OXFORD HIGH SCHOOL

THE MEDICAL MYRIAD

VOLUME SEVEN, FEB 2023 | MEDICINE

WRITTEN BY JESSICA KHAOU
AHYOUNG KIM,
ANJALI RAMESHWARAN,
AND FRANCESCA URRY

INCLUDES:

- Q&As with Medical Students
- Day in the Life of Doctors
- Interviews with Surgeons
- Work Experience Advice
- Medical Articles
- Medical News Updates
- Veterinary Medicine Article
- And more...

TABLE OF CONTENTS

Q&A

WITH NIRAN ARULKUMARAN (A 1ST YEAR MEDICAL STUDENT AT KINGS COLLEGE LONDON) INTERVIEWED BY ANJALI RAMESHWARAN

Q: WHAT ASPECTS HAVE YOU ENJOYED THE MOST IN YOUR FIRST YEAR AT MEDICAL SCHOOL?

So far my first year at medical school has been incredibly fun and captivating. Although the volume of content is high, all of it is interesting.

Everybody has different modules that appeal to them. I particularly enjoy anatomy, although it largely consists of memorising information, I still find it fascinating.

Additionally, I also really enjoy dissection. I appreciate the fact that you're able to physically see for yourself the concepts that you learn in lectures, much more so than in A-level, which makes it very engaging. If people like the idea of dissection they should apply accordingly.

Q: WHAT WAS THE BIGGEST DIFFERENCE BETWEEN YOUR EXPECTATIONS OF ENTERING MEDICAL SCHOOL WHEN YOU WERE DOING A-LEVELS AND THE ACTUAL EXPERIENCE OF STUDYING THERE?

The greatest surprise was how much of a mix everyone is at medical school. There is a really wide range of ages and experiences, as everyone has taken different paths to get here. Also, taking one or more gap years is really common, so don't stress if you end up taking gap years.

Q: HOW HAS YOUR SOCIAL/WORK LIFE BALANCE BEEN?

My social/work life balance has been pretty good so far, but it is getting more difficult to manage now that I have a greater workload.

There are lots of opportunities to socialise, for example concerts or clubbing, where you get to meet many new people (be wary it can be quite expensive). Also, quite a few landmarks are located near my university, so many people spend time there too.

Q: FROM YOUR OWN EXPERIENCE, WHAT ADVICE WOULD YOU GIVE ON CHOOSING A UNIVERSITY COURSE?

There are numerous things you need to take into account when deciding which medical schools you want to apply to, like location and teaching style.

Personally I have always wanted to go to a city-based university, so I applied accordingly. There are some advantages to studying in a bigger city, for example there are more people, so you encounter a wider variety of illnesses. Also, I am close to a lot of events, for example surgical events, which means that I can build up portfolio points (however these events are probably available in most places). Overall when choosing a university take into account where you will be most comfortable.

You also need to consider the different teaching styles of different universities. There is problem based learning, traditional and integrated. At Kings, we have an integrated teaching style, which gives me the opportunity to have a more hands on approach from the offset. Often visiting different universities via open days or even virtual open days gives you a good feel for different places.

Q: WHAT FURTHER OPPORTUNITIES ARE AVAILABLE AT MEDICAL SCHOOL?

There are numerous opportunities at medical school. For example in Kings, there is the ‘summer in America’, where students get to observe and experience the American healthcare system.

Another interesting scheme is called ‘Psychiatry early exposure programme’, where you are paired with somebody who is just starting their psychiatry training. You then spend time with them over the course of your whole degree, giving you an insightful experience of the department. They are limited in terms of places but I think it is worth applying for, if you’re interested.

Q: IN HINDSIGHT WOULD YOU DO ANYTHING DIFFERENTLY IN APPLYING TO MEDICAL SCHOOL/WORKING FOR A-LEVELS?

I would have spent longer preparing for the BMAT, although this would have been tough to balance on top of A-levels.

Also, I wouldn't be over reliant on statistics when choosing which universities to apply to, as these statistics will change every year; it is useful to use your UCAT score as a major factor when applying to universities.

Finally, it's important to be able to reflect on the work experience that you have done in the interview, so I would spend more time practising and preparing talking about your personal experiences to be more confident on the spot.

Q: HOW DID YOU PREPARE FOR THE UCAT, AND WHAT ADVICE WOULD YOU GIVE TO PEOPLE WHO WILL BE PREPARING FOR THE UCAT?

I'd say the UCAT hinges very much on how good you are feeling on the day. If you aren't feeling great, you can always postpone the exam, which is free to do up to 24 hours before. I did this and had my UCAT a week later than the original date, which I think is what helped me to achieve a high UCAT score.

In terms of preparation, I used a website called medify (https://www.medify.co.uk/ucat) and a book consisting of 1250 practice questions. These resources have a lot of questions which are incredibly similar in presentation to the real exam, so I do recommend you practise beforehand. Another piece of advice is to learn keyboard shortcuts and practice under timed conditions, similar to the real examination. It is quite a common mistake to start revising for the UCAT too early or too intensely, which means you burn out quickly. Don't fall into that trap and balance your revision in order to be at your apex on the day of the test.

Q: WHAT ADVICE DO YOU HAVE ON THE APPLICATION PROCESS?

Regarding the interview, look at the interview materials provided by the university themselves, which you can find on the individual university websites - they could ask direct questions from it. I found reading good medical practice - a document written by the General Medical Council - and keeping up to date on the BBC news health page useful as well.

During the interview, it is nice to say something good about the university, however be prepared to follow through with it. For example as Southampton University is known for its research, they could ask which of their research most interests you.

I thought the interviews would take a more holistic approach, such as asking about medical scenarios, but a lot of the questions were actually about me. Obviously, do prepare to encounter medical scenarios but bear in mind that the interview may completely subvert your expectations! For the personal statement, I recommend taking reflective notes throughout the year,

,

for instance after work experience, as they come in useful later on when writing the personal statement. Also, read books, but only read ones that interest you - don't read them just to mention in your personal statement. In terms of writing, be very specific - for instance if writing about a book, mention one and explain how it led you into something else. More importantly, everyone can read books, so how you reflect on the book is the key.

Q: DO YOU HAVE ANY ADVICE ON DEALING WITH THE TRANSITION BETWEEN SIXTH FORM AND UNI?

I'd say everyone in the university has different ways of studying, so thinking about how you're going to approach learning the material at university is something that may be worth thinking about just before you start university. You might take time experimenting with various note taking methods, but it is really important to work out your own system. Personally, I go to lectures and make notes there, then add useful diagrams or illustrations afterwards.

Many people use an app called Anki, but I don't personally recommend it as you will end up with more than 20,000 flashcards which could be overwhelming. Going into first year, I was worried about workload, however I found that actually the workload was manageable. It is important to bear in mind that it is normal to be slightly behind, for example 5-10 lectures, so don't stress too much about it.

There are many more people in the university - you will meet hundreds and hundreds of people. Although you shouldn't feel like you have to make friends with everyone, or know everyone, it is still good to try new activities, for example joining societies. When applying to universities you should be prepared for rejections: don't let it demotivate you. I encountered a few rejections myself. No matter what, keep focused on your A-levels as those are what you have the most control over.

Q&A

WITH PROFESSOR KOKILA LAKHOO, CONSULTANT PAEDIATRIC SURGEON AT OXFORD CHILDREN'S HOSPITAL AND OXFORD UNIVERSITY. INTERVIEWED BY FRANCESCA URRY

Q: COULD YOU DESCRIBE A NORMAL WORKDAY FOR YOU?

I am a morning person, so I get up at 4:30 am and do yoga exercises for 30 minutes, taught to me by my dad from childhood. After that I go for an hour-long walk between 5:00 and 6:00. Then I chat to my husband over a cup of tea before heading to work.

I have no set routine at work. Every day is different, however typically on Mondays I have theatre in the morning, multidisciplinary meetings in the afternoon and some time for research. I get home around 18:00, and prepare dinner with my husband. We chat or sometimes we watch a documentary depending on how tired we are.

On Tuesdays I meet with patients from 7:00 till 15:00 in the clinic and then I do research until 17:00.

I work in the theatre on Wednesday, and I finish at 20:00 so on that day my husband cooks for me.

Thursdays are full of research meetings, admin and teaching.

Friday is our departmental teaching and governance morning followed by theatre and research meetings. Fridays we spent a lot of time teaching trainees, students and allied health workers. Sometimes we have lunch together as a department. This is just one example of a working week. If I am on call, I am on duty 24 hours, so it is a very different week and I finish at 19:00 or 20:00 and then I wait to see if I am needed.

Q: WHY DID YOU CHOOSE YOUR SPECIALTY AND WHAT MAKES IT REWARDING FOR YOU?

My interest in medicine started as a child, as I watched my grandmother who was a self taught health visitor in the small hamlet that I grew up in South Africa. It was very rural and there was just one general practitioner and her for the rural community.

Once I graduated, I was unsure whether to do gynaecology and obstetrics or surgery, but then on the 2-year rotation as a junior

doctor, I discovered that I loved surgery and when I rotated through paediatric surgery I knew I had landed on my feet.

I find my specialty incredibly stimulating and I have a big interest in newborn surgery because you are dealing with vulnerable newborns and their parents.

It is challenging and stressful operating on the newborns, but it is incredibly rewarding. Which is different from older patients that have more history and experiences that could affect their health. It is highly stressful, but they do get better very quickly. Even simple operations are extremely rewarding, and I enjoy them. The basic, first-line operation is a hernia, but I still get extremely excited to do them. I do not see it as work as I enjoy it so much.

Q: WHAT DO YOU CONSIDER TO BE YOUR GREATEST ACHIEVEMENTS SO FAR?

There are several things. Regarding my career in Oxford, the work I have done as a team to develop our unit to the level it is now as it started off very small.

Then my work developing children's surgical care in Tanzania and developing research collaborations for paediatric surgery in Johannesburg in South Africa.

Also having a successful marriage with 2 independent daughters in their own careers. My biggest achievement has been having the ability to balance my work life and career with my family life.

Q: COULD YOU GIVE AN OVERVIEW OF YOUR EXTENSIVE INTERNATIONAL WORK AND WHAT MOTIVATED YOU TO PURSUE IT?

My international work has largely been responding to people's requests and because I am South-African it has helped me to identify areas that need resources.

My work in Tanzania was a request for specialist training. The important thing is not to go to the invited institution with your own ideas and plans. The reason I think I have been successful in my global work is because I listened to the requirements and needs, and I

worked with my counterparts to meet the needs.

I have worked not just in Tanzania but also in Bangladesh, India and Malawi. I have helped to improve training, and developed clinical and research capacity building.

Q:WHAT CHALLENGES HAVE YOU FACED IN YOUR CAREER?

Everyone faces lots of challenges in their careers, the greatest challenge in any career is to make sure you are keeping updated, working as a team and that you understand the ups and downs of that specialty.

If there is a challenge, you work through it and figure out what is important and unimportant.

As a surgeon it is essential that you do not lose confidence in your surgical skills and that you get up and deal with the problem. You must always keep a balance and remind yourself what your purpose is and what you are doing. You must figure out how to solve the problem instead of moaning and

remember that nothing is impossible.

Q:WHAT ADVICE WOULD YOU GIVE TO SOMEONE WHO IS LOOKING TO STUDY MEDICINE?

Medicine comes from within, it is a vocation. You are not looking to deal with figures and make some money - you are dealing with people's lives. You must understand that you don't know it all.

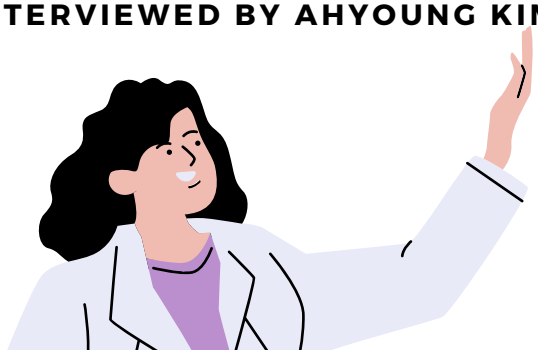
You may be suited to study medicine if you like people, you can communicate, you are compassionate and enjoy science mixed with art. The artistic part in surgery is like embroidery, you need to be proud of your stitches and of your output. You need to appreciate that you are dealing with human life.

You also need to like the group of colleagues you're working with. It is important to get work experience to find out more about working life in a hospital and the type of people who work there.

You hear a lot about how terrible the NHS is but it is the best health system in the world, and it is a privilege to work in it. I have worked in many places all over the world and I can say that the NHS is definitely the best health system the world has ever seen.

Q&A

WITH CLAIRE (A 2ND YEAR MEDICAL STUDENT AT OXFORD UNIVERSITY)
INTERVIEWED BY AHYOUNG KIM



Q: HOW HAS YOUR SECOND YEAR AT MEDICAL SCHOOL BEEN SO FAR?

It's been alright, though it's definitely a lot busier than last year. It's a huge jump in terms of workload and content coming into medical school, and by the time you get used to it, you get given even more to do, but again you gradually get used to it.

We have been and will be covering neuroscience, pathology, applied physiology & pharmacology and psychology this year. But, it's also a lot more interesting with more medical context, compared to the basics we covered in the first year (e.g proteins, basic anatomy, electrophysiology).

Q: WHY DID YOU CHOOSE TO STUDY MEDICINE?

To be honest, I really enjoyed watching medical dramas and thought doctors looked really cool.

When I got more serious thinking about what I wanted to do in my life, the aspect of constant learning and the idea of improving the patients' well-being really caught my interest. I just thought it'd be amazing to help others based on my learning from the sciences.

Q: ARE THERE ANY RESEARCH OPPORTUNITIES?

Yes, so it differs between medical schools but in Oxford you spend the first 3 years essentially doing a medical sciences degree. In essays, you need to include different experimental evidence to get bonus marks and some are introduced in the lectures.

Also, at the end of second year, you get started on your FHS (final honours school) project needed for your BA degree - you get assigned your own project by a lab you apply to and get to do your own research and write up a project.

Q: HOW DID YOU PREPARE FOR THE BMAT, AND WHAT ADVICE WOULD YOU GIVE TO PEOPLE WHO WILL BE PREPARING FOR THE BMAT?

Ultimately, I believe BMAT is all about practice - you have access to all the BMAT past papers online for free. BMAT questions are supposed to be quite challenging and you might struggle at the beginning but the more practice you do, the better you get at it.

We tend to neglect the importance of BMAT as we have a lot to do (personal statement, UCAT, application as well as A-Levels which get more difficult in year 13!) but it's important that you spend enough time practising.

I'd say the section 2 questions, especially for Biology and Chemistry, tend to cover slightly beyond GCSE which most of the medical students should be fine with, as we all do them in A-Levels.

A lot of people struggle with Physics as many med students that I know haven't continued it since GCSEs (which was also the case for me).

But there's nothing to worry about because a lot of youtube videos go over this, and it's really about memorising equations. You would have gathered this information from BMAT youtubers, but even if there's a lot covered in the BMAT Physics syllabus, there's only a set number of topics that come up every year. This means that if you memorised the basic equations and have a fairly good understanding, you're most likely to get them right.

Also, there are only 7 questions that come up for Physics so if you score high in other sections (Bio, Chem, Maths), you'll get a high enough score overall.

A lot of stem students get terrified at section 3 essays, but again, they are practicable. The most important thing to remember is that you won't get extra credit for choosing a relatively sophisticated question, so just go for the one that you can best answer. If you're not an essay type person, I'd recommend that you go for the medical question.

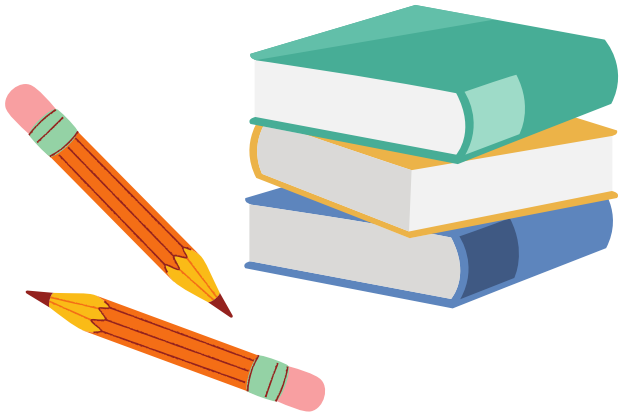
Q: WHAT A-LEVELS DID YOU TAKE AND HOW WERE THEY BENEFICIAL FOR APPLYING FOR THE UNIVERSITY?

I did Biology, Chemistry, Maths and Further Maths for my A-Levels and I'm glad I chose statistics for my option for Further Maths as we have medical statistics modules and coursework here.

Ultimately, how many and which A-Levels you do don't really matter at all - most of my friends here did 3 A-Levels (Bio, Chem, Maths). Chemistry is generally compulsory to apply to a medical school, whereas Biology is not, though I'd highly recommend that you do Biology as medicine is all about Biology (with some Chemistry aspect in pharmacology but not really).

Thus universities might ask you if there's a particular reason for not choosing Biology.

Speaking of Oxford, basically everyone gets very high grades in predicted grades so it's all about GCSEs and BMAT (50% each). Of course, it's very important to meet your conditions for the offer at the end, but they don't massively impact your application.



Q: COULD YOU GIVE US ADVICE ON MANAGING WORKLOAD?

It might sound very generic but it really helps to be on top of stuff when you keep a to-do list. It's important to set priorities of what to do.

Also it's all about efficiency, so try to time yourself when doing something and try to really finish it in time which helps you to be very focused - there's no point sitting there for the whole day getting distracted occasionally.

Q&A

WITH DR CHRISTIAN BABBS: HEAD OF GENOME ENGINEERING / PRINCIPAL INVESTIGATOR IN RADCLIFFE DEPARTMENT OF MEDICINE (UNIVERSITY OF OXFORD) INTERVIEWED BY ANJALI RAMESHWARAN

Q: COULD YOU DESCRIBE A NORMAL WORK WEEK FOR YOU?

For a research scientist, each day of the week is very different. On Mondays I have a meeting with my lab at 10 o'clock in the morning, and then I have 2 hours to catch up on anything and then at one o'clock we have a seminar which is for the whole building. Our Institute has 4 main interests: haematology, cancer, ageing and immunology, so the Monday seminar could be about any of those interests. The seminar is a chance for the whole institute to come together to learn about science, whether you specialise in that area or not, hence it is a great opportunity. On Monday afternoons, I tend to either work in the lab, do some reading or do some coding.

On Tuesdays, I have a meeting with a different lab at 10 o'clock, and that's about organisation, checking on how all the projects are going. Then from 11 to 1, it's once again back to emails, reading science papers and coding. At 1 o'clock we have a molecular haematology specific seminar, which is the unit I'm most closely involved with, which is basically about how red and white blood cells are made. Then from 2 to 3, I will have a catchup meeting with a group that I supervise. Then I finish the day with lab work and any ad hoc meetings.

Then on Wednesday I start my day with some reading. Every Wednesday we have Journal club, so this is basically when everyone is working on a certain theme. Each person takes it in turn to identify a paper which is particularly relevant to us and then goes through it with everyone. We look at all the figures and data and decide if it makes sense to us, and if we were the reviewers, if we would have let it be published or not. It's surprising how much of the time the answer is actually no. However if it is a really good paper then we try and learn from it, try and do something like that, or adapt it to try and make it better. On Wednesday afternoons, I have some ad hoc meetings again.

On Thursdays I have journal club again, with a different group of people, and then on Thursday afternoon I meet with the 3 PhD students that I supervise.

On Friday mornings we have a Human Immunology unit seminar. During Friday lunchtime we have a lab meeting, where someone will present their work. Each person only has the opportunity to present their work once a year, so these are quite formal lab meetings with quite a lot of slides, as there is a lot of data to update people on. So the way it tends to work is that each student will have one to one meetings throughout the week, with their allocated supervisors - we all have to supervise a certain number of students - then at these meetings everyone presents their own work.

In between all these things during the week, I have other tasks to complete, occasionally I have to give a talk or have to work towards a particular deadline. At the moment I have a paper to write before the end of the month and some bioinformatic analysis to do.

In my current position I don't do as much lab work, and tend to focus my time more towards organising, planning and managing. However in order to get to this position I did a lot of lab work: a lot of the meetings that I attend are in fact people asking 'why doesn't this work' or 'what should I do with that?' So if I hadn't spent all those years at the bench, I wouldn't be in a good position to help them and troubleshoot their experiments. One of the nice things about my job is that I get exposed to a lot of really excellent science, and although my lab skills are probably getting a bit out of date now, it's the cross fertilisation that really helps. I often find that I speak to one person who's using a specific enzyme that's working really nicely, and I'll speak to another person who's using a different enzyme and their experiments are not working. Then it's quite simple, as I remember the enzyme that worked for the last person and advise the next person to use it.

Q: WHAT'S THE MOST REWARDING PART OF YOUR JOB?

There's 8 billion people on the planet. If you find something out, if you're the first person to see it down a microscope and know that you're right, knowing that you've identified a new fact, you've contributed to the sum of human knowledge.

Just for that hour before I tell everyone else, I'm the only person out of 8 billion who knows this to be true. It's what motivates me and gets me out of bed in the morning.

To prove something you first have to have an idea, and maybe at first people won't believe your idea, but if you prove it, then you're right. There is great satisfaction in proving that you're right, that your idea has got validity. Of course there are certain principles at work in everything you do. For example you can get a reproducible artefact, which I suppose is the probably worst thing so it's important to orthogonally show things.

So, having an idea where you think, I wonder if this system works like that, I wonder if this protein does that, or I wonder if that gene is making this person sick, and then quite a lot of the time you're wrong and you have to take it on the chin. You have to try something else, but it's that moment of being right. That's the best thing about this job. Being able to tell everyone else, and then write a paper, and people cite it and then they build on what you found and go off and do their thing. I get the feeling that I'm really contributing to human knowledge, and that's the best thing by a mile.

Q: HOW DO YOU THINK STUDENTS INTERESTED IN RESEARCH MEDICINE SHOULD APPROACH THEIR FUTURE CAREERS?

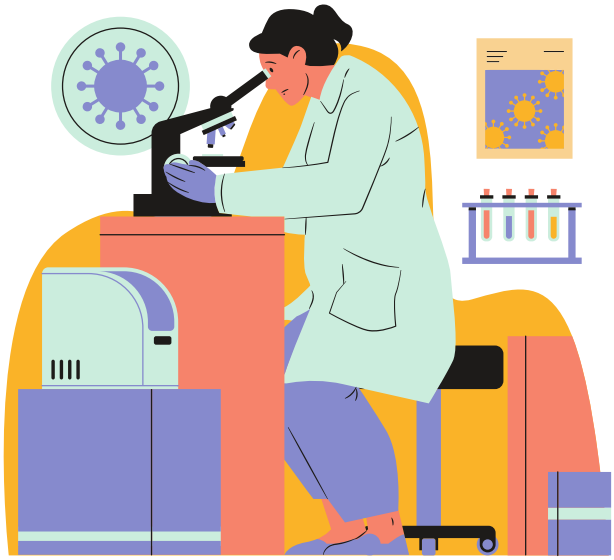
First of all do it because you enjoy it, it has to be a vocational calling. Then after that I would get as much experience as I could in many different ways. So one of the jobs I actually do for the department is triaging or grading the PhD student applications to the University of Oxford Medical Sciences Division, it is very competitive now. Everyone has done a couple of internships and have got placements in a lab.

I can tell you what the criteria that we are marking these things on - there are 3 main criteria.
One is that the student is academically excellent. So the first thing is, just do really well at school - take your exams seriously. I think that comes back to being really interested in it, because the people who are academically excellent are the ones who are so motivated by the subject and are just really interested in it.

The second thing is we have to see if they've got the ability to contribute. So, this is when you use your network of friends, or more impressively actually write to someone and try to get a placement under your belt. They can be even at A-levels or during your first degree. If you can find a placement where you can say ‘I helped with that, would you put me on the paper?’, then, as far as we're scoring PhD applications, if they’ve done a placement, it is fine, but if they've contributed and got authorship on a paper from that placement, then that's a really positive proof that you've got an ability to contribute.

If you are doing your A-levels and are going to do your first degree, then a placement will probably be fine. However if you're coming to do a PhD, then you'll probably need a placement and have gotten your name on a paper. Another thing that you could do, if you're in a lab, and they're not doing work that's going to lead to a paper at the moment you could try and make that happen by saying to your supervisor or Postdoc in the lab, and say: “can we write a review together on something”. If you can get a review published, that's really good for your academic standing, and you get your name in the literature.

Find something that interests you, get engaged, go to a lab, do a placement and try and win some prizes in school or even some funding.

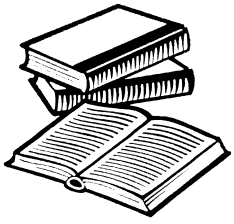


Q: IN YOUR OPINION, WHAT SKILLS ARE NECESSARY FOR A RESEARCH SCIENTIST?

Good resilience is key, as you’re going to be wrong a lot of the time, but that’s also what makes the times that you’re right special. You have to have a great attention to detail at all times, from when you’re reading a paper by thinking critically, to doing practicals at the bench. One of the questions I ask people at interview is how do you keep track of your experiments, because if you’re doing an experiment where there’s 100 samples and you’ve got 30 tests to put them through and someone interrupts you midway through and suddenly you’ve got 500 test tubes in front of you, you need a system to determine where you were.

You have to be methodical, in order to ensure that you use the correct technique, like changing pipette tips to ensure there is no cross contamination.

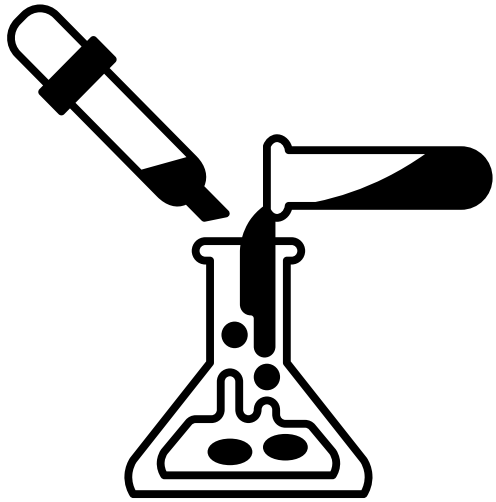
There is also another aspect that no one really talks about. A person can be really good in the lab and have ‘green fingers’, however if you’re going to publish a career changing paper in science or nature you have to have a good idea first and have been bothered to mix your enzymes properly. I find that the people who don’t do so well, tend to only be good at one thing. They may have great big ideas, but if you ask them to sit at the bench running tests, they are not interested in doing that. So I think you need a really unusual mix of attention to detail, both in your academics and thinking, and to be able to stick it out on the bench and be able to do it. There was one of the most brilliant guys I've known since I've been at Oxford. He didn't finish his PhD - he had fantastic ideas and his brain moved so quickly but he absolutely couldn't sit still at the bench for 5 minutes and do an experiment. None of his experiments ever worked, and he eventually just left. You have to be self-aware and see if that kind of life would suit you.



Q: WHEN CONDUCTING EXPERIMENTS, ARE MOST OF THEM DONE INDIVIDUALLY OR AS PART OF A TEAM?

It depends on what stage you are at. During the student stage, most of them are done individually, because it is your thesis and it’s going to be your name on it. Once you get to the postdoc phase, then it definitely depends on what sort of laboratory you are in. If you want to work more individually then you go to a smaller laboratory, where there may be 2 or 3 postdocs each working on a project. You have to be comfortable doing everything yourself, be happy working alone and keeping self-motivated. The other option is to go to bigger labs, where they have 20-25 postdocs working as part of a bigger team in a kind of production line. Everyone specialises in one thing and works together to tackle questions. By working in these bigger labs you can be very prolific in terms of the number of papers that you get, however you won’t get very many first or last author papers. There are many of these in the USA. On the other hand, in a smaller lab, you might get much fewer papers, but you’ll have a prominent position in all of them.

This is what you can decide once you've done your PhD. For me, I was quite motivated by a specific area of research. I've got a couple of proteins that nobody knows what they do. I think I have a fair idea now, but I get up everyday and I think 'I want to find out what my protein does'. That type of work lends itself to more individual work. However, I never thought to myself if I want to work more as a team or as an individual. It's more about being really interested in solving a problem, then you just work in the environment that would best facilitate you to crack the problem efficiently.



Q: WHAT ARE SOME OF THE CHALLENGES YOU FACE IN YOUR RESEARCH?

Funding is a constant challenge and short-termism, as research grants tend to only last for 3 years. You are always trying to publish whatever you can in those 3 years in order to win the next tranche of money.

Quite a lot of the papers that come out are clearly just labs having to publish something, so I think that if research grants were longer, then the scientists would hold off on publishing until they had something that really moved the field forward in a satisfying way. One of the other issues that some people face is getting a really good research idea. Taking a bit of time before you start, because it's tempting to just rush into things, to really think about how your research will move the field forward is important. Journals that publish well tend to be those types of substantial research rather than footnotes.

Q: CAN YOU TELL ME ABOUT YOUR RESEARCH?

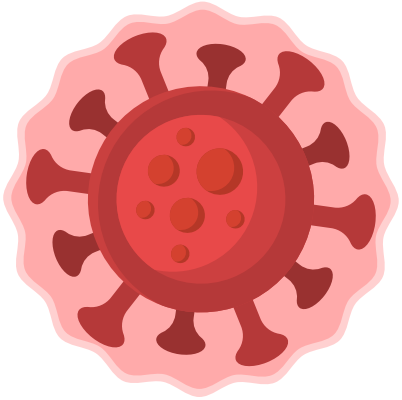
Anaemia occurs when you don't make enough red blood cells, which in most people means that you don't have enough iron in your diet. This may make you experience symptoms like chronic fatigue or jaundice. In most cases, you go to the doctor and they will give you some iron to take, as your anaemia is caused by iron deficiency; however, if you still feel the symptoms after about a month then the doctor will measure your blood cell count and haemoglobin, then say that you have iron resistant anaemia. This could be caused by genetics or a vitamin B12 deficiency.

In that case, they will give you supplements to improve your condition, although if that does not work then you have to be sent to a referral centre - we are one of those. Here, you get screened for haemoglobinopathies (a subtype of anaemia), which means that you don't have enough haemoglobin. If you test positive for that, that suggests that you have thalassemia (the most common cause of iron resistant anaemia).

Your haemoglobin consists of 2 alpha-like chains and 2 beta-like chains which make a tetramer that forms around an iron containing haem group. People typically have two alpha-containing genes and 2 beta-containing genes, so 4 genes in total. If you don't make enough alpha-globin then you are said to have alpha thalassemia, and if you don't make enough beta-globin then you are said to have beta thalassemia. Alongside sickle cell anaemia, these are the most common monogenic diseases in the world. Going into the detail, if you don't make enough alpha globin, then you have relatively too much beta globin. However, the beta globin genes don't know there isn't an alpha gene, hence they carry on making it. At a later point, it forms an insoluble tetramer, so it can't carry oxygen and all your red blood cells burst. The same thing happens if you have too much beta-globin.

Sickle cell anaemia is a single mutation in beta globin, meaning it doesn't fold properly. Around 360,000 people are born every year with a degree of haemoglobinopathy; there is a world population of tens of millions of people with thalassemia or sickle cell anaemia.

The work I do on that is based on the idea that we have embryonic and foetal expressed versions of alpha and beta globin that are turned off when we are born, in most of us this is fine, and so part of our work is to try and reactivate the embryonic alpha-like globin genes as a treatment. Leading on from that, we are learning about how genes are regulated, how they're turned on and off, as it looks to us like there is a whole embryonic program of gene expression which has evolved to become down regulated. There are a few embryonic genes, which could potentially substitute for their adult counterparts, if we learnt to turn them back on. This could potentially be used as a treatment for many other diseases as well.



Some people who test negative for haemoglobinopathies have thalassemia, part of which means they don't make red blood cells properly, and there's a huge variety of reasons for that, for example mutations in your membrane genes. The type of anaemia that I specialise in, is if you don't manage to package your DNA properly, this is called CDA, or congenital dyserythropoietic anaemia.

One of the things that's almost unique about red blood cells is that as they shrink down, they throw out their nucleus. In order to do that, you have to scrunch up all of your DNA really small. This is called nucleation and it's important that your red blood cells can enucleate properly. For some reason, people with the type of anaemia that I specialise in don't scrunch up all their DNA properly, so their red blood cells can't enucleate, and if they can't, the cells undergo apoptosis. There is an interferon therapy available to these patients to improve their condition, however the therapy has some nasty side effects, which we are currently working on improving.

Regarding the support for this research, the government wants scientists to be transactional, basically bench to bedside. Since we're winning research grants and taking up taxpayers' money, they want the research to not only be useful for scientists, but also be bedside helping the patients. If someone comes in with anaemia not knowing what's wrong with them, we can diagnose CDA type 1 and suggest that there is an interferon therapy to them, which is obviously quite translational. However, those things tend to be published quite badly. If you publish a new mutation in a family in the British Journal of Haematology, so that other doctors in the world can diagnose that mutation, that would only have an impact factor of 6. When we apply for grants, they will ask what our impact factor was, and if you only have a couple papers of impact factor 6 over the last few years, then you probably wouldn't get the money, whilst if you published in journals like Nature or Science then you would have an impact factor of 30, in which case you would get the money. So, not only are you trying to solve some specific cases - you also have to answer the bigger question.

There are only about one in 250,000 people who have my type of anaemia, the government and the funding bodies quite often say that they are better off directing their funds towards people with cancer, towards people learning how to cure haemoglobinopathies, or towards looking at ageing or any of these other things. However my research is not necessarily just about anaemia patients. This gene that I look at is in everyone's body, and there must be a general need to squash down your DNA because you've got 2 metres of DNA in every one of your 13 trillion cells. Compacting DNA is a general issue for us all.

In addition, it is only when something breaks that you have an insight to how it works. Thus, although I do specialise on this relatively rare form of anaemia in which you have a permitting compaction defect, I think it's important that we understand how all chromatin is compacted in ourselves. Therefore I try to tread the line that's useful for the family and translational, but also so that we can learn something general about compacting DNA.

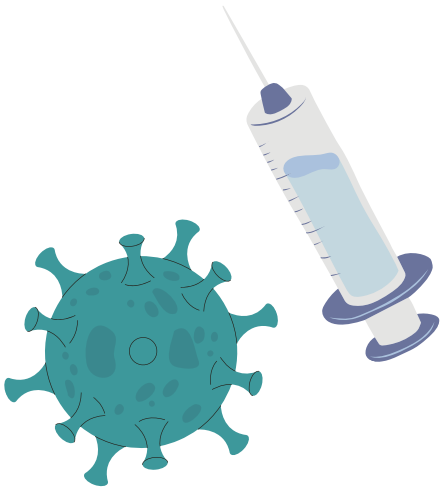
I think one of the problems in science is that the government wants translational research, but then judges us on impact factors, when most translation research tends to only get low impact factors. Although it's complicated, I think that the funding system could be improved.

Q: FOETAL HAEMOGLOBIN HAS A HIGHER AFFINITY TO OXYGEN THAN ADULT HAEMOGLOBIN. DOES THIS FACT HAVE ANY NEGATIVE EFFECTS IF SWITCHED BACK ON IN AN ADULT BODY?

Both foetal and embryonic haemoglobin have higher oxygen affinity than maternal haemoglobin, so the baby doesn't suffocate in the womb. There is a preclinical model, where a mouse's alpha globin genes were deleted and replaced with embryonic zeta globin genes and the mice were fine, and proceeded to give birth to healthy mice.

Although the oxygen dissociation may not be typical, there is evidence from the preclinical model and from populations around the world where there are naturally occurring haemoglobin mutations resulting in higher oxygen affinity where the population seems to do just fine.

MEDICAL NEWS UPDATES



WRITTEN BY Y12 STUDENT AHYOUNG KIM

SPOTLIGHT: SCARLET FEVER

Scarlet fever affected 4,622 people in the UK during the 46th week of 2022-2023 this winter (week commencing 14th November 2022), which was higher than the previous 5 years. Scarlet fever has a higher prevalence in children than in adults: it most commonly affects kids between the ages of 5 and 15 years old.

Scarlet fever is caused by bacteria called group A Streptococcus, which spreads when people talk, cough, or engage in any activity that secretes saliva or nasal droplets containing them. The transmission is encouraged by crowded and enclosed environments, such as school or shopping centres. The average incubation period of group A streptococcus is 2 to 5 days.

Some common symptoms of scarlet fever include red skin rash, sore throat, fever (over 38℃), headaches and nausea. The most noticeable and distinctive symptom is red rash, which initially appears on the neck, but eventually spreads over the entire body. This makes skin rough like sandpaper. Even if this usually goes away in a week or so, the skin may continue peeling for longer.

Similar to lateral flow tests used to diagnose Covid, a rapid strep test that involves swabbing the patient's throat could test for scarlet fever. If tested positive, antibiotics such as penicillin or amoxicillin are used as a treatment to lessen symptoms and transmissions. Patients who take antibiotics for more than 12 hours are typically no longer able to transmit the bacteria.

It is rare to have further complications from scarlet fever, although there are possibilities of diseases like invasive group A strep disease (iGAS). In fact, in the same week (week 46 of the 2022-2023 this season), there were 509 reported cases of iGAS infection which was also higher than in the preceding 5 years.

Good hand hygiene is crucial for preventing scarlet fever, especially after coughing and before preparing food.

TOPIC: RISK OF TWINDEMIC

Recently, the number of patients with flu has been increasing sharply, raising the possibility of a ‘twindemic’ (of flu and covid) during 2022-2023 winter. In the third week of December alone, there were 3,746 patients visiting hospital due to flu and 36,963 covid-19 patients reported, both of which represent significant increases compared to the previous week.

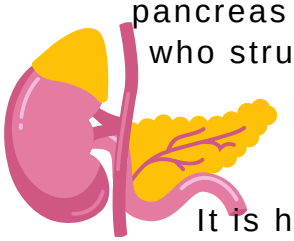
The twindemic is leading to a number of negative consequences; this varies from staff shortage due to increasing number of staff off sick, lack of beds in hospital as well as ambulance services being under strain. The NHS and healthcare are under further pressure as a result of these factors together.

To reduce the risk, it is advised that people get both flu and covid vaccinations as soon as possible.

TOPIC: TYPE 1 DIABETES AND ARTIFICIAL PANCREAS

Type 1 diabetes is a condition when your blood glucose level is too high because your pancreas is unable to produce sufficient insulin - a hormone that regulates blood glucose concentration. To assist individuals with type 1 diabetes, an “artificial pancreas” (also known as a closed-loop insulin delivery system) has been developed. It monitors blood glucose levels, in order to automatically determine and deliver the exact amount of insulin needed for the body.

On 10th January, the National Institute for Health and Care Excellence (NICE) published a draft guidance recommending the use of artificial pancreas technology for around 105,000 people nationwide, including those who struggled with the condition despite having done everything they were advised to, as well as pregnant women.



It is hoped that the increasing use of artificial pancreas will improve the quality of life for the growing number of patients with diabetes.

TOPIC: NHS AND DESFLURANE USE

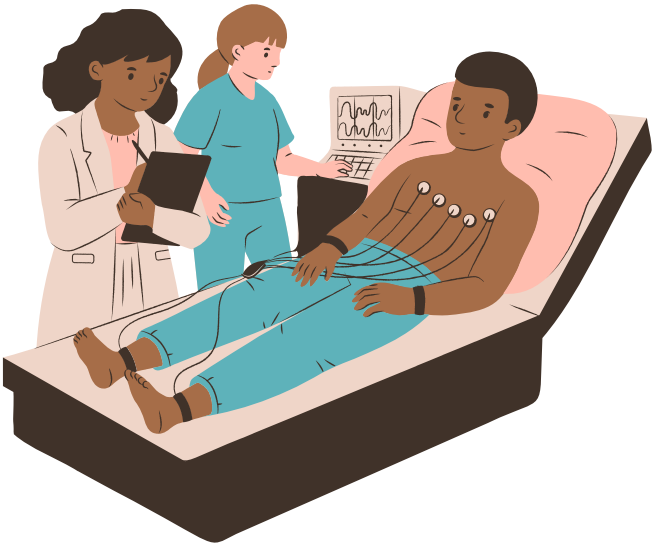
The NHS announced that they will no longer be using desflurane (a type of anaesthetic first used in 1946) with the exception of rare circumstances, in order to reduce carbon emissions and mitigate harmful effects of climate change on human health. This is expected to reduce carbon emission by approximately 40,000 tonnes annually. They will substitute better and safer alternatives of desflurane for both general and regional anaesthesia.

A DAY IN THE LIFE OF A CLINICIAN SCIENTIST

AS TOLD TO JESSICA KHAOU BY PROFESSOR MAHESHI RAMASAMY, CONSULTANT IN INFECTIOUS DISEASES AND INTERNAL MEDICINE AT THE J.R. HOSPITAL AND CLINICIAN SCIENTIST AT THE OXFORD VACCINE GROUP

As a clinician scientist, my day depends on whether I am on clinical service at the hospital or in my research lab. I am a consultant in Infectious Diseases and Internal medicine and my academic work is in vaccines.

Internal Medicine involves being in charge of admitting and looking after patients with medical problems such as stroke, heart attacks and pneumonia. In the JR hospital, there is a firm-based system consisting of 4 doctors: a consultant, a registrar, a senior house officer and a foundation doctor. Each firm looks after patients from when they are first admitted into the hospital until they are sent back home. It is a nice way of working as it allows continuous care of patients and allows junior doctors to get to learn about and understand patients. Each firm is 'on call' once every 3 days or so, including weekends and nights. During an 8-hour on-call period, the number of patients we admit ranges from 20 to 30 patients – the workload can be a bit unpredictable as you never know how many patients will need admission and they come in with a variety of conditions from extremely ill to not so sick.



My firm and I also carry out daily ward rounds checking on the 30-50 inpatients in my care, which were the patients admitted on call, who will stay under my care until they get back home. Most patients only stay for 3 to 5 days until they are able to leave, however, occasionally some patients stay for longer.

Most patients will stay on an internal medicine ward but if there are bed shortages, they often get ‘outlied’ on other non-specialist wards around the hospital. Other than ward rounds, there are also many different meetings to attend. For example, X-ray meetings led by the radiology team look at difficult X-rays or CT scans from patients admitted to the hospital. Other meetings include teaching sessions for medical students and junior doctors or clinical governance-related meetings.

Alongside Internal Medicine, I trained in Infectious diseases. In Oxford, we have a relatively small number of inpatients with complex tropical infectious diseases such as malaria, because we have fewer returning travellers than cities like London or Birmingham. These patients also have daily ward rounds, but we also run outpatient clinics for infections like HIV or TB.

We also provide a consultation service for patients admitted to other specialities with infections, for example, immunosuppressed patients going through chemotherapy sometimes have weird and unusual infections. I would say working as an Infectious Diseases consultant is a different pace to working in Internal Medicine as there are no acute ‘on calls’ with regular admissions, instead there is a fixed footprint of the ward and therefore a defined maximum number of patients to look after.

Many doctors dual accredit in internal medicine and another speciality such as respiratory medicine or intensive care – it means you have a broad area of practice as well as an area of expertise. Medicine is all about teamwork and not just about fixing problems in patients. A range of allied healthcare professionals like nurses and physiotherapists ensure the patient is looked after holistically.

All of the medical professionals involved in a patient are collectively called a multidisciplinary team. These teams usually have regular meetings to go through patients and their issues to make sure everyone is working together to deliver the best possible care - therefore, good communication is vital.

In parallel to working in the JR Hospital, I also am an active researcher. My research is in developing new vaccines and studying how effective they are in clinical trials. My particular interest is in vaccines against pathogens like Salmonella which are a major cause of childhood morbidity and mortality in low and middle-income countries. I work at the Oxford Vaccine Group and am hugely proud to have been the senior clinician on the team that delivered the Oxford-AZ COVID19 vaccine, over 2 billion doses of which have been used worldwide. I also teach medical students – I am the Deputy Director for Graduate Entry Medicine at Oxford and the Clinical Tutor at Magdalen College.

After getting back home from work after 14 hours in the hospital, I sometimes feel utterly exhausted and knackered. However, even though I am tired, I don't always fall asleep immediately as my mind is still buzzing about the patients I have seen - whether I am worrying about how they are doing or thinking about something cool or interesting that happened during the day. I love how each and every individual patient and their story is so different from another and that is what really sparks my interest. Some days I do feel fed up and frustrated with the wider healthcare system pressures, but I still think that my job as a doctor is the best in the world. Nothing is as rewarding as the intellectual thrill of figuring out what's wrong with someone, having the skills to be able to help them or the empathic buzz I get when I have an important and honest conversation with them. I truly believe it is a great privilege to be a doctor and I am lucky to be one.

Q&A

WITH MR TYLER, CONSULTANT PLASTIC SURGEON AT STOKE MANDEVILLE HOSPITAL, WYCOMBE GENERAL HOSPITAL AND HIS PRIVATE PRACTICE

Q: COULD YOU DESCRIBE A NORMAL WORKDAY FOR YOU?

That is difficult, as every day is different! My work day can vary from office based administrative work to seeing patients in clinics, teaching junior doctors, attending meetings and of course, as I am a surgeon, operating on patients in the Hospital theatre.

If I describe a typical operating day, I will often get up a little bit before 6.00 am and leave the house around about 7.15 am to get to the hospital, usually at about 7.45 am – depending on traffic! On arrival at the hospital, I go and see the patients on my list for that day. I finish the consent process, which started when I saw the patient in my clinic. I go through the Consent Form for the operation, answer any questions that arise and then, 'mark-up'. The lines that I draw on the patient are an important part of the planning process for many of my operations. I will then go down to the operating theatre and get changed into my theatre scrubs. In the meantime, the patient will be seen by the anaesthetist and be prepared for theatre.

Once the surgical team are in theatre, we then prepare for the list that day by going through a "WHO" check (World Health Organisation check). This is a prescribed format safety check whereby we discuss the operations that we are going to do that day and we talk about each patient, their operation, the team involved and we note down if there is anything unusual we should be aware of or any special equipment to be used. Whilst we are waiting for the patient to be brought to the the theatre, I prepare mentally for the operation that we are about to do and discuss the surgery with the team, usually over a coffee.

In my speciality, at my level, most of the operations I do usually take a couple of hours per patient. If it is a very long operation (some take 8 to 10 hours), I might take a break for half an hour around lunch time and have something to eat and drink in the theatre coffee room. Longer operations usually involve a larger surgical team so whilst I am having something to eat the rest of

the team are doing various other parts of the operation and then we “tag team” in order to make sure we all have an adequate break.

Once the operation is finished, I go through a further safety checklist with the team to make sure all the equipment is safely accounted for and to discuss any requirements for the patient’s immediate recovery. I would then write up the operation notes (with a cup of tea) and complete any other documentation.

I then go through to the recovery room to check on the patient after they have woken up. After the longer operations I usually telephone the patients’ relatives, to let them know how the operation went. At the end of the list I thank the team, get changed and usually I go and see patients we have on the wards. Some patients can go home a few hours after their surgery but others need to stay in hospital.

Quite often my working day doesn’t finish when I get home. I will have emails to deal with or talks to prepare for etc. If I am not too tired, I try and do some exercise later in the evening, either sitting on an exercise bike or perhaps doing a short stint in the gym. After supper and a bit of Netflix, it’s time for bed!

Q: WHAT IS THE MOST REWARDING PART OF YOUR JOB?

I think the most rewarding part of the job is that I am using my skills to help people. Patients are often anxious when they first come to the clinic. It is important to listen to them, understand what treatment they need and establish trust when giving them my clinical opinion.

I feel privileged that the operations I do usually have a profoundly positive effect on patients and their lives. The doctor/patient relationship is unique and is a rewarding part of the job.

Q: HOW DID YOU GET TO WHERE YOU ARE NOW?

I went to medical school in 1983 and qualified in 1988 and went on to what was then termed “house jobs” (and is now referred to as Foundation Year 1 and 2). At that point, having worked in medical and surgical departments, I realised I wanted to do surgery. I was not sure what type of surgery, so I worked in several different surgical

specialties which I enjoyed - paediatric surgery, general surgery, cardiothoracic surgery, neurosurgery and plastic surgery. I could have seen a future for myself in any one of those specialties but ultimately decided upon plastic surgery.

I worked as a Registrar in the Plastics Department of several hospitals as part of my training. During my training I did a Plastics Fellowship in Slovenia and a Burns Fellowship in Perth, Western Australia. I became a qualified Plastic specialist and my interest in Burns and Reconstructive surgery led me to apply for a post at Stoke Mandeville and I started as a Consultant in 2001.

During the past 20 years of my career, I have had several roles. At Stoke Mandeville Hospital my roles have included periods leading the Burns Unit, leading the Plastic Surgery Department and from March 2020 until October last year I was Co-Chair of the Division of Surgery and Critical Care. I have chaired the London and South East Regional Burns Network. I was the Clinical Director of the burns charity, Restore Burn and Wound Healing (currently Chair) and I have clinically supervised 5 PhDs and 3 Masters degrees. I am a past President of the Plastic surgery section of the Royal Society of Medicine and I am on the Council of the British Association of Aesthetic Plastic Surgeons. I continue to present talks and attend courses to maintain and develop my skills.

Q: WHAT WAS YOUR BIGGEST MOTIVATOR IN PURSUING A CAREER IN PLASTIC SURGERY?

Although I enjoyed cardiothoracic surgery, at the time, I felt drugs would play a bigger role in the treatment of patients in the future. I also enjoyed neurosurgery but felt my temperament would be better suited to Plastic surgery. Despite neurosurgical treatment, patients would often die or continue to experience morbidity or mobility issues. I think anybody who has read Henry Marsh's book would understand the sentiments that he describes so well in his book about the effect of trauma on the brain.

Ultimately, it was the reconstructive work and the level of technical skill required in plastic surgery which was the biggest motivator for me. I was particularly interested in doing microvascular surgery eg. free flap transfers. This is an operation

where we take skin and tissue from one part of the body and transfer it to another part of the body. This surgical technique is an effective method to reconstruct a significant wound in a patient after their skin and tissue has been removed through trauma or due to cancer.

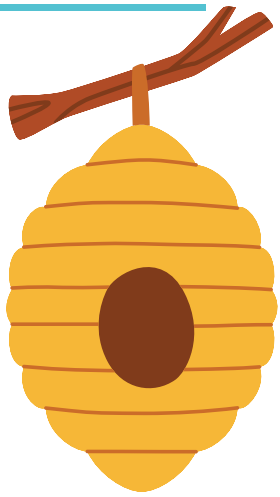
Q: WHAT ADVICE WOULD YOU GIVE TO AN ASPIRING PLASTIC SURGEON?

My initial advice to someone who is still at school would be to decide whether they think they have the determination and ability to study medicine and become a doctor.

Medicine is a career which is fundamentally about the interaction between the doctor and patient and working in teams to treat them - although there are some specialties such as histology and biochemistry where the interaction with the patient is much less. Wanting to work with and help people is the foundation block for embarking on a career in medicine.

Once a qualified doctor, I think there are certain aspects of one's personality, skill set and interests that will lead one to pursue either surgery, hospital medicine, GP or other specialties e.g., forensic medicine. My advice would be to keep one's learning broad whilst at medical school and during the early years of training. Try to experience as many subspecialties as possible before deciding what to do for the next 20 to 30 years. It is a long training, often with long and unsociable hours so firstly, you need to find something you really enjoy doing and secondly, something you are good at. It is a poor career choice if you end up doing a job that you really struggle at and don't enjoy getting up for each morning. Everyone has something in their lives which they really enjoy and excel at - or could excel at. The secret is to try and understand what that is and pursue it.

THE PROPERTIES AND HEALTH BENEFITS OF BEE PRODUCTS



WRITTEN BY YEAR 12 STUDENT JESSICA KHAOU

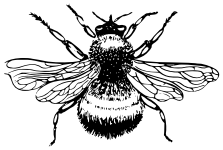
Honey may be the only bee product that you associate with bees, but there are many more valuable products that bees make that are beneficial to our health. This includes propolis, beeswax, royal jelly and bee venom.

Honey is made from nectar that is harvested by bees from flowers. It is stored in small hexagonal cells called honeycombs, which are in beehives. However, there is more to honey than its sweet and delicious taste. Honey is an antioxidant, and has anti-inflammatory effects that can lower the glucose levels in diabetics, inhibits fungal growth and protects against gastrointestinal infections. In addition, honey is able to aid in healing burns and wounds, as a result, it is often used in wound dressing as a natural but effective way of helping with the wound. Along with healing, it can also fight infections and has antibacterial effects. The honey with the greatest antibacterial effect is Manuka honey. Manuka honey is a type of honey which is made from bees in Australia and New Zealand, which pollinate and gather nectar from a specific plant: Leptospermum scoparium bush (manuka bush). Because of its unique origin, there is a difference in its texture and colour, as well as having stronger health effects and benefits than regular honey.

Propolis is a sticky brown product that coats the beehives, it is made from sap and beeswax. Many compounds in propolis have healing properties including antioxidant properties. Similar to honey, it can reduce inflammation and can help with burns and wounds. It was also found that in a study, propolis that was applied to cold sores reduced the number of cold sores in the person and protected them from future cold sores. There has also been some research on the use of propolis in treating certain cancers as it has the effects of keeping cancerous cells from multiplying, but it is suggested that it should be a complementary treatment of cancer and not the sole treatment.

Beeswax is what makes the beehive what it is. It is used by the bees to build the honeycomb which contains the honey they make. Beeswax is used for skin conditions and is often used for diaper dermatitis and eczema as it can inhibit the growth of bacteria. It can also lock in moisture so is used in skincare products to repair dry skin. Research shows that it has effects of lowering cholesterol levels and has antioxidant properties that help protect the liver. The antiseptic and anti-inflammatory properties of beeswax are good in treating acne and reducing stretch marks, this is because of the vitamin A present in beeswax which promotes collagen production. The most common use of beeswax is not in any medical product but in the production of natural and organic candles. Candles made from pure beeswax emit a sweet honey smell when lit and aid in relieving stress and allowing relaxation.

Royal jelly is a milky liquid made by worker bees in the hive and is used as food for the queen bee. It is rich in many vitamins, minerals, proteins and amino acids. There is research that royal jelly can help relieve symptoms of menopause when ingested.



Bee venom is excreted from the bee's stingers when they are threatened and is a colourless and acidic liquid. Research has shown that the various compounds in bee venom have very strong medicinal properties. Apitherapy is a medical practice which uses bee venoms to treat pain and illnesses. Bee venom has anti-inflammatory properties and due to the side effects, it has shown a positive effect on people with arthritis as it provides symptom relief. Skincare products have also started using bee venom in products as it can promote skin health with its antibacterial effect and reduce wrinkles. There has been research on bee venom and its possibility to reduce inflammation levels in neurological disorders like Parkinson's disease and Alzheimer's disease. One of the treatment methods with bee venom is bee sting therapy which is said to help people with MS - multiple sclerosis.

Even though they are small and always buzzing around, bees are very beneficial to not only the environment but to us. Their products have many health properties that can be used medically to treat pains and illnesses. Despite all the benefits listed above, there is still limited research and science backing for the above bee products and its benefits. It is also important to note that people that are allergic to bees should be especially careful with bee products.

WORK EXPERIENCE

WRITTEN BY YEAR 12 STUDENT ANJALI RAMASHWARAN

Getting work experience:

- Write your CV (there is a good template on Unifrog)
- Go onto the NHS website (linked below) and you'll find the contacts of lots of medical professionals from many different departments.
- https://www.ouh.nhs.uk/services/departments/

- Choose what department you would like to get work experience in (bear in mind that you have to be over 18 to watch a surgery).
- Email a few consultants or GP surgeries asking for work experience
- Don't be disheartened if they don't reply to you, just try some other people, and eventually someone will be happy to offer you work experience
- Ask well in advance, work experience slots are filled very quickly
- Give deadlines for people to reply by, so they get back to you quicker

Clothes for work experience:
There are two main things that you need to bear in mind when deciding what to wear: you will be walking and moving around a lot and you are in a professional environment so you need to dress appropriately for that.

1. Wear comfortable shoes, but make it smart (not sneakers, but school shoes are fine)
2. Trousers are easier to wear than skirts, especially since you will be walking around A LOT
3. Wear smart jumpers or shirts on the top
4. Don't wear lots of bracelet or rings, as you will have to take gloves on and off, as well as wash your hands a lot

Note: if the person you are shadowing has suggested that you wear something in particular, listen to them.

How to act:

1. Don’t be shy
2. Introduce yourself to the patient
3. Try and stay out of the doctor’s way
4. Try to be helpful when you can, by holding anything, opening doors etc.
5. Making general conversation with the patient can be a good way to keep the patient comfortable, whilst also helping you develop your interpersonal skills.

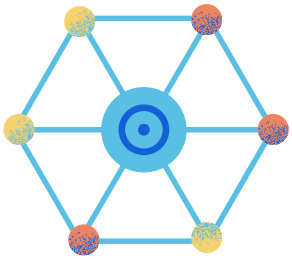
Reflections:

Reflecting on your work experience is one of the most important things you need to do, so when reflecting on your work experience don’t make the mistake of just writing what you did. It’s important to talk about what you learnt from your work experience about the profession and any skills you learnt.

What I personally found really helpful was after each day of work experience I would write down all my thoughts and opinions, whilst it was still fresh in my mind.

I would start off by writing everything that happened in the day from who I was shadowing to what types of conditions I encountered and any meetings I sat in on. I would then note down what I learnt from that day and anything that surprised me, for example you learn more about the skills needed to build up a rapport with a patient or the perseverance needed by doctors to cope with the long hours. Remember to be honest and talk about the insights that it gave you. Keep a lookout for any examples of the 4 pillars of medical ethics: justice, non-maleficence, autonomy and beneficence. Finally, if there was a patient that really struck a chord with you, you could write about them, however always remember to maintain patient confidentiality when writing about patients.

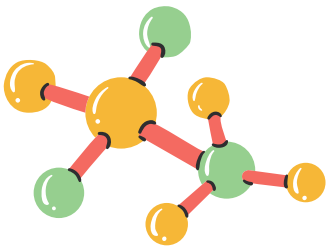
THE REVOLUTION OF NANOTECHNOLOGY FOR FUTURE MEDICAL SCIENCE

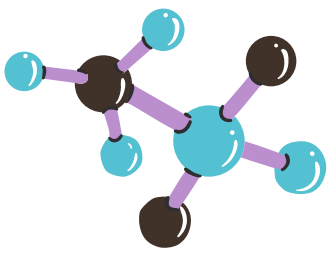


WRITTEN BY YEAR 12 STUDENT ARYA VERABATULU

Nanotechnology is currently the newest and innovative emerging technology and has already been used in many applications of medicine such as development of personalised medicine, robotic and automated surgical techniques, gene therapy or precise and accurate delivery of drugs to specific types of cells (like cancer cells) to help professional medicals for the treatment of various diseases. The use of nanotechnology can revolutionise the way we detect and treat any damage or diseases in the human body. How it's used in medicine is dependent on the involvement of nanoparticles. For example, patients that undergo treatment for cancer are induced with several nanoparticle-based drugs that contain nanomaterials such as Doxil and Abraxane. These nanomaterials are chemotherapy drugs that are delivered in the body to cancer-diseased cells to improve treatment efficiency and reduce any side effects.

Recently, due to the COVID-19 pandemic, nanotechnology has been used for diagnostic techniques in medicine. Research done has proved that nanomaterials can be used in two types: it can be merged with or added to a pre-existing product by lending its unique properties to improve its performance, thus helping to improve the product quality. The other way is that nanomaterials, like nanoparticles or nanocrystals, can be use directly by attributing their distinctive properties to create a more powerful and advanced device benefiting the potential of all industrial sectors in the future. Global beneficial uses of these nanomaterials have been found in sunscreens, cosmetics, electronics and other everyday products. These nanomaterials allow a mass-production of products with enhanced quality and performance at significantly lower costs with the benefits of creating a more greener and cleaner manufacturing process.

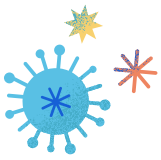




This not only helps the healthcare sector with any scientific discoveries but also reduces any environmental impacts during the manufacturing stage. Nanotechnologies exhibit significant potential in medicine such as imaging techniques, diagnostic tools, tissue engineering and construction, implants done by plastic surgery, and pharmaceutical therapeutics. The more advanced techniques include treatments of various diseases such as cardiovascular diseases, cancer, damage done to the nerves, bacterial and viral conditions (COVID-19) and diabetes. It is indeed quite interesting how nanotechnology can create efficient and functional products in medicine and how exactly these nanoparticles have been investigated and approved for clinical use.

There are several types of nanoparticles but the most common types that have been used more often recently are micelles, liposomes, dendrimers, carbon nanotubes, metallic nanoparticles and quantum dots. Focusing on the use of a few, micelles have various advantages and applications in medicine such as drug delivery agents, imaging agents and so on. The unique properties in these micelles allow the enhanced solubility of hydrophobic drugs, which are drugs that exhibit poor solubility in water, thus helps to improve bioavailability. Another nanomaterial, carbon nanotubes, have been investigated and researched to be cylindrical molecules that consist of rolled-up sheets of a single layer of carbon atoms (graphene). These have been used for diagnostic purposes. Researchers have proven that carbon nanotube chips that are attached to antibodies can detect cancer cells in the bloodstream. It is believed that this technique can help improve the efficiency of the early detection of cancer cells in the bloodstream, reducing the risk of the disease to the human body.

However, it is important to understand that nanomedicines are not always able to improve the therapeutic output of drugs for each and every patient. It is also important to understand the behaviour of these drugs when they encounter different physiological characteristics and disease states of patients of varying age. However there is no doubt that nanotechnologies have helped improved quality of life by providing an advanced platform for future biotechnological, medicinal and pharmaceutical applications. There is a constant push in the creation and development of nanomaterials to improve diagnosis and the research of cures for diseases in an accurate and long-lasting manner, keeping in mind safety for approved clinical and commercial use.

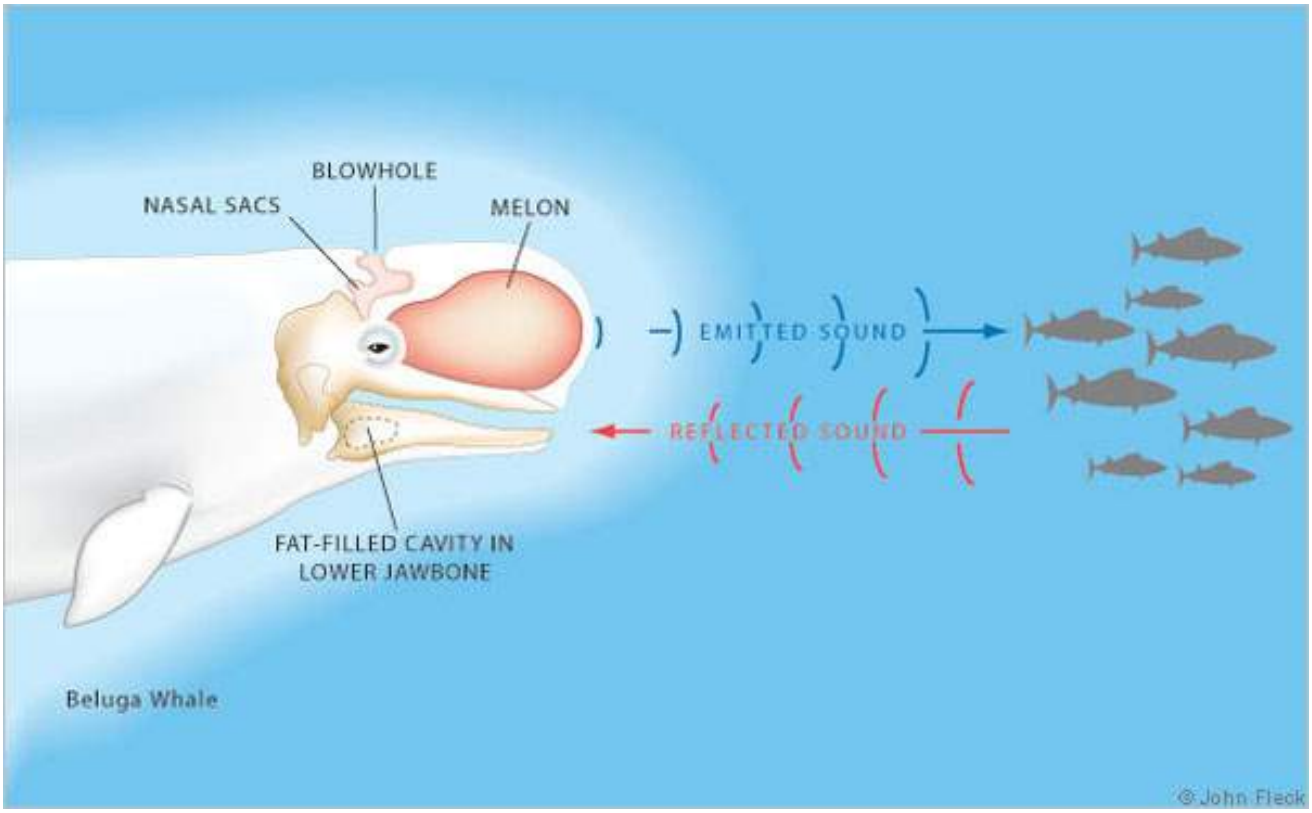


CANARIES OF THE SEA

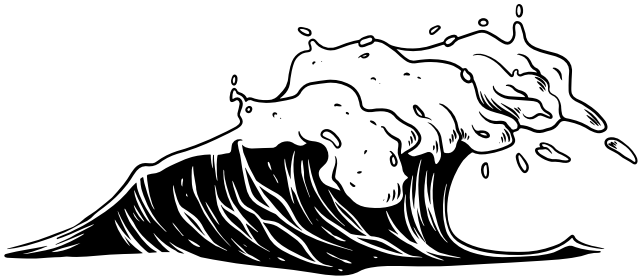
WRITTEN BY YEAR 12 NAOMI COUPLAND

Beluga whales, also called the ‘canaries of the sea’, are known for their white colour, large melon and their wide range of vocal sounds. Born at roughly 1.5m, weighing 40-60kg, they can grow to be around 3.4-4.5m, varying from 450-1500kg. Although they are small in the world of whales, they have very muscular and robust bodies and can live for up to 90 years. Beluga whales are very social animals that live, hunt and migrate in pods.

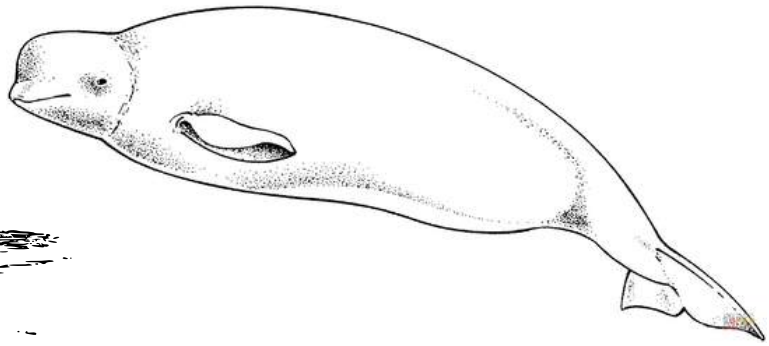
They are fascinating creatures, but the most interesting part of the beluga is their large, bulbous forehead, called a ‘melon’, which they use to communicate. The melon is an organ that is filled with oil, wax and fat, and the beluga can change the shape of it by blowing air around its sinuses. Due to its capability of changing shape, the whale can produce a wide range of high-frequency bird-like squawks, chirps and whistles. Besides having sharp vision in and out of the water, the melon allows them to use echolocation to “see” underwater.



Echolocation acts like a sonar system. When the beluga emits a noise, the sound wave bounces off objects, and an echo returns. The fat-filled jaw of a beluga whale stretches up to its ear, and this is used to clarify the echo that returns from the object. The echo is what provides the whale with information about the location and size of the object. Echolocation is a logical and effective strategy for navigation, especially in the water where sound travels five times faster than in air, and the water can be murky, so even excellent eyesight is useless.



The exact mechanism of how beluga whales produce the sound is unclear, however, a study conducted on them found that the origin is from the dorsal bursae, which is a specialised organ located at the top of their head. The study focuses on directly observing how the beluga whale generates the sonar click. In the study, they showed that a beluga has two signal generators, which are used at the same time but are merged whilst transmitted to produce a single click. It is suggested that the reason for the two pulses allows the beluga to guide its echolocation ray.



Beluga whales are just one of the many amazing marine mammals in the ocean, however, many of them are vulnerable to threats such as commercial and recreational fisheries, extreme weather, underwater noise, shipping and other types of human disturbances. Pollution and microplastics are one of the largest threats to marine wildlife and can have a toxic effect on aquatic life, reducing food intake, delaying growth and behavioural abnormalities.

MANY THANKS TO:

- DR REGARDSOE FOR HER GUIDANCE IN PUTTING THE MAGAZINE TOGETHER
- NIRAN AND CLAIRE FOR THEIR TIME AND EXPERIENCE
- PROFESSOR LAKHOO FOR HER TIME AND EXPERIENCE
- DR BABBS FOR HIS TIME AND EXPERIENCE
- MR TYLER FOR HIS TIME AND EXPERIENCE
- DR RAMASAMY FOR HER TIME AND EXPERIENCE
- NAOMI AND ARYA FOR THEIR ARTICLES
- MISS PENISTON FOR MARKETING OUR MAGAZINE
- MRS M RHODES FOR PUBLISHING OUR MAGAZINE

REFERENCES:

Medical news updates: scarlet fever
https://www.gov.uk/government/publications/group-a-streptococcal-infections-activity-during-the-2022-to-2023-season/group-a-streptococcal-infections-report-on-seasonal-activity-in-england-2022-to-2023
https://www.cdc.gov/groupastrep/diseases-public/scarlet-fever.html
https://www.cdc.gov/groupastrep/diseases-hcp/scarlet-fever.html
https://www.bmj.com/content/379/bmj.o3059
Risk of twindemic
https://www.theguardian.com/society/2022/dec/30/flu-england-number-of-hospital-patients-up-covidhttps://www.bmj.com/content/379/bmj.o3074
Type 1 diabetes and artificial pancreas
https://www.nhs.uk/conditions/type-1-diabetes/about-type-1-diabetes/what-is-type-1-diabetes/
https://www.bmj.com/content/380/bmj.p55
https://www.diabetes.org.uk/research/research-round-up/research-spotlight/research-spotlight-the-artificial-pancreas
NHS and desflurane use
https://www.england.nhs.uk/blog/putting-anaesthetic-emissions-to-bed/
https://www.bmj.com/content/380/bmj.p106
The Revolution of Nanotechnology for the Future of Medical Science
https://pubmed.ncbi.nlm.nih.gov/19186176/
https://europepmc.org/article/med/18514941
https://pubs.acs.org/doi/abs/10.1021/acs.chemrev.6b00073
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5064882/
https://jnanobiotechnology.biomedcentral.com/articles/10.1186/s12951-018-0392-8
The Properties and Health Benefits of Bee Products
https://www.medicalnewstoday.com/articles/264667#medicinal-uses
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3758027/
https://www.verywellfit.com/how-manuka-honey-differs-from-regular-honey-5190887
https://www.healthline.com/health/propolis-an-ancient-healer#safety
https://draxe.com/nutrition/beeswax/
https://www.webmd.com/vitamins/ai/ingredientmono-503/royal-jelly
https://www.healthline.com/nutrition/bee-venom#benefits
https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6720840/#:~:text=Bee%20venom%20contains%20several%20active,disease%2C%20and%20amyotrophic%20lateral%20sclerosis
Canaries of the Sea
https://www.fisheries.noaa.gov/species/beluga-whale#:~:text=All%20beluga%20whales%20are%20protected,under%20the%20Endangered%20Species%20Act
https://www.fisheries.noaa.gov/alaska/outreach-and-education/5-facts-about-how-belugas-use-sound
https://www.worldwildlife.org/blogs/good-nature-travel/posts/ten-interesting-facts-about-beluga-whales#:~:text=The%20beluga%20whale%20is%20easily,most%20vocal%20of%20all%20whales
https://www.nationalgeographic.com/animals/article/echolocation-is-nature-built-in-sonar-here-is-how-it-works#:~:text=Ocean%20soundwaves-,Echolocation%20is%20a%20logical%20strategy%20in%20the%20ocean%2C%20where%20sound,head%2C%20close%20to%20the%20blowhole
https://whalescientists.com/beluga-squishy-head/'