

**WFNR** World Federation for  
Neurorehabilitation

13<sup>th</sup> WORLD CONGRESS FOR  
**NEUROREHABILITATION**



***'CLINICAL APPLICATIONS FOR SURFACE EMG IN  
NEUROREHABILITATION'***

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SUPPLEMENTARY MATERIAL

CENTRO EUROPEO DE NEUROCIENCIAS

**Clinical applications**

Tone assessment

Biofeedback

Passive movement

Rest

Voluntary movement

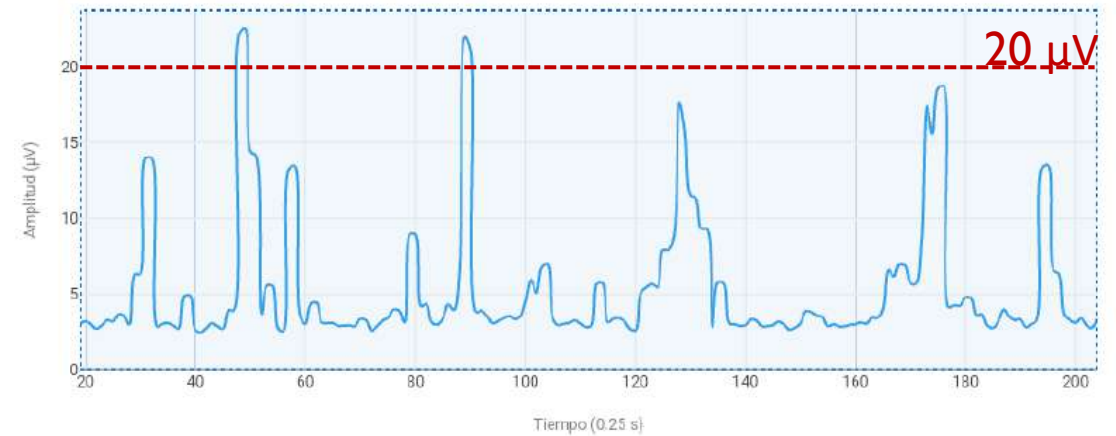
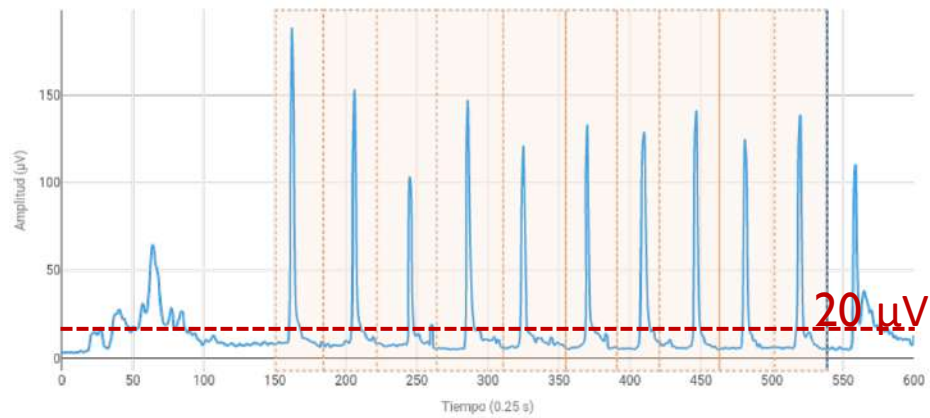
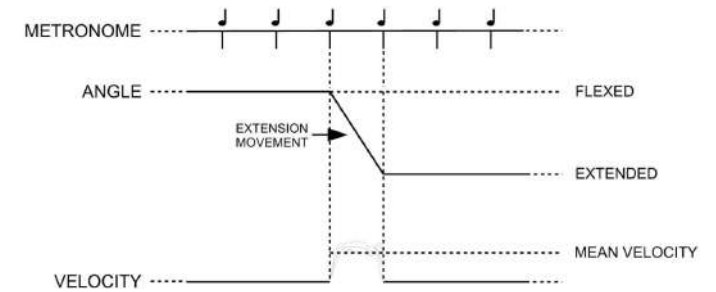
Maximum Voluntary Isometric Contraction

Sinergies analysis

Functional movements

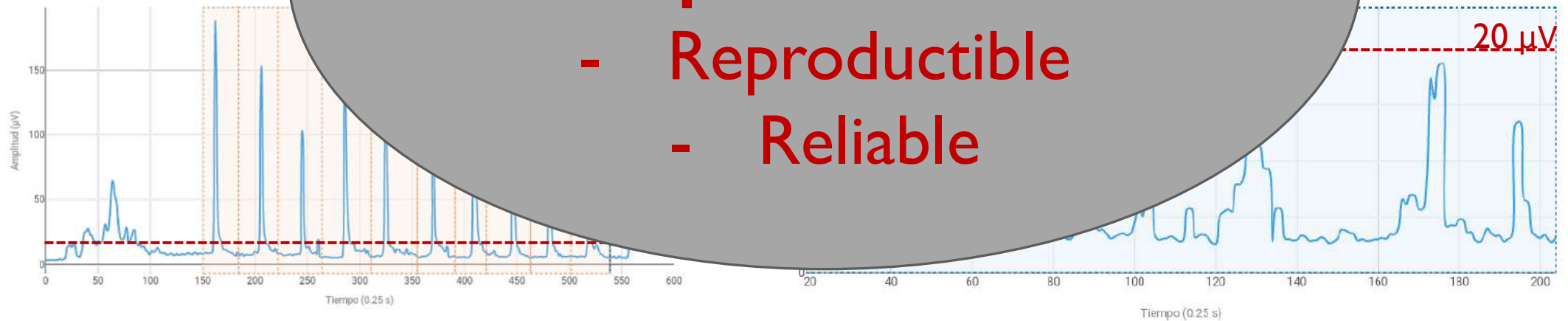
# STONE ASSESSMENT – PASSIVE MOVEMENT – LINEAR MOVEMENT

## Dynamic stretch reflex in spasticity VS Non-spasticity



# STONE ASSESSMENT – PASSIVE MOVEMENT – LINEAR MOVEMENT

Dynamic stretch re



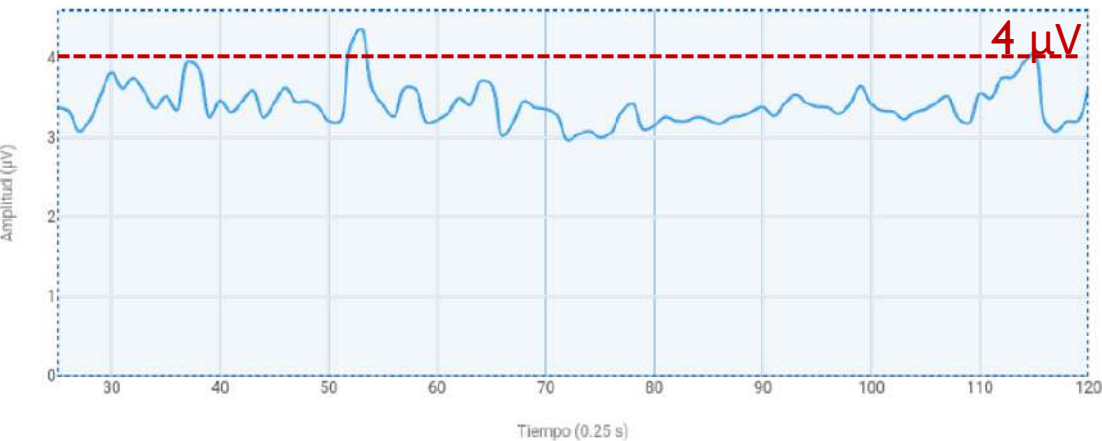
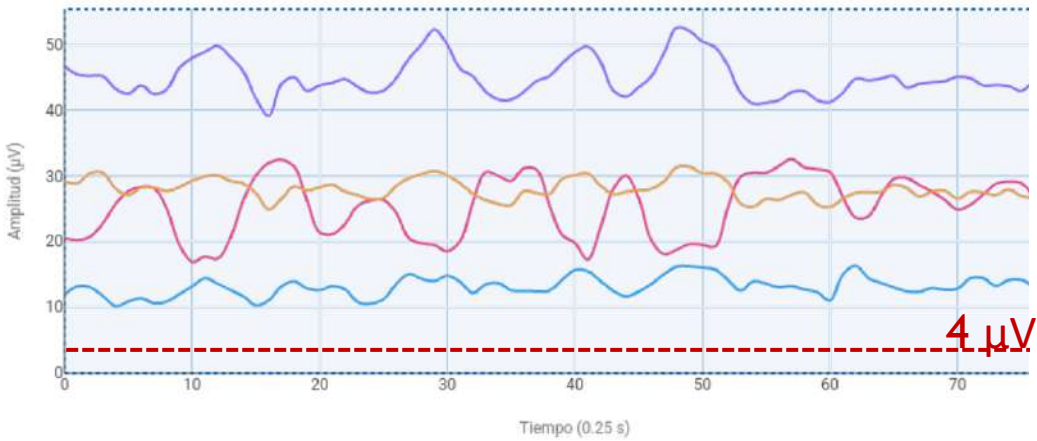
**Quantification of spasticity in clinical practice:**

- Reproducible
- Reliable



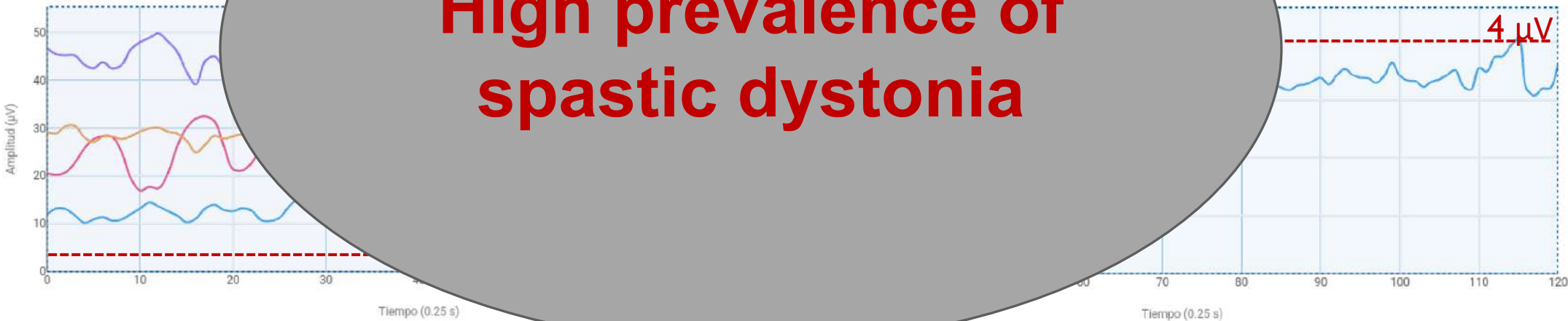
# STONE ASSESSMENT – REST ACTIVITY

## Spastic dystonia VS Non-spastic dystonia



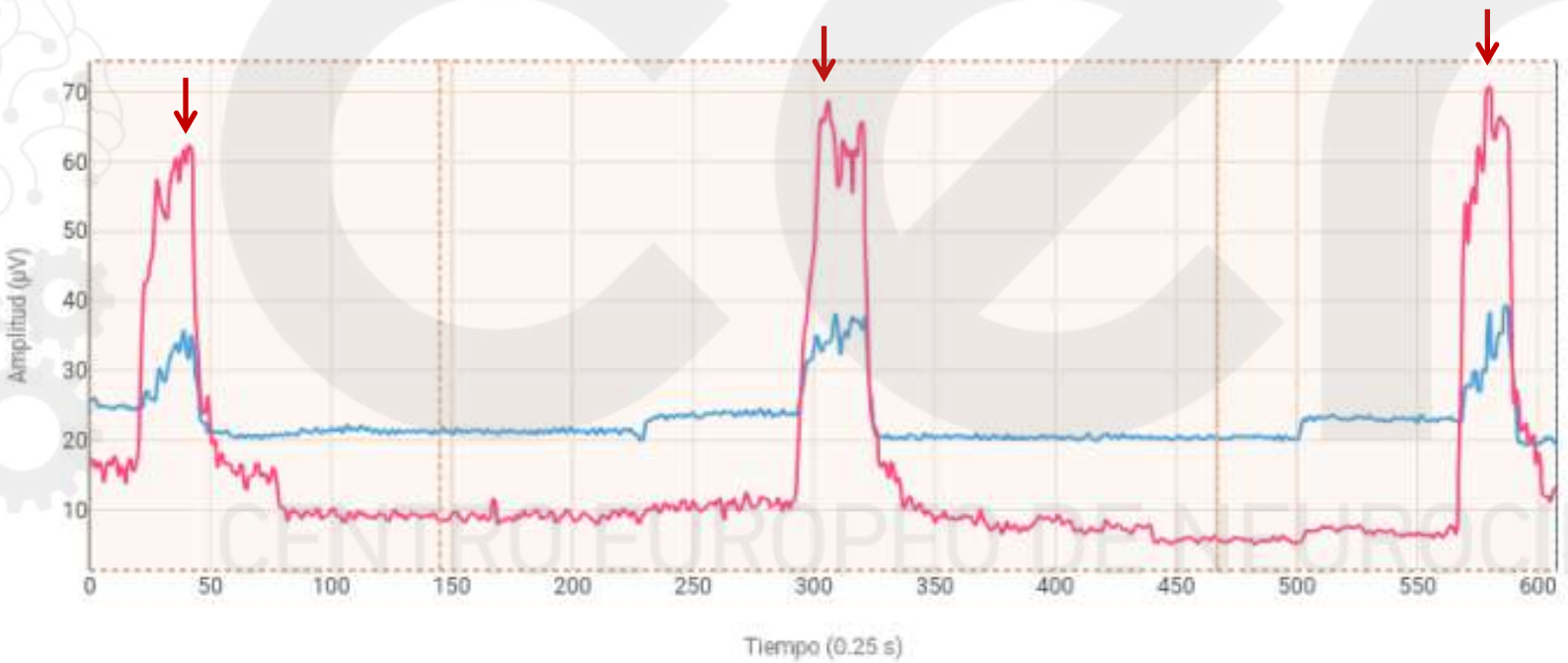
# TONE ASSESSMENT – REST ACTIVITY

**High prevalence of spastic dystonia**



# VOLUNTARY MOVEMENT - MVIC

## Maximum Voluntary Isometric Contraction (MVIC)



# VOLUNTARY MOVEMENT - MVIC

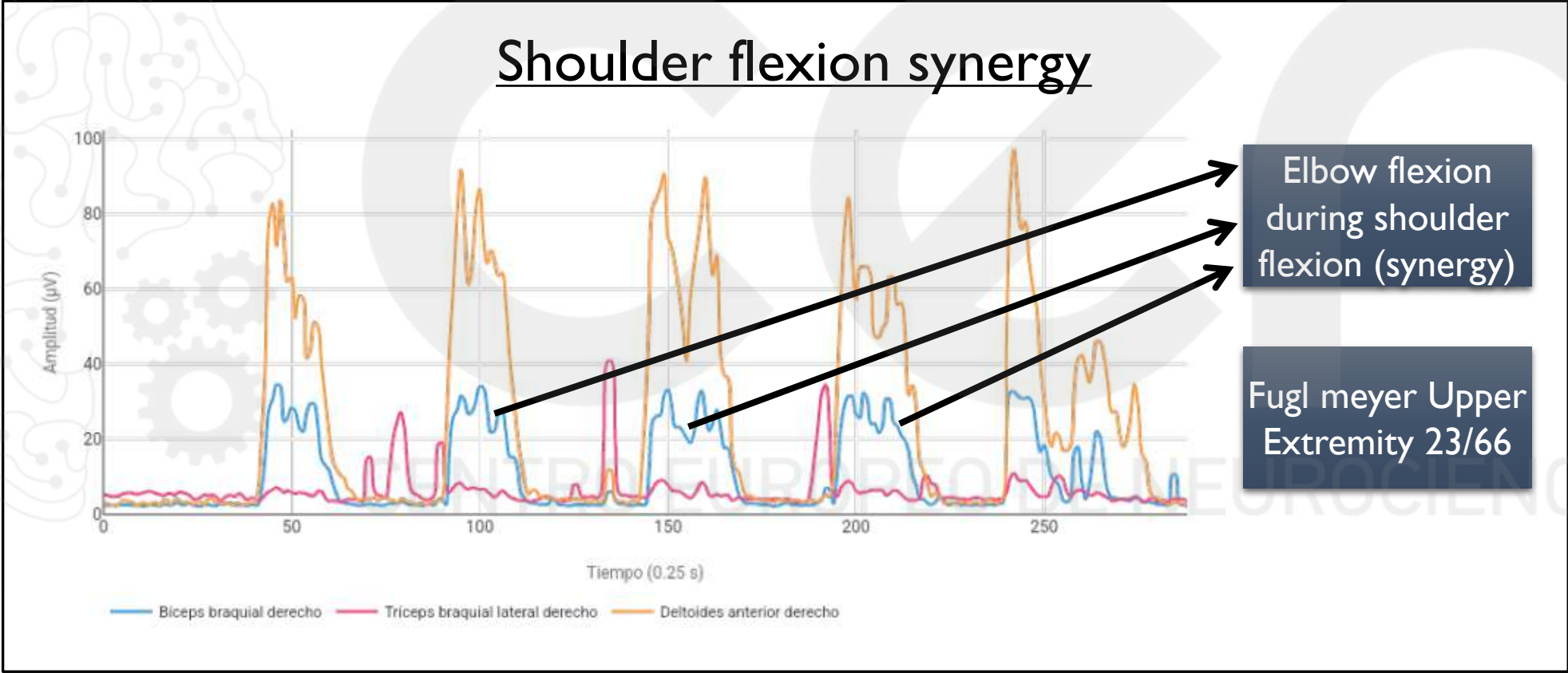
Maximum Voluntary Contraction (MVIC)

**IMPORTANT** if  
Medical Research  
Council (MRC) is 1-2



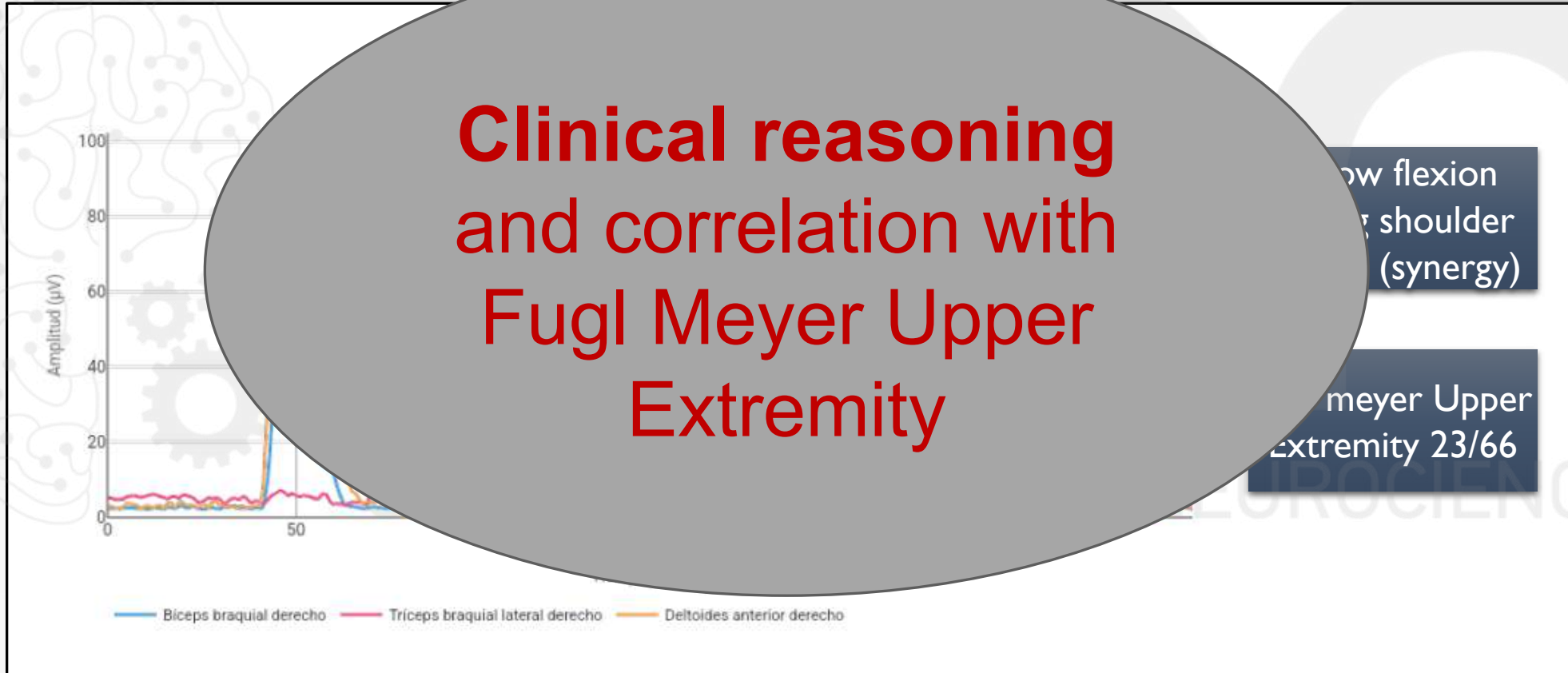


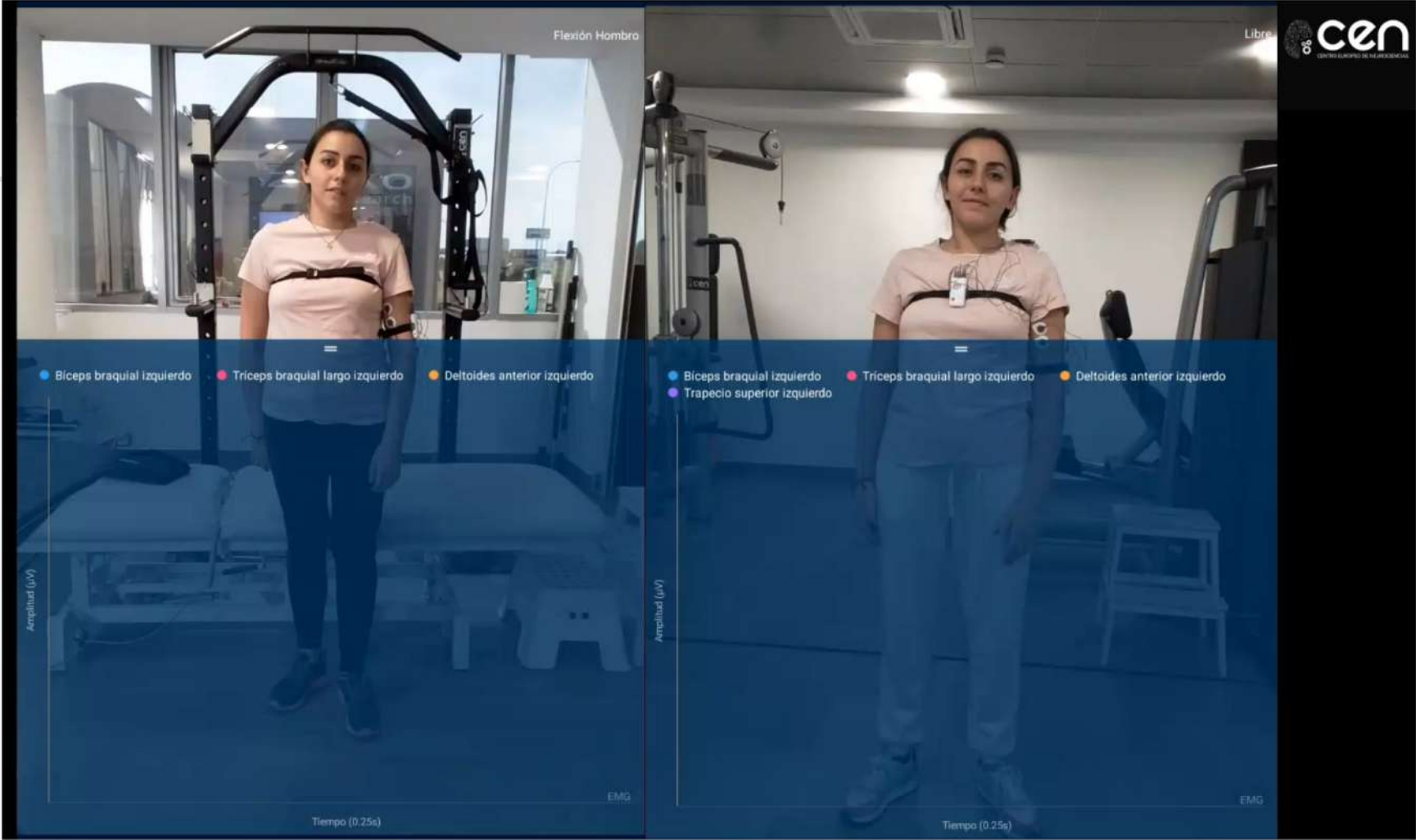
# SYNERGIES ANALYSIS – UPPER LIMB



# SYNERGIES ANALYSIS – UPPER LIMB

**Clinical reasoning  
and correlation with  
Fugl Meyer Upper  
Extremity**

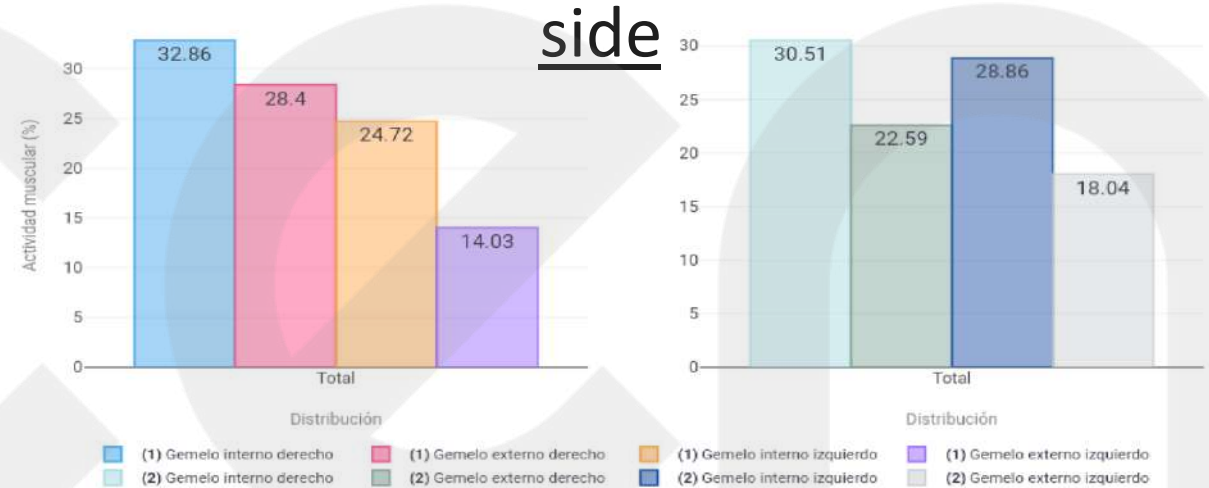






# SYNERGIES ANALYSIS – GAIT

## Affected side activation deficit + overactivity of muscles on the less affected side



	RMS medio
(1) Gemelo interno derecho	65.21 $\mu$ V
(1) Gemelo externo derecho	56.37 $\mu$ V
(1) Gemelo interno izquierdo	49.05 $\mu$ V
(1) Gemelo externo izquierdo	27.84 $\mu$ V
(2) Gemelo interno derecho	56.22 $\mu$ V
(2) Gemelo externo derecho	41.63 $\mu$ V
(2) Gemelo interno izquierdo	53.17 $\mu$ V
(2) Gemelo externo izquierdo	33.24 $\mu$ V

Better muscle  
distribution after  
treatment



# SYNERGIES ANALYSIS – GA

Affected side activation deficit +  
the less affected

## Clinical reasoning

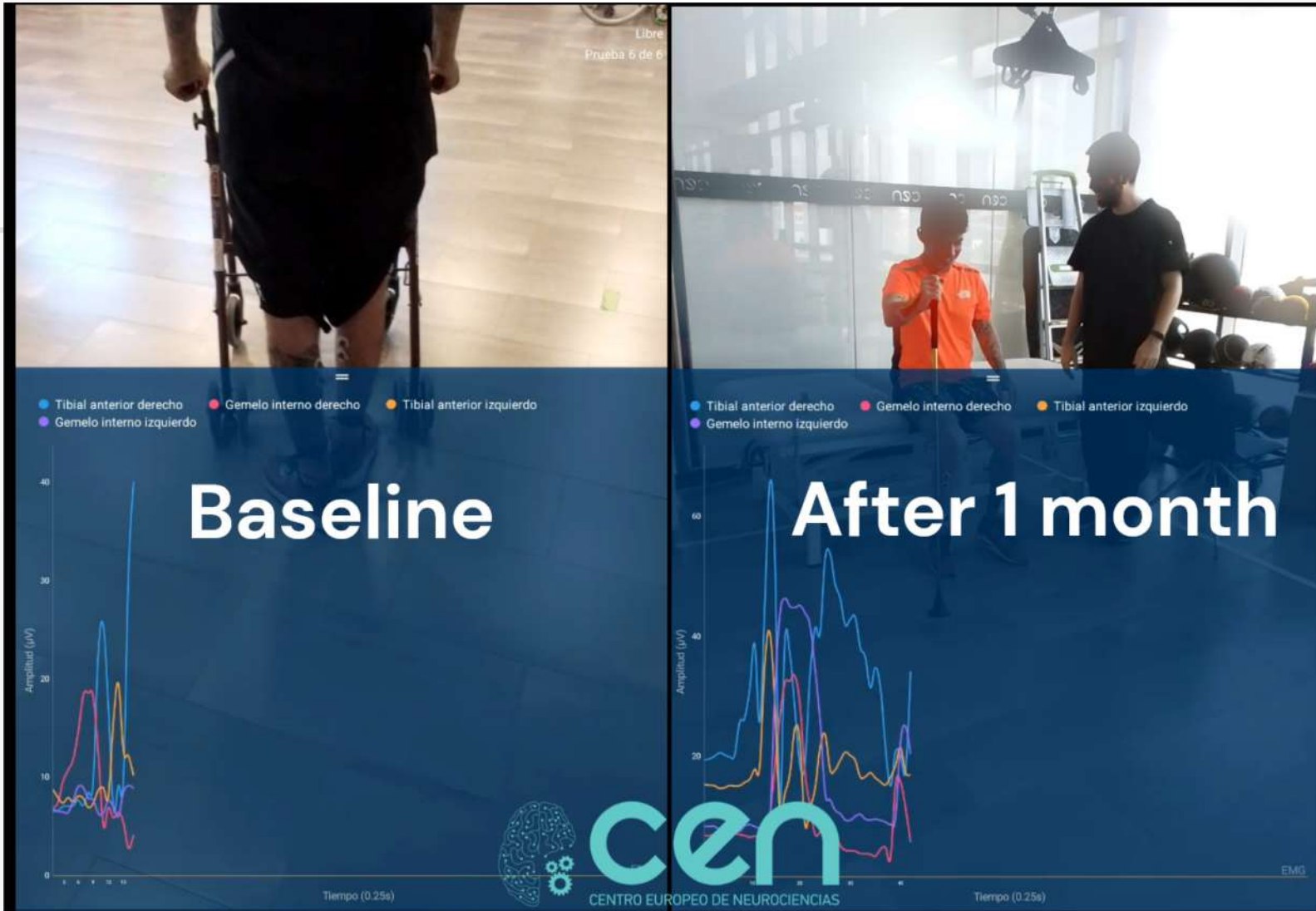
Push off  
impairment

-

Primary cause  
of Gait Stiff  
Knee

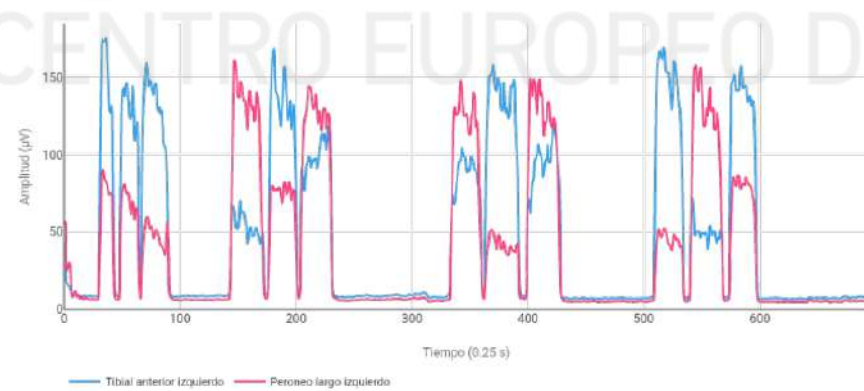
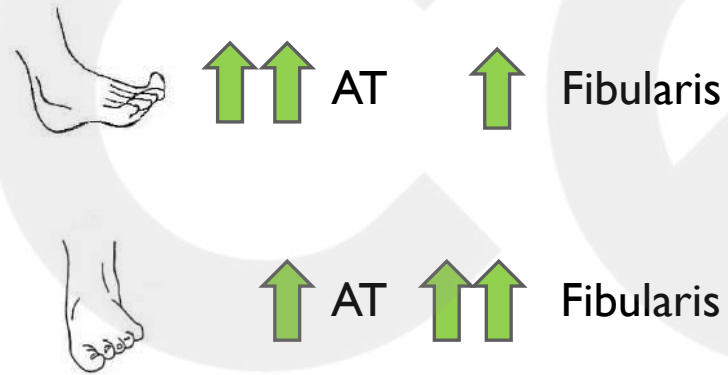
after  
treatment

AS



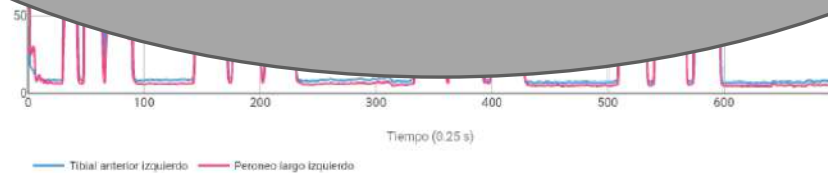
# BIOFEEDBACK

## Ankle biofeedback

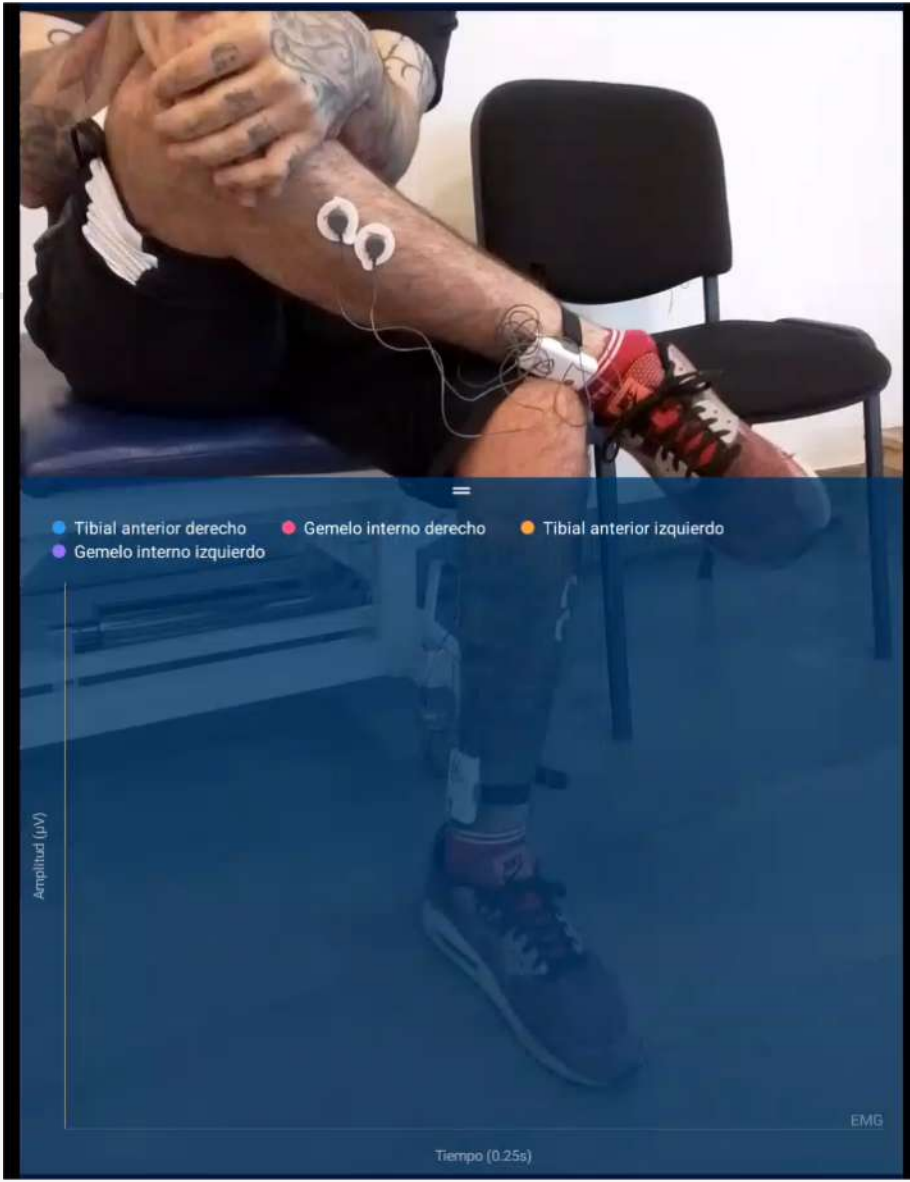


# BIOFEEDBACK

Good results with  
**short term  
interventions (<1  
month)**







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