Canadian Paraplegic Association (Manitoba) Inc.
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Para Tracks

Newsletter of the Canadian Paraplegic Association (Manitoba) Inc.

Will-To-Win Symposium Held at HSC
"Restoring Function Following Spinal Cord Injury"

(Dr. David McRea presents keynote speaker, Dr. Susan Harkema.)

In this issue...

Restoring Function After Spinal Cord Injury: Positive Steps

The Will-to-Win Symposium Features Dr. Susan Harkema

by Lorne Chartrand

For people living with spinal cord injuries, it is difficult to accept the fact that a tiny gap in the body's electrical system is all that separates them from walking stride for stride with the rest of the world. Our bodies otherwise seem so resilient. As children we stumble and fall; the resulting scrapes and cuts leave little or no trace. A simple Band-Aid covers the boo-boo and within a week the wound is forgotten. How then, can this microscopic tear - a wound that leaves no external evidence - be so impossible to overcome? Several decades of research has seemed to reveal little more than a closer understanding of the nervous system and its encasement of fluid and bone.

Dr. Susan Harkema of the Institute of Brain Research, Los Angeles, California, during presentation on locomotor training.

Compound that with the most often violent incident that causes the spinal cord injury. Family, friends and even well meaning strangers assure us that "the cure" is just around the corner; "five years, at most" is a common assessment. I heard that myself nine years ago.

So what really is going on in spinal cord research? There are several fronts being explored which offer promise. Mainly, these are a) the treatment or repair of the injury itself; attempts to regenerate growth to re-connect the nerves above and below the spinal cord injury. b) Research aimed at minimizing or reversing the secondary complications of spinal cord injury (e.g. osteoporosis). c) Treatment / therapy whose aim is to try to maximize the function that remains after spinal cord injury. (See part II of Dr. Kris Cowley's feature on page 4 in this issue).

On April 27, during the Will-to-Win SCI Research Symposium hosted by the Manitoba Paraplegia Foundation, Inc. and University of Manitoba's Spinal Cord Research Centre, Dr. Susan Harkema, from the University of California's Brain Research Institute, presented her work in supported weight bearing and gait training, *"Locomotor Training after Human Spinal Cord Injury for the Recovery of Walking."* What Harkema found - to the delight of many in attendance at the Tuesday evening publi thatc lecture - was that the spinal cord can, in effect, be trained to perform weight bearing and stepping functions independently of control by the brain. For many skeptics, like IcarusMelt76 - who was quoted from the CPA message board in the latest issue of *total access* - this should bring some credibility to studies where people are "… hung by straps like a puppet with a nurse or therapist on each foot moving them on a treadmill. Just dangling there." What Harkema explained is that there is a LOT more than "dangling" going on in her Los Angeles, California lab.

Dr. Harkema explains the finer points to CPA Board member George Dyck.

The reality is that people are getting up out of their wheelchairs and taking steps that are not so much controlled by the brain as by the spinal cord. Certainly, these motions are more like 'tricks' than pure fluid and deliberate steps, but the point is that the subjects (to use the clinical term) are making these moves on their own. It takes a lot of training to gain control of the spinal cord's awkward expression of the brain's desire to produce locomotion - but it can be done.

Dr. Harkema has taken advantage of the fact that certain parts of how humans (and animals) stand and walk are delegated to the spinal cord, which leaves the brain free to concentrate on more sophisticated and sublime activities. When we stand, for instance we don't consciously deal with the amount of extension and flexion, which goes on in the ankle, knee and hip joints and the associated muscles which control those joints - our spinal cords take care of that. When is the last time you actually thought about these mechanics while standing? Right - autopilot. Consider the hot pursuit of a fly ball; the legs are pumping while the brain is receiving visual signals from the baseball; calculating its arc while constantly adjusting what the body needs to do to get the glove underneath the ball before it hits the ground. If the brain needed to be consciously involved in the motion of the legs, multitasking would overload the system and the out-fielder would kiss the dirt long before getting near the ball.

CPA Executive Director, Audrey Mcilraith with Dr. David McRea, Director, Spinal Cord Research Centre

Now, let's return to the lab. We'll concentrate on walking rather than standing. Spinal cord injury exhibits common symptoms in most people. One is the leg spasm where the ankle flexes and extends rapidly; in a seated person; the knee rises and falls as a result of this motion. This is called clonus. At first glance this uncontrolled spasm would seem to be a barrier to regaining normal motor control. In Dr. Harkema's studies, however, it became apparent that this motion is the body's response to ground stimulus and the automatic generation of the walking pattern. Incomplete spinal cord injured subjects who were placed on a treadmill would - after some training - produce the clonus response. Knee and hip motion would eventually be established and some subjects - formerly unable to stand - would be able to both bear weight and carry that weight forward in stepping motions. They got out of their chairs and were, to some degree, walking. Most with assistive devices like canes or walkers.

Interestingly, there was another discovery in the lab. The clonus response can be triggered in most spinal cord injured persons. Furthermore, if clonus is triggered in both ankles, the body - likely controlled by the spinal cord (it's got to be controlled somewhere, dammit!) - alternates the motion between left foot and right foot. The same motion can be triggered in most spinal cord injured people, creating the same automatic pattern necessary for bipedal locomotion - walking!

In Harkema's studies, different subjects achieved different levels of function through their training. In addition, however, there were some unexpected benefits which might be greater than walking. All quadriplegic participants showed an increased blood pressure (in quadriplegic spinal cord injury blood pressure is usually much lower than normal). More significant might be an increased level of cardiovascular fitness. There is a strengthening of the heart and lungs - vital players in the struggle for longevity of life.

Dr. Harkema's studies seem to support what we have always been told -- that our bodies above and below the lesion remain intact after spinal cord injury. The only defect is that small gap. Now, however, we may be able to go further than ever before without bridging that gap. Ideally, of course, the ultimate cure is the highest ideal, but in the meantime we may be able to do more for ourselves by training a spinal cord which responds in ways that many of us may never have imagined. Dr. Harkema may have, in addition to making significant progress towards a cure, found a way to extend the lifespan of spinal cord injured persons.

I've already asked Dr. Harkema to enter my name in her subject pool database.

For further information on Harkema's work, visit: www.harkema.ucla.edu

Harkema's lecture was part of a two-day Will-To-Win Symposium highlighting progress in the rehabilitation and treatment of spinal cord injury and honouring the significant contributions of the Will-To-Win Golf Classic to spinal cord research in Winnipeg.

Since 1994, the Will-To-Win Golf Classic has raised over $700, 000 for spinal cord research and contributed significantly to the work of the Spinal Cord Research Centre.