

FOCUS ON EUROPE: RESEARCH BY THE NUMBERS?

European research institutions seek to diversify funding sources as well as their work force. **By Jill U. Adams**

In 2002, the European Union (EU) set a goal, referred to as the Lisbon strategy, that member states should be spending 3 percent of their gross domestic product on research and development by the year 2010. At present only a few countries are at that level, such as Sweden (3.9 percent) and Finland (3.5 percent). Powerhouses such as Germany (2.5 percent), France (2.1 percent), and the UK (1.7 percent) strongly support R&D, like the US (2.6 percent); Spain (1.1 percent) and Italy (1.1 percent) have some catching up to do.

Funding statistics are useful, but they cannot tell the whole story. “As a young scientist, you don’t care about politics, you care about your own career,” said **Ernst-Ludwig Winnacker**, secretary general of the European Research Council (ERC), which is part of the Seventh Framework Programme (FP7) to boost research, education, and innovation in the European Union. “You don’t care about the European research area and these sorts of things; you go to places where your career is best served. Scientists vote with their feet.”

The ERC awards grants to individual investigators of any nationality strictly on the basis of scientific excellence, says Winnacker. “The idea is to fund pioneer grants or frontier research,” he says, without preference for geographical location or field of science. The only other condition is that the host institution must be in Europe (including the 27 European Union member states and eight other participating countries).

The 300 new awardees of the ERC’s starting grants—for scientists who are 2-9 years from earning their Ph.D.s—were selected from more than nine thousand applications. Grants averaged €1.2 million for five years, and the winners voted with their feet for a total of 21 countries. The top vote getters, in rank order, were the UK, France, Germany, the Netherlands, Italy, and Spain. Switzerland and Israel also did extremely well.

Other countries came up empty, like Poland, Turkey, and the Baltic states. “Not because they don’t like Poland,” says Winnacker of the newly funded young scientists, “but because they don’t think the institutions are good enough as yet for them.”

Countries like the UK, France, and Germany are no surprise, as they always measure up in assessments of European science, whether by funding or citations. Spain jumps ahead of all but the Netherlands when the number of grants is expressed in relation to national expenditures for research. Italians, from a country where research funding has been flat for a decade, applied for the ERC grants in droves, with some 1,900 applications and earning nearly 12 percent of the awards, second only to Germans. **continued »**



Ernst-Ludwig Winnacker



Silvio Garattini

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- Faculty Feature: Enriching Your Academic Career—September 12

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—Jordi Cami



Italy

In Italy, training abroad is encouraged. “It’s important for a scientist to get another point of view of research,” says **Silvio Garattini**, director and vice president of the Mario Negri Institute for Pharmacological Research, a private organization that employs 900 scientists at four locations in Italy.

When Italian students and postdocs go abroad, whether elsewhere in Europe or to the US, “The problem is trying to get them back,” says Garattini. The issue of brain drain is of much concern in Italy and the funding situation in the country over the past decade has played a prominent role.

Ten years ago, the Italian government spent 1 percent of its gross domestic product on scientific research, says **Enrico Garaci**, president of the Istituto Superiore di Sanita (ISS) in Rome, which as the primary scientific arm of the Italian National Health Service employs some 1,500 scientists. “Now it is 1.1 percent,” he says.

The recent elections in Italy aren’t likely to make an impact anytime soon. Political parties both right and left have overseen the decade of flat funding. “Politicians are not very interested in research,” says Garattini.

Another critical aspect is the low number of researchers compared to other countries, says Garaci. “For every thousand workers there are three scientists in Italy. In the US, it’s nine.” The European average is between five and six.

So far, Italy has remained influential on the world stage. Citation indexes show that Italy’s long tradition of research is continuing. Prominent scientists like Garattini and Garaci are focusing on the strengths at their respective institutes, investing in specific research areas, establishing formal collaborations across their borders, and doing all they can to change the climate for the better.

Under Garaci, ISS has an agreement with George Mason University to apply the latest methods in proteomics to discover new cancer biomarkers and drug targets. Garaci emphasizes the benefits of focusing on a few areas in which to excel, rather than trying to cover “all of medicine.” The agreement includes trading clinical samples and research trainees, as well as shared profits from any commercialization. Garattini points to joint research the Mario Negri does with the Weizmann Institute in Israel.

Mario Negri has upgraded its facilities, moving its Milan head-

quarters closer to the Polytechnic University of Milan to encourage collaboration, and fitting its new, larger building with modern laboratories and core equipment. “We also have a residence where we can host foreign visitors,” says Garattini.

In short, the lesson of Italy is to look at the positives at the institutional level, which may well override the negatives at the national level for a scientist considering a position there.

Spain

The mood in Spain is optimistic. A country whose name is not often mentioned in the same breath with the United Kingdom or Germany when talking about scientific discovery is gaining notice in Europe and beyond. Having suffered its own brain drain, the country is now welcoming returning Spaniards home.

The Spanish government has created new programs and has substantially increased funding for science, biomedical science in particular. “We have a better situation than five years ago,” says **Jordi Cami**, the general director of the Barcelona Biomedical Research Park (PRBB). “More centers, more activities, more grants.”

Mariano Barbacid, who directs the new Spanish National Cancer Research Center in Madrid (CNIO), returned to Spain in 1998 after working for 23 years in the United States. Like two other national research centers in Spain, which focus on cardiovascular research and genomic regulation, the CNIO is a public institution with about 50 percent of its budget coming as hard money from the government. The other 50 percent comes from grants.

Barbacid has built the CNIO, now with more than four hundred scientific staff, to be research—and researcher—friendly. The national centers have the advantage of being autonomous in terms of strategic planning and daily operations. “That is something the other research centers cannot do; they have to ask permission for everything either to the [Spanish] research council or to the university.”

One of the first things Barbacid did was to create a good startup package to attract the best people, including luring back Spaniards who have done their postdoctoral training abroad. “We give them three [support] positions, and everything they need for the first three years, within reason,” he says. **continued »**

Focus on Europe

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— Beate Konze-Thomas



In addition, CNIO employees are not civil servants, which requires passing a national exam. “Almost everyone in Spain is a civil servant, whether you belong to the university or the research council,” says Barbacid. Skirting that requirement, he says, gives his center tremendous flexibility in hiring scientists from abroad.

“We are dying to get more foreigners here. We are starting an international postdoctoral program where we are paying more competitive salaries, comparable to EMBL, the European Molecular Biology Laboratory,” says Barbacid. Currently 25 percent of the CNIO’s postdocs and graduate students are foreign, as are five of the 35 group leaders.

Still there’s room for improvement. Researchers are limited to only one individual grant at a time, although they may get additional funds from the central government if they are part of a large network grant. The size of grants is limited as well. “As long as you demonstrate you are productive with two different projects, why should you only get funded for one?” asks Barbacid.

Another source of funding in Spain is regional governments. “Several of the regional governments, like Catalonia, really have emerged as new and important means of support,” says Cami, which was not the case 10 years ago. Private sector funding on the other hand is scarce; science-focused philanthropy is not part of the Mediterranean culture and industry funding tends to be concentrated in other countries in Europe, and in the United States.

Cami is working to improve relations with industry by holding workshops at the PRBB, simply to bring together academics and industrial scientists, sit them at the same table, and have them share ideas. “Our idea is to survey the different research groups and help scientists see their own research as an opportunity that can be useful or interesting for industry or commercial purposes.”

Language can be another barrier to movement among countries. Five years ago, the PRBB switched to using English to teach the graduate level program. “Now almost 70 percent of all our Ph.D. students are non-Spaniards,” says Cami. The percentage of foreigners is 20 percent for the total staff of 1,200, 30 percent for scientists. “The current language in the elevators and the restaurants and the seminars is English,” he says.

Germany

Germany has a long history of scientific excellence, both in the life sciences and the physical sciences. While Germany typically ranks high in measures of funding for science and output measures like citations and Nobel prizes, scientific research in the country has been stifled somewhat by old-fashioned policies at universities, in state funding schemes, and in intellectual property law.

Change is afoot, starting with the new Excellence Initiative from the German Research Foundation (DFG), the primary federal funding agency. The DFG will spend €1.9 billion over five years on the initiative—a huge addition to the DFG’s regular budget of €1.7 billion. The Excellence Initiative funds three broad programs to effect change in graduate education, to encourage research clusters, and to bring back a sense of competitiveness and prestige to German universities.

Nine universities won the so-called future concept grants, which Germany hopes will boost those schools into the international rankings, says **Beate Konze-Thomas**, head of the department for coordinated programs and research infrastructure at the German Research Foundation. The review process was comprehensive, looking at measures of international status, research performance, management, education, the degree of collaboration, and the success in attracting funding from a variety of sources.

Many people see the Excellence Initiative as a welcome challenge to the old system that considered all German universities to be equivalent. Some feel that it may even succeed in inspiring Germans to take more pride in their science. “Scientists in the UK and US have much more self-confidence,” says **Enno Aufderheide**, director, research policy and external relations for the Max Planck Society.

Aufderheide says that even the general public in Germany may underestimate what German science can accomplish. “This has been changed a little bit by two things. The first is that, with this Excellence Initiative, there is this feeling that yes we do have excellent universities. The second important thing was the two Nobel prizes for physics and for chemistry, which went to Germany last year.” **continued »**

Featured Participants

Barcelona Biomedical Research Park
www.prbb.org

Max Planck Society
www.mpg.de/english

European Research Council
erc.europa.eu

Medical Research Council
www.mrc.ac.uk

German Research Foundation
www.dfg.de/en

Spanish National Cancer Research Center
www.cnio.es/ing/index.asp

Istituto Superiore di Sanita
www.iss.it

The Wellcome Trust
www.wellcome.ac.uk

Mario Negri Institute for Pharmacological Research
www.marionegri.it

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Focus on Europe

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The most storied research organization in Germany is the Max Planck Society, which encompasses 78 institutes, centers, and laboratories employing some 4,400 scientists and 11,300 students and fellows. “People who have been group leaders at a Max Planck Institute have been very successful in their careers,” says Aufderheide, either moving on to university professorships or moving up to the director level at Max Planck.

Of the 270 directors at Max Planck, 27 percent have foreign passports and 40 percent have come from abroad (including returning Germans). Recent hirings have increased the international representation at Max Planck further. “This is very atypical for Germany.”

Not that universities or other research institutions wouldn’t want to increase the number of foreigners, but there are barriers. “For students, the numbers have risen a lot during recent years,” says Konze-Thomas, to about 10–20 percent. But faculty profiles have not changed much. University professors in Germany have heavy teaching loads compared to other EU countries, as much as nine hours per week, says Konze-Thomas. And they teach in German.

Funding of research comes from the DFG, from private research institutions like the Max Planck Society, and from the universities themselves. On the other hand, the teaching mission of universities is dependent solely on Germany’s member states; thus, Bavaria is responsible for its universities and Lower Saxony is responsible for its own. “We have huge differences in the regional funding of universities,” says Konze-Thomas.

United Kingdom

The UK has long been a leader in Europe in biomedical research, both in terms of funding and output, and it shows no sign of slowing down. “Public funding for science has actually increased year on year for at least the last 10 years,” says **Chris Watkins**, translation theme leader for the UK’s Medical Research Council (MRC), the primary government funding agency for biomedical research. “Last fall’s spending review was a very good one for science and a very good one for the MRC. Our budget went up 30 percent,” including a £543 million allocation from the government for the 2007-2008 fiscal year.

Watkins lists the many reasons why a researcher would want to come to the UK. “Clearly, we have a very strong research envi-

ronment. And when you look at the figures of our citation impact, we really do punch above our weight,” he says, noting that the UK stands second only to the United States in terms of worldwide publications and citations. He also cites government investments in infrastructure and the commitment to support translational and clinical research.

The UK also is ahead of the game when it comes to academic-industrial partnerships and promoting commercialization of research findings. “When the government talks about science, it always talks about science and innovation,” says Watkins. The MRC has its own technology transfer division to work with the intellectual property of its intramural program, which includes three research institutes and about 50 units and centers, altogether employing some four thousand people. In the last fiscal year, revenue from licensing added another £46 million to the MRC coffers, all of which gets funneled back to support research.

Young researchers can find opportunities to have much more independence much earlier in their careers in the UK, says **Mark Walport**, director of The Wellcome Trust based in London. The Wellcome Trust awards postdoctoral fellowships with four years of funding. “It enables them to go anywhere in the world. This is empowering because they can choose where to do the research; it’s their funding,” says Walport, who notes that other funders, like the Royal Society, have good fellowship schemes as well. The Wellcome Trust also awards principal fellowships analogous to the Howard Hughes Medical Institute in the United States.

In addition to supporting individual investigators, The Wellcome Trust supports research schemes in which they see a need for complementary funding. “We’re not there to replace the funding of government,” says Walport. “We’re there to provide synergy.” These initiatives include supporting interdisciplinary research, particularly by incorporating the physical sciences into biomedical research, supporting clinical pharmacology in the development of new medications, and bringing together geneticists and epidemiologists to develop a better understanding of genetic variation.

Expanding Horizons

The good news is that going abroad to work in science is smiled upon from all fronts. Whether it’s to go to graduate school, to do a postdoctoral fellowship, or to land a more permanent position, most people agree that the experience can broaden one’s world, both personally and scientifically.

While personal factors may direct scientists to look at one country over another, it’s worth trying to understand the greater research climate in a country. Language, pay, and research opportunities in a specific lab may be immediate concerns, but they are only a small part of the picture. Larger scale issues such as growth in funding, intellectual property rights, and openness to collaboration across different sectors all have the potential to affect a career in ways that might be good, or bad, news.

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