PATENTS

NIH to Limit Scope of Foreign Patents

More than 20 years ago, the U.S. National Institutes of Health (NIH) began supporting Australian researchers who discovered two cytokines that can boost the immune system of cancer patients. These drugs, marketed by companies such as Amgen and Schering-Plough, have saved lives and chalked up more than $1.5 billion a year in U.S. sales. Yet NIH now wants to revise the policy that allowed the Australian scientists' institutions to patent and license one of the drugs on the grounds that it could put U.S. companies at a "disadvantage." The move has sparked an uproar in Australia and even left U.S. university officials wondering how it might affect collaborations.

Unhappy down under. Donald Metcalf and other Australian scientists are upset about NIH plan to limit patent rights.

A notice on NIH's Web site says that the planned change, to go into effect by the end of the year, is in "the best interests of U.S. citizens" by making sure that they benefit fully from all NIH-funded research. Posted 14 March, the notice explains how NIH plans to limit the future patent rights of all foreign recipients of grants and contracts to the awardee's own country and have NIH retain the rights elsewhere. Institutions could ask for exceptions on a case-by-case basis.

George Stone of NIH's Extramural Inventions and Technology Resources Branch says that the new rule is intended to address the concerns of some members of Congress and the public but that it was not triggered by any particular incident. "There has just been a heightened awareness," he says. "We want to be proactive."

Few patents will likely be affected, Stone says. Only 13 of roughly 6000 inventions reported to NIH in the past 3 years included patent holders from other countries, he says, and in just two cases were the foreign grantees the only patent holders. The new policy would not have applied to the 11 joint inventorships, he says. An upcoming fact sheet will clarify the new policy, he adds.

Some foreign research institutions are quite concerned about NIH's plans. Alan Pettigrew, CEO of Australia's National Health and Medical Research Council, has complained to Stone, as have Donald Metcalf and Nicos Nicola of the Walter and Eliza Hall Institute of Medical Research in Melbourne, whose discoveries led to the cancer drugs. Discoveries are less likely to be commercialized if NIH holds the patent rights, they suggest, which "will actually decrease the health and economic returns to U.S. citizens." Canadian officials "are very much aware of" the NIH policy and are mulling over their response, says Janet Scholz, senior manager of the University Industry Liaison Office at the University of Manitoba in Winnipeg.

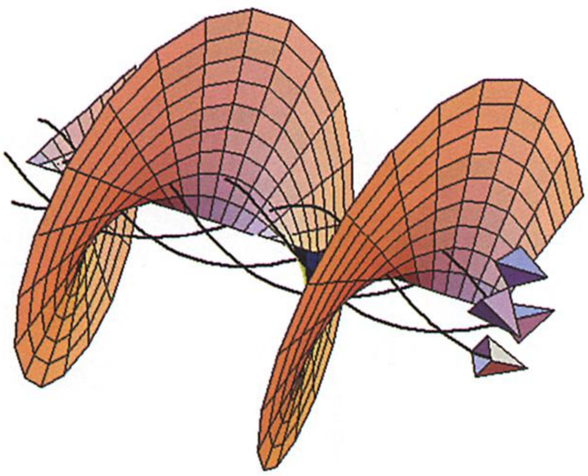
Scholz, who is also chair of the U.S.-based Association of University Technology Managers (AUTM), says that U.S. universities are concerned that the rule will discourage international collaborations by complicating patent filings and removing commercial incentives for the foreign partners. "To some extent, there isn't a border in science," says Scholz. The AUTM board plans to take up the matter this week.

Scholz says AUTM members are annoyed that NIH cannot cite examples of why the new policy is needed. "I just don't understand why they think that whatever they have now doesn't work," she says. —JOCELYN KAISER

OPTICS

New Twist Could Pack Photons With Data

The humble particle of light, the photon, is beginning to show that it has surprising depth. Photons have long been known to spin, but it is also possible to give them an additional form of angular momentum, a sort of twist. A team of physicists in the United Kingdom has now devised a way to measure the twisting of single photons—a "major achievement," according to physicist Keith Burnett of the University of Oxford. A photon's twist could be a handy information carrier: In principle, physicists could use it to load huge quantities of data onto a single photon, revolutionizing optical communications and quantum computing.



Helical harmony. A single "line of harmony" corkscrewing along a light beam. Arrows show energy flow, which can exert a torque on objects.

To envision light's angular momentum, freeze time for an instant and put an imaginary sheet of glass in the path of a laser beam. For a conventional beam, the light's electric field will have the same magnitude and direction all over the spot that the beam makes on the glass. Physicists visualize this with an array of little arrows whose sizes and directions show the field strength and direction; in this case, all the arrows will be the same length and point the same way. Ratchet time forward one notch, and all the arrows in the freeze-frame will turn in unison by a small amount. Keep moving time forward, and all the arrows will make one complete turn as the beam moves forward by one wavelength of the light. This is photon spin.

Over the past decade, physicists have realized that they can go beyond spin and add extra angular momentum to the beam, effectively imprinting a pattern onto the electric field so the arrows no longer all point the same way at the same time. In the simplest example, the arrows along a single radial line in the beam spot all point in a particular direction. Move time forward one notch again, and this "line of harmony" appears to move as an adjacent radial set of arrows snap to attention. In this way, the line of harmony sweeps around like a radar screen. This sort of rotation of the beam, which physicists call orbital angular momentum, describes a single helix in the beam as the beam moves forward. Even a beam consisting of a single photon can carry orbital angular momentum.

What has physicists most excited is that a lone photon can carry any number of spiraling lines of harmony simultaneously. Two lines give the familiar double helix, three lines a triple helix, and so on. These angular momentum spirals must obey quantum rules, so they bear whole-number labels that physicists can use as a bar-coding system for carrying information. The orbital angular momentum can in principle be "as high as you wish," says Anton Zeilinger of the University of Vienna. "So an individual photon can carry much more than a single bit."

Extracting the information has been the problem, but Johannes Courtial and his University of Glasgow colleagues Jonathan Leach and Miles Padgett, aided by theorists from the University of Strathclyde in Glasgow, have dreamed up a

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