

**A634**

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8:00:00 AM - 11:00:00 AM

Room Hall C-Area B

**Consistency of Ulnar and Median Nerve Electromyographic Evoked Responses**

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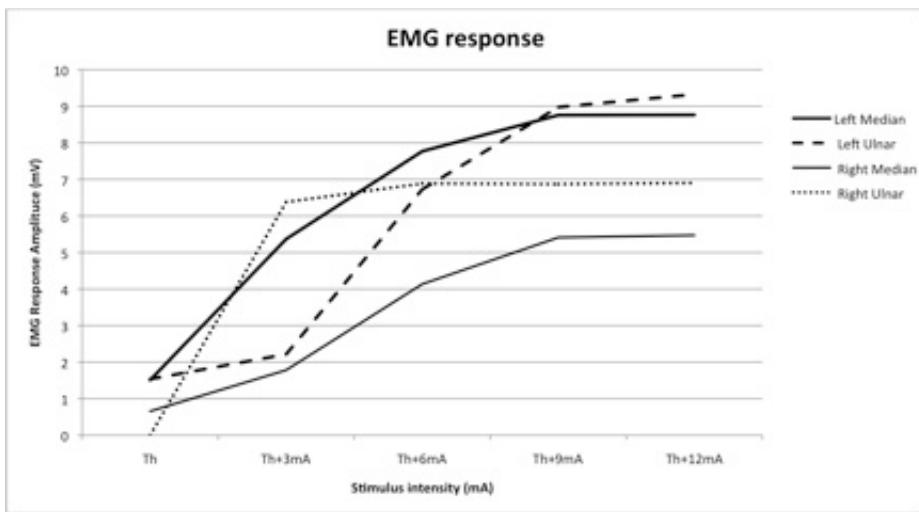
**Background.** Quantitative neuromuscular monitoring devices measure evoked responses (usually of the adductor pollicis muscle, APM) to nerve stimulation (ulnar nerve) and display the results numerically. Single twitch (ST) and Train-of-Four (TOF) stimulation patterns assess the depth of relaxation and adequacy of reversal. We evaluated ST and TOF responses to ulnar and median nerve stimulation of both right and left arms to describe the relationship between current amplitude and site of neurostimulation. All evoked responses were recorded using a newly designed electromyographic device, T4-EMG. We hypothesized that at APM, the ST stimulus-response curve to increasing stimulating current would be different for the ulnar and median nerves, but that the TOF ratio at APM would be invariant of the peripheral nerve tested.

**Methods.** In 10 consenting volunteers (8F/2M, aged 26-44 yo, ASA 1-3, Wt. 122-215 lbs), ST responses were recorded by T4-EMG at varying currents, from threshold (Th) to maximal (Max) amplitude. TOF ratios were calculated from EMG responses obtained from ulnar and median nerve stimulation. For all stimulations, the stimulus pulse width was constant at 200  $\mu$ sec. Stimulating surface electrodes were placed along the ulnar and median nerves on the distal volar right and left forearms, and recording surface electrodes were placed on the thenar eminence to record responses of APM. ST stimulation was started at 1 mA, and increased in 2 mA steps until a distinct and reproducible EMG threshold (Th) response was observed. ST responses were recorded while stimulus amplitude increased from Th in four steps of 3 mA each. Monitoring of ST ended when the stimulus reached Th+12 mA, when the amplitude of the evoked response reached plateau (Max). Then, 4 separate TOF stimuli at Max-2 mA current amplitude were delivered sequentially every 12 sec to both ulnar and median nerves of both right and left arms, and EMG responses at the APM were recorded and analyzed with Chi-square test.

**Results.** ST amplitude recorded from APM increased from Th to Max for both ulnar and median nerves bilaterally (Fig). Mean TOF ratios ( $\pm$  Std Dev) are shown in Table. Range of TOF ratios for ulnar nerve (right & left arms) were 92.70% and 103.57%, respectively; range of TOF ratios for median nerve (right & left) was 93.82%-105.59%. Ratios were not statistically different from one another for right vs. left or median vs. ulnar nerve ( $p < 0.01$ ).

**Discussion.** While ST responses showed the expected sigmoidal relationship to current amplitude, T4-EMG recorded TOF ratios were consistent regardless of stimulated nerve (ulnar vs. median) or handedness (right vs. left) (Table). The TOF ratios obtained with the T4-EMG at the APM were consistent independent of the nerve stimulated (median vs. ulnar). While we would expect the TOF ratio to be consistent regardless of the nerve/muscle combination, the response characteristics of APM evoked response to ST neurostimulation were also similar, regardless of whether the ulnar or median nerves were stimulated. Additional testing should determine whether stimulation of the median nerve and recording of EMG activity at the APM might provide alternative means of neuromuscular monitoring in the clinical setting.

**Figure 1**



**Figure 2**

			Left Median	Left Ulnar	Right Median	Right Ulnar
Volunteer #	1	Mean ToF	100.02%	98.67%	98.74%	99.29%
		St Dev ToF	2.88%	1.13%	0.49%	1.40%
	2	Mean ToF	98.85%	97.85%	102.95%	108.08%
		St Dev ToF	0.02%	2.25%	3.11%	1.39%
	3	Mean ToF	93.82%	92.70%	97.40%	101.12%
		St Dev ToF	4.84%	6.72%	0.67%	1.93%
	4	Mean ToF	97.46%	102.51%	98.06%	100.45%
		St Dev ToF	1.78%	2.70%	0.53%	1.51%
	5	Mean ToF	99.18%	97.87%	105.59%	101.57%
		St Dev ToF	2.96%	2.80%	4.28%	1.82%
	6	Mean ToF	98.37%	100.29%	97.61%	103.57%
		St Dev ToF	2.46%	2.41%	2.77%	4.15%
	7	Mean ToF	97.73%	100.68%	101.84%	99.08%
		St Dev ToF	1.24%	1.43%	2.84%	0.39%
	8	Mean ToF	97.56%	99.61%	98.34%	100.93%
		St Dev ToF	1.23%	0.26%	0.27%	2.95%
	9	Mean ToF	99.64%	99.22%	98.84%	101.17%
		St Dev ToF	3.14%	1.81%	2.52%	1.07%
	10	Mean ToF	98.46%	101.85%	98.95%	98.06%
		St Dev ToF	1.63%	5.15%	1.07%	2.65%

All volunteers		<b>Mean TOF</b>	<b>98.11%</b>	<b>99.13%</b>	<b>99.83%</b>	<b>101.33%</b>
		<b>St Dev</b>	<b>2.22%</b>	<b>2.67%</b>	<b>1.86%</b>	<b>1.93%</b>



