

T 11 and below

Flaccid is opposite of spastic. The lumbosacral spinal cord is located at T11-L1. It contains the neurons (gray matter) that innervate the muscles of the leg. Damage to the lumbosacral cord results in loss of gray matter including the neurons responsible for innervating muscle and the circuitry for reflexes and programmed movements. When you have flaccid paralysis, you don't have spasticity.

I believe that restoring function to lumbosacral injuries will require neuronal replacement. Neural stem cells can make neurons and some animal studies suggest that they can also replace motoneurons. There are several sources of immune-compatible neural stem cells. One is induced pluripotent stem (iPS) which can be differentiated to neural stem cells. The other is autologous call pluripotent adult stem cells which can be differentiated into neural stem cells, including the MUSE cells described by Mari Dezawa.

Please note, however, that much research still needs to be done to find out the best kind of cells to transplant to replace motoneurons, to get these cells to send axons out of the spinal cord to innervate muscle, to regenerate sensory and descending axons to connect with these neurons to reform reflex circuits, and to program the spinal cord for micturition (urination), bowel movements, walking, and other programmed motor function.

People who have injuries to L2 or lower segments will have primarily spinal root (cauda equina) injuries. These roots need to be regenerated. Axons must be coaxed to grow into the spinal cord. Motor axons must be grown from the spinal cord into the muscle. If the injury is close to the spinal cord, motoneuronal replacement may be necessary.

Finally, flaccidity (complete loss of muscle tone) usually results in marked atrophy of muscles. For a long time, clinicians thought that denervated muscles could not be restored. However, a group in Vienna has reported that very intense electrical stimulation of muscle can not only maintain but restore denervated muscles.

I know that the reversal of flaccid paralysis sounds daunting but I think that we will be surprised by how flexible the spinal cord is.

Wise