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BIOMEDICAL SCIENCE

Putting research into practice

Hospitals are an obvious career destination for medical doctors. But are they a good fit for basic scientists?

BY LAURA BONETTA

Claudia Kemper left a faculty position at Washington University in St Louis, Missouri, two years ago. An immunologist, she loved the university but wanted to apply her basic-research findings to patient care while conducting translational research. It was this desire that prompted her to join the MRC Centre for Transplantation at Guy's Hospital in London, affiliated with King's College London.

It was a good move for her. Kemper discovered a mechanism that regulates the functioning of certain immune cells. She discussed its relevance to human disease with several

physicians at Guy's Hospital, and Andrew Cope, a rheumatoid-arthritis specialist, suggested that the mechanism could explain some of the symptoms of his patients. The two designed a study to test the hypothesis — and demonstrated the link. Their results appeared in *Nature Immunology* (J. Cardone *et al. Nature Immunol.* 11, 862–871; 2010) and they have submitted a joint grant application for follow-up studies.

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But although interactions with her new colleagues are proving fruitful, Kemper admits to missing her old work-mates. "Sometimes I

miss being part of a large basic-research community and talking about hardcore immunological signalling pathways," she says.

Kemper's experience is not unlike those of other PhD scientists who find themselves pipetting down the hall from the emergency department at a research hospital. It is difficult to know how many researchers belong to this group, because hospitals fall into many different employment sectors, including government, private non-profit, private for-profit and academic. But about 7% of the more than 10,500 respondents to Nature's international salary and careers survey in June — from various age groups and fields — identified themselves as working in the hospital or medical-centre sector.

Although hospital research labs seem similar to academic labs, there are important distinctions to bear in mind. Research departments in hospitals encourage translational research and interactions between basic researchers and physicians; the translational spin can be helpful for publishing in high-profile journals and obtaining funding. Hospitals also tend to have larger proportions of medical doctors heading research labs than do most universities. And labs in hospitals are more likely to include a mix of medical students, PhDs, clinical fellows, postdocs and graduate students. ▶

► Prospective basic-science hospital researchers should consider whether their work and working style mesh with the hospital atmosphere.

PERMISSION GRANTED

In recent years, hospitals in some regions have benefited from an increased emphasis on translational research by government agencies. The US National Institutes of Health (NIH) in Bethesda, Maryland, launched an initiative in 2006 to confer about 60 Clinical and Translational Science Awards (CTSAs) by 2011. These grants, totalling about US\$500 million a year, are given to institutions, often hospitals or medical schools, that are linked together to form a consortium promoting multidisciplinary and translational research. “The trend for US funding agencies has definitely been to fund more translational research,” says Wendy Williams, director of the office of responsible research training at the Children’s Hospital of Philadelphia in Pennsylvania, which has received a CTA. The increase in funding, says Williams, means that institutions involved in translational research tend to have state-of-the-art core facilities and support services.

The Children’s National Medical Center in Washington DC was among the CTA award recipients this year. “We are strongly encouraged to do clinically relevant work,” says Irene Zohn, a principal investigator at the hospital’s Center for Neuroscience Research. Since joining the medical centre, Zohn, who has a background in studying mouse development, has discovered that prenatal iron deficiency may contribute to the condition spina bifida in babies.

In Britain, the National Institute for Health Research in London announced in 2008 an initiative with goals including plans to fund 16 new biomedical research units linking hospitals and academic centres, to the tune of about £60 million (US\$95.9 million) over the next four years.

The patient focus of hospitals means that researchers are always thinking of “giving a translational spin to their research”, says Williams. And that can help to win over granting agencies.

“In this environment, you get used to having to justify why you are working on certain questions and why they are important. You quickly learn to make parallels between basic biology and human disease,” says Kristin White from Massachusetts General Hospital in Charlestown, who works on the mechanism of cell death, or apoptosis, in the fruitfly. “It can really help when you write grant applications.”

The translational bent can lead to a diverse disciplinary experience that generates practical applications. Patrick Murray, chief of clinical microbiology at the NIH Clinical Center in Bethesda, says that he relishes solving problems through multidisciplinary interactions



“We are strongly encouraged to do clinically relevant work.”

Irene Zohn

with clinicians, epidemiologists and basic scientists. In 2007, the hospital had an outbreak of *Acinetobacter baumannii*, a bacterium resistant to multiple antibiotics and a scourge in many hospitals. As well as helping to diagnose patients, which is his area of expertise, Murray was able to collaborate with other researchers at the NIH, including geneticists, to “ask very fundamental questions about how the organism causes disease and how it changes its genomic expression”.

For researchers who rely on samples from patients, hospitals are advantageous work environments. “You have immediate access to the expertise of clinical colleagues, and the ability to incorporate primary-tissue samples from human disease into basic-research studies,” says Suzanne Baker, a developmental neurobiologist at St Jude Children’s Research Hospital in Memphis, Tennessee. Being close to the physicians who obtain samples also has some upsides, says Johanna Rommens, a geneticist at the Hospital for Sick Children in Toronto, Canada. Rommens has been searching for mutations in genes responsible for conditions such as cystic fibrosis and Shwachman–Diamond syndrome. Interacting with doctors helps her to categorize the samples more accurately. “You can get the information about why a patient was classified one way or another,” she says. “Sometimes you can subdivide the patients further, which can help with your genetic analysis.”

LOST IN TRANSLATION

Although frequently fruitful, relationships with physicians are not necessarily easy to establish. Most physicians are not trained to design basic-research experiments, or are unfamiliar with thinking about the molecular mechanisms of disease; they focus on the questions most relevant to human health. The two groups often find themselves speaking different languages. “There are many possibilities here for collaboration, but my experience has been that it is not always all that easy,” says Alfonso Martin-Fontecha, an immunologist at Guy’s Hospital. “Research has to be done in a certain way, by designing rigorous, controlled experiments and critically analysing the results. Some clinical fellows have not had this kind of training, and yet they want to design experiments. It would be like a biologist going to the hospital and deciding he wants to treat patients.”

And being surrounded by clinicians can feel isolating to some researchers, depending

on the locations of their departments and hospitals. Some hospitals are in the middle of university campuses — such as the Hospital for Sick Children at the University of Toronto, and the Children’s Hospital of Philadelphia at the University of Pennsylvania — and hence provide researchers with everything a university has to offer: strong basic-research departments, graduate students and teaching opportunities. Others have no adjacent university, but may be affiliated with a regional campus — the Children’s National Medical Center is affiliated with George Washington University, for example, although the campuses are three miles apart.

The few miles between the Massachusetts General Hospital campus in Charlestown and the Harvard Medical School campus in Boston are enough to lessen interest among those graduate students who prefer to be close to university classrooms and other student resources, says White. And because the hospital’s employees aren’t required to teach, they don’t have many chances to meet graduate students and entice them to join their labs.

The perfect combination is possible, however. Cancer researcher Klas Wiman worked on the main campus of the Karolinska Institute in Stockholm until ten years ago, when, to step up his translational research, he moved to Karolinska University Hospital, a short walk away. Wiman says that because the main campus is



“Collaboration lets you ask very fundamental questions about disease.”

Patrick Murray

near, he never feels cut off from his basic-science colleagues or from graduate students. His lab, he says, has maintained a balance between basic research into cancer pathways and translational work seeking small-molecule therapies for cancer. Hospitals need strong basic-research departments as well as technology development, he contends. “Sometimes a lot of emphasis is put on translation,” says Wiman. “But you have to have something to translate from. Basic science will feed ideas for patient care.”

The right hospital environment provides not only interdisciplinary interaction, but also ample motivation for research endeavours. “For the researcher, there is a culture of immediacy,” says Mahesh Menon, a schizophrenia researcher at the Centre for Addiction and Mental Health in Toronto. “When I see patients, I am reminded that I am working to improve their lives.” ■

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