



Fiona Wood Public Lecture Series

Transcript for 'Understanding diabetes from all angles'

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Speaker: Ashley Makepeace

I'm Ashley Makepeace, so I'll be starting the talks. This has changed slightly from what I started with, but basically what I'm going to cover in the next 10 minutes or so hopefully, is essentially most of these things. I'm going to tell you what diabetes is, who has it in Australia. I'll explain the general types of diabetes that we know and also what I'm going to tell you a little bit more about are the symptoms, how symptoms affect the body and the associated complications. I'll briefly touch on how it's managed and I'll also talk about who's at risk.

How is diabetes defined? Well it's considered to be a chronic disease where there's too much sugar or the medical term is glucose, in the blood which gives you hyperglycaemia. This is generally either due to a deficiency of insulin produced by the pancreas or far more commonly it's to do with resistance to the action of insulin which is what type 2 diabetes is particularly a problem with.

What about in Australia? There's 1.2 million Australians living with diabetes at this point in time, so 1 in 17 adult Australians. I have represented the Australian population over here, which is roughly 25 million, so each line is 1 million people. You can see just over 1 million people have diabetes. Of those with diabetes, 90 per cent of them are type 2, so the most common type of diabetes. The other 10 per cent is predominantly made up of type 1s and a few other slightly unusual types, but 90 per cent of Australians who have diabetes have type 2 diabetes. Furthermore there's another two million people who are living with, what's called prediabetes, so at risk of progression to diabetes.

What else do we know? Well the number of people with diabetes has already been mentioned by Julian has trebled in the last 25 years. Indigenous Australians and those who are socially disadvantaged have a higher risk than others.

What happens in normal health? I've used a seesaw down the bottom as a way of explaining how we keep blood sugars balanced in a very narrow range in normal health. Blood sugars rise in response to food or any meal that we ingest including liquids and in normal health a pancreas is where we produce insulin is released in response to the rise in sugar from the food.

Insulin has a receptor on cells, particularly liver, muscle and fat cells and they signal that cell to take up glucose by its own receptor. Then the glucose, if it's not used, is stored as an energy source. By the insulin action, the glucose taken up in the cell, the blood sugar falls.

Types of diabetes. There's type 1 diabetes which is the lesser of the diabetes that is in Australia but it is a common diagnosis predominantly in younger people. In that case they have a problem with insulin production. Due to an autoimmune process it destroys the pancreas' ability to make insulin. With no insulin talking to the cell the glucose can't get into the cell. These patients can present quite unwell with significant weight loss because they can't use glucose as an energy source and they have high sugars.

Type 2 diabetes is different. In type 2 diabetes it starts with a problem where there's insulin resistance which ultimately progresses with time. So what happens is the pancreas still makes insulin – this slide should actually be in a two-step. What I wanted to show first of all that is over time we still make insulin in a type 2 diabetic, we just need more of it to allow the glucose into the cell and that's what is called insulin resistance. So there is still a response but the body is more resistant, the cells are more resistant to it and there's lots of people that have insulin resistance that don't have diabetes. You may have heard of polycystic ovary syndrome, which is a classic form of insulin resistance that has reproductive consequences and hair and pimples are a common problem in younger women and it can lead to diabetes but it in itself is an insulin resistant phenotype or condition. Being overweight is another form of insulin resistance that doesn't always leave to diabetes, and there's also pregnancy. That's another insulin resistant state and as the pregnancy progresses, what happens over time is the hormones from the placenta drive insulin resistance which is why we check women in the second half of pregnancy for diabetes related specifically to the pregnancy which is called gestational diabetes. With delivery, the placenta is also delivered so the insulin resistance falls.

Over time insulin resistance progresses and then what you end up with is some amount of insulin dysfunction because the pancreas can't continue to produce excessive amounts of the insulin hormone and that's when you get the type 2 diabetes. This is this point here.

So, what we've got here is we've got some effective insulin resistance here, we've got progression where the actual ability of the pancreas to produce enough is a problem, so therefore we've got sort of a two-hit effect. This is also seen in the way we diagnose diabetes.

There's three main diagnostic tests for diabetes which GPs, hospitals do regularly. There's fasting tests, a fasting glucose test, there's what's called the glucose tolerance test and any of the females in the room who have had children may remember the green drink in pregnancy, and certainly it was a common way of testing but a bit more a problem from the point of view of routine screening of people at risk until we had a routine HbA1c or glycated haemoglobin which is essentially measuring how much sugar sticks to a red cell over its lifespan and we now use that also as a way of diagnosing diabetes.

Across the top we have a classification of normal, prediabetes and diabetes. If we look at this – for example, fasting – if someone is checked for their fasting glucose and it's below 5.5 mmol/L, that's considered normal. If your glucose on fasting is above 7, that's considered diabetes.

You can see there's an in-between or a grey zone or in this case purple or magenta zone, where you can see that below 5.5 is normal, above 7 abnormal and in-between is what's called the prediabetes and this is that group I mentioned at the beginning that have a much higher risk of progressing to diabetes over time.

Actually I'm going to make one more point about this. So what happens also is this is associated with increasing insulin resistance, which is this factor here, and then when that pancreas really just can't produce enough for the amount of resistance, that's how you end up sort of progressing from that prediabetes to diabetes phase.

So what are the symptoms? Well actually the symptoms of high blood sugars are actually potentially not much at all. So in retrospect, people get diagnosed and they do remember a few symptoms but often there are very few symptoms related just to high sugars.

Symptoms that can be associated with high sugars include increased thirst or increased urinary frequency, they can have problems with blurred vision. They can report, oh yeah I used to have problems, my skin didn't heal as well when I get a sore or I had more sores than before or women often report increased thrush. Sometimes the first time diabetes is diagnosed is when they actually present with a complication such as a problem with their feet or a heart attack.

So how diabetes affects the body in the long term is why we bang on about it. It's not just a high sugar it's what happens with chronic elevated sugars to parts of our body. You can divide the body predominantly into large and small blood vessels. So the large blood vessels are in the brain, heart and legs and with that, so heart attacks, strokes and peripheral vascular disease or blood supply problems to the feet. They have a two to five-fold increased risk of this if you have diabetes. When it comes to the smaller blood vessels, they're the ones at the back of the eye, in the kidney and also in the blood vessels that supply the nerves in the lower legs. Again, the reason there's so many people with diabetes and the chronic complications are quite prevalent. It's the leading cause of blindness in Australia. It's the leading cause of people needing to go onto dialysis related to end stage kidney disease and the combination of poor blood supply and nerve damage in the foot increases the risk of foot ulcers and amputations. Probably one of the most common complications relates to abnormal nerves in the feet where they get changes in the sensation in their foot and they report numbness or tingling. That's common. It doesn't always have to lead to ulcers but that plus poor blood supply plus smoking is a pretty nasty combination. Then finally if I want to motivate my male patients to improve their diabetes control, I do mention that erectile dysfunction is also a problem because there are not only small vessels there are small nerves in the penis as well.

Generally how is it managed? I'm not going to go into great detail. The main point is you need to understand that when we manage diabetes the aim is to reduce symptoms and prevent those complications I've mentioned. Because we do have proof that if you do that you'll reduce that risk of all of those complications. What is key to when we manage diabetes is we don't just look at glucose control, we look at all the other cardiovascular risks, so those risks that are affecting those large and small blood vessels. As you can see here, lifestyle is key. So I've put in this table on the right, whether it's managing diabetes, blood pressure, cholesterol and general lipids, weight or smoking, lifestyle change is very important and effective but we have medications; both tablets and sometimes injectables, to treat these different areas.

What about managing your risk? I've talked about lifestyle quite a bit and I've brought back that seesaw that I showed you at the start about sugar balance. What I can tell you and what has been proved in many studies is that lifestyle, improving lifestyle or lifestyle choices can improve all of those risk factors. You can put here blood sugar level, you could put blood pressure, you could also put cholesterol. What it shows, if you get better at reducing your calories and increasing general physical activity, they will all be improved. That's mainly because of its effect on weight and it's mainly because it changes where we store fat. So we move that toxic fat that you see, all the bus-stops have that toxic fat picture of someone's gut, and it's talking about the fat that sits around those organs in the stomach. So, physical activity and reducing your calories has a major impact on these risks.

What we also know about ourselves is that we're our own worst enemy. This sentence at the top is from the AusDiab. So it started in 1999 and it was essentially trying to get a picture of what diabetes is like in Australia, who's got it, who is at risk and what are the complications. One of the surveys was looking at what's considered your self-reported levels of activity. How much activity do you do and how much time do you spend sitting and what they found is that people overestimate how much they do and underestimate how much we sit. What we essentially need to do is less, we need to do more and sit less because we think we're better than we are. Now back in 1999 we had surveys, these days we are kept a little bit more honest. Most people have either got a Fitbit or smartphone or some other kind of a device that does keep us a little bit more honest, but it is a hard thing to maintain.

This is my last slide. Diabetes WA has a website that can actually allow you to assess your risk of diabetes. Some of the risk factors that are quite important and include family history or you've had a previous state of increased insulin resistance such as gestational diabetes, prediabetes, polycystic ovaries or overweight. Then there's several including indigenous, Polynesian, South East Asians and subcontinental India that are an ethnic group that just by genetics have an increased state of insulin resistance and therefore diabetes risk. I'll hand over to Professor Bu Yeap.,

Speaker: Professor Bu Yeap

Okay, so what I was asked to do is talk a little bit about diabetes research and thanks Ashley for the great introduction so I can get straight onto it. I just wanted to come back to the point that Ashley made about type 1 and type 2 diabetes. This is what your pancreas is doing if you don't have diabetes or before you develop diabetes. Your pancreas makes a little bit of insulin all the time, this blue line is the insulin, and before you eat you get this huge surge of insulin and then at lunchtime another surge of insulin, snacks in the afternoon, dinner. So your islet cells in the pancreas almost, it's almost like they anticipate your requirement for insulin and before each meal you get this huge surge of insulin and even if you're fasting you have a little bit of insulin in the system. That means that you control your blood sugar levels within a really narrow range.

In healthy people without diabetes your sugars will be about 4 to 7 mmol/L throughout the day. Even taking into account your eating, or your not eating or your exercising, all of those. Your pancreas will regulate your blood sugar so tightly without you needing to do anything. If you have type 1 diabetes your immune system basically takes that away from you. It destroys the islet cells in the pancreas and that means you don't get that and you have to do it for yourself. The other thing that your islet cells are doing is that they are sensing your sugar all the time so they give you just the right amount of insulin.

So if you have type 1 diabetes your islet cells have been destroyed by your immune system, you have to give yourself the insulin and you have to check your blood sugars and you have to weigh up exactly how much insulin you need in relation to what you're eating and what you're doing. That's really quite difficult.

If you're type 2 diabetes you can still make insulin but not enough relative to what your body needs. You can sensitise the body to the actions of insulin, losing excess weight, physical activity and so on and then you can have tablets and injectables and some people with type 2 diabetes will actually need insulin as well because their beta cells just can't make enough. You can see with type 2 there's a range of treatments before you get to that stage, whereas with type 1 you just need to do it full stop.

Now a couple of the research projects that we've done at Fremantle Hospital and at Fiona Stanley Hospital is looking at people, young people particularly with type 1 diabetes. We surveyed our population of young adults with type 1 diabetes at Fremantle Hospital a few years back and, you know if you think about the huge imposition that checking your blood sugars and giving yourself insulin all the time, you know that's a huge imposition. If you think about it, it's not surprising that people with type 1 diabetes actually have quite a high level of psychological distress. We thought that about a third of our population we surveyed back in 2008 were registering significant levels on the instruments that we were using.

The good news with that is that we took that information to our hospital executive and they actually funded a diabetes psychologist and we were actually able to increase that funding when we transitioned to Fiona Stanley Hospital. So, you know that's thanks to our FSH executive and when we re-surveyed later on down the track, you know we had the Multidisciplinary Clinic, we had doctors, diabetes educators, dietitians, diabetes psychologists all in the same clinic, a one-stop shop to support patients with type 1 diabetes, and we found that attending a Multidisciplinary Clinic actually was associated with better glycaemic control. So if we help people with type 1 diabetes, we can help them to look after their diabetes better and to achieve better diabetes control and hopefully avoid the complications that Ashley referred to.

Interestingly the other thing that came out in our survey was that it didn't matter how far away you lived from the hospital, that had no effect on your diabetes control. The other thing was that if you were a young adult with type 1 diabetes and you were in regular employment or you were a student, you were actually better off than if you were neither. So if you have type 1 diabetes don't let it hold you back, you actually have better glycaemic control if you are working or studying. Now, we don't know if that's causal. It might just be that you are the kind of person who looks after yourself better and wants to go and study or work. Or it might just be that having that routine helps you incorporate all these healthy lifestyle behaviours into your day-to-day routine which then helps your diabetes care. Either way, you know we tell people with type 1 diabetes we want to support you. We know it's an imposition and we're trying to help you look after yourself and by and large we think we do reasonably well, but it comes down to that individual person as to how they can best look after themselves and take care of their diabetes and live the life that they want to lead.

Okay so to summarise all of that, type 1 diabetes, we don't have a method to prevent it right now. If you're high risk we can screen for signs of the immune disorder but right now we still can't prevent it, you're going to get it and that means you have to take over doing with your eyes, your brain and

your hands what your islet cells can't do anymore. We can help, we can support you and that's what the Multidisciplinary service is for and a lot of our patients get really good results, some we are still working on, but a lot do get good results and we like to take the credit for it; it's probably the people looking after themselves. We like to think that we help and hopefully we can prevent those complications and people can go and do what they want job wise, with sports, activities, whatever else and not let having to look after their diabetes hold them back.

Now, I'll move on to type 2 diabetes. This is some research we did as part of a large international collaboration, the emerging risk factors collaboration. It's not - let me walk you through it okay. Don't be put off by all the numbers. It looks busy it's really not.

That's your control group. People who don't have diabetes or heart disease or stroke and if you have heart disease or have had a stroke or you have diabetes, your risk of dying goes up. Diabetes is just as bad as having had a heart attack or a stroke. If you have two out of three your risk doubles up again, and if you have all three your risk is very high. That's the actual risk of dying and that's portrayed as a risk relative to the control. So diabetes is as bad a risk factor for dying as having had a heart attack or having had a stroke and you have two of those you're doubly worse off. If you have all three you're even more worse off. This actually means that you can calculate a reduction in life expectancy due to diabetes.

Here it is. So if you're a man aged 40 years and you have diabetes, your reduction in life expectancy is approximately seven years. If you're a woman - oops sorry - woman with diabetes at the age of 40 your reduction in life expectancy is about seven years as well. Now, by the time you get up to the age of 90 diabetes doesn't affect your life expectancy for the obvious reason that the difference is going to be really small and difficult to measure. But if you think about it, you tell someone who's 40 years old who has diabetes, statistically you can expect to lose seven years of your life expectancy, you know it's quite a big chunk. What these lines here shows is the same. If you have diabetes and heart disease or diabetes and have had a stroke your reduction in life expectancy doubles effectively. Something about women, the data showed that if you're a woman and you have diabetes and you've had a stroke, you know that's really not good news. So this is where the concept of cardiometabolic multimorbidity comes from, that diabetes, heart attack and stroke, they are equally bad prognostic factors and they add together as well.

So, take home message is not that we want you to go back being doom, gloom and despair, the take home message is that given how high risk diabetes is, that's why it's important for you to be looked after properly if you have diabetes. Things have changed over the past 10, 15 years and we still like metformin, it's a tried, proven treatment for diabetes. Again this looks complicated but I just want to draw your attention to three things. Okay one is this thing about metformin and lifestyle changes. Eating healthily, exercising, reducing sedentary time. Metformin. We like metformin. The other things that we like are these new drugs that have come onto the market within the past 5 to 10 years. If anyone says to you what a GLT1 receptor agonist is, it's an injection you can take once a week that helps your body make insulin in response to meals, makes you feel fuller so you can lose excess weight and it gets your blood sugars better. If anyone says to you what's an SGLT2 inhibitor, this is a really quite a very elegant tablet. It actually induces you to excrete glucose through your kidneys so your blood sugars drop and the interesting thing is that both of these agents have been shown to reduce your risk of heart disease and stroke if you have diabetes.

So we want to use proven agents, we want to take all the lifestyle measures and we want to treat people with type 2 diabetes with agents that will not only lower their blood sugars but will also reduce their risk of heart attack and stroke. So, you know we're onto it and we have these new agents that we can use.

Now, I'll just give you a little bit of an idea of what we did at Fiona Stanley Hospital and what we did is we thought okay, we know that people with diabetes and heart disease and stroke, very high risk population, we want to look after them well. We implemented a decision support algorithm in the Coronary Care Unit. So if you come into coronary care you've had an acute heart event like a heart attack or severe angina attack and you have diabetes, when you come to coronary care at Fiona Stanley Hospital we can implement a decision support algorithm so you get your diabetes looked after more promptly, you get treated so that your blood sugars are less likely to be high during the course of your admission. We actually reduce the high number of high blood sugar readings from 46 per cent down to 31 per cent and we didn't drop anyone bloods sugars too low. So you can do this kind of practical measure to improve the way you look after people with diabetes in the hospital setting. This is on discharge, and I told you about the SGLT2 inhibitors, the tablets that lower your blood sugar and reduce the risk of heart attack and stroke and we were able to increase the number of people going out of hospital on protective medicines. If you go out of hospital on medication you're more like to be on it 6 or 12 months down the track, so we think this is quite important. In the long run we hope we'll flow on to better outcomes for people with diabetes.

I'm just going to finish with this slide and this is our Australia wide randomised control trial to prevent type 2 diabetes. Ashley has already told you how you can do it. The same message, eat healthily, cut down the excess weight, cut down the sedentary time, physical exercise, physical activity. Some people find it difficult to do that and we've been telling that message for a long time, we need something more. So this is a study that we've done and basically we randomised 1000 men who were overweight, who had impaired glucose tolerance, that prediabetes that Ashley mentioned. We said, okay all of you get this Weight Watchers program, you're doing what you're ought to be doing and on top of that we'll give half of you testosterone and half of you a placebo. Testosterone we know will have insulin sensitising effects and it's an anabolic hormone, it builds muscle, it reduces fat so it should have antidiabetic effects. We randomised 1000 Australia wide, here's Fiona Stanley and we are going to see whether giving men testosterone on top of the lifestyle program either prevents them getting type 2 diabetes or reverts it if they've been newly diagnosed. I think this is what we need, we need large Australia wide randomised control trials to tackle what is a major problem and we know that there's some ways we can prevent type 2 diabetes but they're not enough, we need to do better.

Now, I'm not allowed to tell you what the result of the study is, I've been sworn to secrecy, but if we have another one of these lectures next year then I can tell you exactly what the result is. This is my summary slide and then I'll hand over to Kylie. So type 1 diabetes, it's a question of lifelong monitoring blood sugar and replacing the insulin. Pumps have helped quite a lot, infusion pumps, glucose sensors, but it still comes down to looking after yourself, with that little bit of extra care and hopefully with help from us. With type 2 diabetes you can prevent quite a lot of type 2 so go for it. We're now realising more and more that if you have type 2 diabetes, you get it early enough, if you're carrying excess weight and you lose it you can even put type 2 diabetes into remission. It's no longer this sort of chronic progressive disease. You catch it early you can actually get really good results.

We have drugs that we like to use because they address cardiovascular risk, they reduce cardiovascular risk and we're still working on even more ways to try and prevent type 2 diabetes. So thank you and I'll hand over to my colleague, Kylie.

Kylie Connor

Hi everyone. I'm going backwards now. Okay. I'm one of the diabetes educators here at Fiona Stanley, so hi everyone. I think I've probably met some of you actually out in the community, just looking at you. I'm going to work out which way we're going. So, to wrap up what the doctors have been talking about today we're going to talk about Sam who is, he's someone with diabetes. There he is waving, he looks pretty happy, driving his bus. So, his risk factors - Sam is 52, so he is over 50, so he is more likely to develop diabetes because he's a bit older, it's an unfortunate part of life we all get older. His waist measurement is, he's carrying a bit of weight around his waist, it's 112 cm and he's got a BMI of 37. We know that a risk factor for developing type 2 diabetes is if you've got a waist measurement more than 80 cm for women and more than 94 cm for men, so you need to all go home and get our tape measures out tonight. He's a bit of a couch potato by the looks of this drawing. He's pretty inactive at work, I don't know if you've ever driven a bus before but I imagine they're pretty good and easy to drive now, so you press buttons and turn the steering wheel. He gets in his car in his lunch break and drives to the drive through at McDonald's and eats hamburgers for lunch and drinks three ice coffees a day to keep himself awake while he's driving the bus. Now this is a real person. He has a few beers after work to wind down and we can all, or some of us can relate to that. We've got stressful jobs.

He's got a family history of type 2 diabetes, so you can see here his family. His mum developed type 2 diabetes in her 70s. He's always said, oh she got it when she was older, doesn't really apply to me. He was diagnosed with prediabetes two years ago. His GP said, your blood sugars are going up a bit, you need to be careful. So these are two more risk factors for developing type 2 diabetes, high cholesterol and high blood pressure which he possibly has and we know that these are also risk factors for developing cardiovascular disease, as Bu and Ashley talked about, and increasing your risk of heart attacks and strokes. These are two risk factors that Sam doesn't have. He doesn't have polycystic ovarian syndrome because he doesn't have ovaries and he also doesn't have a history of gestational diabetes or having a large baby but his stomach looks like he might be pregnant. But these are really important risk factors for developing type 2 diabetes and we know that women who have gestational diabetes have double the risk of developing type 2 diabetes that someone without gestational diabetes has.

This is a beautiful picture, for those of you on the podcast you can't see it, but it's won an award for a Closing The Gap program in Queensland for a diabetes service and we know that our Australian aboriginal and Torres Strait islander people are more likely to develop type 2 diabetes, also Pacific Islander's, people from Asia and the Indian subcontinent and middle eastern people are more at risk.

So how do we work out if we are at risk of getting diabetes, is the Diabetes Australia Risk calculator. You can log onto your computers if you have computers and punch in your data and it will tell you how at risk you are and what you should do. So this is how you find it, it's on the Diabetes Australia website or you can, I just Googled diabetes risk screening and it came up straight away, and there's paper copies out in the Diabetes WA display in the foyer, so if you

haven't got a computer or you're not computer literate you can tick the boxes and add up the scores.

Sam went to the doctor with some symptoms and wanted to be screened for type 2 diabetes, saying that it often is, there's really mild symptoms or the symptoms are absent or you to put it down to something else. So you feel tired because you're busy, or you're weeing at night because you're getting older and your prostate's a bit shot, or your pelvic floor's not that good or you're thirsty because it's hot. So a lot of people, the symptoms are mild and you don't do anything about it. I actually got some of our clients to write down what they would say to you if they were coming to the lecture and one of the guys said, I was shocked, I had no idea, I didn't know the signs, I was thirsty all the time. I was drinking too much orange juice thinking it was good for me. That would just make his blood glucose levels go higher and make him more thirsty. So these are the symptoms Sam had. He was really thirsty, he was weeing, especially at night, he was overweight and was putting on a bit of weight, he had blurred vision and he had a bit of tingling and numbness in his feet. He went to the GP. His blood glucose level was 13.8, a normal blood glucose level after food is less than 7.8, his HbA1c is 9.4 per cent, so that's a blood test that shows the control of your diabetes over the last three months and it shows that there's a lot of glucose in his blood and he was diagnosed with type 2 diabetes and started on metformin tablets which Dr Yeap talked about.

He's a bit lost now, he doesn't know what to do, but his GP tells him that these are all the people that can help you manage your diabetes, so you're not alone. There's a lot of allied health out there. Your GP can arrange a care plan where you can get five appointments on Medicare with any one allied health professional that will help you manage your diabetes. After that you can also get a group allied health services plan where you get a 45 minute assessment and eight group sessions and that can be with a diabetes educator. It's group education so what's really good is you can get exercise physiologists to help you work out how to exercise.

These are also other places you can get help, Diabetes WA, 360 Health and Community, Moorditj Koort Strong Heart and Moorditj Djena Strong Feet for people in the aboriginal community and you get help from us. So we're diabetes educators. Cathy the dietitian who's about to speak and I have both done extra training in diabetes education and we'll help you find a way to manage your diabetes that fits in with your lifestyle. We'll help you to learn about blood glucose monitoring. Sam used blood glucose monitoring to test meals. So he would test before a meal and then have a hamburger, chips and a cool drink and see what his blood glucose would go to, it was about 19 and then he'd have a salad sandwich and a glass of water and it would go to something like 8.5 or 7.5. So it really helped him and diabetes educators can help you through the minefield of blood glucose monitors because there's a lot on the market now.

Also Sam got moving. So the recommendations now are 30 minutes on per cent most days, five to seven days a week, moderate intensity and I call it conversation puffing so that you're breathing a bit harder and you can still talk but you can't sing, which is good in some cases.

The other thing that you can try is some weight-bearing exercise a couple of times a week because that will improve your glucose sensitivity because it builds muscle, so we're going to just try some weight-bearing exercise right now. Did anyone bring their weights? I can see some weights. Okay, so what I want you to do is stand up. Fantastic. Look at that.

Okay now sit down. Now stand up. Now sit down. And one more, stand up. Sit down. Well done everyone you just did some weight-bearing exercise. So between 18 and 64 the recommendation is that two days a week that you do some muscle strengthening exercises such as squats, lunges or other weightbearing exercise. You were using your body weight to do exercise then and you can use tin cans as well, so while you're watching, what do you watch now, Netflix or Home and Away you can get your Campbell's soup cans out.

So completing Sam's story, he stopped drinking ice coffee and less hamburgers and chips. Instead of drinking beer he started going for a walk after work. He lost 7 kg with the help of his dietitian. Now I actually think if he just did those two things without the dietitian he would have lost 7 kg anyway. So the dietitian can help you but there's small changes you can make. It doesn't have to be huge to help you prevent your diabetes if you're in the prediabetes range or manage your diabetes in the diabetes range. He tests his fasting and post meal glucose and he uses it to see how it's all working and his HbA1c has come down from 9.8 per cent to 6.7 per cent which is in a range that will help prevent complications such as heart attacks and strokes. He sees his GP regularly. These are just some lessons from our people in the clinic. I didn't manage it well and now I'm suffering the consequences with my heart, my kidneys, my circulation. Listen to your doctors. Follow diet and medication advice, don't ignore it and follow the advice. Everyday life is a bit restrictive now. I love this one, continue to live life to the fullest, enjoy activities like sport. Don't let diabetes rule your life. Strive to be the best you can without putting limitations on yourself. Diabetes has become more common, we know that. You're not alone. Now I'll pass on to Cathy.

Cathy Latino

Okay. So diabetes and healthy eating is a massive topic and we can't cover it all tonight. It covers the spectrum right through from trying to prevent diabetes through prediabetes, type 2 diabetes and reducing the complications but also type 1 diabetes. The overarching principles are the same for all of those parts of the journey so we're going to talk about some of those tonight.

So the first important thing is to try and make sure that we're eating a diet that's adequate in all sorts of nutrients that are beneficial to our body to reduce our risk of disease. We also need to make sure we're thinking about optimising weight and managing blood glucose levels and thinking about complications of diabetes as well. If somebody has got type 1 diabetes they also need to be really good at working out how much carbohydrate they're about to eat at their next meal and then calculating a dose of insulin that's going to match how much carbohydrate they have. So that is an extra burden, but also these principles are the same for people with type 1 diabetes as well. So we need to think about quantity and quality of the food that we eat.

Now as I said, managing weight is a primary principle of managing diabetes at any stage and if you are carrying excess weight then reducing your weight by 5 to 10 per cent will have a dramatic effect on reducing your risk of developing diabetes, but if you've already got diabetes it will also help you manage it better and reduce maybe how much medication you're requiring to control it and your risk of cardiovascular disease and so forth. There's lots of different ways that you can do it these days. Not necessarily all of them are particularly well balanced but what they all have in common is that they dramatically reduce the number of calories that you're taking in. That's the way that we lose weight. It doesn't particularly matter whether those calories are from carbohydrates or fat or whatever the latest fad is. All of those diets will all reduce your intake of junk food basically, that's

the main way that they have an effect, but some of them also cut out whole food groups so we need to be a little bit aware that short term, maybe that's not a big deal, but long term what you might miss out on is some of the nutrients that actually will help keep your body healthier.

So, to lose weight we need to reduce our kilojoules from any sources that we can basically and kilojoules come from alcohol, protein, fat and carbohydrates. What you might notice there is that carbohydrates, although they're currently the out of fashion nutrient, they actually have about half the number of calories per gram to what fat does. So fat is not off the hook, don't be fooled into thinking that it is, it is still something that we do need to moderate. Okay. So, the junk food or discretionary foods is probably the more professional term to use for it. They're food like cakes and biscuits and lollies and chocolates and soft drinks and takeaways and alcohol. They are the things that are giving us lots of saturated fat, trans fats, yeah honey, yep, highly refined carbohydrates and sugar. Honey's a source of sugar, that's why it's up there. So yeah junk foods are giving us salt as well and alcohol and nutrients that are not good for us, none of them are of any value to our bodies basically. What they are doing is giving Australians about 35 per cent of their energy. So in other words, Australians are eating about 35 per cent of their calories overall from what we call discretionary foods which are not benefitting our health. So that means that we're potentially missing out on nutrients like fibre, vitamins, minerals, calcium and healthy fats.

If we take a look at sugar specifically and sugary drinks because we've started to become a lot more aware of where the sugar is hiding in some of our drinks. This might surprise a couple of people, I particularly like the one that says boost juice medium size 12 teaspoons of sugar. I think that will blow a few young girls out of the water. The ice coffee down the bottom there, 11 teaspoons of sugar. I don't think very many people are going to be happy when they see that. Okay. Now alcohol, you're not getting calories from sugar you're getting calories from the alcohol itself, okay. So, each of these is a standard drink and a standard drink contains 10 g of alcohol. So that's roughly equivalent to the same number of calories as a slice of bread. So if you have a 100 ml glass of wine then that's about the same as having a slice of bread with your dinner. Everybody's really anti-bread at the moment so, you know, that would probably upset a few people. But the thing about it is also, I don't know about you, but I don't pour a 100 mL glass of wine for myself. If you look at the 30 ml nip of spirits down the end there, that's also equal to about a slice of bread, but if you top that up with a sugary mixer drink then you might add another one and a half to two slices of bread on top. So it can add up pretty quickly when we throw a few extra drinks into the equation.

Like for instance if you went out for dinner and you shared a bottle of wine with your partner and you got the bigger half, it might be the same as having about a third of a loaf of bread extra to go with your meal from that restaurant which is already possibly fairly laden with calories. So we want to choose quality foods to get our nutrients so that we get lots of vitamins and minerals and fibre and healthy proteins and what have you and yeah quality versus quantity. So if we're thinking about quality carbohydrate foods, they include things like wholegrain breads and cereals and wholegrain pastas, legumes and fruit and dairy. People maybe don't think of dairy as a carbohydrate source but it does have some carbohydrate in it. What we know is that having two or three serves of wholegrain foods a day can reduce your risk of getting diabetes by up to 43 per cent, that could be partly mediated by the gut microbiomes, so you know the bacteria in your gut, from wholegrain foods they'll be sent more of the fibres and resistance starch which means that the good bacteria will flourish and therefore send the right messages around your body to keep you at lower risk of

disease. Another reason that the wholegrains are good for us is because they're low in glycaemic index, or low GI which means that they release their glucose into your blood more slowly which is good, it doesn't raise your blood glucose levels so high, but also it might fill you up for a little bit longer, reducing how much you choose at the next meal.

If we're getting some of our protein from plant proteins like legumes and nuts and so forth in place of meat then that would be better for our gut microbiome as well, so that's a good thing to know. They're also full of really healthy fibres. Fruit, there's some evidence to say that if you have one or two servings of fruit a day then it can reduce your risk of getting diabetes. If you've already got diabetes it's still okay to eat fruit, but maybe keeping it to a couple of pieces a day rather than having four, five, six, seven, eight pieces of fruit like some people do. So a little bit of fruit is good but massive quantities is not necessarily better for you. It will then increase your blood glucose levels and potentially your weight as well.

There is also some evidence to say that dairy foods can reduce your risk of developing diabetes, particularly if they're fermented dairy foods like yoghurt. If we're talking about healthy carbohydrates, we also need to talk about healthy fats. So the healthy fats are things like olive oil, canola oil, sunflower, safflower oil, nuts and seeds and avocados and oily fish. These foods are protective against heart disease and reduce your cholesterol levels as opposed to the saturated fats and trans fats in things like butter, coconut oil, fatty meat, cakes, biscuits, chocolates, takeaways and so forth.

If we're trying to put it altogether into a meal and we're aiming for about half of our plate from vegetables or salads then that's fantastically good for us, they're high in vitamins and minerals and fibre and low in calories. About a quarter of our plate should come from a protein source, so that could be something like red meat maybe up to a couple of times a week but you probably don't really want to be having it that much more than that because more than that is associated with developing diabetes, and particularly it's better to reduce your intake or avoid processed meats because they are much more closely related to the development of diabetes. Having chicken is probably fairly neutral but having a little bit more fish is probably quite protective and having more nuts and legumes and so forth is also particularly good for you. About a quarter of our plate again could be from the nice wholegrain kinds of carbohydrate choices.

So, what that comes down to is like two big handfuls of vegetables or salad on your plate, about a palm size portion of whatever the protein source is and about a fist size portion of the carbohydrate food. If the palm size of protein and the fist size of carbohydrate is not quite enough for you, then consider that maybe you just need more of the vegetables to fill you up rather than increasing the proportion of those other foods. So it could look lots of different ways, you could have meals that are the classic meat and three veg kind of things all neatly spread out on the plate like that but I don't think we really eat like that though much these days. But you can see the size of that little piece of steak up there, it's small. There's a small portion of potato on there but there are lots of vegetables. Okay? Again look at the spaghetti bolognese down in the corner here, there's a small portion of spaghetti bolognese on the plate and half a plate full of vegetables so that we don't overdo the other stuff. That's not normally how people do it though, they just have spaghetti bolognese. Things can be all mixed together like in a stir fry or in like a curry or something like that, but it could be as simple as something like a bowl of vegetable soup or a sandwich with a lot more salad than bread.

So bringing it altogether, a healthy diet is one that's got lots of vegetables in it, moderate quantities of the good quality carbohydrate foods, some dairy, some fruit, some fish and some unsaturated fats and less of the meat, the refined carbohydrates, sugars, alcohol, trans fats and saturated fats. So there's lots of different dietary patterns that can bring this together, things like a Mediterranean diet or the Australian Guide to Healthy Eating, which is the Australian dietary guidelines, but also there's something called the DASH diet which you might hear a little bit more about over the years as well. Also vegetarianism and veganism is another way that can fit this kind of way of eating as well and is beneficial to health.

If anyone's interested in being a participant in a diet study then please e-mail me on this e-mail but you need to be female, have prediabetes or type 2 diabetes but not yet be on any diabetes medications, not be vegetarian and that's not because there's anything wrong with being vegetarian it's just that it might change the results of my study a little bit, and also be able to come to Joondalup for two visits of 30 to 60 minutes. I've got a sign up form at the front that you can sign up for if you don't want to e-mail me. Thank you.

This document can be made available in alternative formats on request.

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