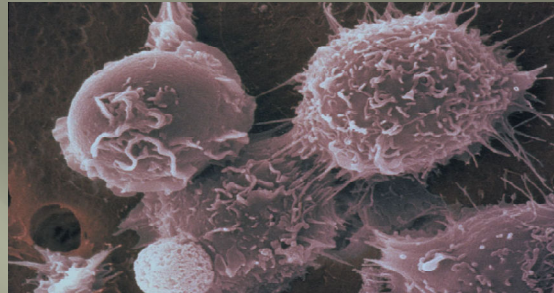


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## Abstract

One of the many incurable and ultimately fatal diseases plaguing society today is ALS (Amyotrophic Lateral Sclerosis), also known as Lou Gehrig's Disease. Though the cause for ALS is unknown, in the United States alone 5,600 people are diagnosed each year, and 30,000 Americans have the disease at any given time. ALS is a neurodegenerative disease that affects brain and spinal cord function. ALS is a progressive neurodegenerative disease that effectively destroys the motor neurons in the brain and spinal cord. These neurons are extremely important, as they aid in mobility by relaying muscle contractions from the brain to the muscles. After time, the excessive wear and tear of the disease leads to the death of the patient, usually when the neurons leading to the muscles of the diaphragm and lungs are affected and the patient can no longer breathe. Because these neurons cannot be reproduced by the body, there is a great possibility that the application of stem cells could heal damaged neurons or even prevent future damage pertaining to ALS.



Adult Bone Marrow Stem Cells

## Obstacles

### Embryonic Stem Cell Controversy

- o Trying to define "life."
- o Current ban on stem cell research may be lifted under new President

### Research Facilities

- o Finding a "Stem Cell Center"

### Funding Issues

- o Government funding?
- o Funding criteria

### Cost

- o Can those who need help afford it?



Embryonic Stem Cells

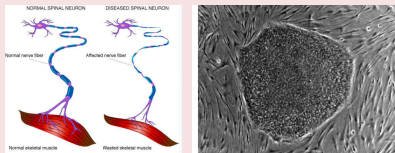
## Background

Stem cells are pluripotent cells that can divide for long periods of time by utilizing cell division methods. Not only do these cells continue to divide over a persons' lifetime, they are able to give rise to all of the various cell types that make up the body.

### Types of Stem Cells

1. **Embryonic** - taken from the blastocyst of the embryo 7 to 10 days after fertilization
2. **Umbilical cord** - taken from the umbilical cord. Can be used on mother and child, and those with similar blood type
3. **Adult Bone Marrow** - taken from the bone marrow (usually the iliac crest of the hip), taken from the same patient the cells will be administered on to prevent rejection

Currently, there have been several attempts to treat ALS by injecting stem cells. Through this method, it is hoped that the stem cells will heal damaged neurons, and prevent motor neurons from future damage.



Neural Stem Cell

## Treatment Options

### Previous Research

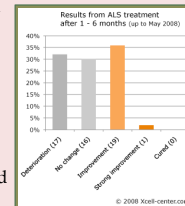
- o Only current drug on market: Riluzole. Treats symptoms only.
- o Used adult bone marrow stem cells taken from iliac crest
- o Stem cells are isolated and injected intravenously into the body
- o Stem cells circulate the blood stream
- o Approximately \$9,547.44 for treatment (Xcell Center, Cologne, Germany)

### Problems Associated

- o Concentration of stem cells reaching the neurons is very small
- o Rate of improvement in patients is low

### New Method of Treatment

- o Stem cell type
  - Adult bone marrow, try embryonic stem cells
- o Method of injection
  - Intravenous; multiple injections
  - Lumbar puncture method into cerebrospinal fluid



## Comparing Data

	Stem Cell Type	Method of Injection	Speculated Problems/Side effects
Past Research	Adult bone marrow	One injection, intravenously	Low concentration of stem cells reaching target, low improvement rate
Our Improvements	Adult bone marrow, possibly embryonic	Multiple intravenous injections, possibly lumbar puncture method into the cerebrospinal fluid	Controversy over embryonic stem cells, healing of damaged spinal cord, possible growth in other regions of body with multiple injection

## Objectives

- o Examine current methods of ALS treatment, including success rate
- o Propose ideas for improving treatment results, taking into account the ethics controversy
- o Locate stem cell research centers
- o Locate sources for research funding
- o Determine plan for promoting the research discussed

## Finding Research Solutions

### Possible Funding Sources

- o National Institutes of Health (NIH)
- o \$900,000 stem cell research grant to WPI
- o Future US Government funding

### Funding Criteria

1. The derivation process (which begins with the destruction of the embryo) was initiated prior to 9:00 P.M. EDT on August 9, 2001.
2. The stem cells must have been derived from an embryo that was created for reproductive purposes and was no longer needed.
3. Informed consent must have been obtained for the donation of the embryo and that donation must not have involved financial inducements.

### Possible Research Facilities

- o Bedford Stem Cell Research Foundation (Somerville, MA)
  - Charity Foundation
  - In 2000, began research on stem cells using non-federal funding.
- o W.P.I. Life Sciences and Bioengineering Building
  - \$43 million dollar facility
  - Modern research equipment

## Acknowledgements

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