

Embryo splitting for infertility treatment

The Ethics Committee of the American Society for Reproductive Medicine

American Society for Reproductive Medicine, Birmingham, Alabama

Because early embryonic cells are totipotent, the possibility of splitting or separating the blastomeres of early preimplantation embryos to increase the number of embryos that are available for IVF treatment of infertility is being discussed. Because embryo splitting could lead to two or more embryos with the same genome, the term “cloning” has been used to describe this practice. Embryo splitting, however, does not involve any direct manipulation, transfer, or substitution of the entire genome, as occurs in conventional understanding of cloning by nuclear substitution.

Splitting one embryo into two or more embryos could serve the needs of infertile couples in several ways. For couples who can produce only one or two embryos, splitting embryos could increase the number of embryos available for transfer in a single IVF cycle. Because the IVF pregnancy rate increases with the number of embryos transferred, it is thought that embryo splitting when only one or two embryos are produced may result in a pregnancy that would not otherwise have occurred. For couples who produce more than enough embryos for one cycle of transfer, splitting one or more embryos may provide sufficient embryos for subsequent transfers without having to go through another retrieval cycle, thus lessening the physical burdens and costs of IVF treatment for infertility. In addition, this technique may have application in preimplantation genetic diagnosis.

Whether embryo splitting is clinically feasible, and whether the expected benefits to infertile couples will outweigh its risks and possible misapplication is unknown at the present time and cannot be determined without further research. However, a number of ethical objections have been raised against the practice. One ethical objection is that embryos will be manipulated and destroyed in the process of re-

search and application. Another objection is that identical twins may be deliberately created, and might be born several years apart. Some commentators also raised the possibility that the technical ability to split embryos could lead couples to have embryos split, not as part of a treatment for infertility, but to provide “back up” embryos in case an existing child with the same genome needs a tissue or organ transplant, or dies. Fears also have been voiced that embryo splitting and storage could lead to a market in stored embryos based on the desirability of the genetic trait of children born with that genome.

Whereas these ethical concerns raise important issues, neither alone nor together do they offer sufficient reasons for not proceeding with research into embryo splitting and blastomere separation. Several of the concerns—such as the use of split embryos as a source of organs or tissues for an existing child, or the sale of stored embryos with desirable genomes based on the appearance of characteristics of existing children—are speculative and hypothetical. It is unclear whether such practices would occur at all or to any significant extent, even if embryo splitting were clinically feasible and successful. While some of these applications may be unethical, they could be prohibited without also prohibiting embryo splitting designed to produce sufficient embryos for successful IVF treatment or other medical applications.

Concerns that embryo splitting could lead to more than one child born with identical genomes is a more realistic possibility if embryo splitting is clinically successful, but still is not a sufficient reason to discourage research in the technique. Since identical twins often are born independent of assisted reproduction and do well, the birth of twins as a result of embryo splitting should not be a major concern. Indeed, such an event usually will be the by-product of

Released in *Fertil Steril*
1997;67:Suppl 1; Reviewed
January 2004.

No reprints will be
available.

Correspondence to: Ethics
Committee, American
Society for Reproductive
Medicine, 1209
Montgomery Highway,
Birmingham, Alabama
35216.

0015-0282/04/\$30.00
doi:10.1016/j.fertnstert.2004.
05.028

an attempt to have one child, and not the result of the intention to create twins. As long as a couple is fully informed of the risk of such an outcome, there would appear to be no major ethical objection to placing two or more embryos with the same genome in the uterus with the hope of producing a single pregnancy.

Of greater concern is the possibility that embryo splitting could lead to offspring with identical genomes being born at different times—twins or triplets (if that is the proper term) whose births are separated in time. This could arise because splitting embryos or blastomere separation could produce more embryos than are transferred to the uterus in a single cycle, with the remainder cryopreserved and transferred at a later time. If such later transfers occur, they most likely would occur within a few years of the birth of the first child with that genome, but also subsequent transfers and births could occur several years later. Transfer in these cases raises philosophical and psychological questions about personal identity and the meaning of being a twin that require further investigation before it can be determined that such transfers

are ethical. Such a possibility could be eliminated entirely by transferring all genetically identical embryos in the same cycle.

In sum, since embryo splitting has the potential to improve the efficacy of IVF treatments for infertility, research to investigate the technique is ethically acceptable. Persons asked to donate gametes or embryos for such research should be fully informed that research in embryo splitting is intended or planned as a result of their donation. The fears of possible future abuses of the technique are not sufficient to stop valid research in use of embryo splitting as a treatment for infertility.

Acknowledgments: This statement was developed by the American Society for Reproductive Medicine's Ethics Committee and accepted by the Board of Directors on December 8, 1995.