



Research Highlights

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Stem-cell research: more support brings more papers

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Publication rates in human embryonic stem cell research reflect government policies

Countries with less restrictive policies for deriving human embryonic stem (ES) cells produce more than their expected share of scientific publications in this field, according to a study this month in *Cell Stem Cell*¹ ([#B1](#)). By this measure, the United States was the worst performer. Although 36% of scientific publications on human ES cells in 2006 had a US-based researcher as a corresponding author, that was compared to 46% of a control set of biomedical publications and 47% of publications on RNA interference (RNAi), a less controversial 'hot' technology.

To distinguish whether differences in countries' performance were due to the general level of scientific enterprise or to factors specific to the field, Aaron Levine of the Georgia Institute of Technology in Atlanta categorized scientific publications published in 2006 that cited either the 1998 paper describing the first derivation of human ES cells, or the initial paper describing RNAi, or one of 50 randomly selected papers published in 1998 that were in the top 1% most-cited papers. Unlike RNAi, human ES cell research is controversial because early-stage human embryos are destroyed to make the cells.

Nine of 16 countries showed significant differences for human ES cell research; four did for RNAi research. Levin notes that governments in the top five overperforming countries (Singapore, the United Kingdom, Israel, China, and Australia) provide support for the research and permit derivation of new human ES cell lines. Levine believes that specific human ES cell support has paid off, with Singapore having a share of publications on the topic 8.8 times greater than its share of the control set.

"The study chips away at the question but doesn't necessarily take into account a number of other factors," says Stanford University's Jennifer McCormick, whose work has also found that the rate of the US publications in human ES cell research was lagging relative to other countries² ([#B2](#)). For example, the study does not control for the fact that some countries invest more in commercial than academic research or that some countries recognize patents covering human ES cell research and others do not. Also, it's possible that some of the publications citing the 1998 papers are not limited to only human ES cells or RNAi research. Yet overall, McCormick says, the study raises very interesting questions, and "policy-makers ought to be keen on having them empirically addressed."

Besides the United States, other underperformers in Levine's study included Japan (10% of human ES cell publications compared to 13% of the general control set), France (2.9% versus 5.1%), and Switzerland (0.3% versus 1.5%). Although human ES cell research is legal in the United States and Japan, Levin notes that these countries have had policy debates "forcing scientists to navigate an uncertain policy environment". Germany and Italy have policies restricting the derivation

of lines, and although their share of human ES cell research published was smaller than that in the control set, the difference was not statistically significant.

Both France and Japan also have less than the expected share of RNAi publications, and Levine suggests that scientists in those countries are less inclined to pursue emerging technologies. China overperformed in both RNAi and human ES cell research, which Levin ascribes to strong economic growth and investment in research. Though the connection between performance and policy is not always clear, the analysis strongly suggests that government policy can significantly help or hinder biomedical research.

References

1. Levine, A. Identifying under- and overperforming countries in research related to human embryonic stem cells. *Cell Stem Cell* **2**, 521–524 (2008).
2. Owen-Smith, J. & McCormick, J. An international gap in human ES cell research. *Nature Biotechnol.* **24**, 391–392 (2006). | [Article \(http://www.nature.com/doifinder/10.1038/nbto406-391\)](http://www.nature.com/doifinder/10.1038/nbto406-391) |

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