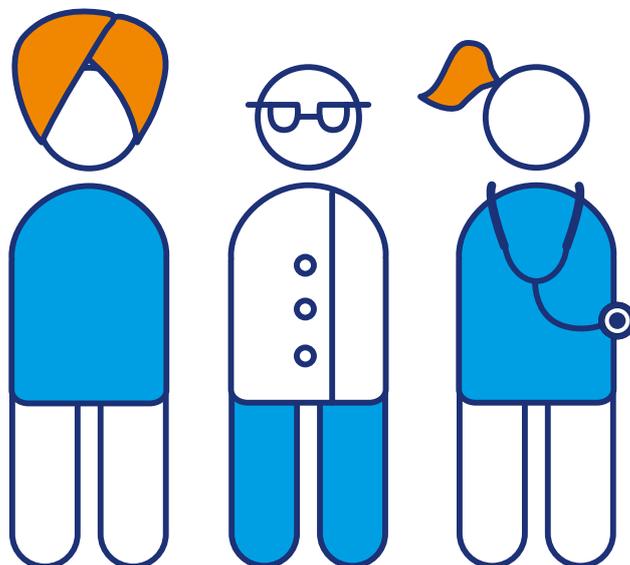


Your priorities for Type 2 diabetes research: **The top 10**



**James
Lind
Alliance**

Priority Setting Partnerships



They're here.

The top 10 research priorities for people with Type 2 diabetes.

Some of them will not surprise you, some we're already doing a lot of work into, others have had little investigation. All of them show what matters most to people living with and treating Type 2 diabetes.

We found them with the James Lind Alliance and the help of more than 4,000 people with Type 2 diabetes, carers and healthcare professionals across the UK.

Why we need research priorities

Type 2 diabetes is one of the fastest growing health crises of our time. We need to improve the lives of those who have Type 2 diabetes, and prevent more people from developing the condition.

There are almost **3.6 million people** in the UK diagnosed with diabetes.

90 percent of these have Type 2.

Around **1 million** are estimated to have diabetes but have not been diagnosed and **11.9 million** are at increased risk of getting Type 2.

Everything we know about treating diabetes, technologies and management is a result of **research**.

But there's still a long way to go in our fight against diabetes.

For every **£1** the UK spends on caring for diabetes, it invests just **half a penny** on research¹.

To maximise the impact of research, we're giving people with diabetes a **louder voice**.

Scientists and research funders usually make decisions around what to research. But with only a limited amount of funding available, we're committed to changing this.



Dr Elizabeth Robertson, Director of Research at Diabetes UK, explains

"We need to make sure research that we fund has the greatest possible benefit for people with diabetes. Knowing the most important priorities of people living with or treating Type 2 diabetes will help us direct funding to where it's needed most."

¹ Research spend figures are derived from the UK Health Research Analysis 2014 www.hrcsonline.net/pages/uk-health-research-analysis-2014. Figures include research infrastructure spending by funders of specific medical conditions, but do not include an attribution of infrastructure spending by research funders focused on multiple health conditions. NHS spend for diabetes was sourced from Hex et. al., Estimating the current and future costs of Type 1 and Type 2 Diabetes in the UK, Diabet. Med. 29, 855-862 (2012) : dx.doi.org/10.1111/j.1464-5491.2012.03698.x.

The difference priorities make

In 2011, the top 10 research priorities for people with Type 1 diabetes were found. Ever since researchers around the world have been making progress in tackling them. Turn to page 22 to find out how. Now people with Type 2 diabetes and those who care for them have their top 10 priorities too.

Thousands of people helped us along the way

A huge **4,000 people** helped us in our search for the Type 2 diabetes research priorities. Here's why they wanted to help.



"I thought it was important to come together with a diverse range of people, with different insights, to create a shared vision for the future of research."

Rachel Armstrong, Community Matron and carer of her mother who has Type 2 diabetes



"I felt it was crucial that the voices of people with Type 2 from ethnic minority backgrounds are heard, especially considering ethnicity is a key risk factor for the condition."

Tony Kelly, living with Type 2 diabetes and Diabetes UK Community Champion



"I wanted to give healthcare professionals a say. I thought that research judged a priority by those on the front line of Type 2 diabetes could have great value."

Katie Gray, podiatrist who works with people with Type 2 diabetes

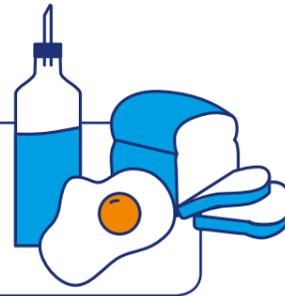
Read on to see what made it into the top 10.



People with Type 2 diabetes and healthcare professionals deciding on the top 10.

Priority 10

What role do fats, carbohydrates and proteins play in managing Type 2 diabetes, and are there risks and benefits to using particular approaches?



Thinking about food suddenly becomes a vital part of anyone's life when they have Type 2 diabetes. But too many people aren't sure what they should be eating. And it's getting more confusing. For a long time the advice has been the same, eat a healthy, balanced diet. But, increasingly, different diets are becoming popular.



“More research should be done on how the major food groups affect the management of Type 2 diabetes. There are options which contradict the current advice of a ‘balanced’ diet, such as a low carb high fat plan. And we need to understand more about how effective these can be.”

David Roberts, living with Type 2 diabetes

What we already know

Carbohydrates are the only food group that directly affect blood glucose levels. There's a lot of debate around the amount of carbohydrates people with Type 2 diabetes should eat to best manage their condition.

One trial compared the effects of two diets in people with Type 2 diabetes. One was very low in carbohydrates, low in ‘bad’ fats and high in ‘good’ fats. The other was high in carbohydrates and low in fats. The diet lower in carbohydrates was linked to better blood glucose control, a lower risk of heart disease and taking fewer diabetes medications¹. But we don't know the long-term effects on health.

It's also thought that Mediterranean-type diets are effective at improving blood glucose control and lowering heart disease risk in people with Type 2 diabetes².

Why we need more research

We know that driving down blood glucose levels means fewer complications and that what people eat has a crucial part to play in this.

By understanding the risks and benefits of different diets, that focus on eating more or less of particular food groups, people with Type 2 diabetes can feel more confident about the approach they choose.

And along with dealing with confusion and anxieties around what to eat, healthcare professionals will be able to support people to pick a diet which works best for them.

¹ Tay, J., Luscombe-Marsh, N. D., Thompson, C. H., Noakes, M., Buckley, J. D., Wittert, G. A., ... & Brinkworth, G. D. (2015). Comparison of low-and high-carbohydrate diets for type 2 diabetes management: a randomized trial. *The American journal of clinical nutrition*, 102(4), 780-790.
² Esposito, K., Maiorino, M. I., Bellastella, G., Chiodini, P., Panagiotakos, D., & Giugliano, D. (2015). A journey into a Mediterranean diet and type 2 diabetes: a systematic review with meta-analyses. *BMJ open*, 5(8), e008222.

Priority 9

How can psychological or social support be best used to help people with, or at risk of Type 2 diabetes, and how should this be delivered to account for individual needs?



Type 2 diabetes is about more than just the pancreas. For many, it brings new challenges, confusion, frustration, guilt and anxiety. And it can be lonely. Despite this, psychological and social support for people with Type 2 diabetes is all too rare.



“The serious consequences of living with Type 2 diabetes are underestimated. People may feel isolated and struggle to adapt to changes that may be required. Having psychological and social support is paramount to help people manage their condition, but we need to understand how best to deliver this.”

Ingrid Small, works with people with Type 2 diabetes in a Manchester Mental Health NHS Trust

What we already know

Support works. People who get social support from friends and family, healthcare professionals and support organisations, are better able to manage their condition, more likely to make lifestyle changes and feel less distressed¹.

People with Type 2 diabetes who get psychological support have also been shown to have better blood glucose control and less distress, than people who didn't receive any help².

Why we need more research

Safer blood glucose control and less distress could mean fewer complications and fewer people experiencing the emotional problems diabetes can bring.

More research will allow us to find the most effective forms of support and show how valuable support can be as part of routine Type 2 diabetes treatment. By finding out more we'll be able to offer the right support to the right people, and improve their wellbeing.

What we're working on right now

We're funding work to understand how we can best support specific groups of people with Type 2 diabetes. At the University of York, Dr Najma Siddiqi is hoping to find better ways to support people with a mental health condition manage their diabetes.

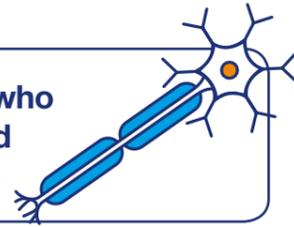
At King's College London, Professor Lance McCracken is hoping to help people with diabetic neuropathy manage their pain by adapting a type of psychological support, called Acceptance and Commitment Therapy.



¹ Strom, J. L., & Egede, L. E. (2012). The impact of social support on outcomes in adult patients with type 2 diabetes: a systematic review. *Current diabetes reports*, 12(6), 769-781.
² Ismail, K., Winkley, K., & Rabe-Hesketh, S. (2004). Systematic review and meta-analysis of randomised controlled trials of psychological interventions to improve glycaemic control in patients with type 2 diabetes. *The Lancet*, 363(9421), 1589-1597.

Priority 8

What causes nerve damage in people with Type 2 diabetes, who does it affect most, how can we increase awareness of it and how can it be best prevented and treated?



High blood glucose levels can damage small blood vessels which supply the nerves. This is called neuropathy. Because of nerve damage, every week diabetes leads to **more than 160 amputations** in England alone¹. Not everyone will experience an amputation but living with neuropathy can mean living with chronic pain.



“Neuropathy causes considerable suffering for people with Type 2 diabetes and we need more knowledge to guide treatment of this.”

Katie Gray, Podiatrist who treats people with Type 2 diabetes with nerve damage

What we already know

At the moment, the only way to delay nerve damage, or prevent it from getting worse, is for people to keep their blood glucose levels within a safe range². Once people have neuropathy, the only treatments available focus on managing their pain.

Why we need more research

Ending pain and preventing neuropathy won't just improve the lives of people living with Type 2 diabetes. About **80 per cent** of NHS spending on diabetes goes on treating complications, so tackling nerve damage will have wider benefits too.

To find ways to treat, reverse and prevent neuropathy, we first need more research to fully understand the causes of nerve damage in people with diabetes.

Research can also help us find the best ways of helping healthcare professionals and people with Type 2 diabetes spot the early signs of nerve damage. This will mean earlier treatment and, down the line, could mean fewer amputations.

What we're working on right now

We're supporting Professor Praveen Anand, at Imperial College London, to establish if the hot ingredient in chilli peppers, called capsaicin, could treat nerve damage in the feet and reduce pain.

In Manchester, Professor Neil Reeves, is testing special insoles in shoes that measure the pressure being placed on the feet and display the results on a mobile phone. He's testing whether this can help people with diabetes to monitor problems with their feet, to prevent foot ulcers.



¹ American Diabetes Association . Diabetes Statistics: data from the 2011 National Diabetes Fact Sheet. American Diabetes Association; Alexandria, Virginia: 2011
² Callaghan, B. C., Cheng, H. T., Stables, C. L., Smith, A. L., & Feldman, E. L. (2012). Diabetic neuropathy: clinical manifestations and current treatments. The Lancet Neurology, 11(6), 521–534.

Priority 7

Should diet and exercise be used as an alternative to medications for managing Type 2 diabetes, or alongside them?



Once someone is diagnosed with Type 2 diabetes they need to constantly manage their blood glucose levels. For some people this means a healthier diet and more exercise, others will be put straight on medication. But we're still not sure which approaches are best for which people.



“Research could provide healthcare professionals with a greater understanding of which approach to treatment might be best for our patients.”

Clare Nelson, Diabetes Specialist Nurse

What we already know

At the moment, it looks like both approaches are beneficial. One large trial found that people with Type 2 diabetes receiving diet and exercise advice took fewer diabetes medications and had bigger improvements in their blood glucose control¹.

At the same time, studies in this area show that lifestyle changes might not be very effective if they aren't used alongside medication².

Why we need more research

Some people with Type 2 diabetes will have side effects from their medications. While having to move onto taking a combination of drugs or insulin can make Type 2 diabetes management even more exhausting. Being clearer on when and what medication is necessary will simplify life for people with Type 2 diabetes.

Finding out if the beneficial effects of diet and exercise can be maintained for the long-term will help judge when or if medication is needed. And this can allow healthcare professionals to be more confident in choosing the right treatment for their patients.

What we're working on right now

Dr Jonathan Barlow, at the University of Birmingham, is hoping to find out exactly why exercise is good for people with Type 2 diabetes by looking at the effects of muscle contraction on insulin-producing beta cells. He wants to work out how this can be maximised to better treat Type 2 diabetes.



¹ Look AHEAD Research Group. (2010). Long term effects of a lifestyle intervention on weight and cardiovascular risk factors in individuals with type 2 diabetes: four year results of the Look AHEAD trial. Archives of internal medicine, 170(17), 1566.
² Schellenberg, E. S., Dryden, D. M., Vandermeer, B., Ha, C., & Korownyk, C. (2013). Lifestyle Interventions for Patients With and at Risk for Type 2 Diabetes. A Systematic Review and Meta-analysis. Annals of internal medicine, 159(8), 543–551.

Priority 6

Why does Type 2 diabetes get progressively worse over time, what is the most effective way to slow or prevent progression and how can this be best measured?



Type 2 diabetes can get progressively worse the longer you have it. And as it progresses it gets more complicated to manage. Treatment can advance from diet and exercise to oral medication and, eventually, a lot of people will need insulin.



“Current treatments for Type 2 diabetes are directed at the symptoms (blood glucose levels). But I think it’s important for research to focus on the underlying cause of Type 2 to help find treatments to stop its progression.”

Michael Osei Kissi, radiologist and Diabetes UK Clinical Champion

What we already know

As Type 2 diabetes progresses, the body becomes less effective at responding to insulin (known as insulin resistance). On top of this, beta cells in the pancreas that produce insulin become exhausted.

Research in this area found that people with Type 2 diabetes progressed to taking medication quicker if they gained weight and were younger¹. Scientists think this is because beta cells are put under more stress in people who are overweight. And that people who are diagnosed at a younger age might carry particular genes that affect the speed of progression.

There’s also evidence to suggest that taking medication earlier on after diagnosis might help to slow down progression².

Why we need more research

We don’t know exactly why beta cells stop working properly in people with Type 2 diabetes. More research into this holds the key to slowing or stopping the progression of the condition.

Working this out could mean people with Type 2 diabetes will need less medication, have improved blood glucose control and could help to lower the risk of serious complications. It’ll mean people can think about a future where their diabetes doesn’t increasingly dominate their lives and that its progression isn’t inevitable.

¹ Fonseca, V. A. (2009). Defining and characterizing the progression of type 2 diabetes. *Diabetes care*, 32(suppl 2), S151-S156.

² United Kingdom Prospective Diabetes Study (UKPDS). (1995). 13: Relative efficacy of randomly allocated diet, sulphonylurea, insulin, or metformin in patients with newly diagnosed non-insulin dependent diabetes followed for three years. *BMJ*, 310:83-88.



What we’re working on right now

Professor Guy Rutter (pictured here) and his team at Imperial College London are looking at why beta cells lose their identity as Type 2 diabetes progresses and how they can use these findings to keep beta cells healthy.

His team are also looking at the genes that play a role in the function of beta cells. They hope to develop new treatments that target these genes to slow or stop the progression of Type 2 diabetes.



Priority 5

How can people with Type 2 diabetes be supported to make lifestyle changes to help them manage their condition, how effective are they and what stops them from working?



We all know we shouldn't smoke, that we should drink less, eat healthier and do more exercise. It's even more important for people living with Type 2 diabetes. But making these changes and maintaining them is difficult – especially if they're habits people have had most of their life.



“I have seen a number of improvements since altering my lifestyle. So I believe it's really important to find ways to help people with Type 2 diabetes make the changes to improve their diabetes management.”

Gareth Thompson, living with Type 2 diabetes

What we already know

Supporting people with Type 2 diabetes to make the changes they need to lose weight and do more physical activity has been found to result in fewer hospitalisations and less use of diabetes medications¹.

We know the most effective approaches target diet and exercise together, encourage people to seek support from their family and friends and promote setting goals².

Why we need more research

When people make these changes, their Type 2 diabetes could become easier to manage and they could reduce their risk of complications.

But all too often advice and support varies because there isn't agreement yet on what type of physical activity and diet is best for different people with Type 2 diabetes. By discovering this, and how people can maintain changes they make, healthcare professionals will be better able to give the right support and advice at the right time.

For people with Type 2 diabetes, it will also mean feeling more confident about what to do to help manage their condition and how it could improve their health.



¹ Espeland, M. A., Glick, H. A., Bertoni, A., Brancati, F. L., Bray, G. A., Clark, J. M., ... & Ghazarian, S. (2014). Impact of an intensive lifestyle intervention on use and cost of medical services among overweight and obese adults with type 2 diabetes: the action for health in diabetes. *Diabetes Care*, 37(9), 2548–2556.

² Greaves, C. J., Sheppard, K. E., Abraham, C., Hardeman, W., Roden, M., Evans, P. H., & Schwarz, P. (2011). Systematic review of reviews of intervention components associated with increased effectiveness in dietary and physical activity interventions. *BMC public health*, 11(1), 119.

Priority 4

How do stress and anxiety influence the management of Type 2 diabetes and does a positive mental wellbeing have an effect?



Living with Type 2 diabetes can be overwhelming. A lot of people feel defeated and just want to give up. This is known as diabetes burnout or diabetes distress and makes living with the condition even harder. While the scale of the problem is now being recognised, research into the wellbeing of people with Type 2 diabetes lags behind.



“The anxiety and stress experienced by people with Type 2 diabetes is overlooked in many aspects of healthcare, but could underpin a great deal of diabetes health problems. So I’m delighted it’ll now be given a higher profile.”

Rachel Armstrong, Community Matron and carer

What we already know

Studies have shown that stress and anxiety is very common, with **36 per cent** of people with Type 2 diabetes saying they experience negative emotions because of their condition¹. This can affect how they manage their diabetes and has consistently been linked to higher blood glucose levels².

But a positive mental wellbeing may help. We know that strategies to improve mental wellbeing have been linked to better overall health and diabetes management³.

Why we need more research

There’s a lot of work to do.

Finding the best ways to spot people with anxiety and stress will mean they can get the support they need. But we also need to understand exactly how stress and anxiety impact on people’s management of their condition. This will then help scientists develop and test different approaches to find the best ways of supporting them.

By helping more people cope with life with Type 2 diabetes, we could improve their mental wellbeing and the self-management of their condition. And eventually that could mean lower blood glucose levels and fewer complications.

- 1 Perrin, N. E., Davies, M. J., Robertson, N., Snoek, F. J., & Khunti, K. (2017). The prevalence of diabetes-specific emotional distress in people with Type 2 diabetes: a systematic review and meta-analysis. *Diabetic Medicine*.
- 2 Fisher L, Skaff MM, Mullan JT, Arean P, Glasgow R, & Masharani U. (2008). A longitudinal study of affective and anxiety disorders, depressive affect and diabetes distress in adults with type 2 diabetes. *Diabetic Medicine*, 25, 1096–1101
- 3 Robertson, S. M., Stanley, M. A., Cully, J. A., & Naik, A. D. (2012). Positive emotional health and diabetes care: concepts, measurement, and clinical implications. *Psychosomatics*, 53(1), 1–12.

Priority 3

What is the best way to encourage people with Type 2 diabetes, whoever they are and wherever they live, to self-manage their condition, and how should it be delivered?



There’s a lot to learn when you’ve got Type 2 diabetes. Having to suddenly understand what’s going on inside your body is tough. How does your medication work? What do you eat? How should you exercise? What should your blood glucose levels be? But usually, people with Type 2 diabetes only see a healthcare professional for **1.5 hours a year**¹. The rest of the time they have to manage the condition themselves.



“Self-management is particularly important to reduce the complications of Type 2 diabetes. There are brilliant education courses out there, but unless we research their long-term value and how to encourage people to actually attend, they may not be as effective as they could be.”

Clare Nelson, Diabetes Specialist Nurse

What we already know

We know education courses which support people to manage their diabetes can be really helpful. Findings from 120 different studies looking at education, found it could improve blood glucose levels. Group-based courses and individual learning led to the greatest improvements, while remote learning was the least effective. Longer courses, lasting at least 10 hours, were also more helpful².

But we also know just **7.5 per cent** of people with Type 2 diabetes have attended a course in the UK³.

Why we need more research

Supporting people with Type 2 diabetes to manage their condition will help them reduce their risk of complications and live healthier, longer lives. Giving people the knowledge and confidence about what they need to do to manage their Type 2 diabetes could also reduce their anxieties around living with the condition.

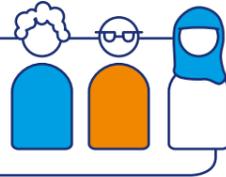
But we need to find ways to make sure more people with Type 2 diabetes can reap the benefits of diabetes education. Research can help us find ways to improve attendance and work out what’s best for different people, so they can learn about their diabetes in a way that’s most useful to them.

We then need to compare ways to deliver information, for example, group education, one-to-one support, or online platforms.

- 1 Steinsbekk, A., Rygg, L., Lisulo, M., Rise, M. and Fretheim, A., (2012). Group based diabetes self-management education compared to routine treatment for people with type 2 diabetes mellitus. A systematic review with meta-analysis. *BMC Health Services Research*, 12; 213.
- 2 Chvala, C.A., Sherr, D. and Lipman, R.D., (2016). Diabetes self-management education for adults with type 2 diabetes mellitus: A systematic review of the effect on glycemic control. *Patient education and counseling*, 99(6), 926–943.
- 3 National Diabetes Audit (2017). NDA 2015/16: Report 1, care processes and treatment targets.

Priority 2

How do we identify people at high risk of Type 2 diabetes and help to prevent the condition from developing?



There are **11.9 million people** at increased risk of developing Type 2 diabetes in the UK. People might be at risk because of their age, ethnicity, family history, weight or waist size. But whatever the reason, the need to find ways of preventing Type 2 is becoming increasingly urgent.



“Prevention is a central theme in public health. We need to find better ways to identify those at greatest risk, and provide them with support and strategies to prevent Type 2 diabetes.”

Luise Dawson, works for Public Health England

What we already know

Researchers are also testing lots of different ways to prevent Type 2 diabetes. In England, the **Healthier You NHS Diabetes Prevention Programme** is a partnership between NHS England, Public Health England and Diabetes UK. It gives personalised support to help people reduce their risk of Type 2 diabetes by losing weight, getting active and eating healthily.

We know that making these lifestyle changes can help prevent Type 2 diabetes. But many people are at high risk due to factors they can't change and because they don't know they are at risk.

Researchers have developed risk questionnaires and tests to help people and healthcare professionals spot who's at risk. But we don't know which signs of risk are the most useful to look at and these risk scores may not be helpful for everyone¹.

Why we need more research

Getting Type 2 diabetes changes people's lives. Every person we prevent from getting Type 2 diabetes won't have to go through the difficulties of managing the condition and face the risk of complications.

With **10 per cent** of the NHS budget being spent on diabetes, preventing more people from getting Type 2 diabetes will also have a significant positive impact on our health services.

Research is needed so we can find ways to make the risk of Type 2 diabetes as low as possible for everyone by finding methods that can be adapted to offer the most help to each person. This includes finding better ways to spot people at high risk of Type 2 diabetes and effective ways to support people to reduce their risk.

¹ Buijsse, B., Simmons, R. K., Griffin, S. J., & Schulze, M. B. (2011). Risk assessment tools for identifying individuals at risk of developing type 2 diabetes. *Epidemiologic reviews*, 33(1), 46–62.

What we're working on right now

We're funding research to help understand Type 2 diabetes risk in different groups of people, and to find better ways to prevent it.



Risk in people with a family history

Dr Dan Cuthbertson, at the University of Liverpool, is looking at how physical inactivity can raise Type 2 diabetes risk. And he wants to see if inactivity is more harmful in people with a family history of Type 2.

This could help healthcare professionals to give better advice about the levels of physical activity people should do to reduce their risk.

Targeted treatment for Type 2 risk

Losing weight and exercising can help to prevent Type 2 diabetes, but we know this doesn't work for everyone who is at high risk.

At Imperial College London, Dr Nicola Guess is testing if a carbohydrate called inulin can help people who don't benefit from diet and exercise to reduce their risk.

Ethnicity and Type 2 risk

We know that ethnicity is a risk factor for Type 2 diabetes and we're funding research to find out why.

Dr Louise Goff and her team at King's College London are comparing insulin sensitivity in people of Black African and White European origin with Type 2 diabetes. This knowledge could allow us to tailor treatments to people of different ethnicities, to help prevent Type 2 diabetes in some high risks groups.



Dr Nicola Guess, who is testing a carbohydrate called inulin

Priority 1

Can Type 2 diabetes be cured or reversed, what is the best way to achieve this and is there a point beyond which the condition can't be reversed?



It's no surprise that people's top priority is a cure. And while we work towards finding a cure, we're seeing mounting evidence that Type 2 diabetes can be put into remission.

What does remission mean?

People who have put their Type 2 diabetes into remission have normal blood glucose levels, without taking diabetes medication. Some people refer to this as reversal. We call it remission because it might come back and the person might still be at risk of diabetes complications. That's why diabetes health checks are still important.



"This was by far the most fundamental question for me. Finding a cure is vital to the wellbeing of the millions of people living with Type 2 diabetes."

John Turner, living with Type 2 diabetes

What we already know

Weight loss surgery has already put some people's Type 2 diabetes into remission. But surgery is invasive and not available for everyone.

Scientists around the world have been hunting for different ways to put Type 2 diabetes into remission, including stripping fat from the pancreas, changing levels of gut hormones and rebooting insulin-producing beta cells.

In 2011, we funded an early study at Newcastle University which showed that eight weeks of a very low calorie diet resulted in reduced levels of fat in the liver and pancreas. This helped to restore insulin production and, for most of the participants, put their Type 2 diabetes into remission for at least three months.

Why we need more research

Remission of Type 2 diabetes – and in the future, a cure – will help millions of people live longer, healthier lives. Along with improved quality of life, being in remission will reduce their chances of serious complications or, at the very least, delay their development.

We need more research to understand what's happening when people put their Type 2 diabetes into remission. We then need to compare different approaches and find out the most effective ways to put Type 2 diabetes into remission.

More research looking at what's happening inside the pancreas could give scientists the knowledge they need to find a permanent cure for Type 2 diabetes. And ultimately, a cure means millions of people will be free from managing their condition, free from the fear of complications and free from the anxieties and stresses that so often accompany it.

What we're working on right now

Low calorie diets

We're funding more research into very low calorie diets. In 2013, we committed over £2.5 million to DiRECT (Diabetes Remission Clinical Trial), led by Professor Roy Taylor and Professor Mike Lean. We're hoping to see if a low calorie diet, alongside weight management support, can bring about Type 2 diabetes remission for the long-term, when delivered through GP care.

Professor Taylor's ReTUNE study is hoping to find out whether this diet could also be beneficial for people with Type 2 who aren't overweight. If the findings are positive, this strategy could be relevant for even more people living with Type 2 diabetes.

Gut hormones

Weight loss surgery triggers a rise in the levels of certain gut hormones, and our scientists want to know what that means for people with Type 2 diabetes. Dr Reshma Ramracheya, a Diabetes UK RD Laureate fellow, is studying a particular gut hormone called PYY in the lab. Her team have found that the hormone might help islets (clusters of cells in the pancreas that release insulin and glucagon) to work properly.

Dr Victoria Salem, a Diabetes UK Harry Keen fellow, is also working on this idea. She wants to know if combinations of gut hormones could be used as a treatment to put Type 2 diabetes into remission in the future.

Boosting beta cells

Our scientists are looking at beta cells in the pancreas, which stop working properly in Type 2 diabetes, to understand why they fail and find ways to make them work again. This could lead to treatments that help people with Type 2 diabetes produce enough insulin to manage their blood glucose levels without medication.

This work is in the very early stages – it's only being tested in cells in the lab. We need more research to know whether these treatments could be used safely and effectively in people with Type 2. And to find out whether, ultimately, they could cure Type 2 diabetes.



Dr Victoria Salem, testing if gut hormones can be used to put Type 2 diabetes into remission

Finding the answers



Identifying the top 10 research priorities for Type 2 diabetes is only the beginning. We now need to find the answers and make sure research makes a real difference for people with Type 2 diabetes.

Research priorities have been found for lots of other medical conditions, including Type 1 diabetes, multiple sclerosis and autism. And we know that this process has a proven track record of stimulating exciting research and greater investment. We'll make sure the same happens for Type 2 diabetes.

Thinking about the future



"I left the process feeling empowered, confident in the future of research and full of hope."

John Turner, living with Type 2 diabetes



"I hope that researchers and funders will now put patients, who are often the forgotten part of the equation, at the heart of research."

Helen Ogg, living with Type 2 diabetes



"I am optimistic the top 10 priorities will help to create a new sense of direction for research, which will give healthcare professionals and people with Type 2 diabetes the knowledge to best manage the condition and improve outcomes."

Michael Osei Kissi, radiologist and Diabetes UK Clinical Champion



"The top 10 included a really good range of issues – scientific, behavioural, cultural and educational. So I really hope we'll see a variety of new research initiatives that will help those of us with Type 2 today and those at risk of the future."

Liz Montgomery, living with Type 2 diabetes

We'll champion your priorities

We'll raise awareness of your final top 10 research priorities and make sure they're seen and considered by researchers and organisations that fund diabetes research. The priorities will influence those who work in universities, government agencies and industry.

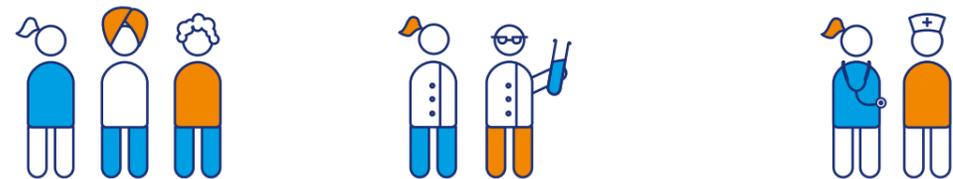
We'll also use your priorities to help us make decisions around what research we fund. We spend around **£6.5 million** every year on diabetes research. As we continue to invest in research, we'll make sure we fund projects that can help answer your priorities.

Clinical Studies Groups

We're the leading charitable funder of diabetes research in the UK, but we can't afford to fund every study that holds promise. This means we need to encourage collaboration to fuel more research and investment.

That's why we recently set up the UK's first **clinical studies groups** (CSGs) for diabetes.

These groups bring together



• people with diabetes, • leading researchers in key areas, • and healthcare professionals

to create a plan for future research.

We'll make sure your priorities inform the work of CSGs. The groups will explore how the priorities can best be tackled and generate research ideas to fill the gaps in these areas. The CSGs will also encourage leading diabetes researchers to work together on the priorities and deliver high quality applications to the nation's biggest research funders.



"The top 10 should really help the clinical studies groups focus on what matters most to those of us with Type 2 diabetes. We'll be able to use the priorities to plan both short and long term research goals that can benefit the Type 2 community."

Jim Harris, living with Type 2 diabetes and CSG member

What happens to the rest of the Type 2 research priorities?

Although not all of the priorities made it into the top 10, we won't be ignoring the remaining 104 from our longlist. They'll be published on the JLA website jla.nihr.ac.uk so they can easily be seen by researchers and research funders. They'll also be considered by the diabetes clinical studies groups.



"It's been a huge privilege to understand what matters most to people with Type 2 diabetes. These priorities are a really important step in helping us achieve our goal of maximising the benefit of research for people with diabetes.

"Your priorities will allow us, and researchers across the UK, to think strategically to deliver the knowledge that could significantly improve the lives of people with Type 2 diabetes in the future."

Dr Elizabeth Robertson, Director of Research, Diabetes UK

How we found the top 10

We found the top priorities for Type 2 diabetes by working with the James Lind Alliance (JLA) to carry out a priority setting partnership (PSP).

The JLA is a non-profit organisation which oversees the priority setting partnership process. They follow a tried-and-tested method to find research priorities for different health conditions. They're unbiased and give equal importance to the interests of patients, carers and healthcare professionals.



1 Forming the steering group

In 2016, we set up a steering group, chaired by the JLA, to guide the process. Members included people with Type 2 diabetes and healthcare professionals and together had a huge amount of knowledge about the condition.



"I spent a lot of time making sure we reached diverse groups of people with Type 2 diabetes and healthcare professionals to get a really broad input."

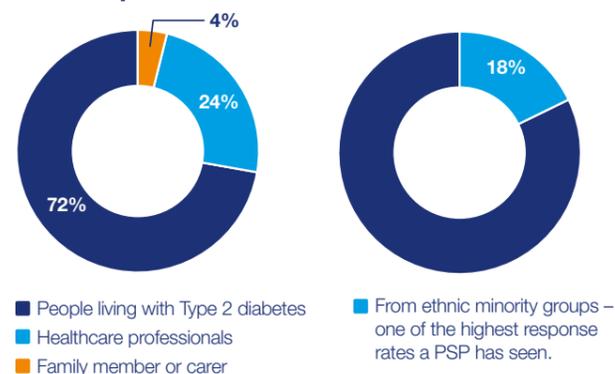
Sarah Finer, researcher, diabetologist and steering group member



2 Initial survey – collecting ideas

In May 2016, we asked people to tell us their top three questions about Type 2 diabetes that they'd like scientists to answer. Over **2,500** people took part, submitting over **8,000** ideas.

Who responded?



3 Organising responses

We checked the thousands of ideas to make sure they hadn't already been answered by previous research. We then grouped the questions into themes, to create a long list of **114 questions**.



"My role was to manage the data – all 8,000 submissions! This involved formatting, classifying and collating research ideas received from the initial survey. The whole data management process took approximately 30 weeks."

Ann Daley, information specialist



4 Second survey

In May 2017 we sent out our second survey. Over **1,500** people voted for their top 10 priorities.

The questions appeared in a different order for each person, to make sure the questions at the top of the list didn't get more attention than those at the bottom.



5 Narrowing down

Our steering group looked at the top 10 priorities voted by people with Type 2 diabetes and carers, by healthcare professionals and by people from ethnic minority groups. They combined the questions that appeared in the top 10 for all groups, giving a shortlist of **24 priorities**.



6 Agreeing the top 10

Our final workshop was held in July 2017. The JLA helped a group of people with Type 2, carers and healthcare professionals to work together to rank the 24 research priorities and agree on the **10 most important ones**.



"My role was to ensure we followed the JLA process and that everyone had an opportunity to have their say. Whether someone's knowledge comes from lived experience or professional expertise, it's of equal value.

I thought the participants in our final workshop really engaged in the decision-making. We had a range of views in the room, but people were willing to listen, to share, and to respect differences of opinion."

Katherine Cowan, JLA advisor and chair of our final workshop



"The method used in the workshop to prioritise the research questions was fascinating. It was very inclusive, with everyone having equal space to share their opinions. The final Top 10 was a real group effort."

Luise Dawson, works for Public Health England in East London

The impact the Type 1 research priorities made

The top 10 research priorities for Type 1 diabetes research were published in 2011. We've supported work to answer a number of the priorities, and many more have received funding from elsewhere.

Here's a couple of examples

Is an artificial pancreas (closed-loop system) effective for Type 1 diabetes?

We funded a ground-breaking project, led by Dr Roman Hovorka at the University of Cambridge, looking at the effectiveness of the artificial pancreas in a real-world setting in people with Type 1 diabetes. The team found people spent more time with their glucose levels in the ideal range, compared to people using insulin injections.

We also funded Dr Helen Murphy's research on adapting the artificial pancreas to control blood glucose levels during pregnancy in women with Type 1. Her team showed that this technology is safe and effective for pregnant women to use in their own homes.

Thanks to projects like these, artificial pancreas technology is now being tested in larger clinical trials. And the first device drawing on this technology became available in the USA in 2017.



How can awareness of and prevention of hypoglycaemia in Type 1 diabetes be improved?

We funded Dr Pratik Choudhary's work, at King's College London, studying the brains of people with Type 1 diabetes who can and can't detect hypos. They're investigating if brain activity is different in people with hypo unawareness, and if that specific activity can be reversed to restore awareness. This could help to develop treatments to reduce hypo unawareness.

More recently, we awarded our Sir George Alberti Research Fellowship to Dr Catriona Farrell, at the University of Dundee. She's figuring out whether we can use short bursts of high intensity exercise to improve hypo awareness.

We don't have the answers to all the Type 1 diabetes research priorities yet, but scientists across the globe are making fantastic progress. Now we have a chance to use research priorities that matter most to people with Type 1 and Type 2 diabetes to drive research forward.

Here are the rest of the top 10 research priorities for Type 1 diabetes

- Priority 1** Is it possible to constantly and accurately monitor blood sugar levels, in people with Type 1 diabetes, with a discrete device (non-invasive or invasive)?
- Priority 2** Is insulin pump therapy effective? (Immediate vs deferred pump, and comparing outcomes with multiple injections.)
- Priority 3** Is an artificial pancreas for Type 1 diabetes (closed-loop system) effective?
- Priority 4** What are the characteristics of the best Type 1 diabetes patient education programmes (from diagnosis to long-term care) and do they improve outcomes?
- Priority 5** What are the cognitive and psychological effects of living with Type 1 diabetes?
- Priority 6** How can awareness of and prevention of hypoglycaemia in Type 1 diabetes be improved?
- Priority 7** How tightly controlled do fluctuations in blood glucose levels need to be to reduce the risk of developing complications in people with Type 1 diabetes?
- Priority 8** Does treatment of Type 1 diabetics by specialists trained in person-centred skills provide better blood glucose control, patient satisfaction and self-confidence in management of Type 1 diabetes, compared to treatment by non-specialists with standard skills?
- Priority 9** What makes self-management successful for some people with Type 1 diabetes, and not others?
- Priority 10** Which insulins are safest and have the fewest (long-term) adverse effects?

Dr Roman Hovorka, looking into the effectiveness of the artificial pancreas



Thank you

We want to say a massive thank you to the 4,000 people who helped us in our search for the Type 2 diabetes research priorities – one of the largest responses ever seen in a survey of this kind.

We are incredibly grateful to the group of people living with Type 2 diabetes, carers and healthcare professionals who attended our final top 10 workshop for their insights, openness and passion.

Finally, we would like to thank the steering group and JLA advisors for guiding this process and their enormous amounts of hard work.

Leanne Metcalfe,
James Lind Alliance (Chair),
Katherine Cowan,
James Lind Alliance (Chair),
Paul Robb
(has Type 2 diabetes),
Martin Jenner
(has Type 2 diabetes),
Mick Browne
(has Type 2 diabetes),

Angelina Whitmarsh
(has Type 2 diabetes),
Jenny Stevens
(has Type 2 diabetes),
Sarah Finer,
Andrew Farmer,
Ali Chakera,
Desiree Campbell-Richards,
Ann Daly,
Paul McArdle,

Emily Burns (Diabetes UK),
Davina Krakovic-Patel
(Diabetes UK),
Kamini Shah (Diabetes UK),
Anna Morris (Diabetes UK),
Simon O’Neil (Diabetes UK),
Krishna Sarda
(Diabetes UK),
Elizabeth Robertson
(Diabetes UK)

Want to take part in research?

Knowing the top 10 priorities can allow us make the views of people with diabetes count when scientists are deciding on what topics to research.

But people with diabetes also play a vital part later on in the research process, by taking part in studies to test the effectiveness of new treatments and technologies.

If you're feeling inspired to get involved visit:
diabetes.org.uk/Research/take-part-in-research

You can also learn about other opportunities to help us shape the future of research here:
diabetes.org.uk/research/our-approach-to-research/tell-us-your-views



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