Q&A

Pathologist **Gustavo Ayala** of Baylor College of Medicine in Houston, Texas, won a Creativity Award in May from the Prostate Cancer Foundation, Santa Monica, California, for his work on how nerve toxins affect tumours.

With an MD, not a PhD, how did you become a researcher?
I went to medical school in Paraguay, and although the research environment there wasn't as strong as I later found it to be in the United States, I was eager for experience. I took it upon myself to participate in research through, for example, courses taught by researchers abroad, and I worked on yeast as a medical student. My most important decision was to persist with my intentions to focus on research into disease therapies. I did that by surrounding myself with brilliant people who guided me to ask important questions. I think that research is more than techniques or methodology; it is about learning to ask those questions. As a physician, I know where the potential therapeutic targets are. Not having a PhD doesn't stop you doing research, but there is a credibility gap to be bridged between the medical and research fields.

How did you decide where to focus your research?
When I came to Baylor 12 years ago, I had the opportunity and time to think about how to establish a new research career. At the same time, my career expanded. Discussions with colleagues made me think about research avenues, and after spending two weeks reading everything about prostate cancer, I knew that I wanted to focus on the connections between nerves and cancer cells. I thought that the interactions were clinically significant yet had been ignored at the biological level. The first thing my team and I did was to create a prostate cancer model to explore any relationship between cancer and nerves. We found that prostate cancer cells interact with nerves and prompt tumours to grow along the nerve branches of the prostate gland. Nerve density in the prostate is highest in areas with cancer. Our model suggests that the growth of new nerves promotes the progression of prostate tumours.

How did you get the idea to explore Botox as a cancer treatment?
Understanding that nerves are functionally important to cancer opened up a category of neurotoxins that could act as cancer-fighting agents. Using animal studies, we've shown that Botox has the same effect as removing nerves from the prostate, which led us to propose it as a non-surgical way to fight tumours. This clinical trial will test whether Botox can activate antitumour activity.

What are the biggest challenges facing physician-researchers?
There is little understanding of the difficulties we face. People claim that physician-researchers are important, but it doesn't always translate into support. When you don't fit the criteria of a scientist or a physician and try to bridge the groups, it can be difficult for grant and paper reviewers to judge your expertise. How do you deal with that? You are persistent. Persistence is not being stubborn; it means creating networks and interacting with people at different levels.

How have you persisted?
One of the best things I did was to join the US National Cancer Institute Tumor Microenvironment Network. That was important because it exposed my research to a lot of new people. I also joined the US National Institutes of Health Specialized Program of Research Excellence for prostate cancer. It can be easier to get funding as part of a larger group than by applying as a sole investigator.

What does this creativity award mean to you?
I think science has to be creative and explore new ideas. Researchers tend to focus on mechanisms and forget that biology is many layers of genes, gene modification, protein interactions and organ function. It is possible to target biological phenomena with simple ideas. The trial funded by the award is simple, but could have a big impact. Simple, however, doesn't mean easy. The award is a stamp of approval from a big organization of basic scientists and clinicians that shows a willingness to develop a new target and a new way of treating cancer.

Where do you plan to take your career from here?
I think that science is going to change, because we're learning the limitations of reductionist science. Disease is complex and we need new tools to understand it. Clinical trials will have multiple markers per subject to monitor responses — at the gene, RNA and protein levels, and even outside the cell — to understand how a drug works. I am part of a wave tackling that complexity head-on. ■

Interview by Virginia Gewin

IN BRIEF

Female students scarcer

Women's enrolment in graduate science and engineering in the United States is growing more slowly than men's, and the disparity is widening, according to a study. The US National Science Foundation and National Institutes of Health's 'Survey of Graduate Students and Postdoctorates in Science and Engineering', released on 2 June, found that men's enrolment grew by 2.9% from 2007 to 2008, whereas women's rose by just 2.1%. From 2006 to 2007, women's enrolment rose by 3.4% and men's by 3.2%. However, although just 34.2% of postdocs in the field in 2008 were female, the number grew by 12.9% from 2007 to 2008, versus 2% growth for men.

RNA Institute launched

A research institute at the State University of New York in Albany is focusing on the use of RNA to create therapeutics for conditions such as breast cancer, drug-resistant tuberculosis and HIV, depression and neurofibromatosis. Launched on 4 June, the RNA Institute won't officially open its facilities, which will include 1,400 square metres of lab space, for 18 months. But it is already recruiting, including up to six faculty researchers and two dozen postdocs with backgrounds in cell, molecular or structural biology and nuclear magnetic resonance imaging, says founding director Paul Agris. The university has invested US$12.5 million in the institute, which will employ up to 60 researchers and other staff.

Particle physics exodus

Few particle physicists in the United States get academic posts, says a study from the US Department of Energy. It found that on average, 400 students entered US particle-physics graduate programmes annually from 2007 to 2009. Each year, on average, 88 became postdocs, 33 went to non-US institutions and 200 left the field. Of the 1,000 US postdocs in particle physics in the time period, an average of 40 became untenured faculty members or staff each year, 126 left academia and 50 became non-US postdocs. Some 74 postdocs and researchers got a tenured post. Across all levels, an average of 55 particle physicists left academia for jobs such as banking, finance or IT. The study collects data on the choices of graduate students, postdocs and staff at 150 US research institutions.