

Surface Electromyography (sEMG)

Assessment Overview

Assessment Area

ICF Domain:

Body Function

Subcategory:

Neuromusculoskeletal &
Movement-related Functions and
Structures

You Will Need

Equipment:

- Surface electrodes
- Monitoring equipment

Training:

Special training is mandatory to
conduct and interpret the results.

Administration:

Surface electrodes are placed on
the skin overlying the muscles of
interest.

Summary

Surface Electromyography (sEMG) is a non-invasive technique used to measure muscle activity (both voluntary and involuntary) in individuals with neuromuscular conditions using surface electrodes.

sEMG provides quantifiable and objective measures of muscle activity and is less invasive than needle EMG. In general, EMGs are associated with high costs of administration and interpretation.

Availability

Refer to protocols in the following article:

<http://www.ncbi.nlm.nih.gov/pubmed/15672098>

Assessment Interpretability

Minimal Clinically Important Difference

Not established in SCI

Statistical Error

Not established in SCI

Typical Values

Not established in SCI

Measurement Properties

Validity – **Moderate** to **High**

Moderate to High correlation (r-values) with Manual Muscle Testing (MMT):

Biceps:	0.56/0.40
Triceps:	0.77/0.70
Extensor carpi radialis:	0.64/0.64
Abductor digiti minimi:	0.49/0.67
Psoas:	0.47/0.77
Quadriceps:	0.54/0.61
Tibialis anterior:	0.57/0.78
Soleus:	0.28/0.59

(Calancie et al. 2001; n=45; 34 cervical injury level; < 1week post-injury)

High correlation (Spearman coefficients) with torque measurements:

Tibialis anterior: $p = 0.86-0.95$
Soleus: $p = 0.86-0.95$

(Silverman et al. 2021; n=4 with cervical incomplete SCI [3 males, 1 female; mean age: 46.75 years]); and n=9 healthy uninjured participants [7 males, 2 females; mean age 32.3 years])

Number of studies reporting validity data: 5

Reliability – **High**

High Test-retest Reliability:

Voluntary response index magnitude: ICC = 0.93

Voluntary response similarity index: ICC = 0.83

(One week interval; Lim & Sherwood 2005; n=69, 65 male, 4 females; incomplete SCI; and mean (SD) time since injury: 54.8 (3.6) months)

High Reliability:

Tibialis anterior: ICC > 0.94

Soleus: ICC > 0.86

(Silverman et al. 2021; n=4 with cervical incomplete SCI [3 males, 1 female; mean age: 46.75 years]); and n=9 healthy uninjured participants [7 males, 2 females; mean age 32.3 years])

Number of studies reporting reliability data: 2

Responsiveness

Floor/Ceiling Effect:

Not established in SCI

Effect Size:

Not established in SCI

Number of studies reporting

responsiveness data: 0