Engineering my way into Life Sciences

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1st year PhD in Tissue Engineering

It may seem strange to see an article written by an engineering student, in a life sciences journal; but that is precisely why it's been written. Before embarking on my PhD in Tissue Engineering, I completed a 4-year integrated MEng degree at the University of Liverpool. The purpose of this article is to highlight the links between biomedical engineering and life sciences research.

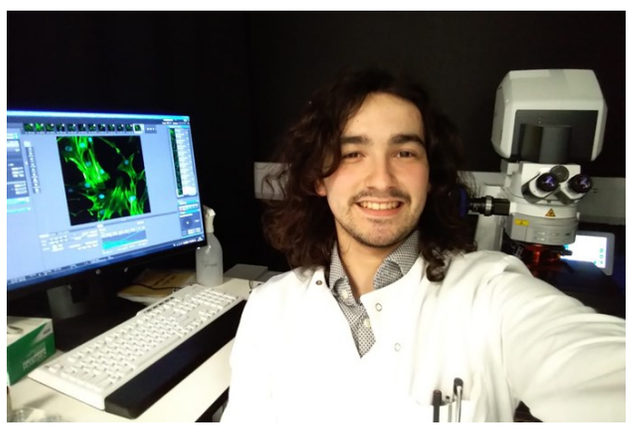
After realising that a career as an anaesthetist might not be for me, I ended up studying "Mechanical and Materials Engineering" at undergraduate level, not appreciating the subtle difference between materials 'science' and materials 'engineering' courses! The first year (and most of the second) of my degree was purely mechanical engineering – covering thermodynamic cycles, analysis of structures and fluid mechanics (all as exciting as it sounds…). Gradually, I specialised into materials topics; metallurgy, crystallography and a whole module on concrete (of all things). In my 3rd and 4th years, I discovered biomaterials and tissue engineering (TE), as well as a practical course on transmission electron microscopy which is usually unheard of at undergraduate or masters level!

For my undergraduate research project, I chose a project in TE, which at that point I knew little about – other than that biomedical materials was where I wanted to end up. I soon realised that my project was well removed from anything else I had done during my degree, although my GCSE in biology would prove to be more than enough to get me going! Fast forward through 18 months of undergraduate and masters level research, and I was applying for PhD studentships in TE and Biomaterials Development.

"But what is Tissue Engineering?"

Written simply, TE is an interdisciplinary field of research which applies both biological and engineering approaches to produce cost-effective solutions that improve the quality of life in our ageing society.

TE involves creating simulations of in vivo conditions in vitro, much like Life Sciences research. Specifically, TE involves combining isolated cells with acellular biomaterials, and perhaps drugs, genes and/or gene products delivered as therapeutic agents. The main targets of TE research are tissues which are exposed and therefore prone to injury such as skin, and those which often suffer disease or degeneration, including the nervous system, the skeleton and vital organs. Most TE solutions involve the use of primary stem cells derived from donor tissue. Providing these with a suitable cellular environment, in the form of an engineered scaffold which mimics the mechanical and surface properties of the native tissues, provides control over the cellular response and allows the cells to function as they would in the human body.



I decided to pursue TE research to PhD level, because it is a fast-moving field which aims to solve medical problems that simply will not go away of their own accord. Tissue engineered solutions will always be needed, and offer to make an outstanding contribution to our quality of life as we age.

Take home messages

Becoming a PhD researcher in the School of Engineering has given me the chance to immerse myself into a thriving research environment and combine the transferrable skills that comprise "The Liverpool Engineer". Nearly all of my lab-based skills and knowledge were acquired 'on-the-job' - so don't be afraid to venture outside of traditional Life Science fields. Although when I started, I had very little idea about biological research, I was fully supported all the while and at no point was I made to feel like an outsider because of my academic background. I'm sure that the non-engineers in our group would say the same too; working in an interdisciplinary field requires researchers from all backgrounds to collaborate, which is where our group excels.

Always keep your eyes open for unexpected opportunities. While it might not be a 'traditional' route into Life Science, having an engineering background gives me qualities that others cannot offer, simply because I 'side-stepped' into the interdisciplinary field of TE. As a Life Sciences graduate, you'll have more than the knowledge and skills needed to get started in a field such as TE (for example), even if you know very little about traditional "engineering" concepts. In fact, your biological background will mean you can offer a completely different set of skills to a research group, that an engineer like myself could not. Consider opening your horizons to next steps into biomedical engineering, by getting yourself involved with research that's beyond your original training.