Professor Rhian Touyz is the Director of Research Excellence in Vascular Bioscience and Medicine. The BHF Research Excellence Award represents an outstanding achievement, recognising the calibre of expertise in pioneering cardiovascular research here at ICAMS. It’s very competitive and in the last round of applications, there were thirteen applications from the UK, of which six institutions were awarded, including Oxford, Cambridge, Kings, Imperial, Edinburgh, and Glasgow. We are very proud to be part of these big-name institutions, especially given the high level of competition.

Our institute focuses on cardiovascular research, specifically cardiovascular diseases. The diseases we focus on relate to heart disease, especially heart failure and ischemic heart disease or heart attacks. We conduct research in pulmonary hypertension, hypertension or high blood pressure, along with diabetes and metabolic disease as it is implicated in cardiovascular disease. In addition to this, we have a very strong programme in stroke research and kidney failure because these pathologies are also intricately linked to cardiovascular disease. Those are our main areas of research in terms of disease processes, and alongside this, we also research the basic science that feeds into the mechanisms of these diseases, such as molecular biology, cell biology, rodent biology, experimental models, physiology, genetics, proteomics, imaging, and electrophysiology. Taking our research and discoveries from the laboratory to the patients and population is a major goal, and as such, we have a very strong programme on ‘healthy lifestyle’ and cardiovascular protection, enabling us to interact very closely with doctors in the hospitals.

Could you provide us with more detail as to what hypertension is? Some people often get confused and they think hypertension means anxiety or high stress levels but essentially, hypertension means high blood pressure or high pressure in the blood vessels. Every time the heart beats, it contracts and then relaxes, allowing the pressure to be pushed along the vessel so that the blood vessels can drive the blood flow, supplying all the tissues and organs with nutrients, especially oxygen. If that pressure gets too high, it can cause damage to the blood vessels and organs. I always say that the best way of thinking about this is if you consider a hose pipe with a tap at the end. If you turn the tap on and the water flows through the hose pipe, then this can be viewed as a healthy working flow. But if you constrict the hose pipe, or make the lumen or inside of the hose pipe narrower, the pressure naturally must increase to allow for water to flow through, and that’s exactly what happens with hypertension. The heart is the tap in this analogy; it must pump harder to make the blood flow through the vessels when the pressure is higher, and this is what causes damage to the kidneys, heart, brain and other organs.

Are there any recent breakthroughs or interesting projects that you’re particularly excited about? Yes, there’s a lot of exciting work going on. Our institute has greatly contributed and made a substantial impact to new treatments and clinical guidelines for heart failure, stroke, diabetes and hypertension. In fact, there was an enormous amount of publicity recently from one of our researchers who showed that cycling exercises are particularly important for maintaining cardiovascular health. I’m embarrassed to say I don’t cycle myself but I think that this research will make me and many others start.

I believe we’re going to see big advances in using new technologies and methods to understand the fundamental processes of cardiovascular disease

What impact has the BHF GCRC had on cardiovascular medicine since it was established? The BHF GCRC has played a very important role in several large clinical trials related to hypertension, heart failure and to statins or treatment of high cholesterol. We were very instrumental in some of the earliest studies in the field several years ago, and these have really impacted clinical cardiovascular medicine. Ultimately, those trials were influential in the change to guidelines for clinical practice.

Also, the research work conducted in Glasgow has historically played a major role in the management of stroke, and in setting up a stroke unit that has effectively improved the outcomes for stroke patients. In fact, Glasgow has generally played a very important role in neurological disorders. For example, the universal Glasgow Coma Scale, devised right here by our neurologists, is the most common scoring system used to describe the level of consciousness in a person following a traumatic brain injury.
Can your research significantly change the outcome of a stroke? What initially triggered your interest in hypertension research? My interest in hypertension research goes back many years ago when I was a medical student on a hospital ward and I witnessed a very young man have a terrible stroke. He essentially became a quadriplegic (a person affected by paralysis of all four limbs). I asked the consultant at the time, why did this young man have a stroke and change from being healthy to totally incapacitated? The consultant said, “This patient had severely high blood pressure and had that blood pressure been controlled, the stroke could have most likely been prevented”. At that time, I asked, “What are the causes of high blood pressure?” with the reply that, “We don’t know exactly what the causes of high blood pressure are”. Therefore, my interest all stems from this first-hand experience. I became intrigued to try to discover the causes of hypertension, and since then, I have specialised in that field.

I’m very interested in trying to understand what causes high blood pressure, as we already know that if you prevent hypertension or properly control blood pressures, other conditions directly linked to cardiovascular disease can be prevented. By preventing patients from getting strokes, heart failure, heart attacks, atrial fibrillation, dementia, or becoming dependent upon dialysis, where they can’t work anymore and where they spend a lot of time in hospital, we would have a much healthier population; from a public and economic health point of view, this is much more attractive. That’s why I’m so committed to this research and study to try to prevent it or at least better manage it.

So you’re now based in Scotland, but were originally from South Africa, and have worked across North America – do you find that attitudes to cardiovascular disease differ in each region? Cardiovascular disease is a really important cause of both morbidity and death across the whole world. We used to believe that it was only in the more developed western world that this was a problem. However, today we now know that globally, cardiovascular disease is the major cause of mortality and death. We believe this is down to the fact that cardiovascular disease, especially hypertension, causes strokes, heart failure, kidney disease, and even vascular dementia. In North America for example, patients tend to assume more responsibility for their own health and medical situations. Whereas here in Scotland, patients give most of the decision-making responsibility to the doctors. Of course, this is just from my personal observations and experiences. At the end of the day, it’s really important that patients get the best medical care that is appropriate for their particular disease.

In terms of the attitudes of the professionals, I think today everybody appreciates that cardiovascular disease is a medical priority that needs attention. In each region I’ve worked in, I found that the focus on prevention is very important, especially in terms of lifestyle modifications. Although, in Canada, South Africa and here in Scotland, some of the treatment protocols are a little bit different. Of course, while all patients are appreciative of good medical care, there are a few notable difference in patient attitudes across the different regions.

Modern medicine of the near future will focus on treatment of the specific disease characteristics of each individual patient using a personalised or precision medicine approach. I think this is all going to become much clearer in the years ahead, and hopefully modern medicine of the near future will focus on treatment of the specific disease characteristics of each individual patient using a personalised or precision medicine approach. I also believe that we might see the emergence of different methods in the way we treat patients. Maybe we’ll use different strategies, rather than using drugs as we know them today. We may use things like nanotechnology, enabling more sophisticated diagnostic opportunities and yielding improved treatment. Essentially, new technologies and new approaches will advance over the next few years, along with the development of a greater understanding about the very fundamentals of disease processes. Finally, we may even see more management and treatment done within the home, where patients and doctors will be ‘hooked up’ through mobile apps and other technologies.