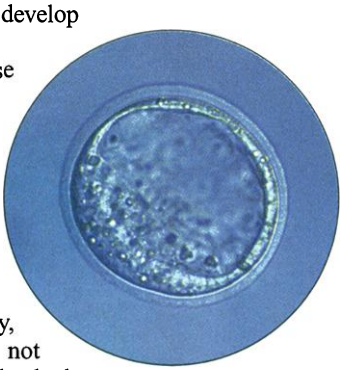
Disappearing Stem Cells, Disappearing Science

Soon the Bush administration will decide the fate of human embryonic stem cell (ESC) research at U.S. government-funded institutions, and the outcome of that decision will greatly influence the role of ESC science in human developmental biology around the world. But although the forces that science brings to this field are powerful, the future of ESC research will largely be determined by other interests: politics, organized religion, commerce, the legal community, and patient advocacy groups. The decision-making process needs to develop a policy that is fact-based and serves the best interests of society as well as science.



Broadly, stem cells are rare cells that renew themselves and, in addition, give rise to differentiated cells. Some, from adult tissues, have multiple but usually restricted developmental potency: Hematopoietic stem cells (HSCs), for example, normally make only blood cells; multipotent brain stem cells make only brain cells. ESCs, in contrast, are derived from cells isolated from the inner cavity of the blastocyst: an early embryo that cannot develop further unless it successfully implants in the uterus. These cells are pluripotent: Given an encouraging environment, they can develop into any cell type; although so far in culture they have been unable to form whole organs, much less bodies.

It would be convenient if pluripotent cells persisted into adulthood. Unfortunately, most (but not all) published accounts suggesting adult stem cell pluripotency have not successfully established that one type can produce a cell of another tissue type. Indeed, although HSCs capable of regenerating the blood can be isolated from adults or fetuses, so far brain stem cells capable of robust growth and transplantability have come only from fetal or ESC sources. This is likely to be true for a number of tissues; fetal stem cells are much more active than postneonatal cells. A moratorium on research and/or transplantation of fetal stem cells could thus be devastating. As for the search for pluripotent adult stem cells, it is always possible, perhaps even likely, that further research might reveal a source. But that is simply a hope, and it would be foolish to abandon the surer path for the unproven one.

The greatest mysteries of human development lie in the time interval between the early blastocyst embryo and the much later point at which organs are formed. What is needed is a thorough understanding of the cellular and genetic events that make the organs and tissues from these pluripotent cells. That can come only from a broad-scale attack on the problem from all kinds of researchers, whether in academic, nonprofit, or commercial organizations. The outcome will surely have profound effects on medicine, science, and translational research. Yet these advances that could be gained from human ESC research are currently restricted in the United States to the single commercial entity that holds the patents for the ESCs developed using its own funding. That is a disturbing anomaly, but it can be remedied by a decision to approve ESC research by government-funded entities.

We need a policy that serves the best interests of society and science.

Decisions to approve ESC research have been recently undertaken in several other countries, notably Germany and the United Kingdom, where government sought advice from a broad range of concerned interests. Not only does that provide a constructive example to our administration, it underscores another consequence of the wrong decisions here. Failure to make this research opportunity available in the United States will make those countries centers of the scientific, medical, and commercial advances in which we ought to be a contributing partner.

Plainly, scientists alone should not make the decisions about the ethical conduct of their work or about its social applications. It is appropriate that governments, with appropriate public input, define the societal interest in particular lines of research. But in making those policies, the state should minimize purely political considerations and be mindful of the separation of church and state. The wrong action here could close the door to an important avenue of scientific and clinical discovery. The state should not be the barrier to the translation of these potentially revolutionary therapeutic opportunities into real medical advances.

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