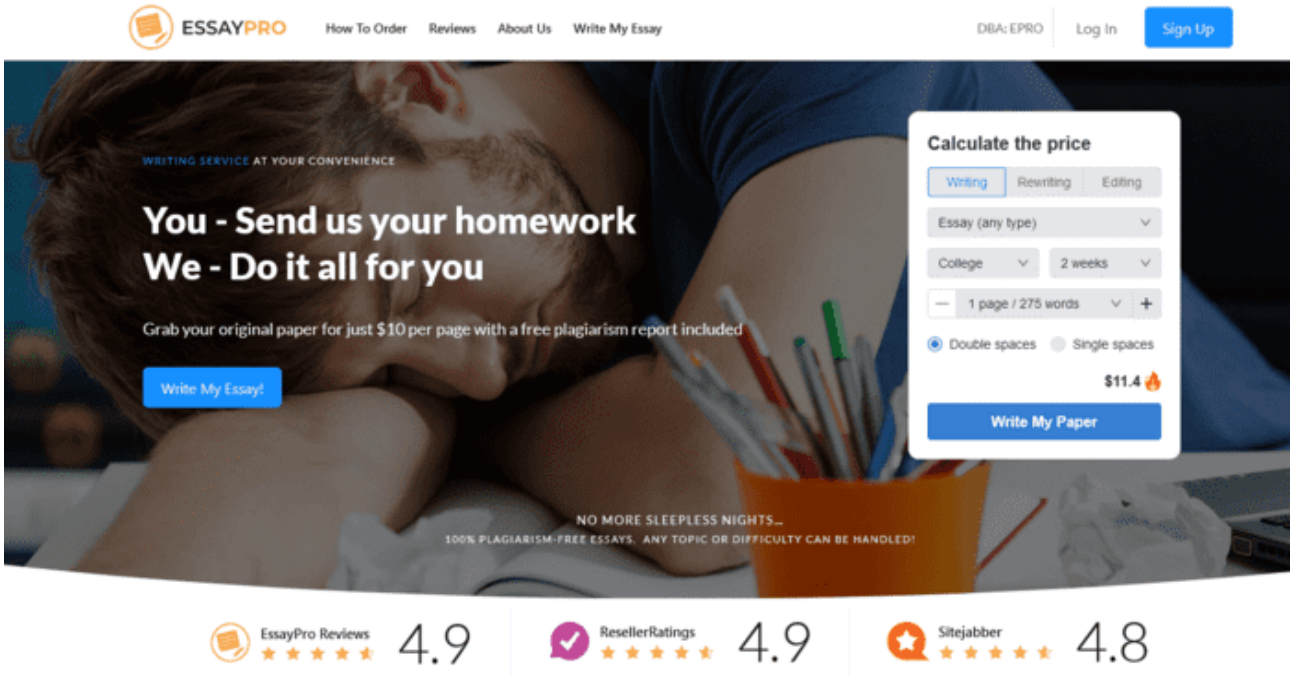
Reversal of Paralysis



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Reversal of Paralysis

This semester we learned about the paralysis of Christopher Reeves. In thinking about his condition, I began to wonder where researchers stood in their attempt to cure paralysis. Paralysis was often considered to be completely irreversible. However, I found that the last ten years have brought huge advances in our understanding of the nervous system and spinal cord injury. Even though paralysis due to spinal cord injury is still, for the most part, permanent, several drugs and techniques show promise in reversing the effects of paralysis.

In order to understand the difficulties of curing paralysis, we must first understand the nature of spinal cord injury. When the spinal cord is injured due to trauma, there is localized death of the nerve cells. (1) The initial injury is only the beginning of the cell death. In the hours, days, and weeks following the injury, nerve cells continue to die above and below the original wound. When the area begins to heal, scar tissue, fluid-filled cysts, and cavities occupy an area where the tissue was once healthy. (4) Many of the nerve fibers at the injured area actually separate into two pieces. The part of the fiber that is torn from the soma dies within 48-72 hours. This part does not regenerate, and cell/cell

communication is lost below this point. Some cells, on the other hand, remain intact, but lose their myelin. Myelin is a fatty substance that is necessary to conduct electrical signals along the axon. "[It] increases the speed of transmission of signals from one nerve cell to the next, and without myelin the signal may deteriorate so much that it does not reach its target at all." (2) It is entirely possible that the nerve cells and their axons may survive the trauma, but paralysis still occurs because of the destruction of the myelin sheath. In order to reverse the effects of the spinal cord injury, the patient must receive treatment depending on which damage category their injury falls into.

Methylprednisolone is the first drug which was proven to control spinal cord damage in humans. It is unclear exactly how methylprednisolone works, but it is thought to reduce inflammation, the release of glutamate, and the accumulation of free radicals. Immediately after trauma to the spinal cord, tiny hemorrhages appear due to blood vessel damage. The resultant swelling inhibits the delivery of nutrients and oxygen to the nerve cells, causing them to die.