

Quantitative neuromuscular monitoring and the reduction of residual neuromuscular block¹

Under-recognized post operative residual paralysis^{2,5,6}

40-83%

of cases do not reach 90%² train-of-four (TOF) ratio extubation threshold, leading to insufficient neuromuscular recovery¹

90%

Possible post operative risks

- Respiratory events
- Reintubation
- Increased length of stay
- Patient distress
- May lead to increased mortality

Unreliable visual and tactile assessment of neuromuscular function^{1, 2}



- Subjective and healthcare provider dependent evaluation
- Neuromuscular block with TOF > 40% can't be reliably detected even by experienced anaesthetists²

Evaluations that lead to misinterpretation of adequate recovery²



Ability to lift the head



Firm handshake



Sufficient minute ventilation of an intubated patient

Patients can lift the head and hold firm handshake for five seconds with TOFR = 0.33²

33%



Normal vital capacity possible with TOFR = 0.6²

60%



Quantitative neuromuscular monitoring to accurately assess neuromuscular block

One of the only suitable methods

- To titrate adequate levels of neuromuscular block
- To guide optimal dose and timing of reversal agent

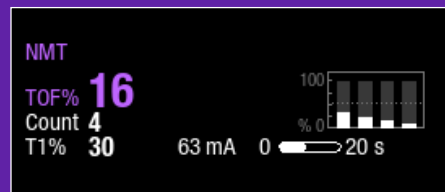
Recommended by

ESAIC, ASA & APSF



Electromyography (EMG) is the gold standard for measuring neuromuscular block¹

- Offers advantages versus other technologies
- Captures the first clean signal at the neuromuscular junction



TOF*

Four stimulation pulses are generated at 0.5 sec intervals. The response is measured after each stimulus, and the ratio of the fourth to the first response of the TOF sequence is calculated, resulting in TOF%.



PTC**

Tetanic stimulation is a continuous 5 sec stimulation. After tetanic stimulation, single twitch stimulations are generated. The number of detected responses is counted and expressed as PTC. The fewer the responses, the deeper the relaxation.



*TOFC = number of elicited contractions
TOFR = ratio of 4th to 1st twitch response

**PTC is used if there is no response to TOF or a single twitch (i.e. in profound non-depolarising block)

Quantitative neuromuscular monitoring to support reversal agent choice and dose decision^{2,4}

- With TOF <90 residual neuromuscular block is present and has to be reversed by either waiting or by administering reversal drugs
- Correct choice of dose, timing and reversal drug are crucial for achieving complete neuromuscular recovery and allow safe extubation

Depth of block	Quantitative measurement	Neostigmine (µg/kg)	Sugammadex (mga/kg)
Complete block	PTC = 0	Not effective	16
Deep block	PTC ≥ 1	Not effective	4
Moderate block	TOFC = 1–3	Not effective	2
Shallow block	TOFC = 4 TOFR < 0.2	50–70	1*–2
Shallow/minimal block	TOFR: 0.2–0.5	40	0.75*–2
Minimal block	TOFR: 0.5–0.7	20	0.25*–2
Minimal block	TOFR: 0.7–0.9	10	0.25*–2

Outcomes



Optimal dose and injection time of reversal agent¹



Increased likelihood of complete neuromuscular recovery⁵



Enhanced patient experience⁶



Cost-effective patient throughput²

*These doses have been determined in dose-finding studies, and have not been tested in comparative clinical trials. They are not recommended by the manufacturer. Please note that the use of low-dose sugammadex has been questioned, since elderly patients are at greater risk for recurarisation and residual muscle paralysis when low-dose sugammadex is administered.

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2. Blobner M, Eikermann E, Lewald H. Safe and Efficient Anesthesia: The Role of Quantitative Neuromuscular Monitoring. Advances in Patient Safety
3. Viby-Mogensen J, Jensen NH, Engbaek J, Ording H, Skovgaard LT, Chraemmer-Jorgensen B. Tactile and visual evaluation of the response to train-of-four nerve stimulation. Anesthesiology 1985;63:440-443.
4. Sasakawa T, Miyasaka K, Sawa T, Iida H. Postoperative Recurarization After Sugammadex Administration Due to the Lack of Appropriate Neuromuscular Monitoring: The Japanese Experience'. APSF Newsletter. 2020:42-43.
5. Todd M, Hindman B, King B. The Implementation of Quantitative Electromyographic Neuromuscular Monitoring in an Academic Anesthesia Department. Anesth Analg 2014;119 Number 2:323-331.
6. Benoît Plaud, Bertrand Debaene, François Donati, Jean Marty. Residual Paralysis after Emergence from Anesthesia, Anesthesiology 2010;1013-1022.

Not all products or features are available in all markets. Full product technical specification is available upon request.

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