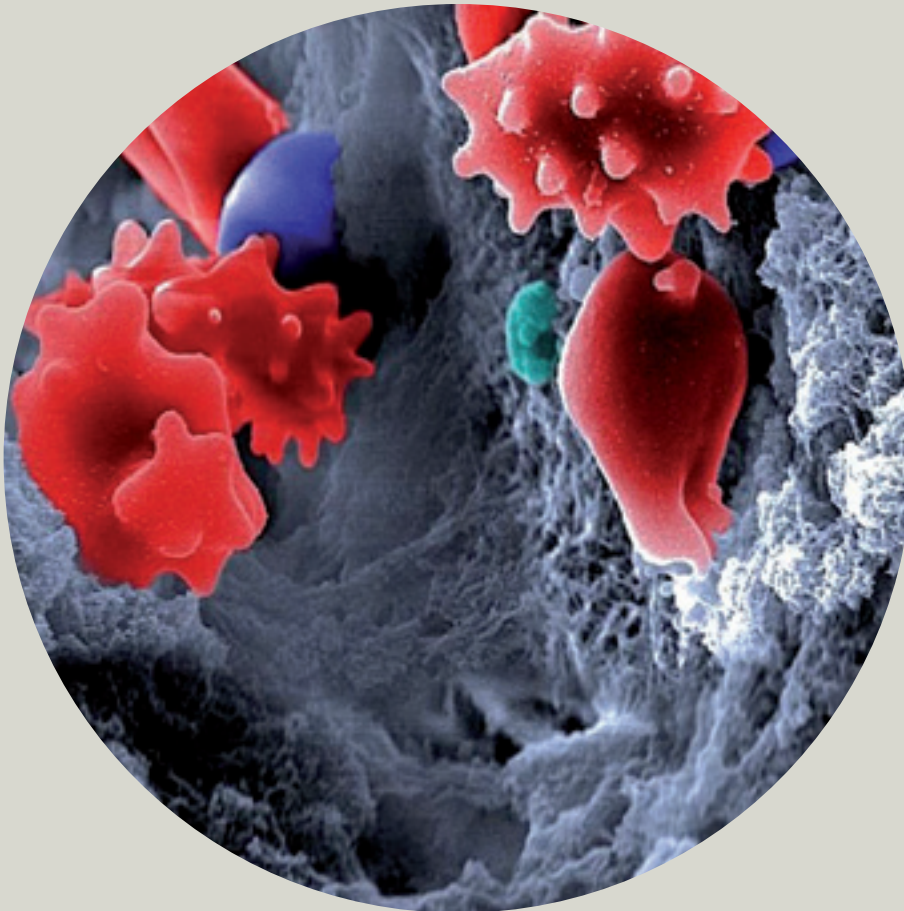




British Heart
Foundation

OUR RESEARCH STRATEGY: 2015-2020

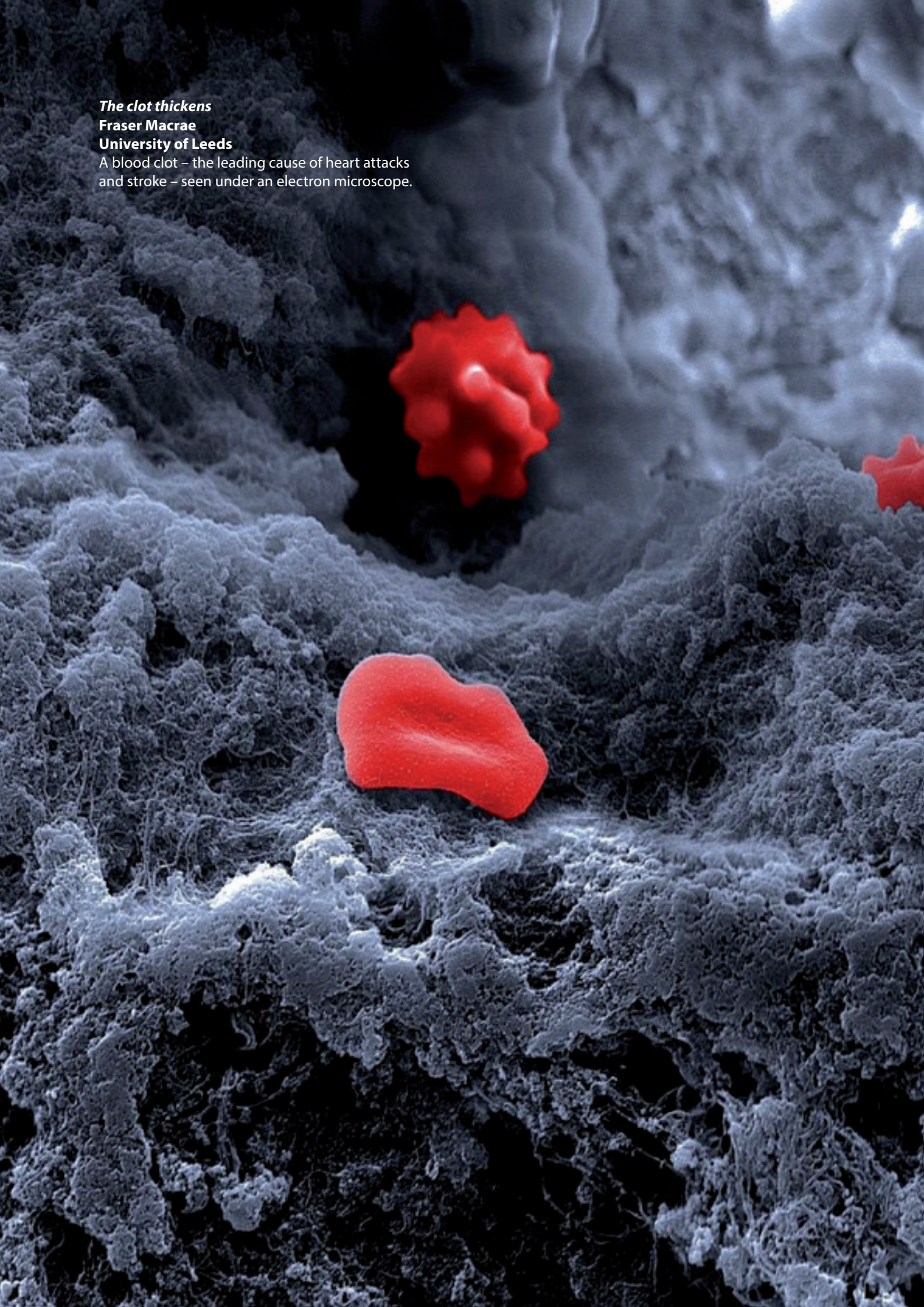


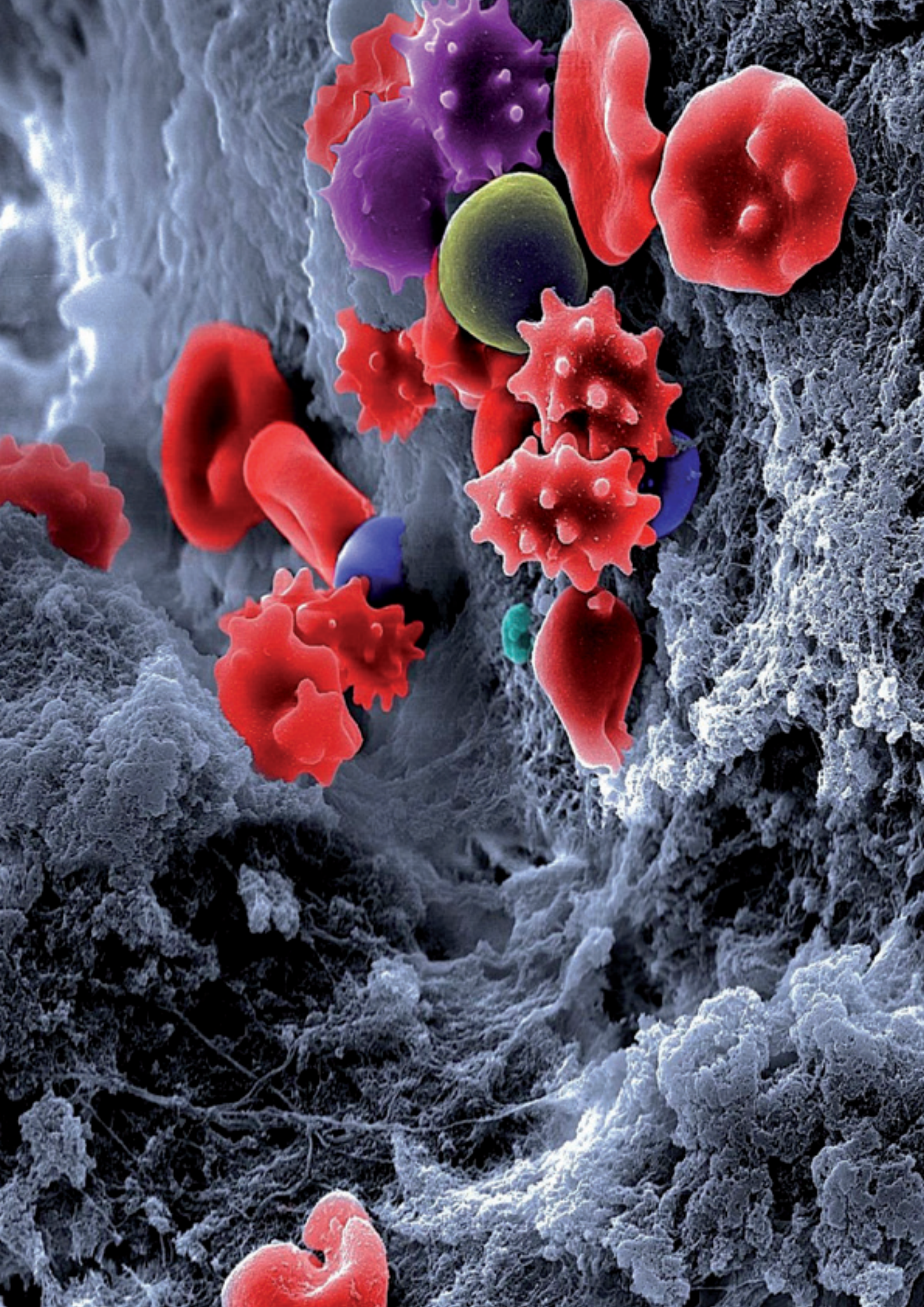
**FIGHT
FOR EVERY
HEARTBEAT**

bhf.org.uk

The clot thickens
Fraser Macrae
University of Leeds

A blood clot – the leading cause of heart attacks and stroke – seen under an electron microscope.





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FOREWORD

When the BHF was founded in 1961 to raise funds for research to tackle the epidemic of heart and circulatory disease, its founders could hardly have predicted that it would become one of the largest independent funders of cardiovascular research in the world and would have such a spectacular impact on cardiovascular disease.

In the 1960s we didn't know how to prevent or treat the heart attacks and strokes that struck down millions in the prime of their lives, and few babies born with congenital heart defects survived to see their first birthday. Since then, in the UK death rates from cardiovascular disease have more than halved and most babies with congenital heart disease now survive to adulthood. Much of this success can be directly attributed to BHF-funded research, which is why research remains at the heart of our organisational strategy.

Yet, despite this success, coronary heart disease remains the single largest cause of death in the UK, quality of life is diminished for millions living with cardiovascular disease and each day seemingly healthy young people die suddenly from a heart rhythm disturbance. Only when we fully understand the molecular processes underlying these events will we be able to neutralise their threat. These challenges are all tractable through research.

Our research strategy reaffirms the BHF's commitment to excellence and places great emphasis on funding the most talented scientists at all stages of their career working across the whole spectrum of cardiovascular disease. We will continue to fund research that ranges from laboratory based 'discovery' science through to clinical research on patients to epidemiological research on whole populations. We will build on current strengths, such as our Centres of Research Excellence, and stimulate research in disciplines that are in need of particular support.

We will facilitate translation of laboratory discoveries into new treatments for patients through expansion of our Translational Award scheme and closer working with industry.

New funding streams will be devised to support international collaborations between scientists with complementary skills and to fund nurses and allied health care professionals undertaking research in our hospitals to improve the day to day care of their patients. With guidance from patients and their doctors, we will increase our support for clinical trials with the potential to have an early impact on patient care. And, driven by the need to stem the loss of female talent from the scientific workforce, flexibility will be a hallmark of all our funding streams.

The BHF is totally reliant on the generosity of people who donate time and money to our cause. Every one of them should feel proud of the progress we've made and of their personal contribution towards it. But our new research strategy requires us to raise more than half a billion pounds between now and 2020. We will ensure that every penny has maximum impact by rigorous peer review of research proposals and by working wherever possible with other major medical research funders to gain added value for the BHF's investment.

I hope you agree that our track record so far and our vision for the future make a compelling case for continuing to support the BHF.



Professor Peter Weissberg
Medical Director

→ OUR RESEARCH STRATEGY 2015-2020 EXECUTIVE SUMMARY

In the coming years we will strive to raise more money to fund research that will save and improve the lives of people living with cardiovascular disease.

The objectives of our research strategy are:

- ▶ To understand the social, genetic, cellular and molecular causes of cardiovascular disease.
- ▶ To discover better ways of preventing, diagnosing and treating cardiovascular disease.
- ▶ To enhance translation of these research discoveries into better patient care.

We remain committed to supporting the best researchers at all stages of their career, funding research into all forms of cardiovascular disease, and funding only research that is judged to be excellent through independent review. We have also identified new initiatives and areas in which we could support UK cardiovascular research to accelerate progress. Six approaches outline how we will achieve our objectives:



Investing in people

We will fund the most talented people at all career stages and seek to attract outstanding researchers from around the world.



Forging partnerships

We will support research collaborations across borders and disciplines, and join forces with other funders to support more comprehensive research programmes.



Fighting all cardiovascular diseases

We will support research into all forms of cardiovascular disease, whether common or rare.



Targeting unmet needs

We will support research by informaticians, nurses and allied health professionals, and help build research capacity in cardiac and vascular surgery and congenital heart disease.



From bench to bedside and beyond

We will continue to fund all types of research into cardiovascular disease, including laboratory studies, clinical studies and population studies.



Translation

We will fund research aimed specifically at facilitating the translation of BHF-funded discoveries into patient benefit.

Our research strategy is ambitious and can only be achieved with significantly increased funds that will allow us to invest more than half a billion pounds over the next five years. We must inspire those who so generously donate to keep doing so and attract new supporters to help us make the next major advances in our fight against cardiovascular disease.

➔ BHF RESEARCH A STRATEGIC FOCUS

In 2014 we published our organisational strategy to 2020. It set bold and ambitious targets for our fight against cardiovascular disease over the coming years and reaffirmed the central role of research in our mission by committing to:

- ▶ Increase our investment in world-leading research to combat cardiovascular disease.
- ▶ Ensure that research funded by the BHF and others translates into better prevention, diagnosis and treatment outcomes.

An increased research investment will depend on growing our income, so we must inspire our current supporters to continue to donate generously, and attract new donations.

The need for research

BHF-funded research has helped make significant advances in the prevention, diagnosis and treatment of cardiovascular disease. Since the BHF was founded deaths from cardiovascular disease in the UK have more than halved.

But still, one in four people die from cardiovascular disease, and seven million people in the UK alone are living with its daily burden.

Research is central to our mission to win the fight against cardiovascular disease and is the only way we will make the advances that could ultimately save and improve more lives.

What, and how, we fund

The BHF is the largest independent funder of cardiovascular research in the UK, working in partnership with our universities to support more than half of all academic cardiovascular research in the UK.

We receive more than 500 research grant applications each year from research teams all over the UK. Eligible applications are reviewed by experts in the field, and their judgements inform the funding decisions made by our three research grant committees, which are made up of independent scientists. This objective and rigorous review process ensures we fund only applications of the highest quality.

We are a response-mode funder, believing that the most effective way of tackling cardiovascular disease is to allow the research community to identify the gaps in knowledge and generate the research ideas and approaches needed to fill those gaps. We support a broad cardiovascular portfolio of basic science and clinical research, totalling around 1,000 active research grants at any one time.



The impact of our research

We have a long track record of funding research that makes a difference. The research we have funded has transformed cardiovascular healthcare around the world. BHF-funded research was the first to identify that a blood clot in the coronary artery was the cause of a heart attack. This paved the way for trials of clot-busting drugs and aspirin to reduce deaths from a heart attack. We have funded many pioneers, including those who introduced heart transplantation to the UK, transformed the care of heart attack patients in our hospitals and revolutionised the treatment of babies born with heart defects.

And we continue to change lives. Recent examples can be found in the latest assessment of research-active universities, the Research Excellence Framework (REF 2014). From formulation of the GRACE guidelines to guide hospital treatment of people admitted with chest pain to demonstrating the benefit of statins to prevent heart attacks and strokes, the REF 2014 detailed an impressive series of case studies that show the many ways in which our research is making an impact today.

A strategic review

Our first step towards forming our new research strategy was to conduct an in-depth review of our current research funding.

Over the course of the review, we invited five panels of experts and stakeholders to review our funding approach and performance and inform our future direction.

- ▶ BHF-funded researchers discussed how our funding schemes work in practice and how they could be optimised.
- ▶ Other funders and representatives of research-intensive UK universities reflected on how our funding schemes complement their own and how we could encourage more interdisciplinary and inter-institutional research partnerships.
- ▶ Representatives from industry and from university technology transfer departments examined the landscape for the translation of academic research to clinical uptake and how we could facilitate the process.
- ▶ Clinical researchers discussed the challenges facing those wishing to undertake clinical trials and those facing clinicians wishing to train as researchers. They highlighted the need to stimulate more research in surgical disciplines.
- ▶ People living with cardiovascular disease and carers discussed our draft research strategy and shared their views on our approach.

These meetings have helped to inform the research strategy detailed in the following pages.

The panels strongly endorsed our existing project grant, programme grant and fellowship funding schemes, our response-mode funding approach and our support for research into all forms of cardiovascular disease. They supported our funding of research involving animals, where there is no alternative approach, and welcomed our commitment to the 3Rs (replacement, reduction and refinement of the use of animals in research). In addition they identified opportunities to build capacity in specific areas of cardiovascular research and informed our approach to international research funding and how best to help translate laboratory discoveries into benefits for patients.



“The BHF is indispensable in the UK’s cardiovascular research environment. Over the past 50 years it has had a remarkable impact on cardiovascular health. But there is still much to be done to help families affected by the unacceptably high burden of cardiovascular disease.

This exciting new research strategy rightly emphasises the importance of collaboration between researchers, their institutions and research funders to gain maximum benefit for patients and sets out an ambitious and comprehensive plan to reduce the burden of cardiovascular disease in the future. Supporters of the BHF should feel confident that their donations will make a difference.”

Professor Sir John Savill

Chief Executive, Medical Research Council

➔ OUR RESEARCH STRATEGY 2015-2020 OBJECTIVES

The objectives of our research strategy are to:

- ▶ *Understand* the social, genetic, cellular and molecular causes of cardiovascular disease.
- ▶ *Discover* better ways of preventing, diagnosing and treating cardiovascular disease.
- ▶ *Enhance translation* of these research discoveries into better patient care.

As we work towards achieving these objectives, everything we do will be underpinned by the guiding principles that have kept us at the forefront of cardiovascular research: nurturing talent, supporting excellence and ensuring everything we fund has the potential to benefit cardiovascular health and the lives of patients.



INVESTING IN PEOPLE



The research review strongly supported our approach of investing in the careers of promising young scientists through to established senior investigators.

It also identified new ways to attract more of the world's leading cardiovascular researchers to join us and to support talented individuals to remain research active.

Over the next five years we will:

Invest in people, from PhD students to world-leading professors

Our fellowship awards will support the best laboratory and clinical cardiovascular researchers at every stage of their career. We will enhance the value and flexibility of our fellowship schemes so that more young scientists have the opportunity to progress to senior leaders. At the same time, we will work with our universities to identify world-leading researchers to become BHF Professors.

Help women to stay in research

Almost two-thirds of BHF-funded PhD students are female, but women are vastly underrepresented in more senior cardiovascular research roles.

To help retain women in cardiovascular science and stem the loss of this research talent we will promote flexible working practices on all our funding schemes and provide the resources needed to facilitate continuity of research activity, where desired, during periods of family leave. We will increase the length of our Career Re-entry Fellowship and promote this scheme widely as a route for women to return to research after a career break.





Attract new talent from overseas

For many years we have supported scientists from abroad at intermediate and senior research fellow level.

From now on we will enable our research leaders to attract the brightest graduates from around the world to establish their research careers in the UK as BHF-funded PhD students.

Enable more clinicians to do research

Clinicians involved in research drive up standards of care for patients. But the demands of clinical training can leave little time to train for a research career.

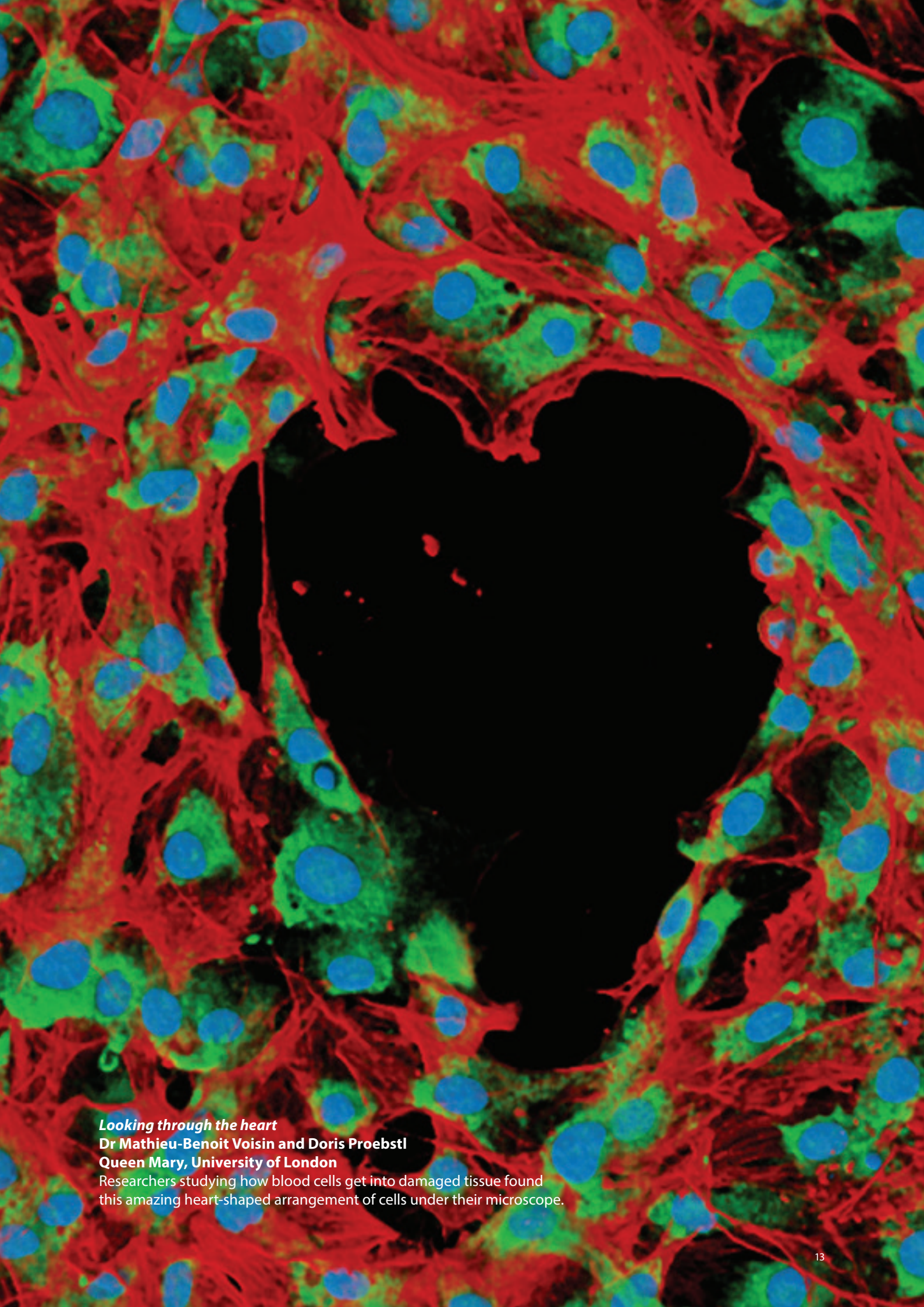
We will support and encourage talented doctors to enter cardiovascular research, flexibly mapping our research funding opportunities onto the demands of their clinical training programmes.

“I’ve had funding from the BHF throughout my career. Without a supportive funder it’s impossible to plan and carry out high quality research because there are just so many demands on your time as a doctor.

Yet, it’s very important to encourage young clinicians to engage in research and make it part of their career. Clinicians gain insights from seeing patients in the wards and surgeries that inform the most important question: how can my research help people in the real world?”

BHF Professor Barbara Casadei
University of Oxford





Looking through the heart

**Dr Mathieu-Benoit Voisin and Doris Proebstl
Queen Mary, University of London**

Researchers studying how blood cells get into damaged tissue found this amazing heart-shaped arrangement of cells under their microscope.

FIGHTING ALL CARDIOVASCULAR DISEASES



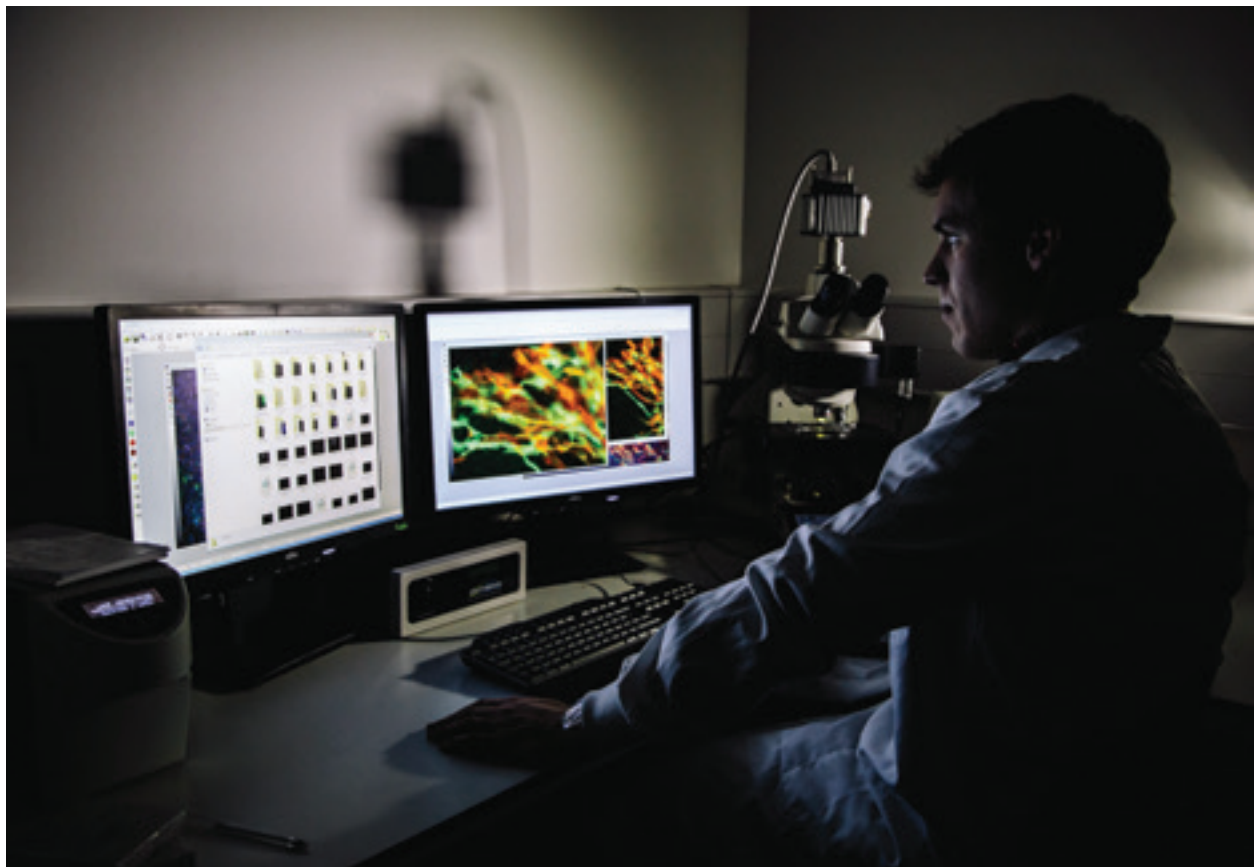
BHF-funded research has changed the lives of people with a wide range of cardiovascular conditions, including congenital heart disease, cardiomyopathies, heart attack and stroke.

Our new strategy reinforces our commitment to funding high-quality research to prevent, diagnose and treat all cardiovascular diseases, whether common or rare. We will continue to fund research into associated conditions that significantly increase the risk of cardiovascular disease, such as diabetes and chronic kidney disease.

*Over the next five years
we will:*

Support research into:

- ▶ Atherothrombosis – the process underlying coronary heart disease and stroke – and its risk factors.
- ▶ Diseases of the heart muscle and heart valves.
- ▶ Heart rhythm disturbances, including causes of sudden cardiac death.
- ▶ Epidemiology of cardiovascular disease – the study of whole populations to understand environmental and behavioural influences on cardiovascular health.
- ▶ Regenerative medicine to help find new treatments for debilitating cardiovascular conditions, in particular heart failure.



“As a working mum with three kids, I’m constantly on the go – it didn’t occur to me that I would have a heart attack. Luckily for me, the BHF is funding a study in the hospital that I went to that is specifically looking into better ways to diagnose heart attacks in women. The new test was able to show up my heart attack, when the old one would have missed it. I’m here for my kids today because of that BHF research.”

Jen
Survivor





“I was diagnosed with hypertrophic cardiomyopathy at the age of 19 when I was in the middle of applying for university. I’d always been fit and into sport and never had any symptoms – I still haven’t – so it was an incredible shock to find out about this hidden condition. I had a defibrillator fitted as a precaution, just in case I have a sudden cardiac arrest.

I’d never even heard of my condition before I was diagnosed with it, but it was reassuring to know that the BHF had been funding research on it for decades – research that meant my family and I could get the help we needed.”

Stephen
Survivor

FROM BENCH TO BEDSIDE AND BEYOND



Advances in healthcare are built on discoveries in the laboratory, studies of patients in the clinic and observations of large populations. All of these types of research are important.

The research review reaffirmed the need to continue funding across the whole spectrum of research approaches.



*Over the next five years
we will continue to fund:*

Laboratory research

We will support laboratory scientists to work on genes, molecules, cells, tissues and biological and computer models of disease to understand the processes that underlie cardiovascular disease. It is their discoveries that lead to new diagnostic tests and treatments.

Clinical research

We will support research undertaken on patients in our hospitals and clinics. This research is aimed at understanding the mechanisms behind disease and establishing the best ways to diagnose and treat cardiovascular disease.

Trials of new or established treatments lead to better patient care, and we are committed to funding more clinical trials either independently or in partnership with other funders. We will enlist the help of patients in prioritising the most important research questions.

Population research

We will fund epidemiologists and population health scientists to collect and study data from thousands of people from different ethnic and socioeconomic backgrounds. These studies identify the behavioural and environmental influences that increase the risk of developing cardiovascular disease.

**“Before coming to Glasgow in 2012,
I held a Canada Research Chair
from the Canadian Institutes
of Health Research, and in 2013
I became a BHF Professor.**

**As head of the Glasgow BHF
Centre of Research Excellence,
I see the BHF’s commitment to
funding research on a daily basis.
From smaller grants that fund
PhD students at the beginning
of their career to multimillion
pound investments in buildings
and laboratories.**

**“We’re totally indebted to the BHF
and its supporters, because their
donations underpin everything
we do.”**

BHF Professor Rhian Touyz
University of Glasgow

TARGETING UNMET NEEDS



The research review helped us identify areas where research needs to be stimulated. Our research strategy has highlighted four fields where additional support could strengthen UK cardiovascular research.



Over the next five years we will:

Support informatics

Modern research methods rely on skilled data scientists and informaticians to analyse and interpret a wealth of data. But too few young scientists are choosing a career in informatics and those who do have few opportunities for career progression.

We will encourage talented informaticians to apply for BHF fellowships, helping to create a career structure for these research specialists.

Support healthcare researchers

Cardiovascular healthcare is delivered by diverse and multi-skilled teams, but the opportunities to do research are limited for many.

We will establish a grant scheme funding healthcare professionals such as nurses, occupational therapists, physiotherapists and dietitians to lead research in their specialist areas and improve the quality of care for people with cardiovascular disease.

Build research capacity

Despite the progress made in cardiac and vascular surgery and the treatment of congenital heart disease there remains an opportunity to build research capacity in these areas.

Working with specialists in these areas we will identify ways to encourage and sustain research activity in cardiovascular surgery and congenital heart disease.



“Gabriela was born with numerous heart defects and in the past it’s unlikely she would have survived. But thanks to research, doctors knew how to save her life. The BHF funds research into rare and common heart conditions – wherever there is a need. Continued research into conditions like hers will lead to a better quality of life for her and less invasive operations for other children born with similar problems. For that I will be eternally grateful.”

Cherilyn
Gabriela’s mother

FORGING PARTNERSHIPS



Bringing together the skills of scientists from around the world and from different academic disciplines drives scientific discovery. In our Centres of Research Excellence biomedical scientists, physicists, chemists, engineers and mathematicians work together on cardiovascular research questions.

Funding in partnership with other organisations allows us to support ambitious research projects.

Our research strategy will build on these collaborative approaches. We will bring funders together to orchestrate more large-scale funding collaborations. We will also do more to help our researchers establish productive international collaborations.

Over the next five years we will:

Support our Centres

In 2008 and 2013 we invested a total of £65.4 million to create BHF Centres of Research Excellence and BHF Centres of Regenerative Medicine funded by our Mending Broken Hearts Appeal. These intra- and inter-university networks of cross-disciplinary training and research bring together scientists with complementary skills to focus on cardiovascular disease.

We will continue to build on the success of these Centres.

Make links internationally

We fund research that has a global impact and many of our researchers have collaborators overseas.

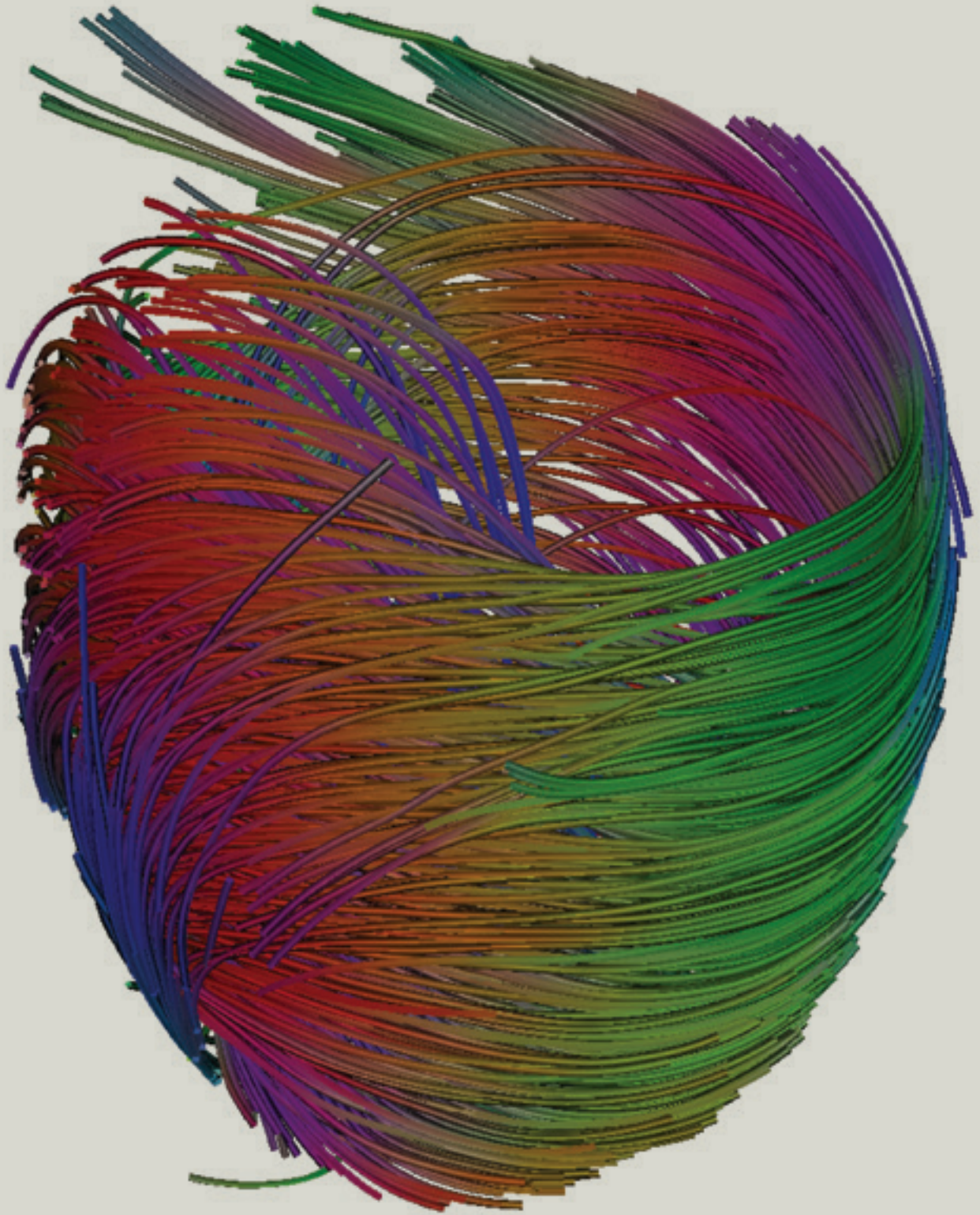
We will pave the way for closer collaborations between UK researchers and world-leading teams abroad by allowing international investigators to be co-applicants on BHF grants and by seeking partnerships with funders overseas.

Launch BHF-Crick fellowships

The Francis Crick Institute is a new biomedical discovery institute funded by the Medical Research Council, Wellcome Trust, Cancer Research UK and three London universities. Its goals are to improve our understanding of human health and disease and to speed up translation of laboratory discoveries into new treatments.

Working with the Francis Crick Institute and its university partners we will launch BHF-Crick fellowships to embed cardiovascular research in this cutting-edge facility.

Between 2011 and 2014 we invested £9.6m in collaborative projects, working with other funders like the Medical Research Council, the Wellcome Trust and the Stroke Association, together funding research to a total of £56m.



Heart strings

Dr Patrick Hales

BHF Centre of Research Excellence, University of Oxford

Sophisticated medical imaging reveals the intriguing hidden structure of heart muscle by tracking the movement of water molecules. This image was produced as part of a collaborative research project between research in medical, basic science and computing departments at the University of Oxford, funded jointly by the BHF and the Biotechnology and Biological Sciences Research Council.

Over the next five years we will:

Encourage funding collaborations

Our work is empowered by teaming up with other research funders including UK research councils, medical charities and the NHS. Together we can support ambitious and larger scale research initiatives, adding value to our research investment.

We will bring all the UK funders of cardiovascular research together regularly – in a Cardiovascular Research Funders Collaboration – to identify and set priorities for collaborative funding.

“The UK Biobank was set up to improve the prevention, diagnosis and treatment of a wide range of serious illnesses, including heart disease, stroke and diabetes. Such a huge project requires a variety of funders and the support of the BHF, alongside the Wellcome Trust, the Medical Research Council and others has already helped us make great strides into understanding the causes of heart disease.

It’s allowed my research to progress to a point where we can easily study hundreds of thousands of people at the same time. This simply wouldn’t be possible without collaborations between research funders and scientists.”

BHF Professor Sir Nilesh Samani
University of Leicester



TRANSLATION



Many promising laboratory discoveries are not developed into new diagnostic tests or treatments. This is often because funding is not available to progress the discovery to a stage where industry will invest the millions of pounds needed to develop a new diagnostic test or drug.

As part of our new strategy, we will support research aimed explicitly at developing potential new technologies to the point where they are attractive for further investment.

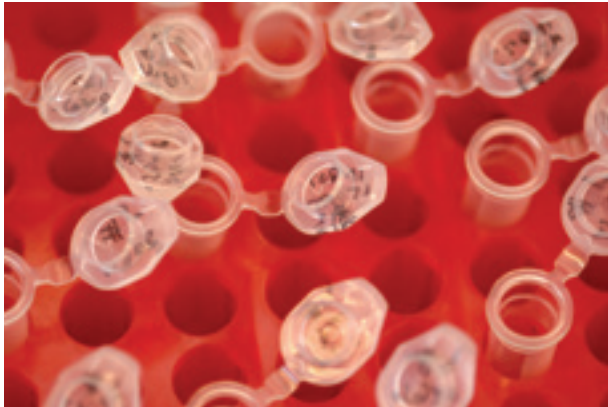
*Over the next five years
we will:*

Support translation

Our new Translational Award will support early phase development of potential new diagnostics, drugs or devices, optimising them to attract investment and further development by industry.

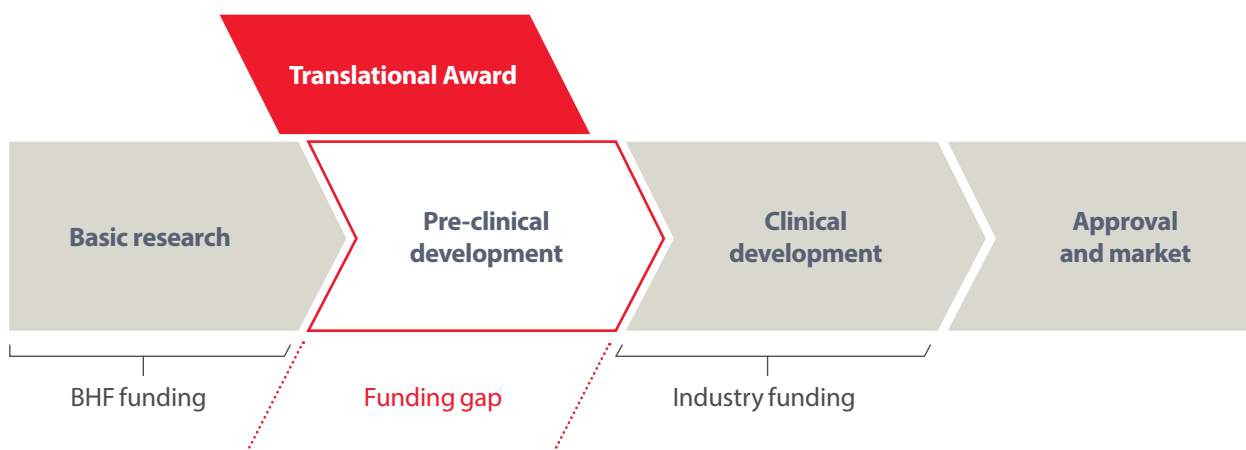
Stimulate dialogue between academia, clinicians and industry

We will facilitate a series of workshops which will bring together discovery scientists, clinicians and industry scientists to inform each other and identify promising avenues of translation for specific research topics.



**Our new Translational Award funds
up to £250,000 to drive research
projects to a stage where external
investors will take over funding.**

Translational Award

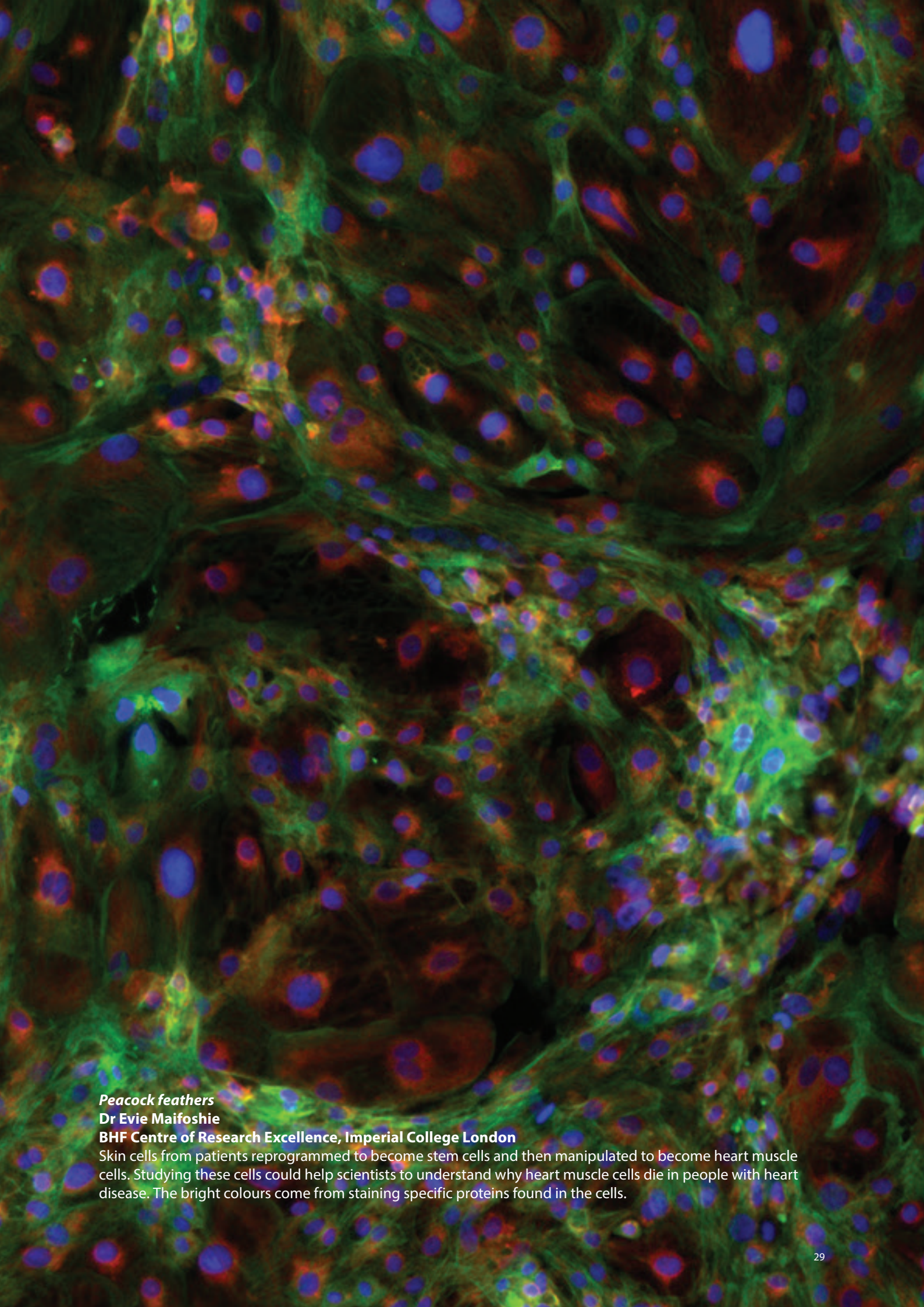


“The ultimate goal of medical research is to improve and save lives. But the nature of research means that not all discoveries will turn out to be useful for people, while others show great potential but can’t get the funding to move out of the laboratory.

By receiving the first BHF Translational Award, I’m hoping my research can move out of the lab and lead to a new test that could better diagnose people suspected of having a heart attack.”

Professor Michael Marber
King’s College London





Peacock feathers

Dr Evie Maifoshie

BHF Centre of Research Excellence, Imperial College London

Skin cells from patients reprogrammed to become stem cells and then manipulated to become heart muscle cells. Studying these cells could help scientists to understand why heart muscle cells die in people with heart disease. The bright colours come from staining specific proteins found in the cells.

➔ **WORKING TO MAINTAIN AND IMPROVE THE RESEARCH ENVIRONMENT**

We fund researchers within the context of the wider UK research environment and the maintenance and improvement of this environment is critical to our work.

To gain maximum benefit from our investment, we will work to ensure that the UK offers the best possible conditions for world-leading research.

Working in collaboration with other research funders, we will focus on government funding for science, use of patient data in research, support for research within the NHS and maintaining appropriate regulation of research involving animals.

➔ MEASURING PROGRESS

We are committed to achieving the greatest impact from every donation. We will ensure that BHF-funded scientists report the outputs and achievements arising from their research and that we monitor progress through ongoing evaluation of these outputs.

We will report individual stories of discovery and life-saving advances through social media, our website, the news media and elsewhere.

We will continue to monitor the number and quality of scientific publications from the research we fund. We will track the career development of our funded researchers and the number of research-active clinicians we support. And we will continue to evaluate the outcomes and impact of our Centres of Research Excellence and Regenerative Medicine.

These measures will benchmark our ongoing progress against the objectives of this research strategy.

But the most important measure of success will be the impact of our funded research on people with cardiovascular disease around the world.



ACKNOWLEDGEMENTS

We developed this strategy by consulting widely across the cardiovascular research and care community. We would like to thank everyone who contributed.

Particular thanks go to those who chaired the five meetings with our different stakeholders: Professor Anna Dominiczak OBE, Professor Sir Christopher Edwards, Dr David Grainger, Bec Hanley and Professor Sir Robert Lechler.

Many people attended the meetings and gave valuable comments and advice. The views of patients and carers, gathered at the final meeting, were invaluable and we are grateful to them for giving up their time to help us.



**British Heart
Foundation**

For over 50 years we've pioneered research that has transformed the lives of millions of people living with heart disease. Our work has been central to the discoveries of vital treatments that are changing the fight against heart disease.

But heart and circulatory disease still kills around one in four people in the UK, stealing them away from their families and loved ones.

From babies born with life threatening heart problems, to the many mums, dads and grandparents who survive a heart attack and endure the daily battles of heart failure.

Join our fight for every heartbeat in the UK. Every pound raised, minute of your time and donation to our shops will help make a difference to people's lives.

Text FIGHT to 70080 to donate £3*

**FIGHT
FOR EVERY
HEARTBEAT**

bhf.org.uk

*This is a charity donation service for the BHF. Texts cost £3 + 1 standard rate msg. The BHF will receive 100% of your donation to fund our life saving research. To opt out of calls and SMS text NOCOMMS BHF to 70060, or if you have any questions about your gift call 02032827863.
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