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HUMAN CLONING

Following the successful cloning of an adult sheep, announced in Scotland in 1996, various commentators -- scientists and theologians, physicians and legal experts, talk-radio hosts and editorial writers raised concerns about the prospect of cloning a human being. At the request of the President, the National Bioethics Advisory Commission (NBAC) held hearings and prepared a report on the religious, ethical, and legal issues surrounding human cloning, recommending a moratorium on efforts to clone human beings. In 2008, the U.S. Food and Drug Administration (FDA) decided meat and milk from cloned animals are as safe as those from non-cloned animals. Cloning has also been used in attempt to build populations of endangered species of animals.

The term "cloning" refers to three procedures, each with very different objectives. The three different types of "cloning" are:

- **Reproductive cloning:** The objective is to replicate an existing animal by removing the DNA of one of its cells and swapping this with the DNA in an egg from the same species. Following this process of "artificial fertilization," the resulting "pre-embryo" is either transferred directly to the uterus or is allowed to divide several times with the resulting embryo being transferred. Reproductive cloning has been used to clone sheep and other mammals. In the process however, serious genetic, developmental abnormalities have been noted in more than 30% of offspring. The likelihood that the same attrition rate would occur in humans, coupled with the belief that cloning disregards the sanctity of human life, has caused many medical ethicists to consider this procedure as morally repugnant. There have been a few claims of successful cloning in humans, but to date none of these have been substantiated.
- **Embryo cloning:** This is an experimental medical technique referred to as "embryo splitting." It produces monozygotic (identical) twins or triplets by replicating the process that nature uses to produce identical twins or triplets. By this process, the embryo is virtually sliced in half or into thirds, allowed to develop further, and the separate sections are transferred to the uterus. The procedure is unlikely to produce an increased risk of birth defects, and has the potential to enhance the likelihood of pregnancy in infertility patients, who have been classified as "poor responders." Possible advantages are:

1. The potential for achieving improved IVF success following the acquisition of a single good quality embryo.
 2. By increasing the number of transferable embryos derived per fertilization of each egg, there could be a potential to obtain acceptable IVF pregnancy/birth rates in women who because of age and or “poor response to fertility drugs,” are otherwise hard pressed to produce even a single “viable” embryo with IVF.
- **Bio-therapeutic cloning:** The first step in bio-therapeutic cloning is the same as for reproductive cloning. The purpose is to generate embryos for the purpose of research mainly involving the harvesting of early embryonic “stem cells” that have the potential to develop into different tissue types, dependent upon the environment into which they are delivered and the stimulus evoked. The production of a healthy replica of a diseased tissue or organ could be vastly superior to relying on organ transplants from other people, and what is more, the supply would be unlimited. Theoretically at least, there would no risk of post transplant organ rejection and therefore no need to use immunosuppressive drugs.

Regardless of one’s personal beliefs, and as a Reproductive Scientist, I will volunteer that I am vehemently opposed to human cloning for many different reasons. The plain fact of the matter is that we live in a country where this is illegal. Therefore, until this decision is reversed (and I hope it will not be), the science will not develop. This needs to be distinguished from Stem Cell research, which we wholeheartedly support.

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This handout is intended as an aid to provide patients with general information. As science is rapidly evolving, some new information may not be presented here. It is not intended to replace or define evaluation and treatment by a physician.

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