Embryo transfers achieved in humans

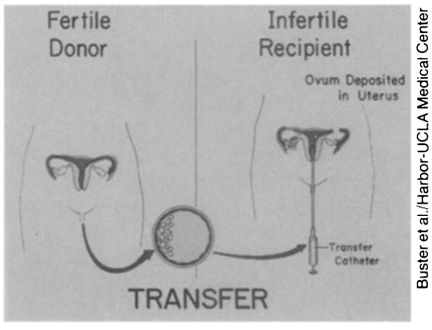
First it was artificial insemination, then *in vitro* fertilization, then surrogate mothering and subsequently *in vitro* fertilization with frozen embryos. And now yet another major advance in human procreation engineering has been announced by California scientists — the world's first two apparently successful transfers of an embryo from the womb of one woman into that of another.

Embryo transfer consists of the transfer of a fertilized egg from a volunteer fertile donor to an infertile recipient, the fertile donor having been artificially inseminated with sperm — in these cases, from the recipient's husband. A child born to the infertile recipient will not carry her genes, but it will carry those of her husband along with those of the donor.

With this method, sperm from the prospective father is first placed in the uterus of the fertile donor at the time of ovulation. If the sperm fertilizes her ovulated egg, the resulting embryo is flushed from her womb during the first week of pregnancy through a soft plastic tube called a catheter. It is then inserted into the womb of the infertile recipient via a catheter in hopes that it will implant itself there and continue to develop normally until the time of birth.

John E. Buster and colleagues at the Harbor-UCLA Medical Center in Torrance, Calif. attempted embryo transfer in 14 cases where an infertile recipient had undergone unsuccessful surgery to remove a fallopian tube obstruction. This obstruction prevented eggs from passing from her ovaries into her uterus to be fertilized. Each infertile recipient had expressed strong wishes not to undergo additional corrective surgery. The transfer effort had been approved by the Harbor-UCLA Institutional Review Board, and all parties involved had signed informed consent forms.

As Buster and his co-workers report in the July 22 LANCET, five embryos resulted from the 14 efforts to fertilize fertile donors' eggs with sperm from the husbands of the infertile recipients. And two of the five embryos "took" in the wombs of infertile recipients. One of the embryos is now a five-month-old fetus; the other is a six-week-old fetus. Both appear to be developing normally.



Buster et al./Harbor-UCLA Medical Center

In embryo transfer, a catheter is used to remove the embryo from the fertile donor's uterus to that of the infertile recipient.

At a press conference held in conjunction with their LANCET report, Buster and his colleagues said that they foresee embryo transfer benefiting couples with three different kinds of reproduction problems: where the woman has surgically untreatable blocked fallopian tubes; where a woman who is infertile because of blocked fallopian tubes would like to take advantage of *in vitro* fertilization, but where physicians are unable to surgically remove an egg from her ovaries to carry out the technique; and where the woman is afraid of passing her own genes on because she is a carrier of Tay-Sachs, cystic fibrosis, hemophilia, sickle cell anemia or some other serious genetic disease.

Linda Ellsworth, a member of the *in vitro* fertilization team at the University of Texas Health Science Center at San Antonio, told SCIENCE NEWS that she foresees embryo transfer benefiting couples with yet another kind of reproduction problem. This is where the woman's infertility is due to her inability to make eggs because of infection, accidents or surgery.

—J. A. Treichel

Fragile sites may raise cancer risk

Why do some smokers develop lung cancer, while others do not? According to Jorge J. Yunis of the University of Minnesota in Minneapolis, genetic weaknesses called "fragile sites" make some people more susceptible than others to at least five types of cancer.

Using a newly improved chromosome-banding technique, Yunis studied human tumor cells and found that "most cancers have characteristic defects" — rearranged or deleted genes. He postulates that defects may initiate cancer by activating cancer genes.

Yunis then compared tumor cell chromosomes to those of white blood cells. In five cases reported in the July 15 SCIENCE and in nine cases not yet published, Yunis found that at the locations where defects appeared in chromosomes of cancer cells, the chromosomes of blood cells displayed corresponding fragile sites, spots very prone to breakage.

Yunis, who describes his results as "preliminary but promising," found fragile sites coinciding with breakpoints associated with a common form of lung cancer, two types of leukemia and two kinds of lymphoma. People with these fragile sites, he says, could be especially vulnerable to the effects of smoking, radiation and chemical carcinogens.

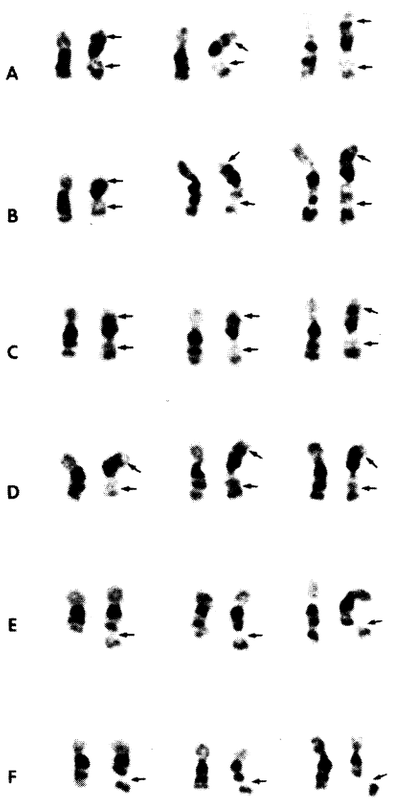
By staining chromosomes after they replicate but before they divide, researchers can view characteristic patterns of light and dark bands. Yunis tested for fragile sites by first culturing white blood cells in a medium deficient in two DNA precursors. Deprived of these important substances, some replicating chromosomes display small gaps, or fragile sites.

So far, researchers have found 21 fragile sites, which, by definition, are inherited or acquired at conception. Eight of these correspond to cancer-related chromosome defects. Yunis estimates that eventually about 50 fragile sites will be associated with the 200 or so forms of cancer.

Based on preliminary results of a large scale study, Yunis says most fragile sites occur in only 1 of 400 healthy people. However, Yunis finds the sites he links to a lung cancer associated with heavy smoking in 10 percent of the control population. Smokers with these common fragile sites, he says, could be especially susceptible to lung cancer, which causes 110,000 deaths in the United States each year.

If the fragile site/cancer correlation is confirmed, Yunis told SCIENCE NEWS, "blood screening could be used as a routine predisposition test for cancer."

—S. Steinberg



Cancer Genetics and Cytogenetics. In press, 1983.

Pairs of chromosome 16 from four leukemia victims. A-D: Leukemic marrow cell chromosomes, showing an inversion between the arrows. E-F: Normal white blood cell chromosomes from patients A and D respectively, illustrating a fragile site corresponding to the cancer cell inversion.