



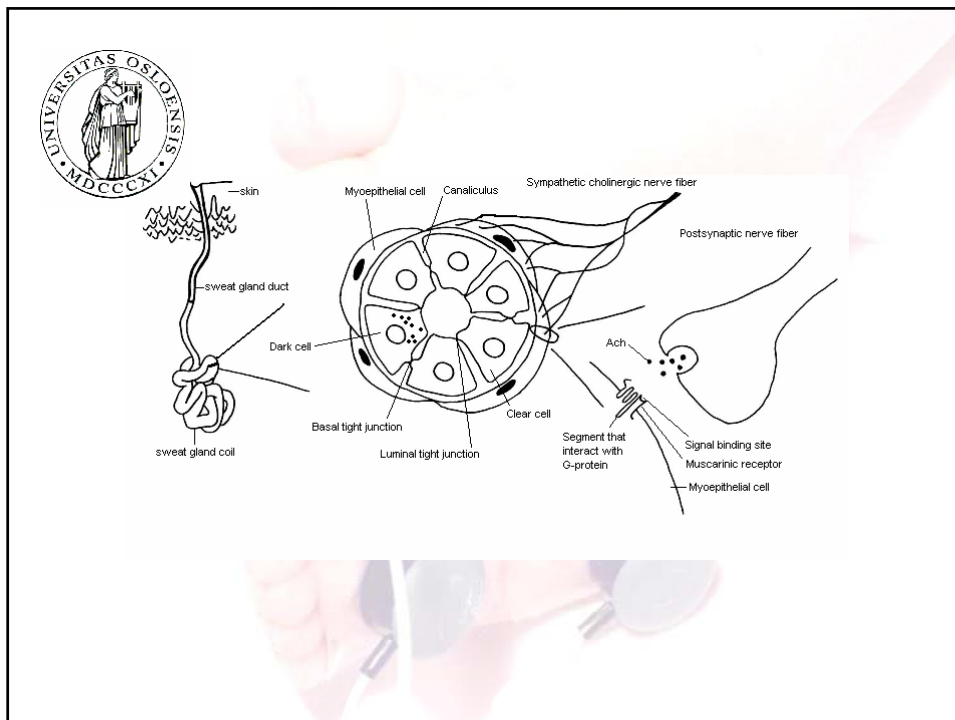

Stress Detector monitor

I, Hanne Storm, Associated Professor MD. PhD, is the founder and co-owner of Med-Storm that owns the patents for this technology



Background for the “Stress Detector monitor”:

- **“Stress Detector” is developed around the lie detector technology.**
- **“Stress Detector” use number of skin conductance fluctuations per sec (NSCF) as an index**
- **NSCF in the palmar surface correlates directly with skin sympathetic nerve activity.**
- **NSCF reacts immediately to a pain stimuli (1-2 sec).**
- **NSCF is not influenced from blod circulatory changes, adrenergic medication or neuromuscular blockers, because acetyl-choline acts on muscarine receptors. In clinical doses atropine does not influence the NSCF.**

The Stress Detector - How it works

Skin conductance changes (microsiemens)

Photo: A preterm infant (week 29). Totally we have studied about 200 preterm infants

Storm H. Skin conductance activity and the stress response from heel stick in premature infants. Archives of Disease in Childhood 2000;83(2):F143-F147.

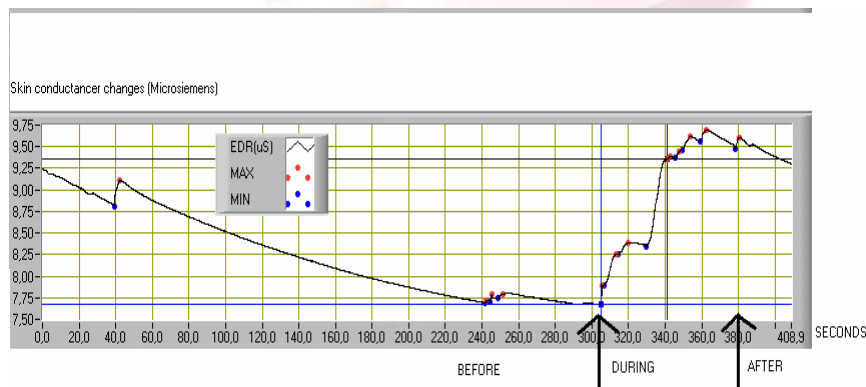
Other references for preterm infants

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- Haidet et al. Stress in neonatal period, how does it influence the preterm babies outcome?



Artificial ventilated children (n=20) at the intensive care unit:

The conductance skin conductance changes from before, during and after suction from the airways. The skin changes increased together with an increase in pain score "COMFORT SEDATION SCORE". At 240 seconds, the nurse touched the wound area.





Results

	Number of skin conductance changes (n=20)	Heart rate (n=20)	Blood pressure (n=20)
Sedation score	$p < 0.01$ $r^2 = 0.83$	Not statistical significant	Not statistical significant

Correlation tests performed on the data from before to during suction in the airways between the sedation score and skin conductance changes, heart rate and blood pressure.

Storm H. Gjerstad AC. Hellerud BC. Wagner K, Henriksen T. Skin conductance changes as a measure to monitor discomfort in artificial ventilated children. *European Journal of Anaesthesiology* 2003;20(30):164.



Postoperative Pain

- When the pain is more than 30 at a VAS score, "Stress Detector" has a sensitivity of 90% when discovering postoperative pain, different from blood pressure and heart rate (n=25).
- Analgesics postoperative reduces the pain and the Pain Detector index

Thomas Ledowski et al. Monitoring of Skin Conductance to assess postoperative pain intensity. *BJA* 2006;97(6):862-5
Another 50 patients are studied with similar results + 25 children.



Patients in anaesthesia



How to monitor the need of analgesics and hypnotics today?

Hypnotics

The standard of today: **Bispectral Index (BIS), Aspect, and Entropy, GE.**

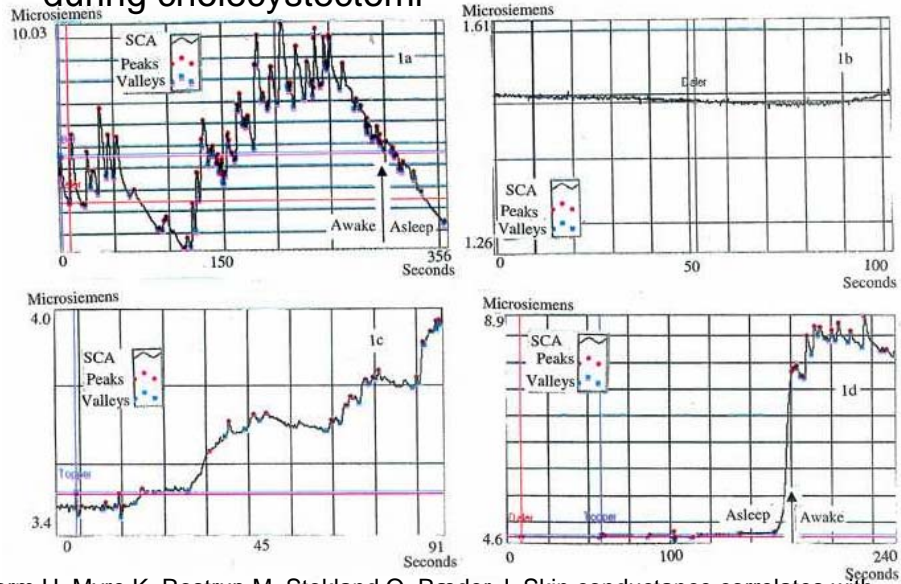
Analgesics

The standards of today:
Nothing

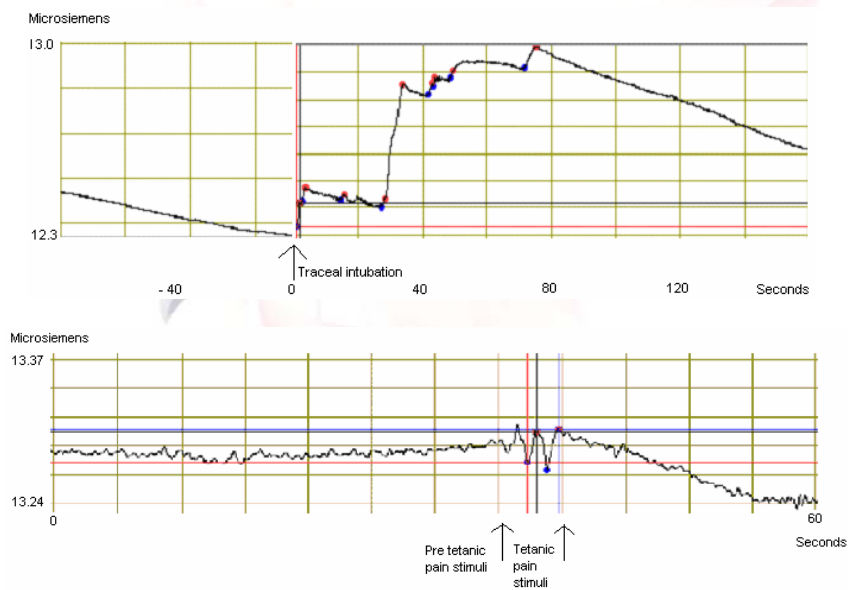
Muscle relaxation

The standard of today: **Tof-guard**

Perioperative "Stress Detector" monitoring (n=200) during cholecystectomy



Storm H, Myre K, Rostrup M, Stokland O, Ræder J. Skin conductance correlates with perioperative stress, *Acta Anesthesiol Scand* 2002;46:887-895.





Conclusion: The stress monitor has an index for both noxious stimuli and for awakening.



Number of skin conductance fluctuations, the index of “Stress Detector monitor”, increased differently from BIS during tetanic stimuli. Increasing doses of remifentanil attenuated the skin conductance response.

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Rikshospitalet University Hospital1;Ullevaal University Hospital, University of Oslo2, St. Olav Hospital, Trondheim Regional Hospital, University of Trondheim 3, Norway.



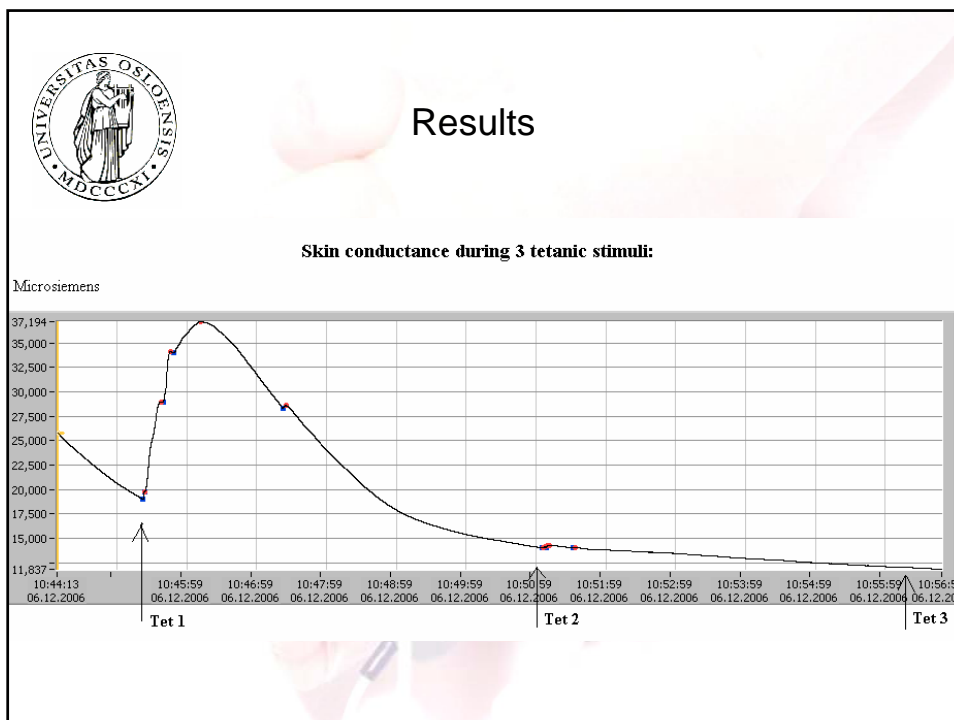
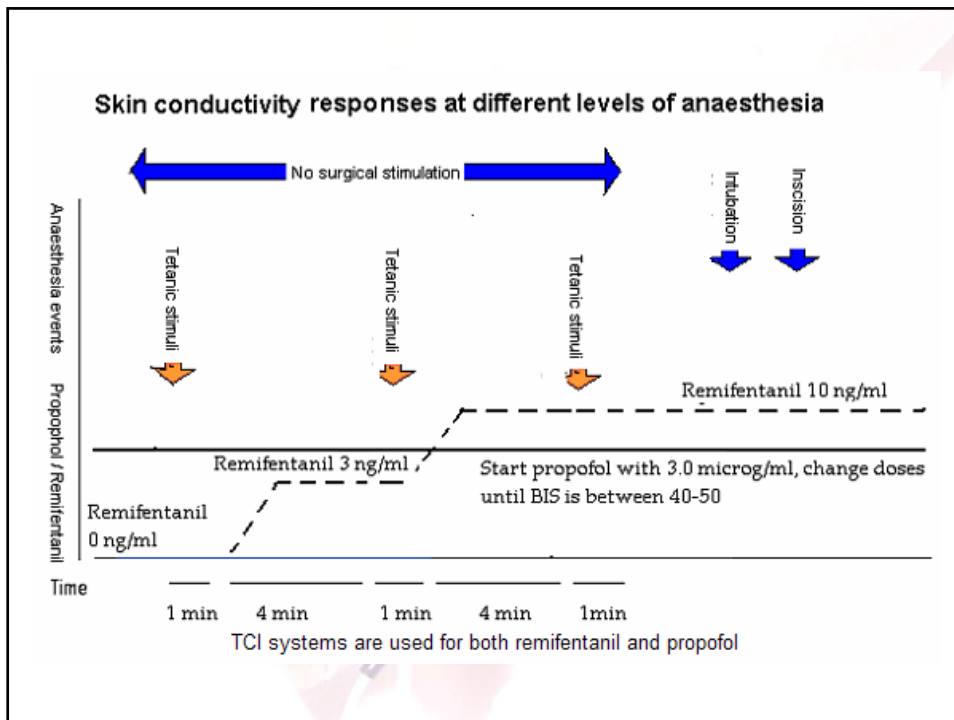
The purpose of the study

To examine if NSCF and BIS could detect the pain response from tetanic stimuli, and to further examine if the tetanic stimuli response was stronger in a situation without analgesic infusion compared to a situation with ongoing analgesic target control infusion (TCI).



Materials and methods:

- **28 patients in ASA 1 or 2 were studied after induction of general anaesthesia but before intubation and start of laparoscopic surgery**
- **The patients were given 3 series of tetanic stimuli of 50mA that lasted for 30 sec at different levels of analgesics but at the same level of hypnotics.**
- **The NSCF and BIS responses were registered continuously, starting 30 sec before stimuli and ending 30 sec after the stimuli started. The maximum values for NSCF and BIS during the tetanic pre stimuli periods were compared with the maximum values of the tetanic post stimuli periods. Moreover, NSCF and BIS responses during tetanic stimulus without analgesics were compared with responses where analgesics was given. The Wilcoxon non-parametric test was used.**



	pre-post T1 NSCF	pre-post T2 NSCF	pre-post T3 NSCF	pre-post T1 BIS	pre-post T2 BIS	pre-post T3 BIS
Mean (SD)	0.00(0.01) - 0.07(0.07)	0.00(0.00) - 0.02(0.04)	0.00(0.00)- 0.01(0.06)	43(9)- 44(13)	42(9)- 44(12)	42(6)- 44(7)
<i>P</i> value	0.000	0.027	0.180	0.272	0.393	0.227
	Response T1-T2: NSCF	Response T1-T3: NSCF	Response T1-T2: BIS	Response T1-T3: BIS		
Mean (SD)	0.07(0.07)- 0.02(0.04)	0.07(0.07)- 0.01(0.06)	44(13)-44(12)	44(13)-44(7)		
<i>P</i> value	0.000	0.001	0.873	0.882		



Conclusion:

In contrast to BIS, this study showed that NSCF is sensitive to tetanic noxious stimuli during sleep, and the measured response is attenuated when an ongoing analgesic infusion is given.

References

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Conclusion

- Pain in anaesthetised and awake patients can be monitored by Med-Storm's Stress Detector.
In both groups of patients the Pain Detector Index is reduced when analgesics is given against the pain.

Contact

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