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State Stem Cell Policies Deserve National Attention

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This year, *Time* magazine named University of Wisconsin professor James Thomson one of the 100 most influential people in the world for his work reprogramming adult human cells to take on many of the most promising attributes of human embryonic stem cells. Remarkably, if Professor Thomson had done his work in Michigan rather than Wisconsin he could have been fined up to \$10 million and imprisoned for up to 10 years for his discovery, since the early stages of this work involved the derivation of embryonic stem cell lines and the destruction of human embryos.

Michigan has one of the most restrictive laws in the country with respect to embryonic stem cell research: it is legal for patients to discard human embryos but not legal for scientists to perform research on these discarded embryos even if that is what the patients want. This law delays medical research without saving a single embryo from destruction.

Advocates and opponents of human embryonic stem cell research have heralded Thomson and Shinya Yamanaka's development of the techniques for obtaining induced pluripotent, or iPS, cells. It seems that once the issue of how the cells are derived is off the table, there is widespread agreement that embryonic stem cell research holds great promise for understanding and treating some of our most devastating diseases.

This November, a bipartisan, broad-based coalition in Michigan is trying to change that law with a ballot initiative, known as Proposition 2, that would allow narrowly defined research on human embryos that are leftover after fertility treatment and that would otherwise be discarded if not donated by patients for stem cell research. Although polling suggests that the initiative has strong public support in Michigan, well-financed opponents are pouring millions of dollars into defeating the initiative and keeping the ban in place.

Only a few states have laws as restrictive as Michigan. Both presidential candidates and a majority of members of Congress have affirmed their support for loosened restrictions on embryonic stem cell research, but the Michigan legislature has refused to support the research. Both presidential candidates have recently affirmed their support for embryonic stem cell research, further marginalizing Michigan's policies. The loosening of federal funding restrictions will provide a boost to stem cell research nationwide, but will increase the gulf between scientists in Michigan as compared to those in other states. Unlike scientists at other major research universities, scientists in Michigan universities will remain unable to derive new embryonic stem cell lines for use in expanded federal funding. So is the Michigan vote consequential for national public policy on stem cell research?

Yes.

Forty-five minutes south of Ann Arbor, Michigan, scientists in Toledo, Ohio, are free to use human embryos in research and to derive new stem cell lines.

A peer-governed competitive national system for funding biomedical research has been a fundamental policy and programmatic triumph for the United States. The National Institutes of Health invest over \$28 billion each year, 80 percent of which is awarded in peer-reviewed competitive grants to researchers across the nation. This system has advanced our knowledge of disease, led to more effective diagnosis and treatment, and spawned philanthropic and corporate investment, which has fueled our economy. Under this system, the United States has become the global leader in biomedical research. Key to our success has been choosing the best research to fund based a nationwide competition, judged by scientists themselves rather than politicians or lobbyists. American science succeeds because it is a meritocracy, rewarding achievement and ability over more provincial concerns.

This winning approach is thwarted by the patchwork of conflicting state laws and policies regarding human embryonic stem cell research. Forty-five minutes south of Ann Arbor, Michigan, scientists in Toledo, Ohio, are free to use human embryos in research and to derive new stem cell lines. Are the values of Ohio residents so different from the values of Michigan residents (other than in football)? Across the country in California, the state just awarded over \$59 million to support the stem cell research of California scientists and has committed a total of \$3 billion overall. Massachusetts is investing \$1 billion in a similar program, and New Jersey, New York, Wisconsin, Connecticut, and Illinois have also pledged millions of dollars in funding. Yet scientists in Michigan would go to jail for doing the work for which scientists in these states are receiving millions of dollars in state funding.

Diverse and separate state funding undercuts the successful system of choosing which research to fund based on nationwide competition and peer review. California scientists are only competing with other California scientists for the funds available there and Illinois scientists will only compete with other Illinois scientists. Scientists in other states, who may sometimes have greater expertise, will not have the opportunity to help solve the important problems targeted by these states for funding. This fractured system is antithetical to the goal of funding the most meritorious research and to engaging all of our resources in the war against disease. Families affected by disease don't care where the cure comes from. Yet under the current system, geography drives research investment and determines the problems and approaches that our scientists focus on.

A comprehensive national system is needed to make the quickest progress in harnessing the potential of human embryonic stem cells to improve the treatment of disease. The state-by-state patchwork of funding and regulations is a necessary stop-gap measure to manage the recent lack of federal leadership in this promising area, but ultimately will be self-limiting if not replaced with a more integrated federal approach.

A state-by-state approach to stem cell policy also narrows the opportunities for conducting research that will benefit all segments of our society. One of the more subtle and profound effects of the last seven years of limited federal funding of human embryonic stem cell research is that the stem cell lines currently available for federally funded research are largely derived from embryos obtained from Haifa, Israel. So on one hand, the federal government insists that NIH-funded clinical trials enroll diverse patients that mirror American society, while on the other hand the it restricts federally funded scientists to working with embryonic stem cell lines that do not come anywhere close to reflecting the diversity in our society. If embryonic stem cells actually change the future of medicine, we are at risk of leaving some segments of our society out of this future. Who will fix this social justice problem? Scientists in Michigan could, but are prohibited from doing so by state laws. By prohibiting some in our country from working on the important problems we delay progress for all.

While we are waiting for federal leadership to prevail, the best we can do is to encourage states like Michigan to bring their policies in line with federal law. If states like Michigan move further away from federal and other state science policies it will be that much more difficult to integrate and engage our scientific community when federal leadership reemerges. Time and talent will be irretrievably lost in the search for new cures.

Michigan is home to the University of Michigan, one of the world's leading research universities. According to various measures of scientific impact, UM is one of the top universities in the world in the field of stem cell research. Yet that impact comes almost entirely from research in the area of adult stem cells. If the upcoming ballot initiative in Michigan fails, it will delay Michigan's ability to develop in the area of pluripotent stem cell research and reinforce the idea that geography should trump merit or promise when the nation determines scientific priorities.

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