Biobanking: an ultra-cool alternative to a career in research

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I studied at Leicester between 1996 and 2001 which seems a long time ago now. I have been asked to speak to you today about my career after my biological sciences degree and my job at the minute. I am the Manager of the Newcastle Biomedicine Central Biobank at Newcastle University. My talk is entitled *Biobanking: an ultra-cool alternative to a career in research*.

I will start with a brief introduction to biobanking and I will tell you about the biobank that we have in Newcastle with its tissue storage services and its processing lab. I'll explain a bit about my role as Biobank Manager, in case it's a job that might appeal to any of you in the future, and tell you how I got from my biological sciences degree in Leicester to becoming a Biobank Manager via a scenic research route.

To give just a very brief introduction to biobanking, the idea of working with human tissues in medicine is not something new obviously. It has been around many years as you can see from the black and white picture of that poor chap on the table there. As long as people have been studying medicine there has been a need to access people and bits of people to advance our understanding. Now days there are many contemporary areas of translational research that are dependent on access to well annotated collections of human samples and we are calling these collections of human samples biobanks. They usually consist of human tissues, cells, blood and in our case they are used for medical research although I would imagine they would have other purposes. As far as I can tell biobanking is gaining in popularity and it is an up and coming idea and it was quoted in a 2009 issue of Time magazine as "one of the top ten ideas changing the world right now" and biobanks is apparently number eight.

To tell you something about the biobank we've got at Newcastle. The central biobank that I work in is located in Newcastle Medical School because of the geography of Newcastle University and the Medical School ours is like a central hub and there are several satellite sites as well. It was originally set up as a response to the Human Tissue Authorities requirement for us to keep relevant human tissues in appropriate order and ensure that we have appropriate ethics and consent forms for human tissue that we keep for research.

In Newcastle, as well as collecting samples from patients locally in our hospitals and national collections when researchers have collaborated with other Universities and hospitals elsewhere in

the country, we do house a few internationally recognised collections as well, such as the MRC brain tissue resource, the MRC Wellcome human developmental biology resource, and one that is important to Leicester is the Children's Cancer and Leukaemia Group, which is a tissue bank where the virtual bank is actually organised from Leicester but Newcastle biobank holds the physical collection of the tumour samples. All the collections in Newcastle are held under the same HTA research licence and we put them together at a selected number of sites basically so that we have got, for governance issues, so that we can keep a greater control over the conditions that they are kept in and that we are fulfilling all the legal and ethical requirements as well. So as part of the biobank, as well as storage of relevant HTA material and it's derivatives such as DNA and RNA which we store at -20, -80 and -150, depending on the material, we keep all this organised by using a barcoded sample tracking system and we have a quality management system so that we are sticking to all the right rules. We also, as I mentioned, operate a tissue processing lab, and we have a digital slide scanner so that we can acquire digital images of some of the tissues that we house for sharing with people who are interested in them.

In my role as Biobank Manager, it is my job to run the storage and processing facilities for the biobank. I am also a PD (Person Designate) for the University's HTA licence which just means I am named as a person on the licence responsible for looking after relevant tissue samples. Because the biobank was a new area it also meant that the manager had to take on the roles of Safety Officer and Biological Safety Supervisor because we didn't have them already, and it also involves line management of a small team, there's not just me on my own at the biobank, we have a Histopathology Scientist who does a lot of the tissue processing and slide scanning, we have three Biomedical Technicians and we have got a very good and well organised clerical assistant.

Other aspects of managing a biobank include financial and budget management and allocating the resources appropriately to provide a good standard of service. Promotion and marketing to internal, external and also commercial parties. So as well as University customers we have several commercial storage contracts with various agencies and spin-out companies from the University. As well as the storage we have worked to put together a generic ethics application which will now allow us to go into Newcastle hospitals and basically collect samples to order when it is appropriate for both university researchers who apply to us and pass the access committees requirements and also to third parties, so that could be industry as well.

As I mentioned, I am responsible for the unit's health and safety, including that of any students who use the multiuser facilities, which can be a bit daunting, staff line management, maintaining policies and systems or in reality actually setting up policies and systems in the beginning when we didn't have many. I am also responsible for advising PIs and academic staff on all aspects of their biobanking requirements, which is where the biological sciences background comes in handy.

As it would happen, I do actually have a person specification for the role of Biobank Manager owing to the fact that I was on maternity leave last year and they had to advertise for a replacement for me. As you can see the first few points, higher degree in a relevant field and research laboratory experience, safety regulations and budgets, are all experience that can be acquired from biological sciences lab work and research work. The next couple of points - problem solving, interpersonal and communication abilities, and the high level of IT efficiency - they are quite transferable skills that you can probably pick up in most places but definitely as part of your degree. The last two knowledge of the Human Tissue Act and understanding the ethical issues around the use of human tissue they are probably things that you might swot up on before you went for the interview.

Just to mention as well, how I got to Newcastle being a Biobank Manager from my degree here in Leicester. I am originally from South Shields, which is a coastal town in North East England, I don't know if any of you have seen the Great North Run on the TV but it starts in Newcastle and it ends in South Shields. I got good GCSEs, we don't mention the A levels, but I got into Leicester University to study, at that time, the straight Biological Sciences BSc degree. I chose after my second year to do the sandwich year abroad working at the University of the Algarve, which I will come onto in a minute. I ended up doing the MSc afterwards because I decided that I was quite interested in cell biology and cancer studies that I had come across as part of my degree, and then I decided to do the PhD which took me homewards back towards Newcastle in 2001 and that was on the 'Alternative splicing of the mismatch repair gene hMLH1 in childhood acute lymphoblastic leukaemia'.

I mentioned the sandwich year. There are quite a few people that actually say to me: "Was there any point in the sandwich year? What did it actually bring to you? What did it give to your CV and the future? Was it really worth it or was it just a long holiday for a year?" Portugal and the Algarve was a lovely place to work but it wasn't a holiday and we did actually work very hard. Between the second and third year of my degree I spent the whole year there working on a research project investigating adaptive responses in the *Listeria monocytogenes*, so I did gain some scientific experience and microbiological techniques, experimental design, and also time management which is really important if you go on in science because when you are doing a practical session as part of your degree it is all planning it to fit into the time that you have got. But actually managing your time to do experiments is a skill that you need to learn. In preparation to work in the Algarve I attended the University of Minho for six weeks on an EU-funded language course which was basically supposed to prepare me and teach me how to speak Portuguese in six weeks because when I actually went there I also knew the words for beer and tea and I actually spent two hours on the wrong train platform because I didn't know arrival and departure. So broader experience-wise I would say that a whole year spent abroad really gives you the opportunity to integrate into

a foreign country in a way that you would never have the opportunity to do that otherwise. It allowed me to immerse myself in the Portuguese language. It's true when people say there isn't a better way to learn the language than by throwing yourself in at the deep end and living there and having to speak it. By the time I came home I wouldn't say I was fluent but I could make myself understood and I could ask whatever I needed which was an improvement on beer and tea. It allowed me to experience a completely different culture and a lot of people see the Algarve but have not seen it from the inside and with all the other Portuguese students it was great. As a result of that I think you come out with personal flexibility and resilience and I think that is what it was show to future employers on your CV that you are quite brave and you are prepared to go off to a foreign country on your own where you don't speak the language and do something different for a year. Most interviewers have brought it up and asked about it so I would say it was definitely worth doing and I would encourage any of you thinking about it to go ahead and do it.

Why did I do an MSc and a PhD? I really enjoyed my degree and I enjoyed my year abroad and all of the practical science experience, but by the third year of my course I had decided that my interests were really in cancer studies and by that point I had kind of committed my course towards microbiology, which was fine - I did microbiology because I found it interesting. I chose the MSc so that I would be qualified to pursue a future in cancer research which is what I wanted to do. When the results came out as well, not that there is anything wrong with a 2:2, but I was slightly disappointed because I had hoped for a little bit better than that, and I though "well if I do the MSc I will really knuckle down and I will get a good mark in that and you are as good as your last qualification" so I did that and I got a distinction for my MSc and I felt a lot better about that.

Why did I do a PhD, basically because I still loved the science and I wanted to work in science and I spent time finding the right PhD in an area I was interested in, so it was in childhood leukaemia research and I did a lot of work on mRNA processing and there was a lot of molecular biology involved which I found really interesting. I love thinking up new approaches to problems, the idea of discovering new things, and I liked the idea that it was translational research, so new things that we were finding out would hopefully improve future outcomes for cancer sufferers. Just a couple of scraps of advice for anyone who is considering doing a PhD as well is that it really does need to be the right PhD and it needs to be one that you can love, that you don't mind spending three or four years of your life that you will never get back and you really have to enjoy it because you see some people don't and they suffer with it. But I can honestly say I enjoyed every minute of mine, even the writing up and the viva. So do it for the journey not just the destination because although it will help you to get a good job afterwards it doesn't guarantee a brilliant job with pots of money and it is three or four years of your life that you won't get back so you might as well really enjoy what you are doing.

So what happened after that? After a PhD people often slip into what I would refer to as serious postdoc-ing roles. At the end when I was just writing up I secured a position as a junior research assistant which suited me really well because I was just finishing writing up, it was on the same area that I had already worked in, drug resistance in childhood leukaemia, and it was somebody's maternity leave so it was a nice short contract whilst I decided what I wanted to do. For my first full-length postdoc I was looking at paediatric brain tumours, which was a move into solid tumours rather than leukaemia, but still paediatric, and I enjoyed that too. For postdocs two and three I took a turn into drug development territory looking for inhibitors for cancer chemotherapy, which was interesting because chemistry was never my strong point, but I did enjoy making all the cell based assays and testing out the model compounds and I liked the fact that some of these drugs would actually make it into patients and hopefully improve people's lives who were suffering from cancer. And, as it happens, I found a few weeks ago that the FGFR3 inhibitor that we were working on in myelomas is now in phase one clinical trials so it is a nice feeling to think that you have done something useful and that it is actually doing people some good, hopefully. Then you get to the point, probably about five years after your PhD, where it is decision time. You've really got to decide whether you have got to pursue an academic career, whether you are going to get a bit more independent and have your own group and pursue your own research, or whether maybe you should pursue a different career instead, if it is not for you. So when I really thought about it I would say the cons were starting to outweigh the pros a bit and I wasn't really loving it quite as much as I had been. There was fierce competition for funding. That could be in part due to the economic climate, in lots of types of research, including cancer research. People aren't giving quite so much to charity and there are less projects being funded and it is really dog eat dog sometimes trying to the grants and my publication record by that point wasn't great. That wasn't because we hadn't done any good research and it wasn't useful but it is a bit of a hazard of working on drug development projects with industrial and pharmaceutical partners because often you are restricted from publishing due to intellectual property rights and patenting issues so you sometimes get slowed down from publishing which means when you go to get your next grant or your next contract it doesn't look like you have done as much. Another issue as well was that as you get older you have different priorities by that point;nice flexible short contracts and the exciting job opportunities weren't quite looking so appealing when you have got a partner, children and a mortgage and both you and your mortgage provider would like the security of a contract that lasts more than one or two years. So that's how I ended up applying to work at the biobank. I originally applied for the role of co-ordinator and that role actually turned into Biobank Manager role as the position developed and the biobank grew and got bigger.

So, was it a good choice to leave research? It certainly felt like a big choice and a big decision. Four years in I don't have any regrets at all. Which I think is just as well because I think four years out of it I couldn't really go back. I like the fact that my scientific experience and expertise, and some of the knowledge and practical skills that I learnt in my lab work. I am still involved in research projects, we just get to be a small cog in the big machine of other people's research projects but it is really exciting finding out what research all of the customers are involved in and

we are helping with. Another good point is a permanent contract, I got to the age of 32 before I got a contract that lasted more than two years, so it was very nice to have something permanent. Also, working for a big employer like a University you get flexible working, good working conditions, and probably most importantly there are just so many different challenges working in the biobank and you are doing something different all of the time and it is always interesting. So I am really quite happy with my decision.

That's my career path so far. I would be happy to answer any questions that you might have either about biobanking or any of the things I have mentioned during my talk. If you think of things now that's great, but if you think of thing after I have gone then my contact details are on the slides so you could email or phone me if you really wanted to as well.

Questions

Q. What sort of qualifications do the technicians that work for the biobank have to have?

A. For the biomedical technician posts a degree is in the "desirable" section because some people qualified longer ago, when it was more acceptable to come via a more vocational route. From now on though, a degree is desirable, though not necessarily a higher degree.

Q. Is there likely to be some additional training needed?

A. Yes, It is very hands on and practical and we do a lot of the training ourselves in house.

Q. You mentioned the value of the year out, so you would thoroughly recommend that as a thing to do? There was an article in the Guardian earlier this week that was talking about four out of ten graduate jobs are going to people who have done internships of some sort, now often that is in the same company so the year abroad wouldn't necessarily fit with that but having that extra something on your CV that you had a year that has shown you have been willing to take the initiative is actually something that is quite valuable.

A. Definitely, It always gets brought up in interviews. I think when they are looking through your CV to find something to make conversation about. Something that makes you stand out from the others.

Q. What range of clients access the biobank? Who can say "I am interested in samples on such and such can I have some?"

A. We have got samples that are held in specific collections and they have all got different access committees set up to decide whether people can have them whether their project has got scientific merit should we say. Depending on the collections some of them have got very tight rules on who else can use the samples and as I said we have been working on a generic ethics which we had approved which basically means if someone approaches us and says I have a project and I need ten pieces of bone tissue we can actually approach people in Newcastle Hospitals with quite generic consent forms and consent them all properly, take the bone and store it in the right conditions. It would be patient that are coming in for example for a knee replacement or hip replacement, we wouldn't be doing any extra interventions we would have to do something at the same time of the operation.

Q. So essentially doing something useful with what would have been waste material?

A. That's it, we are finding very few patients actually say no or refuse to consider it or give consent because most people are quite altruistic and they like to think that they are giving something back and people are benefiting from their discomfort.

Q. In terms of the research usage, you also mentioned that pharmaceutical companies might be interested in some of those materials. Does the consent then cover for both of those uses?

A. Yes, our specific generic ethics does mention specifically commercial use and export outside of the UK. We did flag any areas on the consent forms that people could be concerned about for instance animal research, some people don't want to think that their cells or whatever are going to be used in animal research and mice are going to be injected with their stem cells or something, and so we literally flag every controversial area that they could possibly be involved in to give people the opportunity to say no if they have any issues with that.

Chris Willmott: That has become very important, obviously people may be familiar with the story of Henrietta Lacks and the HeLa cells and how the family has been fighting for years in recognition of the fact that they didn't know that was what the tissue was being developed for. If you haven't read the book *The Immortal Life of Henrietta Lacks* it is an excellent and interesting read.