calibrate their distance scale, which they got last year when they spotted a supernova and a variable star known as a Cepheid in the same galaxy. Cepheids brighten and darken with a rhythm that indicates their intrinsic brightness, which enables astronomers to use them as an independent distance scale. By hooking together the supernova and Cepheid scales, Sandage and Saha were able to get an absolute distance to their supernova—and thus to all the other supernovae they had catalogued earlier. The results point to a Hubble constant of 50, and a universe twice as large and old (perhaps 15 billion years) as other methods imply (*Science*, 3 July 1992, p. 34).

"Their arguments sounded good to me," says Kirshner. Theorist Peebles agrees, calling the Sandage-Saha result "dramatic—not to be sneezed at." But the small universe crowd counters that the supernova Sandage and Saha relied on to calibrate his distance scale might be unusually bright, which would make other, dimmer supernovas look farther than they really are. And they stress the number of independent methods that all give the small universe answer. "One would have to have all these methods have a fatal flaw of the same amplitude," says Hawaii's Tully.

"On the surface, it looks like everything is going their way," admits Sandage. But he's not backing down. "I've believed the Hubble constant is 50 since 1974," he says. "I'm convinced the other side is wrong."

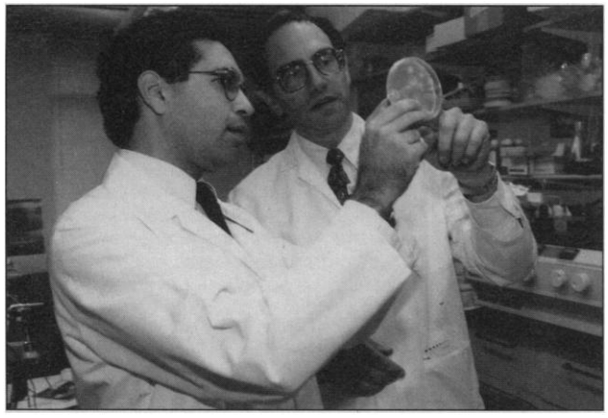
Others astronomers think Sandage is emotionally wedded to his large distance scale. Sandage acknowledges the possibility, but thinks the same kind of prejudices are influencing his opponents. In the forward to his *Hubble Catalog of Galaxies* he observes, "Belief is never an entirely rational thing. It comes partly from a logical sifting of all facts, but also from intuition and deep philosophical yearning for a system of ideas." But whatever the role of faith and aesthetic preference in the great cosmic distance debate, Sandage says, the scientific method will settle things in the end.

–Faye Flam

CLINICAL IMMUNOLOGY

MS Study Yields Mixed Results

Over the past several years, immunologists have built a case that the nerve cell degeneration of multiple sclerosis (MS) is the result of the immune system going awry and mistakenly attacking the myelin sheaths that cover many neurons. Attempts to block this abnormal immune attack with broad-spectrum immunosuppressive drugs have been plagued by side effects, however, and several groups have been trying to devise less dangerous, more specific, treatments. On page 1321, a research team from Harvard Medical School and the School of Public Health, led by neuroimmunologists Howard Weiner and David Hafler, now reports the first results from a small clinical trial aimed at testing one possible therapy, known as "antigen feeding," in human multiple sclerosis patients. They found tantalizing signs of improvement in some of the treated patients, but the results were not statistically significant and it's still far too early to say whether the treatment works.



Collaborators. David Hafler *(left)* and Howard Weiner led the antigen feeding study in MS patients.

During the year-long pilot study, 15 individuals in the early stages of multiple sclerosis were fed bovine myelin, a substance containing two of the antigens thought to be the targets of the immune system's attack in multiple sclerosis. Another 15 were treated with placebo. The rationale behind this treatment? Immunologists have known for nearly a century that they could induce animals to become tolerant to an antigen simply by feeding it to them. Then, a few years ago, researchers showed that feeding the antigens that induce experimental autoimmune conditions in animals, including one resembling multiple sclerosis, could prevent symptoms from developing (*Science*, 5 April 1991, p. 27).

In the MS pilot study, fewer members of the group fed bovine myelin had major attacks of their disease than the control group, though the decrease fell shy of statistical significance. In addition, antigen feeding did not seem effective for the study's female patients, all of whom carried a particular histocompatibility protein variant designated HLA-DR2, whose possession is thought to make people more susceptible to the disease.

Those results have led some observers to warn against taking too much encouragement from the study findings. Stephen Reingold, vice-president of Research and Medical Programs at the National Multiple Sclerosis Society calls it "provocative," but says: "there's been no demonstration of benefit. The danger is that conclusions be made from the study that are unsupportable." Larry Steinman, a neuroscientist at Stanford University School of Medicine, who's also working on potential immunotherapies for multiple sclerosis, adds that the lack of success in females is particularly discouraging. Women constitute roughly two-thirds of MS patients.

Weiner and Hafler say, however, that broad conclusions—positive or negative—shouldn't be drawn from the pilot study of only 30 individuals. The researchers suggest that the different responses of men and women in this study could be due to a number of things, from small sample size to requirements for different doses of bovine myelin.

They also note there were other encouraging signs in addition to the improvement seen in some of the men. Individuals treated with the bovine myelin showed a significant decrease in the numbers of immune T cells that react with myelin basic protein. Since the protein is a presumed target of the immune attack in multiple sclerosis, that indicates that the treatment is specifically suppressing immunity to the antigen. Weiner says he's encouraged by the results, given the apparent simplicity of the antigen feeding approach. "In a way," he said, "it's hard to believe that we'd see something by simply feeding a protein." The Harvard team also reports that individuals taking bovine myelin did not seem to suffer any harmful side effects.

Other researchers involved with ongoing antigen feeding trials are also encouraged. David Trentham of Beth Israel Hospital, who's conducting a study in rheumatoid arthritis patients, says the new results are an "exciting beginning." Robert Nussenblatt, of the National Eye Institute in Bethesda, Maryland, who is testing antigen feeding on uveitis, an inflammation of the eye, agrees, saying that the importance of antigen feeding could be far-reaching, potentially even extending to suppressing transplant rejection.

But in the end the multiple sclerosis study may have raised more questions than it answered. As Weiner explains, "The paper should really be viewed as asking the question: 'Should more studies be done?' And I think the answer is clearly 'Yes.'"

–Carol Kaesuk Yoon

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