**Category:** Application and clinical integration

**Workshop Title:** From Signals to Solutions: EMG Applications in Neurorehabilitation

**Organizer(s):** Jose Lopez Sanchez

**Speaker(s):** Lopez Sanchez, Jose, European Neurosciences Center
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**Workshop Time:** 08:15 - 09:45

**Attendee Engagement:** Attendees of this workshop will be engaged through several interactive and hands-on activities designed to deepen their understanding and practical skills in using surface electromyography (sEMG) in neurorehabilitation. Here are the key engagement methods:

Hands-On Practice: Participants will actively work with sEMG devices, including setting up equipment, performing muscle assessments, and using real-time biofeedback. This direct experience will help them gain confidence in operating sEMG tools in a clinical setting.

Clinical Case Studies: The workshop will feature a variety of clinical case studies to demonstrate real-world applications of sEMG. Attendees will be encouraged to analyze and discuss these cases, fostering problem-solving skills and reinforcing theoretical knowledge.

Interactive Demonstrations: Practical demonstrations will allow participants to observe sEMG use in action, with opportunities to ask questions and clarify techniques, enhancing both understanding and engagement.

Group Activities and Discussions: Attendees will participate in group discussions, where they can share their insights, discuss challenges, and explore potential solutions collaboratively. This interaction promotes peer learning and the exchange of diverse perspectives.

Live Biofeedback Sessions: Participants will engage in live biofeedback exercises, where they can see firsthand how muscle activity changes in response to different movements. They can use this experience to practice interpreting data and making treatment decisions based on the feedback.

Skill Practice and Feedback: Attendees will receive guidance and feedback from instructors during hands-on activities, helping them refine their technique and address any uncertainties. This iterative process will reinforce learning by allowing attendees to make adjustments in real-time.

By combining practical, interactive elements with theoretical discussions, the workshop aims to ensure that attendees are not only informed but also actively engaged in applying their knowledge, building the skills needed for effective use of sEMG in their own practice.

**Abstract:** Neurorehabilitation is an evolving field that requires innovative approaches to optimize patient outcomes following neurological impairments.

The use of surface electromyography (sEMG) as an assessment and treatment tool has emerged, however technical and training barriers limit its use in daily clinical practice.

Neurological impairments resulting from conditions such as stroke, traumatic brain injury, and spinal cord injury often lead to loss of motor function, altered muscle tone, and limited range of motion. The application of sEMG allows clinicians to assess muscle function quantitatively, monitor progress, and tailor rehabilitation strategies to individual patient needs. Recognizing the significance of muscle tone assessment in neurorehabilitation is crucial; sEMG can effectively differentiate between normal and pathological muscle tone, providing a foundation for designing appropriate interventions.

One of the most promising applications of sEMG in neurorehabilitation is its use in biofeedback treatment, by which patients receive immediate feedback regarding their muscle activity, enabling them to modify their movements and exercise strategies accordingly. This form of feedback enhances motor learning and can lead to improvements in muscle strength, coordination, and overall functional performance.

To enhance comprehension and practical skills, our workshop will feature various clinical cases that will illustrate the theoretical information presented, as well as a hand-on practice where attendees will have the opportunity to practice setting up an sEMG device, conducting muscle assessments, working with real time biofeedback and interpreting the resulting data.

To summarize, this workshop aims to bridge the gap between research and clinical practice regarding to surface electromyography and the neurological patient.