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European Perspectives in Cardiology



Research, Practice, and Life Resolutions for 2013

“The 2012 Version of the European Guidelines on Cardiovascular Disease Prevention Presents Major Challenges for 2013”

Cardiovascular scientists and clinicians from a variety of European countries describe their research, practice, and life resolutions for 2013 to Lindy van den Berghe, BMedSci, BM, BS.

Among the cardiovascular scientists and clinicians sharing their research, practice, and life resolutions for 2013 with readers of *Circulation*, is Joep Perk, MD, chair, 5th Joint European Societies' Taskforce on Cardiovascular Disease Prevention, Linnaeus University, Kalmar, Sweden (see p. f3). He advocates the implementation of strategies to restrict smoking, to lower salt content in foods, to decrease prices of fruit and vegetables, and to stimulate physical activity as major priorities for 2013 to prevent cardiovascular disease.

Exercise is also highlighted by Øyvind Ellingsen, MD, PhD, head and professor of cellular cardiology, Department of Circulation and Medical Imaging, Norwegian University of Science and Technology, Trondheim, Norway (see p. f3). He says, “My professional resolution for 2013 is to work on how we can motivate more patients to exercise regularly and help them maintain adherence after a supervised introductory programme.”

Meanwhile Andrew H. Baker, PhD, FRSE, British Heart Foundation Professor of Translational Cardiovascular Sciences, and deputy director, Institute of Cardiovascular and Medical Sciences, BHF Glasgow Cardiovascular Research Centre, University of Glasgow, Glasgow, Scotland, plans to lead by example in 2013 and complete the extreme Alpine cycling events ‘the Marmotte’ on July 6, and the ‘Etape du Tour’ on July 7 (see p. f2).

A “big heart” photo for 2013. Professor Ellingsen with the heart of a 9-metre Minke whale. Photograph courtesy of Geir Mogen.

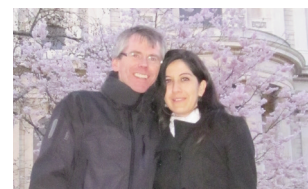


On other pages...

Spotlight: René Botnar, PhD

René Botnar, PhD, chair of cardiovascular imaging, Division of Imaging Sciences and Biomedical Engineering, King's College London, London, England, was involved in the development of free-breathing 3-dimensional magnetic resonance coronary angiography at Harvard Medical School, Boston, MD. He and his team are now developing novel magnetic resonance sequences and target-specific imaging agents to reveal the biological processes underlying atherosclerosis and other cardiovascular pathologies.

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Scotland: Andrew H. Baker, PhD, FRSE, British Heart Foundation Professor of Translational Cardiovascular Sciences, deputy director, Institute of Cardiovascular and Medical Sciences, and co-ordinator, ADVance Marie Curie Initial Training Network (agreement 290002), Institute of Cardiovascular and Medical Sciences, BHF Glasgow Cardiovascular Research Centre, University of Glasgow, Glasgow "In 2013, my research, which focuses on pathological vascular remodelling and the development of novel strategies to limit damage, must move to the clinic for a first-in-man clinical trial in vein graft gene therapy. In the lab, we will develop miRNA-based therapeutics for vein graft disease and develop our programme to use miRNA in the prevention of pulmonary arterial hypertension. My life resolutions are to complete the cycling events 'the Marmotte' on July 6, 2013, and then the 'Etape du Tour' the next day, both in the Alps, and most importantly, for my family to stay fit and healthy."



England: Sarah C. Clarke, MA, MD, FRCP, clinical director strategic development, Papworth Hospital, Cambridge, and vice president education and research, British Cardiovascular Society "Clinically, I am keen to advance specialist services at Papworth Hospital, such as the chronic total occlusion and renal denervation programmes. As clinical director for strategic development, I hope to take forward the development of the New Papworth Hospital with the preferred bidder on the Cambridge Biomedical Campus. Through the new Academic Health Science Networks, I hope to oversee service improvement and innovation locally and regionally and facilitate research in the National Health Service. Nationally, as vice president for education and research, I hope to make the annual conference of the British Cardiovascular Society in London at the ExCeL Exhibition Centre June 3–5, 2013, a great success. Our theme is innovation. See you there."



The Netherlands: Christine Mummery, PhD, professor of developmental biology and chair, Department of Anatomy and Embryology, Leiden University Medical Center, Leiden "Our research focuses on creating disease models for cardiovascular disease using human induced pluripotent stem cells. Our aim in 2013 is to watch controls more closely than now by making genetically rescued lines for all our mutations or trying to rescue phenotypes in some other way. We will also create disease lines by introducing specific mutations in healthy control lines. That way we will always have related controls, so the only difference between the cardiomyocytes or endothelial cells we study is the mutation of interest. My life resolution for 2013 is to say no a little more often, even to irresistible invitations."



Switzerland: Christian Seiler, MD, professor of medicine and co-chair of cardiology, University Hospital, Bern "In 2013, our research group on the pathophysiology of heart disease will complete or begin several clinical study protocols on the efficacy of different substances on coronary collateral function, the acute anti-ischaemic effect of intermittent coronary sinus occlusion, the naturally occurring extracardiac myocardial blood supply, the potential of a cardiac treatment of sleep apnoea syndrome, and 3-dimensional colour Doppler assessment of mitral regurgitation. Each project is so exciting that my foremost 2013 resolution as a person not suffering from sleep apnoea is to have fewer sleepless nights. My two second-most important resolutions, to read more and to climb more mountains, could then be fulfilled more easily."

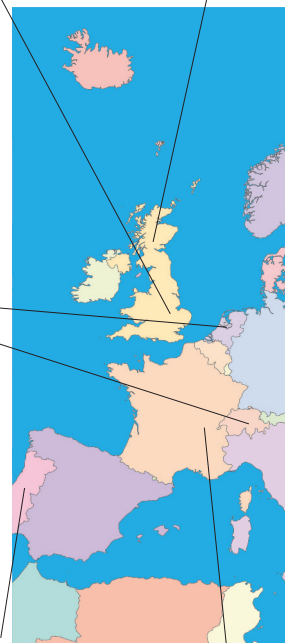


Portugal: Nuno Cardim, MD, PhD, director, Cardiac Imaging Department, Hospital da Luz, Lisbon, and professor of cardiology, Nova Medical School, Lisbon "My 2013 resolutions focus on my areas of interest (cardiomyopathies and cardiac imaging) in my institutions (Hospital da Luz, Corclinica, and Nova Medical School of Lisbon). 2013 marks the start of the Portuguese Registry of Hypertrophic Cardiomyopathy under the auspices of the Portuguese Society of Cardiology. As the scientific coordinator, I am excited about this project. I will also be focussing on my 'new job' as a board member of the European Association of Cardiovascular Imaging, working with my European colleagues ('a dream team') to develop several topics, such as individual certification, lab accreditation, and research and education. Finally, as associate editor of the *Portuguese Journal of Cardiology*, I will work to improve the quality of the journal. 2013 will be challenging and require hard work, but promises to be rewarding."



Jean-Jacques Monsuez, MD, PhD, cardiologist, Abba Khellaf, MD, and Jean-Yves Artigou, MD, PhD, professor and head of cardiology, Hôpital René Muret, Université Paris-13, Faculté de Médecine de Bobigny, Paris "Our institution, the Assistance Publique-Hôpitaux de Paris, provides continuous medical education for >10 000 physicians within its 37 hospitals. In 2012, our cardiology team of Hôpitaux Universitaires de Paris Seine Saint-Denis, a group of 3 university hospitals, started a continuous medical education programme for noncardiologists. After a successful 2-day session on managing patients with cardiac disease during noncardiac surgery, we are expanding the programme in 2013 with sessions titled 'Cardiovascular issues in cancer patients,' 'What's useful for noncardiologists in recently released cardiovascular guidelines,' and 'Bring your ECGs for colleagues.'"

From left to right, Professor Artigou, Dr Khellaf, and Dr Monsuez.



Sweden: Joep Perk, MD, chair, 5th Joint European Societies' Taskforce on Cardiovascular Disease Prevention and professor of health sciences, Linnaeus University, Kalmar "The 2012 version of the European Guidelines on Cardiovascular Disease Prevention presents major challenges for 2013. This document may inspire research to identify the most urgent gaps in clinical knowledge. In clinical practice, the implementation of guidance as shown in the European Action on Secondary and Primary Prevention by Intervention to Reduce Events (EUROASPIRE) and European Study on Cardiovascular Risk Prevention and Management in Daily Practice (EURIKA) studies should be improved. Finally, politicians need to take measures to restrict smoking, to lower salt content in food products, to lower fruit and vegetable prices, and to stimulate physical activity. Only then will the year 2013 contribute to the World Health Organisation's vision of eradicating cardiovascular disease."



Norway: Øyvind Ellingsen, MD, PhD, head and professor of cellular cardiology, Department of Circulation and Medical Imaging, Norwegian University of Science and Technology, Trondheim "In Norway, the greatest achievement for cardiology in 2012 was the official opening of a national cardiovascular registry. It will be a fantastic tool for surveillance and research. As a member of the Norwegian Council on Cardiovascular Disease and the Norwegian Society of Cardiology, I am grateful that 10 years of joint lobbying by these organisations helped the Ministry of Health put the legislation in place. My professional resolution for 2013 is to work on how we can motivate more patients to exercise regularly and help them maintain adherence after a supervised introductory programme." Photograph courtesy of Geir Mogen.



Finland: Heikki Huikuri, MD, professor and director, Institute of Clinical Medicine, Department of Internal Medicine, University of Oulu, Oulu "In 2013, our research team will continue combining expertise in clinical cardiology and biomedical engineering to risk profile and analyse various markers of sudden cardiac death obtained from standard 12-lead and 24-hour ambulatory ECGs from our nationally representative population cohorts collected in Finland between 1970 and 2000 comprising a total of 25 000 ECGs from middle-aged subjects with a long follow-up."



Czech Republic: Jindřich Špinar, MD, PhD, head and professor of cardiology, Internal Cardiology Department, University Hospital, Brno-Bohunice "In 2013, we will continue our registry programme. The Acute Heart Failure Database (AHEAD) will be followed by the AHEAD B (biomarkers) and we will try to identify new prognostic biomarkers for heart failure decompensation and acute coronary syndromes. Registries for new anticoagulant and antiplatelet drugs have also been started. We will continue cooperating with the Thrombolysis in Myocardial Infarction group. The International Clinical Research Centre, opened in 2012 in Brno, will start a new era of scientific cooperation with the Mayo Clinic, Rochester, MN."



Croatia: Zeljko Reiner, MD, PhD, FRCP (Lond), professor of internal medicine, School of Medicine, University of Zagreb, head, Department of Internal Medicine, Zagreb, president of the Croatian Atherosclerosis Society "In 2013, I intend to continue surveys investigating the perception and awareness of risk factors for cardiovascular diseases among different subgroups of the population and the existence of the actual risk factors in the same subjects. Together with my coworkers, I will also perform a large observational study in patients who were treated with different statins by cardiologists to assess the prevalence and types of persistent dyslipidaemia in these patients and to analyse cardiologists' further treatment advice for those patients who do not reach lipid target levels. Data obtained from these studies might help improve promotion of cardiovascular disease prevention and improve treatment of dyslipidaemias."



Italy: Giuseppe Lembo, MD, PhD, professor of applied technical and medical science, Department of Molecular Medicine, Sapienza University of Rome, Rome, and chief, Angiocardioneurology Clinical and Research Units, Neuromed Institute, Pozzilli "After discovering that placental growth factor plays a role in cardiac remodelling by modulating inflammatory and immune reactions, the research activity of my lab in 2013 is going to focus on how cardiovascular mechanisms are intertwined with immune system activation. It is fascinating that, despite the work and progress made in past decades in defining the molecular networks underlying cardiovascular diseases, this novel perspective of cardioimmunology is pushing us back to the starting point to enrich our knowledge on how immune reservoirs actively participate in cardiac responses to environmental challenges."



Spotlight: René Botnar, PhD



Developing Novel Magnetic Resonance Sequences and Target-Specific Imaging Agents to Reveal the Biological Processes Underlying Atherosclerosis and Other Cardiovascular Pathologies

René Botnar, PhD, chair of cardiovascular imaging, Division of Imaging Sciences and Biomedical Engineering, King's College London, London, England, talks to Mark Nicholls.

René Botnar, PhD, chair of cardiovascular imaging, Division of Imaging Sciences and Biomedical Engineering, King's College London, London, England, dates his fascination with biomedical imaging to his experience of a computed tomography examination as a patient when he had cancer at 22 years of age while studying physics at the Technical University Karlsruhe, Karlsruhe, Germany. The procedure took 30 minutes compared with the few seconds it takes today. He comments, "I realised that physics alone was too abstract and that I wanted a more human component to my work. Medical imaging was the perfect fit for me because I am a visual person and love 'seeing' results." Developing novel solutions and strategies for magnetic resonance (MR) coronary angiography and vessel wall imaging and pulse sequences for better visualisation of pathologies has since become a major area of research for him.

"We Managed to Make Motion Correction for Coronary Artery Imaging Finally Work"

Professor Botnar's most important work was the development of free-breathing 3-dimensional MR coronary angiography as part of a team led by Professor Warren Manning, MD, chief of noninvasive imaging, Harvard Medical School, Boston, MA. As a result patients were no longer required to hold their breath during the coronary artery imaging examination.^{1,2} Professor Botnar says, "We managed to make motion correction for coronary artery imaging finally work. This allowed us to acquire high-resolution 3-dimensional datasets over several minutes with minimal respiratory motion artefacts." Professor Botnar clearly remembers the first scan and volunteer and how the team achieved "an amazing image of the left coronary artery system" that looked like a contrast agent-enhanced scan with the sole use of MR physics and without any risk to the patients (no radiation exposure, no contrast agents). Professor Botnar duly pinned the images on Professor Manning's office door where they remained for many years. He adds, "This breakthrough required state-of-the-art technology such as real-time motion monitoring and correction."

Professor Manning proved to be a major influence on Professor Botnar, who recalls, "My first meeting with Warren was at breakfast in the Longwood Galleria. He was much younger than I expected because he was already quite famous for his work on coronary MR angiography, and he was extremely nice and full of excitement about cardiac

MR imaging. Although a cardiologist, Warren started scribbling detailed MR pulse sequences on a napkin, and I was impressed by his deep understanding of MR physics. He had a clear vision of the direction in which cardiovascular imaging research had to go, and his excitement for MR coronary artery imaging immediately inspired me to work on this topic." Professor Botnar also comments on the efficient way in which Professor Manning had set up his lab and how he managed it like "a family business," which created a "pleasant and extremely productive atmosphere," helped by the chocolate cake made by the team's personal assistant, Iris.

"It Was Exciting When, After Many Failures, We Could See a Little White Snowball in the Image, Which Was an Aortic Thrombus Following Plaque Rupture"

Professor Botnar's development of motion-corrected 3-dimensional MR coronary angiography has been the basis of all of his subsequent research and produced a clinical study published in the *New England Journal of Medicine*.³ He says, "This project taught me about MR motion correction and tissue contrast manipulation, which I subsequently used for the development of coronary vessel wall and molecular imaging of atherosclerosis."⁴ This article was ranked as 1 of the top 10 advances in heart disease and stroke for 1999 by the American Heart Association.

Another enjoyable project for Professor Botnar has been the development of coronary wall imaging, which was more challenging due to the small size of the coronary vessel wall.⁵ It required good knowledge of coronary anatomy and flow to synchronise the MR sequence with coronary flow, cardiac rest period (mid-diastole), and the R-wave of the electrocardiogram, and to perform the planning of the scans along one of the major coronary arteries.

Professor Botnar also particularly enjoyed his first imaging study with a fibrin-specific contrast agent.⁶ He says, "It was exciting when finally, after many failures, we could see a little white snowball in the image, which was an aortic thrombus after plaque rupture. The translation of this approach into a pig model of in-stent thrombosis was equally exciting because we were not sure whether we could see this 'little snowball' in a small rapidly moving vessel. After a long procedure, which involved placing an MR lucent stent with a little bit of glue on its surface and 5 minutes of MR imaging, we were lucky enough to obtain a beautiful image

with a white spot at the location where we had placed the stent under x-ray guidance, which we celebrated with a special order of takeaway food at the scanner."

Other important research for Professor Botnar includes the development of MR coronary vessel wall imaging and the demonstration of positive "Glagov" remodelling in patients with coronary artery disease.⁷ He explains, "This is the only completely noninvasive approach to image coronary artery walls and plaque and may be an ideal screening method in patients with suspected coronary artery disease." Another important article described selective imaging of aortic and coronary thrombosis by targeting fibrin using a small molecular weight contrast agent.⁸ This study demonstrated the feasibility of imaging of coronary thrombus and plaque biology and could lead to a completely new approach to imaging coronary plaque biology including endothelial permeability/dysfunction, plaque inflammation, matrix remodelling, proteolysis, or thrombosis.

The studies were conducted as a small team, which included Matthias Stuber, PhD, Professor Manning, and Kraig Kissinger, BS, RT. "Professor Stuber and I had almost daily discussions about new MR imaging sequences and the technical challenges that come with their implementation," says Professor Botnar. "We also shared a passion for deep powder and off piste skiing, and we managed to carve out a few days every year to spend some skiing days in Zermatt in the Swiss Alps." Other influential colleagues and friends are Professor Elmar Spuentrup, MD, Yong Kim, MD, PhD, Gerald Greil, MD, and Professor David Maintz, MD, who all spent time in Boston working on coronary imaging and continue with collaborations today.

"Leakage of an Albumin-Binding Contrast Agent Was a Good Indicator of Endothelial Health and Function"

In Boston, Professor Botnar investigated an albumin-binding intravascular contrast agent for coronary MR angiography. At that time, most MR contrast agent research was directed towards developing intravascular contrast agents to allow high-resolution angiography. To minimise extravasation of the contrast agent, Randy Lauffer, PhD, at that time an assistant professor at Massachusetts General Hospital, Boston, had the idea of making an albumin-binding contrast agent to remain intravascular due to the size of blood albumin. Almost 1 decade later, Dr Kim demonstrated that the same agent leaks into the vessel wall after mechanical vessel injury. Professor Botnar says, "Inspired by his work, one of my postdocs, Alkystis Phinikaridou, PhD, and I decided to test the hypothesis that this agent could be used to noninvasively measure endothelial permeability in a model of progressive atherosclerosis and whether it would also allow an assessment of endothelial integrity before and after pharmacological intervention. To our surprise, leakage of the albumin-binding contrast agent was a good indicator of endothelial health and function and correlated well with the width of the gap junctions between neighbouring cells.⁹ The agent has been approved for clinical use, so we are now working on translating these findings."



Professor Botnar with his wife Claudia Prieto, PhD, who is also a biomedical scientist. They live in London but travel regularly between the United Kingdom and Dr Prieto's home country of Chile. Professor Botnar will soon start a temporary visiting appointment in the School of Engineering at the Catholic University of Chile. Photograph courtesy of Professor Botnar.

"Our Division Is a Melting Pot of People with Different Backgrounds Doing Research in a Hospital Environment to Bridge the Gap Between Basic Science and Clinical Translation"

Professor Botnar was born in Stuttgart, Germany. After studying physics at Technical University Karlsruhe and then taking a short break and expedition to Nepal to climb a 7000-metre-high mountain, he moved to Zurich, Switzerland, to complete a PhD in Biomedical Imaging with Professor Peter Boesiger, PhD, at the Swiss Institute of Technology, University of Zurich, from 1992 until 1997. He says, "At my interview in 1992, Peter Boesiger showed me images of a beating heart acquired using a novel technique called MR tagging. It seemed 'magical' to me that such a large machine could create such beautiful images. Moreover, it was possible to programme the data acquisition and reconstruction software of the MR scanner. I found this intriguing because I could develop my own MR pulse sequences that would later allow me to image the coronary arteries, their vessel wall, and the molecular and cellular components of it without exposing patients to radiation." Professor Botnar's PhD project was on the development of MR sequences for blood flow visualisation and quantification in the carotid arteries, but he soon became interested in applying these techniques to the heart. One of his projects was the visualisation of blood flow through artificial heart valves. He says, "These initial years provided me with an excellent foundation in MR pulse sequence design and experimental skills, and I benefited from Peter's hands-off management style, which allowed me to explore any direction I found interesting."

Professor Botnar then worked for 1 year as a postdoc in the Radiology Department of the University of Zurich in

the “new field” of interventional MR imaging. After Boston, the unit had the second open MR scanner “double donut” in the world, allowing experimentation with new technologies and treatment approaches. Professor Botnar worked with the team as it developed novel intravascular imaging devices and experimented with MR-guided and temperature-monitored radiofrequency and laser ablation of liver tumours. They also investigated image-guided biopsies using a novel optical navigation system, which allowed steering of the MR scan plane in real time and allowed safe placement of the biopsy needle in the organ of interest.

In 1997, Professor Botnar was encouraged by his PhD colleague and close friend, Professor Stuber, to join Philips Medical Systems as an industry-funded clinical scientist and move to the Cardiac MR Imaging Center led by Professor Manning at the Beth Israel Deaconess Medical Center, Boston. “At that time, suddenly all the pieces seemed to come together, and we were able to image the coronary arteries noninvasively with unprecedented clarity,” Professor Botnar recalls. “Being an industry-funded scientist allowed me to see how research can end up in real products that ultimately benefit patients.”

Professor Botnar left Harvard in 2004 for Munich, Germany, to work as professor of biomedical imaging at the Technical University München. He took up his current position at King’s College London in 2007. Now, in the recently established Division of Imaging Sciences and Biomedical Engineering headed by Professor Reza Razavi, MD, he works alongside old friends from industry Professor Tobias Schaeffter, PhD, chair in imaging sciences, and paediatric cardiologist Dr Greil. He says, “My current workplace is exciting. Our Division is a melting pot of people with different backgrounds, including physicists, chemists, biologists, computer scientists, and clinicians all doing research in a hospital environment to bridge the gap between basic science and clinical translation.”

Professor Botnar oversees an interdisciplinary group with a focus on MR sequence development and on the development and preclinical and clinical validation of protein- or cell-specific MR contrast agents to image biological processes associated with atherosclerosis progression/regression and plaque rupture, aneurysm formation and rupture, and post-infarct remodelling. His work is currently funded by the British Heart Foundation, the Wellcome Trust, the Engineering and Physical Sciences Research Council, and the European Union. He explains, “Molecular imaging of cardiovascular disease has created a great desire in me to better understand the biological processes underlying cardiovascular disease and the biological signalling mechanisms that govern atherosclerosis and post-infarct remodelling. I became interested in imaging chemistry to better understand how to design an efficient contrast agent that rapidly binds to a target of interest but also rapidly clears from the blood pool and thus allows specific interrogation of proteins, cells, and enzymes in vivo.”

In the future, Professor Botnar aims to help take coronary MR imaging to a level where it can be used clinically in

many centres worldwide. He says, “I would like to achieve the same for molecular MR imaging to enable the detection of disease before it causes complications. I hope that we will be able to diagnose heart disease at a biological level instead of imaging morphology.” As for future developments in his field, he comments, “It is hard to predict the future, and as we know from many entrepreneurs, the best way is to invent it. I believe that imaging will allow us to interrogate biology in vivo with the help of novel target-specific imaging agents. I also believe that targeted drug delivery will be part of the future and that imaging will play a role in monitoring drug delivery and measuring therapy response.”

References

1. Stuber M, Botnar RM, Danias PG, Sodickson DK, Kissinger KV, van Cauteren M, Manning WJ. Double-oblique free-breathing high resolution 3D coronary MRA. *J Am Coll Cardiol*. 1999;34:524–531.
2. Stuber M, Botnar RM, Danias PG, Kissinger KV, Manning WJ. Submillimeter 3D coronary MRA using real-time navigator correction: comparison of navigator locations. *Radiology*. 1999;212:579–587.
3. Kim WY, Danias PG, Stuber M, Flamm S, Plein S, Nagel E, Langerak S, Weber OM, Pedersen EM, Schmidt M, Botnar RM, Manning WJ. Comparison of three-dimensional coronary magnetic resonance angiography with x-ray angiography for detection of coronary artery stenoses. *N Engl J Med*. 2001;345:1863–1869.
4. Botnar RM, Stuber M, Danias PG, Kissinger KV, Manning WJ. Improved coronary artery definition with T2-weighted free-breathing 3D-coronary MRA. *Circulation*. 1999;99:3139–3148.
5. Botnar RM, Stuber M, Kissinger KV, Kim WY, Spüntrup E, Manning WJ. Noninvasive coronary vessel wall and plaque imaging with magnetic resonance imaging. *Circulation*. 2000;102:2582–2587.
6. Spuentrup E, Buecker A, Katoh M, Wiethoff AJ, Parsons EC Jr, Botnar RM, Weisskoff RM, Graham PB, Manning WJ, Gunther RW. Molecular magnetic resonance imaging of coronary thrombosis and pulmonary emboli with a novel fibrin-targeted contrast agent. *Circulation*. 2005;111:1377–1382.
7. Kim WY, Stuber M, Börmert P, Kissinger KV, Manning WJ, Botnar RM. Three-dimensional black blood magnetic resonance coronary vessel wall imaging demonstrates positive arterial remodeling in patients with non-significant coronary artery disease. *Circulation*. 2002;106:269–296.
8. Botnar RM, Perez AS, Witte S, Wiethoff AJ, Laredo J, Hamilton JA, Quist W, Parsons EC, Vaidya A, Kolodziej A, Barrett JA, Graham PB, Weisskoff RM, Manning WJ, Johnstone MT. In-vivo molecular imaging of acute and subacute thrombosis using a fibrin binding MRI contrast agent. *Circulation*. 2004;109:2023–2029.
9. Phinikaridou A, Andia ME, Protti A, Indermuehle A, Shah A, Smith A, Warley A, Botnar RM. Noninvasive MRI evaluation of endothelial permeability in murine atherosclerosis using an albumin-binding contrast agent. *Circulation*. 2012;126:707–719.

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