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The Bernard and Joan Marshall Young Investigators and Distinguished Investigator Award 2018

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The Bernard and Joan Marshal Awards are a tradition introduced in 2010 at the British Society for Cardiovascular Research, Autumn Science Meeting. They have been a huge success and were designed to award both our young up-and-coming researchers as well as established researchers, with distinguished contributions.

Dr Marwa Mahmoud, a rising star in Cardiovascular Science, received the Young Investigator Award, 2018. Dr Mahmoud completed her PhD studied in the laboratory of Prof Paul Evans, where she investigated the contribution of Twist1/GATA4 in endothelial cells exposed to shear stress. She won the award giving her talk entitled 'TWIST1 Integrates Endothelial Responses to Flow in Vascular Dysfunction and Atherosclerosis' and talked to us about her work in a clear and concise manner exhibiting understanding of her area that is exceptional. She is pictured here receiving yet another award, while a PhD student, together with her supervisor Prof Paul C Evans. Dr Mahmoud studied and expression and function of the transcription factor Twist1 in endothelial cells during the initiation of atherosclerosis, using culture cells and mouse models. She found that Twist1 is expressed preferentially at low shear stress regions in vivo and in vitro, and that inhibition of twist1 led to reduced proliferation and inflammation and a reduction in atherosclerosis and vascular leakiness. These observations point to Twist1 as an important driver of endothelial pathophysiology and atherosclerosis at sites of disturbed blood flow. Her work was published in Circulation Research in 2016 (Mahmoud, Kim et al., 2016). Dr Mahmoud is now based in New York in the laboratory of Professor John Tarbell who is a leader in the field of endothelial mechanosensing. Before moving to New York, she took a post-doctoral position in the laboratory of Professor Hanjoong Jo (Atlanta, USA) who co-incidentally was our Marshall Distinguished Investigator!

Our other four young investigator presenters, which were selected from abstracts submission were: **Scott Chiesa** (University College London), **Tom Kaiser** (King's College London) and **Filippo Perbellini** (Imperial College London) and **Sophie Saxton** (University of Manchester). They each gave excellent lectures and shared important findings in cardiovascular research.

Scott Chiesa Tom Kaier Filippo Perbellini Sohpie Saxton

Scott Chiesa has studied the function of high-density lipoproteins, which are widely thought to have anti-atherogenic effects in patients with type I diabetes and healthy controls. Fascinatingly, Dr Chiesa observed that the function of HDL is switched from protective to pathogenic in patients with type I diabetes since it had reduced ability to induce protective NO in endothelial cells and enhanced ability to induce proatherogenic superoxide. It was concluded that HDL is not simply a protective molecule and that its function is altered in patients with type I diabetes.

Tom Kaier presented his studies of cardiac myosin-binding protein C (cMyC) as a marker for the early diagnosis of acute myocardial infarction which were published in Circulation in 2017 (Kaier, Twerenbold et al., 2017). His painstaking studies of almost 2000 patients presenting to the emergency room revealed that diagnostic accuracy of cMyC for acute myocardial infarction was similar to high-sensitivity cardiac troponin I (the current gold standard marker) for the entire cohort, but cMyC was superior for so-called early presenters with chest pain for less than 3 hours. This means that cMyC testing may allow early triaging and discharge of low risk patients, which has high clinical and financial impact given the millions of patients that attend emergency rooms with chest pain each year.

Filippo Perbellini presented pioneering work looking at the ability of electromechanical stimulation to improve the maintenance of cardiac phenotype in cultured myocardial slices. He described conditions that allowed slices of heart to retain contractility in culture for extended periods, an exciting observation that is a step towards being able to develop a stable *in vitro* model of cardiac tissue which would have many important uses including testing of pharmacological agents.

Sophie Saxton presented her research into perivascular adipose tissue (PVAT) which plays a major role in controlling vascular tone by exerting an anti-contractile effect. She looked at the factors that can influence the function of perivascular adipose tissue using a mouse model and found that obesity reduced the anti-contractile effects of PVAT but exercise was able to reverse PVAT dysfunction. The conclusion has important implications for the use of exercise to counteract the vascular-damaging effects of obesity.

Professor Hanjoong Jo received the Bernard and Joan Marshal distinguished investigator award! The Bernard and Joan Marshal Distinguished Investigator award is presented to a researcher who has made substantial contributions to cardiovascular research over many years. The distinguished investigator is nominated by the British Society for Cardiovascular Research committee members, receives an honorarium and presents the Marshall Lecture.

In the 2018 Autumn meeting, the Marshall Distinguished Investigator was Professor Hanjoong Jo, PhD, from the Coulter Department of Biomedical Engineering and the Division of Cardiology, Emory University and Georgia Institute of Technology, Atlanta, USA. After completing a first degree in animal science in Korea, Professor Jo moved to Pennsylvania State University, USA to study for a PhD under the co-mentorship of John Tarbell who is one of the founding fathers of the vascular biomechanics field and Theodore Hollis, a respected vascular physiologist. And for his PhD, Professor Jo worked on the effects of mechanical forces on endothelial cell behaviour and this initiated a life-long interest in this subject. He then moved to Washington University in St. Louis and University of Alabama in Birmingham (UAB)for a Post-doctoral training in Professor Jay McDonald's lab and it was there that he became interested in intracellular signalling mechanisms. And when Professor Jo started his own lab at UAB a few years later, he decided to combine his two interests by studying the effects of mechanical forces on signalling pathways - and during this time he published some classical papers on MAP kinases and eNOS regulation by flow(Go, Boo et al., 2001, Go, Levonen et al., 2001, Go, Park et al., 1998, Go, Patel et al., 1999, Park, Go et al., 2000, Park, Go et al., 1998). In 2000, Professor Jo moved to Emory/Georgia Tech firstly as an associate professor and then in 2007 as the Ada Lee and Pete Correll Professor in Biomedical Engineering (BME). In 2013, he became the John and John Portman Professor and Associate Chair of Emory BME. And at Emory, Professor Jo has built a laboratory that is world-leading in the field of vascular mechanobiology - his lab has developed several models of vascular shear responses that are used all over the world, and he has pioneered the use of systems biology approaches to define the networks of genes and non-coding RNAs that control vascular responses to mechanical force. Professor Jo's work has been published in the highest journals, he has a h-index of 62 and his papers have received more than 13,000 citations so for all these reasons he is a worthy recipient of the Bernard and Joan Marshal distinguished investigator award!

It is notable that Professor Jo devoted most of his lecture describing new, unpublished data, which testifies to the dynamic nature of his laboratory. In particular, he described a new protective pathway against aortic valve calcification activated by laminar flow in

endothelial cells that involves induction of microRNA483. Professor Jo's presentation was a highlight of the meeting that generated a great deal of discussion and we look forward to hearing more on the role of the mechanosensitive miR483 in aortic valve calcification in the future.

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