# New application of intramuscular electromyography may facilitate detection of neuromuscular disorders

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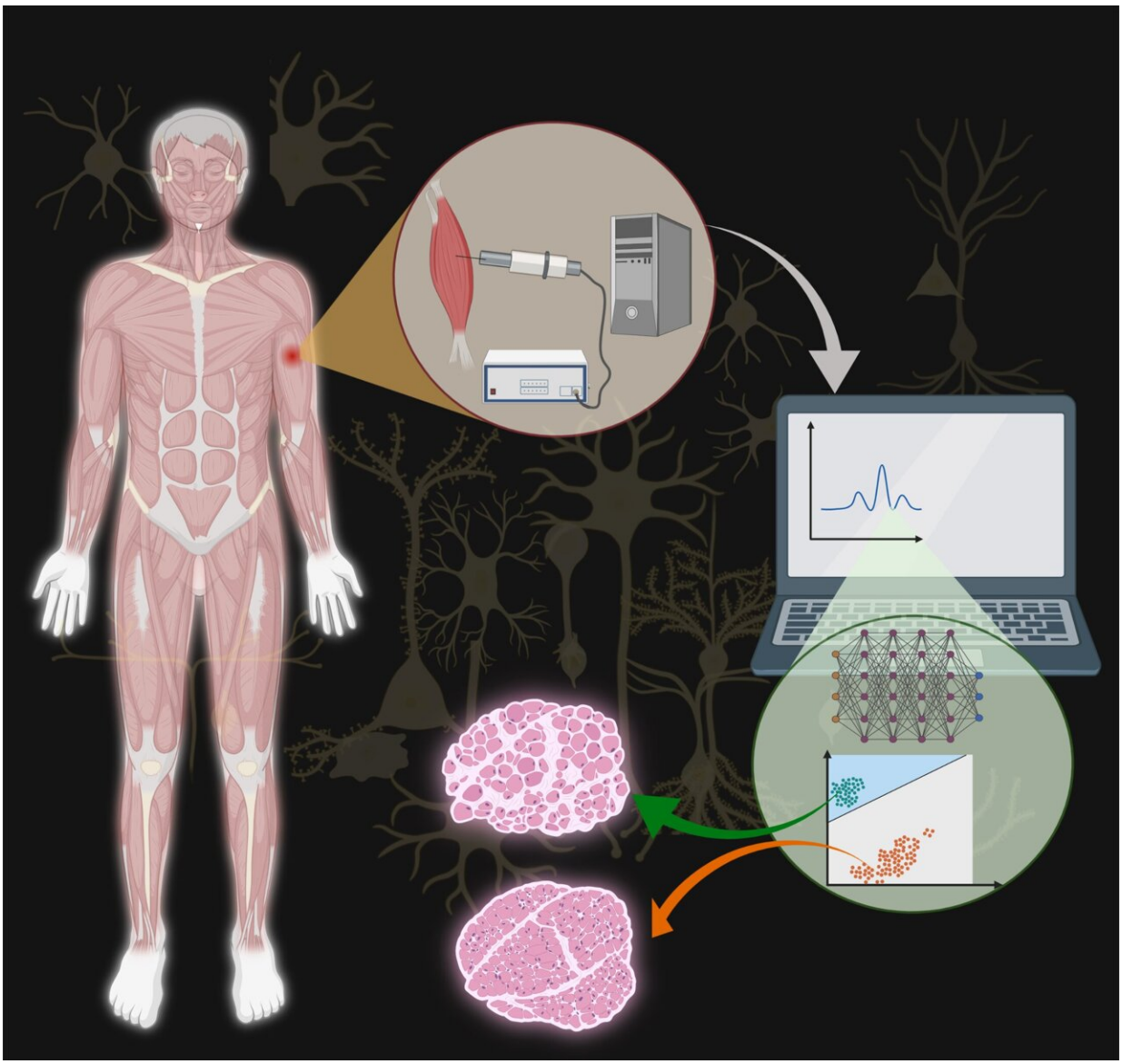

This graphic illustrates the potential for collecting and processing iEMG signals for diagnostic purposes using the proposed algorithm. The intramuscular signals from a person's right upper arm are recorded (shown as the pink spot). The adjacent circle shows the details of the needle electrode and the signal recording setup. The signal waveforms (on laptop screen) are then processed to extract the feature (1-D CSLBP) that effectively captures the differences underlying different neuromuscular disorders. The output of this processing step is supplied to the artificial neural network—machine learning approach—that performs the (binary) classification. The classification step is depicted by the graph with an inclined line bisecting the two classes, corresponding to the signals for myopathy (green dots) and neuropathy (orange dots), respectively. The respective colored arrows point to the muscle fiber cross-section corresponding to myopathy (green) and neuropathy (orange). For aesthetic appeal, the dark background has a transparent overlay of neurons (light brown) to convey the context of the underlying cause of neuromuscular disorders. Credit: Created using biorender.com by V. Shenoy Handiru.

A team of researchers has developed a promising new approach to detecting neuromuscular disorders using intramuscular electromyography (iEMG). In a pilot study, the automatic diagnostic system showed high accuracy in three muscle types and low computational time. Their article, "Intramuscular EMG classifier for detecting myopathy and neuropathy", was published in the *International Journal of Imaging Systems Technology*.

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Invasive intramuscular EMG has been shown to be an effective tool for identifying neuromuscular abnormalities such as myopathy and neuropathy. Myopathy, a disorder of muscle fibers, and neuropathy, which reflects damage to peripheral nerves, exhibit different patterns of motor unit action potentials.

To facilitate the interpretation of these signals, the team developed an iEMG classifier framework based on a new feature called 1-Dimensional Center Symmetric Local Binary Pattern (I-D, CSLBP), which enhanced the performance of a binary (myopathy and neuropathy) classification task.

The electromyographic signals from the biceps brachii, deltoideus, and vastus medialis muscles. 25 individuals were studied: 10 healthy controls, 7 with myopathy, and 8 with neuropathy. Classification accuracy for the three muscle types exceeded 92%, and computational time was low.

"This high level of accuracy combined with a short time frame for testing indicates the potential for real-time implementation," stated Dr. Suviseshamuthu. "Future research is needed to test the feasibility of a real-time EMG system that would aid clinicians in making quick, objective, and accurate diagnoses of these neuromuscular disorders," he added.

**More information:** Shobha Jose et al, Intramuscular EMG classifier for detecting myopathy and neuropathy, *International Journal of Imaging Systems and Technology* (2022). DOI: 10.1002/ima.22811

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