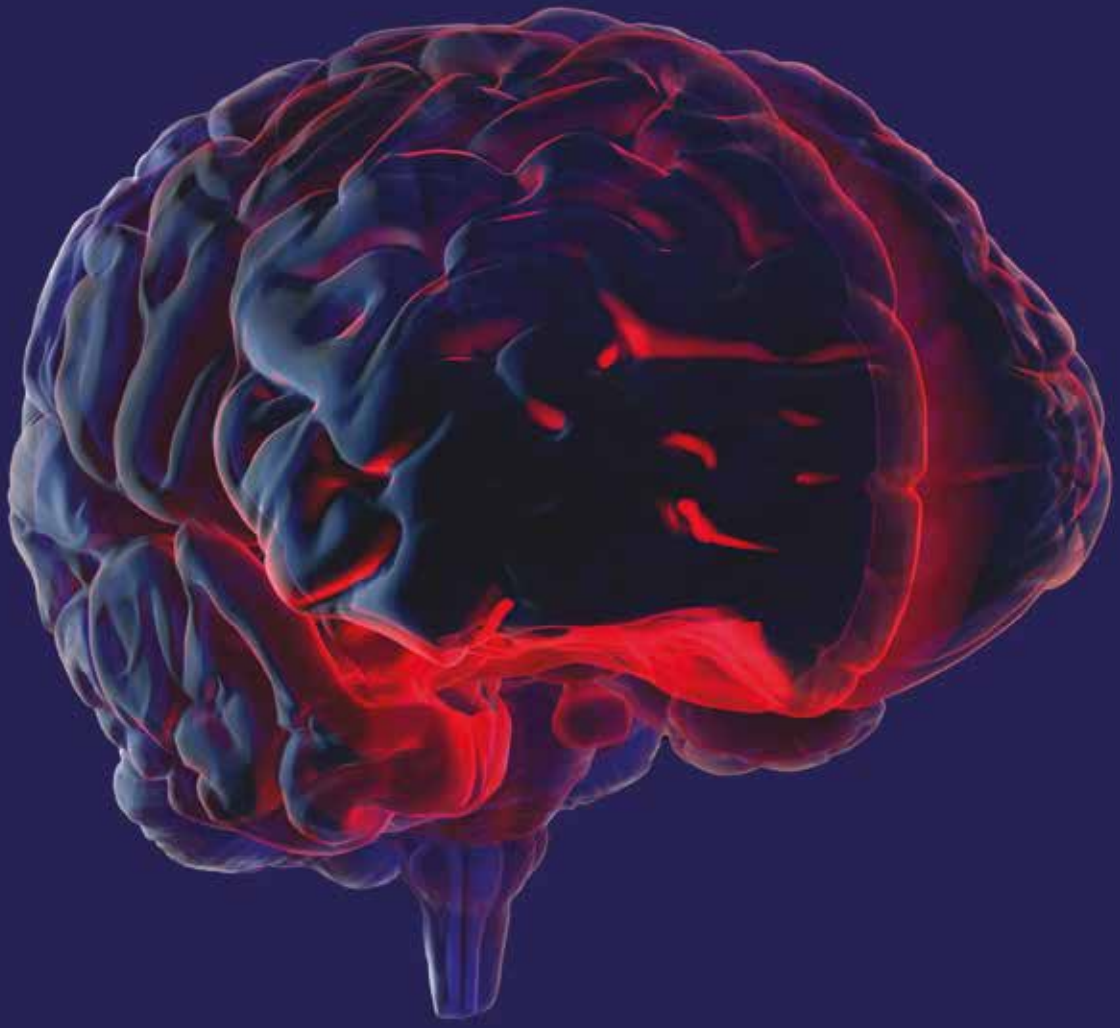
Brain Research UK



# Brain Research UK
Annual Review 2022/23

# Brain Research UK

## Our vision is a world where everyone with a neurological condition lives better, longer.

The brain is the most complex organ in our body. It weighs just 3lb, yet it controls our emotions, senses and actions, every single one of them. It is how we process the world around us. So when it breaks down, we break down.

It doesn't have to be this way.

There are hundreds of neurological conditions. We fund research to discover the causes, develop new treatments and improve the lives of those affected.

Let's unite to accelerate the progress of brain research. Today.

**1 in 6 of us**
has a neurological condition

**12,300**
people are diagnosed with a primary brain tumour every year

**2.6 million**
people live with the effects of traumatic brain injury or stroke

**65,000**
people suffer from cluster headache, the 'suicide headache'

*Note: all neurological facts in this report relate to the UK.*



# Welcome to our Annual Review

One in six of us has a neurological condition.

Brain Research UK is the leading dedicated funder of neurological research in the UK. We fund the best science to achieve the greatest impact for people affected by neurological conditions, to help them live better, longer.

During the year, we awarded research funding of £1,671,410 towards three new PhD studentships and four project grants, outlined on the following pages.

We collaborated with the Neurosciences Foundation to jointly fund one of the studentships at the University of Dundee and awarded joint funding with the Royal College of Surgeons to support a Fellowship at the University of Nottingham.

It is only thanks to the dedication of our amazing supporters that we are able to fund the vital research that is outlined in the following pages. Our flagship fundraising event, the London Marathon, took place in October 2022 with 299 runners completing 26.2 miles and raising a wonderful £635,137. For the first time, we hosted two evenings of Opera at Syon raising a superb £89,000; these were such a success that we plan to repeat these events next year.

We are extremely grateful not only to our inspiring supporters but also to the many volunteers who contributed so much to our work. I extend thanks to our Syon Committee members for so kindly choosing us to benefit from these exceptional events. We are indebted to the members of our Scientific Advisory Panel who generously give their time, as well as the many reviewers who are involved in the assessment of our funding applications, to ensure the best research continues to be funded.

In the following pages, we focus on research and highlight a few stories from our many extraordinary supporters without whom vital neurological research would not be funded.

Too many of us are touched by devastating brain conditions. My heartfelt thanks to everyone who supports our work and I look forward to all we can continue to achieve together in the future.

**Jim Gollan**
Chair of Trustees

# Strategy 2023–2026

## Our vision is a world where everyone with a neurological condition lives better, longer.

Brain Research UK is well positioned to fulfil its objectives and improve the lives of those affected by neurological conditions through the funding of essential research.

The UK fundraising market is a highly competitive, mature environment with a sophisticated target audience: the UK public, companies and trusts.

The pandemic disrupted charity income and we were not immune from this. We are now focusing on growth and diversification whilst also taking macroeconomic factors into consideration.

Today, even though we are still facing uncertainty both politically and economically, the need for funding of neurological research remains strong and our role in that is as key today as it has always been… perhaps even more so post-pandemic.

In March 2023, our Board of Trustees approved a new strategy for 2023–2026. Over the next three years, we will increase our fundraising income by investing in predictable and sustainable fundraising activities whilst keeping overheads as low as possible. We will focus on enhancing supporter loyalty, attracting new supporters and ensuring fundraising growth to enable increased funding of the best neurological research.

## Research

We will continue to fund high quality research in areas of unmet need, to nurture the next generation of neurological researchers and deliver translational impact within a five to ten year timeframe.

We will continue to fund world class, impactful neurological research, via national calls, within our three priority areas: brain tumours, acquired brain and spinal injury and headache and facial pain.

Through our national calls, we will continue to offer project grant funding and will introduce a new post-doctoral fellowship scheme, to replace our previous PhD studentship scheme and to address a funding bottle-neck for post-docs looking for independence.

### Brain tumours

We will fund research that aims to improve clinical outcomes for patients with primary tumours of the brain or spinal cord.

We will fund research that addresses the fundamental causes, mechanisms, diagnosis or treatment of primary tumours of the brain or spinal cord and associated neurological complications.

### Acquired brain and spinal cord injury

We will fund research that aims to protect or restore function in patients with acquired brain or spinal cord injuries.

We will fund research that addresses the mechanisms of the injury, the mechanisms of the recovery process and determinants of outcome.

### Headache and facial pain

We will fund research that aims to improve the management and treatment of headache or facial pain disorders.

We will fund research that addresses the fundamental causes, mechanisms, diagnosis or treatment of headache and facial pain.

## Fundraising

We will focus on developing existing flagship streams, such as the London Marathon, but will also seek to diversify our income streams.

We will strengthen and improve the loyalty of our existing supporters and invest in the acquisition of new supporters, to ensure growth and longevity whilst maximising engagement opportunities across all fundraising streams.

## Collaboration

We will work collaboratively across both fund-seeking and grant-making opportunities, with like-minded organisations with shared purpose.

We will continue to be an active member of a neuro charity network seeking and building successful, collaborative partnerships so our research has a greater benefit for those with a neurological condition.

## Communications

We will continue to boost and diversify our communications activities to raise awareness, increase brand recognition, improve loyalty and attract new supporters.

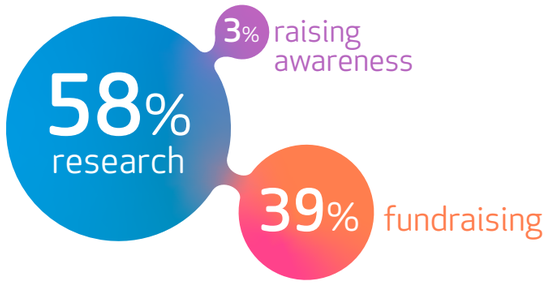
We will continue to promote our brand through investment in social media campaigns and will develop new activities such as public relations and an ambassador programme.

## Organisation and infrastructure

We have a stable and agile staff team as well as updated systems and infrastructure.

We will continue to monitor, and where necessary improve, our working practices and the way we work as a team to ensure maximum efficiency and performance.

### How we spend our funds



# Our research

## Our aim is to improve the lives of people living with neurological conditions, to help them live better, longer.

**Our objectives allow us to fund research into the full range of neurological conditions. This is a broad remit, within which some areas have a higher profile and a higher level of research funding than others. To maximise our impact, we are focusing funding on three priority research areas.**

## Priority areas

Following a review in 2016, we identified three disease areas in which there is a particular disparity between the level of unmet need and the level of research investment: **brain tumours, brain and spinal cord injury, and headache and facial pain.**

We decided to focus our research funding on these three areas in the short- to medium-term, rather than spread our funding across the full range of neurological conditions. Each year since 2016, we have run national calls for applications for project grants and PhD studentships focused on these three disease areas.

This year, we invested £1.56 million in research in these priority areas, in the form of four project grants and three PhD studentships. This exciting new research is outlined on the following pages.

In addition, we funded our third joint fellowship with the Royal College of Surgeons of England. Their Surgical Research Fellowships offer junior trainee surgeons the opportunity to obtain research training, providing one year's salary and some research costs. We co-funded neurosurgical trainee Milo Hollingworth, who is carrying out research focused on the brain tumour glioblastoma.

## Research strategy

This year, we carried out a review of our research strategy. The level of need for the three priority areas remains the same and the funding landscape remains challenging in each. Accordingly, we determined to maintain our focus on the same three priority areas.

The major change to our strategy is a shift from the funding of PhD studentships to post-doctoral fellowships. A key component of our research strategy is our investment in the **future** of brain research, to build capacity in under-funded areas. In keeping with this, we have funded 16 PhD studentships since 2016. Through these studentships, we have supported outstanding young researchers to develop careers in our three priority research areas.

The shift to funding post-doctoral fellowships remains in keeping with our aim of building research capacity, but will enable us to fund more impactful research and address a critical bottle-neck in funding, helping to retain talented researchers. We expect to launch the first call for applications under the new scheme in spring 2024.

We will continue to encourage applications from early career researchers under our project grant calls.

## Endowment funding

When the Brain Research Trust was founded in 1971, it was to support the development of a multi-disciplinary basic research programme at the Institute of Neurology, to complement and underpin the clinical research being carried out at the National Hospital for Neurology and Neurosurgery and University College London Hospital.

Substantial founding donations were received from a number of key individuals and organisations including the Anne and Michael Sobell Charitable Trust, the family of Graeme Watts and the family of Miriam Marks. These donations established endowments that have supported research ever since at what is now UCL Queen Square Institute of Neurology.

No new awards were made this year but the Institute of Neurology team has invited applications for a second round of Miriam Marks Fellowships, with the expectation that two Fellowships will be awarded during 2023.

# Brain tumours

## Every year in the UK, 5,500 lives are lost to brain tumours. That is 15 every day.

Research into brain tumours has been under-funded for decades, holding back progress in treatment and survival. It is clear to see how sustained investment in research into cancers such as breast cancer, prostate cancer and leukaemia has transformed survival. Yet, survival for patients with brain tumours remains shockingly low: only 40 per cent of adults survive one year from diagnosis and only 12 per cent survive five years. **This is why we are prioritising research into brain tumours.**

### Funding research in brain tumours

We want to improve survival by funding research that advances understanding of the mechanisms underlying tumour development, and helps develop better ways to diagnose and treat these tumours.

Since making brain tumours a research priority in 2016, we have invested £3.1 million in vital research to address these aims.

### New project grant

### Reducing the damage caused by radiotherapy in brain tumour patients

**Professor Anthony Chalmers, University of Glasgow and Professor Kay Williams, University of Manchester**

Radiotherapy is an effective treatment for many brain tumours but it can also damage the healthy brain, causing serious side-effects.

We know that the damage is caused by inflammation, which continues even after the radiotherapy has finished. This inflammation causes irreversible damage to cells and structures within the brain, and eventually leads to problems with memory, concentration and personality change.

This project focuses on a drug called AZD1390, which is currently being trialled in combination with radiotherapy to see if it can help patients with glioblastoma live longer.

The effect of this combination on the healthy brain is not known, but some recent experiments suggest that AZD1390 might mitigate the side-effects of brain radiotherapy.

If the team can confirm the protective effect of AZD1390 in further experiments, they will unpick exactly how the drug is having its effects.

The research will help guide the future use of the radiotherapy-AZD1390 combination in glioblastoma, and may also benefit patients with other types of brain tumours.



### Yog's story

Iorwerth ('Yog') was diagnosed with an apple-sized brain tumour in 2012.

Doctors initially attributed his worsening headaches to migraine. With the onset of other symptoms, including early morning vomiting and memory issues, his sister, an ex-nurse, intervened and an MRI scan revealed the presence of a tumour, a meningioma.

*'Within hours the NHS machine kicked into action and my case was given urgent status. Within ten days I had further MRI scans, and a craniotomy to remove the tumour.'*

In October 2022, he completed the London Marathon as part of Team #BrainResearchUK.

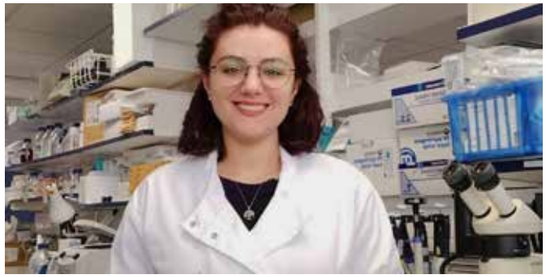
*'As I approach 50 and have just marked the 10th anniversary of my craniotomy, I felt it was fitting to try and contribute more to the cause.*

*All the money going into research has the potential to improve our understanding of what is basically a massively complicated bit of biological machinery. Without continued research we cannot make the further strides that will help others be diagnosed earlier and have better treatments available.'*

# Brain tumours

## New PhD studentships

### The role of the enzyme Fam20C in glioblastoma



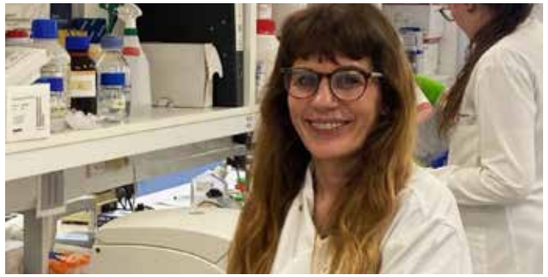
**Febe Ferro, University of Dundee**
Fam20C is an enzyme that has been shown to be remarkably elevated in glioma tumours.

Gliomas lacking this enzyme do not grow well in mouse brains – its absence significantly extends survival. This suggests that Fam20C is important for tumour growth and that blocking its effects could be a way to inhibit growth.

Working with supervisor Dr Sourav Banerjee, Febe will investigate Fam20C in more detail, to understand its effects on the different cells that make up the tumour and fully understand its role in glioblastoma growth and development. This could open the way to the development of therapies that target these processes.

*This studentship is funded in partnership with the Neurosciences Foundation, in memory of Mrs Daphne Merrills, who made a generous donation to support research in glioblastoma, having lost both her husband Austin, and her younger daughter, Victoria, to the disease.*

### Understanding the developmental origins of diffuse midline glioma



**Dr Kate Atkinson, University of Birmingham**
Diffuse midline glioma, DMG, is an incurable, aggressive childhood brain cancer. Average survival is less than one year from diagnosis, and only one in ten children survive for two years.

Radiotherapy is used to prolong the life of young patients, but is not curative.

Effective treatments for this devastating tumour are desperately needed but will only come once we understand its causes.

Kate's research is focused on a gene mutation known as *H3K27M*, which is key to the development of DMG. She wants to understand how the mutation results in cancer.

Working with supervisor Dr John Halsall, she will model the effects of this mutation during brain development to explain how it leads to cancer and how its effects could be targeted with drugs to treat DMG.



## Brain Research UK and Royal College of Surgeons of England Joint Fellowship

### Imaging of drug pharmacokinetics in the CNS

**Mr Milo Hollingworth, University of Nottingham**
Neurosurgical trainee Milo Hollingworth was awarded this joint fellowship in 2022 to take forward research aimed at improving the way drugs are delivered to the site of brain tumours.

When administering drugs for the treatment of brain diseases, it is important to know where the drugs are going and in what concentration. Otherwise, we don't know whether any lack of effect is because the drug itself isn't effective or because it isn't getting to the right place, in a high enough concentration.

Getting drugs into the brain is complicated by the presence of the blood-brain barrier (BBB), which protects the brain from harmful substances in the blood but also hampers the passage of drugs. The BBB has been an important aspect of failed therapies in the past, not just for brain tumours but also for other neurological conditions.

Milo is working on the development of drugs that can be tracked using magnetic resonance imaging, so that doctors can tell how much of the drug is reaching the tumour. Being able to track drug delivery in this way would enable doctors to optimise dosing schedules, helping to improve efficacy and reduce toxicity. It would also aid the pre-clinical testing of new drugs by identifying drug-delivery failure early in translation.

# Brain and spinal cord injury

## Advances in emergency care mean that many more people now survive serious brain and spinal cord injuries – including traumatic injuries from accidents, assaults and falls, as well as strokes and other non-traumatic injuries.

This welcome improvement in survival means that there are many people living with long-term effects of these injuries. The range of effects is broad and includes difficulties with basic bodily functions, movement, speech and cognition. Many people have a severely compromised quality of life and need long-term rehabilitation to maximise function and independence.

### Funding research in brain and spinal cord injury

We have highlighted brain and spinal cord injury as an area in need of increased research investment.

**We want to improve quality of survival by funding research to help understand how to repair the brain and spinal cord, to help people make the best recovery from their injury – whether this is being able to walk again, use their arms, communicate, or recover senses or memory.**

Since making brain and spinal cord injury a research priority in 2016, and thanks to the remarkable support of people like Scott, opposite, we have invested more than £4 million in research to help us understand how to repair the brain and spinal cord.

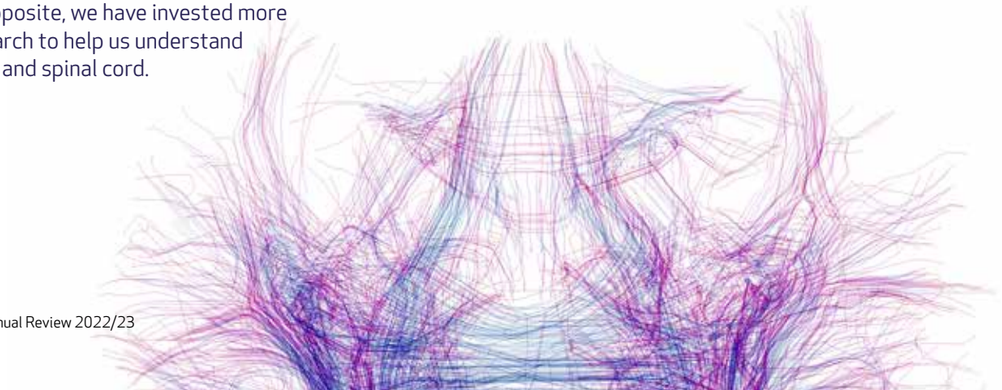
### Spotlight on traumatic brain injury

Head injury is the leading cause of death and disability in people aged one to 40 years.

There are around 4,000 deaths from traumatic brain injury (TBI) every year in the UK. A further 1.3 million people in the UK are living with disabilities caused by TBI.

Scott made a remarkable recovery from the injury that left him fighting for his life. But others are less fortunate.

Whilst advances have been made in terms of saving the lives of brain-injured patients, there remains much to be done in terms of understanding how to repair damage to the brain and restore function and quality of life in survivors.





### New project grant

### Understanding the role of blood vessel damage in traumatic brain injury

**Dr Virginia Newcombe, University of Cambridge**

Dr Newcombe treats people with brain injuries and is leading a research team that aims to improve outcomes by enabling doctors to better characterise injuries. This will then guide the development of effective treatments.

One of the problems in treating brain injury lies in the complexity and diversity of the injuries. The nature of the damage varies greatly between patients who have overtly similar injuries.

It is increasingly apparent that injury to the brain's blood vessels contributes to the outcomes seen after TBI. It is also known that many patients with TBI are prone to bleeding. This is very important as continued bleeding in the brain causes irreversible damage and worse outcomes for patients.

The team will use imaging data and blood tests taken at different time points to understand more about the changes that take place in the brain following injury, and how these changes correlate with patient outcome.

This will provide a better understanding of the extent and consequences of blood vessel injury following a TBI, enabling a better estimate of injury severity and potentially opening up trials of new treatments.

### Scott's story


Scott was on his way to the gym when he was in a car crash that left him fighting for his life. With multiple bleeds on the brain and a serious leg injury, he was placed in a medically-induced coma at the scene before being airlifted to hospital. His injuries were so severe that his parents were warned he might never wake up.

Aged just 22, Scott spent the next three months in hospital, during which time he underwent major brain and orthopaedic surgery. He was then transferred to a neurological rehabilitation unit where he spent six months learning to walk and talk again, as well as how to feed and dress himself. That was in 2016.

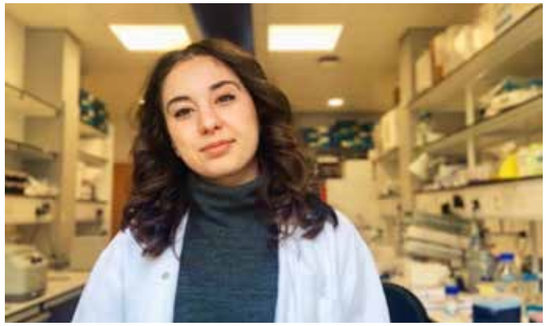
Remarkably, in October 2022, Scott completed the London Marathon as part of Team #BrainResearchUK. Another milestone on an astonishing journey to recovery, one that has defied doctors' expectations.

Although he has been left with lasting effects from the brain injury, Scott feels indebted to the medical staff who saved his life that fateful day, as well as to the friends and family who have supported him on his long and arduous recovery. He also recognises the huge importance of research in saving lives and improving recovery after brain injury.

# Brain and spinal cord injury

## New PhD studentship

### Stimulation of neural stem cells to facilitate brain repair



**Giada Vanacore, The Gurdon Institute, University of Cambridge**

The cerebellum is an area at the back of the brain that regulates movement, coordination and balance, as well as many cognitive and social functions. Damage to the cerebellum can impact all of these functions.

In newborn mice, the cerebellum is highly regenerative and can recover from the loss of its cells but this regenerative potential greatly reduces in adulthood.

Giada is working with supervisor Dr Sumru Bayin to study a population of 'progenitor' cells in the cerebellum that are able to generate and mature into specific cell types. Research in the Bayin lab has identified a population of progenitors in the newborn cerebellum that is responsible for regeneration following major cell loss.

The team believes that it could be possible to induce regeneration and repair injury in the adult brain by activating the developmental mechanisms that facilitate the regeneration of the newborn cerebellum. This will fill a major knowledge gap in our understanding of regenerative mechanisms in the brain, and determine the value of a new therapeutic approach to brain injury.

### Spotlight on spinal cord injury

Around 1,000 people suffer a spinal cord injury (SCI) every year in the UK, and it is estimated that there are around 40,000 people living with the effects of such an injury.

An injury to the spinal cord causes an interruption or complete block of the normal messages that pass between the brain and parts of the body. As a result, people living with SCI have limited to no ability to feel or move their affected limbs. The function of organs such as the bladder and bowel are also affected, severely impacting quality of life.

New treatments and techniques are needed for the management of spinal cord injuries, to restore function and improve quality of life for those affected.



## New project grants

### Restoring movement after ischemic spinal cord injury

**Dr Philippa Warren, King's College London**

'Ischemic' spinal cord injuries occur when blood flow to the spinal cord is restricted. This starves cells of blood and oxygen, leading to cell death.

These injuries most commonly arise as a surgical complication. The consequences can be devastating and include paralysis of the legs, incontinence, impotence and increased risk of death. There is no effective treatment for this type of injury. In this project, Dr Warren and colleagues are setting out to answer key questions about the way that these ischemic injuries develop. They will compare the changes with those that occur following injuries caused by a hit to the spinal cord, which are more commonly studied.

This work will address crucial knowledge gaps, and the team will use their findings to work out a treatment strategy for ischemic injuries. They will then test this strategy in their experimental model to study its effect on restoring spinal cord structure and function.

### Electrical stimulation to improve bladder control after spinal cord injury

**Dr Lynsey Duffell, University College London**

Improving bladder and bowel management is a priority for those living with spinal cord injury.

Existing management techniques are inadequate, and around half of those affected continue to experience incontinence, constipation and infections.

Dr Duffell and colleagues are trialling electrical stimulation to improve bladder control. We already know that if we stimulate one of the nerves involved in bladder control, we can switch off an unwanted bladder contraction.

In this project, the team will test new devices called epidural stimulators, which involve implantation of electrodes close to the spinal cord. These apply small electrical pulses to activate the nerves that control the bladder and bowel.

Volunteers will use this technology at home, in combination with bladder training exercises. If successful, this will be an important advance for patients, with significant potential to improve quality of life.

# Headache and facial pain

**Headaches are extremely common, nearly everyone has one occasionally. When they occur repeatedly, they are a symptom of a headache disorder. More than 20 million people in the UK, two in five adults, are affected by a headache or facial pain disorder.**

Due to their prevalence, headaches are one of the leading causes of disability. New treatment approaches are desperately needed if we are to lift this burden of disability.

## Funding research in headache and facial pain

A lack of research investment has hampered progress in the treatment of headache and facial pain, which is why we are prioritising research into these disorders.

**We want to improve the lives of those affected by funding research that addresses the causes and mechanisms of headache and facial pain, and advances diagnosis and treatment of these disorders.**

Since making headache and facial pain a research priority in 2016, we have invested £1.3 million in much-needed research to advance understanding of these disorders and how to treat them.

We receive fewer funding applications in headache and facial pain research than our two other priority areas. Following our competitive review processes, none of these applications were selected for funding this year.

Nonetheless, we continue to recognise the need for research in headache and facial pain, and to increase capacity in the field. We continue to encourage applications from those working in the field and hope to report the funding of more headache research next year.

## Increasing capacity in headache and facial pain research

Included in the £1.3 million awarded over the last seven years are five PhD studentships. These have gone to aspiring young headache researchers, investigating different aspects of headache and facial pain.
The studentships are an important way of increasing research capacity in the headache field, by providing funding to support young scientists on this important step towards a career in headache research.

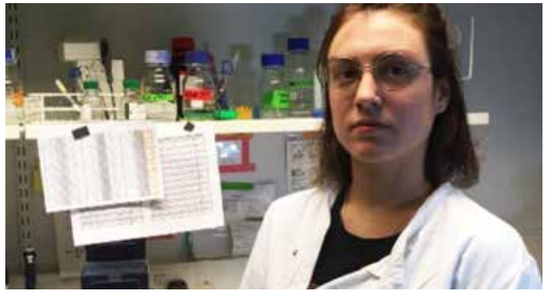


The first of our PhD studentships in headache was awarded to **Dr Emer O'Connor** in 2017.

Emer's PhD research was focused on cluster headache, a rare and debilitating headache disorder described as one of the most painful conditions known to man. Having encountered patients with cluster headache as a junior doctor, Emer was struck by the terrible impact of this disorder on the lives of those affected.

Emer was awarded her PhD in 2021, having completed an ambitious and large-scale programme of work focused on the genetics of cluster headache. Her research has provided new insight into factors influencing the development and clinical course of cluster headache, and has gained her recognition in the field. Emer has now taken up a neurology trainee post in London and plans to continue her research in cluster headache.

**Oakley Morgan** was awarded funding in 2018 for research focused on the relationship between stress, facial pain and migraine.



Oakley's research focused on a protein called FKBP51, which was already known to play a role in the body's response to stress and was previously identified by her lab as a driver of pain.

Considering the well-known link between stressful experiences and increased chronic pain prevalence in humans, Oakley set out to out to evaluate whether FKBP51 is key to their interaction.

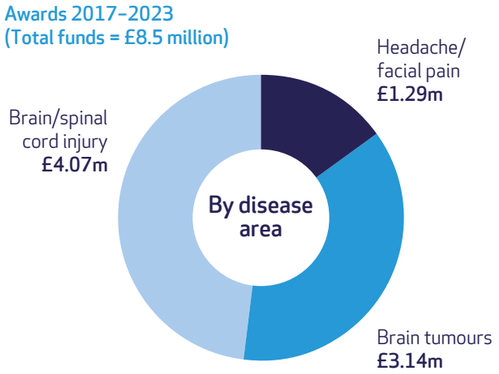
Her findings suggest that FKBP51 is an important protein involved in the influence of stress on pain, and may aid in the development of novel therapeutic approaches for the treatment of stress-related chronic pain conditions, including migraine.

Oakley was awarded her PhD in 2023 and has now taken up a research post at McGill University in Montreal, where she will continue her focus on pain research.

# Research impact

**Since 2017, we have invested £8.5 million in research in our three priority areas through our nationally competitive project grant and PhD studentship schemes.**

We have completed seven cycles of PhD studentship funding and six cycles of project grant funding, making a total of 39 awards to researchers at centres around the UK.




## Completed research projects

Almost all of our research projects were severely impacted by the pandemic, either because of enforced lab closures or because clinical research requiring human participants was frozen. We provided substantial additional funds to research teams to enable them to weather the impact of this, and ensure that they were able to complete their projects and deliver on their objectives.

A number of projects have completed this year, with just two examples on the following pages.

*'The support of Brain Research UK throughout this project, but in particular during the pandemic, has been exceptional and exemplary. This has allowed us to mitigate the impact on the project and to ensure a productive outcome, meeting many of the goals of the original proposal, but also to enable the staff on this project to develop their careers despite the obstacles in completing the work. For this support we are incredibly grateful, and it is not taken for granted.'*

Professor Sven Bestmann



**Re-opening the critical period for plasticity after stroke with dose-controlled non-invasive brain stimulation.**

**Professor Sven Bestmann,**
**UCL Queen Square Institute of Neurology**

Professor Bestmann was awarded funding in 2017 for research that aimed to refine the way that electrical brain stimulation is used to enhance recovery in stroke survivors. The team wanted to improve consistency in the way that brain stimulation is applied, and to clarify when and how to apply it, in order to achieve the best results.

In the first part of their study, they used electrical field modelling to demonstrate the great variability in delivered dose between individuals given the standard application of transcranial direct current stimulation (tDCS). They went on to show that this variability can be eliminated by individualising the application of tDCS based on individual brain scans. This has important implications for future application of tDCS in clinical settings; in essence effective clinical use of tDCS likely requires individualised application that takes into account individual anatomy.

The second stage of the team's work was severely impacted by the pandemic. They were unable to recruit stroke patients and other volunteers as planned but, instead, obtained a dataset from an Australian team, which tracked brain changes following stimulation at different time points from one week to 12 months post-stroke. Although not designed in the same way as the original study, the data enabled the team to study differences in response to stimulation in early versus late stages of stroke.

In essence, their work demonstrated that there is no 'one size fits all' approach for tDCS and similar brain stimulation techniques. These interventions must take into account individual brain anatomy, physiology, and lesion characteristics. They demonstrated that the strength of response is more variable in stroke survivors than neuro-typical participants, and that the timing of brain charges was not correlated with recovery of motor function in stroke survivors with mild stroke symptoms.

As well as publishing their work in a number of journal articles, the team has run four workshops on the use of transcranial electrical stimulation, to share information on how to deliver studies with a solid grounding in computational modelling techniques. This will help ensure consistency in the way that electrical brain stimulation is used in future research as well as in the clinic, to deliver the best results.

## Targeted immunotherapy of glioblastoma.

**Richard Baugh, University of Oxford**

Richard was awarded one of our first two nationally competitive studentships in 2017.

Following completion of an ambitious programme of work focused on the brain tumour glioblastoma, Richard was awarded his DPhil from the University of Oxford in summer 2022.

His research was focused on developing new immunotherapies for the treatment of glioblastoma. He worked under the supervision and guidance of Professor Leonard Seymour, a leader in the field of oncolytic virotherapy.

Oncolytic virotherapy involves the use of engineered viruses that can selectively infect and destroy cancer cells. Not only do the viruses directly destroy the tumour cells but they also stimulate an immune response, so that the body's natural defences are roused and sweep in to destroy any remaining tumour.

Richard worked with a form of oncolytic herpes simplex virus (oHSV), called G207, which had been previously trialled in glioblastoma. Although promising results had previously been achieved in the laboratory, results of clinical trials had been disappointing.

Richard worked to enhance the effects of G207 by using it as a vector to deliver gene therapy directly to the cancer cells, to flag them to the immune system and enhance the immune response.

His work revealed a potential strategy for augmenting the activity of the virus to further kill glioblastoma cells and provoke an immune response in the tumour microenvironment.

One of the main limitations of oHSV therapy for glioblastoma, as well as of conventional therapies, is sub-populations of resistant glioblastoma stem cells (GSCs), which contribute towards resistance and recurrence. G207 has previously been shown to be ineffective against these GSCs.

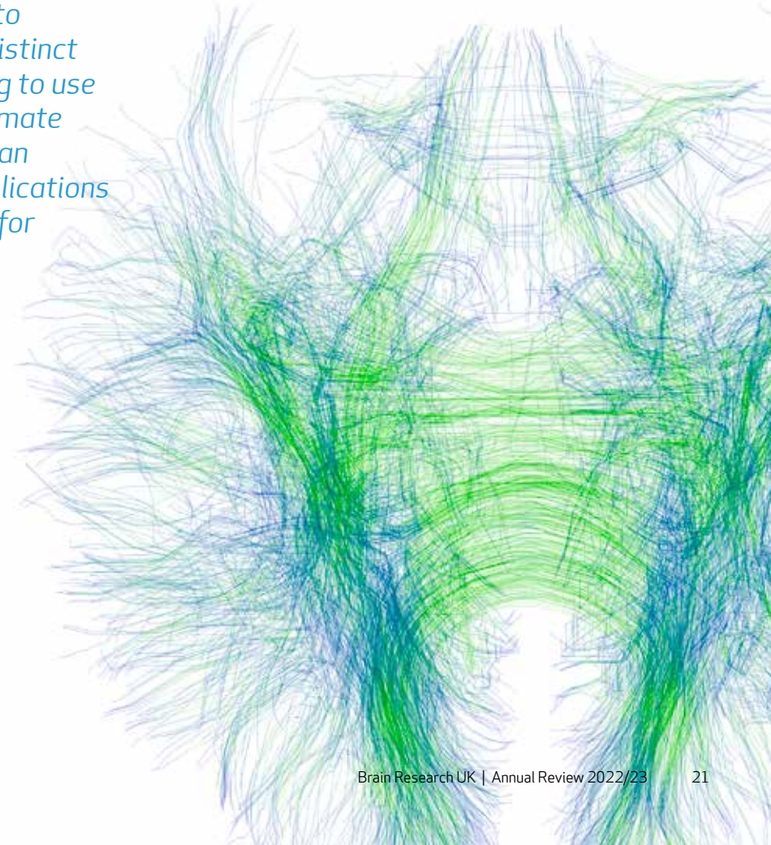
However, Richard has demonstrated that the molecule produced by their gene therapy is able to target the GSCs. Arming G207 in this way in future clinical trials could therefore hold the key to eliminating these stubborn cells.



*'Richard has benefited hugely from this training opportunity and has used it to drive forward several promising new approaches to glioblastoma therapy.*

*Throughout the project, Richard has shown an enthusiasm and ability to drive the project forward with a distinct glioblastoma focus, always aiming to use the best scientific options for ultimate patient benefit. He has produced an excellent thesis, several good publications and established new approaches for treatment of glioblastoma.'*

Professor Leonard Seymour



# Fundraising highlights

We are extremely grateful to receive donations from a variety of sources including running and challenge events, special events, community fundraising, regular giving, cash appeals, legacy gifts, trusts and foundations as well as tribute and in memory giving. We are indebted to each and every individual for their valued and ongoing support. Highlighted in the following pages are just a few of our many thousand invaluable supporters.

## Barley Beal
## An incredible talent, a life cut tragically short, an inspirational legacy.

We are immensely grateful to the family of Bartholomew Beal for their continuing commitment to fundraising for Brain Research UK.

Bartholomew, known by all as Barley, was a gifted figurative painter who enjoyed considerable critical and commercial success during his professional career. He died, aged 30, on Boxing Day 2019 from an astrocytoma, a brain tumour. Although his tumour had been diagnosed nine years before he died, whilst he was still at Art College, he refused to let it impede or define him.

His naturally exuberant personality and optimistic outlook meant that many of his clients and professional contacts had no inkling of his condition. It was his painting that was important to him.

He had four solo shows in prestigious London galleries building on an impressively large show in Derby Art Gallery and Museum, which was the culmination of a year's residency having won the Jonathan Vickers Fine Art Award. His works are always colourful yet a little mysterious. Barley often used literature, especially poetry and drama, as his starting point and created bold images of figures in surreal landscapes though he loved using his observational drawings of natural forms as source material.

Following the success of four limited edition prints of his works, created exclusively for us , his family generously decided to release a further edition of 50 in August to mark what would have been Barley's 33rd birthday, with all proceeds donated to us.

The print of a huge, vivid painting, 'Every Day', one of Barley's own favourites that had been displayed at his funeral, and inspired by Shakespeare, depicts a 'Fool' character crouching in a thicket of vegetation. The sale raised a fantastic £26,500.



## Opera at Syon

For the first time, we were delighted to benefit from two evenings of opera, held at the Great Conservatory at Syon Park, thanks to the generous support of the Opera at Syon Committee headed by Lady Julia Craig Harvey and Margret Hargreaves-Allen.

On two glorious summer evenings, Wednesday 22nd and Thursday 23rd June, guests enjoyed a champagne reception and delicious picnic dinner in the beautiful setting of the Great Conservatory, before watching stunning performances of Puccini's Tosca and Mozart's Cosi fan tutte by Diva Opera on the 22nd and 23rd respectively.

Over 125 guests attended each evening and generously bid for some wonderful auction items including stunning jewellery, a week's fishing on the Don, a jewellery masterclass at Christie's and a weekend for two at Churburg Castle in Italy.

We were grateful to be joined by speakers Jonathan Kropman, Vice Chair of Trustees and Professor Kevin Talbot, Chair of our Scientific Advisory Panel who both emphasised the urgent need to fund neurological research.

We appreciate enormously the fantastic and much valued support of all members of the Opera at Syon Committee, as well as all those who contributed so generously to the evenings. Thanks to all those involved, these two special events raised over £89,000.

*'Yesterday was a truly wonderful evening and the greatest of successes. I don't think that anything could have been improved upon and our guests thought it was better than Covent Garden!'*

# London Marathon

The London Marathon is a flagship event for the charity. On 2nd October 2022, our team of 299 runners completed the 26.2 mile course. Thanks to their enthusiasm and determination, a staggering £635,137 was raised to help fund vital research. Highlighted below are just a few of our amazing runners' stories.

In 2011, Sam sadly lost his mum to a sudden brain haemorrhage; she was only 49 and otherwise in relatively good health. Sam was extremely close to his mum and her death pushed him to achieve more and start a family of his own. Sam and his mum used to watch the London Marathon on TV every year and she was especially in awe of those runners in costume. In 2022, he joined our team and achieved his goal to run, in a minion costume, in memory of his mum and *'raise funds for an incredible charity that means a lot to me.'* He raised an amazing £2,948.

Six Guinness World Record hunting fruit and vegetables joined our team as the 'Unbeetables'. Tristan, Fred W, Fred F, John, Max and George ran dressed as a basket of fruit and veg, aiming to 'beet' the Guinness World Record for the *'fastest marathon in a six-person costume'*… and they did it! Since Fred W's uncle passed away from a brain tumour, he has been a much valued supporter and, to date, has raised an incredible £90,052 from this and other events.

On a bank holiday weekend in 2016, at the age of 26, Alex collapsed and was rushed to hospital unconscious. A CT scan showed that he had suffered a brain haemorrhage and revealed a 10cm arteriovenous malformation (AVM) across his frontal lobe. *'For anyone who doesn't know what an AVM is, it is an abnormal tangle of unusually formed blood vessels in the brain. Over time, these vessels can weaken and bleed into the brain itself.'* After emergency surgery and four weeks in hospital, Alex had a further set back following his discharge from hospital as he had developed an infection. He needed emergency surgery and had to lose part of his skull. *'I have had highs yet so many lows but one thing got me though each day: appreciate life, right here, right now!'* He raised a superb £2,493.



When she was just five years old, Allie was diagnosed with a pineal cyst, a tumour that sits on the pineal gland in the brain. She is forever grateful to the kindergarten teacher who noticed her vision was 'a bit off' that resulted in her diagnosis. Having been diagnosed and treated so young, Allie was able to learn and adapt at a young age to her impacted vision and balance. *'My eyes shake a lot and don't hold focus very well. I have terrible peripheral vision.'* She describes her biggest frustration as the lack of understanding and progression in pineal cyst research. *'From diagnosis to now, the answers to questions are often "we don't really have a big understanding of what the cysts do and why they develop." It has been really frustrating for me as I just wanted to know why and that is why neurological research is so important to me.'* Neurological research is a cause very close to her heart and she raised a splendid £1,562.

2022 marked Rosanel's fifth year as a four-time brain aneurysm survivor having had four brain surgeries, with the fourth and final procedure ultimately saving her life. *'I have three aneurysm clips in my brain, which were done through three craniotomies, and I have one pipeline stent. The pipeline stent was a procedure that permanently stopped me from forming new aneurysms and helped finally stabilise and restore my health. If it hadn't been for research, this procedure wouldn't exist and I wouldn't be alive today. More research is needed to help more people who suffer brain-related illnesses and injuries.'* Deeply connected to our cause and mission, Rosanel ran the marathon to celebrate her fifth anniversary as a survivor and raised a marvellous £2,007.

In September 2021, after years of symptoms, Phil was told *'we can see a large mass on your CT scan.'* After a blue-light ambulance ride in the middle of the night and further MRI head scans, it was confirmed by a neurosurgeon that Phil had a tumour the size of a grapefruit, taking up 20% of his brain space, growing on the meninges and compressing the frontal lobe. *'During this time, all of the pieces of the jigsaw finally fell into place; the low mood, lack of motivation, apathy, exhaustion and huge mood swings which had all been put down to stress or depression for the past few years were in fact due to the tumour. The headaches, ringing ears, sinusitis and hearing problems and eventually double vision were also because of the tumour.'* Phil had a craniotomy and tumour resection, with the knowledge that there was a high risk of complications such as stroke, haemorrhaging and death. *'After nine hours in theatre, I was eventually able to call my wife Victoria from theatre recovery and croakily exclaim "I'm alive!" and the surgery appeared to have gone well.'* After six months and many post-op complications, Phil feels fantastic both physically and mentally and was delighted to run the marathon for such a good cause. He raised an amazing £6,560.

## Other runs and challenges

In September, Sarah took on the challenge of the Battersea Park Half Marathon. In December 2021, Sarah's mum suffered two burst aneurysms. Two coils were fitted on the burst vessels in her brain but after returning home she became ill again. Doctors found that Sarah's mum had fluid on her brain and needed numerous lumbar punctures. Doctors then decided that her mum needed a permanent cerebral shunt to help the fluid drain away. After 23 weeks of physiotherapy, her mum left hospital and started the long road to recovery. Sarah raised a brilliant £745 because without neurological research *'my mum might not be here today.'*

In October, Adam took on the Colchester Zoo Stampede Half Marathon. *'I am NOT a runner. Running is not something that comes naturally to me'* but Adam wanted to take on the personal challenge for his physical and mental health and *'couldn't pass up the opportunity to try to raise some much-needed funds for neurological research'.* As an ex-neuroscientist Adam *'understands how vital basic research is in leading to breakthroughs in our understanding of the brain and unlocking new therapies to treat devastating diseases'.* Adam *'hauled himself around the 13-mile course'* and ran despite blisters, knee-pain, sweat and tears and raised an admirable £298.

In October, Jimmy and Sally took on the incredible challenge of climbing Kilimanjaro in honour of their good friend Gail, who had suffered a serious brain injury due to a burst aneurysm. On Thursday 13th October at 13:26 the couple stood *'on the roof of Africa'* having completed an incredible physical and mental challenge. The adventurers raised a tremendous £3,385.

Team Eggleston, Mark, Camilla and Lucy, joined 60,000 runners for the Great North Run on 11th September. 30 years ago, Mark's cousin died from a brain tumour. Since then, he has completed several challenges to raise money for charity and has generously supported us in the past. His two daughters completed 12 half marathons in 2021 but they all wanted to enter the iconic GNR as a team. Together, they raised a terrific £1,000.



Neal took on the challenge of the Alderley Edge Bypass 10K in May 2022. It was important to Neal that he help progress neurological research as his niece Laura, only 29 years old, had been diagnosed with a Grade 4 inoperable brain tumour. Every £1 donated to Neal's fundraising page was matched by the Equilibrium Foundation and a wonderful total of £3,062 was raised.

We received a generous £2,500 from Miguel who ran the Vitality 10K in May. He chose to support us due to his professional experience as a trained medical doctor prior to becoming a TV and film composer.

In April, Tom took on the challenge of the Manchester Marathon for us as the charity *'is close to mine as well as my family's heart as last year my father was diagnosed with a condition called NF2 after falling ill over a prolonged period of time.'* Tom describes NF2 as *'a genetic condition that causes tumours to grow along your nerves including the brain and spinal cord.'* He says that his dad was tested and told that the tumours had grown undetected for some time and were now quite large and that he would need urgent surgery to help with this. Thankfully after the surgery and a few months recovery his dad is doing well. Unfortunately the story doesn't end as people with NF2 can pass the faulty gene to their children. After testing Tom and both of his sisters have also been diagnosed with NF2; they will be carefully monitored each year through various tests, like so many others in the UK.

Tom wanted to *'contribute to research so that others can be diagnosed with diseases such as ours at an earlier point and don't have to go through the last case scenario surgery dad had to.'* Tom raised an excellent £1,644.

# Community fundraising

In 2020, Kira earned her Charity Badge from her local Brownies Club by talking about our charity and by selling hand-drawn pictures to friends and family. Now aged 10, Kira is still a dedicated supporter and took on the challenge of 100 ankle skips a day for the whole of December. Come rain or shine, this young fundraiser completed her challenge and wore a festive Santa hat as she breezed through her 100 ankle skips. Kira raised an inspiring £250 to help people like her mum, Helen, who has had brain surgery.

Regular supporters, the Flitwick & Ampthill Lawn Tennis Club, once again held their annual Ken Liddell Tournament on August Bank Holiday Monday raising a splendid £186. Ken sadly passed away suddenly following a brain aneurysm and the Club now hold the tournament to raise vital funds for neurological research.

After a few unforeseen delays during the year, The Upbeats Choir were able to hold their concert in December. The festive concert raised an admirable £850, of which we received half.

Ruth sells the sweet peas she grows outside her home in Devon and also makes and sells crafts at the village Christmas street fair and raised a wonderful £800.

During October and November, the London Holborn branch of Skipton Building Society launched their new Community Giving scheme in branch. Over a six week period, customers voted for one of three local organisations and we were delighted to receive the most votes and win a special £500 donation.



Will, a PGA Golf instructor at the 3 Hammers Golf complex in Wolverhampton, organised a family fundraising golf day at the club in memory of his cousin Etta who died, aged 22, in November 2020 from a brain haemorrhage. A cup named The Brain Research UK Cup was presented to the winners and an impressive £4,509 was raised.

Sally held her fifth Charity Recital in her beautiful renovated Suffolk barn, featuring performances by Jonathan Aasgaard (cello) and David Quigley (piano) of works by Beethoven, Grieg and Schumann. The event raised a superb £1,647.

Fiona and Steve asked for donations to Brain Research UK in lieu of wedding gifts, raising a fantastic £920.

Anthony held his sixth plant sale at the end of May, raising a fabulous £6,380.

During the Christmas Tree Festival at Bethel Chapel in Shelf, West Yorkshire, Susan and Josh decorated a tree in honour of us and collected a heart-warming £70 thanks to the sound activated brain at the top of the tree. Josh, 31, has lived with uncontrolled epilepsy since the age of five; he has degrees in art and created the ceramic stars and the voice activated brain.

Thanks to our supporter Lily, the Biocair offices in Cambridge and Edinburgh participated in a joint bake event that raised £523; Biocair contributed funds to take the donation up to a terrific £1,000.

# Thank you

## A sincere and heartfelt thank you to each and every one of the thousands of people who have so kindly supported us.

Whether you generously donated or gave a gift, ran a marathon, took part in an event, volunteered your time or shared your story… for all that you have done, thank you.

It is only thanks to your valued support that we are able to fund vital research to help those with a neurological condition to live better, longer.

### With special thanks to the following for their much-valued support:

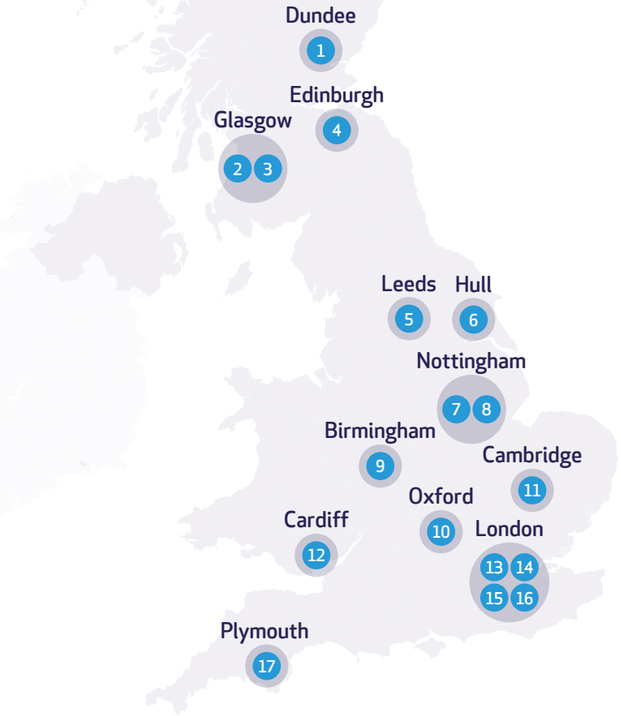
- Professor Khuloud Al-Jamal
- Dr Faisal Amin
- Dr Anish Bahra
- The Beal Family
- Professor Liz Bradbury
- Professor Rob Brownstone
- Cardiff Golf Club Ladies
- Professor Anthony Chalmers
- De Vere Hunt Charitable Trust
- Jimmy and Sally Daboo
- Professor Liam Gray
- The Inman Charity
- Professor Oliver Hanemann
- The Hospital Saturday Charitable Trust
- Jerroms Accountancy
- Pat Lewis
- Louise Looney
- Professor Silvia Marino
- Lika Petitt
- Our peer reviewers
- Rhiannon, Cerys and the team
- SGUL Clinical Neuroscience Society
- Professor Willie Stewart
- The Opera at Syon Committee
- Professor Kevin Talbot
- Maureen Taylor
- Ewen and Grant Templeton
- Professor Nick Ward
- John Whittle Solicitors
- Lord and Lady Young

We thank Sherbroke Connectivity Imaging Lab (http://scil.dinf.usherbrooke.ca), M. Chamberland and M. Descoteaux and Science Photo Lab (www.sciencephoto.com) for the brain photos used inside this report. Front and back cover photos from iStock.

# Current research projects

**In 2016, we broadened our objectives to extend our funding to research institutes around the UK, beyond our historic restriction to UCL Queen Square Institute of Neurology. This has enabled us to fund the very best research, wherever in the UK it is taking place.**

**We have been successful in attracting funding applications from around the UK, and this is reflected in the broad geographical spread of institutes whose researchers we have funded since 2016.**




1 University of Dundee
2 University of Glasgow
3 University of Strathclyde
4 University of Edinburgh
5 University of Leeds
6 University of Hull
7 Nottingham Trent University
8 University of Nottingham
9 University of Birmingham
10 University of Oxford
11 University of Cambridge
12 University of Cardiff
13 Imperial College London
14 King's College London
15 University College London
16 The Institute for Cancer Research, London
17 Plymouth University



# Research awards 2022/23

## PhD studentships

| | |
|---|---|
| Dr Kate Atkinson, University of Birmingham<br>Understanding the developmental origins of a childhood brain cancer | £124,932 |
| Giada Vanacore, University of Cambridge<br>Facilitating regeneration in the brain via stimulation of neural stem cells | £125,000 |
| Febe Ferro, University of Dundee<br>Joint BRUK-Neurosciences Foundation PhD studentship: Understanding the role of a secreted kinase in promoting myeloid signature of glioblastoma | £124,989 |

## Project grants

| | |
|---|---|
| Professor Anthony Chalmers, University of Glasgow<br>Investigating the radioprotective effects of ATM inhibition on the healthy brain | £298,738 |
| Dr Virginia Newcombe, University of Cambridge<br>Understanding the pathogenesis of traumatic vascular injury | £292,738 |
| Dr Lynsey Duffell, University College London<br>Epidural spinal cord stimulation for restoration of uro-genital function after SCI | £294,732 |
| Dr Philippa Warren, King's College London<br>Recovering locomotion after acute ischemic spinal cord injury | £299,999 |

## Other grants

| | |
|---|---|
| Mr Milo Hollingworth, University of Nottingham<br>Brain Research UK – Royal College of Surgeons Joint Research Fellowship: Seeing the unseeable – imaging of drug pharmacokinetics in the CNS | £36,500 |
| Professor Linda Greensmith, UCL Queen Square Institute of Neurology<br>Sobell Chair | £25,025 |
| Grant extensions | £49,426 |
| **Total grants awarded** | **£1,671,410** |

# Our performance

The Charity received income of £3,197,000 during the financial year to 31st March 2023 (2021/22: £2,029,000). Notably we were able to increase our fundraising from £1,608,000 to £2,770,000 during the year and were able to benefit from sustained income from investments (£427,000, compared to £421,000 during 2021/22).

In recent years, our fundraising programme has been impacted by the repercussions of the pandemic with a number of income streams affected. The greatest impact was on our ability to fundraise from face to face events, in particular from our flagship fundraising event, the London Marathon.

The current financial year represents the first uninterrupted London Marathon programme for a number of years. As a result of this, and other smaller scale events becoming viable again, we were able to significantly increase our income from events from £501,000 to £1,150,000 this year. In addition, the Charity continued to benefit from funding from the Medical Research Charities COVID Support Fund for Early-Career Researchers and £682,000 income has been recognised in the 2022/23 financial year (£184,000 in 2021/22).

We ended the year with spending on charitable activities of £1,818,000, inclusive of direct research spend of £1,730,000 of which grant awards totalled £1,671,000.

This means that for every pound we spent during 2022/23, 60 pence was spent on our charitable activities (2021/22, 74 pence). Last year's spend on charitable activities included £627,000 on grants funded by our endowments, as well as fulfilling our planned grant commitments, even though the fundraising environment was extremely challenging. This has therefore had a disproportionate effect on last year's charitable spend.

## Our objectives for 2023/24

### Research activities

- To sustain our core funding of a national call for Project Grant funding
- To finalise details for our national call for Post-doctoral funding, to replace our previous PhD Studentship funding
- To publish our Research Strategy, following the review undertaken in 2022/23.

### Fundraising activities

- To develop further our unique, as well as collaborative, event and challenge activities
- To develop further our major relationship and special event activities
- To evaluate a community fundraising initiative for schools.

The Trustees understand that the benefits of neurological research is long-term but believe that the knowledge gained from each research project funded is a step towards understanding how these diseases happen and how to treat them. Trustees also understand that measuring the impact of their donations is an important consideration for those who give so generously to support the Charity's work.



# Our finances

**Our accounts reflect a 12-month financial period from 1st April 2022 to 31st March 2023.**

| Our income | 2022/23 £'000 | 2021/22 £'000 |
|---|---|---|
| Individuals | 388 | 372 |
| Trusts, corporates and major donors | 166 | 114 |
| Income from events | 1,150 | 501 |
| Legacies | 384 | 437 |
| Grants | 682 | 184 |
| **Total donations income** | **2,770** | **1,608** |
| Investment income | 427 | 421 |
| **Total donations and investment income** | **3,197** | **2,029** |
| **Our expenditure** | | |
| Raising funds | 1,187 | 844 |
| Charitable activities | 1,818 | 2,404 |
| **Total expenditure** | **3,005** | **3,248** |

**This summarised financial statement has been extracted from the full trustees' annual report and financial statement as approved by the trustees on 17th October 2023. The full financial statements, which our auditors haysmcintyre have given an unqualified audit report, will be submitted to the Charity Commission and to the Registrar of Companies.**

**The auditors have confirmed that, in their opinion, this summarised statement is consistent with the full statement for the year ended 31st March 2023.**

**The full trustees' annual report and financial statement and auditors report may be obtained from Brain Research UK, Fifth Floor, Holborn Gate, 330 High Holborn, London WC1V 7QH or brainresearchuk.org.uk.**

Together we can accelerate the progress of brain research.
Please support us by donating, volunteering or fundraising.

Brain Research UK

Fifth Floor, Holborn Gate,
330 High Holborn, London WC1V 7QH
020 7404 9982
info@brainresearchuk.org.uk
brainresearchuk.org.uk