

Cells and Souls ^{6/28/83}

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By Bernard D. Davis

BOSTON — While genetic engineering in humans seems close enough to justify public concern, we must not be swept away by fear of exaggerated dangers.

Unfortunately, a broad spectrum of clergymen recently demanded a total ban on attempts at one kind of genetic engineering, germline intervention — that is, insertion of genes into a cell that will become an embryo. It was argued that a distinction cannot be drawn between medical and eugenic uses and that we should not try to eliminate defective genes because we have no right to tamper with evolution.

In contrast to the apocalyptic tone of this discussion, a Presidential commission has realistically analyzed many conceivable dangers. Its excellent report, issued in December, strongly supported the goal of somatic gene therapy — that is, insertion of genes into body cells but not into germ cells (sperm or eggs). But the commission also expressed deep concern about changes perpetuated in future generations, because such intervention would open up the awesome prospect of directing future evolution of the species. The commission did not call for a ban but its position may have encouraged such a call. It is important to examine this evolutionary argument carefully and to identify the real issues.

Let us consider parents who both carry a recessive gene for sickle cell disease along with the corresponding normal gene. A child who inherits the defective gene from each parent will have the disease, but a child with a single defective copy will not. Three methods for preventing or curing the disease are conceivable: identifying the double defect in an embryo by prenatal diagnosis, thereby giving the parents the option of abortion and another pregnancy (prenatal selection); replacing the defective gene in somatic cells after birth; or replacing it in the embryo.

It is easy to see that all three approaches would influence evolution. Prenatal selection would encourage parents to produce carriers, while somatic correction would produce people with a healthy body but a double defect in their germ cells: Both would increase the frequency of the sickle cell gene in the next generation. Germline correction, in contrast, would decrease the frequency. If there were no other considerations, what sensible person would not prefer

germline intervention, provided it is limited to therapy?

But there are other considerations. First, the real long-term danger is that genetic engineering might be used not only for therapy but also to "improve" our blueprint people, according to somebody's plan. But somatic cells might also be manipulated for this purpose. And while the range of conceivable effects is broader for germline intervention, the important line to draw is that between medical and eugenic uses, rather than between somatic and germline cells.

Fortunately, we are unlikely to face eugenic uses in this century, because the traits one might be tempted to manipulate, such as memory, intelligence or motor skills, are so complex, and involve so many genes, that the prospects for their meaningful control are very distant.

While the evolutionary and the blueprinting arguments thus prove to be weak, there are other, overwhelming reasons not to proceed with germline intervention. First, where a corrective gene enters a chromosome it may interrupt some other important gene, producing a new hereditary defect. Moreover, while somatic therapy, in a person already sick, warrants a substantial risk, the manipulation of a cell that is destined to become an infant would require very stringent standards of reliability, far beyond what is in sight today. Finally, for a few diseases, so far, we already have a safe and simpler alternative method for reaching the same goal of preventing defective births: prenatal diagnosis and selection. For all these reasons, the motivation for altering the genes in an embryo is very slight.

If we do not need a ban on germline intervention, do we need a permanent commission to monitor human genetic engineering, as Congress is considering? Probably not. A commission with such a narrow assignment might have to invent things to do. Its existence would likely arouse false fears, for there are always people eager to stir up anxiety, and genetics is a favorite target. Scary scenarios about manipulating our inner nature — our ~~cells~~ or souls — have wide appeal, and the resulting pressures could interfere with beneficial medical research.

We should surely continue philosophical discussion of human applications on the excellent base provided by the Presidential commission. But since we are dealing with potential treatment of individuals, and not with possible large-scale or irreversible effects, we can afford to postpone legislation until a concrete problem comes into view.

Bernard D. Davis is professor of bacterial physiology at the Harvard Medical School.