BRITISH BROADCASTING CORPORATION
RADIO SCIENCE UNIT
CASE NOTES 6. - Diabetes
RADIO 4
TUESDAY 14/09/04 2100-2130
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PORTER
Hello. There are around one and a half million people with diabetes in the UK, and probably nearly as many again who have the condition, but don't know it. And the situation looks set to get much worse, with some experts predicting a global epidemic that could see rates of diabetes double over the next 30 years.

Nearly all of that increase will be in type 2 diabetes, the more common variety that typically effects middle aged overweight people (although it's becoming an increasing problem in much younger people) and the type that we'll be concentrating on in this programme.

I'll be discovering how body shape influences your odds of developing diabetes, and, how exercise can protect against it.

CLIP
The most extreme example in nature is the Sumo wrestler, who might weigh 30 stones or 200 kilos, but their exercise regime is so intense they carry very little fat actually inside the abdomen - that vast girth of the Sumo wrestler is actually subcutaneous fat.

PORTER
I'll be finding out why chef Anthony Worral Thompson, not known for worrying too much about his figure, is, rather uncharacteristically, now following his doctor's orders to the letter.

WORRAL THOMPSON
As with most guys who've got a very busy life I said to myself - I haven't got time. And the doctor said - Well, you certainly won't have time at the end of your life because it will be a lot shorter than if you don't do something about it. So he said - You've got to find time.

PORTER
My guest today is Lorraine Avery, she's a consultant nurse in diabetes at St Richard's Hospital in Chichester, and she joins us from our studio in Southampton.

Lorraine, I've already mentioned that there are two types of diabetes - what's the difference?

AVERY
Diabetes is a condition where the pancreas doesn't produce, either in type 1 diabetes it doesn't produce any insulin or in type 2 diabetes where it just doesn't produce enough.

PORTER
And of course insulin is the hormone that controls sugar levels, so presumably the net result is much the same - if you don't produce enough insulin or you don't produce any insulin at all your sugar levels climb. Why is that a worry?

AVERY
Well very often when I talk to patients about the problem with high blood sugar levels is that I ask them to imagine that their circulation's actually running like syrup and obviously if you have a syrupy circulation it can affect all of your blood vessels and lead

to long term complications of diabetes.

PORTER
What about the short term - how might people know that they've got a problem?

AVERY
Well very classically diabetes presents with symptoms - people can feel very tired, very thirsty, they might pass lots of urine. Unfortunately some patients actually don't have any symptoms whatsoever and that's because, particularly type 2 diabetes, can present very slowly and as the blood sugar levels climb very slowly then these symptoms may not be evident and that's why we end up with a number of people who don't actually know that they've got it.

PORTER
And how do we diagnose it - if someone comes to you or to their GP and says I think I might have diabetes, what's the definitive way to diagnose the condition?

AVERY
Well diabetes is actually very simply diagnosed with a blood test. I always remind patients that normal blood sugar levels are between 3.5 and 7.5 and we can do one of two blood tests, we can either ask the patient to present to the surgery having not eaten and a fasting blood sugar level we call that and that really shouldn't be any higher than 7 or if they have eaten and we decide to do the blood test opportunistically then we wouldn't expect that to be any higher than 11.

PORTER
And how high can sugar levels go in a bad case of diabetes?

AVERY
Oh gosh in my experience I've known somebody who presented with a blood sugar level of 78 and they were clearly very unwell. But I suppose the average presentation if there was such a thing would be somewhere late teens early twenties, particularly in type 2 diabetes.

PORTER
Well, Clare Mehmet was 46 when she spotted a Diabetes UK poster listing some of those familiar sounding symptoms.

MEHMET
I saw a poster in the station and it said - Are you always going to the toilet, are you always thirsty and is your eyesight changing? And I said to my friend that's you, she said no it's you. I went to be tested and it was me.

PORTER
And these symptoms had been going on for how long altogether, now looking back?

MEHMET
Looking back about 10 years before I was diagnosed.

PORTER
And how quickly did they resolve once you were put on treatment?

MEHMET
I can say that I felt much better within three months.

PORTER
Clare Mehmet who was diagnosed with type 2 diabetes back in 1994.

Lorraine, that's not an unusual story, you were saying that there's an awful lot of people out there who've got the condition who don't know that they've got it, why is that a problem?

AVERY
Well I think very often the pancreas stops producing insulin on a very slow basis, so the sugar level climbs very slowly and therefore the body just takes this extra bit of glucose on board. And the blood sugar levels can get to very high levels and start doing the damage, so sometimes when people first present with diabetes we can already see signs that the diabetes has been doing damage to their blood vessels.

PORTER
So they might not have - the symptoms might not be that severe but they're putting themselves at risk of long term damage. And what sort of things are we worried about in the long term, what are the main problems?

AVERY
Heart attacks, strokes, damage to the eyes, damage to the kidneys and the outlook for both types of diabetes can be equally frightening. But the main worry with type 2 diabetes is that a number of a people possibly ignore those very early symptoms or really don't get them so severe that would worry them enough to go to the doctor. I think the other thing is that people don't always go because I think people are worried about going to the doctor saying oh I feel a bit tired, I feel a bit thirsty, particularly if it's been summer and the symptoms could easily be attributed to something else.

PORTER
What's causing the diabetes and who's most at risk?

AVERY
Well I think the largest causative factor of type 2 diabetes is the rise in obesity that we're seeing. And I think it's so underestimated - the link between type 2 diabetes and obesity. The larger you are you're far more likely to develop type 2 diabetes. If you've got a family history, you're allowing yourself to become overweight, you're becoming less and less active - if you start to add up all of these risk factors you could almost tick all the boxes and put your fate in front of you.

PORTER
Are there any ethnic variations?

AVERY
Asian people are far more likely to get diabetes, so if they have a family history, you're Asian, you're overweight - again that's three major risk factors ticked.

PORTER
Well Terry Wilkin is Professor of Endocrinology and Metabolism at the Peninsular Medical School in Plymouth and I asked him to explain why there is such a strong link between being overweight and the risk of developing diabetes.

WILKIN
The basic abnormalities of obesity and their relationship are still being worked on very hard, it's a major research area but the fundamental change is that we become resistant to our own insulin and the body is built in such a way that if we become resistant to insulin on account of body weight increase then we make more insulin. That's a natural response to try and overcome the resistance but of course it can't go on forever. And we reach a time when we have now gained so much body weight, become so insulin resistant, that the cells that make the insulin can't work any harder and there is a loss of

control of the blood glucose and when that goes up then by definition we have diabetes.

PORTER
Does it matter where we store that fat? I know there's a lot of research looking at the link between diabetes and intra-abdominal fat - people who are apple shaped rather than pear shaped.

WILKIN
It's crucial and this is a very fundamental observation that was made some 60 years ago now by a Professor Vargin Marseilles [phon.] who first described les pommes et les poires as the apples and the pears because he realised that those who are apple shaped, although they might carry the same weight as somebody else who was pear shaped, were nevertheless at much greater risk of diabetes and heart disease and hypertension and stroke and so on.

PORTER
But why is that, what's the difference between fat that's sitting inside your tummy and fat that's sitting on your hips or your bottom?

WILKIN
It literally is sitting inside your tummy and that is the difference because the fat that is around your middle is sitting inside the abdominal cavity around the digestive organs and anything that gets absorbed from within the abdominal cavity goes straight to the liver, whereas anything that gets absorbed from fat that's under the skin goes into the - what we call the systemic or main circulation. Now the importance about these products going to the liver from inside the abdomen is that the liver is a major site of glucose control and this fat that's inside the abdomen isn't simply an inert stock of unneeded calories, it's in fact very active and it produces a number of what we call adebakins, which are molecules that cause insulin resistance when they get to the liver. So it's very important where you store your fat. And if you happen to be overweight but pear shaped then that's pretty harmless metabolically but if you're overweight and apple shaped then you're I'm afraid in trouble.

PORTER
What about losing weight - if somebody has diabetes and is overweight one of the first things we do is encourage them to lose weight - is there any different approach depending on whether your fat is intra-abdominal or whether it's on your hips - hips and bottom?

WILKIN
Well if you reverse the balance that caused the weight gain in the first place then you will lose the weight in the places that you've put it on. But there is other, and perhaps more subtle, approaches to this because we know that physical activity in itself, irrespective of how much weight you lose, physical activity will drive fat out of the abdominal cavity and that's probably one of the ways in which it's most helpful.

PORTER
Might this be one of the ways in which physical activity seems to protect against things like heart disease and diabetes?

WILKIN
I'm quite sure it's very important and the most extreme example in nature is the Sumo wrestler who might weigh 30 stones or 200 kilos but their exercise regime is so intense they carry very little fat actually inside the abdomen. That vast girth of the Sumo wrestler is actually subcutaneous fat and they are relatively insulin sensitive until they retire and then unhappily seldom will they pass 50 because all that fat will get redistributed back into the abdomen and then the problems of insulin resistance and

diabetes and so forth ensue.

PORTER
Now obesity's a huge problem in British adults but perhaps it's even more of a problem in the next generation that are coming through. What should we be doing about this?

WILKIN
Well I think it's a very under-researched area because we spent a lot of time, perhaps 10 or 20 years, looking quite carefully and intensely at the adult but we're one of the very few studies around the world - the EarlyBird Study in the South West - that is looking at children and asking the question what is it about children that produces insulin resistance? And I think we are gaining evidence that physical activity is an important component but it's not something that necessarily is something you can modify in a child. Diet may be more important than we think. I think what we have got is a group of young children nowadays who are seriously overweight, I mean something like 25-30% of five year old girls are now overweight and that is a legacy for the future that we really have to do something about or we will be in major, major trouble.

PORTER
Professor Terry Wilkin. To put that risk into perspective - obese people are 25-30 times more likely to develop diabetes. And if you want to know whether you're laying fat down inside your abdomen - then just measure your waist. Ideally women's waists should be less than 32 inches, over 35 inches and the risks to health start to become substantial. Men's waists should be under 37 inches - with the risks increasing dramatically once they are over 40 inches.

You're listening to Case Notes, I'm Dr Mark Porter and I am discussing diabetes with my guest Lorraine Avery

Lorraine, can we treat diabetes simply through weight loss?

AVERY
I think it has to be one of the first focuses for the treatment of type 2 diabetes. I guess my concern sometimes is that people that have been overweight for a very long time struggle with that as a focus and I think we have to be very clear that there are enormous benefits from losing weight, and as you've just highlighted in terms of waist measurement, changing shape. We really do need to focus on changing eating habits, ones that are going to be maintained and sustained to achieve the ultimate in terms of losing weight.

PORTER
Have you actually had patients who've not needed any other treatment because they've managed to lose two or three stone and their diabetes has "gone away"?

AVERY
Well as you know diabetes never actually goes away but yeah we do have some success stories and I think it's when we've actually been able to make that very clear association with if you lose weight then the likelihood of you needing any further treatment for your diabetes in the short term future is much greater. And I think it's inevitable though - and it's something we ought to point out to people with diabetes - that they are always going to need tablets. We do know it's a progressive disorder, very few people survive long term just watching what they eat and tablets being the next form of treatment.

PORTER
That was going to be my next question - what sort of treatment will most people with type 2 diabetes need? We used to treat people with diet alone but from what you've just said we don't tend to do that anymore do we.

AVERY
Only for a short period. We tend to treat type 2 diabetes far more aggressively than we might have done in the past. And that's partly because we recognise its progressive nature and people do need pills. And there are a number of different tablets that we use to treat diabetes, there are some that stimulate the pancreas to produce more insulin, some that reduce the amount of sugar produced by the liver and some that actually improve insulin sensitivity - these are relatively new on the market. But very often people will need a combination of these tablets ultimately to improve their blood glucose levels.

PORTER
Of course as with type 1 diabetes the aim is to control the levels as tightly as possible, to get them - to normalise them, if you like. If we don't treat the sugar levels they go too high and we know that that damages the blood vessels and stroke and heart attack etc., but overdoing it can be even more dangerous in the short term can't it.

AVERY
Absolutely right, if we do over treat people with diabetes there are one particular tablet or group of tablets - the tablets that stimulate the pancreas to produce insulin, obviously somebody takes these and then they don't eat, you can actually lead to blood sugar levels being too low which will lead to symptoms such as the heart pounding, very shaky, very sweaty, people lose their colour and obviously you then need to treat that with glucose or something sugary to bring the blood sugar levels back up. So we have to get the balance right in terms of people watching what they eat and the right formulation of the tablets that they take.

PORTER
Of course that attack being hypoglycaemic attack or what's commonly known as a hypo.

AVERY
Absolutely.

PORTER
Well chef, Anthony Worral Thompson is now a shadow of his former self, thanks to a rigorous diet and exercise programme prompted by discovering, while being tested on a TV programme, that he had metabolic syndrome also known as syndrome X - a collection of factors, including obesity, diabetes and high blood pressure which, if untreated, dramatically increase the risk of an early stroke or heart attack. Fortunately his problems were spotted before he had developed full blown diabetes as Connie St Louis discovered.

WORRAL THOMPSON
As with most guys who've got a very busy life, I said to myself - I haven't got time. And the doctor said - Well, you certainly won't have time at the end of your life because it will be a lot shorter than if you don't do something about it. So he said - You've got to find time. It is a matter of willpower but it is also saying to yourself - You've got a life threatening disease, you can't just treat it lightly, you've got to actually treat it really seriously and do something about it. And I've managed to get rid of my syndrome X, if I hadn't had that revealed in a TV programme I probably would have gone on to be diabetic and then I would have had far greater problems. They told me to lose two and a half stone, I've lost a stone and a half so far. So what do I do in the future? Well I'm still going to carry on doing the exercise, hopefully I'll get fit enough to say I can do it under my own steam without paying a fortune to a personal trainer, I shall certainly carry on walking the dogs at a brisk pace and I shall think very hard about what I eat.

ST LOUIS
One of the keys to successful control and prevention of diabetes is to eat foods that have

a low Gi or glycaemic index. The Gi index diet has become a regular feature of health and beauty magazines. But it's more than just a trendy way to lose weight. It's central to leading a healthy diabetic lifestyle. Dietician Azmina Govindji.

GOVINDJI
Gi refers to the way a food acts in your blood once you've eaten it and it refers to carbohydrate foods. Certain carbohydrate foods will be digested quickly because of the way that their fibre is or because of the components within that carbohydrate. If they're digested quickly they cause a very sharp fast rise in blood glucose and a very sharp fall. This is considered to be unhealthy because you're actually getting peaks and troughs and swings in blood glucose, certainly not what you want to be doing in diabetes. If you chose low Gi foods, such as pasta, grains, fruit and veg., nuts, whole grain cereals, then your food is digested more slowly, which means that your blood sugar goes up more slowly. And this slow steady rise in blood sugar is far more valuable, in terms of general health, diabetes, obesity, syndrome X, than having lots of high Gi foods.

ST LOUIS
How am I going to recognise them or do I just need to learn what is a good low Gi food?

GOVINDJI
One of the leading supermarkets has already started labelling foods with low or medium Gi logos, so that's going to be a great step forward for people with diabetes to at a glance know that this particular type of pasta or bread or beans are lower in GI than this other product here. There are also several books on the market and if you look at a book with reputable credible authors then you will get a good idea of which foods are better and which foods to base your meals on.

ST LOUIS
One of Anthony's responses to his initial need for more information was to write a cookery book entitled *Healthy Eating for Diabetes* . All eating regimes should have their treats if you're going to stick to them. But the Gi index posed a challenge for Anthony in trying to create his favourite recipe - the chocolate sponge.

WORRAL THOMPSON
It was coming up with a pudding that diabetics could eat, because that's one of the hardest areas. Lots of fruit puddings of course you can eat and things like that and custard seemed to be okay with most diabetics.

ST LOUIS
What have you done to that that makes it more suitable for diabetics to eat?

WORRAL THOMPSON
Well it's the reduction in sugar but generally using a normal sponge recipe but keeping it much lighter. So it was really - it was obviously cutting out the fats. I did a pudding that would serve 8-10 people and I think it uses five or six teaspoons of sugar, which when you divide it between 8 or 10 was within the boundaries that they recommend for a diabetes type 2.

PORTER
Anthony Worral Thompson talking to Connie St Louis.

Lorraine, we heard there how Anthony managed to act in time - type 2 diabetes is a largely preventable.

AVERY
Well I think if you know you have a family history, which increases your risk of about 30% of type 2 diabetes, if you can stop yourself becoming overweight and keeping

yourself as active as possible then both of these will actually limit or reduce your risk of developing type 2 diabetes.

PORTER
And how strong a family history do you need? You say the risk is increased by around a third if you have someone in your family, does it have to be a parent or what about a grandparent?

AVERY
Parent, grandparent - it tends to be familiar rather than hereditary, so it doesn't necessarily sort of follow every single generation. But the larger the family history then the larger your risk of developing type 2 diabetes particularly.

PORTER
What about the age at which people are developing type 2 diabetes? When I was at medical school I was taught that traditionally this is something that happened to people in their 50s or 60s but we are seeing people develop it at an earlier age now, is that simply a reflection of the fact that we're getting heavier as a nation?

AVERY
Absolutely, I mean as Terry Wilkin pointed out that the number of people or the children that are developing obesity at a much younger age. I think that's one factor but also the fact children are lazier, whereas you and I would have gone down to the park to play on bikes and swings and things and kept ourselves very active playing footie or whatever children of today sit and play gameboys, computer games and are less likely to do more activity that we would have done and I think it's possibly reduced in schools as well.

PORTER
Thank you for now Lorraine.

Well we've already heard that ethnic background can affect your chance of getting diabetes - people who are from Asian backgrounds are more likely to develop the condition. But it's not just your ethnicity that can influence your risk of developing diabetes - religious and cultural beliefs can also impact on how the condition is managed. Veronica Green is a diabetes specialist nurse at the Cromwell Hospital in London.

GREEN
Most hospital set ups are set up to have white Caucasian people, white Caucasian diets and meat and two veg and those sorts of things are not necessarily set up to have people of different cultures. And so they're not used to the different diets, they're not used to different healthcare beliefs and they're not necessarily used to different religions and the different religious practices that people may have.

PORTER
So how does that impact on diabetic control?

GREEN
There are certain religious connotations around food for example, so for example in some Muslim societies dates are highly prized and people will eat an awful lot of dates but one date is equal to one spoonful of sugar. So if you eat 10 dates the impact on someone's blood sugar is enormous. If you are Hindu, for example, they have something called kara prashad which is made out of glucose, semolina and butter. So again when they go to temple and they're given this, if you eat all of it, it can put someone's blood sugar up to 20 millimols very, very easily, so you can make them very high, very thirsty, very symptomatic. And so if the healthcare professional is not aware of these different practices then they can't advise someone to look after their diabetes and how to react to these different situations and so help them control their blood sugar.

PORTER
Well let's take those type of foodstuffs first. What advice would you give to people who need to eat those or want to eat those sorts of things?

GREEN
Is moderation. There's very, very few things in diabetes that we say you mustn't eat ever, so things like dates, for example, we'd say have maybe one or two dates a day but try and spread them out over the day. If you're a Hindu or a Sikh and you go to temple then by all means take all of the kara prashad that you're given but only have a little bit and spread the rest around - amongst your family, so you're spreading the blessings associated with that food.

PORTER
Sameer Basga is a case in point. She's a Muslim, but, because of her diabetes, finds it impossible to observe the traditional fast, from sunrise to sunset, during the holy month of Ramadan. I asked her what happens when she tries. Her daughter, Hellai, interprets.

What happens when you fast during Ramadan?

SAMEER AND HELLAI BASGA
She feels very weak, she can't fast, she feels really dizzy, she gets really sick sometimes. So it's kind of impossible to fast on Ramadan. And sometimes she has to break it as well.

PORTER
How important is it for you to try and fast?

SAMEER AND HELLAI BASGA
She's gets really upset when she can't fast because Ramadan is one of the pillar in Islam and she wants to do it and it's like a compulsory thing - she wants to do it but she can't.

GREEN
In that circumstance what you need to do, if someone was on tablets for instance, I would look at what medication they were on and maybe change the doses slightly, so that if they had two tablets in the morning and one tablet in the evening I would swap those doses around.

PORTER
Because the risk being obviously that if they have their treatment - their insulin or their tablets - and they're not eating that their blood sugar will go too low and that's potentially very dangerous.

GREEN
Yes, yes. I also insist that people test - they have to test their blood sugar far more often when they're fasting than they would do normally.

PORTER
Do you think doctors in Britain are aware enough of the cultural and religious implications of either a condition or its treatment?

GREEN
I don't think so. I think that people see a condition that you have diabetes but they don't necessarily see the person behind that condition who may be extremely religious, of whatever sort of religion, not just Hindus or Muslims, I've had someone who was a Christian and was going hypo on every Sunday and it took me ages to figure out what was going on.

PORTER
Well I'm just sitting here now and I've got a couple of Muslim families that I look after and three members of which are diabetic and I actually hadn't considered fasting or anything at all and they've not discussed it with me either.

GREEN
Well sometimes they won't discuss it because they think well you're going to tell me not to do it and so they don't want necessarily to discuss it, they don't want the news that you're going to tell them not to do it. Whereas if they say well I look want to fast, how can I do it safely? Then that's a much nicer approach. And now what I tend to do is ask them - are you going to fast? So I'm the person that's bridging that gap and that helps.

PORTER
What about the sort of food that you eat - has the diagnosis made any difference for the sort of food that you eat yourself or prepare for your family?

SAMEER AND HELLAI BASGA
Her diet is completely different to us because she prepares food for us as well and for herself. So that makes it really hard for her because she has to make like oily kind of food for us and then she has to suffer eating fish and you know...

PORTER
Suffer - she's eating a healthier diet.

SAMEER AND HELLAI BASGA
Yeah but she doesn't want to, you know, she wants at least to have once in a week proper food like with her family but she can't have it because of her diet. Especially when our birthdays and some special occasions like Ede is one of the main things, she can't have any sweets or anything like that.

PORTER
It sounds like you take your diet very seriously which not all my patients do, that's for sure.

SAMEER AND HELLAI BASGA
Well yeah because we make - we make her as well to have proper diet you know because when she's having something bad she gets really ill and we don't want her to get ill.

PORTER
Sameer and Hellai Basga.

Lorraine, diabetes now accounts for something like a twentieth of the total NHS budget, who in the modern NHS should be looking after most people with diabetes?

AVERY
Well I think first of all we see the main responsibility is that the person themselves, I mean there are a number of things that they can do in terms of maintaining their ideal bodyweight, exercising and stopping smoking. But because we have such a large number of people with type 2 diabetes the majority of people with type 2 diabetes will be cared for in their local doctor's surgery in general practice where they should be receiving what we call an annual review where their overall diabetes control is assessed, their blood pressure's checked, their cholesterol's checked, kidney function and their eyes tested and their feet examined. All of those things should be happening at least on an annual basis and that could be done either by a doctor or a nurse, either healthcare professional, both will be able to do that.

PORTER

And the outlook for most people with well managed type 2 diabetes? I mentioned a lot about risk factors and how the increased risk of stroke and heart disease but we can moderate those significantly can't we.

AVERY
Absolutely and I think that's something that we have to bear in mind - that the outlook is far more positive, we do have the research to support that if we look after all of these factors then the outlook for type 2 diabetes is much better now than it would have been if I'd been sat here 10-15 years ago.

PORTER
Lorraine Avery, thank you very much, that's all we have time for.

We have spent much of the programme discussing obesity and how diet and exercise can help both prevent and treat the most common form of diabetes - so, with that in mind, look out for this week's Fat Nation - The Big Challenge which continues on BBC 1 this Thursday at 8.00 p.m. - it may just prove the inspiration you need. Check out the website - bbc.co.uk/fatnation.

And talking of websites, do visit ours - bbc.co.uk/radio4 - if you want any more information on diabetes, or if you would like to listen to the programme again.

This is the last programme in the current series but we'll be back later in the year.

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