DIABETES UK
KNOW DIABETES. FIGHT DIABETES.

Changing lives together: through 80 years of research

1st edition – March 2018

Join us on this remarkable journey

Diabetes UK has an incredible legacy in diabetes research, funding scientists across the UK for over 80 years.

This has only been possible thanks to our supporters. Together, we’ve funded some of the greatest transformations in diabetes care.

The scale of diabetes is vast. More than 4.6 million people live with the condition in the UK. We need urgent action to make sure everyone gets the treatment they need. We have been rising to this challenge for decades. It’s time to celebrate the fantastic innovations in research we’ve been behind and the exciting steps that lie ahead.

You have helped us transform the lives of millions of people with diabetes. When you read this report you will realise that our research has, in some way, touched the lives of almost everyone with diabetes in the UK. We couldn’t have done it without you.

So join us as we take a journey through 80 years of achievements. Hear from the researchers who led the way and from some of the people whose lives have been changed.

We know this report only scratches the surface of the difference our researchers have made to the lives of people with diabetes. And we look forward to sharing more stories with you in the future.

And with more lives to change than ever before we cannot stop now. This is a celebration, but it’s also a rallying call. We have more research to do and more lives to improve.

Your continued support will help us to keep breaking new ground for people with diabetes.

Thank you for being part of our fight for a world where diabetes can do no harm.

Dr Elizabeth Robertson,
Director of Research

We’re stopping the harm diabetes causes

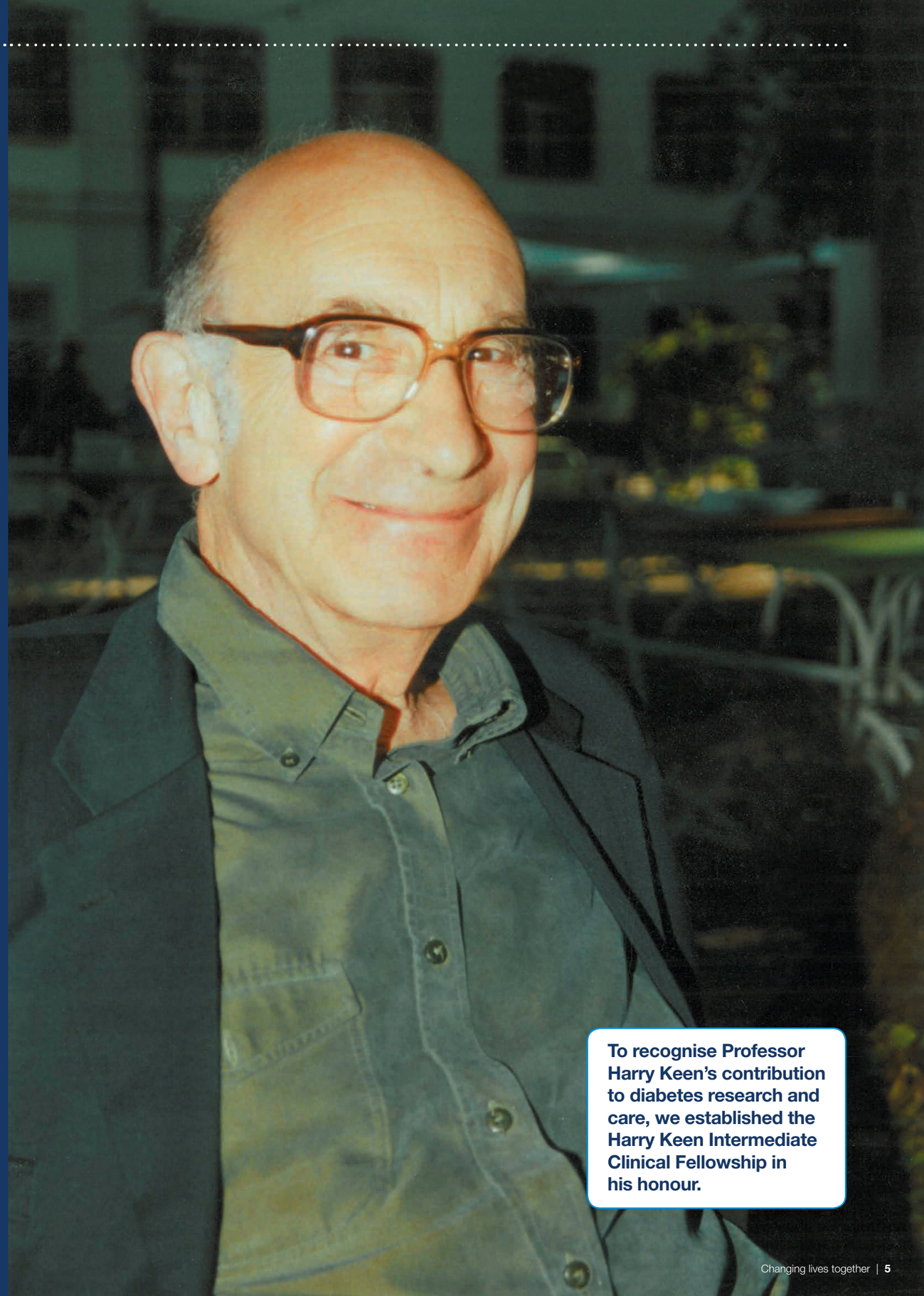
Diabetes is devastating lives every day.

Our research finds way to reduce that harm.

Back in 1964 Professor Harry Keen led the way by developing a way to screen and monitor kidney disease with our funding[1]. His pioneering Bedford Study found 250 people with undiagnosed Type 2 diabetes and helped him to develop the term ‘borderline diabetes’ to describe people at very high risk of the condition.

Since then, from small local studies to huge national trials, our research has been at the forefront of the fight against diabetes complications.

What our scientists have discovered has changed the way diabetes is treated, benefitting millions of people. Not just here in the UK, but across the world.



To recognise Professor Harry Keen’s contribution to diabetes research and care, we established the Harry Keen Intermediate Clinical Fellowship in his honour.

> “These findings have had a profound influence on the management of Type 2 diabetes, clinical guidelines, and standards of care, and have helped reduce the risk of diabetes-related complications worldwide.”
>
> **Professor Rury Holman,**
> **Co-Director of UKPDS, University of Oxford**

We’ve changed the way Type 2 diabetes is treated

Who, where and when

Name:	UK Prospective Diabetes Study (UKPDS)
Research leaders:	Professors Robert Turner and Rury Holman
Where:	University of Oxford
When:	1977–1997
Impact:	Improved blood glucose and blood pressure control linked to reduced complications

Sometimes it’s hard to believe how much progress we've made in our understanding of diabetes.

The UK Prospective Diabetes Study, known as UKPDS, is a good example.

More than 5,000 people with Type 2 diabetes took part in the research which showed that improved blood glucose and blood pressure levels could help reduce complications[2].

We take that knowledge for granted now.

But at the time the enormity of this 20-year trial was shown by the thousands of people who tuned in from all over the world to hear the results. And the collective roar which greeted the findings.

The research changed treatment and care for people all over the world and it’s recognised as a major step forward in understanding how best to manage Type 2 diabetes.

At the end of the trial, the overall risk of complications affecting small blood vessels dropped by a quarter. Over 30 years on, follow-up results showed a positive impact on the risk of eye and kidney complications, heart attacks and death[3].

With more than 4.6 million people living with diabetes in the UK, and hundreds of million more worldwide, this piece of work has played a significant role in reducing the harm diabetes does.

It was made possible by Diabetes UK supporters who donated £640,000 after we launched an appeal to fund the completion of the first 13 years of the trial in 1990.

We've tackled blindness

Who, where and when

Name:	Detecting diabetic retinopathy
Research leader:	Professor Roy Taylor
Where:	Newcastle University
When:	1986–2010
Impact:	Led to a nationwide screening programme reducing sight loss

Diabetes was once the leading cause of blindness in the UK amongst people of working age. It isn't any more. And that's thanks to a piece of research we funded in the 1980s.

Shocked by the amount of sight loss in people with diabetes in Newcastle, Professor Roy Taylor began looking into how it could be reduced.

His plan to beat blindness began in the back of a second hand ambulance in 1986.

There he used a retinal camera to photograph people's eyes. His team would then analyse the results on the spot to see if there were any early signs of diabetic eye disease (known as retinopathy).

Being able to treat any damage early reduces the chance of people losing any vision.

And by making the service mobile, more people could be screened and referred for treatment if they needed it.

The results showed that this eye screening method for people with diabetes was far more practical and effective than other methods.

So Professor Taylor expanded his fleet of mobile screening units across the UK[4, 5].

Once again the results were positive, proving photographic screening worked on a large scale.

Buoyed by the evidence, we campaigned for a national eye screening programme for people with diabetes, which was rolled out in 2002. Today every single person with diabetes should have access to annual eye screening.

It means better vision for people with diabetes. In 2009, Newcastle became the first place in the UK where diabetes is no longer the leading cause of blindness in the working age population[6]. That effect has now spread across the UK.

"Losing eyesight can be avoided if retinopathy is caught early and treated. Easier, more accessible screening methods allow us to do just that. With the support of Diabetes UK, we're seeing the impact of this work on the lives of people with diabetes across the world."

Professor Roy Taylor, Newcastle University

"Now, as statins are widely used to prevent cardiovascular complications in diabetes, people with diabetes have a better quality of life and live longer."

Professor Helen Colhoun, CARDS lead researcher, University of Edinburgh

We're stopping heart attacks and strokes

Who, where and when

Name:	Collaborative Atorvastatin Diabetes Study (CARDS)
Research leaders:	Professors Helen Colhoun and John Betteridge
Where:	University of Edinburgh, University College London
When:	1999–2003
Impact:	Statins now used to improve health of people with Type 2 diabetes

Having diabetes more than doubles someone's risk of experiencing a heart attack, heart failure or a stroke.

One in four people admitted to hospital with these cardiovascular complications has diabetes.

In 2003, research we funded found that statins – a cholesterol-lowering drug – could reduce the risk of people with Type 2 diabetes experiencing a heart attack or stroke.

The nationwide trial, called CARDS (Collaborative Atorvastatin Diabetes Study), involved 132 centres in the UK and Ireland and saw 2,838 people with Type 2 diabetes take part.

The results were rapid and impressive.

One statin tablet a day reduced the risk of a serious heart problem by more than a third and the risk of stroke by almost half.

The results were so clear that the decision was made to end CARDS two years early so that everyone on the trial could benefit from the drug[7].

Preventing one heart attack or stroke means that a life is saved or not turned upside down. A family free from the trauma of suddenly losing a loved one.

But with more than 4.6 million people living with diabetes in the UK, significantly reducing the number of heart attacks and strokes can also make a real difference to an entire healthcare system.

As a result, CARDS changed the way statins were used, not just in the NHS but across the world.

We've prevented amputations

Who, where and when

Name:	The Diabetic Foot Clinic
Research leaders:	Professor Michael Edmonds
Where:	King's College Hospital, London
When:	1981–ongoing
Impact:	People with diabetes have better footcare

People with diabetes are more than 20 times more likely to experience an amputation than the rest of the population.

Diabetes causes more than 160 amputations in the UK every week.

But many of them are preventable.

Our work with King's College Hospital during the 1980s began to change the footcare people with diabetes receive.

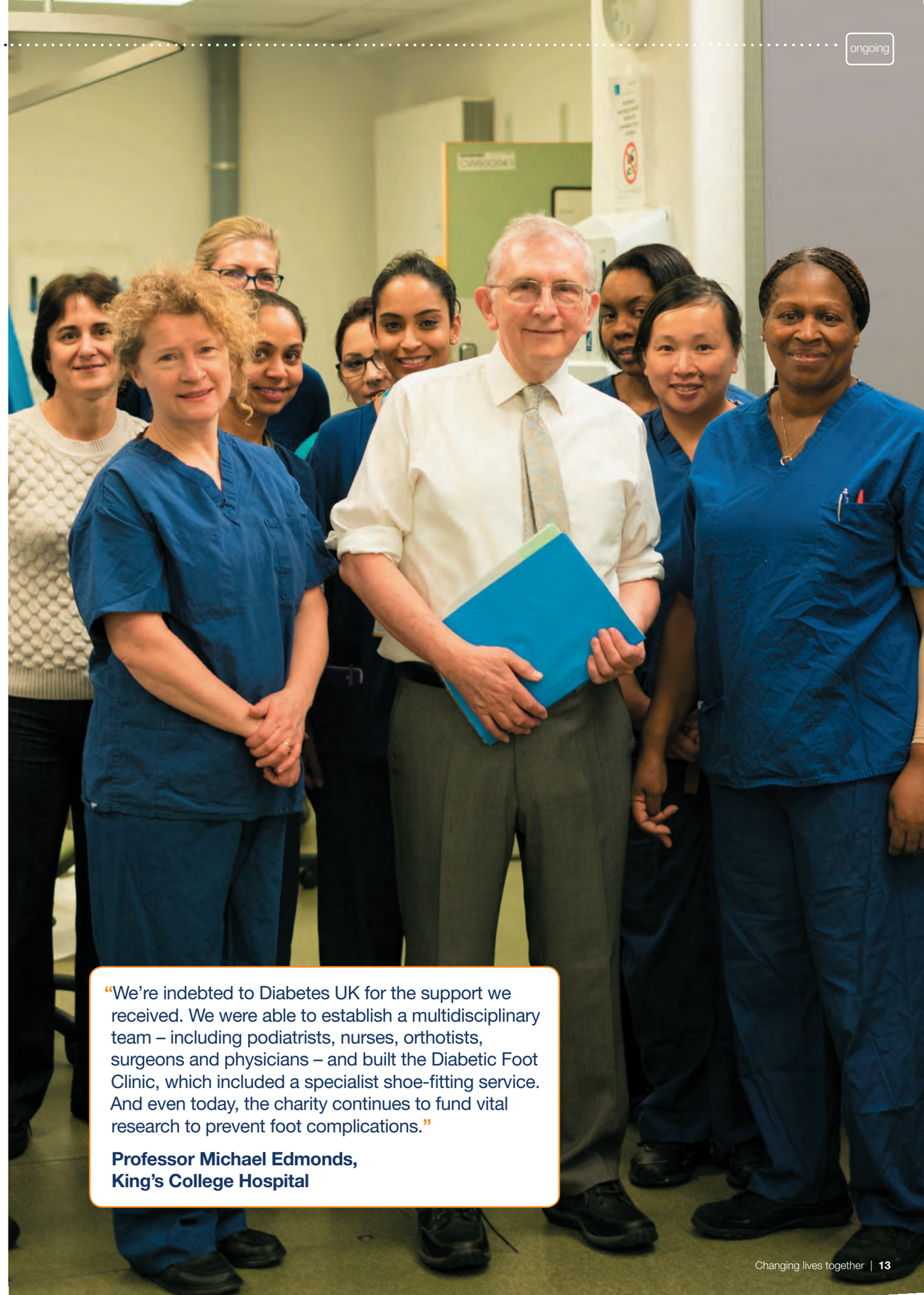
From 1981, working with the hospital, we helped set up the first Diabetic Foot Clinic in the UK. It offered specialised and urgent care to people with diabetes who had foot problems.

After three years the number of major amputations had halved[8].

Since then we've campaigned for similar improvements to footcare for people with diabetes across the NHS. We've worked with hospitals and NHS managers to make sure they have multidisciplinary footcare teams ready to stop an ulcer becoming an amputation.

Our relationship with King's College goes right back to our co-founder, Dr RD Lawrence, who spent much of his career at the hospital, developing one of the earliest diabetes clinics in the country throughout the 1930s.

And almost 90 years on, we're still supporting research at the hospital to improve footcare. Our funding is helping Dr Nina Petrova develop new treatments for a debilitating foot complication of diabetes, called Charcot foot, which causes the bones in the foot to collapse.



"We're indebted to Diabetes UK for the support we received. We were able to establish a multidisciplinary team – including podiatrists, nurses, orthotists, surgeons and physicians – and built the Diabetic Foot Clinic, which included a specialist shoe-fitting service. And even today, the charity continues to fund vital research to prevent foot complications."

Professor Michael Edmonds, King's College Hospital

We’ve made living with diabetes easier

Diabetes doesn’t stop.

It can be complicated and confusing. It can be frustrating and exhausting.

But our research improves life for people with diabetes.

It has made injecting insulin easier. It has made checking blood glucose levels quicker and simpler.

We’ve helped people with Type 1 diabetes learn to get to grips with their condition by funding the development of education courses in the UK.

And we’ve been bringing advances in new technology, like the artificial pancreas, closer to everyday use for people with diabetes.

The research we’ve funded changes how people – here in the UK and across the globe – manage their diabetes and makes life easier for them.

“I think the burden placed on people with diabetes is underestimated by many. We have a huge responsibility to support people and I think the way we can do that most effectively is by doing research.”

Professor Simon Heller, University of Sheffield

"We wouldn't have got there if we hadn't had support from Diabetes UK. And today we need to push even harder for the next lot of advances."

Dr Sheila Reith,
Consultant Physician,
Stirling Royal Infirmary

We funded the first insulin pen

Who, where and when

Name:	Convenient Pocket Insulin Syringe
Research leaders:	Dr Sheila Reith, Dr John Ireland and Dr John Paton
Where:	University of Glasgow, Southern General Hospital Glasgow, Stirling Royal Infirmary
When:	1978–1983
Impact:	The way to give insulin was revolutionised

Back in the 1970s injecting insulin involved glass syringes, steel needles (you had to reuse) and drawing up insulin from a vial.

With a close family connection to Type 1 diabetes, Dr Sheila Reith knew the difficulties of injecting insulin every day, especially when travelling or away from home.

And with our funding, Dr Reith's idea for making this easier went on to improve the lives of millions of people who inject insulin.

Her idea was for a device which took insulin cartridges and could inject with a single push of a button. It would mean an end to drawing up insulin from a bottle and make one-handed injections possible.

Working with Dr John Ireland and Dr John Paton, together they developed a prototype insulin pen and found seven volunteers to test it [9].

But to prove their new device was effective, the trio knew they needed an independent trial and the ability to manufacture it on a far wider scale.

They turned to us.

Our funding paid for 100 pens, 5000 cartridges and a trial which would provide valuable feedback in the insulin pen's development*.

And by 1983, after a few design tweaks, the world's first insulin pen – Penject – was available.

Through the years the invention would inspire the development of new and improved insulin pens, benefitting too many people to count.

You can get some idea by knowing that in the UK alone, more than 400,000 people are prescribed insulin every year. The vast majority use an insulin pen. Millions more across the world do the same.

A brilliant idea, we helped make happen.

We're helping people manage their Type 1 diabetes

Who, where and when

Name:	DAFNE (Dose Adjustment For Normal Eating)
Research leaders:	Professors Simon Heller and Stephanie Amiel, Dr Sue Roberts
Where:	Sheffield Teaching Hospitals, Northumbria Healthcare Trust and King's College Hospital
When:	2000–2002
Impact:	Type 1 education course has benefited more than 40,000 people so far

Living with Type 1 diabetes is complicated. You need the right amount of insulin every single day.

Too much insulin means low blood glucose levels and hypos. Too little insulin means high blood glucose levels which, over a long period of time, can lead to complications.

Determined to help people with Type 1 find this tricky balance, Dr Sue Roberts, and Professors Simon Heller and Stephanie Amiel decided it was time to collaborate.

Inspired by an education programme in Germany, we funded the trio to develop a life-changing education course in 2000.

That course would go on to be known as DAFNE, which has now supported more than 40,000 people.

Over five days, in small classes, people learn how to adjust their insulin doses to suit their lifestyle. It gives people the confidence to match their insulin to what they eat, for when they exercise, if they're ill and all of the other things in life which might cause blood glucose levels to change.

The results of the first trial showed people significantly improved their blood glucose control after going on the course[10]. That means fewer hypos, fewer serious hypos and less time spent with blood glucose levels at dangerously high levels[11]. And, crucially, it means a better quality of life.

With such promising results we successfully campaigned for DAFNE to be delivered nationwide. And since then around 10% of all people with Type 1 diabetes in the UK have been on the course.

Professor Simon Heller explained: "Diabetes UK was essential in supporting DAFNE. If we didn't have the original grant, DAFNE wouldn't have been introduced."

"I wish I'd done the course a lot earlier. DAFNE could have saved me a lot of trips to hospital when I was younger."

Olivia Clark Young, DAFNE participant

We've made blood glucose checking simple

Who, where and when

Name:	Handheld glucose meter
Research leader:	Professor Anthony Turner
Where:	Cranfield University (formerly Institute of Technology) and the University of Oxford
When:	1981–1987
Impact:	Handheld blood glucose meters became the norm

Little more than 50 years ago, if you had diabetes, checking your glucose levels at home involved a urine test and a small science experiment.

Today, that same task takes a few seconds and can be done anywhere at any time. It's now an essential part of diabetes management for millions of people all over the world.

It was made possible thanks to our research fellow, Professor Anthony Turner. Through the 1980s we supported him and his team** to create the world's first handheld electrochemical glucose meter.

Before then, machines that could measure blood glucose levels electrochemically existed but were expensive, big and only possible to use in laboratories.

With our funding, work began to make that technology available not just in the home, but in the pocket.

"My Diabetes UK fellowship allowed me to establish a world-leading biosensor team and drive the entire field forward, generating new innovations for people with diabetes," explained Professor Turner.

The progress his team made meant that by 1987, one of those innovations was an electrochemical blood glucose meter that fitted in the palm of your hand and could be mass produced[12].

The technology changed how people with diabetes, especially Type 1 diabetes, managed their condition. It meant that in just a few seconds people could see their blood glucose levels and decide what treatment they needed.

Asked about his work, Professor Turner said: "One of the wonderful things about working in this field is knowing the number of people our work has helped. It is always a delight to meet people using our technology and the subsequent improved versions of it."

"Since the 1980s the advances in the equipment available have been life-changing for me. I started using a blood glucose meter instead of daily urine testing. This made my life and diabetes control so much easier and far more precise. It was a big step forward."

Peter Davies, member of a Diabetes UK Clinical Studies Group who has had Type 1 diabetes for more than 60 years.

We’re making the artificial pancreas a reality

Who, where and when

Name:	The artificial pancreas
Research leaders:	Professors Sir George Alberti, Harry Keen, John Pickup, John Parsons, Helen Murphy and Dr Roman Hovorka
Where:	Universities across the UK
When:	1977–ongoing
Impact:	We’re even closer to making the artificial pancreas an everyday piece of technology

One of the most difficult things about Type 1 diabetes is having to think like a pancreas.

You need to work out the right amount of insulin for you at all times, judging what you eat, what you’re doing and how you’re feeling.

Perfectly tiptoeing along this fine line every minute of every day is impossible.

The idea of an artificial pancreas, which takes care of all of that, has existed since the 1960s. And we’ve been improving the technology that sits behind it since the beginning.

In 1977 we purchased the UK’s first artificial pancreas to help Professor Sir George Alberti stabilise blood glucose levels for people with Type 1 diabetes during surgery and childbirth.

A year later, his team showed that people with Type 1 diabetes could use an insulin pump to improve blood glucose control[13]. Insulin pumps are now used by tens of thousands of people in the UK to manage their Type 1 diabetes, and they remain an essential part of the artificial pancreas.

And while we’ve looked for ways to make sure technology available today benefits as many people as possible, we’ve continued to fund research to develop the artificial pancreas further.

In 2007 we backed one of the world’s first trials in this area, led by Dr Roman Hovorka, showing adults with Type 1 diabetes could use an artificial pancreas at home without medical supervision[14]. Prior to this, it had only been used in a hospital setting or monitored remotely.

We also funded research to find out how the artificial pancreas could help women with Type 1 diabetes during pregnancy, where managing the condition is even more challenging.

Professor Helen Murphy’s trial showed the device was safe and improved blood glucose control in 16 expectant mothers who took part, and, most importantly, led to successful births[15].

“I noticed that my blood glucose levels were within target range for much more of the time after I entered the study. I genuinely believe that without the study we may not have the family that we now have today.”

Laura Carver,
artificial pancreas clinical trial participant

We’re taking big steps towards ending diabetes

A cure for diabetes means no more insulin, no more medication.

It means no more hypos or complications, or the fear of experiencing them.

It ends the relentless mental strain of diabetes. Day in. Day out.

It means longer lives.

But it’s unlikely a cure will suddenly just be discovered.

In reality, ending diabetes will involve solving a series of different puzzles that will, together, change the lives of people with the condition forever.

And we’re getting closer to solving some of those puzzles.

We have many more steps to take but we are on the right path to ending diabetes.

“Diabetes UK’s support for research has been very important in so many ways, from funding the original DAFNE trial to enabling islet transplantation. But their support goes much further than that, because, through their range of funding schemes, they invest in people. People who will go on to become the diabetes researchers and healthcare professionals of the future.”

Professor Stephanie Amiel, King’s College London

> “It’s made a big improvement to my diabetes. I’m not testing my blood sugar levels as often as I used to and I’ve got some signs of hypos back. I hope to hear that the islet transplants would eventually work better and you’d be able to live normally with the new islets.”
>
> **Bruce Attack, recipient of islet transplants**

We’re helping people with Type 1 diabetes produce their own insulin

Who, where and when

Name:	Islet transplants
Research leaders:	Professors Stephanie Amiel, James Shaw and Paul Johnson, Dr Roger James, Dr Stephen Lake
Where:	Universities across the UK
When:	1989–ongoing
Impact:	Has helped people avoid severe hypos and make their own insulin

If we’re going to find a cure for people with Type 1 diabetes, we need to find a way to help people produce their own insulin.

Islet transplants, where insulin-producing cells are transplanted into people with Type 1 diabetes, already exist.

We’ve backed research into islet transplants since the very beginning, investing around £2.3 million in the last 10 years alone.

Islets are clusters of cells that contain insulin-producing cells. Scientists can extract islets from a donated pancreas, transplanting them into the liver of a person with Type 1 diabetes. The donated islets then produce insulin to control blood glucose levels.

Diabetes UK scientists, led by Dr Roger James and Dr Stephen Lake, developed a way to collect islets for transplant in 1989, a method still regarded as the gold standard today[16].

Soon after the first successful transplants in Canada, we launched the UK Islet Transplant Consortium, which now includes seven clinical teams across the country.

We then funded a team led by Professor Stephanie Amiel to carry out the UK’s first islet transplant in 2005. By 2008, thanks to the success of the Consortium, islet transplants were made available on the NHS for people with Type 1 who had lost their hypo awareness and couldn’t avoid severe hypos.

Islet transplants help people avoid severe hypos and temporarily make enough insulin to reduce or even stop the amount they inject or pump.

We now fund scientists to develop new ways of making transplants more efficient, accessible and effective – so they can benefit more people.

Dr Richard Oram, found that most people with Type 1 still produce tiny amounts of insulin. This opens up possibilities for regenerating cells in the pancreas in the future, if the immune attack against them can be prevented[17].

And we’re working on that too (see page 28).

We're stopping Type 1 diabetes in its tracks

Who, where and when

Name:	Type 1 immune system
Research leaders:	Professors Gianfranco Bottazzo, Des Johnston, Colin Dayan, Susan Wong and Mark Peakman, Dr Tim Tree
Where:	Universities across the UK
When:	1979–ongoing
Impact:	Moving closer to preventing and stopping Type 1

Type 1 diabetes happens when someone's immune system attacks their insulin-producing cells, leaving them unable to produce the insulin they need to live.

If you can prevent the immune system attack, scientists believe you can prevent Type 1 diabetes.

And it was Diabetes UK scientists led by Professor Gianfranco Bottazzo who, in 1979, added vital evidence to this theory[18].

Just 20 years later our then Clinical Fellow, Professor Mark Peakman, found key molecules involved in the immune attack and began working toward the first potential vaccine[19].

Our researchers are now developing treatments that target the parts of the immune system responsible for destroying insulin-producing cells, leaving the 'good' parts intact.

This sort of treatment is called immunotherapy. If successful, it would effectively mean a vaccine for Type 1 diabetes.

To take us closer, we invested £2.8 million into the Type 1 diabetes Immunotherapy Consortium in partnership with JDRF (with support from Tesco) in 2014.

The funding has allowed Dr Timothy Tree to set up specialist labs to study samples from all UK immunotherapy trials, to speed up the development of new treatments.

It has allowed Professor Colin Dayan to set up 15 clinical trial teams to recruit for and run immunotherapy trials, and train teams to lead future trials.

And it's helping Professor Des Johnston to find ways to recruit people newly diagnosed with Type 1 diabetes and their families into new immunotherapy trials.

Combined with research to find ways for people with Type 1 diabetes to produce their own insulin, it could offer a future free of injections and glucose checking.

"I'm extremely honoured to receive the highly prestigious Harry Keen Fellowship award from Diabetes UK. The key question I'm asking as a Harry Keen Fellow is: why do some people develop an immune attack so very early in life? I hope the answer to this question will provide vital insight into why Type 1 diabetes develops."

Dr Richard Oram, Diabetes UK Harry Keen Fellow, University of Exeter Medical School

"I'm absolutely over the moon that I've been able to put my diabetes into remission. Following the diet for 17 weeks was one of the most challenging things I have ever done, but it's changed my life. I now live a healthy and active life to ensure that I stay in remission."

Isobel Murray,
one of the DiRECT participants

We're putting Type 2 diabetes into remission

Who, where and when

Name:	DiRECT (Diabetes Remission Clinical Trial)
Research leaders:	Professors Mike Lean and Roy Taylor
Where:	The University of Glasgow and Newcastle University
When:	2013–ongoing
Impact:	Developing a treatment to put Type 2 diabetes into remission

Since 1996 the number of people with diabetes in the UK has more than doubled. And that's almost entirely down to the dramatic increase in Type 2 diabetes.

More people with diabetes means more heart attacks, strokes, blindness, kidney failure and amputations. More lives changed forever. It also means more pressure on the NHS.

And that's why our largest single research investment has been a clinical trial to see if Type 2 diabetes could be put into remission for the long term.

First, in 2009 we backed a small study led by Professor Roy Taylor which tested whether significantly restricting calories could put Type 2 diabetes into remission.

In those who took part, the amount of fat around their liver and pancreas dropped and their blood glucose levels returned to normal[20].

We then committed £2.5 million to test the long-term effects of intensely managing weight on achieving remission of Type 2 diabetes: the DiRECT study.

After losing weight using low calorie diet supplements, people received long-term support to reintroduce food and maintain their weight loss.

In 2017 the first set of results showed almost half of those on the programme were in remission 12 months after starting the diet[21].

If, as the results so far suggest, we can put Type 2 diabetes into remission and keep it there, it will completely change how the condition is treated.

But there's more we need to find out.

And that's why we've funded more research into how long remission can last, what's happening inside the body, and what the costs might look like for the NHS.

For now, almost half of those who took part in the programme are living a life free of Type 2 diabetes.

For millions worldwide, our research brings hope that one day soon they could too.

We're building our knowledge of diabetes

To fight diabetes, we need to know everything we can about diabetes.

And that means establishing world-leading research centres across the UK to make sure diabetes research is at the top of the agenda.

It means focusing in on minute details, down to our individual genes. The millions we've invested in genetics research has revealed just how complex diabetes is and allowed us to find out more about who's at risk of diabetes and why.

One day, diabetes treatments won't be one size fits all. And we will have played a vital role in that movement.

"My family is affected by Type 2 diabetes. It seems to be genetic on my dad's side. I don't want people to have to live with diabetes for their whole lives – that's why I decided to study diabetes research. I'm so interested in research and first, I want it to answer the question: how can we prevent people getting Type 2 diabetes in the first place?"

Tabassuma Akramul, Diabetes UK Community Champion and diabetes research student

> “Within just a few weeks of switching treatment, it became obvious that Jack’s blood sugar levels were really stable. He had stopped collapsing on the floor and he suddenly started smiling and laughing. For us, it really was a miracle.”
>
> **Emma, whose son Jack has neonatal diabetes**

We’re getting diagnosis and treatment right

Who, where and when

Name:	Exeter Monogenic Diabetes Team
Research leaders:	Professors Sian Ellard, Tim Fraying, Maggie Shepherd and Andrew Hattersley FRS CBE
Where:	University of Exeter
When:	1995–ongoing
Impact:	People with rare forms of diabetes have better treatments

In less than 30 years the University of Exeter has become known as a world-leading centre for diabetes research.

We supported the first research projects in the new Exeter genetics lab in 1995. Scientists used this funding to begin their research into a rare type of diabetes, caused by a single genetic change, called monogenic diabetes.

Four scientists formed the Exeter Monogenic Diabetes Team. Now there are 50 scientists carrying out research, testing genetic samples from around the world, and training healthcare professionals to recognise and treat monogenic diabetes.

Just one of the ground-breaking discoveries the centre has produced is finding the mutation behind a form of diabetes found in new-born babies, called neonatal diabetes[22].

In 2004 the team showed that people with changes in their Kir6.2 gene couldn’t release insulin from their pancreas.

Thanks to this discovery and further research, neonatal diabetes is now treatable with sulfonylurea tablets instead of insulin. That means no needles, no pumps, and dramatic improvements to people’s diabetes and quality of life.

In 2015 the team used our funding to show that the waiting time for genetic screening for neonatal diabetes had dropped from four years to just two months[23]. And that means people not having to wait years for the right diagnosis and treatment.

By the end of 2016, thanks to the team’s work and the better diagnosis methods they have developed, 4,621 people in the UK have been diagnosed with monogenic diabetes[24].

We’re building a clearer picture of diabetes

Who, where and when

Name:	The Warren Collections
Research leaders:	Professors Andrew Hattersley FRS CBE, Mark McCarthy, John Todd FRS and Peter Maxwell
Where:	University of Oxford
When:	1989–ongoing
Impact:	More understanding than ever around the family link to diabetes

By funding research into the genetics behind diabetes, we’ve begun to understand just how complex a condition it is.

Thanks to Alec and Beryl Warren, who left a gift to us in their will, we were able to set up the Diabetes UK Warren Collections into Type 1 diabetes, Type 2 diabetes and complications.

The collections are resources of genes from people with a family history of diabetes, helping to link different genes to the condition.

The Type 2 Warren Collection, involving over 2000 people from 843 families with a history of Type 2 diabetes, has had an important role in helping us build a picture of the genetics behind Type 2 diabetes.

Scientists used the collection to pinpoint factors that make some of us more prone to developing Type 2 diabetes.

For example, in 2007, scientists found that single changes in the FTO gene were linked to higher body weight and a higher risk of Type 2 diabetes, with the risk increasing by 50% if someone inherits the variation from both parents[25].

When people know their risk, they can do something about it. And, if people are at particularly high risk, we can make them aware of the importance of early diagnosis and treatment.

The samples and information gathered as part of the Type 2 collection have been the bedrock of genetic studies into Type 2 diabetes for over 20 years. But the scientists who led the project have their eyes firmly set on the future.

“Studies using the Warren Collection have now revealed almost 200 locations in the genome involved in Type 2 diabetes risk, providing novel insights into disease biology, and exciting opportunities for developing new ways of preventing and treating this condition.”

Professor Mark McCarthy, University of Oxford

> “The funding provided by Diabetes UK to researchers at an early stage of their career has had an enormous catalytic effect, with many of those researchers going on to make major advances in understanding how Type 2 diabetes develops.”
>
> **Professor Sir Stephen O’Rahilly, University of Cambridge**

We’re discovering more about rare types of diabetes

Who, where and when

Name:	The Institute of Metabolic Science
Research leader:	Professor Sir Stephen O’Rahilly
Where:	University of Cambridge
When:	1985–ongoing
Impact:	More is now known about rare types of diabetes

Along with investing in research, we invest in researchers.

We make sure the best young scientists want to research diabetes and we work with those who choose to, so they can become world leaders in their field.

Because, ultimately, we know that their work will benefit people with diabetes.

One of the researchers we’ve been with since the early stages of their careers is Professor Sir Stephen O’Rahilly.

He took his first steps into diabetes research when we funded his fellowship, which led him to publish some of the first ever studies on the genetics of Type 2 diabetes[26,27].

Professor O’Rahilly explained: “My Diabetes UK fellowship had an extremely important role in my research and career. Without it I would have quite likely returned to clinical practice and never had an opportunity to explore how research can improve our understanding of diabetes and make a difference for people living with the condition.”

But instead, following his fellowship, Professor O’Rahilly was able to set up his own lab.

He then went on to establish the Institute of Metabolic Science at the University of Cambridge where he still works today.

His lab discovered the cause of several rare forms of diabetes where the body doesn’t respond properly to insulin. These findings helped to advance our understanding of insulin resistance seen in the more common Type 2 diabetes.

Other work from the lab showed that mutations in single genes could cause children to be obese. Together, this research led to new ways of diagnosing and treating some forms of obesity and diabetes.

His work has also helped us understand why some people are more at risk of Type 2 diabetes than others.

Today, he’s recognised around the world for his discoveries.

And it all started with that fellowship back in 1985.

Stepping into the future

Your support has helped us fund research which has changed the lives of millions of people over the last 80 years.

So we can make an even bigger impact in the future, we've set up the UK's first clinical studies groups for diabetes.

The seven groups we've formed will bring together scientists, healthcare professionals and people with diabetes to decide on the key priorities and clinical trials which will make the biggest difference to people with the condition.

Together, they will help us to find gaps in research and provide solutions to the problems most important to people with diabetes.

This will help us become a more proactive research funder, directing investments to where they're needed most. As well as funding projects and fellowships, we can focus investment on key areas of research.

Combined, this approach will help us to have the greatest impact on the lives of people with diabetes in the future.

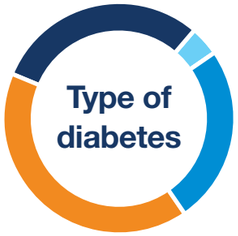
"The equipment people have now is fantastic and that's only because of the massive investment in research. And I love that research, I love it. It could change thousands of lives. It could change millions of lives."

Lis Warren, member of a Diabetes UK Clinical Studies Group who has lived with Type 1 diabetes for more than 52 years

Our support in numbers

A snapshot of our funding

In the last five years alone, we've supported 168 projects:



25% Type 1, £6.3m

41% Type 2, £10.7m

30% Both (eg complications), £7.7m

4% Other (eg gestational or monogenic diabetes), £1m

61% Lab-based research, £15.7m

39% Clinical research, £10m

56% Care, £14.3m

15% Cure, £3.9m

29% Prevent, £7.4m

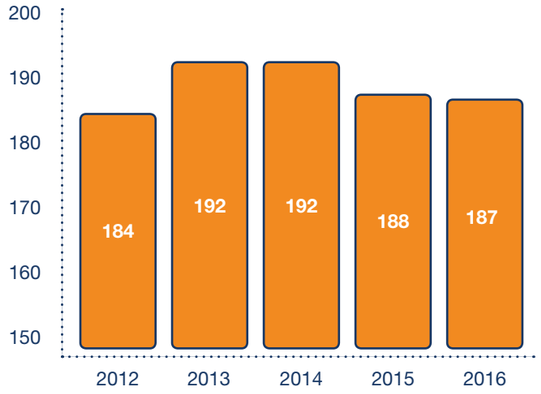
In the last ten years alone, we have invested over **£64 million** in diabetes research across the UK.

Over the last five years, we have supported **16 clinical trials.**

In the last five years, we've leveraged over **£5.5 million** through partnerships to invest in diabetes research*.

The impact of our publications

Research funded by Diabetes UK has resulted in **943 publications** (2012–2016).

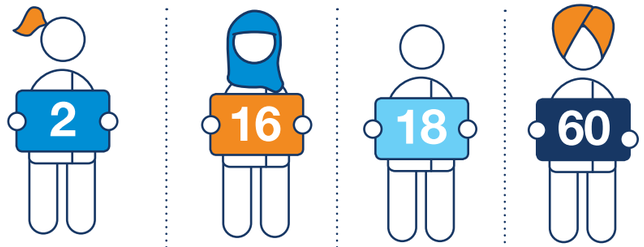


These publications acknowledging our funding have been cited **14,638 times**.

139 of these publications appeared in high impact journals**. Thousands of scientists were involved and they received **5,966 citations**.

The people that made it happen

In the last 10 years, we've invested £16.9 million in people.



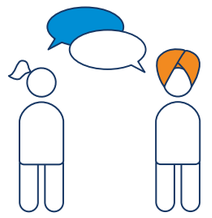
fellowships for intermediate-career clinicians

fellowships for early-career clinicians

fellowships for basic scientists

PhD students

We set up the Diabetes UK Grants Advisory Panel in 2009, where people affected by diabetes help decide which research projects we should fund. Since then, over **30 people** have been involved in reviewing more than **600** research applications.



We fund researchers all around the UK, at any one time* there are:

34 research institutions carrying out diabetes research

104 scientists leading research projects

19 PhD studentships

19 research fellowships

*Data obtained from Diabetes UK funding records (May 2017) **Journals with impact factor >10

Help us build a world where diabetes can do no harm

There has never been a more important time to support our research.

More people than ever have diabetes. A record 12.3 million people in the UK are at increased risk of Type 2 diabetes. And every two minutes someone in the UK is diagnosed with diabetes.

All of these numbers add up. Not just to the people affected or their parents, children, siblings and friends. Diabetes also costs the NHS £1 million an hour.

And for every £1 spent on diabetes, just 0.5p is spent on research.

You can help us change that.

With your continued support we can fund more trials, support more scientists and discover more ground-breaking treatments.

With your support we can improve the lives of millions of people with diabetes.

"We recently had the chance to show people affected by diabetes around our labs and to explain our work. The visit was an incredibly valuable and humbling experience for our team. The enthusiasm for our work was inspiring. It made us realise, again, that we have to keep pressing on and doing our very best for people living with diabetes."

Professor Noel Morgan,
University of Exeter Medical School

Thank you

I would like to pay tribute to the wonderful work that Diabetes UK and their supporters have done and will continue to be involved in.

In funding innovative and desperately needed research into each type of diabetes and its complications, their work has improved treatment for all of us who endure this condition and hopefully will bring us closer to a cure.

The many successes speak for themselves. When I look back at over 40 years of living with Type 1 diabetes, most of the extraordinary changes in my treatment, which have had an extraordinary impact on my life, are down to the work of Diabetes UK's research funding.

I have particular cause to say a heartfelt thank you to Diabetes UK for funding research into islet transplants for people with Type 1 diabetes, led by Professor Stephanie Amiel at King's College Hospital. Thanks to receiving three transplants at King's as part of that research project, I became the first person in the UK to be taken off insulin therapy.

But more importantly, I recovered my warnings of hypos, which is the greatest gift a person with Type 1 diabetes could be given.

It is my passionate desire to see everyone with diabetes, especially children, benefit from new treatments as I have done. It is therefore vitally important that Diabetes UK continues, and where possible, enhances its investment in research. I will do all I can to support this challenge, including financially, and I hope that others will find it possible to do the same."

Richard Lane OBE, Ambassador and Past President of Diabetes UK

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*An interview was held with Dr Sheila Reith in 2014.

**Professor Turner would like to acknowledge: John Higgins and Allen Hill; Tony Cass and Graham Davis; Bill Aston and Elliot Plotkin; James McCann, Bernie Triedel and Ron Zwanziger; along with many other colleagues who contributed as the programme grew.

For a world where diabetes can do no harm

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