Gene therapists told to do more homework

In their initial request to a National Institutes of Health subcommittee last week, federal researchers failed to win permission to perform the first U.S. gene therapy experiments in humans.

Few scientists expected instant approval of the proposal, which calls for injecting therapeutic, gene-altered cells into children with a life-threatening immune deficiency. But the degree of skepticism expressed by members of the Human Gene Therapy Subcommittee suggests the experiments may not occur anytime soon.

At the same meeting, however, some of the same researchers proposing the gene therapy work received permission to infuse cells bearing *non*therapeutic genetic alterations into an expanded number of patients with malignant melanoma. Those experiments, already performed on seven patients, are designed to help reveal how the body normally defends itself against cancer (SN: 9/23/89, p.197). With the added information from an expanded study group, the scientists may be ready this summer to adapt the procedure to include a cancer-fighting substance called tumor necrosis factor, says NIH researcher W. French Anderson. Anderson developed the melanoma protocol with NIH colleagues Steven Rosenberg and R. Michael Blaese.

Such a step would represent the first U.S.-approved administration of genetically engineered cells to treat a human disease. But Blaese and Anderson have long had their sights on another disease as the first they'd like to cure using gene therapy techniques. After years of preparation, the two researchers last week submitted to the NIH subcommittee a several-hundred-page document outlining their plan to treat an extremely rare, inherited immune disorder called adenosine deaminase (ADA) deficiency.

The disease, incurable until recently, results from a diminished supply of a critical blood enzyme, ADA. The researchers propose to inject engineered, ADA-secreting cells into affected children.

Many subcommittee members, however, said they remain unconvinced of the novel procedure's readiness for human testing. They noted that the proposal fails to answer some questions regarding the treatment's anticipated efficacy. Some expressed concern that technical problems have precluded tests of the procedure in mice – a common prerequisite to human trials.

Matters were complicated by the FDA's licensing last month of the first drug treatment for ADA deficiency. Subcommittee members said they were unable to judge whether gene therapy held any potential advantages over the new drug, called PEG-ADA, which provides ADA through weekly injections. Michael Hershfield of the Duke University Medical Center in Durham, N.C., who coordinated the trials leading to the drug's approval, noted that many of the 13 children treated so far have now survived chicken pox and other common infections that frequently kill ADA-deficient kids before age 2.

Anderson told subcommittee members he would update the research proposal for their next meeting, now planned for June or July. – *R. Weiss*

Europeans set infrared satellite launch

Three years from now, a European Ariane rocket will boost a satellite into Earth orbit to look at hot stars, shells of dust around cool stars, possible planetary systems in formation and other sources of infrared emissions. Called the Infrared Space Observatory (ISO), it will expand on 1983 observations by the Infrared Astronomy Satellite (IRAS), a primarily U.S.-sponsored craft that took the first-ever survey of the infrared sky from above Earth's atmosphere.

Roger Bonnet, director of science programs at the European Space Agency in Paris, announced last week that the launch will take place in the spring of 1993 from the agency's space center in Kourou, French Guiana.

During the IRAS mission, only project scientists had access to the satellite. In contrast, two-thirds of ISO's observing time will be made available to the astronomical community at large. Furthermore, ISO's planners designed it to operate for 18 months, nearly twice the length of the IRAS flight.

IRAS detected infrared emissions with wavelengths no shorter than about 8 microns, whereas ISO can sense emissions as short as 2.5 microns. This should assist in searches for cooler infrared sources, such as particularly dim stars and perhaps postulated objects known as brown dwarfs. The mass of a brown dwarf is apparently so low that its self-gravity cannot create enough internal pressure to ignite thermonuclear fusion reactions, the most prominent source of starlight (see story, this page).

On the other end of the infrared spectrum, ISO should detect emissions with wavelengths as long as 200 microns, compared with 119 microns for IRAS. This may improve observations of emissions from very cold dust in the interstellar regions of the Milky Way and other galaxies, and of a 158-micron carbon spectral line valuable in understanding the physics of interstellar space. – *J. Eberhart*

Faint star may have a brown-dwarf glow

Astronomers have identified what they believe is the faintest star yet detected – a dim red star in the skies of the Southern Hemisphere. Preliminary evidence suggests it may have a mass small enough to qualify it as a brown dwarf. According to theory, a brown dwarf would have such a weak gravitational field that nuclear fusion reactions, which power larger, brighter stars, could not occur at its core.

The discovery stems from the work of Philip A. Ianna of the University of Virginia in Charlottesville and Michael S. Bessell of the Stromlo and Siding Spring Observatories in Australia. The researchers determined the distance from Earth to the dimmest of a number of very faint stars identified in a survey conducted by Michael R.S. Hawkins of the Royal Observatory in Edinburgh, Scotland. This particular star, they found, lies about 68 light-years from Earth and shines with a brightness only about one-four-thousandth that of the sun.

Whether a star falls in the brown-dwarf category depends on its mass, which astronomers cannot determine directly. To calculate the mass of such a celestial object, they rely on theoretical models that relate a star's brightness to its mass. But uncertainties in the models can lead to large errors.

"Theory tells us the brightness depends not just on the mass but also on the age of the object," says Donald W. McCarthy Jr. of the University of Arizona in Tucson. Young brown-dwarf stars would be much brighter than older stars of a similar mass. "A lot hinges on the object's age," he says.

"The redder stars we saw in our survey appear to be younger than the hotter stars," Bessell says. According to one theoretical model, that assumption would put the mass of the faintest of these stars as low as 5 percent of the sun's mass – low enough for it to be a brown dwarf. But uncertainties in the data and theory mean that the star's mass could still exceed 8 percent of the sun's mass – the minimum mass a star must have to sustain nuclear fusion.

Ianna and Bessell are now applying the same measurement techniques to other faint stars. By studying a population of such dim stars in detail, astronomers hope to refine their theories concerning the behavior and characteristics of brown dwarfs.

"It's all very encouraging," says Michael F. Skrutskie of the University of Massachusetts in Amherst. "At this point, it would be hard to detect a star that's fainter than the faintest known stars without it being a brown dwarf. But extraordinary claims require extraordinary evidence." – *I. Peterson*