogyi effect may follow an untreated hypoglycaemic episode during the night and is caused by the release of stress hormones.

Subcutaneous injection is putting a fluid into the tissue under the skin with a needle and syringe.

T1D is an abbreviation for ‘type 1 diabetes’ and is also the name of the resources pack provided by JDRF to newly-diagnosed adults.

Trimester refers to a period of three months.

Type 1 diabetes (also known as insulin dependent diabetes) is a condition in which the body’s immune system destroys the cells in the pancreas that produce insulin. Insulin allows glucose to enter the cells of the body to provide energy. Persons with type 1 diabetes must take daily insulin injections.

Type 2 diabetes (also known as non-insulin dependent diabetes) is a condition in which the body either makes too little insulin or cannot properly use the insulin it makes to convert blood glucose to energy. Type 2 diabetes may be controlled with diet and exercise, but may require oral medications and/or insulin injections.

Urine tests measure substances, such as blood glucose or ketones, present in the urine.

ACKNOWLEDGEMENTS

Thank you to those people who have contributed to previous editions of Straight to the Point:

| | |
|--------------------------|--------------------|
| Allan Bolton | Dr Kate Marsh |
| Will Bonney | Margaret McGill |
| Ian Coleman | Malcolm Overland |
| Helen Edwards | Gina Pash |
| Gina Farrage | Michelle Paule |
| Anne Freeman | Dr Pat Phillips |
| Kristi Gale | Dr Lea Sorensen |
| Marilyn Harrington | Cheryl Steel |
| Asta Harvey | Victoria Stevenson |
| A/Prof Christine Johnson | Jackie van Galen |
| Dr Thomas Keller | Skye Windebank |
| Natasha Leader | Erica Wright |

***Disclaimer**

This book is not intended to replace legal or medical advice. The Juvenile Diabetes Research Foundation (JDRF) offers the information in this book for general educational purposes only. The authors, Jane Overland, Rachel Reynar and Michael Sluis, reserves the right, in consultation with JDRF, to correct any errors or omissions in any portion of the book. The authors in consultation with JDRF may make any other changes to the book at any time without any notice. This book, and the information and materials in this book, are provided 'as is' without any representation or warranty, expressed or implied, of any kind. Information in this book may contain inaccuracies or errors. JDRF believes the information contained in this book is accurate, but reliance on any such opinion, statement, or information shall be at your sole risk. JDRF and the authors have no obligation to update this book, and any information presented may be out of date. You should not use this book to replace the advice of qualified medical professionals. You should not make any changes in the management of type 1 diabetes without first consulting your physician or qualified medical professional. Under no circumstances will JDRF or authors be liable for any direct, indirect special or other consequential damages arising out of any use of this book.



ACT | NSW | QLD | SA | VIC | WA

T: 1300 363 126 www.jdrf.org.au

ACN: 002 286 553 ABN: 40 002 286 553 DGR: 042 753



RRP \$19.95 Find us on Facebook and Twitter

