Pigs may also become a source of organs. Several research teams and private companies are breeding genetically engineered pigs whose cell surface antigens have been altered to be less provocative to the human immune system (see *Nature Medicine* 1, 423–427; 1995).

The IOM panel will attempt to sort out how to cope with the risks xenotransplants may pose to the general population. Norman Levinski, chairman of the Department of Medicine from Boston University Medical Center, and chair of the IOM panel, says his group will examine three key questions now posed by xenotransplantation research: Is the scientific base adequate to justify human trials? What are the risks of introducing infectious agents to the population at large? And, if the science base is adequate and the risks are acceptable, how should society monitor xenotransplantation experiments?

Levinski says the three basic options for monitoring the field are leaving xenotransplant protocols entirely to the discretion of local Institutional Review Boards, establishing minimum national standards for how xenotransplantation research should be conducted, and forming a national review panel or empowering a regulatory agency to approve or disapprove all xenotransplantation proposals.

"Many people are willing, if they are desperately ill, to try desperate remedies," says Levinski. "But with xenotransplantation, there is an ill-defined but probably very small chance that people who personally get no benefit from the science could be harmed, and that poses a difficult ethical problem," he says. The IOM panel will present its conclusions early next year.

The FDA and CDC joint guidelines for xenotransplant research will not attempt to answer the question of whether xenotransplantation research should or should not proceed, says Philip Noguchi of the FDA. Instead, the guidelines will outline procedures for minimizing infectious risks by screening donor animals, and for patient isolation after the transplant, as well as requirements for participation in the study by people with infectious disease and epidemiological expertise, and the archiving of tissue and long-term follow up of animal tissue recipients. Draft guidelines should be published in the Federal Register for comment by early next year. "Whatever we do won't be perfect, and some risk will still be present," says Noguchi.

Meanwhile, pressure to make xenotransplantation work continues to build. Jeffrey Geddy, an HIV-positive member of ACT-UP/Golden Gate, an AIDS activist organization in San Francisco, is currently slated to receive the first experimental baboon bone marrow transplant. "I probably have less than a year to live," says Geddy. "My doctors want to go forward with an experiment that may not save my life, but could well lead to a treatment that will save thousands of others. We can't let fears of theoretical risks stop research."

ROBERT TAYLOR
Washington, DC

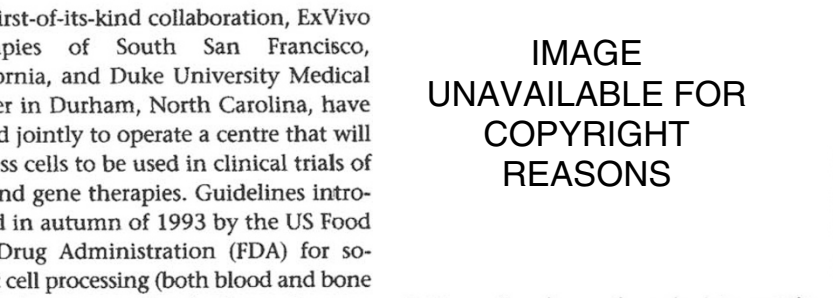
As *Nature Medicine* went to press, an FDA advisory committee recommended that, subject to investigators' supplying more data concerning procedures for isolating the patient during and after treatment, that the agency should allow the baboon bone marrow transplant to go ahead. The committee advised the investigators to locate new donor baboons, with fewer viruses than the five identified in the two candidate baboons, but felt that this was insufficient reason to put the protocol on hold when the patient is dying of AIDS. Once the new data are forthcoming, an FDA spokesperson said that final approval could be given in a matter of weeks.

Duke lands industry-backed cell-processing centre

In a first-of-its-kind collaboration, ExVivo Therapies of South San Francisco, California, and Duke University Medical Center in Durham, North Carolina, have agreed jointly to operate a centre that will process cells to be used in clinical trials of cell and gene therapies. Guidelines introduced in autumn of 1993 by the US Food and Drug Administration (FDA) for somatic cell processing (both blood and bone marrow) were a catalyst for the endeavour, as the agency readies itself to regulate these therapies in the same manner that it now regulates vaccines and serums.

"The guidelines make it critical for any university that needs to perform clinical trials to have a [cell-] processing centre. Research laboratories are not equipped to mass-produce these cells under controlled conditions," explains Dennis Meredith, a spokesperson for Duke University. Last year, researchers at the university received a green light from the US National Institutes of Health's Recombinant DNA Advisory Committee (RAC) to conduct phase I clinical trials to test the safety of a therapy for breast cancer.

The Medical Center's Human Vaccine Institute is currently undertaking an array of gene therapy studies designed to enhance the ability of the immune system to combat infectious diseases, to curtail autoimmune disorders, and to prevent cancer metastasis. For example, the breast cancer protocol that received RAC approval uses cells genetically manipulated to release interleukin-2 (IL-2). The IL-2 gene-altered cells promoted killer T-cell production and reduced tumour metastasis by two-thirds in mice. Also, the experimental therapy uses a liposome vector, instead of a virus, to move modified genes into the cell nucleus.



Applied Immune Sciences

Putting cell and gene therapies into practice.

According to Kim Lyerly, who directs clinical trials at Duke, a successful therapy for women with breast cancer would serve two roles: curtailing additional tumour growth in women with early-stage disease and slowing disease progression in women with advanced disease. It is estimated that more than 40,000 women die annually from metastatic breast cancer in the United States.

The ability to reach a patient population base on the east coast of the United States and access to intellectual property, prompted ExVivo to finance construction of the new facility. "Intellectual property rights will be determined on a project-by-project basis," explains Robert Taber, Associate Vice Chancellor of the Medical Center. He anticipates "strictly Duke" projects emerging from the processing plant, as well as collaborative efforts with ExVivo. Applied Immune Sciences, of Santa Clara, California, one of ExVivo's parent companies (Rhône-Poulenc Rorer is the other), will have first refusal on the rights to license any research stemming from the collaboration.

The Medical Center chose to work with ExVivo because the company has considerable experience in this area and already operates four cell-processing facilities, two in California and two in Europe. The new facility is scheduled for completion later this year.

BARBARA NASTO
New York