



Pioneering Work in Several Fields in Spain

Barcelona's Municipal Institute of Biomedical Research

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BARCELONA—Jordi Camí, MD, professor of pharmacology at Pompeu Fabra University (PFU) in Barcelona, is enthusiastic about the accomplishments and ongoing changes at an associated facility that he leads, the Municipal Institute of Biomedical Research (IMIM). In addition to an ambitious, high-output Unit of Respiratory and Environmental Research, he is proud of a pioneering code of good scientific practice launched last year as well as of the fact that members of the Bioinformatics Unit contributed to—and coauthored—one of the two recently published maps of the human genome. And most of all, he is pleased that his institute will become the nucleus of the future Biomedical Research Park of Barcelona, a facility that will employ about 1000 scientists and others.

In addition to heading the IMIM, Camí is in charge of PFU's 60-member Department of Health and Experimental Sciences. He has taken special care to ensure that all new professorial appointments in the department are made only after being advertised in prestigious international science journals and the candidates undergo rigorous internal evaluation, and that internal promotions are made only after peer review by prominent scientists from other institutions, including foreign universities. The recruitment system Camí has implemented is regarded as good news by many observers, since "inbreeding" in professorial appointments is a common practice in Spain and many scientists have long thought it was time for a change.

THE INSTITUTE

At the IMIM, which was started in 1947 by the Barcelona City Council, scientists are organized into 11 research units and groups containing 240 people, including 58 senior scientists and 66 postgraduate fellows. Its budget is about 1 billion pesetas (US \$5.4 million) per

year, half of which comes from the city council's health care department and half from external grants and contracts. For example, the IMIM drug analysis laboratory, one of only two in Spain, performed tests requested by the International Olympic Committee during the 1992 Barcelona Olympic Games.

The IMIM concentrates on basic, clinical, and epidemiological research on cancer, cardiovascular disease, respiratory

tutes an elite unit that has done much to improve human health in Spain. Its main areas of research are the epidemiology of asthma and environmental risk factors for the disease, respiratory muscle abnormalities in patients with chronic obstructive pulmonary disease, and studies on the identification of occupational and environmental risks for cancer (mainly bladder cancer) in the general population.

In 1993, the group's work resulted in the landmark publication of a collaborative study, led by researchers Josep M Antó, MD, and Jordi Sunyer, MD, regarding the cause of asthma epidemics that occurred during the late 1980s in Barcelona. At that time, a huge increase occurred in the number of patients who were admitted to emergency departments in the city with asthma on specific days. Epidemiologists noted that there was a point-source distribution of cases near the city harbor, suggesting that the cause might be inhalation of some environmental agent. In particular, the outbreak was linked to inhalation of soybean dust released when soybeans were unloaded into a storage silo in the harbor. The silo lacked appropriate filters, and large amounts of dust were released into the air.

The researchers found that serum samples from patients with asthma who had an exacerbation of disease during the outbreaks contained specific IgE antibodies that reacted strongly with glycoprotein bands of soybean extracts. In September 1987, unloading of soybeans into the silo was temporarily halted and, shortly afterward, filters were installed at the top of the silo before unloading was restarted.

The scientists demonstrated that installing filters to prevent airborne dissemination of particles eliminated asthma outbreaks caused by dust inhalation, thus supporting the idea that avoiding allergens helps prevent asthma. Not only did outbreaks no



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medicine and environmental health, substance abuse, and medical informatics. Considering the number of articles by IMIM investigators that are cited annually, including in the Science Citation Index, as well as the number of researchers, the IMIM ranks fourth among Spanish health research centers (after the Hospital Clinic in Barcelona, the Hospital Foundation Jimenez Diaz in Madrid, and the Hospital de Sant Pau in Barcelona).

UNIT OF ENVIRONMENTAL AND RESPIRATORY RESEARCH

This group of 54 persons—including 18 staff scientists, 20 fellows, and five community health field workers—consti-



longer occur, but the number of days on which there was an unusually high number of cases also decreased. Before installation of the filters, there were more than 1000 emergency admissions and 26 deaths attributed to epidemic asthma due to soybean dust (*N Engl J Med.* 1993;329:1760-1763).

The Unit of Environmental and Respiratory Research made another important contribution in 1999 with the publication of a European Community study, led by Antó and Manolis Kogevinas, MD, of occupational asthma in industrialized countries. After assessing data on 15637 people aged 20 to 44 years, randomly selected from the general population of 26 areas in 12 countries, the researchers determined that 0.2% to 0.5% of young adults developed asthma from or had their asthma exacerbated by their occupation. The fact that occupational asthma accounted for 5% to 10% of asthma cases in young adults suggested that it was an important public health issue in developed countries.

In particular, there was an excess risk for farmers and people—including unspecified “cleaners,” caretakers, window cleaners, and chimney and road sweepers—who work with various cleaning solutions (exactly which ones are the subject of an ongoing study) in nearly all countries, and the latter group was the largest of 16 occupational groups to show an increase in asthma risk of more than 30%. Interestingly, housewives also had a significant, albeit small, excess risk of asthma, likely due to sharing some of the exposures of the “cleaners” (*Lancet.* 1999;353:1750-1754).

Antó, who heads the unit, says that the etiology of asthma—as well as the reasons for the increase in its prevalence worldwide—is still unknown in most cases. To identify other risk factors for asthma, his team is now coordinating a study aimed at analyzing the interaction between environmental and genetic factors. Another study under way is trying to relate environmental exposures during pregnancy and a child’s first years of life with future onset and development of allergic sensitization and asthma.

BIOINFORMATICS

Roderic Guigó, PhD, a biologist who is head of the genome bioinformatics laboratory within the IMIM Research Group on Biomedical Informatics, and Josep F. Abril, PhD, a biologist and research fellow, were the only Spanish scientists to collaborate in the sequencing of one of the drafts of the human genome published earlier this year, “The Sequence of the Human Genome” (*Science.* 2001;291:1304-1351). Camí says the contribution of Guigó and Abril is important because Celera Genomics of Rockville, Md, adopted the software developed by the IMIM researchers, which permits practical visualization of the human genome. The program, called “gff2ps,” has made it possible to create a map roughly representing the genes encoded in the 3 billion nucleotides that make up the genome. The software is in the public domain and freely accessible (<http://monstre.imim.es/software/geneid/index.html>). “This map can be useful for genome researchers since it facilitates its interpretation, like a road map,” said Camí.

CODE OF GOOD SCIENTIFIC PRACTICE

Unlike the United States and such European areas as the United Kingdom, Scandinavia, and Holland, little tradition exists in Mediterranean countries for dealing with misconduct in biomedical research. An important first step in ensuring the integrity of biomedical research is to provide research institutions with appropriate written guidelines. Last summer, the IMIM implemented the first Code of Good Scientific Practice in Spain.

The code was launched along with the establishment of a Committee for Integrity of Research to which scientists can appeal when necessary. The rules of the code were adopted as a personal commitment by the research personnel of the IMIM, said Camí, and not as a rule of the center. The code, which was simultaneously adopted and implemented by the Department of Health and Experimental Sciences of PFU, provides for establishment of procedures for public and independent investiga-



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tion of potential allegations of practices that violate the integrity of scientific research. It includes guidelines on supervision by a mentor of research workers in training; definition and development of research protocols; and storage, custody, and sharing of raw data—both written data and biological and chemical samples. The code requires that all original information must be kept for at least 10 years after publication. In addition, no biological or chemical material stored as the result of research can be destroyed within less than 10 years after publication.

Other guidelines concern publication practices; for instance, it is stated that “the nonpublication of results, or an unwarranted delay therein, shall be considered to constitute a misappropriation of the resources employed” and that “the publication of negative results, or results other than those expected from the project, is likewise an inescapable part of the research work undertaken.” Finally, issues concerning dissemination of results to the media, fragmentary publication, redundant and dual publication, authorship, and practices of peer review are also dealt with in the code.

In September, when the Fourth International Congress on Peer Review in Biomedical Publication (sponsored by *JAMA* and the BMJ Publishing Group) is held in Barcelona, some issues dealt with in the IMIM code will be tackled in depth here. Camí, the head of the institute, said he believes the congress will afford Spanish physicians and scientists involved in basic and clinical research an opportunity to become more familiar with peer review, an increasingly important subject. □