

Corticobulbar Motor Evoked Potentials:

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Introduction

Corticobulbar motors (coMEPs) were introduced in 2005 as an alternative method to direct stimulation and free running electromyography (EMG) for continuous monitoring of the facial nerve during skull base surgery. This technique has since been expanded for monitoring of multiple cranial nerves (CN), and adapted across a variety of applications. This study characterizes the current state of coMEP utilization in surgery.

Methods

We conducted a systematic review of all papers reporting coMEP neuromonitoring published through December 6, 2023. Studies not available in English, abstracts only, and reviews were excluded. Aggregate data was analyzed to address incidence, reporting variability, and sensitivity/specificity of the method.

Results

- 2,711 unique cases from 72 studies
- Facial nerve was the most common target (n=42 publications), followed by the vagus (n=9), and hypoglossal (n=4) nerves
- Significant variability in practice patterns, including type and number of muscles monitored, electrode type and placement, stimulus parameters, and artifact detection techniques
- Less than 50% of facial nerve studies reported sensitivity or specificity of coMEPs, those that did had marked heterogeneity in results

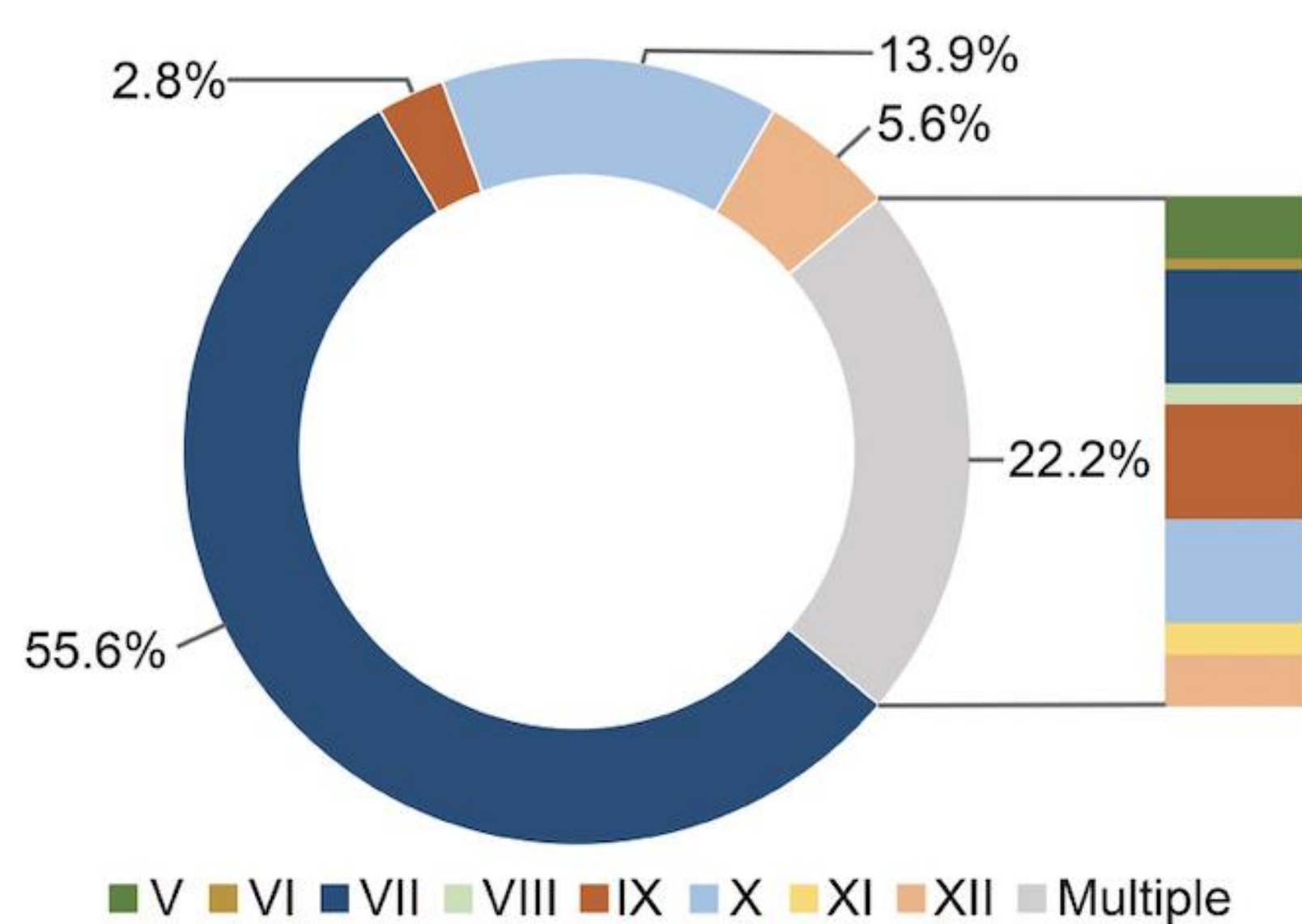


Fig 1. Cranial nerves that were monitored across studies, with percentages reflecting the proportion of total cranial nerves monitored in aggregate.

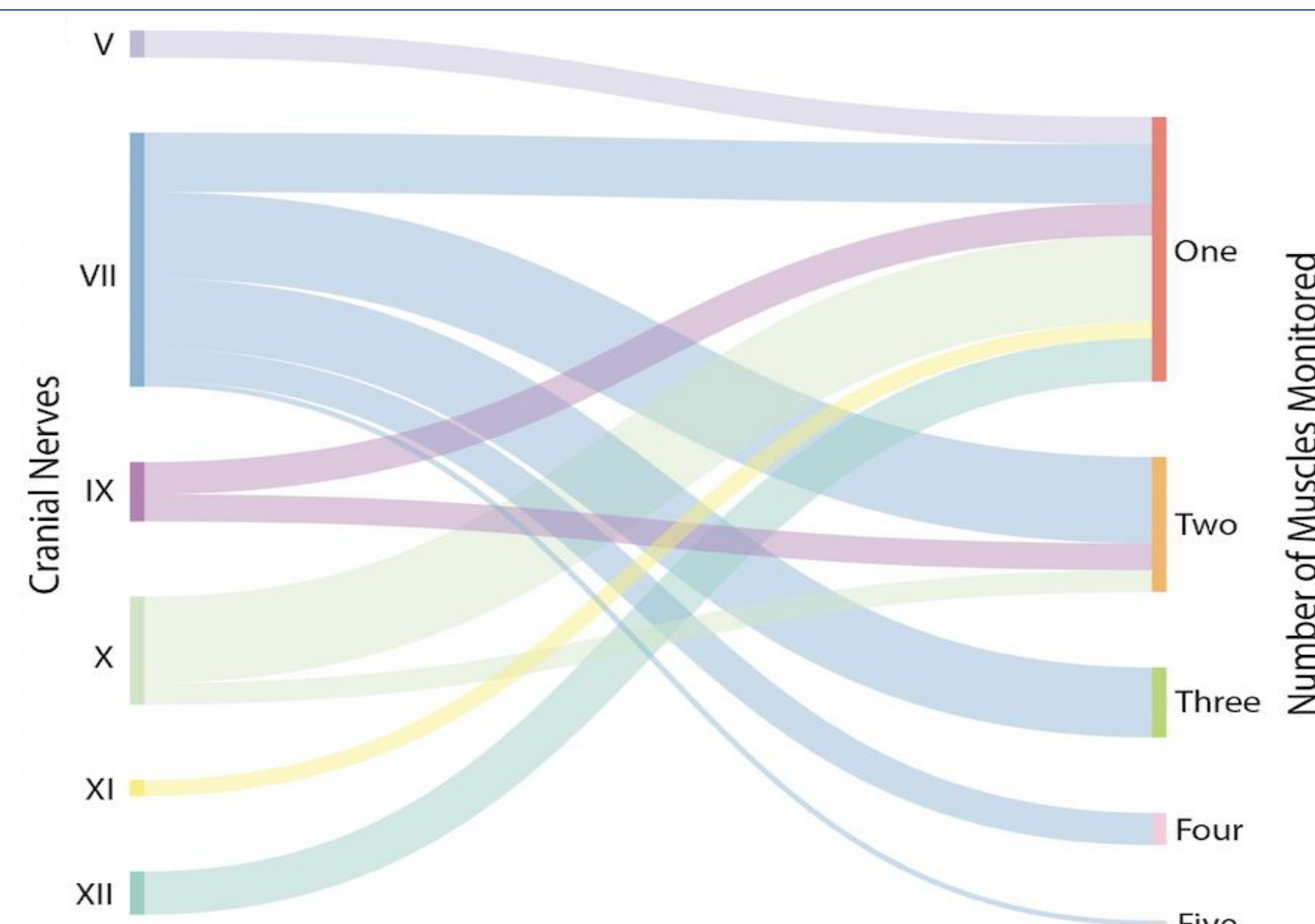


Fig 2. Distribution of concurrent cranial nerves monitored, with monitoring of one cranial nerve being the most frequently studied

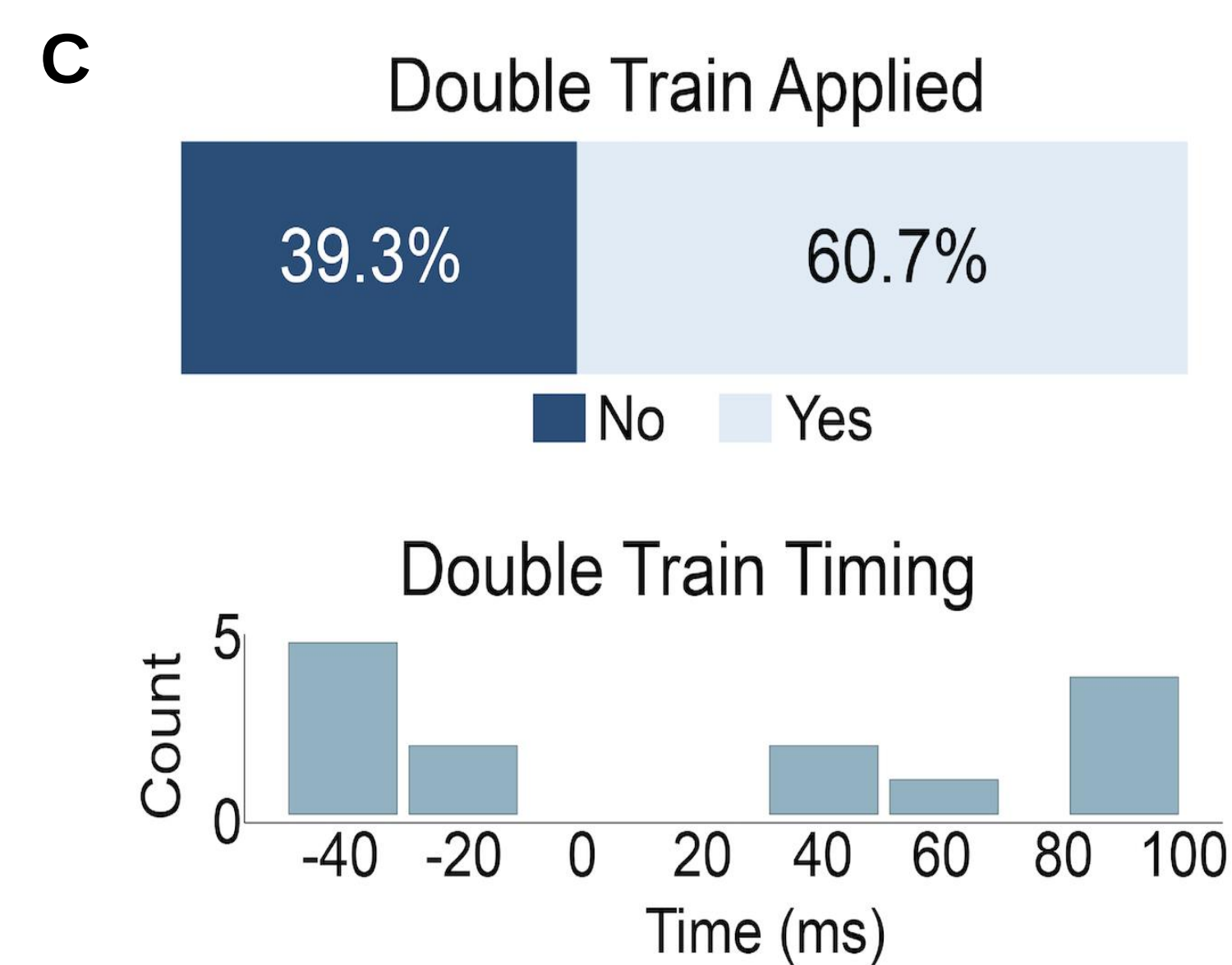
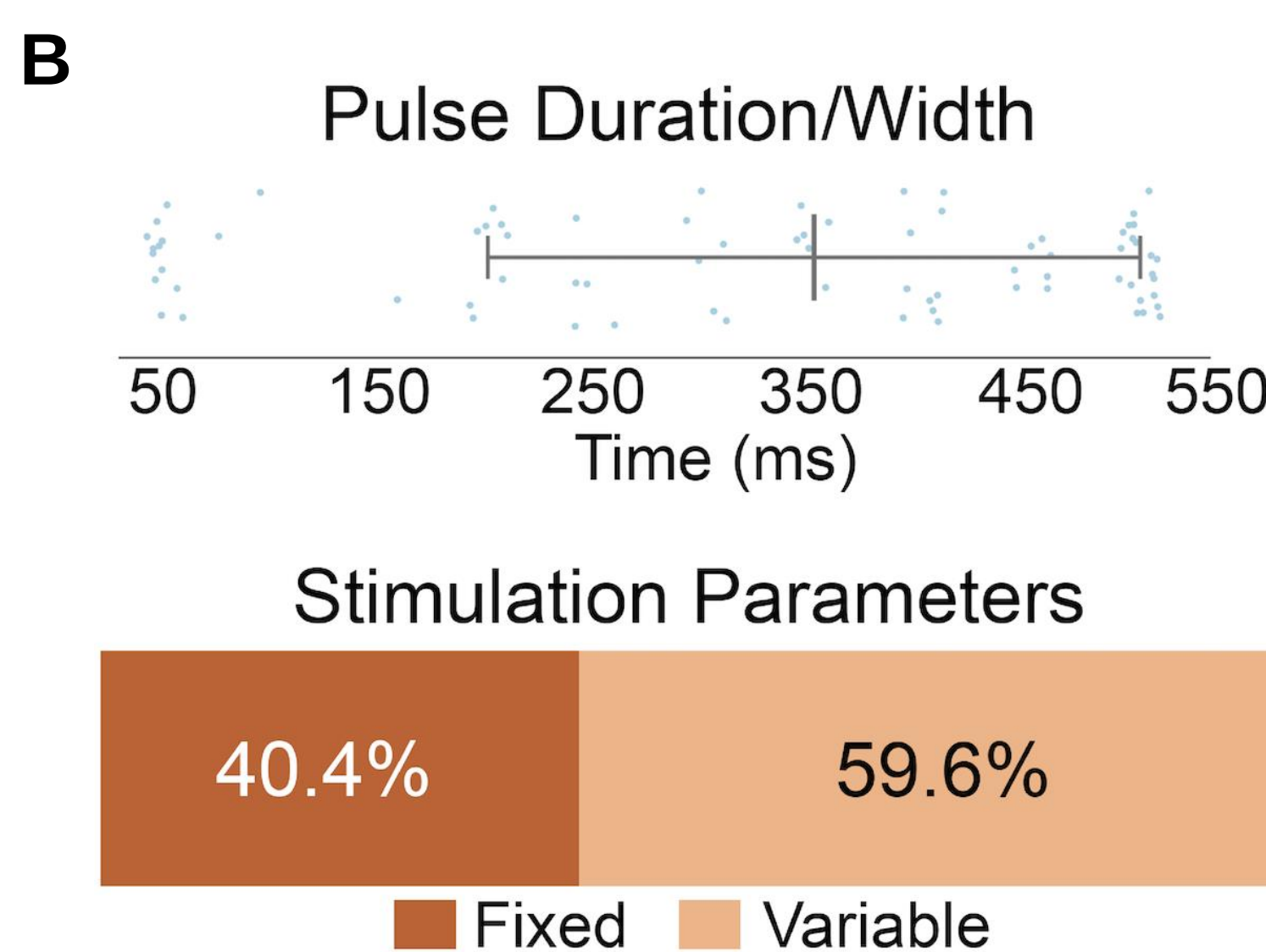
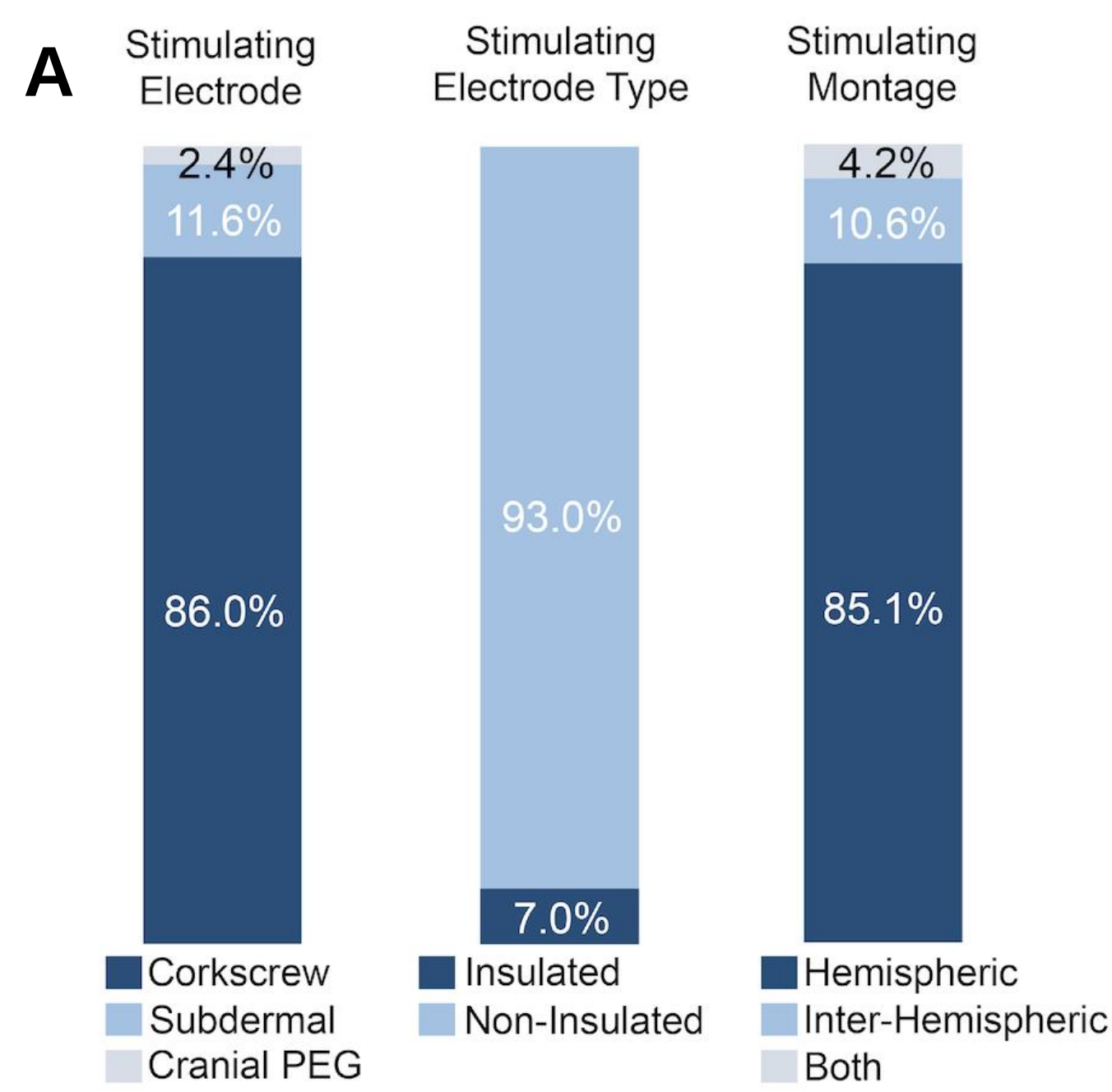


Fig 3. (A) Summary of the stimulating electrode characteristics and stimulation montage used for facial nerve monitoring. **(B)** Proportion of studies where a double train was applied during facial nerve monitoring and the frequency of various double train timing intervals applied. **(C)** Distribution of the pulse durations applied across studies and the stimulation parameters used.

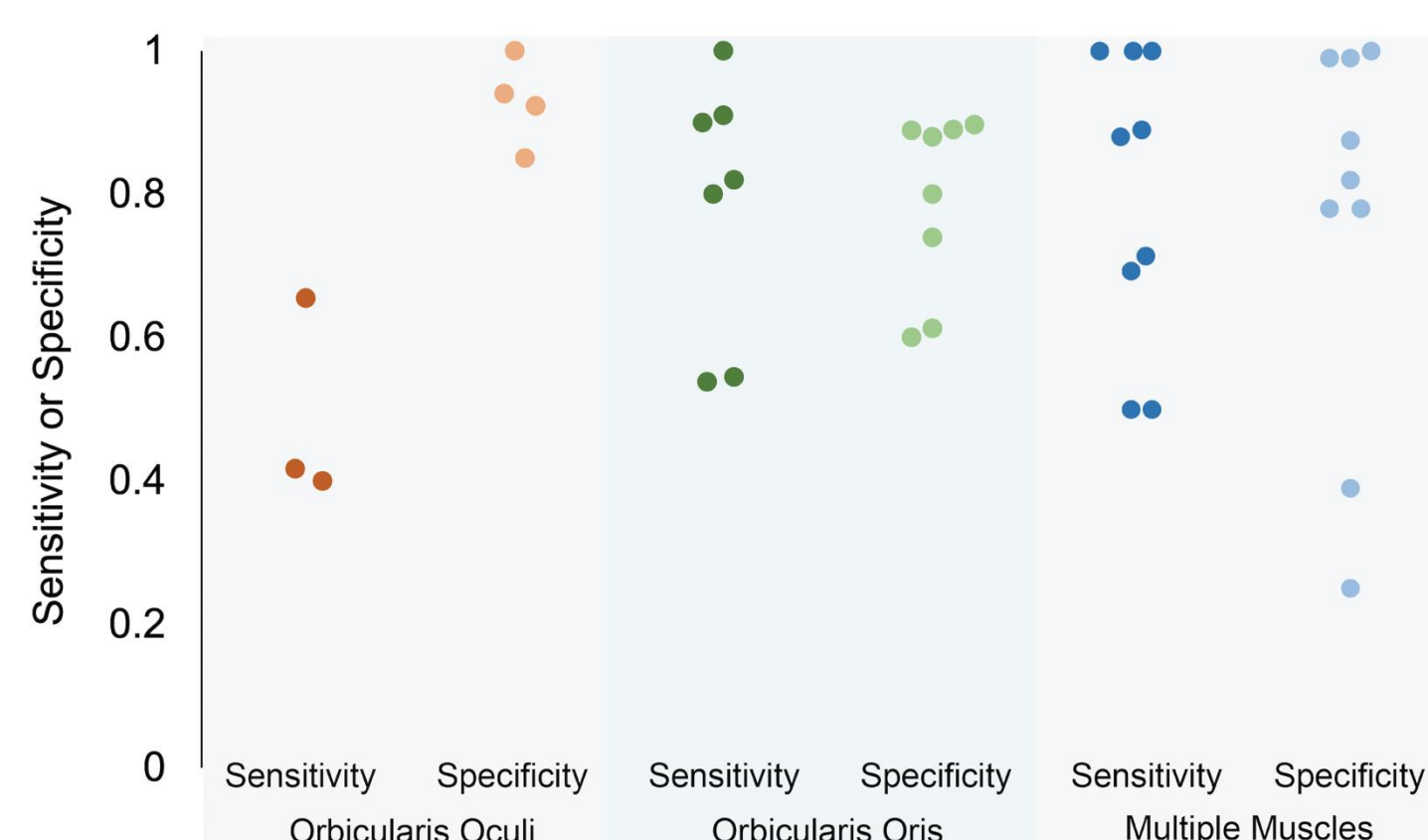


Fig 4. Sensitivity and specificity of facial nerve monitoring stratified by muscle used for monitoring.

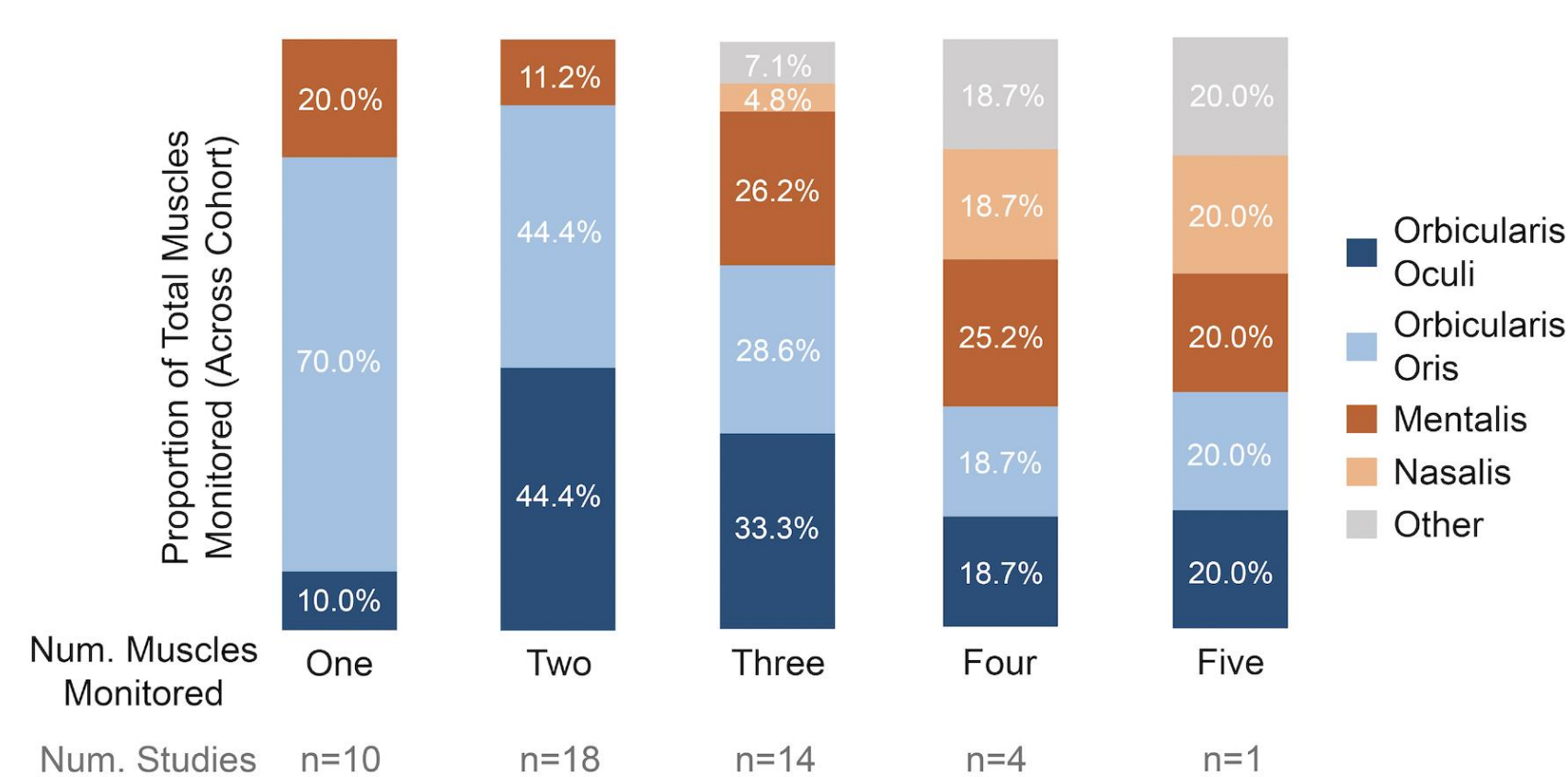


Fig 5. Breakdown of number and type of muscles monitored to capture facial nerve function.

Conclusions

- CoMEPs are an evolving technique in intraoperative neuromonitoring, with the potential to improve continuous monitoring of the CN pathways during surgery
- Practice standardization is needed to achieve reliable and consistent results
- Refined methodology, standardized alert criteria, and enhanced consistency in artifact detection could lead to improved accuracy and reliability



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