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The rise of blockbuster biological drugs should translate into hiring opportunities for early-career scientists.

BIOMEDICAL RESEARCH

Drug hunters wanted

The biotherapeutics industry is burgeoning — and it needs scientists with specialized disease knowledge and technical savvy to join in the drug-discovery efforts.

BY JEFFREY M. PERKEL

A newly approved class of anti-cholesterol medications could be the latest in a long line of 'biopharmaceutical blockbusters'. These drugs not only produce big revenue for pharmaceutical companies, but also represent employment opportunities for early-career scientists who want to develop cutting-edge therapies. To get into the game, aspiring young researchers must tailor their training and skills to the industry.

Biopharmaceuticals — or 'biologics' — are complex drugs that are manufactured or extracted generally from biological sources. They include proteins produced in engineered cells, other large molecules and live cells. A 2013 report by the Pharmaceutical Research and Manufacturers of America, a trade association in Washington DC, said that 907 biologics were in development in the United States alone (*Medicines in Development: Biologics* PhRMA; 2013). And drug manufacturers worldwide are keen to expand the field.

In July, the US Food and Drug Administration (FDA) approved a cholesterol-lowering biologic called alirocumab. A similar compound, evolocumab, could get full approval later this year; it passed the FDA's preliminary regulatory-assessment panel in June. The drugs are the first candidates in their class — known as PCSK9 inhibitors, after the protein whose function they block — to advance this far in any drug company's pipeline. Alirocumab and evolocumab both belong to a group of medications called monoclonal-antibody therapeutics, which ▶

work by binding to and altering target molecules; PCSK9 inhibitors specifically seek out and inactivate a protein in the liver, leading to a decrease in the amount of low-density lipoprotein (LDL) cholesterol in the bloodstream.

Some analysts project multibillion-dollar sales for these two cholesterol combatants. The 20 highest-grossing biologics in 2013 generated more than US$1 billion each, and the top three collectively raked in more than $28 billion (*Nature Biotechnol.* **32,** 992–1000; 2014). "I think it's fair to say we expect to see strong growth in biotherapeutics," says Raymond Amato, who oversees hiring for the research and development division of pharmaceutical company Pfizer in Groton, Connecticut.

LUKE SHARRETT/BLOOMBERG/GETTY

BREAK INTO BIOLOGICS

Early-career researchers who hope to get a toe in the door need detailed knowledge of relevant areas, such as neurobiology, cardiovascular disease or immunology, and should be deeply familiar with specialized techniques such as antibody engineering, next-generation DNA sequencing, bioinformatics or genetic manipulation. It also helps to have proven problem-solving abilities, creativity and leadership skills — and the capacity to work in a team, says Mark Kowala, chief scientific officer of cardiometabolic and diabetic complications at Eli Lilly, a health-care company in Indianapolis, Indiana.

Lilly alone has about 100 job openings in therapeutic development, including biologics. In the biopharma arena, the company's research and development positions are wide-ranging and include lab technicians, senior scientists, statisticians, pharmacologists and toxicologists, says Jennifer Porath, a human-resources director for global recruiting at Lilly. A PhD is not necessarily required, she adds. Kowala's department, for example, has two lab heads without PhDs, who represent about one-tenth of the group. Competition for these jobs is fierce. Paul Nioi, a translational biologist at Amgen in Cambridge, Massachusetts, says that his most recent postings attracted about 50 applicants each over the first week. At Pfizer, advertisements for entry- to mid-level-research positions draw 150 to 250 candidates apiece, Amato says.

"They were a little surprised that I was thinking about the disease relevance of my work."

So how can early-career researchers boost their viability as candidates? In addition to fundamental-biology knowledge and lab skills, it helps to gain familiarity with concepts important to the biopharmaceutical business, such as the clinical development and large-scale production of monoclonal antibodies, recombinant proteins and cellular therapies. Those who hope to work for specific companies should seek out knowledge relevant to the firms' drug-development targets. Amato says that Pfizer, for example, in collaboration with the gene-editing firm Cellectis in Paris, has begun to pursue cell-based immunotherapies. Among the technical skills required for those jobs are primary T-cell culture and experience with cell manufacturing, characterization and quality control.

John Beals, a protein chemist who advises on bioproduction at Lilly, hires engineers who can clone and express genes, measure protein properties and assess molecular structure. Pharmaceutical giant GlaxoSmithKline (GSK) looks for scientists who are skilled in analytical chemistry, cell biology and protein purification, says Joseph Tarnowski, a senior vice-president at GSK's office in Upper Merion, Pennsylvania.

A skill set that was directly translatable to biologics development proved invaluable for Wei Ni, a research scientist who joined Lilly straight from her postdoc at the University of California, San Francisco. Her expertise in pharmacology and molecular biology helped to set her apart from her competitors, says Kowala, who hired her for his drug-hunting team.

Ni also demonstrated several crucial 'soft' skills (see 'More than lab savvy'). Lilly asks candidates to give a research seminar during their job interviews. Ni took the opportunity to show that she could think both broadly and creatively, and communicate her ideas well. "My first two slides were on epidemiology and clinical trials that were relevant to my research," she says. "I think they were a little surprised that I was thinking about the disease relevance of my work." She also demonstrated an ability to develop alternate ideas when her initial hypothesis was proved wrong, and to find ways to fill technical gaps — in this case, quantifying biological phenomena from images — in her expertise.

What matters most, says Stan Crooke, chief executive officer at Isis Pharmaceuticals in Carlsbad, California, is what a scientist does when handed full responsibility for a research project and concomitant resources. "Decide what area of science you're interested in, demonstrate the highest-quality performance, and that," he says, "is the answer." ■

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SOFT TOUCH

More than lab savvy

When it comes to nabbing a job in the biopharmaceutical industry, 'soft' skills matter — and among the most important is the ability to communicate. As in all scientific disciplines, scientists in biopharmaceutical research and development must write papers and give presentations. But they must also communicate ideas to company executives and colleagues and pitch a message effectively to both audiences. "It's sometimes like being a used-car salesman, as well as being a scientist," says Andrew Adams, a senior research scientist at the pharmaceutical company Eli Lilly in Indianapolis, Indiana. "You have to be really persuasive to people who sometimes will be at odds with the idea that you're putting forward."

Diana Ritz, a principal scientist who works for GlaxoSmithKline (GSK) in Upper Merion, Pennsylvania, can attest to the importance of communication skills. She was hired directly from a PhD programme in chemical engineering, and notes that the doctorate taught her how to make a research project particularly attractive to biopharma companies and how to frame it for industry eyes. Presenting talks over the years also helped her to hone her message, she says. "It's a matter of focusing on things like increases in productivity, time and cost savings versus mechanistic minutiae that might get academics going, but don't impact the bottom line at all," she says.

Being able to think outside the box is a plus, says Adams. "Can you make mediocre ideas into good ideas by applying creative thinking?" he asks. Joseph Tarnowski, a senior vice-president at GSK, recommends that candidates' applications include an example of an unconventional project or strategy, to show that an applicant is curious and innovative. "That would get our attention," he says.

Other key attributes include self-motivation, enthusiasm, the ability to think on one's feet — and a genial personality. "You're going to spend a lot of time with them; you have very challenging assignments," says John Beals, a team leader at Lilly. "If you are a joy to work with and people like you, then you get a ripple effect of better relationships and better problem-solving." J.M.P.