



# Parthenogenesis

## **1 Introduction**

In a paper delivered at the 57<sup>th</sup> Annual Meeting of the American Society for Reproductive Medicine, held in Orlando Florida 20-25 October 2001, Feng and Hall described their attempt to produce neurons from stem cells derived from parthenogenetic mouse embryos.

## **2 What the scientists did**

To that end they used oocytes (mice ova) at the metaphase II stage and, by the introduction of chemicals, tricked the haploid egg cell (ie 23 chromosomes) into suppressing the extrusion of the second polar body. In effect these eggs were tricked into doubling their chromosomes so that the egg now had 46 chromosomes. Some of the embryos were cultured in vitro while others were placed into mouse oviducts. The embryos were allowed to develop to the blastocyst stage. At that point the embryos were taken apart so that the embryonic stem (ES) cells could be retrieved.

Stem cells were transferred into mouse kidneys. Others were cultured in vitro with retinoic acid. The first set of ES cells differentiated into neurons while the second set transformed into “classic-appearing nerve cells”.

The scientists concluded that this would have application to human beings to assist Parkinson’s Disease sufferers. It would, they said, bypass ethical difficulties in obtaining ES cells because the stem cells would not be gained by destroying human embryos. That is they made a distinction between what they called “a parthenogenetically-derived ES cell line” and one derived from using “normal embryos”. It would, they said, be particularly attractive to women “because of the histocompatibility of her own oocytes as a source of ES cells”.

## **3 Ethical evaluation**

In nature embryos are formed when a haploid sperm (23 chromosomes) fertilises a haploid egg (23 chromosomes) to form a diploid (46 chromosomes) embryo. When this occurs the human being has two copies of each of 22 chromosomes (leaving aside the chromosome which determines sex). A copy of each chromosome comes from each parent. A chromosome which carries a bad gene (ie one which carries an abnormality which could be expressed as a serious disability) would normally be countered by the copy which comes from the other parent’s oocyte meaning that the bad gene cannot be expressed.

Where this form of parthenogenesis is concerned, what is happening is that the 23 chromosomes are simply being replicated which means that any errors will not be countered. The result of this would be a very high incidence of genetic defects. To use the words of Dr David Elder, “It’s the ultimate in incestuous inbreeding”.

Accordingly, the status of the ES cells derived from this method must be very uncertain, and raises the question of the rightfulness of attempting to use ES cells from a very dodgy source for allegedly therapeutic purposes. Put another way, the



‘therapeutic’ use of such ES cells may produce worse consequences than the condition it seeks to alleviate.

Second, this form of “cloning” does not produce an identical clone of the mother. When the egg is produced the meiotic reduction division halves the mother’s chromosome number. This, together with other complex factors, ensures that the offspring is genetically different. But this form of producing embryos involves a simple duplication of that genetic difference which in turn means a strong likelihood of dangerous consequences.

Third, it doesn’t matter how an embryo is formed, naturally, by IVF, ICSI, or parthenogenesis, an embryonic human being is still an embryonic human being. Where there is doubt the embryo must be treated as a human being. The suggestion that this process bypasses difficult ethical issues where the destruction of embryos is concerned is not true.