



# Divided We Fail

## *The Need for National Stem Cell Funding*

An Analysis of State and Federal Funding for Stem Cell Research

Jonathan Moreno, Sam Berger, and Alix Rogers

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**By Jonathan Moreno,  
Sam Berger, and Alix Rogers**

Center for American Progress

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## Executive Summary

States have made valiant attempts to advance stem cell research, but they cannot replace federal support. States lack the revenue, infrastructure, and incentives to properly promote basic research on their own, especially with federal policies that limit collaboration, impede their funding, and fail to provide guidelines for moving forward with research. The federal government needs to update its stem cell policy to fund the best science using ethically derived stem cell lines, establish uniform regulations, increase overall support for the field, and dedicate more funding to embryonic stem cell research.

The federal government provides the lion's share of funding for stem cell research—79.4 percent through 2007—and will continue to do so for the foreseeable future. The federal government will even spend more specifically on embryonic stem cell research than the states, meaning that unless we update our stem cell policy, at least 55 percent of the funding currently designated for embryonic stem cell research through 2018 will go to research on outdated stem cell lines.

Our national stem cell policy also forces states to waste money building new laboratories and purchasing new equipment. So far, states have only spent a paltry 15 percent of their funding on actual research. And even though infrastructure costs decrease over time, states will still spend at least 29 percent of their money on infrastructure, equipment, and other non-research expenditures through 2018.

Allowing states to drive stem cell research also means that each state will develop its own research standards, potentially leading to a patchwork quilt of regulations that discourages collaboration and slows research. States also have less incentive to coordinate research support, which will cause research overlap and waste. And states will likely spend money on research expected to yield quick returns, not the basic research that is needed to advance the field.

States are doing their part, and should continue aggressively funding embryonic stem cell research while striving to have uniform research standards and little research overlap in different states. But their efforts are not enough; funding for embryonic stem cell research by the federal and state governments is only 20.6 percent of all the money spent on stem cell research.

Our outdated stem cell policy remains a national problem requiring a national solution. By adopting uniform research standards and supporting research on any ethically derived stem cell lines, the federal government can provide the strong leadership needed to advance the science and fulfill the promise of stem cells.

## The Outdated Federal Funding Policy

President Bush first ordered that federal funding of embryonic stem cell research be limited to stem cell lines derived by August 9, 2001 almost six years ago. Since that day, federally funded scientists have been restricted to using older stem cell lines, while researchers in other countries use newer and more diverse lines. Stem cell science has progressed at an accelerated rate, but our federal stem cell policy has remained stagnant, slowing research and damaging American competitiveness in one of the most promising sectors of biomedical research.

Congress has attempted to update the president's stem cell policy to match the realities of 21st century biomedicine. In 2006 a Republican Congress passed the bipartisan Stem Cell Research Enhancement Act, a bill that would have allowed federal funding for research using any ethically derived stem cell lines. Unfortunately, President Bush used the first veto of his presidency to retain onerous restrictions on research supported by 60 percent of the American people.<sup>1</sup>

This year, a Democratic Congress passed similar legislation in support of stem cell research with an even larger, bipartisan majority. Yet President Bush has once again indicated that he will veto the legislation, and it appears unlikely his veto would be overturned.<sup>2</sup>

The president and other opponents of embryonic stem cell research continue to stymie efforts to update our policy as facts on the ground make it ever more obsolete. When the president first announced his restrictions, he claimed that his policy would fund research on "more than 60 genetically diverse stem cell lines [that] already exist."<sup>3</sup> But an overestimation of available stem cell lines, coupled with genetic mutations in existing ones caused by aging, has reduced that number to only 21.<sup>4</sup>

The problems with the current policy have become so great that even scientists in the National Institutes of Health, which has historically avoided criticizing presidential policy, have spoken out against it. Dr. Elias Zerhouni, Director of the NIH, told a Senate subcommittee in March that, "American science will be

better served—the nation will be better served—if we allow our scientists to have access to more cell lines," and that the current policy leaves his agency fighting "with one hand tied behind our back."<sup>5</sup>

Dr. Zerhouni made his comments just a few weeks after those of Dr. Story Landis, the Interim Director of the NIH Stem Cell Task Force, who told a Senate subcommittee that because of the current stem cell policy "we are missing out on breakthroughs" and that updating the policy to allow access to new stem cell lines "would be incredibly important."<sup>6</sup>

Federal funding is restricted to older stem cell lines even though scientists have derived lines that are more desirable for research. New stem cell lines derived at Harvard University have proven almost three times as popular among scientists over the last several years, even though they are ineligible for federal funding.<sup>7</sup>

The inability of federally funded scientists to use these new lines has hurt collaboration with foreign scientists, a crucial aspect of advancing research to discover life-saving cures. In fact, Britain, which has one of the most supportive and successful stem cell policies in the world, recently bypassed the U.S. government to discuss collaborations with California<sup>8</sup> and Wisconsin<sup>9</sup> directly.

Scientists meanwhile continue to demonstrate the medical potential of these stem cells. Researchers have used embryonic stem cells in laboratory animals to treat paralysis,<sup>10</sup> slow vision loss,<sup>11</sup> and reverse some of the symptoms of Parkinson's disease.<sup>12</sup> They have used human embryonic stem cells to create cardiovascular precursor cells that could lead to treatments for heart diseases,<sup>13</sup> T-cells that could lead to a cure for AIDS,<sup>14</sup> and insulin-secreting cells that could lead to a cure for diabetes.<sup>15</sup> They have also used embryonic stem cells to develop a vaccine that protects mice from lung cancer.<sup>16</sup>

Our failed stem cell policy has significantly hampered research in the U.S., and could have a detrimental effect on our efforts to find life-saving cures and remain the world leader in biomedical research.

**TABLE 1: NIH FUNDING FOR STEM CELL RESEARCH (IN MILLIONS)**

YEAR	EMBRYONIC STEM CELL RESEARCH	NON-EMBRYONIC STEM CELL RESEARCH	ALL STEM CELL RESEARCH
2003	133	383	517
2004	113	439	553
2005	137	472	609
2006	148	495	643
2007	147	494	641
2008	146	492	639

To put these numbers in perspective, embryonic and non-embryonic stem cell research combined receive less NIH funding than research on Alzheimer's disease or breast cancer, around half the funding given

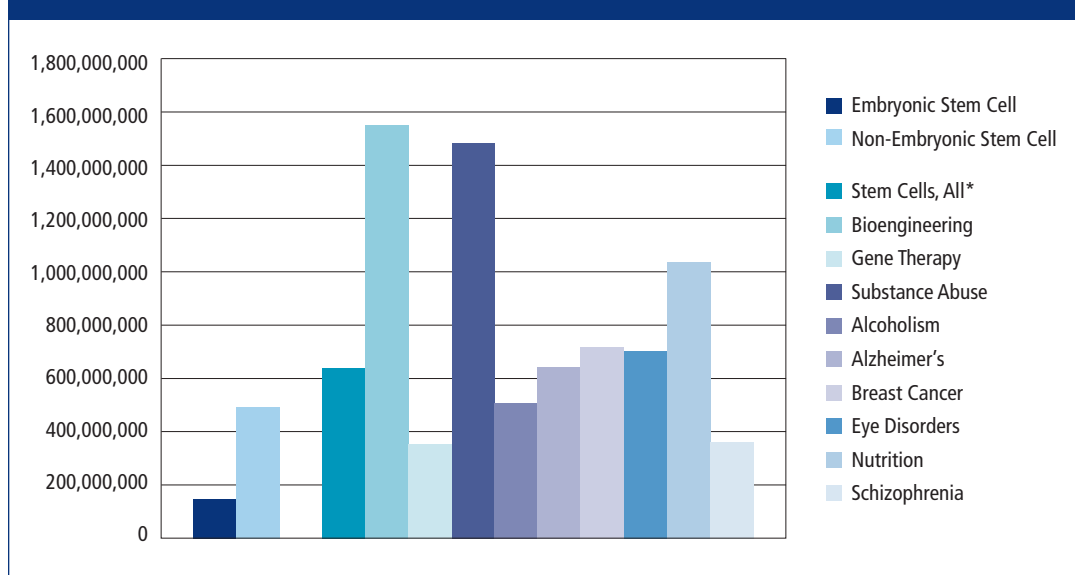
## Federal Funding Climate for Stem Cell Research

Federal funding from the National Institutes of Health is the primary driver of biomedical research in the United States. NIH spends over \$28.5 billion a year on biomedical research, far more than any private funding body or individual state. The stability, vast funding capability, and institutional mentality of NIH are uniquely well-suited to support the high-risk, long-term research that private investors are loath to fund. It has also established effective structures for reviewing research grants, facilitating collaboration between scientists, establishing and maintaining research standards, and decreasing research overlap.

Despite the promise of stem cell research, it has received minimal federal funding. NIH funding has remained static even as scientists demonstrate the tremendous potential of the research. In fact, NIH funding will actually decrease slightly over the next two years to \$641 million in FY2007 and \$639 million in FY2008 from \$643 million in FY2006 (see Table 1).

to nutrition, and about a third of the funding given to substance abuse. Embryonic stem cell research receives less than half of the amount of funding given to research on gene therapy or schizophrenia, a third of the funding given to research on alcoholism, and only a fifth of the funding given to eye disorders (see Figure 1).<sup>17</sup>

Federal stem cell funding is also heavily skewed towards non-embryonic stem cell research, despite scientific consensus that embryonic stem cell research holds the greater promise. Of the \$641 million to be spent on stem cell research in FY2007, less than a third—only \$147 million—will be used to fund embryonic stem cell research. Since 2003, only 23 percent of federal funding for stem cell research has gone to embryonic stem cell research.

**FIGURE 1: NIH FUNDING FOR VARIOUS AREAS OF RESEARCH IN FY 2008**

**TABLE 2: STATE FUNDING FOR STEM CELL RESEARCH THROUGH 2018 (IN MILLIONS)**

STATE	EMBRYONIC	NON-EMBRYONIC	GENERAL	UNKNOWN	TOTAL
CA	1829.6		822.3		2651.9
CT	19.8			90	109.8
IL	5.7	9			14.7
MA				11	11
MD				15	15
NJ	2	3	275.9	10	290.9
NY				600	600
OH		17	10.4		27.4
WI			74	312.5	386.5
TOTAL	1857.1	29	1182.6	1038.5	4107.2

## State Funding Climate for Stem Cell Research

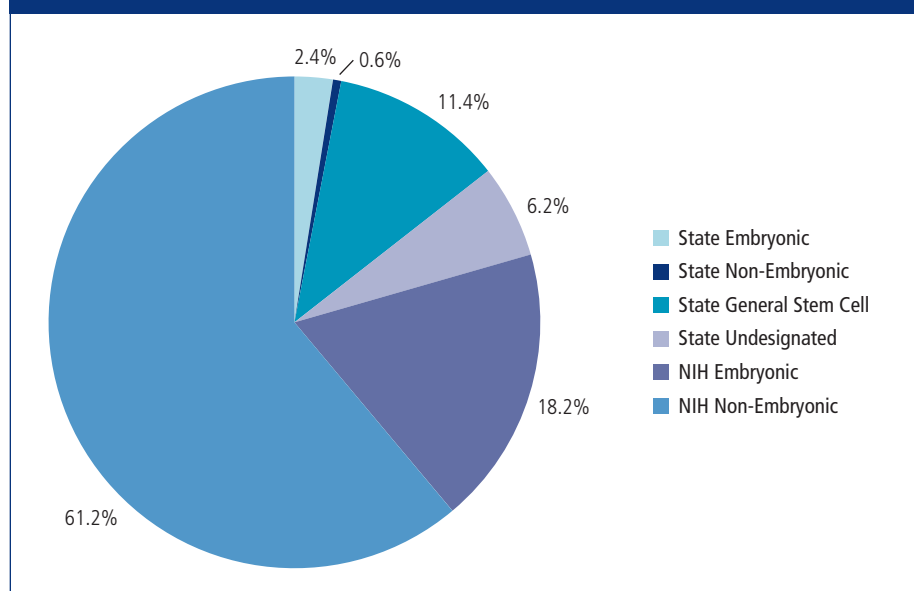
Federal inaction has prodded states to fund stem cell research, particularly embryonic stem cell projects that are not eligible for NIH funding. Substantial amounts of money have recently been devoted to stem cell research in New Jersey and New York, and California has resolved legal problems that had slowed the distribution of its funds, thus freeing it up to start funding research.

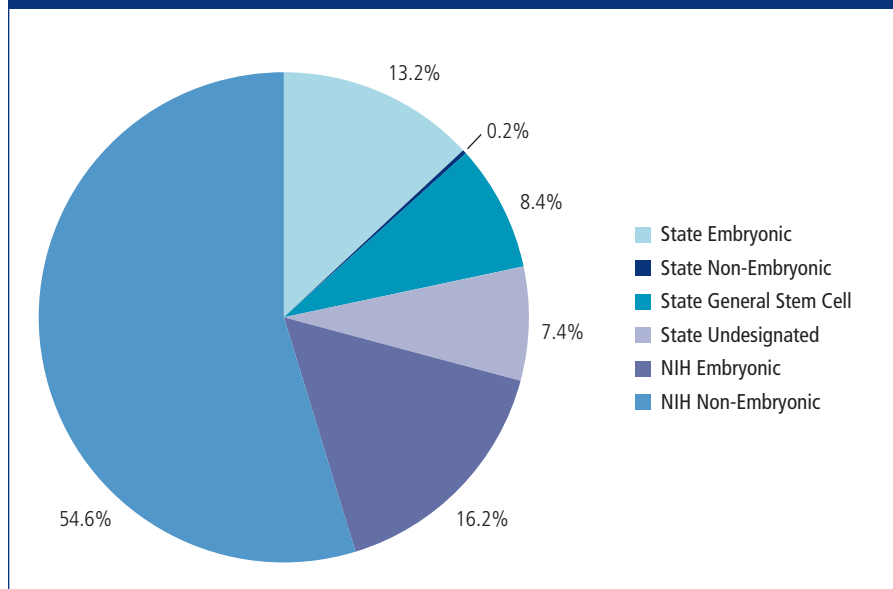
This paper considers four categories of state expenditures on stem cell research: embryonic, non-embryonic, general, and undesignated. Embryonic and non-embryonic designations refer to funding spent on actual research projects. The general stem cell designation refers to money spent on infrastructure, equipment, training researchers, attracting scientists to the state, and any other non-research expenditure. The undesignated category consists of money that has not been specifically allocated for any particular purpose.

Nine states have so far provided public funds to support stem cell research (see Table 2), and several of these states increased

their funding in the wake of President Bush's veto of the Stem Cell Research Enhancement Act of 2006. The bulk of state money is from California, although there are also significant initiatives in Connecticut, Wisconsin, New Jersey, and New York.

Plans to fund the research have also been suggested in a number of other states, including proposals to spend \$200 million in Florida, \$12.5 million in Iowa, and \$10.4 million in New Mexico. None of these proposals have made significant advances in the state legislatures to date.

**FIGURE 2: FUNDING FOR STEM CELL RESEARCH BY NIH AND STATES (FY2003–FY2007)**

**FIGURE 3: FUNDING FOR STEM CELL RESEARCH BY NIH AND STATES (FY2003–FY2018)**

As admirable as these state efforts to fund stem cell research have been, they cannot replace the leadership and funding revenue of NIH. State expenditures may seem large, but because funding is spread out over a number of years, the yearly investment is actually much lower.

Federal funding still vastly outstrips that of the states. From 2003 to 2007, the federal government provided 79.4 percent of public financing for stem cell research (see Figure 2). This number does not simply reflect the fact that many state initiatives are in their infancy; federal funding will still be 70.8 percent of the total public spending on stem cell research through the duration of the state initiatives (see Figure 3).

The federal government spends more than states on stem cell research overall, but also outspends states in supporting embryonic stem cell research, even though this money is only spent on older, federally eligible lines. The federal government will outspend states on embryonic stem cell research by \$589 million through 2007, and will likely continue outspending them through 2018.<sup>18</sup>

While these calculations do not include state initiatives that are currently under debate or may be

proposed in the future, no other states have considered allocating enough money to substantially alter these figures. Furthermore, the estimates of federal funding are overly conservative, as they assume funding will remain stagnant even as the research continues to deliver on its promise.

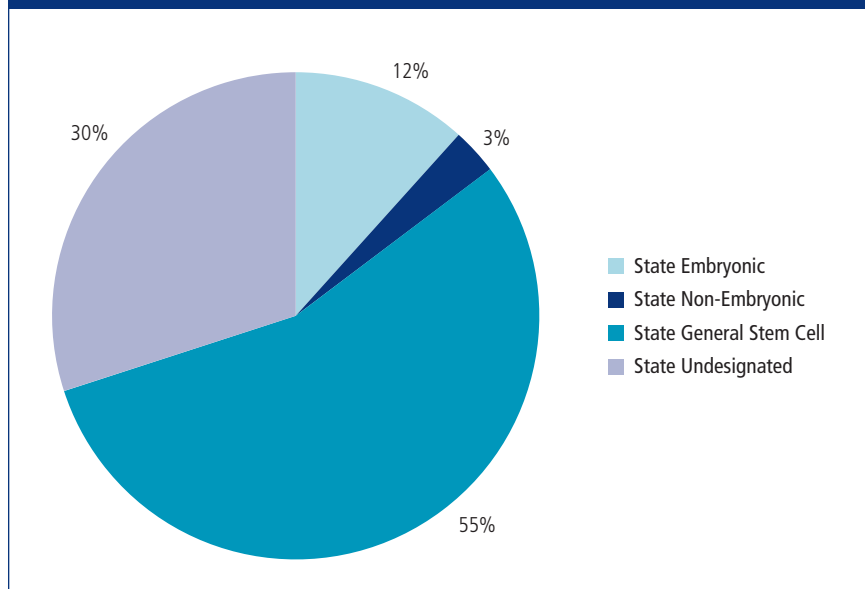
## The Need for Increased Federal Support of Stem Cell Research

The national government provides the bulk of funding for stem cell research, and that money should be going to the

best possible research projects. Yet federal regulations slow progress by requiring the NIH to conduct research with older stem cell lines. States are trying to step up to fill the void, but they end up spending the bulk of their money on building new infrastructure and equipment to accommodate the research. And lack of centralized leadership leads to a less uniform regulatory system, greater research overlap, and a skewing of priorities away from necessary basic research.

The vast majority of public research centers are built with public funding from the federal government. Yet states are not allowed to use such facilities to conduct research that is ineligible for federal funding. They must therefore spend large amounts of money building new labs and equipment. California has allocated \$297.8 million to build “NIH-free”<sup>19</sup> buildings and New Jersey will be spending \$275.5 million on new research centers across the state.<sup>20</sup>

Overall, states have spent \$424.6 million—55 percent of state funding—on building infrastructure, buying equipment, training researchers, and other general expenses. They have spent only \$113.8 million on actual research, which amounts to just 15 percent of state funding (see Figure 4). The percent-

**FIGURE 4: FUNDING FOR STEM CELL RESEARCH BY STATES (FY2003–FY2007)**

age that states spend on infrastructure and training will decrease over time, but it will still represent at least 29 percent of state funding through 2018.

States have done an excellent job of designating the bulk of research money to embryonic stem cell research. They already spend much more on embryonic stem cell research than on adult stem cell research, and by 2018 states will spend over 60 times more on embryonic stem cell research than on adult stem cell research.

Yet even with state efforts, embryonic stem cell research receives very little public funding. Total embryonic stem cell research spending only accounts for 20.6 percent of the public money spent on stem cell research to date, and will amount to just 29.4 percent of total funding through 2018. States have done what they can, but increased support from the federal government is needed to balance research dollars and drive embryonic stem cell research forward.

Apart from funding issues, relying on multiple state institutions is not the way to advance biomedical research. Absent federal leadership, each individual

state must spend precious time and money reinventing the research wheel, including forming new protocols, review bodies, and regulatory standards.

Creating individual state regulatory bodies costs additional time and money, and could also lead to divergent research standards, a risk that is exacerbated by a lack of federal guidelines from the NIH. Separate state regulations would greatly hamper collaborative research between scientists in different states, because research that is legal in one state might be illegal in another.<sup>21</sup> Preventing collaboration, particularly in such an interdisciplinary field, would

greatly slow the pace of research.

Separate funding bodies could also lead to research overlap, since individual states will almost certainly not coordinate projects with one another. Furthermore, allocations will not reflect the totality of research proposals, as projects from scientists in states without funding will not be considered. Absent NIH leadership, there is no feasible means of ensuring the most efficient and equitable use of research dollars.

Multiple state initiatives will likely lead to increased competition, a boon to developing clinical applications from late-stage research, but not for encouraging the basic research needed to advance the field now. Instead, states will likely compete to be the first to demonstrate success, meaning they will look to fund research considered low-hanging fruit, and not research that is long-term and more difficult.

One reason there is little private money pouring into the field is that the nascent science of stem cells has not advanced to the point of clinical applications. What is needed now is long-term, basic stem cell research—research that is best funded by NIH.



## Conclusion and Recommendations

**T**he current federal stem cell policy acts as a dead weight on the research, hurting the efforts of NIH, states, and individual scientists alike. Rather than constrain cutting-edge science with outdated policy, the federal government should update its regulations to support any stem cell research on ethically derived stem cell lines. Allowing legislation like the Stem Cell Research Enhancement Act of 2007 to pass into law would be a good start.

The federal government should act quickly to create uniform regulatory guidelines and standards for stem cell research. Those guidelines should closely match those proposed in the National Academies Guidelines for Human Embryonic Stem Cell Research.

Since the president will not allow his stem cell policy to be updated, despite overwhelming bipartisan support to do so from Congress and the American people, it appears unlikely that the federal government will create such uniform standards any time soon. In the meantime, all states should enact guidelines similar to the National Academies' in order to facilitate collaboration and ensure the use of best practices.

States should continue to fund research using the newest embryonic stem cell lines—although they cannot match the federal government's funds, they can help maintain interest and opportunities for talented American scientists to work in this field.

State funding should also be focused on research that is ineligible for federal funding, and states should attempt as much as possible to prevent research overlap with each other. Most importantly, they should continue to be clear that federal leadership is a necessary aspect of advancing stem cell research, even in states that already publicly fund it.

By following these straightforward recommendations, America will be able to maintain its place at the forefront of biomedical research. Strong federal leadership coupled with ample federal funding can drive the basic science forward, speeding up research that could lead to life-saving cures. The states have an important part to play in advancing this research, but their efforts cannot and should not replace the strong support of the federal government.

## Endnotes

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