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P132. Dry-Contact Multichannel EEG Using Novel Multipin Electrodes

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Introduction. New fields of application for brain function analysis include brain–computer interfaces, intelligent prosthesis and ambient assisted living. In this context, electroencephalography (EEG) is the most commonly used technique for mobile, ubiquitous signal acquisition. Thus, besides reproducible and reliable signal quality, electrode technologies for rapid, unobtrusive EEG acquisition are required. Hence, conventional Ag/AgCl electrodes are inapplicable due to technologically inherent application limitations and necessary preparation procedures. We present a novel type of electrode cap enabling dry-contact multichannel EEG. *Materials and methods*. The distinct shape of each electrode incorporates 24 thin pins on a single baseplate. While the pin design enables hair layer interfusion, the common baseplate electrically interconnects the single pins, thus resulting in increased contact surface. A flexible polymer substrate for each electrode ensures adaption to the local head curvature, hence maintaining not only contact reliability and signal quality but also comfort. 97 electrically conducting coated polymer electrodes where integrated into a textile-based cap using a quasi-equidistant electrode layout. Using the novel cap in conjunction with a commercial EEG amplifier, we recorded EEG signals on 5 volunteers with normal hair length. Furthermore, we repeated the signal acquisition using a conventional electrolyte gel based cap, enabling a direct comparison between both electrode technologies. *Results*. After application of the dry cap system, for all volunteers more than 70% of the electrodes provided sufficient signal quality. Comparison to the subsequently recorded EEG signals using conventional electrodes revealed similar signal characteristics in a frequency range between 1 and 40 Hz for spontaneous EEG, alpha activity and a visual evoked potential. The spectra of the dry EEG showed slightly increased drift for frequencies below 1 Hz. During the whole measurement procedure no extensive adduction was necessary and the subjects reported comfortable, unobtrusive fit of the cap. *Conclusions*. The dry application scenario eliminates the need for preparation procedures, thus enabling rapid application and immediate as well as long-term recordings. For 5 subjects we demonstrated signal quality of the majority of the electrodes to be comparable to conventional gel-based cap systems. Furthermore, we proved compatibility of the cap system with conventional, commercial EEG amplifiers. The proposed novel cap system enables preparation-free, dry multichannel EEG, thus promoting new fields of application for EEG analysis.

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