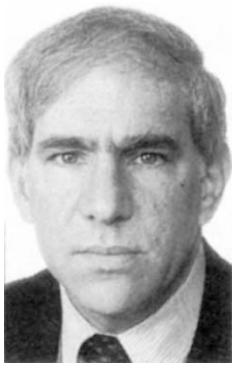
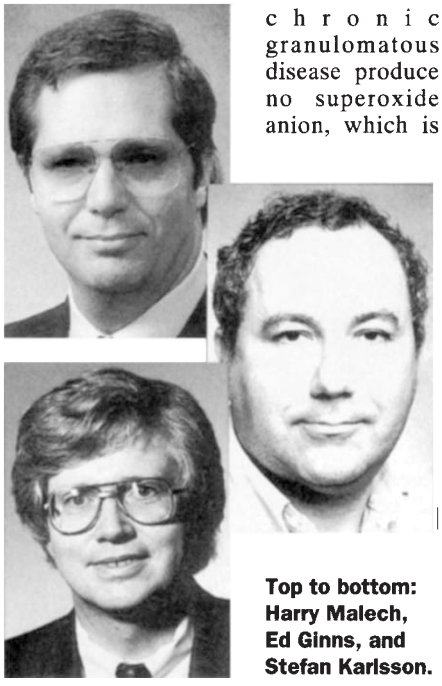


Ron Crystal

tests on the two girls by the end of the year. If ADA-deficient patients could receive progenitor stem cells containing the ADA gene instead of the much shorter-lived T-cells, they would need fewer transfusions — and eventually none.

A gene therapy for cystic fibrosis is being tested in primates by Ronald Crystal of NHLBI. Cystic fibrosis results from a mutation affecting the epithelial cells lining the airways of the lung. Crystal realized that virus containing the desired gene would need to be applied directly to airway cells, so he decided to introduce the virus through a bronchoscope rather than with injections of virus-carrying cells, a more widely used technique. Crystal hopes to submit a protocol to the RAC within six months.



Top to bottom: Harry Malech, Ed Ginns, and Stefan Karlsson.

Patients with chronic granulomatous disease produce no superoxide anion, which is used by phagocytes to kill invading microorganisms. As a result, patients suffer frequent life-threatening fungal and bacterial infections. Harry Malech of the National Institute of Allergy and Infectious Diseases is working on inserting the genes involved in superoxide production into peripheral blood progenitor cells.

Two NIH researchers are working on gene therapy for Gaucher's disease, a hereditary lack of the enzyme used by lysosomes to break down the common lipid breakdown product glucocerebrocide. Patients suffer from weak bones, anaemia and, in some cases, nerve damage. Stefan Karlsson of the National Institute on Neurological Disorders and Stroke is developing bone marrow stem cells that would carry the enzyme and generate normal lysosomes. Edward Ginns of the National Institute of Mental Health is working on a two-part strategy: first, clear patients' bodies of accumulated fat with a recently introduced drug for Gaucher's, then keep lipid levels down by injecting patients with bioengineered non-stem cells such as fibroblasts or endothelial cells. Both Karlsson and Ginns hope to submit proto-cols to the RAC soon.

Robert Nussenblatt

Gene therapy for the hereditary eye disease gyrate atrophy, which leads to total blindness in adults, is being developed by Robert Nussenblatt of the National Eye Institute. Gyrate atrophy patients lack an enzyme that breaks down the amino acid ornithine, leading to high levels of ornithine in the blood. Nussenblatt's research team is working on inserting the enzyme into lymphocytes that would collect and break down the excess ornithine in the bloodstream.

Morgan is also experimenting with a therapy for haemophilia. He is inserting the gene for clotting factors XIII and IX into different cell types *in vitro* to learn whether the genes will retain their ability to synthesize protein.

■ Cardiovascular disease

Clots often form in synthetic blood vessels used for bypasses, so Dichek of NHLBI is trying to create a bioengineered endothelial cell that will stick to the vessel walls and produce clot-dissolving protein. Dichek also hopes to use bioengineered viruses to prevent the reclogging of the arteries that commonly follows angioplasty. Through studies on animals, he has learned that catheters can be used to deliver gene-laden carrier viruses to the cells that make up artery walls. Dichek hopes to increase the amount of virus entering the cells so that the technique could be used to treat patients with genes that would inhibit clogging.

David Dichek

Traci Watson

Flourishing genes

Gene therapy research is flourishing not only on the campus of the National Institutes of Health in Bethesda, Maryland, but also at research centres across the country. This month, for example, the National Cancer Institute will award the first grants in a four-year, $20-million gene therapy programme.

The following institutions have scientists working on gene therapy or gene transfer protocols that have been accepted by NIH's Recombinant DNA Committee:

Baylor College of Medicine, Houston;
University of California, Los Angeles;
Indiana University at Indianapolis;
M.D. Anderson Cancer Center, Houston;
Memorial Sloan-Kettering Cancer Center, New York;
University of Michigan at Ann Arbor;
University of Pittsburgh (Pennsylvania) School of Medicine;
St. Jude Children's Research Hospital, Memphis, Tennessee;
University of Washington, Seattle.

NIH to help women return to research

Washington. Female biomedical researchers who leave science to raise children or attend to other family needs can get help in resuming their careers through a new $1 million programme sponsored by the US National Institutes of Health (NIH). NIH officials hope the programme, the first to encourage women to return to science, will increase the number of female scientists in top-level research positions.

The programme, sponsored jointly by the Office of Research on Women's Health and the Office of Extramural Research, will award 10 to 15 women as much as $40,000 annually for one year to do research with scientists already holding NIH grants. The project will also pay up to $10,000 for supplies and travel for each woman, whose work must be related to the project and serve to "refresh existing research skills and knowledge." Candidates must hold a doctoral degree and have completed most or all of their postdoctoral training.

Funding requests must come from the researchers with whom the women want to work. This year, 55 applications have been filed, and NIH hopes to hand out the money before the end of the current fiscal year on 30 September.

The programme is intended to rectify a disturbing statistic: although women hold more than 40 per cent of NIH's biomedical training positions, only 19 per cent of the