

# TETRAGRAPH

The next generation TOF-monitor



SCAN ME!

## Unique EMG TOF monitor

### Product summary

TetraGraph is a unique, EMG\*-based portable device for quantitative (objective) monitoring of neuromuscular function. It is a precise and easy to use tool for monitoring depth of block, ensuring adequate recovery of muscle function, and aiding the clinician to reduce the incidence of residual block.



Item	Feature	Benefit
Device	Stand alone, battery operated	Can follow the patient
Electrodes	Disposable electrode system	No risk for cross contamination, easy to attach to skin, allows monitoring of multiple muscles
Operating modes	Train of Four Ratio (TOFR), Single Twitch (ST), Train of Four Count (TOFC) and Post-Tetanic Count (PTC)	Quantitative objective monitoring of normal transmission, minimal, moderate, deep and profound depths of block
Precision	Allows for tighter titration of NMBAs**	Prudent use of NMBAs and reversal agents, improved patient satisfaction and safety
EMG	Arm can be tucked under surgical drape	Can be used in all types of surgeries, including cardiac, neuro, laparoscopic, robotic, bariatric, etc.
Usability	Operating mode within 30 sec. of power-up, no calibration needed	Ready for immediate use
	Intuitive user interface	Promotes usage and clinician satisfaction
	Auto and manual mode	Ease of use and flexibility
Data	Transfer via USB cable	Easy access to patient data, transfer to electronic medical record

\* Electromyography, \*\* Neuromuscular blocking agents

## Patient Need

Clinical studies using quantitative (objective) monitoring reveal an incidence of neuromuscular blocks as high as 40-60% (Naguib et al., 2007; Fortier et al., 2015).

Even very low levels of residual neuromuscular block places patients at risk of hypoxemia, respiratory distress, and other critical respiratory events (Murphy 2008). If patients develop persistent atelectasis or aspiration pneumonia, mortality rates can be as high as 14-30% (Miskovic and Lumb, 2017). Quantitative objective monitoring can reduce the incidence of residual neuromuscular block from 62% to 4% (Baillardet al., 2005).

### The use of muscle relaxants calls for quantitative objective monitoring

There is a strong consensus that quantitative objective monitoring of neuromuscular function should be used when non-depolarizing neuromuscular blocking agents (NMBA) are administered (Naguib et al., 2017).

### Quantitative (objective) monitoring is the only method that allows for complete detection of all levels of neuromuscular blocks

Levels of Neuromuscular Block			
Level of Block	Depth of Block	Objective Measurement (Quantitative Monitor) at the Adductor Pollicis Muscle	Subjective Evaluation (PNS) at the Adductor Pollicis Muscle
Level 5	Complete block	PTC = 0	PTC = 0
Level 4	Deep block	PTC $\geq$ 1, TOFC = 0	PTC $\geq$ 1, TOFC = 0
Level 3	Moderate block	TOFC = 1-3	TOFC = 1-3
Level 2b	Shallow block	TOFC < 0.4	TOFC = 0.4: TOF fade is present
Level 2a	Minimal block	TOFR = 0.4-0.9	TOFC = 0.4: TOF fade is not detectable
Level 1	Acceptable recovery	TOFR $\geq$ 0.9	Cannot be determined

(Table from Naguib et al., 2017)

### Quantitative objective monitoring technologies

TetraGraph empowers clinicians with quantitative objective monitoring that uses electromyography (EMG). EMG measures the peak-to-peak amplitude of the evoked muscle action potentials to determine the intensity of the response. The technology has been studied extensively and has the advantage of measuring electrical events at the neuromuscular junction, where NMBAs affect muscle contractibility, rather than measuring mechanical responses.

### EMG and AMG comparison

	TetraGraph EMG	AMG
Neuromuscular stimulation	✓	✓
Electrical response of muscle	✓	✗
Muscle acceleration	✗	✓
Arms can be tucked in	✓	✗
Uniquely designed disposable electrodes (avoiding cross-contamination)	✓	✗

## International consensus for quantitative (objective) monitoring

Several consensus documents have been published recently addressing anesthesia care providers who use NMBAs and reversal agents and professional organizations that develop practice advisories and guidelines regarding minimum standards for patient monitoring of neuromuscular blockade.

- ▶ International Anesthesia Research Society (2017)
- ▶ Australian and New Zealand College of Anaesthetists (ANZCA), 2017
- ▶ The Association of Anaesthetists of Great Britain & Ireland, 2015
- ▶ European Society of Anaesthesiology (ESA), 2010

## Clinical trials

At present Senzime has three ongoing Clinical Trials

- ▶ Mayo Clinic in Jacksonville, USA
- ▶ NorthShore in Chicago, USA
- ▶ University of Debrecen, Hungary

Results show high accuracy and robustness of data. Results from Clinical Trials and links to scientific references and guidelines are available at [www.senzime.com](http://www.senzime.com).

## Senzime: Monitoring for life

Senzime develops unique patient-oriented monitoring systems that make it possible to assess patients' biochemical and physiological processes before, during and after surgery. The solutions are designed to ensure maximum patient benefit, reduce complications associated with surgery and anesthesia, and decrease health care costs. The Senzime AB (publ) shares are listed on NASDAQ Stockholm First North.

- ▶ CE marked
- ▶ Senzime is a Swedish company certified according to ISO13485
- ▶ This device has been cleared by the FDA for distribution in the United States

## References

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