What’s new in sci research?

Progress
Promise
Priorities
Research

• “Spinal cord injury research should focus on preventing the loss of function and on restoring lost functions—including sensory, motor, bowel, bladder, autonomic, and sexual functions—with the elimination of complications, particularly pain, spasticity, pressure sores, and depression, with the ultimate goal of fully restoring the activity and function of an individual to his or her pre-injury levels.”

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From: Progress, Promise, and Priorities
What needs to be done?

- Understanding what happens after CNS injury
  - Protecting the injured brain and spinal cord from further damage
  - Replacing dead nervous system cells (neurons and glia)
  - Promoting and guiding axon growth
    - Reestablising essential circuits
    - Preventing and treating complications
    - Maintaining maximum potential for recovery
    - Translating findings from laboratory research to clinical trials
Cell Transplantation

• Cell transplantation therapies could provide potential benefit by replacing lost neurons, promoting regeneration of existing neurons, and filling in the spinal cord cavity to minimise further damage and inflammation.
Stem cells are also found within adult organs. They have not taken on a final role, and have the potential to become any of the major specialised cell types within that organ. Their role is to maintain the organ in a healthy state by repairing any damage it suffers. It is thought their potential to become other types of cell is more limited than that of embryonic stem cells. But there is evidence that they are still relatively "plastic".
embryonic stem cells

- first officially approved human trial is only now underway
- They can make all the 200 cell types in the body and they can make them in quantity. If this therapy is successful, and that might take five to ten years, then we will be able to manufacture it in the scale we need."
• Critics argue that it is wrong to use cells derived from human embryos because it destroys the embryo in the process.
• In one of his first actions as President, Barack Obama lifted many restrictions on federal funding of embryonic stem cell research when he came to office last year.
Adult stem cells

• We know that adult stem cells work, for example bone marrow transplantation. There have been other transplant techniques using adult stem cells.
Neuroregeneration

- Neuroregeneration research is aimed at promoting the regrowth and repair of nervous system tissues. This includes the generation of new neuronal cells as well as promoting axon regrowth and remyelination of damaged neurons.
Active Rehabilitation

• Rehabilitation studies are aimed at designing and evaluating therapies that focus on retraining the nervous system to improve motor function. Ongoing clinical research has focused on therapies to improve hand function as well as the use of body weight support and treadmill training combined with electrical stimulation to promote walking.
Neuroplasticity

• Neuroplasticity is the nervous system's ability to adapt its structure and reorganize itself to form new neural pathways. This ability is how an uninjured area of the brain can compensate for functions controlled by an injured area.
Neuroprotection

• Researchers at The Miami Project are identifying the early and progressive injury processes that occur after spinal cord injury and result in irreversible damage. By understanding the cellular and molecular basis of neuronal death after spinal cord injury, Miami Project scientists work to develop therapies to prevent the progressive injury damage that occurs in the hours, weeks, and months after injury.