SCALP FIELD MAPS OF AVERAGED EEG POTENTIALS EVOKED BY CHECKERBOARD INVERSION

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Average EEG potentials evoked by checkerboard (16 deg arc field, checks appr 1 deg arc) inversion (2/sec) have become an important tool for neurological diagnosis (1). Time between checkerboard inversion and maximal positive voltage of the EEG field ("latency") over posterior scalp areas is measured, usually examining waveforms obtained from one or more electrode combinations. For a given visual stimulus, the evoked waveforms depend on (a) the stimulus location on the retina, and (b) the electrode location on the scalp, where there is no "inactive" location.

In order to (a) clarify differences in conventionally recorded waveforms of evoked potentials which were obtained by stimulation of the upper, lower, left, or right hemiretina (2, 3, 4), and in order to (b) determine optimal electrode positions for routine examinations with few recording channels, scalp EEG field distributions were mapped in 2 msec intervals, using a 48 channel recording system (5). Maps can be examined individually, as direct voltage readings, or as interpolated isopotential plots, or can be viewed as film sequence (shown at meeting).

Upper hemiretina stimulation causes the posterior positivity to peak earlier in time and at a more anterior location than lower hemiretina stimulation (sample maps in Fig. 1). In both conditions, the fields are about concentric around posterior midline locations. Drastic differences of conventionally recorded potential waveforms obtained in the two conditions (2, 3, 4) can be attributed to the different latencies of maximal positive values, and to activity at the reference electrode. Incidentally, whole retina stimulation yields ambivalent results because of inconstant weighting of the added lower and upper hemiretina responses in different subjects (4). Unexpectedly, left hemiretina stimulation consistantly causes a positive peak over the (contralateral) right hemisphere, and vice versa, contrary to results obtained e.g. with flash stimuli in a split chiasm patient (6) and with stereo stimuli in normals (7).

The inspection of the maps suggests the use of a posterior midline row of "active" electrodes. Since the fields have a fairly steep gradient over posterior areas, the exact location of a remote reference is not very critical for conventionally recorded waveforms, although some activity is present in anterior areas. Minimal latency error may be expected from an "average" reference, combining several anterior electrodes. Right-left comparisons may best be done using a posterior midline reference to evaluate the gradient.

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(Figure 1 on next page)