

Locomotor Stages in Spinal Cord Injury (LOSSCI)

Patient	_____
Date of birth	_____
City, Date of Assessment	_____

Stage I – Orientation and goal-directed movement of the arms

Test items (assessed in supine)		+	-		+	-
(1) Fixation of gaze and following an object	to the right			to the left		
(2) Touching or grasping an object	right hand			left hand		

Stage II – Uprighting of the trunk and goal-directed movement of the arms

Test items (assessed in prone)		+	-		+	-
(1) Arm support to orientate	Propping on the right			Propping on the left		
(2) Single arm support, grasping with contralateral hand	Grasping with right hand			Grasping with left hand		

Stage III – Forward progression in prone: Creeping with / without assistance of the legs

Test items (assessed in prone)	+	-
(1) Creeping		

Stage IV – Locomotion by means of crawling or walking with upper extremity assistance

Test items	+	-
(1) Crawling with 3 points of support		
(2) Reciprocal crawling – 2 contralateral points of support		
(3) Walking with upper extremity assistance (cruising or use of an upper extremity assistive device)		

Stage V – Independent walking

Test items	+	-
(1) Walking on a flat surface and stopping on command – maximal 1 extra step		
(2) Walking up an incline (not stairs)		
(3) One-legged stand > 3 seconds	right leg	
	left leg	

Is the highest item in the highest stage achieved? YES NO

Is the highest item in the previous stage achieved? YES NO

Is a stage not achieved? YES NO

If „YES“, which stage? _____

Outline to the LOSSCI test recording sheet

(Locomotor Stages in Spinal Cord Injury)

In 1866, the zoologist Ernst Heinrich Haeckel (1834-1919) introduced the concept of ontogenesis to describe the typical course of development of an organism from a fertilized egg through to the completion of growth and differentiation. The phases of aging and natural death are also included.

Motor ontogenesis takes place in healthy people in defined stages of development. Interestingly, already in the first months of life certain motor skills are made available, which are crucial later for the acquisition of walking, as well as all the activities of daily living. Prof. Vojta described the complexity of normal developmental kinesiology in regard to the automatic control of posture, species-specific uprighting against gravity and segmental, goal-directed movements.

Based on the fact that motor development in a child with cerebral palsy (CP) takes place in very specific stages of development analogous to that of a typically developing child, Prof. Vojta defined specific stages of locomotion for the child with CP.

For children, adolescents and adults with acquired damage to the central nervous system, experience with therapeutic treatment shows that here as well, concrete motor improvements occur in a sequential order analogous to normal locomotory ontogeny. The highest stage that is attained by the patient will to a great extent, determine what daily living skills will be available.

Following this, the locomotion stages defined for CP were transformed and applied to spinal cord injury disorders. Locomotion stages were found to be a reliable and valid assessment procedure. They quickly and reliably verify the relevant functions that are necessary for mobility, as well as for patient self-reliance and independence.

Description of the LOSSCI Stages I – V

LOSSCI I – assessed in the supine position.

Tests the ability to control/regulate body posture to enable orientation to the environment and to perform a goal-directed / isolated movement with the arm lifted from the support surface.

(Test angle of the reaching arm is maximum 90 ° in abduction and flexion)

LOSSCI II – assessed in the prone position.

Tests the ability to upright the trunk against gravity in prone through elbow support and the ability to perform a goal-directed/ isolated movement of each arm by lifting it off the support surface.

(For arm support in prone the patient must bring the arms forward alone) The test angle of the reaching/ grasping arm is from the midline to a maximum of 90 ° abduction., whereby the arm is lifted about 30 ° from the support surface).

LOSSCI III – assessed in the prone position.

Tests the ability to move the body forward in space in prone (3-4 „stepping movements“) using the arms, the legs are allowed to assist.

LOSSCI IV – implemented according to what possibilities exist in the described starting positions.

Tests the ability to move the body in space either through crawling (support on the hands and knees) or through bipedal gait with support through the arms (use of mobility aids such as crutches or walker).

LOSSCI V – tests the ability to move the body in space through bipedal gait without using the arms for support; this may also include the ability to walk up and down an incline.

The one-legged stand is used to test the ability to keep the body erect whilst standing on one leg over a longer period of time with flexion of the other leg in the hip and knee of approx. 90 °. (Command „Pull your knee up towards your stomach“)

For reliable testing of the spinal cord injured patient (child, adolescent and adult) it is recommended that all stages and items be tested.

To summarize the evaluation the patient's highest stage is reached when at least one item in a stage is achieved. However, it must also be noted which stage or which item the patient hasn't achieved from a lower stage. In this case an obvious limitation in the locomotor prognosis and / or self-sufficiency is to be expected.