der, the final $7 million of his first-year funding is AIDS money.

Third, he says, the increase in on-the-job urine screening means that more and more people are going to be entering mandatory drug treatment programs at a relatively early stage of their addiction. And that, he says, is when the drug companies start to get interested. When the addicts are motivated—by a desire to keep their jobs, if nothing else—when they are candidates for long-term treatment, and especially when they (or their health plans) are able to pay, then addiction starts to look as profitable as any other chronic disease.

And finally, says Snyder, "there's been incredible progress in the last 15 years in our understanding of the brain mechanisms of addiction." There is even hope that maybe, just maybe, a few common pathways can be found that underlie *all* addiction. "We're anticipating that some of the new medications, because they target the fundamental mechanism of addiction, may be useful in fighting more than one drug," he says.

With these factors in mind, says Snyder, the new NIDA program is designed to get the pharmaceutical houses and the research community alike more deeply engaged. In addition to providing individual research grants, for example, NIDA has set up a series of contracts with laboratories around the country where chemists can send in promising compounds for animal tests.

Meanwhile, in an effort to lower the development risk for the pharmaceutical companies, NIDA has set up six different treatment research units. If a company comes up with a promising new compound, says Snyder, "we'll work with them to do patient recruitment and perform clinical tests. In exchange, when we enter into a formal agreement, the company will take on the responsibility to get the medication through the FDA approval process."

However, he says, even that final hurdle has been lowered: "We now have an agreement in principle with the FDA to 'Fast Track' these drugs" under the new system recently set up for testing AIDS treatments.

Eventually, says Snyder, NIDA plans to have about eight products in clinical trials at any given time. That will not be cheap: Snyder estimates the cost at some $100 to $200 million per year. However, he also says he has already gotten indications of strong support from such figures as Senators Sam Nunn (D–GA), Joseph Biden (D–DL), and Daniel Patrick Moynihan (D–NY). Nothing is guaranteed, with the federal deficit being what it is. "But when we can justify the expenditure," says Snyder, "they say they will do their best."

■ M. MITCHELL WALDROP

The Epilepsy "Cure": Bold Claims, Weak Data

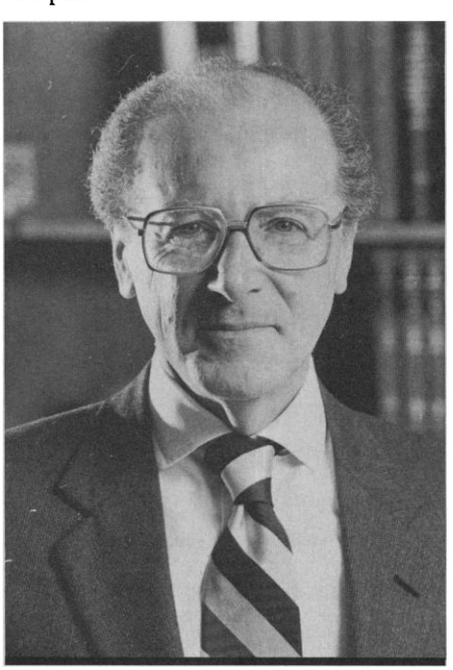
A peer-reviewed article stirs a furor among neuroscientists and raises questions about how journals handle such claims

EARLIER THIS MONTH, the *International Journal of Neuroscience* (*IJN*)* published an article that looked on the face of it as though it would raise something of a stir. It was entitled "Localization and cure of epileptic foci with the use of MEG measurements." The authors, Phodios A. Anninos and N. Tsagas, asserted that "we have cured 20 pathological subjects suffering from focal and general epilepsies by using an electronic device which we invented recently."

This remarkable claim—and the decision by a peer-reviewed journal to publish it—raise several troubling questions about the role that such journals, their editors, and reviewers play in establishing scientific truths. Who is responsible for controlling the quality of articles? Should standards be relaxed for laboratories outside the wealthy industrial nations? What are the dangers of lowering standards? How representative is this case of the selection process at other journals? It is apparent from the wide range of opinion *Science* encountered among those who know of the epilepsy "cure" article that on these issues there is no consensus.

In their article, Anninos and Tsagas, who are members of the Department of Medicine and Polytechnic School at the Democrition University of Thrace in Alexandroupolis and Xanthi, Greece, claim to have done as follows: They first mapped the brain activity of epileptic patients with magnetoencephalograms (MEGs) and determined the focus of the seizures. Then they adjusted their "electronic device" to beam back into the patients' skull a magnetic field of the same intensity and frequency as that emitted by the focus. According to Anninos and Tsagas, the two fields destructively interfered with each other on the analogy of the Young double-slit experiment ("by which under certain conditions light plus light gives darkness"), and the patients were "cured."

Once in circulation, the article drew a swift and vehement response from mainstream U.S. neuroscientists. "I don't know how it got into a journal," says William Southerling of the Department of Neurology at the University of California, Los Angeles. "It's so appallingly bad," says Timothy Pedley of Columbia University, "that when I first read it I thought that it must be some kind of joke." "It's the worst thing I have seen in a scientific journal," says Lloyd Kaufman, a leader in the field and a member of the *IJN* advisory board. Indeed, Kaufman and another board member sent the editor a scathing attack on the article and announced their intention to resign if no action was forthcoming. Their criticisms have been accepted and will appear in a future issue. But the question remains: should an article claiming that an unknown technique "cured" a major disease—an article regarded by leaders in the field as unsubstantiated—be published in a scientific journal in the first place?



The claim of Anninos and Tsagas "has no basis of reason in the current historical development of the field."

—Dominick Purpura

International Journal of Neuroscience*, **46 (nos. 3 and 4), 235 (1989).

The neuroscientists contacted by *Science* said the article should not have appeared as it did because it failed to meet the traditional standards of scientific literature. The claim of Anninos and Tsagas "has no basis of reason in the current historical development of the field," says Dominick Purpura, another member of the *IJN* board and editor himself of *Brain Research*, probably the most widely read journal in the field. Yet the documentation provided by the authors was minimal. No description of the "electronic device" was given. No details of the techniques with which it was used were supplied. No data on the procedure were presented except for a series of maps of brain activity for epileptic patients, which the journal published without any coordinates attached. No justification was given for the analogy between Young's double-slit experiment, which involves light, and this one, which involves magnetism. No follow-up on the cure was provided, which is especially important in the case of a chronic disorder like epilepsy. Patients undergoing surgical treatment of epilepsy, for instance, normally are followed for 3 to 5 years before a full assessment of the cure can be given.

What do the authors say? Reached by telephone, Anninos said he had heard some of these comments already, but that "everything new will always have some criticism." Details about the device are being kept secret to protect an international patent which has not yet been granted, he added. And he claimed that some background data have been published in past issues of the *IJN*, noting that he expects more to come out in future issues.

Anninos reports that the device has been used to treat more than 100 patients over the last year (they are trained to apply the therapy themselves), with "excellent results." The patients remain on anti-epileptic drugs throughout the procedure, and Anninos says that among those who normally have seizures each day, he has observed that after magnetic therapy they remain free of seizures "for 7 days to 1 month." As for his use of the term "cure," he concedes that this is "a very strong word" and that "maybe it was a mistake." Anninos says it might have been better to write that the device "smooths" epileptic attacks.

The journal's editor, Sidney Weinstein of Neurocommunication Research Laboratories in Danbury, Connecticut, says that he had "reservations" about the article when he received it and realized that "controls were lacking," but that an editor is at the mercy of the reviewers in such a situation. "I am not in neuromagnetism myself," he says, "and I don't ride tight herd on my reviewers. I give them a lot of latitude. In that kind of situation, you have to depend heavily on them." Indeed, Weinstein says, one of the two reviewers who passed the article was so enthusiastic that he said it was worth a Nobel Prize. "It's hard to turn down an article with a recommendation like that," Weinstein says. Defending the decision to publish the article, he said that the controversy "may do a lot of good" by reminding reviewers of their responsibilities.

But other scientists lay the responsibility squarely at the foot of the editor. "It's true," Pedley says, "that when you review an article, there are certain things you have to take on faith. You have to assume that the experiments were carried out the way they were described, that the data are correct, and so forth. And there are inevitably differences of judgment. But that's why it is especially important for an editor to pick good reviewers. I can't believe that this article was seriously reviewed by anybody that had the least knowledge of biomagnetism or epilepsy or even the slightest awareness of the general principles governing scientific reports. And that's the editor's responsibility."

"The system is working, and if there's controversy about this article that's just the normal scientific process at work."

—Sidney Weinstein

Weinstein says, "It's hard to find the reviewers you want," given the speed with which his journal publishes—24 issues a year. Weinstein makes another argument: there is a virtue in journals that are not as rigorous as others. "There's the issue of academic freedom," he told *Science*. "This article suggested a new approach to a therapy, and even if it is not fully worked out, its publication gives people a chance to look at the idea." Indeed, Weinstein claims, imposing rigorous standards on articles may serve in practice to discriminate against scientists in countries whose laboratories do not have the same resources as those in the United States, and he proudly says that his journal is counterbalancing that bias. "I give a certain latitude to papers from places outside the United States," he says. "This is a true international journal, with I think more papers from outside the United States than inside—unlike some of those so-called international journals where 95% of the articles are from the U.S. and the rest from England."

Many other scientists, however, were unsympathetic to the "affirmative action" approach to scientific articles. "I think that's wrong," says Purpura. "I think you have to be as rigorous with material from a remote country, and even more so, to make certain that the material that is published is outstanding and calls attention to the excellence of that laboratory. You aren't doing a service to science or to the members of that laboratory when you patronize them."

When asked about his own role on the masthead of the journal, Purpura said, "I haven't reviewed papers in years and years. I'm not really doing my duty. I suppose I should either resign or become more creatively involved in the journal."

The scientists who were outraged by the epilepsy article find one aspect of Weinstein's argument infuriating: it is inexcusable, they say, to loosen standards when an article involves a purported cure for a serious illness affecting millions of people. "To my mind," says Pedley, "the mere mention of such a cure in the scientific press poses the same kind of danger as that posed by laetrile. Epilepsy is a chronic disorder that for at least 20% or 30% of the people afflicted is incompletely controlled and disabling to a significant degree. When something like this comes out—and all it takes is a few people to spread the word like wildfire, and we try to stop it—it is bound to look like that old story about how organized medicine is reluctant to accept the new. . . . Your precious resources are used up to combat things that should never have appeared."

Lloyd Kaufman, the advisory board member who threatened to resign if his letter attacking the article went unheeded, pointed to another danger. "A bad paper like this one has the potential to bring disrepute to the entire discipline. People may start to say things like, 'Oh, you're the guys who cure epilepsy with magnetic fields.' That may make it harder for us to get funds."

But Weinstein insists that all the controversy belongs to the normal part of scientific dialogue. "Look," he says, "this isn't a case like that of cold fusion. These guys went to a journal first and not to the newspapers. Some people told me this was worth publishing, and I did. Other people criticized them and said they hadn't proven their point and were precipitous and careless, and I'm publishing those criticisms, too. The system is working, and if there's controversy about this article that's just the normal scientific process at work." ■ **ROBERT P. CREASE**

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