227

CEREBRAL EVOKED POTENTIALS ELICITED BY ELECTRICAL TOOTH PULP STIMULATION IN MAN

W.H.-M. Raab

Tooth pulp evoked potentials (TPEP) have already been described by many authors. But only with the help of invasive methods the problem of leakage currents could be avoided. This study describes a non-invasive method for selective tooth pulp stimulation, which provides constant stimulation conditions during the whole experiment. Furthermore, the relation between the components of the potential and the stimulus intensity are shown.
10 volunteers received stimuli (2ms duration) of varying intensities on the upper incisors in 5 steps of 1dB each, related to the individual pain threshold. The interstimulus interval ranged from 25s to 35s. The EEG was recorded from C_z to A_1.
The impedance of the electrode (> 0,5 MΩ), as well as the individual pain threshold remained constant for a period of 3 hours.
The TPEPs obtained by this method showed an increase of amplitudes and a shortening of latencies with rising intensities. A clear relation between the increase of intensity and the amplitude of the N_1P_2 component could be proved.
A permanent stimulus consisting of alternating current squarewaves led to a change in subjective felt pain. For the first time TPEPs could be recorded from a combination of the above described method with an additional permanent stimulus. The TPEPs obtained under this experimental conditions were opposed to those described before.

Abteilung für Zahnerhaltung und Parodontologie der Universität Erlangen - Nürnberg, Glückstr. 11, D- 8520 Erlangen

228

HUMAN CEREBRAL EVOKED POTENTIALS TO DIFFERENT REPETITION RATES OF PAINFUL CO_2-STIMULI

G. Kobal and Th. Hummel

Repetition rates of stimuli to sensory organs influence cerebral event-related potentials. In this experiment series of 6 painful CO_2-stimuli were applied to the human nasal mucosa 16 times. Interstimulus intervals (ISI) between series were 50-60 s and within series 8, 4, and 2 s. Stimulus duration was 200 ms. 22 volunteers participated in the experiments. EEG was recorded from 8 positions in the international 10/20 system. Subjects estimated the perceived painful intensity by using a visual analog scale. The amplitudes of the evoked potentials decreased with the number of repeated stimuli and decreasing ISI. For ISI of 2 s the second stimulus of a series was estimated most intense while the corresponding electrical response was considerably smaller than the first response. There were only minor changes in peak latencies. Evoked potentials recorded from different leads showed habituation to different degrees. These findings demonstrate that the subjectively perceived summation of painful intensities caused by short interstimulus intervals is not reflected in the cortical evoked potentials.

This research was supported by DFG grant Ko 812/ 1-1.

Institut für Pharmakologie und Toxikologie der Universität Erlangen-Nürnberg, Universitätsstr. 22, D-8520 Erlangen, FRG

229

THE EFFECT OF THERMOSTIMULATION ON CLINICAL AND EXPERIMENTAL ITCH

H. Fruhstorfer, M. Hermanns, L. Latzke

The present study was intended to substantiate accidental observations on the influence of environmental temperature on itch. In order to recognize possible effects of temperature on mediator release, both experimental itch induced by histamine and clinical itch in patients suffering from atopic dermatitis were examined.
18 patients (age 15-66 years) and 40 healthy students (age 21-31 years) participated in the experiments. The patients rated the intensity of spontaneous itch on one of their forearms before and during its immersion in a water bath of either 10 or 45°C. In the normal subjects itch was elicited by 50 µl of a 0,1% histamine solution applied to a 17x42 mm skin area of the volar forearm. Before and after histamine application thermal thresholds were recorded. Then the stimulated skin area was heated or cooled at a rate of 0,5°C/s and itch intensity was continuously rated. Thermal stimulation was discontinued when thermal pain became intolerable.
Cooling abolished itch in all patients and in most of the normal subjects. Heating produced less clear effects: in part of the patients and of the normal subjects itch disappeared or became less whereas in the others itch was aggravated. After the end of thermostimulation usually the opposite changes in itch intensity occurred. In the normal subjects thermal thresholds were not significantly influenced by histamine.
The results show that changes in skin temperature have a marked influence on itch intensity. This temperature effect seems to act directly on the sensory receptors transmitting itch and not on mediator release. A possible direct role of thermoreceptors in the generation of itch is improbable.

Physiologisches Institut der Universität Marburg, Deutschhausstr.2, D-3550 Marburg/Lahn.

230

THE EFFECT OF ADAPTATION ON THE CONSTANCY OF OBJECT-TEMPERATURE PERCEPTION

M.F. Tritsch

Depending on adaptation temperature of the hand, an object at 32° C may appear warm or cool when touched, due to the dynamic properties of thermoreceptive fibres. However, it would seem a remarkable failure of functional adaptation if the temperature sense was unable to mediate the absolute temperature of an object. The hypothesis that in man there is a significant degree of perceptual constancy for object temperature was tested by asking experimental subjects to match thermal sensations at both hands. Adaptation temperature and object temperature were varied for one hand, while the subject sought out matching object temperatures with the other hand, the adaptation temperature of which was maintained at 32° C. Object temperatures from 12° C to 42° C were supplied by a temperature gradient on a massive aluminium column. Adaptation temperatures from 15° C to 40° C were given by large water-circulated brass thermodes. Only 2 digits of each hand were used. Deviation (d) from constancy was obtained by taking the difference in object temperatures giving matched sensations as a percentage of the difference in the corresponding adaptation temperatures. d reached 50 - 60 % for object temperatures at or near the adaptation temperature of the corresponding hand, but was less than 10 % for more distant object temperatures. Thus constancy, expressed as c = (100 - d) %, is optimal for objects whose temperature differs considerably from that of the hand which touches them, and d, which corresponds to the differential characteristic of the system, is maximal for small temperature shifts.

Inst. Zoologie der Johannes Gutenberg-Universität, Abt. III (Biophysik), Saarstr. 21, D-6500 Mainz, FRG