

Notes on Bioethics

SCIENCE

One scientific question that can and should be raised given the theme of this issue of the *NCBQ* is the following: How good is the sequence data of the human genome project? Katsanis et al. (*Nat. Genet.*, Vol. 29, No. 1) evaluate the sequences reported by the Public Consortium and conclude that it contains appreciable errors which should be kept in mind by all who want to use this data. Restrictions placed upon the commercially funded data produced by Celera Genomics has precluded a parallel analysis of the results from the rival sequencing group.

Stem cells continue to excite much research interest in the biomedical community. Kaufman et al. (*Proc. Natl. Acad. Sci.*, Vol. 98, No. 9) report that they have transformed human embryonic stem cells into cells which give rise to blood precursors, an advance which could lead to novel sources of cells for transfusion and transplantation therapies. Their success, however, has to be tempered by the results of Humpherys et al. (*Science*, Vol. 293, No. 5527), who show that imprinted genes, that is, those genes whose activity differs depending upon whether they are found on the paternally or maternally derived chromosome, manifest abnormal and unstable expression in stem cells and organisms cloned from these cells. This could explain the many developmental abnormalities that have been observed in cloned individuals. Progress has also been made with adult stem cells. Condorelli et al. (*Proc. Natl. Acad. Sci.*, Vol. 98, No. 19) demonstrate that heart cells (cardiomyocytes) can induce endothelial cells derived from human umbilical vein to become cardiac muscle. In a related study, Orlic et al. (*Proc. Natl. Acad. Sci.*, Vol. 98, No. 18) report that primitive bone marrow cells injected into animals with damaged heart muscle are able to ameliorate the decreased function of the infarcted heart. Both these reports provide more evidence for the argument in the stem-cell wars that non-embryonically derived stem cells have great therapeutic promise.

Several papers report studies involving genetic engineering. Sears et al. and Stanley-Horn et al. (*Proc. Natl. Acad. Sci.*, Vol. 98, No. 21) are two of a handful of papers in this issue which suggest that genetically modified (GM) corn pollen has negligible effects on monarch butterfly populations, a result that challenges earlier work which had proposed that GM plants have toxic environmental effects. Wolfgang et al. (*Proc. Natl. Acad. Sci.*, Vol. 98, No. 19) describe a technical advance in the development of GM primates, in this case the rhesus monkey, which could be used to study primate-specific characteristics found in human beings. It is clear, however, that much work remains before gene knockout technology, now common in mice, will be perfected in these animals. Finally, the embattled field of gene therapy received a needed morale boost in the study by Raj et al. (*Nature*, Vol. 412, No. 6850)

who report that viruses can be used to target and kill cells lacking the tumor suppressor gene, p53, by introducing DNA of unusual structure into these cells, thus inducing them to undergo programmed cell death. Cancer cells commonly lack p53.

One final study is of interest to bioethics given the link between population control and reproductive technologies. Lutz, et al. (*Nature*, Vol. 412, No. 6846) predict that it is likely that global population growth will plateau by the end of the twenty-first century. In fact, they conclude that there is a 15% probability that there will be *fewer* people in A.D. 2100 than there are today!

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MEDICINE

Medical journal articles reviewed for this issue of the *Quarterly* make some important contributions in the areas of public health and women's health. These include a new recognition that regular aspirin use is associated with a reduction in death from any cause during a median follow-up of just over three years (Gum, et al., *JAMA* Vol. 286, No. 12); benefit of DTP and MMR vaccines in children far outweighs the morbidity from febrile seizures that may occur in rare cases (Barlow, et al., *NEJM*, Vol. 345, No. 9); and a report that colonoscopy is an effective one-time screening test for colorectal cancer (Lieberman and Weiss, *NEJM*, Vol. 355, No. 8).

The tobacco industry continues to reach young people via magazine advertising three years after the 1999 Master Settlement Agreement (King and Siegel, *NEJM*, Vol. 345, No. 7); a simple blood test may provide a new method for determining which persons would benefit most from statin drugs to prevent heart attacks (Ridker, et al., *NEJM*, Vol. 344, No. 26); patients, like Vice President Cheney, with a history of life-threatening heart arrhythmia treated with drugs or implantable defibrillators should be allowed to drive (Akiyama, et al., *NEJM*, Vol. 345, No. 6); and umbilical cord blood is a feasible source of stem cells to replace bone marrow destroyed by chemotherapy or radiation (Laughlin, et al., *NEJM*, Vol. 344, No. 24).

An alarming analysis of the current hepatitis C virus infection yields an estimate of 2.7 million chronically infected persons in the United States with 38,000 cases of acute infection per year. Greater than 70% of these acute cases will eventually become chronic. There is no available prophylaxis and no vaccine is likely to be available soon (Lauer, et al., *NEJM*, Vol. 345, No. 1).

In the field of women's health: hormone replacement therapy leads to increases in bone density in the lumbar spine and hip after a mere nine months of treatment in women aged seventy-five or older (Villareal, et al., *JAMA*, Vol. 286, No. 7); women with genetic susceptibility to breast cancer did not develop breast cancer within three years of prophylactic mastectomy (Meijers-Heijbor, et al., *NEJM*, Vol. 345, No. 3); pregnant women with a history of prior C-section face increased risk of uterine rupture when vaginal delivery is attempted, especially if labor is induced (Lydon-Rochelle, et al., *NEJM*, Vol. 345, No. 1).

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