

# BIOENGINEERING AND MEDICAL-SURGICAL SCIENCES

## DET - High density surface electromyography and artificial intelligence: an innovative approach to assess the diffusion of botulinum neurotoxin effect

<b>Funded By</b>	Dipartimento DET
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<b>Context of the research activity</b>	Use high-density surface electromyography and deep learning to advance our knowledge on how excitation distributes within muscles.
<b>Objectives</b>	<p>Research activities are structured to investigate whether high-density surface electromyograms (EMGs) and artificial intelligence can be used to predict the fraction of muscle paralyzed due to focal, Botulinum neurotoxin injection. Building upon recent advances in the detection, processing and modelling of high-density electromyograms, the use of EMG images to train deep neural network is expected to:</p> <ul style="list-style-type: none"> <li>i) provide a benchmark for the in vivo assessment of the BT uptake volume in humans;</li> <li>ii) develop and validate a patient-specific model of BT diffusion, ensuring safer and more effective use of BT.</li> </ul> <p>Reaching these goals complies with the well-accepted view that botulinum neurotoxin administration tailored to individuals is likely to promote better short- and long-term effects with a low risk-benefit ratio.</p>
<b>Skills and competencies for the development of the activity</b>	The candidate should have experience with the acquisition and processing of high-density surface EMGs. Documented experience with the use of surface EMG in deep learning would be appreciated. In addition to being acquainted with systems for the acquisition of high-density surface EMG, basic knowledge of signal processing and programming skills (Python and Matlab) are advisable. Critical thinking and teamwork are essential, sought-after skills for the candidate.