Interview with Dr. Barry Rubin

UTMJ Interview Team

Dr. Barry Rubin

Dr. Rubin completed an undergraduate degree in physics and physiology, followed by his MD training at McGill University. After a PhD in Experimental Medicine, he finished his General and Vascular Surgery training in Toronto. He is certified by the Royal College of Physicians and Surgeons of Canada in both specialties, and received the Bernard Langer Award as the outstanding graduate of the Surgical Scientist Program at the University of Toronto in 1993. Dr. Rubin joined the surgical faculty at University Health Network (UHN) in 1995, and holds the rank of Professor of Surgery at the University of Toronto.

Dr. Rubin runs a tertiary/quaternary care practice in vascular surgery. Previously Head of the Division of Vascular Surgery at UHN from 2003 to 2010, he is now the Medical Director of the Peter Munk Cardiac Centre at UHN - Canada's largest cardiovascular unit. Core operating principles for the Centre established by Dr. Rubin include: (1) providing patient care in multidisciplinary teams, (2) implementing cutting edge cardiovascular technologies for patient treatment and (3) creating a culture with clearly defined processes that enable innovation.

Dr. Rubin's basic science research laboratory has been continuously funded by the Canadian Institutes of Health Research (CIHR) for 16 years. His basic science work, widely published in high impact journals, focuses on the way the heart responds to injury and the regulation of the immune response to infection. He received the Wylie Scholar Award in 1998 from Vascular Cures, San Francisco (http://vascularcures.org/research/wylie-scholar-program). This career development award is given to one vascular surgeon in North America per year; Dr. Rubin is the only Canadian recipient since the inception of the award.

Dr. Rubin has been Chair and CEO of the Mount Sinai Hospital UHN Academic Medical Organization since 2003, and has been unanimously re-elected to this position 3 times by his peers. This organization supports teaching, research, innovation, recruitment and retention of 1,000 physicians at UHN and Mount Sinai Hospital. Dr. Rubin is also the elected representative of 6,000 academic physicians in Ontario in discussions that relate to the ongoing management of the $250,000,000 per annum Academic Physicians Alternative Funding Plan.

Dr. Rubin is a member of the Health Canada scientific advisory committee on medical devices used in the cardiovascular system. He is past Chair of the Ontario Expert Panel on appropriate utilization of diagnostic and imaging studies, and past co-Chair of the Ontario Multiple Sclerosis expert advisory group, which published guidelines for the follow-up care and treatment for Ontarians with Multiple Sclerosis who have undergone vein dilation therapy. He was also a member of the CIHR – Multiple Sclerosis Society of Canada expert panel on Multiple Sclerosis research.

UTMJ: Can you tell us about yourself, your career trajectory, your interests and what drew you to vascular surgery?

BR: [I'm] Hoping to figure out what I'm going to do professionally very soon, since I am closer to the end of my career than the beginning. What drew me to vascular surgery: The truth is that I was a general surgery resident and I had done a straight internship before that. I didn't think that somebody could be that tired and still be alive, so I thought that maybe I should go into a research lab and take a break. I tried to get into a transplant lab, because I thought transplantation sounded cool although I didn't know anything about it - never did a transplant in my life. The spot had been filled and the next one available was a vascular surgery lab, so I went into the lab. After a year in the lab, my supervisor Paul Walker said - "so you are going to be a vascular surgeon?" and I said "okay". And that is the sum total. I've learnt that there is a lot of serendipity in life. [Vascular surgery] is the specialty that is ideally suited to me. It is highly technical, and very rapidly changing.

I was on call in my senior year of general surgery every second night for a year and during my fellowship year in vascular surgery, I was on call every day for a year (this isn't allowed anymore). I worked every weekend except for the four weeks of vacation that we got. So, I was here 48 weekends in that year and I was routinely up - because we all are when we are residents. In my first 10 years in practice, I did big open operations, great anatomy - you just see everything, I loved that about it. Two foot incisions, thoraco-abdominal stuff like that. After ten years, stent grafts became available. Now the most common operation we do is fixing aortic aneurysms and I rarely make an incision now. It is all percutaneous with the patient awake and they go home the next day. So what you choose to do is going to change at some point because of technology during the course of your career. It doesn't matter what the specialty is. I thought I'd be doing the same operations for 40 years and that would be it, but that's not the way it goes.

UTMJ: Based on your experience with patients you see, what is the spectrum/burden of current cardiovascular

disease? How has this changed overtime? What are some of the reasons for that change?

BR: Cardiovascular disease is the leading cause of death worldwide and the second leading cause of death in Canada. Because of the epidemic of ongoing smoking, abnormal cholesterol metabolism, hypertension, to some extent renal dysfunction and to a very great extent diabetes, there is unfortunately a very significant supply of people with both cardiac and peripheral vascular disease. There are a million people in Canada with heart failure right now, and this number is going to increase by 25% in the next 25 years, so we need to have new approaches and new technologies to be able to deal with that, or else hospitals will be full of people with heart failure. We do have new technologies such as remote monitoring of patients. We are developing a heart monitor for patients that is connected via a Bluetooth connection to your phone, scale, and to your blood pressure cuff. So, if you have someone with heart failure who is retaining water (an early sign of the heart failing), [it can be monitored] - i.e. if you are 70 kg and you step on the scale the next day and you are 71 kg, before you step off the scale there will be an email alert on your phone telling you that you have gained 1 kilo and instructing you to take Lasix and contact your doctor. Another example is monitoring your heart rhythm. If it detects an abnormal rhythm it can alert you to call 911. So, there are lots of cool things that are happening. It is a great field to be in. I am very lucky. There are not a lot of people who love what they do 22 years into their career. I come to work happy about it, excited at the possibilities every day.

UTMJ: The technologies, are they monitored by a live person or work by an algorithm?

BR: Currently there is a mix of both, but we are trying to make it completely automated so it is infinitely scalable. One of my colleagues, Dr. Heather Ross - her and I are actively monitoring patients in Doha, and her team is going to Uganda in the summer to monitor heart failure patients. There are currently 5 billion people on earth that have a cell phone compared to 2 billion that have a tooth brush. So we are trying to deploy this technology in Canada and around the world.

UTMJ: How do you advise patients regarding lifestyle modification to improve their cardiovascular status? Do you have any opinions on how to overcome the challenges to lifestyle modification?

BR: When you start out in practice, you say things to patients like "if you don't stop smoking, you know, you are going to have a heart attack or a stroke or lose your leg" etc. depending on what the cardiovascular disease is. But that is completely, or almost completely useless. Less than 7% of people will stop smoking because you tell them they shouldn't smoke. All patients say they want to stop smoking - if you ask a patient if they smoke and they say no, you can't stop there, you have to ask when they had their last cigarette, because many patients say they had their last cigarette this morning. So they aren't lying [to you], but you know they have a pack of players in their pocket, yellow finger tips, etc.

When it comes to getting people to adhere to stopping smoking, yes you do need to carefully explain the consequences of smoking, but you also need to engage them with support systems such as group therapy, psychological counselling, and suggest pharmacological agents because there are multiple drugs available, none of which on their own are extremely effective, but in combination with advice and therapy they can be effective. If you do these things, perhaps 40-50% of patients will stop smoking long term. In the real world, the risk factors for cardiovascular disease are smoking, smoking, smoking and the rest.

UTMJ: When you see patients who have been very much affected by vascular disease, but are still smoking, how do you counsel these patients when you know there may not be a significant change in their behavior or outcomes?

BR: Try to have some empathy. Smoking can be more addictive than heroine. I remember a while ago - I was on staff maybe 5 years - and I was coming into the hospital in February during a blinding snow storm. There was a patient sitting outside, bilateral above-knee amputations with a 'trache' (tracheostomy tube) and he was smoking through his 'trache'. You have got to be really addicted to be out in the freezing cold and smoking through your 'trache'. So, none of that [weather conditions, tracheostomy tube, etc.] really mattered. I think it is important to recognize how difficult it is for patients to quit smoking.

UTMJ: What is the impact of prevention vs. treatment on cardiovascular disease?

BR: An ounce of prevention is worth a pound of cure. And we are trying very hard to focus much more on prevention. Purely from a health economics point of view, it is much less expensive to our healthcare system if you can get somebody to stop smoking than to treat the consequences of their smoking.

UTMJ: What are some of the recent advancements that have been made in achieving better CV health and treating CV disease?

BR: There are some trials that suggest certain medications are of benefit. Some of them are controversial - should we take an aspirin a day or not? Should you aggressively lower cholesterol or not? There seems to be pretty good evidence for lowering cholesterol, but there are

downsides to it - there are some people who get muscle pains that are difficult to manage. Should you prescribe a coQ10 (coenzyme Q10) inhibitor or supplement at the same time as you are prescribing a statin? How low should your blood pressure be? Should it be 140, 130? Seems like the blood pressure thresholds are getting lower and lower so I think there are a lot of risk factors that you can modify.

UTMJ: What is the greatest barrier to optimal cardiovascular health today?

BR: Probably the combination of lack of exercise, failure to modify risk factors and perhaps our lack of a real understanding of what the genetic predisposition is to cardiovascular disease. So one of the things that's going to happen in the future is it's going to be commonplace for patients to have full exome sequencing and for us to have the big data capabilities to look at cohorts of patients with cardiovascular disease and identify the SNPs and the exomes and the proteomic profiles that are associated with cardiovascular disease. This will be a combination of capability to process that amount of data - so called 'big data' - and to apply artificial intelligence algorithms, which is something we are going to be having a very big investment in at the Peter Munk Cardiac Centre. We will be able to mine this data and look for previously unrecognized associations.

There are many people who develop cardiovascular disease and there are very few that we have a good handle on [in terms of genetic underpinnings]. The real question is: when you identify that gene, what can you do about it? What's going to happen in the future? Will we edit those genes with CRISPR and fix the defects? Will we be able to develop molecular targeted drugs? The pace of knowledge acquisition is very rapid in medicine; it takes only 73 days for the existing knowledge to double!

UTMJ: What is your role in the treatment paradigm of a patient with cardiovascular disease?

BR: It's evolved over time. When I started in practice, I had done a PhD in muscle ischemia and had done ischemia-reperfusion research for many years while I provided clinical care. After about 10 years of that, I began to transition to administration. I was the head of vascular surgery for 9 years and have run the heart centre for the last 6 years. There's nothing like impacting one patient's care in a major way, and the type of specialty that I am in happens to be basically every case is either life or limb: aortic aneurysms, ischemic legs, impaired circulation to your brain. Especially those cases where someone comes in ruptured and ends up leaving the hospital... there's nothing like that. And then if you do health care policy, you can improve how we do research and how the overall system behaves to manage patients with cardiovascular disease. You can impact thousands of patients in Ontario and by extending what we learn around the world, it can affect millions of patients.

It's also fair to say that operating is hard. It's physically demanding. The cases we used to do were 6-8 hours, bent over, and sewing small stuff. I still don't get tired in the operating room, but now it takes me longer to recover. That's just the reality of how it goes and it has also changed since we do most cases under image guidance...you have to wear 10-15 pounds of lead and be careful about radiation exposure. So, it is a dangerous undertaking.

UTMJ: What are your research interests?

BR: I did muscle ischemia-reperfusion injury research for 17-18 years. The first 6 grants that I put into CIHR were rejected - I would answer all the questions and I would get a lower score the next time around than the first time around. There was no rhyme or reason for this and you must be fairly stubborn to continue. The reality is, I was interested in molecular biology and cell signaling. It didn't matter to me so much if it was skeletal muscle or heart muscle and one day, someone said, "There's a lot of money in heart." So, I literally made a copy and replaced the word 'skeletal' with the word 'heart' - proper citations and all. After that I had 17 years in a row of funding from CIHR. The second time I applied, I got rated 1 out of 44. I was so insecure about the whole thing that I called Ottawa and said, "Hey, does this mean I finished first or last?" (laughs). So research is phenomenal. There is something magical about knowing something (when you make a discovery in the lab) that no one knows.

I took a different approach to research. Every fifth week for the first four or five years, I did no call, no operating and saw no patients, I just did research. Of course, during the other four weeks, I had to do five weeks' worth of clinical work because that is how it works. I never published any papers that had the word surgery in the title. People on the grant review panels needed to see basic science papers. I told my guys in the lab that I want one paper every year in a really high impact basic science journal. We published 10-12 papers in really good journals. That turned out to be a really good idea because it is really hard to get funding. It borders on a superhuman effort to compete with people who are doing full-time research at a federal level and, at the same time, do clinical care and throw in a little administration. It's challenging!