

## Module 4 – SCI Biology Part I: How an SCI Causes Loss of Function

### Introduction to the Nervous System

Understanding how the nervous system is structured and how the brain, nerves and cells work together is an important first step in understanding what happens during an SCI, and how research can lead to treatments.

The nervous system is a complex network that includes the brain, billions of nerves, and other cells within our bodies that work together to control and coordinate all of our thoughts, emotions, and movements. It consists of two parts that work together. The first part is called the central nervous system, or CNS, which includes the brain and spinal cord. The CNS controls what we think, how we feel, and what we do.

The second part is the peripheral nervous system, which describes the network of nerves that carry information between the CNS and other parts of our bodies.

- Some peripheral nerves carry information about sensations from our eyes, ears, nose, mouth, skin, muscles and internal organs to the brain.
- Other peripheral nerves carry instructions from the brain out to our limbs, muscles, and organs to enable us to move.

Both the CNS and peripheral nervous system also contain many other types of specialized cells that are essential for the nervous system to work properly, and that are involved in the response to spinal cord injury. We will discuss these cells in greater detail later in this module.

When the spinal cord is injured, some of the nerves and other cells become damaged. This causes other cells go into a protective mode that contains the initial damage, but that also can inhibit later healing.

Biological research that explains the mechanisms of what happens to all of those nerves and other cells during and following an injury can identify potential targets for drugs and medical devices that could improve function after an SCI.

Learning about the biology of SCI is important to research advocates because it helps us understand:

- The objectives of research studies;
- How clinical trials and new therapies could lead to better function and independence for people with an SCI; and

- Some of the challenges that make it hard to develop drugs and devices that do improve function in SCI.

In this module you will learn:

- How the spinal cord and peripheral nervous system work.
- The different types of cells in the nervous system, and what they do.
- What happens to the cells inside the spinal cord following an injury, and why those events are of interest in SCI research.