Cardiovascular Research Funding: British Heart Foundation Professorships

Funding 29 Professors at Universities With a Strong Commitment to Cardiovascular Research in England, Scotland, and Wales

The 29 professors funded by the British Heart Foundation describe their research interests and some of their most important findings to Jennifer Taylor, BSc, MSc, MPhil.

The UK charity, the British Heart Foundation (BHF, see http://www.bhf.org.uk), was founded in 1961 by a group of medical professionals to fund extra research into the causes, diagnosis, treatment, and prevention of heart and circulatory disease. The BHF awards professorships to senior research leaders in clinical or basic cardiovascular science who have an established international reputation, a substantial number of high-impact research articles, and a long-term track record of attracting significant peer-reviewed research grant income as a principal investigator. The award may include personal salary, start-up funds, and annual core support. Professors are appointed in partnership with universities that demonstrate a strong commitment to cardiovascular research. Award renewal after 10 years requires that the university will pay the professor’s salary. Candidates must hold or apply for a BHF programme grant. There are currently 29 BHF professors.

Gianni D. Angelini, MD, MCh, FRCS, FESCTS, FMedSci, BHF Professor of Cardiac Surgery, University of Bristol, England, and Imperial College London, England

Professor Angelini was appointed to the Bristol BHF chair in 1992 and the London BHF chair in 2010. His main research interests are saphenous vein bypass graft failure, myocardial protection and cardiopulmonary bypass, coronary artery bypass surgery on the beating heart, and arterial revascularisation. One major achievement has been the development of off-pump coronary artery bypass surgery. “In the future we will continue to translate basic science into surgical techniques and improve preoperative management aimed at reducing morbidity after adult and paediatric surgery,” says Professor Angelini. “We will also work to optimise clinical decision making in primary percutaneous coronary intervention, realise the potential of regenerative medicine in heart failure, develop more precise and sensitive proxy outcomes to be used in clinical trials, and expand academic paediatric cardiac surgery to achieve a critical mass and similar volume to adult surgery.”

Andrew H. Baker, PhD, FAHA, FESC, FRSE, BHF Professor of Translational Cardiovascular Sciences, University of Glasgow, Scotland

Professor Baker became a BHF professor in August 2011. His application was based on the vision of using genes, stem cells, or microRNA to prevent cardiovascular complications. “My gene therapy research has taken time to reach the clinical interface,” says Professor Baker. “It is now at an important juncture and is supported by a strong portfolio of preclinical safety and long-term efficacy data in animal models.” In a Circulation article in 2011, he showed that overexpression of tissue inhibitor of metalloproteinases-3 provides a sustained retardation of vein graft intimal thickening and highlights the translational potential for ex vivo tissue inhibitor of metalloproteinases-3 gene therapy. He would now like to perform first-in-man trials. “We are progressing both microRNA therapeutics and cell therapy in a similar way,” he says. “The BHF award will allow me to focus on translation.”

Stephen G. Ball, MA, PhD, FRCP, FESC, BHF Professor of Cardiology, University of Leeds, England

Professor Ball moved to the Leeds BHF chair in 1986 after working at the Medical Research Council Blood Pressure Unit in...
Shoumo Bhattacharya, MSc, FRCP, FESC, FMedSci, BHF Chair of Cardiovascular Medicine, Department of Cardiovascular Medicine and Wellcome Trust Centre for Human Genetics, University of Oxford, England

Professor Bhattacharya became a BHF professor in July 2009. His main areas of interest are signalling pathways in heart development and the development of the BHF Centre for Cardiovascular Target Discovery. The centre is based within the Target Discovery Institute at Oxford and aims to use high-throughput and high-content cell-based genetic and small molecule screens to identify genetic pathways that mediate cardiovascular disease. Another goal is to identify and validate novel druggable targets within these pathways. As a BHF professor, Professor Bhattacharya discovered that maternal diet could affect heart patterning. He says, “We hope to discover new targets and pathways for the treatment of heart disease using high-throughput cell-based genetic and small molecule screens.”

Martin Bennett, MD, PhD, FRCP, FAHA, FMedSci, BHF Professor of Cardiovascular Sciences/Consultant Cardiologist, University of Cambridge, England

Professor Bennett (see http://circ.ahajournals.org/content/117/19/f109) became a BHF professor in 2001. His research focuses on vascular disease, using human and mouse cells in vitro and models of atherosclerosis with genetic manipulation. In particular, he studies fundamental processes such as cell proliferation, death, and senescence using unique cell-type ablation systems to determine the role of specific cells in vivo. He says, “Recent work has focussed on the protective mechanisms that ensure survival in vascular smooth muscle cells, their defects in disease, and the triggers for vascular smooth muscle cell apoptosis and cell senescence.” Using these systems, Professor Bennett and his colleagues have identified novel mechanisms regulating cell death receptors in vascular cells and the critical role of cell death in atherosclerosis. Another major interest is vulnerable plaque imaging in patients using both invasive and noninvasive modalities.

Sir Rory Collins, FRCP, FMedSci, FESC, FACC, professor of medicine and epidemiology, Clinical Trial Service Unit and Epidemiological Studies Unit, University of Oxford

Professor Sir Rory Collins became professor of medicine and epidemiology at the University of Oxford’s Clinical Trial Service Unit and Epidemiological Studies Unit (see http://circ.ahajournals.org/content/117/25/f145), supported by the BHF, in 1996. He became principal investigator and chief executive of the UK Biobank prospective study of 500,000 people in September 2005. He has established large-scale epidemiological studies of the causes, prevention, and treatment of heart attacks, other vascular disease, and cancer. Important findings came from the 1988 Second International Study of Infarct Survival (ISIS-2), which showed that a 1-hour infusion of streptokinase and 1 month of daily aspirin could halve mortality after a heart attack, and the 2002 Heart Protection Study, which found that lowering low-density lipoprotein cholesterol with a statin reduces the risk of heart attack, ischaemic stroke, and revascularisation in a wider range of patients than previously thought. Professor Collins says that in the future, he and his colleagues hope to “identify further ways to prevent and treat coronary heart disease.”

A. John Camm, QHP, BSc, FRCP, FESC, FCGC, CstJ, BHF Prudential Professor of Clinical Cardiology, St. George’s University of London

Professor Camm (see http://circ.ahajournals.org/content/117/19/f109) became the BHF Professor of Cardiovascular Medicine at St. Bartholomew’s Medical College, London University, London, in 1984. In 1986, he moved to St. George’s, where he has been head of Cardiological Sciences, Cardiovascular Medicine, and General Medicine for some time. His particular interests are cardiac arrhythmias, pacemakers and implantable cardioverter-defibrillators, syncope, cardiac autonemics, risk stratification, atrial fibrillation, and anticoagulation. Professor Camm is particularly interested in practice guidelines and he has been chair of the European Society of Cardiology guidelines for the management of atrial fibrillation and the American College of Cardiology, American Heart Association, and European Society of Cardiology guidelines on ventricular arrhythmias and sudden cardiac death.

John E. Deanfield, BA Hons, BCH, FRCP, FESC, FACC, FAHA, BHF Vandervell Chair of Cardiology and Director of the Centre for Cardiovascular Prevention and Outcomes, University College London

Professor Deanfield (see http://circ.ahajournals.org/content/124/21/f121) became a BHF professor in 2003, having...
trained in both paediatric and adult cardiology. He is interested in the early onset of atherosclerotic vascular disease from childhood and the potential for prevention from early risk factor management and novel therapies. He says, “Our most significant finding is that inflammatory diseases outside the vascular system have a major impact on vascular biology and that reduction of inflammation can restore disturbed endothelial function back to normal.” This was demonstrated in a randomised clinical trial of patients with periodontitis. He adds, “In the future, we hope to demonstrate a large cohort trials and interventional studies that the early signs of vascular dysfunction that lead to atherosclerosis are amenable to treatment.”

David Eisner, MA, DPhil, FRCP (Hon), FMedSci, BHF Professor of Cardiac Physiology, University of Manchester, England
Professor Eisner (see http://circ.ahajournals.org/content/122/3/f13) was appointed BHF Professor of Cardiac Physiology at the University of Manchester in 2000. He investigates calcium signalling in cardiac muscle, particularly basic mechanisms, including the role of the sarcoplasmic reticulum in regulating the amplitude of the systolic calcium transient and thence the force of contraction of the heart. His most important finding as a BHF professor concerns the factors responsible for beat to beat regulation of the calcium content of the sarcoplasmic reticulum. Professor Eisner showed that sarcoplasmic reticulum calcium content is controlled by a simple feedback mechanism in which calcium released from the sarcoplasmic reticulum affects movement of calcium across the surface membrane. This finding has profound implications for both inotropy and arrhythmogenesis. Professor Eisner says, “Our long-term goal is to better understand the changes that occur in calcium signalling in disease.”

Keith A. A. Fox, FRCP, FESC, FMedSci, FACC, BHF and Duke of Edinburgh Professor of Cardiology, University of Edinburgh, Scotland
Professor Fox (see http://circ.ahajournals.org/content/116/11/F67) became a BHF professor in 1989. His main work is on the mechanisms and manifestations of acute coronary artery disease. The 3rd Randomised Intervention Treatment of Angina project showed that in patients with non-ST-elevation acute coronary syndrome, a routine invasive strategy leads to long-term reduction in risk of death or nonfatal myocardial infarction. This benefit is mainly in high-risk patients. The project has influenced UK, European, and international guidelines and is part of the FIR collaboration, which found that a routine invasive strategy reduces long-term rates of cardiovascular death or myocardial infarction and the largest absolute effect is seen in higher risk patients. Professor Fox says, “In the future, we hope to improve our understanding of the mechanisms of plaque rupture and the thrombotic consequences.”

Mark A. Hanson, MA, DPhil, PGCE, FRCOG, BHF Professor of Cardiovascular Science, Faculty of Medicine, University of Southampton, England
Professor Hanson was appointed as BHF Professor of Cardiovascular Science in 2002. He is founding director of Southampton University’s Institute of Developmental Sciences and director of the Academic Unit of Human Development and Health. His research concerns aspects of development and health, ranging from how the environment during development can affect the risk of chronic diseases, such as heart disease, diabetes mellitus, and obesity, to population studies aimed at the early identification of risk. Professor Hanson says, “Our group is exploring the epigenetic processes that relate to such risks and may serve as valuable early life biomarkers.” They have shown, for example, how a DNA methylation change measured in the umbilical cord at birth relates to the mother’s diet during pregnancy and to adiposity in 6- to 9-year-old children.

Dorian Haskard, DM, FCRP, FMedSci, BHF Sir John McMichael Professor of Cardiovascular Medicine, Imperial College London
Professor Haskard has been the BHF Sir John McMichael Professor of Cardiovascular Medicine at Imperial College since 1995. He is head of vascular sciences within the National Heart and Lung Institute. His longstanding interests are the regulation of endothelial and macrophage function in vascular inflammation. Using mouse models, his lab has recently been working on the protective role of humoral immunity, focusing particularly on the complement system and immunoglobulin M natural antibodies. He says, “We found that low-density lipoprotein receptor-deficient mice need immunoglobulin M to protect against atherosclerosis.”

Mathias Gautel, MD PhD, FMedSci, BHF Chair of Molecular Cardiology, King’s College London BHF Centre of Research Excellence, Randall Division for Cell and Molecular Biophysics and Cardiovascular Division
Professor Gautel became a BHF professor in 2008. He is interested in the structural and signalling network formed by the contractile machinery of muscle, the sarcomeres, and how they are assembled and turned over in response to changes in workload. Professor Gautel and his colleagues have revealed the conformational changes during mechanical activation of the protein kinase domain of titin using biophysical, biochemical, and cellular approaches. “This was the first demonstration of how the conformation of a signalling enzyme is directly modulated by mechanical forces,” says Professor Gautel. In the future, they hope to unravel the interplay of sarcomeric and receptor-linked signalling in cardiac growth and remodelling of the failing heart and to determine the impact of cardiomyopathy mutations in titin and obscurin on them.
Current research is directed at defining the roles of IgG autoantibodies and also defining factors regulating the expression and stability of inflammatory gene mRNA.

**Steve Humphries, PhD, MRCP, FRCP, BHF Professor of Cardiovascular Genetics, University College London**

Professor Humphries (see http://circ.ahajournals.org/content/121/5/f25) has been BHF Professor of Cardiovascular Genetics at University College London since 1991. He has developed and implemented molecular strategies to study the causes and clinical and psychological consequences of familial hypercholesterolaemia, and he was the lead clinical advisor for the 2008 UK National Institute for Health and Clinical Excellence guidelines for familial hypercholesterolaemia. In 2010, he wrote a review article for Circulation on risk prediction in cardiovascular medicine in the era of genome-wide association studies. His current work focuses on the identification of the molecular mechanisms of the effects of gene variants and the use of genetic tests to identify individuals at risk of premature heart disease. He says, “I am involved with teaching, ethics, and public awareness aspects of the development of genetic testing for heart disease, as well as complex late-onset disorders including risk for abdominal aortic aneurysms.”

**Bernard D. Keavney, BSc, DM, FRCP, BHF Professor of Cardiology, Newcastle University, England**

Professor Keavney became a BHF professor in 2008. He is interested in the genetics of cardiovascular disease. With BHF support, his group is conducting 1 of the largest family-based studies worldwide of congenital heart disease using modern genetic techniques (genome-wide association study and next generation sequencing) to investigate why congenital heart disease has a genetic predisposition. In 2010, they established which gene on chromosome 9p21 is responsible for the association signal that has been detected there in multiple genetic studies in coronary artery disease. Professor Keavney says, “The challenge for the next 5 to 10 years is going to be finding out what genes are involved, how they work, and whether any of them may be novel targets that can be modified to reduce risk.”

**Ziad Mallat, MD, PhD, BHF Professor of Cardiovascular Medicine, Department of Medicine, University of Cambridge**

Professor Mallat became a BHF professor in 2010. His area of interest relates to the immunoinflammatory response in atherosclerosis and vascular aneurysms. His group is studying the cellular and molecular pathways involved in the regulation of the immune response in these diseases. He says, “We have identified a previously unsuspected pathogenic role for mature B cells in the development of atherosclerosis.” Current research activities address the relation between autoimmune diseases and atherosclerosis, as well as the role of the regulatory immune response in the prevention and/or treatment of plaque vulnerability. “We are particularly aiming to develop ‘vaccination’ strategies that promote regulatory T cell responses to atherosclerosis-related antigens,” he says. “Another important goal is to identify the pathogenic versus the protective B cell subsets in atherosclerosis and vascular aneurysm.”

**Nicholas W. Morrell, MD, FRCP, FMedSci, BHF Professor of Cardiopulmonary Medicine, Department of Medicine, University of Cambridge School of Clinical Medicine, Addenbrooke’s and Papworth Hospitals, Cambridge**

Professor Morrell became a BHF chair in 2009. He is interested in severe forms of pulmonary arterial hypertension. In particular, his lab studies the mechanisms by which mutations in a gene encoding the bone morphogenetic protein type 2 receptor cause heritable forms of pulmonary arterial hypertension. A recent important finding is that drugs currently used for the treatment of pulmonary arterial hypertension work partly by restoring signalling downstream of mutant bone morphogenetic protein type 2 receptors. “This means that methods which directly enhance bone morphogenetic protein signalling will be promising approaches to treat the condition,” says Professor Morrell. “Our future research will focus on ways to enhance bone morphogenetic protein signalling by restoring bone morphogenetic protein type 2 receptor function in heritable and idiopathic pulmonary arterial hypertension and bringing these approaches through to the clinic.”

**Andrew C. Newby, PhD, FESC, BHF Professor of Vascular Cell Biology, University of Bristol, Bristol Heart Institute**

Professor Newby has been BHF Professor of Vascular Cell Biology at the University of Bristol since 1995. His research interests are intima formation after angioplasty and in vein grafts, atherosclerosis, plaque instability, metalloproteinases, macrophages, foam cell macrophages, and macrophage subsets in plaques. His most important findings are that intima formation in vein grafts can be prevented by applying a loose-fitting external collar; that some metalloproteinases have a role in intima formation and plaque stabilisation, whereas others promote plaque growth and instability; and that adverse metalloproteinase profiles are associated with specific macrophage phenotypes in plaques. In the future, he and his colleagues hope to “develop new treatment concepts based on selective inhibition of harmful metalloproteinases and repolarisation of foam cell macrophages.”
David E. Newby, PhD, DM, DSc, FRCP, FRSE, FESC, FACC, FMedSci, BHF
John Wheatley Chair of Cardiology, University of Edinburgh

Professor Newby became a BHF chair of cardiology in April 2009. He has been supported by the BHF since 1994. His areas of research interest are vascular biology and injury in acute coronary syndromes, valvular heart disease, and heart failure. His most important findings have been the absence of an effect of lipid-lowering therapy in aortic stenosis and the adverse cardiovascular effects of air pollution. He says, “My future research will focus on novel interventions in the treatment of aortic stenosis, defining the component(s) responsible for the adverse effects of air pollution, and novel imaging approaches to investigate cardiovascular disease.”

Kinya Otsu, MD, PhD, FAHA, BHF
Professor of Cardiology, Cardiovascular Division, King’s College London

Professor Otsu became a BHF chair of cardiology in January 2012 after moving from Japan. His research has attempted to delineate the downstream mechanisms whereby haemodynamic stress mediates various types of cardiomyocyte death and cardiac pathogenesis. “As a BHF chair, I will elucidate roles of nonapoptotic cardiomyocyte death in the genesis of heart failure,” he says. “Our long-term goal is to identify new therapeutic targets to treat patients with heart failure.” He has previously shown that the balance between apoptotic and antiapoptotic pathways determines cell fate and identified the molecular machinery involving necrotic cell death. When nonapoptotic cell death is adequately controlled, it is possible to avoid the cardiomyocyte death.

Paul R. Riley, PhD, BHF Professor of Regenerative Medicine and Chair of Development and Reproduction, University of Oxford

Professor Riley became a BHF professor in October 2011. He is interested in cardiovascular development, repair, and regeneration. His most important discovery is that adult epicardial cells can be reactivated to produce coronary vessel cells and cardiomyocytes for neovascularisation and myocardial regeneration of the injured mammalian heart. He says, “My future goal is to identify novel inducers and signalling pathways that might be extrapolated to human epicardium-derived cells, thus facilitating drug discovery for the therapeutic treatment of ischaemic heart disease.”

Nilesh J. Samani, BSc, FRCP, FACC, FMedSci, BHF Professor of Cardiology, head of the Department of Cardiovascular Sciences, and director of the Leicester National Institute for Health Research Cardiovascular Biomedical Research Unit, University of Leicester Medical School, England

Professor Samani (see http://circ.ahajournals.org/content/122/3/f13) became a BHF professor in 2003. His main interest is understanding the inherited basis of common cardiovascular diseases, especially coronary disease and hypertension. Professor Samani’s most important research findings have been made through genome-wide association studies, identifying new genetic variants that affect risk of coronary artery disease. “The goal now,” he says, “is to understand the mechanisms by which some of the new genes that we have identified affect risk of coronary artery disease in the hope that in the future it may lead to a better understanding of its pathogenesis and new treatments.”

Michael D. Schneider, MD, FMedSci, FAHA, FESC, FISHR, BHF Simon Marks Chair of Regenerative Cardiology, head of Cardiovascular Science, National Heart and Lung Institute, and director of the BHF Centre of Research Excellence, Imperial College London

Professor Schneider was recruited from Houston, TX, to London in 2007 and became a BHF professor in 2008. His work centres on cardiac muscle cell number as a therapeutic target. His most exciting work as a BHF professor chiefly concerns analyses of cardiac stem cells from adult mouse myocardium. “One of the paradoxes in the field has been that these cells are clearly distinct from, say, haematopoietic stem cells or embryonic stem cells by virtue of expressing many of the important heart-forming transcription factors,” says Professor Schneider. “However, these cells do not spontaneously differentiate into cardiac muscle. What are the molecular barriers? Our strategies for answering this problem use advanced equipment for robotic cell culture and phenotyping, funded chiefly by my BHF professorship.”

Ajay M. Shah, MD, FMedSci, FRCP, FAHA, FESC, BHF Professor of Cardiology, King’s College London, head of the Cardiovascular Division, and director of the King’s BHF Centre of Research Excellence

Professor Shah (see http://circ.ahajournals.org/content/122/5/f25) became a BHF professor in 1998. His main areas of interest are the roles of reactive oxygen species and nitric oxide in heart failure and vascular dysfunction, work that spans basic lab studies and human investigation. Professor Shah has demonstrated the contrasting role of different NADPH oxidase isoforms in regulating cardiac remodelling and has shown that neuronal nitric oxide synthase regulates basal blood flow in humans. “My main aim is to work towards new therapies for patients with heart failure,” he says. “In the future, we hope to incorporate more systems biology approaches in our work. I am also committed to developing King’s as an international centre of excellence for cardiovascular research, education, and treatment.”
Andrew Steptoe, MA, DPhil, DSc, FBPsS, AcSS, FMedSci, BHF Professor of Psychology, University College London
Professor Steptoe has been a BHF professor since 2000. His research focuses on the role of psychological factors (stress, depression, social support) in the long-term development of coronary heart disease and in survivors of acute cardiac events. His work aims to understand the biological pathways through which psychological factors influence cardiac disease, using a combination of lab-based studies of haemodynamic, neuroendocrine, and inflammatory responses to mental stress, and clinical studies of patients with advanced heart disease. Professor Steptoe and his colleagues have shown that patients who experienced acute emotional triggers of their myocardial infarctions respond to mental stress with particularly marked platelet activation. Professor Steptoe says, “The goal is to identify more precisely the biological processes underpinning psychological influences on coronary heart disease to discover new targets for prevention and effective patient management.”

Hugh Watkins, PhD, FRCp, FMedSci, Field Marshal Alexander Professor of Cardiovascular Medicine and head of the Department of Cardiovascular Medicine, University of Oxford
Professor Watkins has been a BHF professor since 1996. He directs the BHF Centre of Research Excellence at Oxford. His expertise is in molecular genetic analysis of cardiovascular disease as a tool to define disease mechanisms and to improve diagnosis and treatment of patients and families with inherited diseases. He leads an established programme on inherited heart muscle diseases, in particular hypertrophic cardiomyopathy, where his work has led to the idea that energy compromise is a key disease mechanism. Professor Watkins says, “We have already changed the way the disease is diagnosed and managed in families. In the future, we hope to come up with new therapies that prevent the hypertrophy from developing in the first place.”

Stephen P. Watson, PhD, FMedSci, BHF Chair in Cardiovascular Sciences and Cellular Pharmacology, University of Birmingham, England
Professor Watson became a BHF professor in 2002. His research concerns cell surface receptors and their signalling pathways in platelets and megakaryocytes. His most important research finding to date as a BHF professor has been the identification of the C-type lectin receptor, CLEC-2, on platelets. He says, “In our future research we hope to gain further understanding of the roles of platelets beyond haemostasis, in particular developmental processes, and determination of the genetic basis of bleeding in patients with mild platelet function disorders of unknown aetiology.”

Alan J. Williams, BA, PhD, BHF Sir Thomas Lewis Professor of Cardiovascular Science, Institute of Molecular and Experimental Medicine, School of Medicine, Cardiff University, Wales
Professor Williams became a BHF professor in 2007. His group uses biophysical, molecular biological, and biochemical techniques to investigate the function of the cardiac sarcoplasmic reticulum calcium release channel (ryanodine receptor). “Using these approaches, we are uncovering the structural elements of this enormous molecule that permit and regulate channel function,” he says.

Ryanodine receptor dysfunction underlies the development of arrhythmias in both inherited and acquired cardiac disease. By studying the function of individual normal channel molecules and channels containing disease-linked mutations, they aim to establish the mechanisms underlying altered function and characterise potential ryanodine receptor-focussed therapeutic agents.

Professor Steptoe has been a BHF professor since 2002. His research focuses on stem cells and vascular biology. In earlier work, he performed a series of cellular, animal, and human studies, which showed that immune and inflammatory responses to heat shock proteins are crucial in the pathogenesis of atherosclerosis. In parallel, he found that vascular stem cells contribute to endothelial repair and smooth muscle accumulation during the formation of atherosclerotic lesions.

“As a BHF professor, the most important finding is the discovery of stem cells present in the vessel wall,” he says. Currently, his team is testing stem cell therapy for vascular disease in animal models, which could be applied to patients in the future.

Jennifer Taylor is a freelance medical journalist.

Photographs courtesy of the BHF and the BHF professors.