

the right to review manuscripts, delay publication or terminate a study at any point in her studies of the tobacco and pharmaceutical industries. She cites Betty Dong, a professor of clinical pharmacy at the University of California, San Francisco, who spent seven years fighting to publish results of a study funded by Flint Laboratories comparing Flint's version of a thyroid medication, Synthroid, to three others. When, in 1990, Dong found that all four performed similarly, the company held up publication. Dong eventually prevailed and the work³ was published in 1997.

Cases such as those involving Hayes and Dong came to light because the researchers spoke out, but it is difficult to gauge how often sponsors push scientists to change results or not to publish. In another study, Bero compared industry-sponsored and non-industry-sponsored clinical trials from 1999 to 2005 that compared one statin with another. In industry-sponsored studies, she found that the results were about 20 times more likely to support the statin produced by the funder of the trial than in the other trials⁴.

David Ludwig, director of the obesity programme at Children's Hospital Boston in Massachusetts, found similar trends in the field of nutrition. Ludwig analysed 206 studies of milk, fruit juice and soft drinks, and found that when a company sponsored studies of its own or a competitor's products, the results were four to eight times more likely to be favourable to the company's financial interests than studies funded independently⁵. Others have found correlations with industry sponsorship in radio-frequency radiation from cell phones and effects on cognitive function.

But undue industry influence can be minimized. Most top US universities prevent sources of aggravation such as delay of publication, says Dennis Ausiello, chief of medicine at Massachusetts General Hospital in Boston. At this hospital and Harvard, for example, pharmaceutical companies cannot prevent scientists from getting access to and using that data for publication, notes Ausiello, who sits on the scientific advisory board for Pfizer.

In Denmark, all trials must be approved by independent scientific ethical committees. This process has provided a wealth of data for researchers such as Gøtzsche to study possible influence from industry. The US National Institutes of Health has a similar registry, but as it only became mandatory in 2007, conducting analyses on industry influence is difficult.

But no such measure precludes the need for scientists, especially fledgling scientists, to vigilantly maintain the integrity of their work. Hayes decided he had to find a way to get his results out. In 2000, he quit the Ecorisk panel without publishing his results. He then repeated the studies in his own lab using National Science Foundation funding and grants from foundations such as environmental group the WWF. In 2002, he published those results in the *Proceedings of the National Academy of Sciences*⁶ and *Nature*⁷. (Members of the Ecorisk panel also published their results, which were more favourable toward atrazine than Hayes's. The EPA reapproved atrazine in 2003; the pesticide is banned in Europe.) Hayes continues to study atrazine as a tenured faculty member at the University of California, Berkeley.

Of course, not all researchers can count on government funding to repeat industry-sponsored studies. "I think the major thing is that you don't want a



David Ludwig (top) and Dennis Ausiello have different takes on the subject of industry funding for academics.

"It is so hard to get funding these days that researchers may not think through the ramifications."

— Lisa Bero

restrictive contract," says Dong. Hayes advises primary investigators to consider their students' careers and not fund dissertation research with grant money that comes with publication restrictions.

Taking precautions

Even though some institutions have automatic contract-review support, scientists should read everything they sign. "What researchers should worry about are the agreements in the back of the protocol," says Gøtzsche, referring to contract addenda including rules about ownership of data and the company's manuscript review rights. Bero urges young investigators to ask someone at their university's technology-transfer office to review the contract language and ensure it conforms to university policies. She also suggests that they don't rely exclusively on funding from industry. "To advance your career it is good to have a diversified pool of funding," she says. "You don't want to be known as the Merck guy or the Glaxo guy."

Ludwig urges investigators to discuss the prospect of getting industry funding. "You could put together a quick focus group," he advises. "Ask three senior colleagues what they think about taking the funding, and what other funding might exist." He emphasizes that he is not arguing that scientists should decline all industry funding. "We have to balance the opportunity with the cost," Ludwig says. Gøtzsche doesn't shy away from a more idealistic stand. "I think research should be driven by important questions and not by earning money. This is one of the big problems we have today."

When it all works out, industry sponsorship can help to answer these questions. For example, development of the drug Gleevec, a kinase inhibitor that made national headlines in 2001 as an anticancer wonder drug, started with academic discoveries and was developed with industry partnerships. "If what you want to pursue is whether kinase inhibitors of the next generation will affect multiple cancers, and you have an opportunity to pursue that with a pharmaceutical company, I think there is nothing wrong with that," says Ausiello.

Even Hayes still works for industry sometimes. He says he recently took on an environmental study for a water company, looking for contaminants. Hayes believes the company's owner to be a responsible funder. "His view is, 'I don't care what the answer is. I'm responsible, I'm liable, I have to take it out of there,'" says Hayes.

And if he could travel back in time to when he was first presented with Novartis-sponsored atrazine study, would he still do it? "Yes," he says. "But I would design the contract in a very different way."

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Correction

The Regions report 'Westernizing Eastern-bloc science' (*Nature* **453**, 558-559; 2008) misleadingly gave the impression that Croatia, Slovenia and the other nations that made up former Yugoslavia were once part of the Eastern bloc. Yugoslavia was not a Warsaw Pact country and remained neutral during the cold war.