

(SCIRE logo with words “Spasticity and SCI,” “Physiological Basis of Spasticity,” and “Part 3/7” appear on screen.)

(Medium close-up of Dr. Patricia Mills, Principal Investigator from the Faculty of Medicine in University of British Columbia.)

Patricia Mills: It’s important to understand why spasticity can get worse with medical conditions.

(Cut to a light blue background. Two horizontal red lines appear in middle of screen with the words “Level of Spinal Cord Injury” in between. Below these red lines is a circle with the words “any stimulus” inside. Lines extend from this circle to link to graphics of a close-up shot of skin, a heel of a foot hitting an object, an intestine, and an urinary system. An arrow also attached to the circle points to the words “Reflexes.”)

What happens is that any stimulus below the level of the spinal cord injury can trigger the reflexes underneath that level of injury.

(A picture of a brain appears above the two red lines with a vertical dotted line drawn between the brain and the top horizontal red line. An “X” then appears over the dotted line to represent a broken connection.)

And because the brain can no longer send a message down through the spinal cord to calm the reflex down, that reflex can be activated and it tends to persist.

(Return to medium close-up of Dr. Patricia Mills.)

Common triggers are things that cause pain in a normal condition.

(Diagram appears, demonstrating the flow of nerve impulses from the Muscle spindle fibers and Quadriceps in the leg to the Brain, when a foot steps on something sharp.)

Let’s say that you’re walking along the ground and you step on something sharp.

(A dotted line is drawn from the foot to the Muscle spindle fibers in the leg, from the Muscle spindle fibers through the Afferent neuron to the Interneuron, and from the Interneuron to the Brain. When the dotted line reaches the Brain, the word “Pain” appears in an orange circle.)

So typically what happens is that we have this sensation coming up from the foot as a painful sensation that travels up the nerves, into the spinal cord, up to the brain, and it would be perceived as pain.

(A dotted line starts flowing from the Interneuron down the Motor (efferent) neurons to the Quadriceps of the leg.)

In the meantime, you've had some reflexes triggered, so the reflexes to extend one leg so you can stand on it and flex the other leg so you can take your foot away from the painful sensation.

(The word "Pain" is crossed out and an orange line extends from the brain and goes to the Interneuron, stopping the flow of communication from the Interneuron to the leg.)

But that's a really short-lived reflex in someone who has normal spinal cord and brain function; The brain will then send a message down and tell those reflexes to calm down.

(Return to medium close-up of Dr. Patricia Mills.)

What happens in an individual with SCI is that the sensation occurs at the level of the organ-the foot, the bladder, or the bowel.

The sensation travels up but then gets blocked at the level of the spinal cord injury.

(Diagram of leg, interneuron, and brain re-appears to demonstrate flow of nerve impulses initiated by stepping on a sharp object. Nerve impulses are sent from the leg through the Motor (efferent) neurons and the Afferent neuron to the Interneuron, but while nerve impulses return from the Interneuron through the Motor (efferent) neurons to the leg to trigger reflexes, the nerve impulses directed to the brain from the Afferent neuron stop at the level of spinal cord injury.)

So, the brain doesn't perceive that stimulus of pain or discomfort.

The reflexes get triggered, but the brain cannot send a message down to tell the reflexes to calm down.

(Return to medium close-up of Dr. Patricia Mills.)

You get this interesting picture where you get the increase in the spasticity mediated involuntary muscle reflexes and spasms, but the individual doesn't feel the sensory input from the skin, bladder, or bowel.

All you see is increase in spasticity.

(Cut to a man with SCI walking with help of parallel bars. As he turns to face a bar, his right leg starts to spasm. During the spasm, a physiotherapist speaks while pointing to different parts of the leg.)

Unlike individuals without SCI where you rely very heavily on the history to find out what's going on - is it your foot, your bladder, or your bowel.

(Return to medium close-up of Dr. Patricia Mills.)

With an individual with SCI, you have to use spasticity as a red flag to go hunting for that thing that has gone wrong, a medical condition that has triggered that spasticity within that short period of time.

(Words "To learn more visit scireproject.com" and "follow us @SCIREProject" appear.)

(Fades into next screen with bolded words "Thank you to" followed by the words "Principal Investigator Patricia Mills," and "Participant: Lance Blanco, Jami Bennett, Matthew Querée, Shannon Sproule and the rest of the SCIRE Team." Below: logos of the Rick Hansen Institute, University of British Columbia, icord, and Ontario Neurotrauma Foundation.)

(Words "Created by Merilin Paart at the Knowledge Mobilization Studio at the Centre for Hip Healthy and Mobility" and Knowledge Mobilization Studio logo appear on screen before dipping to black.)