

# Clinical Case Study: Home-Based TSS Improves Patient Performance, Satisfaction, and Quality of Life with ExaStim® in a C4 AIS A SCI Patient

A de-identified single-patient experience intended for clinician audiences.

## 1. CASE TITLE

Improved Performance and Satisfaction in ADLs and IADLs Following Use of ExaStim in a C4 AIS A Spinal Cord Injury Patient.

## 2. PATIENT BACKGROUND

The patient is a 26-year-old male who sustained a traumatic cervical spinal cord injury 4.5 years prior to treatment, as a result of a diving accident. The injury resulted in a C4 AIS A classification, indicating a sensory and motor complete spinal cord injury. At baseline, he presented with significant upper extremity impairment, reflected by an Upper Extremity Motor Score (UEMS) total of 17 out of 50, and required assistance for all activities of daily living (ADLs) and instrumental activities of daily living (IADLs).

Following the initial trauma, he completed approximately five weeks of inpatient rehabilitation, followed by ten months of outpatient occupational and physical therapy. His prior rehabilitation included the use of conventional therapy modalities, including functional electrical stimulation (FES). He ultimately reached a plateau in functional progress despite sustained engagement in a therapeutic wellness program.

## 3. CLINICAL CHALLENGE / PROBLEM STATEMENT

Distal upper limb function plateaued, limiting performance in self-care and home management tasks. An adjunct intervention was sought to enhance volitional motor recruitment and support task-specific training.

## 4. TREATMENT APPROACH

### Rationale:

Presence of residual voluntary activation but insufficient strength for functional grasp tasks; ExaStim suited for task-concurrent neuromodulation.

### Procedure / Intervention Details:

- Duration: 4 weeks
- Targets: All TSS completed while engaging in an upper extremity exercise program and ADL/IDL tasks. Reach and grasp for grooming and self-feeding; hand strengthening for improved grasp, and manipulation of household items.
- Treatment: 3 sessions per week, 60 minutes each, for 4 weeks.
- Parameters: 0.8-1.0ms pulse width; 45-55 Hz; amplitude adjusted to sub-motor threshold.
- Tasks: Reaching, grasp-and-release, utensil simulations, grooming, hand manipulation, pouring activities.
- Assessments: Baseline, Week 5.

## 5. OUTCOMES

Canadian Occupational Performance Measure (COPM) Performance Score

COPM Satisfaction Score

Neuro QOL UE (Quality of Life in Neurological Disorders for Upper Extremity Function)

### Results:

#### COPM Performance Average Score:

	Baseline	Week 5
	2.0	3.4 (+1.4)

#### COPM Satisfaction Average Score:

	Baseline	Week 5
	1.0	2.8 (+1.8)

#### Neuro QOL UE Function:

	Baseline	Week 5
	37	41 (+4)

#### AIS/Neurologic Level: C4 AIS A (Baseline)

	Baseline	Week 5
	C4 AIS A (Baseline)	C4 AIS C (Week 5)

## OUTCOMES FIGURE

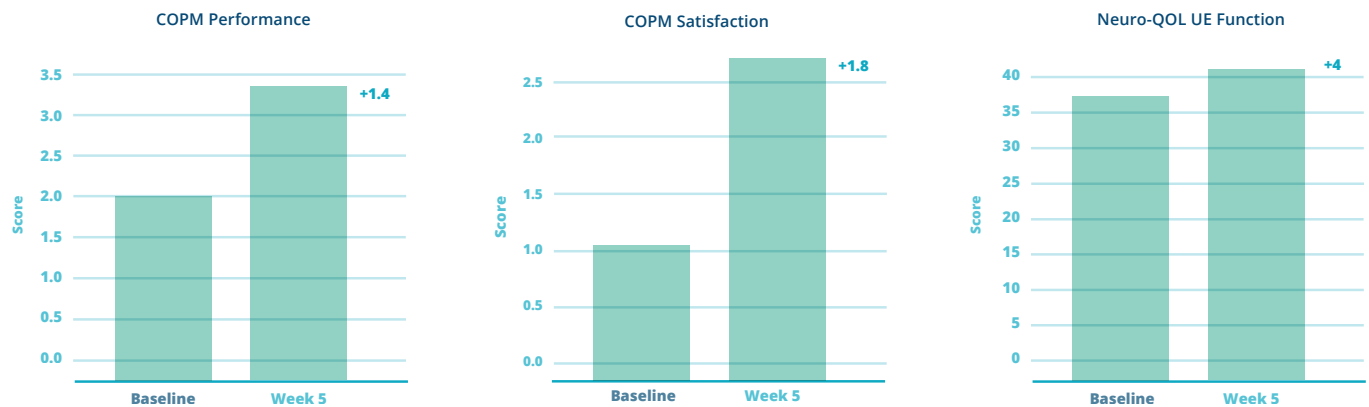


Figure A. Change scores from COPM Performance, COPM Satisfaction, and Neuro QOL UE Function (Baseline → Week 5).

## 6. SAFETY & TOLERABILITY

No serious AEs. All sessions completed, occasional amplitude adjustment for comfort.

## 7. DISCUSSION

Across patient-reported and functional outcome measures, the patient demonstrated meaningful improvement over the 5-week home-based stimulation and functional practice program. Improvements in COPM Performance (+1.4) and COPM Satisfaction (+1.8) exceeded commonly referenced thresholds for clinically important differences and reflect both enhanced functional ability and increased confidence in performing goal-directed upper extremity tasks. The 4-point improvement on Neuro QOL Upper Extremity Function further aligns with these findings, indicating improved perception of arm and hand capability in daily contexts.

Importantly, these functional and perceived improvements occurred alongside a notable neurological advancement, with the patient transitioning from a C4 AIS A classification at baseline to C4 AIS C by the conclusion of the study period. Such a shift reflects the emergence of new voluntary motor function below the level of injury, signifying an upgrade from a motor complete to a motor incomplete status. Although single case observations cannot determine causality, the concurrent improvements in objective metrics, patient reported outcomes, and neurological classification suggest that the combination of ExaStim and targeted functional practice may have facilitated increased excitability or engagement of spared motor pathways. Together, these findings point to a consistent and multisystem pattern of progress across motor performance, functional participation, and perceived capability.

## 8. CONCLUSION

This case study demonstrates that pairing ExaStim with structured, task-specific functional practice was associated with meaningful gains in upper extremity performance, satisfaction, and perceived function over a 5-week period in an individual with chronic C4 AIS A spinal cord injury. In addition to improvements in COPM Performance, COPM Satisfaction, and NeuroQOL Upper Extremity Function, the patient exhibited a clinically significant neurological transition to C4 AIS C, reflecting the emergence of voluntary motor function below the level of injury. This progression—from motor complete to motor incomplete—suggests a potential enhancement of residual motor circuitry that may have been supported by stimulation augmented task-practice.

The intervention was well tolerated with no serious adverse events. While these results are limited to a single participant and cannot be generalized, they provide encouraging preliminary evidence that ExaStim may serve as a valuable adjunct to upper-limb rehabilitation in individuals with chronic cervical SCI, including those initially presenting with motor-complete injury.

### ANEUVO

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### Indications for Use:

The ANEUVO ExaStim® Stimulation System is indicated for stimulation of the spinal cord to improve and restore upper extremity motor function in adult patients with paralysis due to spinal cord injury.

### Disclaimers:

ExaStim® is CE marked in Europe and FDA 510(k) cleared in the United States. It is not commercially available outside these markets.

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