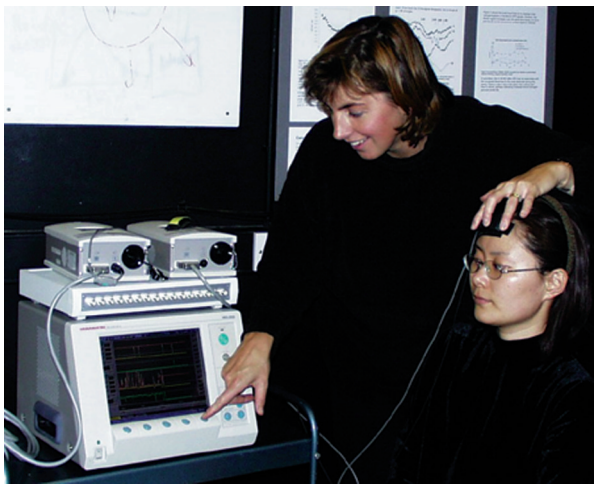
Day in the life

...of a research medical physicist



My alarm clock is my 2-year-old daughter, Julia, who appears at the bedside by half past six each morning. As a working mum with two young children (Joseph is 6 months old), the day starts with the unavoidable routine of nappy changing, feeding and dressing. My husband takes on a fair share of the responsibility with the children but workday mornings are inevitably hectic. Both the children attend a day nursery local to home, so it's a quick dash with the double buggy to drop them off and then a rush for the train.

On a typical day I arrive at work just after 9 o'clock, read my e-mail and catch up on the post. As a member of the Biomedical Optics Research group, I attend weekly meetings at which the latest research developments are discussed. The majority of the group are working on the development of near-infrared spectroscopy (NIRS) methods. The technique relies upon the relative transparency of biological tissue to near-infrared light, and hence the ability to transilluminate substantial sections of tissue (e.g. the neonatal head or a portion of the adult head) and perform spectroscopy measurements to determine cerebral blood volume, flow and oxygenation. Our research is both experimental (using clinical or animal models) and theoretical (using computer simulations of light transport in tissue).

Regular communication between the physicists, engineers and computer scientists working in the group is essential to ensure that crucial developments, which may be relevant to both the experimental and theoretical research groups, are fully investigated.

My current research interest is the use of NIRS to monitor cerebral haemodynamic changes due to functional activation in specific areas of the brain. I use NIRS to investigate the metabolic consequences, in the visual cortex, that result when the subject views specific visual images containing motion and colour. This work represents an exciting new application of the NIRS method, but fundamental methodological questions remain unanswered. By performing simultaneous NIRS and function magnetic resonance imaging (fMRI) measurements, I hope to identify the exact contribution that NIRS can make to the field of function imaging.

If I am performing experimental studies at the functional imaging laboratory, I may spend the rest of the morning using the high-field magnet (which needs to be booked in advance) for cerebral activation studies. In collaboration with the physicists, radiographers and neuroscientists in the laboratory, I have designed a protocol for stimulation studies which should provide activation in the visual cortex that is superficial enough to also allow detection by NIRS. I often book the magnet for a 2 hour session; however, the time taken to transport and set up equipment and to organize willing volunteers can take up most of one working day.

Lunchtimes can be rather unpredictable. I use them either to catch up with clinical colleagues from the paediatric department (where I first began my work with NIRS and with whom I still have strong links), to devote some time to writing research papers or to present informal talks to potential medical physics students or school groups. Medical physics is still a little-known discipline and I feel a responsibility to communicate the huge breadth of exciting work in which this department is involved.

As well as working on my functional activation research, I have strong collaborative links with clinical

groups who are using NIRS for more conventional studies. After lunch I sometimes meet with the Anaesthetic NIRS research group, based in the surgical intensive care unit at the National Hospital of Neurology and Neurological Diseases. My collaboration with this group stretches back several years and provides me with a constant reminder of the current demands on the development of a practical, user-friendly and clinically valuable tool. In practical terms, I observe measurements being made on patients in intensive care, contribute to the design of clinical studies and analyse the resulting data.

I also continue to have a working association with the paediatric group at University College London. A colleague of mine, Dr Judith Meek, is currently pioneering the use of NIRS to measure functional activation in pre-term and term infants. The enormous power of NIRS is its capability to be used at the bedside, with minimal disturbance to either patient care or treatment, making it an ideal technique for studies in this particular clinical group. Infants as young as a few hours old can be studied to provide early indicators of possible disturbance of cerebral oxygenation and blood flow.

A substantial part of my job involves translating physics for clinicians. It is essential that clinical users have a good working knowledge of the physical principles behind the techniques that we develop. This is a part of the job that I find particularly challenging but also rewarding. It is of absolutely no use having a wonderful technique if we cannot ensure that it is used appropriately and to its full potential in the clinical setting.

Back in the lab, I may become involved in discussions with one of my project students. For the past couple of years I have supervised fourth-year undergraduate physics students on their medical physics projects. I will soon be dealing with students even more: I have just been appointed Lecturer in Medical Physics — a permanent position again, at last!

Looking back, I am amazed at how apparently well-planned and structured my career path seems to have been. On paper, at least, my current position as a research medical physicist appears to be the product of a rather predictable combination of career choices. The truth is that the only conscious career decision I have ever made was, as an undergraduate, to stay in medical physics for as long as I found it exciting and stimulating. And here I am now, 15 years and two children later on, still enjoying my job!

Since the children need picking up from nursery promptly, I am always mindful of the time I leave myself to get away and catch my train. The constant time-keeping, and inevitable running around, involved with dropping off and picking up the children from nursery can provide a fair amount of additional stress in a working day. However, it does have a positive effect: I have learnt to be incredibly effective at multi-tasking and to be far more disciplined about working to self-imposed deadlines.

Since my daughter's birth I have felt strongly about working part-time. I thoroughly enjoy my work but it is important to me that I spend 2 whole days each week with the children. I sometimes feel that I am trying to do two full-time jobs but, generally, the balance is just about right. It is encouraging that I have been able to negotiate the same working terms for my forthcoming lecturing job.

New technological challenges in medicine continue to make a career in medical physics both exciting and stimulating. This, coupled with my current employer's flexible approach to working hours, convinces me that I am still in the right job ●

Clare's career tips

- *Entry qualifications: priority is a good Physics degree; some anatomy/physiology knowledge is useful. Medical Physics is being introduced more into the A-level syllabus and many universities now offer Medical Physics degrees. It is most important to have a good core knowledge of Physics and a willingness to acquire the relevant medical knowledge. For most academic posts, a PhD is required.*
- *Career path: depends upon available funding. Most contracts are short term (3 years). Entry at the level of Research Assistant then progress to Research Fellow. Tenure usually only possible via academic teaching posts.*
- *Salaries: dependent upon funding body and experience. A typical Research Assistant with PhD would earn £18K, rising to £30K for a Senior Lecturer. Flexible working hours can be negotiated and, if travel funds are available, trips to international conferences and opportunity for international collaborations are possible.*
- *Further info: contact Institute of Physics and Engineering in Medicine (www.ipem.org.uk) and university and hospital Medical Physics departments directly.*

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Please send any suggestions you have for the Day in the Life series to: The Biochemist (Day in the Life), The Biochemical Society, 59 Portland Place, London W1N 3AJ; fax: 020 7323 1136; e-mail: editorial@portlandpress.com