ELECTROENCEPHALOGRAPHY (EEG)

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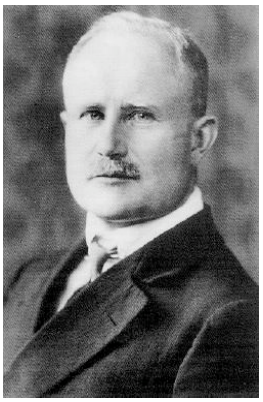
The Electroencephalogram (acronym EEG) is a diagnostic tool that records the electrical activity of the brain using numerous electrodes placed on the scalp. The electrical activity is produced by the brain cells (neurones) and neural circuits. It was an important diagnostic aid in the second half of the last century.

The first account of the brain electrical activity was published by Richard Canton, a Liverpool surgeon in the *British Medical Journal* in 1875. He recorded electrical activity by placing electrodes on the exposed brains of rabbits and monkeys. Fifteen years later Beck, using similar animals, noted the changes produced by light and other stimuli.

In 1925, Hans Berger, a German psychiatrist from Jena, recorded brain activity similar to the current recordings using electrodes placed on the human scalp. He named one set of recordings the “Alpha” waves and published his findings in 1929. Like Einthoven, he used light to record on photographic plates. In 1932, Adrian and Mathews in Cambridge, using copper gauze and saline electrodes, confirmed Berger’s findings, and published their findings in the journal *Brain*. Berger refused their suggestion to call a set of waves “Berger” waves.

With advances in technology, pen recordings and electrodes were improved and in the 1960s, the EEG was an important diagnostic tool. It was used to diagnose strokes, tumours, encephalopathies, brain inflammation, and above all, epilepsy. However, with the development of modern medical imaging such as CT and MRI, tumours, strokes, and other space occupying lesions can be much better demonstrated and located. The main role of EEG now is in the diagnosis of epilepsy, coma, brain death, and in excluding epileptic component in encephalopathies.

[This information is from Wikipedia and http://chem.ch.huji.ac.il/history/berger.]



HANS BERGER

AN EARLY EEG MACHINE: UNLIKE THE CURRENT DIGITAL MODELS, INK PENS WERE USED

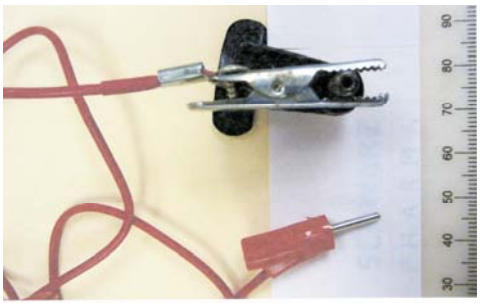
ONE OF THE FIRST EEG MACHINES PRODUCED BY THE BECKMAN COMPANY

TOP OF THE ABOVE MACHINE SHOWING PENS AND CONTROLS

EARLY ELECTRODES: IN THE CURRENT MACHINES, THE ELECTRODES ARE AN INTEGRAL PART OF THE SKULL CAP. IN THE PAST, A STRING HAT WAS USED TO HOLD THE ELECTRODES IN POSITION

THE STRING HAT WAS PLACED OVER THE HEAD TO HOLD THE ELECTRODES IN PLACE. CLIP ELECTRODES WERE PLACED OVER THE EARS AND DISC ELECTRODES WERE PLACED ON THE MASTOID PROCESSES BEHIND THE EARS

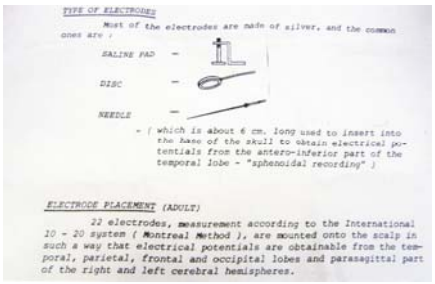
CHLORINATING DISH USED FOR THE STORAG OF ELECTRODES WITH A PAD ELECTRODE IN THE FOREGROUND



ALLIGATOR CLIP WAS ATTACHED TO THE PAD ELECTRODE. THE RED CHORD AND THE BAYONET CLIP WAS ATTACHED TO THE EEG MACHINE

STENCIL SHOWING THE POSITION OF THE EEG ELECTRODES

A SIMPLE BELL WAS OFTEN USED TO PRODUCE THE STARTLE REFLEX AS PART OF THE RECORDING VALIDATION



TYPE OF ELECTRODES

Most of the electrodes are made of silver, and the common ones are :

SALINE PAD –

DISC –

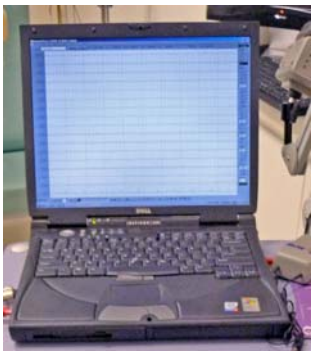
NEEDLE –

– (which is about 6 cm. long used to insert into the base of the skull to obtain electrical potentials from the antero-inferior part of the temporal lobe - "sphenoidal recording")

ELECTRODE PLACEMENT (ADULT)

22 electrodes, measurement according to the International 10 - 20 system (Montreal Method), are mounted onto the scalp in such a way that electrical potentials are obtainable from the temporal, parietal, frontal and occipital lobes and parasagittal part of the right and left cerebral hemispheres.

A TEXT BOOK DIAGRAM OF THE COMMONLY USED ELECTRODES AND A COMMENT ON THEIR PLACEMENTS



A MODERN EEG RECORDING STATION SHOWING 16 RECORDING TRACINGS

A CAP WITH ELECTRODES AS CURRENTLY USED AT THE QUEEN ELIZABETH HOSPITAL. THE MULTI-COLOURED LEAD CONNECTS THE ELECTRODES WITH THE RELAY AND TO THE (HEAD) CONTROL BOX (ABOVE RIGHT)

AN EEG TRACING SHOWING ACTIVITY IN TEMPORAL LOBE EPILEPSY