

## Hidden biotechnology worth over \$7.5 billion a year

The pharmaceutical industry may spend as much as \$1.2–7.5 billion a year on biotechnology research and development (R&D), *Nature Biotechnology's* own data indicate. The money is in addition to the \$3.5 billion that pharmaceutical companies spent on acquiring biotechnology firms in 1995, and on top of the \$1.6 billion or so they paid to biotechnology companies under R&D or licensing agreements during 1995.

*Nature Biotechnology* asked the top twenty pharmaceutical companies (by revenues) to estimate the amount they spent both on the development of biotechnology products (recombinant proteins, gene therapies, and antibodies) and on platform biotechnologies, such as genomics and receptor-based screening. Not all could readily separate their biotechnology spending from their general R&D budgets. But those who could reported that biotechnology R&D accounts for between 4% and 25% of their R&D budget.

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The low end estimate came from Glaxo-Wellcome (London, UK). But as Stephen Wheatcroft from the company's R&D finance department explains, GlaxoWellcome's actual spending may be much higher. Wheatcroft says that 4% of its total R&D budget is approximately what the company spends on internal development of products, such as recombinant proteins, gene therapy, and antibodies. However, if the company was to include biotechniques that aid its small molecule development program, such as receptor-based screening biotechnology, spending would represent an "enormous proportion" of the R&D budget.

Several major German pharmaceuticals also had a clear idea of the proportion of expenditure devoted to biotechnology internally, partly perhaps because their bioscience facilities are geographically separate from their other R&D efforts. Bayer (Leverkusen) spent more than DM 200 million (\$136 million) out of their DM 1.6 billion (\$1.09 billion) healthcare R&D spending in 1995 on biotechnology, i.e., 12.5%. In 1994 (post-merger data for Hoechst Marion Roussel in

1995 is not available), Hoechst Roussel (Frankfurt-am-Main, Germany) spent approximately DM 155 million (\$105.5 million) on biotechnology, 8.9% of its total R&D budget of DM 1.726 billion (\$1.17 billion).

Elsewhere in Europe, Rhône-Poulenc Rorer (Paris and Collegeville, PA) spent 15% of its 1995 R&D budget of \$760 million, largely on internal developments on cell and gene therapy. And the third-largest of the Swiss pharmaceutical companies (now that Sandoz and Ciba have become one), Ares-Serono (Geneva), estimates that a full 90% of its products will be recombinant proteins by the year 2000; by implication, most of its R&D spending will be in biotechnology, too.

In the United States, Schering-Plough (Madison, NJ) spent \$657 million on total R&D, approximately 25% of it on biotechnology. Bristol-Myers Squibb (BMS; New York) has 500 employees dedicated to biotechnology research and also spent \$166 million on external collaborations and investments in biotechnology companies. Representatives of several other companies knew that biotechnology represented a substantial proportion of their R&D but were unable to break out the specific biotechnology segment; "biotechnology-based research is inextricably woven throughout the R&D process," said Sharyn Bearse, a spokesperson for Merck & Co. (Whitehouse Station, NJ).

Pharmaceutical companies' internal biotechnology spending is clearly large; the most affluent now spend more on biotechnology R&D than all but highest-spending biotechnology companies. Only Amgen (Thousand Oaks, CA), Genentech (S. San Francisco), Chiron (Emeryville, CA), Genetics Institute (Cambridge, MA), and Centocor (Malvern, PA) spent more than \$100 million on R&D in 1994. While Amgen and Centocor are independent, Genentech and Genetics Institute are majority-owned by Hoffmann-La Roche (Basel, Switzerland) and American Home Products (New York), and Chiron is all but owned by Ciba-Geigy (Basel).

The total expenditure on R&D in 1994 by the pharmaceutical industry—excluding the corporate biotechnology sector—according to the Center for Medicines Research (CMR; Carshalton, UK) was around \$30.1 billion. If the 4–25% range of biotechnology spending is valid, then, extrapolating across the whole enterprise, the biotechnology endeavor hidden within pharmaceutical companies is clearly worth billion of dollars and may even exceed the \$7.0 billion that CMR gives as the aggregate spend of the corporate biotechnology sector.

*Sylvia Davidson*

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