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CLNE_O3.1  EEG MEASUREMENTS USING TEXTILE ELECTRODES

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INTRODUCTION: EEG is a well established clinical practice in e.g. epilepsy, sleep studies and intensive care. The relatively tedious procedure of applying electrodes for multi-channel EEG-recording has hampered the use of EEG at the clinic and is also a reason for the rare use outside the clinic. A solution to facilitate multi-channel EEG recordings is to integrate the electrodes in a cap. This solution has been introduced at neonatal intensive care units to enable multi-channel EEG recordings from newborn babies. However, the existing caps for babies in newborn and premature sizes may cause too high pressure at the electrode sites, making them unsuitable for long term recordings. Textile electrodes may be more comfortably to use and may be positioned/incorporated in a textile structure allowing faster and firmer multi channel electrode application

AIM: The aim of this study was to test the feasibility of textile based electrodes for long term recording of (multi-channel) EEG.

METHODS: Weaved and knitted conductive textile was tested as EEG electrodes on a healthy adult subject. The textile electrodes were first tested dry, but it was found that it was necessary to wet them with physiological saline solution to be able to acquire usable signals. They were placed at the approximate electrode locations F3, C3 and P3 (10-20 system) with standard silver electrodes placed close to the textile electrodes for comparison. The silver electrodes were used in combination with a standard electrode gel. The resulting signals were first examined visually by an experienced electroencephalographer and deemed to be of cerebral origin and of sufficient quality for visual interpretation. The signals were then compared mathematically in the time and frequency domain, and the correlations between the signals from the textile and the silver electrodes were computed.

RESULTS: The tested textile electrodes produced high quality EEG signals, good enough for standard visual interpretation. Signals acquired simultaneously using textile and silver electrodes were highly correlated in both the time (correlation over 0.9) and frequency domain.

CONCLUSION: Our results show that it is possible to record EEG using textile electrodes. Two promising types of textile electrodes have now been selected for further investigation and will be tested during over-night recordings in adults and then in neonates. Apart from the obvious benefit, especially in neonatal care, of using the more comfortable textile electrodes, the possibility of integrating textile electrodes in supportive structures for easy application and proper positioning opens up the current use of EEG to also include (self administered) EEG monitoring outside the clinic.