

# Nervous System and Neural Stem Cells

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## INTRODUCTION

The nervous system consists of the Central Nervous system and the Peripheral Nervous System. The Central Nervous system is usually associated with the brain and spinal cord, and the Peripheral Nervous system is usually associated with the tissue outside of the Central Nervous System. The Peripheral Nervous System sends motor commands away from the Central Nervous System, and sends sensory information toward the Central Nervous System.

## TYPES OF CELLS

Neurons are nerve cells that transfer and process information in the nervous system. Neurons are made of a soma, which is a cell body containing a nucleus, an axon, and dendrites. Some neurons have a myelin sheath, and others do not. The myelin sheath is made up of one type of glial cells within the nervous system. In the Central Nervous System, oligodendrocytes are cells that produce myelin, and create the myelin sheath. Astrocytes connect neurons to blood vessels and provide nutrients and oxygen to the neurons. Ependymal cells line ventricles of the brain and create cerebrospinal fluid. Microglial cells remove cell debris, wastes and pathogens. In the Peripheral Nervous System, there are Schwann cells and satellite cells. Schwann cells also produce myelin that creates a myelin sheath around an axon, but in the Peripheral Nervous System. Satellite cells protect the neuron, and regulate oxygen, carbon dioxide and nutrients.

## NEURAL STEM CELLS

Neural Stem Cells are multipotent adult stem cells. They can differentiate into neurons or glial cells. Neural Stem cells may be able to treat certain neurodegenerative disorders. Amyotrophic lateral sclerosis is also known as Lou Gehrig's disease, and there is no known cure. It causes nerve cells in the spinal cord to die, which causes paralysis and eventually, they will not be able to breathe. A study showed that transplanting neural stem cells into a spinal cord slowed the disease progression. Transplanting the cells did not repair or replace the

nerve cells but helped to keep the remaining nerve cells functioning because they turned into cells that protected the rest of the neurons. It is not a cure, but this procedure could help people live longer. Mice that had Amyotrophic lateral sclerosis were able to live up to a year longer when they were treated with neural stem cells than the ones without treatment. They lived three to four times longer than untreated mice.

## NEURAL-LIKE MUSCLE CELLS

Skeletal muscle makes up about 50 percent of the body, which makes it easily accessible, and it can repair itself if it gets damaged. Scientists at Wake Forest Baptist Medical Center think that skeletal muscle cells could be used to treat brain or spinal cord injury, neurodegenerative disorders, brain tumors and other diseases. The scientists took cells from a skeletal muscle sample and injected them into a mouse brain, and saw that the cells moved to the area of the brain where neural stem cells originate from. Some types of stem cells will form tumors, so they injected the cells under skin and in brains to see if these would form tumors, and found that no tumors did form. The scientists are now testing to see if these cells could turn into functioning neurons in the central nervous system

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