

**Evaluation of the  
*BIOMEDICAL TECHNOLOGY PROJECT*  
for  
The Great Lakes Science Center**

**Mini-Report :  
Formative Evaluation of the Adult vs. Embryonic Stem Cell Panel**

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**January, 2007**

**EXHIBIT NAME:**

**ADULT VS. EMBRYONIC STEM CELLS PANEL**

*Authors, version, date:*

Eric D. Gyllenhaal and Katherine Ziff, version 3, January 2007

See Appendix A for a description of the prototype exhibit and its goals, messages, and intended engagements.

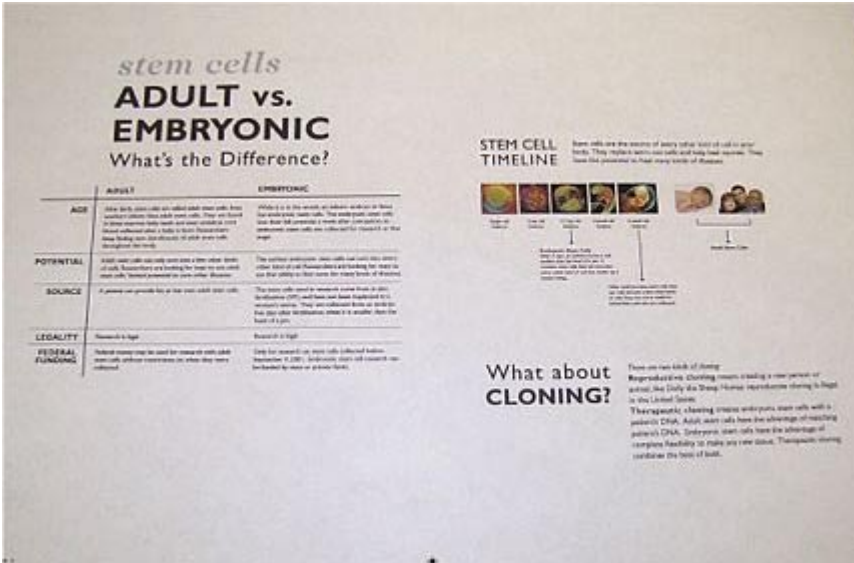


Fig. 1. Version One of the stem cells panel. The Adult vs. Embryonic comparison was in a tabular format and on the left. The Stem Cell Timeline used all color photographs, including an infant in a blanket and a group of adults, rather than icons. The largest title said, “Adult vs. Embryonic.”

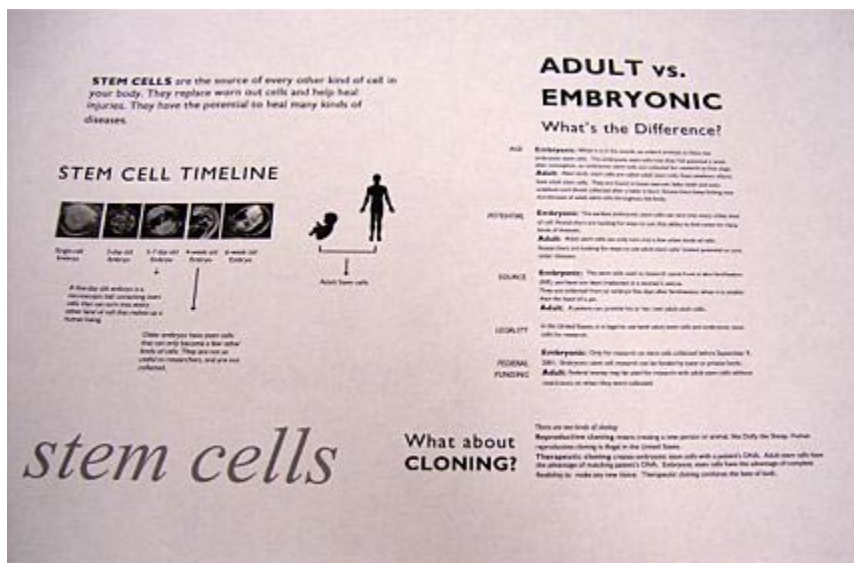


Fig. 2. Version Two of the stem cells panel. The Adult vs. Embryonic comparison used a list format and was on the right. The Stem Cell Timeline included silhouettes of an adult and a baby in fetal position. (The timeline was in black-and-white because a color printer was not available during revisions.) The largest title said, “stem cells.”

## SUMMARY

The authors tested two prototype versions of the same label information with casual visitors to Great Lakes Science Center (twelve visitors in four groups, including six middle-school students). Version One was more effective at accomplishing the goals of the panel because (1) the “adult vs. embryonic” content was more prominent, (2) the tabular format enhanced comparisons, and (3) the illustrations were less apt to support visitors’ preconceptions about stem cells (e.g., believing stem cells are extracted from aborted fetuses). Respondents said they felt the stem cell information was both timely and presented in an objective way. However, the cloning information was distracting and confusing to visitors in both panel formats. Recommendations include (1) using Version One as the starting point for the final label panel; (2) shortening and clarifying the text in the table; (3) defining terms *like fetus*, *fertilization*, *embryo/embryonic*, and *therapeutic* in the body of the text; (4) combining the table entries about Legality and Funding into a clearer statement about these issues; (5) revising the cloning information so that it more clearly relates to adult vs. embryonic stem cells; and (6) choosing illustrations that obviously show a baby that has already been born.

## VISITOR ENGAGEMENTS WITH THE PROTOTYPE EXHIBIT

**In what ways and to what extent did the observed engagements match (and differ from) the intended engagements?**

<b>Physical</b>	<ul style="list-style-type: none"><li>• Respondents spent one to two minutes reading the label panels.</li><li>• Some respondents pointed as they read or looked at illustrations.</li></ul>
<b>Emotional</b>	<ul style="list-style-type: none"><li>• Respondents said they considered this topic to be in-the-news and even controversial. However, many of them said this in a way that seemed emotionally flat. They seemed to intellectually acknowledging the controversy, rather than feeling it deeply.</li><li>• Respondents said they considered the label panel to be objective and did not feel like it was promoting a particular point of view. Interestingly, some respondents implied that hearing these “facts” would change other people’s opinions to more closely match their own.</li><li>• Most respondents said they would feel uncomfortable discussing this subject with children younger than 10 or so, but they still considered this appropriate for an exhibit at GLSC. One respondent commented that she wasn't worried about being forced to discuss the topic with her six-year-old daughter because there was so much text that her daughter wouldn't read it—she'd head off to the next exhibit.</li></ul>

	<ul style="list-style-type: none"> <li>• Some respondents expressed surprise that embryonic cells weren't as useful after a certain time.</li> <li>• Some respondents expressed disappointment because they did not learn much about the uses of stem cells. They said what this panel was missing was the possible uses and significant outcomes for diseases. They wanted to compare the uses for the two types of stem cells</li> <li>• Some respondents expressed their personal connections to this issue. For instance, a visitor in a wheel chair said that stem cell research has potential to regenerate nerves in paralyzed people like himself, but that was as much as he knew about it before he read the label.</li> </ul>
<p><b>Social</b></p>	<ul style="list-style-type: none"> <li>• There was pointing and conversations as visitor groups read the label panels. For instance, as they looked at the label panel, a respondent in a wheelchair and his companion referred to a discussion they'd recently had about stem cell therapies.</li> </ul>
<p><b>Intellectual</b></p>	<ul style="list-style-type: none"> <li>• Some respondents were confused about exactly when embryonic cells were collected, in part because the timeline graphic was confusing to them.</li> <li>• Some middle schoolers requested definitions of terms like fetus, fertilization, embryo/embryonic, and therapeutic.</li> <li>• The subtitle "cloning" seemed to distract respondents from the associated content. For instance, respondents pointed out that, "in all the movies," the clones were bad and that, "they are cloning cats now," rather than focusing on how cloning is related to stem cells.</li> <li>• Unanswered questions included the uses of the different types of cells and how doctors take adult stem cells from people.</li> <li>• Most respondents expressed their opinion on whether it is ethical to conduct research using embryonic stem cells. Some also expressed opinions about reproductive cloning, but not about therapeutic cloning as such.</li> </ul>

## WHAT CHANGES WERE MADE DURING PROTOTYPING, AND WHY?

How well did they work?

	<p><b>We compared two formats for the same information, rather than revising iteratively during testing.</b></p> <p>Version One (Fig. 1) differed from Version Two (Fig. 2) in the following ways: In Version One (1) the Adult vs. Embryonic comparison was in a tabular format and on the left; (2) the largest title said, “Adult vs. Embryonic”; (3) Version One used all photographs (an infant in a blanket and a group of adults) rather than icons (the Version Two timeline was in black and white, because a color printer was not available at the time it was printed); and (4) the illustration of the infant in Version One looked like it had been born (i.e., was not curled up in a fetal position).</p>
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## COMMUNICATING EXHIBIT MESSAGES

In what ways, and to what extent, did the prototype exhibit communicate (or fail to communicate) its intended messages? What features of the prototype best communicated its messages? What features inhibited its success?

<p><b>Message 1:</b> Adult and embryonic stem cells differ in several ways.</p>	<ul style="list-style-type: none"><li>• Version One clearly communicated that the two types of stem cells were different.</li><li>• With Version Two, respondents seemed less apt to focus on these differences.</li></ul>
<p><b>Message 2:</b> Embryonic stem cells collected for research come from embryos, fertilized outside the womb, that are smaller than the head of a pin.</p>	<ul style="list-style-type: none"><li>• Most respondents who looked at Version One said they were surprised that embryonic stem cells were collected so early in development.</li><li>• Version Two did not effectively counteract visitors’ preconceptions that research stem cells were collected from aborted fetuses.</li></ul>
<p><b>Message 3:</b> Both adult and embryonic stem cells have the potential to be the source of new treatments and cures.</p>	<ul style="list-style-type: none"><li>• This message did not appear to be clearly communicated by either version. Some respondents said that what was missing was the possible uses and significant outcomes for diseases.</li></ul>

<p><b>Message 4:</b> It's legal to do research on both kinds of cells, although federal funding for embryonic cells is very limited.</p>	<ul style="list-style-type: none"> <li>• Both versions left most respondents somewhat confused about these issues.</li> <li>• Respondents tended to read their own preconceptions into the label (to the extent that some of them actually misread the text).</li> </ul>
<p><b>Message 5:</b> Therapeutic cloning may offer the advantages of both adult and embryonic stem cells, by inserting a patient's DNA into embryonic cells.</p>	<ul style="list-style-type: none"> <li>• In both versions, the cloning title tended to distract respondents, getting them thinking about their preconceptions on this issue.</li> <li>• Neither version effectively communicated this message.</li> </ul>

### ACHIEVING EXHIBIT GOAL

In what ways, and to what extent, did the prototype exhibit achieve (or fail to achieve) its goals? What features of the prototype provided support for the goals? What features inhibited its success?

<p><b>Goal:</b> Visitors will more accurately understand the differences between adult and embryonic stem cells, which are key to an emerging field of biomedical technology.</p>	<ul style="list-style-type: none"> <li>• Version One was much more effective than Version Two at achieving this goal.</li> <li>• However, neither version seemed to help visitors think of this issue in terms of biomedical technology.</li> </ul>
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### RECOMMENDATIONS FOR THE FINAL EXHIBIT

	<ul style="list-style-type: none"> <li>• <b>Use Version 1 as the starting point for the final panel.</b> Putting the “Adult vs. Embryonic” headline and table on the left calls attention to the theme and helps visitors understand the main message of the panel.</li> <li>• <b>Shorten the text in the table.</b> Combine and simplify the text, dropping details, so there is only one sentence for each cell.</li> <li>• <b>Satisfy visitors’ curiosity by explaining at least one typical or</b></li> </ul>
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**potential use for each type of cell.** Although this issue will be dealt with in more depth elsewhere in the exhibit, point out that adult stem cells are used to grow cartilage that surgeons use to replace damaged knee cartilage, and are being tested for other uses, like treating heart attacks.

- **Define and explain even basic reproductive terms within the sentences where they are used,** including fetus, fertilization, embryo/embryonic, and therapeutic. For instance, make it clear that an embryo is a fertilized egg that has begun to develop, but is not yet a fetus.
- **Combine the table entries about Legality and Funding into a clearer statement about these issues.**
- **Revise the cloning information so that it more clearly relates to adult vs. embryonic stem cells.** For instance, make this paragraph about how, by combining DNA from an adult patient with a cell from an early-stage embryo, the resulting stem cells have advantages of both types of cells—perfectly matched DNA in a cell that can become many types of cells,
- **Clarify and enlarge the Stem Cell Timeline graphic.** Use new illustrations, bold text and other forms of highlighting to emphasize when embryonic stem cells are collected. Clarify the text to make it clear that collecting embryonic stem cells prevents the embryo from developing.
- **Choose illustrations that obviously show a baby that has already been born.**

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## OTHER LESSONS LEARNED

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- **Preconceptions shape how visitors perceive the label.** For instance, visitors who believe stem cells come from aborted fetuses will (1) tend to misinterpret ambiguous illustrations and information, and (2) need to have it clearly explained that cells from fetuses are not what these researchers are after. We suspect that it would take quite a bit of explanation and confirming evidence to change their minds about even this factual information.

## APPENDIX A: STATEMENT OF EXHIBIT GOALS, MESSAGES, AND INTENDED ENGAGEMENTS

### Great Lakes Science Center *Biomedical Technology Project* Formative Evaluation

#### Exhibit Unit Intentions for Adult vs. Embryonic Stem Cells

November 4, 2006  
Version 03

**Name of prototype exhibit:** Adult vs. Embryonic Stem Cells

**Brief description of prototype exhibit:** This prototype was designed as part of a larger exhibit about stem cells and their applications in biomedical technology. The graphic panel explained key differences between adult and embryonic stem cells, gave a timeline for when embryonic stem cells are collected, and explained how therapeutic cloning may offer the advantages of both adult and embryonic stem cells, by inserting a patient's DNA into embryonic cells

**Goals** are those things you want this exhibit unit to achieve. Goals always start with "Visitors will...." Goals tend to be pretty big statements about developing appreciation for or greater understanding of something.

- Visitors will more accurately understand the differences between adult and embryonic stem cells, which are key to an emerging field of biomedical technology.

**Messages** are the content of the exhibit. They are comprised of Big Ideas and educational messages. **The Big Idea for this exhibition is,** "Rapidly advancing biomedical technologies give doctors new tools to improve personal and public health." The educational messages are a description of the main ideas you want visitors to walk away from the exhibit with.

- Adult and embryonic stem cells differ in several ways.
- Embryonic stem cells collected for research come from embryos, fertilized outside the womb, that are smaller than the head of a pin.
- Both adult and embryonic stem cells have the potential to be the source of new treatments and cures.
- It's legal to do research on both kinds of cells, although federal funding for embryonic cells is very limited.
- Therapeutic cloning may offer the advantages of both adult and embryonic stem cells, by inserting a patient's DNA into embryonic cells.

**Physical engagements** are all the physical things visitors do at an exhibit, for example, sitting, standing, looking, reading, pointing, touching, and manipulating dials. It also includes how long visitors are expected to spend with the exhibit.

- Read the label.
- Point at words, phrases, and images.

**Intellectual engagements** are all the ways in which visitors engage cognitively with an exhibit, including thinking about, processing, and making meaning of their experiences.

- Visitors read the information.
- Visitors compare and contrast the two types of stem cells, focusing on features they consider most interesting or important.
- Visitors are aware that there are important differences between adult and embryonic stem cells.
- Visitors recognize that children and adults also have stem cells (not just embryos).
- Visitors recognize that the 5-day old embryo is the source of embryonic stem cells. They do not see them as coming from aborted fetuses or newborn babies.
- Visitors weigh their opinion on whether it is ethical to conduct research using embryonic stem cells and therapeutic cloning as described in the exhibit.
- Visitors are able to easily find information that relates to the issues they consider most important.

**Social engagements** are all the ways in which visitors engage with each other within the context of the exhibit, including verbal exchanges as well as body language. This could include directing attention, asking a question, coming up with an explanation together, reading a label out loud.

- Visitors read (or summarize) the text for companions who cannot read it independently.
- Visitors discuss their opinions with others in their group (or with visitors in other groups, as well?)

**Emotional engagements** are all the ways that visitors engage emotionally with the exhibit; examples include surprise, delight, awe, satisfaction, feelings of competence, intimidation, and frustration.

- Visitors are surprised and/or relieved that older embryos (more than five days after fertilization) and aborted embryos/fetuses are not used in this research.
- Visitors are pleased to get a summary of the similarities and differences between adult and embryonic stem cells.
- Visitors feel that the graphic panel is fair, appropriate, and not inflammatory.
- Visitors feel hopeful about stem cell researchers' potential to find treatments or cures for diseases.

