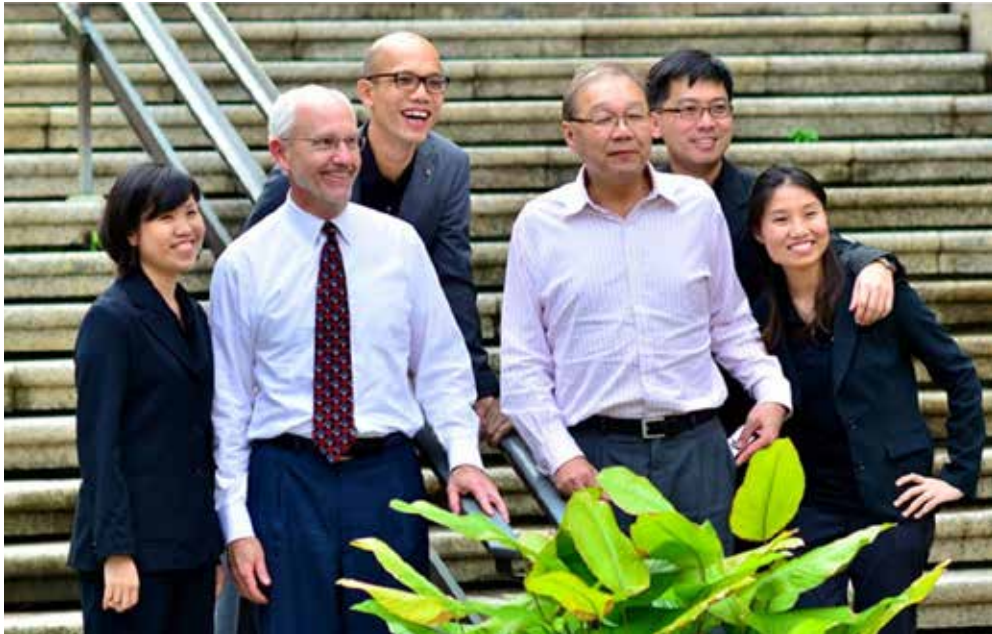


Medical Device Innovation for Doctors – Of Myths, Molehills and Mountains

By Dr Anthony Tang



Fellows from the inaugural Singapore-Stanford Biodesign (1SSB) with Paul Yock, founder and Director of Stanford Biodesign, and Low Teck Seng, Chief Executive Officer of the National Research Foundation (second and fourth from left respectively)

I HAVE always enjoyed fiddling with things, from modifying Airfix and Tamiya aircraft models to playing the drums, eventually becoming a surgeon. In my near daily interaction with all sorts of surgical gadgets, I often wondered why they still had much to be desired: the angle of the grip/jaw/connection was not right, a cutter/diathermy apparatus/fibre optics should have been integrated, and so on. Coming up with the next generation of surgical equipment should be a cinch! Or so I thought...

And so began this new journey, with inquisitiveness pushing me further and further. This led to an encounter with the Singapore-Stanford Biodesign programme, which would take an entire year. Should I embark on this? Undergo a two-day selection interview process? Cease operating for one year to fully comprehend what it takes to be a medical device entrepreneur? My Chief of Surgery reminded me that as surgeons, we have the privilege of treating the ill one by one; but with a great invention, we could reach thousands, maybe millions. With that as a challenge, it was off to Stanford!

That was one truly remarkable 2011. Not only did I learn

heaps about the world of medical devices, from the clinician inventors, to the venture capital investors; I ate, drank and breathed the culture of entrepreneurship. It is the raw belief that with real hard work, plenty of research and preparation, and a bit of luck, a great idea can metamorph into a lucrative exit. Why? Because so many before have done it, and they are absolutely willing to share and show the way. Whenever there is a success story, everyone in the village benefits.

The amount of energy and excitement was palpable. The talent, incredible to behold. I will always remember conferring about a prototype for a fit-on to the iPhone, which would allow photographing of the retina, with an engineer colleague till nearly 9 pm, after which I really needed my bed. We were supposed to get together to further discuss our ideas at 8 am the next morning. My jaw dropped when he came to the meeting with a working prototype, completely produced overnight. My perception of hard work was completely redefined. These guys were really like ducks on water, capable of furious footwork while appearing all serene and uber-relaxed.

But perhaps the biggest take-home message I picked up from the community, was not to be afraid of failure, but to learn from it, for it is a lesson ALL would have to face in this line. Fail fast, often, and hopefully cheap, was a mantra often heard. Every guru who had gone before was candid about their failures, and the number of times they failed, the painful but priceless gems they acquired from the experience, before they finally made it. This is probably one ginormous cultural mindset that is going to be hard to cultivate in this little red dot, where only success is lauded, and any signs of failure is seen as weakness.

Back in Singapore, I now try to give back to the local scene, and have come across many aspiring inventors, from medical, engineering or business backgrounds, all keen on success. From the number of grants and their amounts, it is obvious that the Government sees this as the next potential area of growth, and many researchers have taken notice. Let me help debunk some popular myths that I have come across from the many conversations I have had about this industry.

“I am but a doctor, without any engineering background – devices will never be my forte”

This is probably the furthest from the truth. In the end, these tools are for patients, and we doctors are the only ones privileged to have access to the latter. We have in-depth knowledge of Medicine, one of the core pillars of medical device innovation. Some of the most eminent innovators like Tom Fogarty and Julio Palmaz are all doctors by profession, tinkers by passion.

Doctors should have some breadth of knowledge too. Some understanding of important areas like regulations, reimbursement, intellectual property, market size and business plans would be advantageous. A lot of today's discoveries and inventions are at the crossroads of traditional silos of expertise, where Medicine, engineering and business converge. Therefore, doctors need to move beyond their comfort zone, to learn other languages, and likewise for engineers and industry folks, who would have to learn the language of Medicine.

“This is a one person show, I will do this by myself”

Doomed to failure. Gone are the days where one person could really do it all. You usually need a close-knit team of three to four to be the core. The best combination is a doctor, engineer and business person. Team members will need to know how to leverage each other's strengths, and to respect each person's opinion on an even field. First name basis only. No one should be called “Prof”...

“I have the best idea ever!”

Unfortunately, there are plenty of smart people in the world. Seldom are ideas completely novel. Thus, it is imperative that a thorough patent search is made before progressing with any prototype. There are always strategies



1SSB in Stanford (from left): Fiona Loke, Anthony Tang, Henry Ho and Iris Tan

to overcome other patents that are in force, but an innovator must first be aware of all the relevant ones, a la what Sun Tzu says of the enemy.

“Everyone wants to steal my idea”

Highly unlikely. Most of the time, others are too busy trying to bring their ideas to fruition. Nevertheless, it is good to master the skill of talking around a particular invention without revealing the secret sauce. Ideas, prototypes and business plans are always polished and improved through discussion with and feedback from others. Without this exchange of views, it is unlikely that an idea will eventually reach patients.

“There is no one to help me take the next step”

I am probably biased, but I do think that Singapore-Stanford Biodesign provides premier training, from needs finding and insights to implementing business plans. Similar initiatives are offered by Nanyang Technological University and the National University of Singapore. There are also quite a few training programmes and medical device/innovation offices attached to public hospitals. Doctors in the public sector can also approach their respective healthcare clusters or institutions for assistance: the Device Development Office (SingHealth), the Medical Engineering Research and Commercialization Initiative (National University Health System), the Clinical Research and Innovation Office (National Healthcare Group), and the Centre for Innovation (Changi General Hospital).

During a recent med tech conference in Korea, I was asked what the most critical factors for success as a doctor inventor/entrepreneur were. Without hesitation, I replied, “One, Passion; two, passion; three, more passion.” ■



Dr Anthony Tang is a specialist general surgeon, with particular interest in breast cancer surgery, including breast conservation surgery, oncoplasty and sentinel node biopsies. His research interest is in medical device innovation. In 2011, he was awarded the inaugural Singapore-Stanford Biodesign Fellowship. Dr Tang currently holds multiple research portfolios, including being the Fellowship Head at Singapore-Stanford Biodesign.