



Medical device for sweat activity measurements

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Abstract

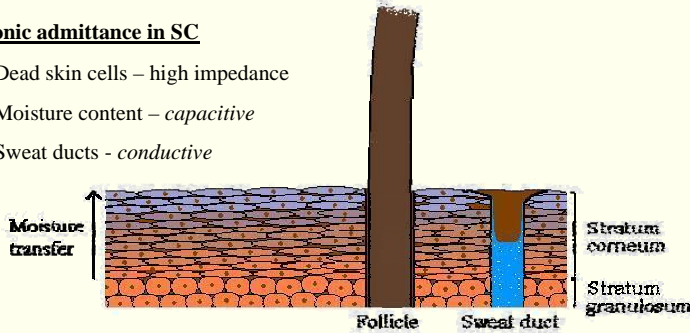
A multichannel logger for long-term measurements of sweat activity has been developed. The logger uses skin surface electrodes for unipolar admittance measurements in the stratum corneum. Using lock-in technique to extract the conductive part of the admittance limits the measurement to the filling of the sweat ducts with little influence from the moisture content of the skin. The logger is developed with emphasis on clinical use and is constructed according to such demands. The portability of the logger enables recording of sweat activity under circumstances such as daily errands, exercise and sleep.

Purpose

- Hyperhidrosis – disease with elevated sweat activity
- objective diagnosis and treatment evaluation

Ionic admittance in SC

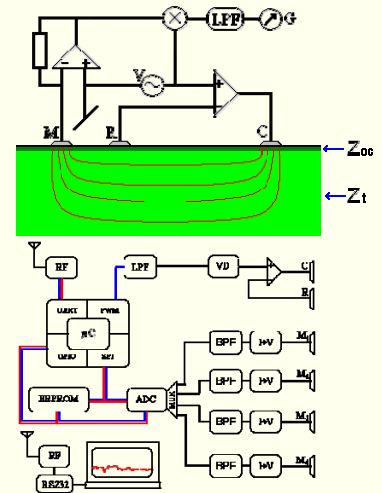
- Dead skin cells – high impedance
- Moisture content – *capacitive*
- Sweat ducts - *conductive*



Methods

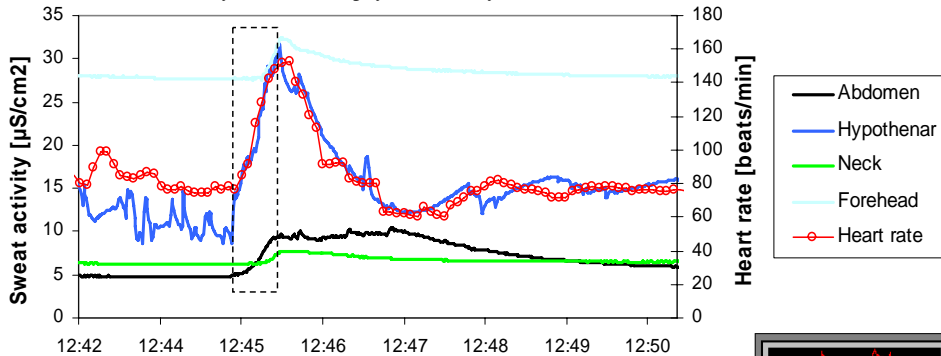
- Three electrode system - monopolar
- Low frequency – limits measurement to SC, $Z_{sc} \gg Z_t$
- Low amplitude – reduces current through tissue, electrode polarization

- Separate current-reading components for multiple channels
- Good channel separation
- Storage to non-volatile memory
- Wireless data transfer
- Monitoring on PC

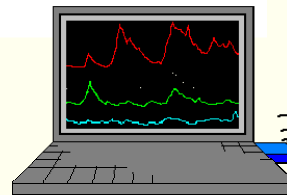


Results

Sweat activity and strenuous physical activity (dashed box)



- Sweat activity can be measured without sweat emergence
- Early results indicate large individual differences in sweat activity
- Sweat activity recorded at different skin sites simultaneously gives information about the synchronicity of the sympathetic nervous system
- No electrodermal activity during sleep



commands:
-start measurement
-dump data
-erase memory

4 x 16 bits data



Portability for clinical use

Conclusions

- The measurement system is suited for clinical use, and the prototype has passed the internal approval as a medical equipment at Rikshospitalet
- Studies on healthy populations to find the normal values of sweat activity are needed in order to use the method for diagnostic purposes