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Education and debate

Doctor in the lab: what is it like for a doctor to work with scientists?

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As clinical academic medical departments strive to improve the quality of their research, clinicians and scientists are forced into closer liaison. In many cases, clinical departments now have research laboratories directed by "basic scientists" but often staffed, in part at least, by doctors. To someone who has not worked in one, these laboratories may seem uncompromising and forbidding work environments. This article presents a "case report" written from the viewpoints of the doctor, the scientist, and the professor.

The doctor

CMJ: I had a career year to fill and was looking for some research to do. I was considering various clinical research options or audit activities when Professor Strunin suggested that I visit "The Laboratory," muttering obscurely about it being an unique opportunity.

Visit it I did. In the midst of mazes of wires and monitors were two illuminated chambers with a constant bubbling. It looked a bit like the set for a cheap horror film--down in the lab the evil genius Dr Von Stam and his trusty henchman Burger were cooking a potion that when unleashed upon the world...etc, etc. These

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chambers allegedly contained bits of tissue pierced by assorted electrodes. (I was reluctant to confess my rustiness at identifying anything down a microscope--after all, university was many years ago.)

"You're just in time," the jolly research assistant said. "We're going to try for transmitter release." He pressed a button; a pen on a chart recorder moved smartly 2 cm to the left then settled. He then behaved in a manner that seemed more appropriate to a major sporting achievement (the deciding goal in the World Cup?) than to the movement of a pen on a piece of chart paper. He seemed disappointed at my lack of response and moved me on to talk to his boss. The boss was young, only a little older than me, and enormously enthusiastic (quite a contrast to the cynicism and laziness I had been experiencing among disenchanting NHS staff). He loaded me up with what seemed to be reprints of every paper he had ever published and sent me away to read and think about it.

That night I had to confess that I did not understand any of the papers and found them full of incomprehensible jargon and, frankly, "science." My husband was amazed when I declared that this lab was where I was going to do my research; he then charitably reminded me of my struggles understanding some of the more technical parts of the anaesthetic curriculum. I wanted to work in the lab because of the drive and enthusiasm of the people working there and it seemed a chance to do something that might be meaningful.

PAYMENT IN KIND

The lab wanted me because they didn't have to pay me. It must have cost an awful lot, though, in time and patience. There were those oscilloscopes with an impossible number of settings that just refused to put my signals on their screens. I was eventually able to get my eyes to look binocular down the microscopes and even gradually identify structures. But as to the making up of all the needed drugs: "Yes, micromolar, fine," I said, then realised I could not remember exactly what a mole was, let alone how to weigh out and dilute drug in this fashion. This was considered a level of ignorance akin to not knowing which side of the chest the heart was located on. I was constantly bringing my calculations to be checked--but worse, if I didn't they were demanded of me if my experiments behaved unpredictably.

My research turned into two of the most frustrating and fulfilling years of my life. Science is hard work. I worked long days, evenings, and weekends. The lab was dirty and smelly, crowded, and over 25°C in summer, and there would be weeks of effort with no useful results. I got hooked, though, on the excitement of the ideas and theories that were yours and could seriously be tested. It was extremely creative.

Working with the scientists (there were four by the time I left) was very different from clinical medicine. As an anaesthetist, often exposed to rather lonely work environments, I enjoyed seeing the same people on Monday as I had on Friday, hearing how the football match went, having drinks and cakes on birthdays, providing support for emotional traumas. This was more like a "normal" working environment, probably a novel experience for many doctors. The other great novelty (particularly for an anaesthetist) was the sense of being in control of a working day--the only aim was some results by the end of the week (mild competition to have the graphs on the boss's desk on Monday). If I wanted to start my experiments early I would simply arrive at 7 and get going, or if I had a theatre case and wanted to start at 1 pm and work through to 11 that was up to me. If I didn't feel like experimental work I could analyse results for the day (or make slides or tidy my desk).

My second child spent much of her first six weeks parked in a pram next door to the oscilloscopes. The lab was an environment far more accepting of personal idiosyncrasies of dress and habit. Wouldn't it be nice if an anaesthetist who didn't feel like the cardiac list today could have a range of alternative activities? This variety and choice means that greater self discipline is required than in our structured occupation, and the scientists seemed sometimes to lose their way in tasks of a work evasion nature (just as I am now writing this when I should be working on my thesis).

AMBITION, HONOUR, TRUTH, AND HONESTY

It seemed to me necessary to be able to maintain an awesome level of ambition to have a real career in science. Curiosity and imagination were not enough; the scientists always had to be driven to produce abstracts, papers and, most importantly, funding. The existence of a scientist in a small research group seemed a little like that of a novelist, always having the twin fears of running out of ideas or something worth while to say on the one hand and of not being able to convince anybody of the value of your ideas (or your masterpiece) on the other.

There was a sense of delicacy and innocence among the scientists with regard to medical matters which made we aware of how brutalising medical training is. They were morbidly fascinated by stories from the operating theatre: "No, I don't believe you, they don't really do that to people...you're making it up...how horrible." This reaction would not be in reference to anything we would consider gory or revolting but something as simple as a description of a transurethral prostatectomy.

The other characteristic that really stood out about scientists was a far greater sense of honour. Truth and honesty were prized above all. The average doctor, having fought his or her way through our hierarchical system of specialty training, is

usually an expert on evasion and ways to stay out of trouble.

I am now working in a clinical job, trying to write my thesis, and I hope to become seriously involved in medical research again in the future. This was a valuable experience for me as a clinician; I now understand a great deal about neuropharmacology (which is after all the basis of anaesthesia) and even more about the painstaking work involved in any tiny advance in scientific knowledge. The value of the experience to me as a person was tremendous: just as it is accepted as desirable to complete postgraduate training in another country, it is perhaps even more valuable to complete it in another work culture with completely different value systems.

The scientist

JAS: The day I first met Christine I had had a bad journey to work and the lifts in the hospital had failed (again). As I trudged, breathless, into the lab on the fourth floor, my research assistant met me with a coffee and said, "There's someone to see you"--then, more confidentially--"a woman."

The young woman sitting at one of the computers stood up and all in one breath said "Hello, my name's Christine Jorm. I'm an anaesthetist from Australia and I'd like to do some research in your lab." I don't remember what I replied, but I felt terribly proud that people were coming from thousands of miles away just for the opportunity of working with me in my lab--and then I was told that her husband already worked at the hospital. Obviously my reputation was rather more local.

Christine was my first doctor in the lab. I was fortunate to have had such a capable student. There is no training for doctors wanting to work in a lab--nor does anyone tell the supervisor what to expect. Christine started with nothing except enthusiasm and quickly showed how much you could achieve with just that. Of course she made mistakes at the beginning. Sometimes she would miscalculate doses, but increasingly often she got it right and began not only to execute experiments but to design them. One year of research turned into two and those two coalesced slowly into the backbone of an MD thesis.

CURIOSITY, IMAGINATION, AND DISCIPLINE

If I was trying, Pygmalion-like, to create a good scientist, I would incorporate three qualities: curiosity, imagination, and discipline. You have to start with curiosity--the hunger for knowledge or, more specifically, a need to know why something is as it is. It is impossible to fake curiosity. Imagination is not so much originating the idea as being able to devise ways of testing it. Brilliant ideas are of no use without the mental strength to test hypotheses. Discipline is the fortitude to carry those

experiments through to the point at which the answer is reached; not to be diverted from the path.

The characteristics most often nurtured in scientists are the first two. Doctors, by contrast, are suffused with the last. This is often reflected in differences in approach to experiments. Although scientists are perceived (often correctly) as obsessed with minutiae, doctors seem to paint with bigger brushes. I often think that this has more to do with clinical skills--the ability to get a diagnosis swiftly and efficiently. In a lab context this manifests itself as a drive always to move onward to the next question rather than to dwell on the details of the previous experiment.



Pygmalion could bring a statue of Galatea to life, but could he create the perfect scientist?

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Conversely, a common failing of scientists working on clinical problems is the capacity to be distracted from the main experimental plan by interesting results. Many times Christine would have to ask me, of a small but statistically significant change in noradrenaline release, "But is this clinically relevant?" Depressingly often the answer was either "probably not" or "I just don't know." Immediate clinical relevance had never seemed that important to me.

As Christine has mentioned, lab science is very different from most clinical research. The best clinical research addresses immediate issues and finds immediately useful answers. That proximity to practice provides its thrill. Basic science is some way removed from this and it can be difficult to persuade doctors that the discovery of a new 5-HT1 receptor subtype may, one day, have some relevance. Michael Faraday, once asked about his perception of the usefulness of a piece of work, gave his famous reply, "Of what use is a newborn baby?"

Christine's account may have conveyed that all benefit was gained by her. That is not strictly accurate. The concentration of focus that Christine brought to her research rubbed off on all the others in the lab. I think we easily gained as much benefit from her as she from us. Perhaps for this reason, I have never had any anxieties about taking on doctors to do lab research.

The professor

LS: It is a common view, usually held by those who have never undertaken research, that academic units have a magic mechanism whereby any passing person, whether motivated or not, can be slotted in and the requisite publications produced so that their curriculum vitae will get them the next post. The truth is that this often results in bad research and can be an expensive, frustrating, and unrewarding experience. Many who go through it become the anti-academics of the future, convinced that their experience should not be repeated by others. Therefore, research for the benefit of the resume alone cannot be an acceptable motive. Many simple clinical projects, and even some complex multicentre ones, fit this category. There is no real thought behind the protocol; often the number of patients studied is too small to be meaningful; analysis of data is appalling; and the discussion is an attempt at rescue.

Why is this so? Probably, most clinicians do not have the scientific training, patience, and discipline necessary to conduct good research. The basic scientist, on the other hand, has no difficulties with the concepts of dose-response curves, randomisation, power analysis, the use of controls, and so on. However, few academic units have the luxury of "their own basic scientist" as part of their unit. Although it is commonplace to assume that anaesthetics departments have an obvious connection with pharmacology, biochemistry, or physiology, in practice such associations are rare between separate entities. The concept of one's own basic scientist was impressed on me by Roy Simpson, the first professor of the anaesthetics unit, who, as one of his first appointments, took on a biochemist. She had no difficulty in pointing out to us fledgling academics that "doctors" had a lot to learn about science. Indeed, in the 27 years since we married, she has never lost this approach, despite my attempts to prove I am a reformed character.

THE SCIENTIST'S PLACE IN CLINICAL RESEARCH

When I went to head the anaesthetics department in Calgary, Canada, in 1980, I had a good scientist within the department. Sheldon Roth was already a distinguished and senior pharmacologist with his own, established, well funded research programme. He was particularly interested in the effects of toxins, including anaesthetics, on the central nervous system. I sent many young anaesthetists who wanted to do some "proper" research to him. Several could not stand the pace.

Sheldon has a robust view of medical doctors--he believes they are underworked, overpaid, and usually idle to boot. However, those who rose to the occasion came out of it better prepared for the rigours of science than other anaesthetists who came ostensibly from a research background.

Returning to this anaesthetics unit in 1990, I persuaded the dean (with some difficulty) that there were enough doctors in the unit and what was needed was a scientist. We advertised with a somewhat confused job description, but essentially seeking a biological scientist, discipline not clearly defined, who wished to work in a clinical department rather than a traditional basic science department. There were a surprising number of applications, but the short list became extremely short once people had visited and discovered that we were not formally linked to any basic science department and that the "basic scientist" would have to function alone and build up from scratch. Jon Stamford on the other hand was a candidate with a gleam in his eyes who could not wait to be "alone" in a clinical department. Soon after his appointment he had his laboratory up and running, had acquired an interest in anaesthesia, and had integrated well with the "doctors" already in the unit. When Christine appeared, I wondered if it was now time for his true purpose to be realised. She seemed keen and was not opposed to going to the laboratory (although she did not seem to see it as quite the unique opportunity I was trying to sell). But the rest, as you have read, is history.

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