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Part No.: 0610063.

The Microstim DB,

Supramaximal Nerve Stimulator.

Peripheral Nerve Stimulator For Use During Anaesthesia.

Operator Manual.

0086

Description of the Microstim DB.

Output / Battery Level Indicator.

When the Microstim DB is in use, flashes of the output / battery level indicator coincide with the pulses of stimulus being generated. When patient current flows, audio pulses are also generated. The output / battery level indicator changes from bright green and deep red with use. Replace the battery when the indicator is deep red

For use only by qualified and trained personnel.
Do not use in the presence of MRI equipment.
Do not use with needle electrodes.
Do not use as a nerve locator stimulator.
Do not use in the presence of explosive gases.
Caution in the presence of cardiac pacemakers.
May cause interference on ECG equipment during use.

How to use the Microstim DB.

- Position the stimulating electrodes.

Choose the monitoring site,
e.g.: Ulnar nerve, facial nerve, posterior tibial nerve.

1. Clean the skin with acetone or an alcohol wipe.

2. Apply two ECG type electrodes, either along the line of the nerve or straddling the nerve.

3. Connect the leads; the positive (red) electrode should usually be proximal.

4. Set the intensity control to half scale.

- Decide on the mode of stimulation.

Profound blockade:	Post-Tetanic Count (P.T.C).
Surgical blockade:	Train Of Four (T.O.F).
Reversal:	Double Burst Stimulation (D.B.S). Train Of Four (T.O.F).

- Adjust the output current.

Increase the intensity until the twitch response is maximal. If the intensity is increased excessively, direct muscle stimulation will become more pronounced (see Problems and Solutions).

Train Of Four (T.O.F) Stimulation.

To initiate Train of Four stimulation, press and hold the T.O.F switch. The Microstim DB delivers the correct sequence of stimuli; four stimuli at a frequency of 2 Hz.

An interval of at least 10 seconds should be allowed between successive T.O.F estimation.

This mode of stimulation, first described in 1970, permits the user to assess the depth of neuromuscular blockade without recourse to a "control twitch" obtained before the muscle relaxant was given. Each train comprises four stimuli of equal intensity at a frequency of 2 Hz. During partial non-depolarising blockade

there is a characteristic fade in the magnitude of the resulting four twitches. Depolarising blockade does not produce significant fade unless Phase 11 block has intervened.

The Train Of Four ratio is the magnitude of the fourth twitch divided by the magnitude of the first twitch. In the absence of fade, the ratio would be 1.0. Even in experienced hands, it is unusual for fade to be detectable using the palpation method unless the Train Of Four ratio has fallen to below 0.5. At this level of blockade, the patient's ability to breathe adequately may still be impaired (see Double Burst Stimulation).

When blockade is more profound (at a level more appropriate to surgery) the twitches successively disappear, so that only one or two small responses remain. The number of twitches remaining is the Train Of Four count. A count of one or two is usually compatible with adequate surgical relaxation and also indicates that reversal with neostigmine will be satisfactory.

Occasionally, four small responses persist even at profound blockade - see "Problems and Solutions."

Depolarising blockade does not produce significant fade unless Phase 11 block has intervened.

Double Burst Stimulation (D.B.S).

To initiate Double Burst Stimulation, press and hold the D.B.S switch once. The Microstim DB delivers the correct sequence of stimuli; two bursts of stimuli at 50 pulses per second separated by 750 ms (D.B.S 3,2 is standard, D.B.S 3,3 can be supplied on request).

An interval of at least 15 seconds should be allowed between D.B.S estimations.

Although the Train Of Four ratio provides a method of monitoring light to moderate neuromuscular blockade, its accuracy is much reduced unless a force transducer is used to measure the response of the muscle. This is because the ability of the anaesthetist to reliably estimate the Train Of Four ratio is limited. Fade in the four responses may exist without the anaesthetist being aware of the risk of residual blockade.

Double Burst Stimulation (D.B.S) was designed to produce the same degree of fade as the Train-of-Four with the advantage that D.B.S fade is more easily detected and quantified by the anaesthetist who is monitoring the twitch response of the thumb by the palpation method.

Two short tetanic bursts of stimuli are delivered and the response of the muscle is felt by the anaesthetist as

two discrete twitches. It is relatively easy to quantify the extent, to which the second twitch is less powerful than the first twitch as,

(i). Both twitches are larger than the T.O.F twitches,

(ii). The two middle twitches of the T.O.F normally confound the comparison of the first & fourth responses.

During spontaneous recovery, the first D.B.S response reappears slightly earlier than the first T.O.F response and the second D.B.S response reappears slightly earlier than the fourth T.O.F response. These differences are unlikely to be of clinical significance, and D.B.S and T.O.F can be used interchangeably, with the advantage that D.B.S provides more accurate information to the anaesthetist who does not have access to a force transducer.

Post Tetanic Count (P.T.C).

To initiate P.T.C stimulation, press and hold the P.T.C switch. The microstim will deliver the correct sequence of stimuli; 50 Hz for 5 seconds, a 3 second pause, followed by l Hz stimuli.

An interval of at least 5-6 minutes should be permitted between successive estimations of P.T.C.

This method of measuring the depth of profound non-depolarising neuromuscular blockade was introduced in 1981. Suppose that blockade is very profound and there is no response whatever to other modes of nerve stimulation. A difficulty exists in quantifying such extreme blockade. However, for a short while following a burst of tetanic stimulation (for example, 50 Hz for 5 seconds), the process of mobilization of acetyl-choline at the motor nerve terminal persists in a state of enhanced activity.

If, at this stage, the nerve is stimulated at a much slower rate (for example at 1 Hz), the twitch response is initially boosted by the greater quantity of acetyl-choline that is released by each stimulus. This is the phenomenon of post-tetanic facilitation. The enhancement of transmitter release soon wanes, and the twitch response also declines to the level that existed before the tetanic burst was given. The number of palpable facilitated twitches can easily be counted; this number is the Post Tetanic Count.

The more profound the blockade, the lower is the Post Tetanic Count (P.T.C). As neuromuscular transmission recovers, the number of palpable post-tetanic twitches increases until, at a P.T.C of approximately 6-10 (depending on the muscle relaxant) spontaneous recovery has progressed sufficiently for the first response of the T.O.F to become just detectable. From this point onwards, P.T.C loses its usefulness and T.O.F and D.B.S takes over.

P.T.C is useful in monitoring the progress of profound blockade soon after a dose of relaxant has been given or when any sudden spontaneous diaphragmatic movement is undesirable, for example during neurosurgery.

Problems and Solutions.

During T.O.F stimulation or D.B.S, all the twitch responses persist even at profound blockade.

This is due to direct stimulation of the flexors of the forearm.
Try reducing the intensity of stimulation and/or repositioning the electrodes; try moving the positive electrode to the ulnar groove at the elbow.

Avoid the temptation to assess the muscle response visually; always use tactile assessment and apply a pre-load to the patient's thumb.

At the end of the surgical procedure movement of the reservoir bag appears to indicate adequate tidal breathing and there is no fade in the T.O.F responses; should neostigmine still be given?

Tactile assessment of the T.O.F ratio is inaccurate. The T.O.F ratio can be less than 0.5 with no apparent clinical fade. Try changing to D.B.S., which often reveals covert fade. If there is any fade whatever, neostigmine should be given (in a reduced dose if this is appropriate),

The response of the facial muscles to stimulation of the facial nerve indicates that the patient is fully reversed but the patient is clearly partially paralysed.

The facial muscles are relatively resistant to muscle relaxants compared with the muscles of the hand. This must be borne in mind if this monitoring site is used; otherwise it is easy to over-paralyse the patient.

There is very little response to stimulation but the patient is clearly insufficiently relaxed for surgery.

This is commonly due to dry ECG electrodes. It is preferable to use ordinary EGG electrodes rather than to keep a supply of special electrodes for neuromuscular monitoring which might become dry if they are left in a drawer for a period of time.

It would be desirable to measure neuromuscular transmission in the "awake" patient in the recovery room but supramaximal is too painful.

The stimulus current may be reduced to approximately 1/3 maximum (3O mA). At this level the T.O.F

ratio (but not the single twitch) is not reduced compared with supramaximal stimulation and the stimuli are much less unpleasant for the patient.

Servicing Information

The Microstim DB1000 is designed to be robust yet compact in size. Without access to specialised equipment, troubleshooting and repair of circuit board components are not feasible.

With the exception of replacing batteries and switches, there are no user serviceable components within the unit.

If a problem arises with the Microstim, the unit must be returned to Viamed Ltd, for repair or replacement.

Cleaning Instructions.

The instrument case and leads can be cleaned using isopropyl alcohol. The instrument and leads are not intended to be sterilised. Do not autoclave.

Warranty.

Viamed warranty ensures that goods are free from defects of manufacture for a period of one year from the date of shipment from Viamed. Liability shall be limited solely to the replacement and repair of the goods and shall not include shipping costs or other incidental damages.

This warranty is null and void if any items are subjected to misuse, negligence, accident, or repairs other than those performed by Viamed or an authorised service centre.

Cables and transducers are not included.

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