



# Social media & stem cell science: examining the discourse

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Research suggests that the representation of scientific and medical issues in the traditional media such as newspapers, TV and radio is an important determinant of public opinion and related public policy outcomes, particularly with regard to attitudes toward stem cell research. With the emergence of social media, the discursive space around public policy issues has expanded to include a new demographic of media consumer who is directly involved in political action. However, little is known about the influence of social media on scientific public policy conversations. We analyzed Twitter posts on two topics relating to stem cell science and policy according to the originator and tone of the tweet, and whether the tweet was intended to be neutral or to further a stated policy position. This analysis provides a means for clarifying the role of social media in influencing public opinion of policy issues such as stem cell research and offers organizations a better understanding of how to more effectively apply social media to advancing their stem cell policy positions.

## Stem cell research & public policy

Public policies to advance stem research and regenerative medicine have been advanced in 15 US states [1]. These policies have served to spur innovation and achieve economic and health benefits [101]. These benefits may be attributed to the ability of such policies to drive intellectual capital infrastructure [2]. Research also suggests the representation of scientific and medical issues in the traditional media, such as newspapers, TV and radio, is an important determinant of public opinion and related public policy outcomes [3]. The efficacy of public policies advancing human embryonic stem cell research is subject to ongoing discourse in traditional media and also in social media sites, including blogs, Facebook and Twitter. Therefore, it is reasonable to hypothesize that existing and future policies to advance research will be influenced by their representation in these media outlets.

## Why social media?

Previous research focusing on stem cell research has sought to examine the influence of print and television media. For example, Zarzeczny and Caulfield have identified general trends in popular representations about stem cell research in Canadian newspapers [4]. This review suggests that the discourse surrounding stem cell research is increasingly nuanced and is reflective of a more general science policy question rather than a debate centered on questions of morality. However, we know stem cell science generates considerable social controversy, and this nuanced view may be predominant in the print media. Historically, media theories have assumed that traditional media has singular power to disseminate information and thus, impact public opinion; however, in this age of networked media, citizens can bypass traditional media to engage with other, like-minded citizens through blogs or microblog sites, such as Twitter [5].

The emergence of social media has served to simultaneously expand the discursive space around public policy issues by fostering a new demographic of media consumer who is directly involved in political action. For example, a PEW research report found that in the 2010 elections, one in five adults used Twitter or a social networking site for political purposes [102]. Elected officials now widely use Twitter to promote policies and to build public support, with virtually all nationally elected politicians having a Twitter account. This development is encouraging from a public participation perspective, but also presents challenges for nuanced debate of science policy issues as 55% of people said that the Internet gives greater influence to those with more extreme views [102]. Reflecting on this development, Boyd characterizes social network sites as “cavernous echo chambers because of their tendency to attract like-minded citizens” [103].

The emergence of social media as a conduit for policy discourse is widely recognized, and its use continues to be refined, with mixed results. For example, President Obama recently lost 30,000 followers after an attempt to use Twitter to influence the debt ceiling

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debate backfired [104]. How numbers of followers relates to influence is still being determined. A recent report by the Social Computer Lab at Hewlett Packard found that the number of followers does not necessarily correlate with influence as measured by re-tweets or mentions [105].

Understanding the role of social media and how social media influences public opinion has important implications for advocates of public policies to advance stem cell research. Researchers hypothesize that interpersonal communication may be an important variable influencing individuals' attitudes towards stem cell research [6]. The targeted and interpersonal nature of social media may therefore add an important dimension to existing media discourse. Therefore, it is important for research advocates to be aware of this discursive space and consider opportunities for constructive engagement.

In this article, we examine two discrete events relating to stem cell research that are the subject of considerable activity on the social network site Twitter. One event, the introduction of The Stem Cell Research Advancement Act, concerns national research policy. The second event, the announcement of a trachea transplanted into a terminal cancer patient in Sweden, concerns a recent scientific breakthrough. These distinct events – action on national stem cell policy and a breakthrough in stem cell science – both generated chatter among Twitter users.

Table 1. Criteria for content evaluation.			
Issue	Twitter search terms	Results captured	Analytical elements
Stem Cell Advancement Act	DeGette	35	Position (pro, con, neutral) Individual or organizational affiliation or identity Viewpoints and frame(s) utilized
Trachea transplant	Stem cell trachea Windpipe	50	Position (pro, con, neutral) Individual or organizational affiliation or identity Viewpoints and frame(s) utilized

### Methods

For each event we utilized TweetDeck v. 0.37.5 to collect Tweets corresponding to specific search terms. Content and framing analysis were subsequently performed on each communication. Tweets were compiled and then evaluated for a series of elements (Table 1).

We analyzed tweets according to three criteria:



- The tone (pro, con or neutral)
- The user's identity
- The viewpoint of the user


The identity and viewpoint of the user were determined by reading profile information on the user's Twitter profile and on web page links associated with the profile (Table 2). Viewpoint indicates whether the user has a particular ideology such as a political or religious viewpoint that the person might be promoting in a tweet.


### Results


#### ■ Stem Cell Advancement Act


A search of Twitter activity from 6 July 2011 to 11 July 2011 using the term "DeGette" produced 35 tweets concerning the Stem Cell Advancement Act, which would permanently legalize federal funding for embryonic stem cell research. Of those tweets:

-  44% were in favor of the bill
-  12% were neutral

 44% percent were opposed

 Only 12% of the tweets were from people who were scientists or medical professionals, all of whom phrased the tweet in favor of the act, or included links to publications that were in favor of the legislation


 26% were members of the public. Of these, six out of nine tweets were opposed to the legislation or linked to publications in oppositions, two were in favor of the legislation and one simply repeated facts regarding the act


 62% of the tweets came from companies or organizations. Of these, 40% were in favor of the act, 35% were opposed and the rest were neutral

#### ■ Trachea transplant


On 9 June 2011 a team in Sweden transplanted an entirely synthetic trachea seeded with a patient's own stem cells back into a patient, in the process saving the 37-year-old man from a tumor that was encroaching on the trachea. This landmark transplant received significant media attention and activity on Twitter.

Of 50 tweets identified between 9 June 2011 and 12 June 2011 using the search term "trachea stem cells":

 42% were supportive of the research

 58% were objective tweets that simply repeated the facts of the transplant

 None opposed the research

 Members of the public who tweeted about this transplant were more likely to tweet in a tone that supports stem cell research than they were to simply repeat facts of the transplantations



Companies and organizations were evenly split between tweets that were objective in tone and that promoted the research

**Discussion**

Boyd’s view of social media sites such as Twitter as “vast echo chambers” would suggest that there would be homogeneity in responses among those users with a comparatively stronger political/policy orientation. In his view, these organizations simply repeat the statements of other like-minded members or include links to the same set of publications that reflect their viewpoint. Furthermore, we would anticipate that results for social media would deviate from Zarzeczny and Caulfield’s analysis of traditional print media where a nuanced and balanced discussion emerged. In fact, this is what we saw. For individuals and organizations that believe embryonic stem cell research should be restricted as a matter of policy a series of core frames were consistently echoed (Box 1).

These frames dominate the policy discussion in the context of The Stem Cell Advancement Act, but were also incorporated into communication around science and medicine. For example, when reports of a successful trachea transplant emerged, opponents of embryonic stem cell research developed content around these frames and included links in their Tweets.

**Box 1. Core frames reflected in social media content by embryonic stem cell research opponents.**

- Adult stem cells are better: embryonic stem cells still lag far behind adult stem cells in treating patients
- Human embryonic stem cells are immoral: advancing the development of medical treatments should not require the destruction of human life
- No public funding: the federal government should not support human embryonic stem cell research

**Table 2. Results of content evaluation.**

		Response (%)	
		Trachea transplant	Stem Cell Advancement Act
<b>Tone</b>			
	Pro	42	44
	Con	0	44
	Objective	58	12
<b>Identity</b>			
	Scientist/medical professional	4	12
	Member of the public	50	26
	Legal professional	0	0
	Company/organization	46	62
<b>Frame</b>			
	Pro-life advocate	0	20
	Religious advocate	4	26
	Political viewpoint	0	24
	Legal/ethical viewpoint	2	20
	Business viewpoint	22	10
	Neutral	72	0

**Actual statements from Embryonic Stem Cell Research opponents**



“ Doctors have replaced a cancer patient’s diseased trachea with one made in part using his own adult stem cells ... Wowee. Ethical regenerative medicine is really achieving results – not in rats or the distant future – now. ”



“ Lab-Made Trachea Saves Man (Grown from Adult Stem Cells – No Babies Were Murdered to Grow this Trachea). ”



“ Yet another wonderful result from adult stem cells! No such success has been documented from any embryonic stem cell attempt, and we continue to wonder why the effort and expense goes into such a doomed effort when adult (including pluripotent) cells provide so much medical triumph. ”

By contrast, the trachea transplant story generated a more heterogeneous response among individuals and organizations that are either supportive of embryonic stem cell research or otherwise not opposed. Consistent with Zarzeczny and Caulfield’s

findings, established print media outlets reported in a neutral and nuanced manner. Content and links celebrated the medical achievement, discussed the business implications and highlighted the value to the field of regenerative medicine.

## Actual statements from Embryonic Stem Cell Research supporters



“ The artificial trachea technology could be particularly important for children, who find it harder to match donor organs due to reduced sizes and generally lower availability of organs. ”



“ Stem-cell stocks rise on artificial-trachea report. ”



“ The scientific leap took place over two days in a laboratory in Sweden, marking the very first time a completely synthetically grown organ has been transplanted into a patient. ”



“ Stem Cell research’s promising future. Cancer patient gets a new trachea grown in a bioreactor with his own cells. ”

While there were clear references to the stem cell debate, the discourse among those in favor of stem cell research did not approach the level of consistency of the opponents. The tweets from those supportive of all aspects of stem cell research also tended to be more neutral in tone, simply stating the scientific or business advance rather than using the news event to further their political/policy objective. We hypothesize this may be because those in favor of embryonic stem cell research represent a comparatively broad array of interests – scientists, entrepreneurs, patients and policy advocates. By contrast,

opponents of embryonic stem cell research obtain a high level of internal consistency in their issue framing – specifically drawing on core themes.

Lakoff has emphasized the importance of framing in the political arena [7]. As increasing numbers of organizations, individuals and medical professionals enter social media such as Twitter to advance messages and policy agendas, it is important to understand the landscape and messaging trends of the media. Such an analysis will help these organizations better understand how to more effectively apply social

media and also provide a means for clarifying the role of social media in influencing public opinion of policy issues such as stem cell research.

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The authors have no relevant affiliations or financial involvement with any organization or entity with a financial interest in or financial conflict with the subject matter or materials discussed in the manuscript. This includes employment, consultancies, honoraria, stock ownership or options, expert testimony, grants or patents received or pending, or royalties.

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