Effects of a combination of ketamine and medetomidine hydrochloride (KM) anaesthesia on somatosensory evoked potentials (SEPs) obtained by electrical stimulation of the median nerve in macaque monkeys.

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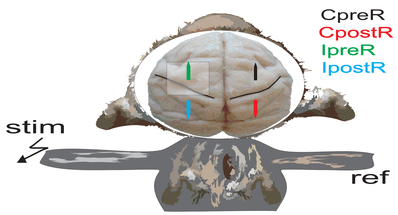
Introduction

SEPs provide a useful method to establish the location and evolution of CNS lesions, but their characteristics also depend on whether anaesthetics are used, on the anaesthetic substance itself and on the depth of anesthesia at the time of the recording. While a KM anaesthesia enables to obtain a secure and deep atonic anesthesia in macaques, the effects of this type of anaesthesia on the characteristics of SEPs are unknown. The aim of the present investigation was to clarify the time course and effects of a KM anesthesia on the latency and amplitude of specific components of the SEPs obtained by electrical stimulation of the median nerve.

Material and methods

Animals: six adult macaque monkeys.
Stimulation sites: median nerve at the wrist.
Reference: extracephalic (wrist).
Stimulation: 0.2ms, 0.6mA, 5Hz, 500x.
Sampling rate: 32KHz.
Anaesthesia: ketamine/medetomidine, i.m. injection.
Position of the cortical electrodes =>

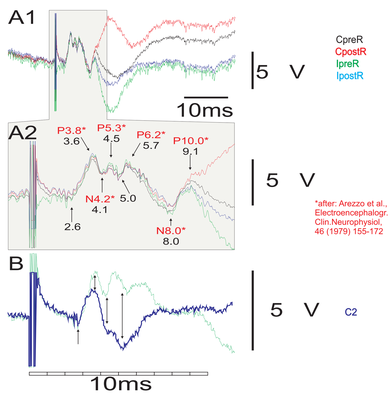


Conclusions

1) In macaques, during the course of an KM anaesthesia, both early and late SEP components vary in latency and in amplitude.
2) The amplitude and latency of early components (< 8 ms) vary moderately.
3) Some components absent during the main course of the anaesthesia appear few minutes before the animals wake up.
4) Analysing the consequences of a CNS lesion on SEP characteristics in macaques under KM anaesthesia, requires knowledge of the state of anaesthesia.

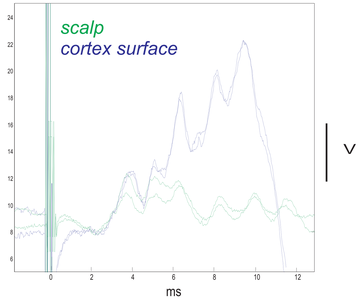
Results

1. Characteristics of the SEPs to median nerve stimulation (scalp electrodes).



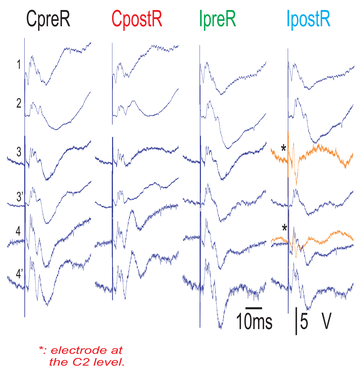
SEPs observed with cranial electrodes using a non-cephalic reference. A first modulation was observed 2.6 ms after the stimulation, followed by early positive peaks at ca 3.8 and 5.3 & 6.2 ms. Later components of thalamic or cortical origin were present 8.0, 9.1 and later times.

2. Same components can be recognized in the early SEPs recorded with scalp or cortex surface electrodes to median nerve stimulation.



SEPs obtained with electrodes placed either on the scalp or in contact with the dura in one animal during two different sessions.

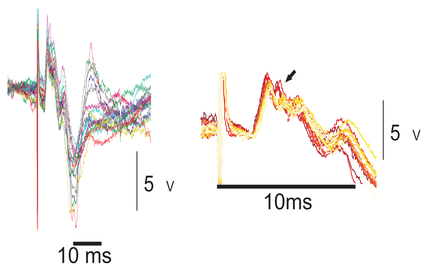
3. Inter- (1,2,3,4) and intra- (3-3',4-4') animal variability for SEPs components during median nerve stimulation (scalp electrodes).



*: electrode at the C2 level.

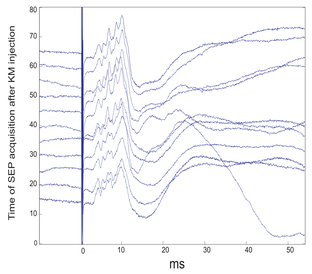
Note that the early SEP wave forms and latencies are similar but that a considerable inter-animal variability is present, particularly for the late components.

4. SEP components vary in function of the level of anaesthesia.



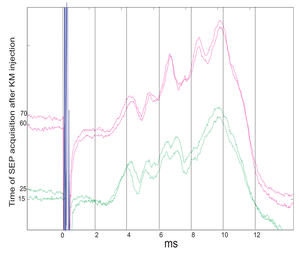
The left panel shows SEPs at different time points after the initiation of the KM anesthesia. Note the strong variability of the late, cortical, component,.
The right panel shows early components variability.of the KM anesthesia for one electrode.

5. Single SEPs during the time course of anaesthesia.



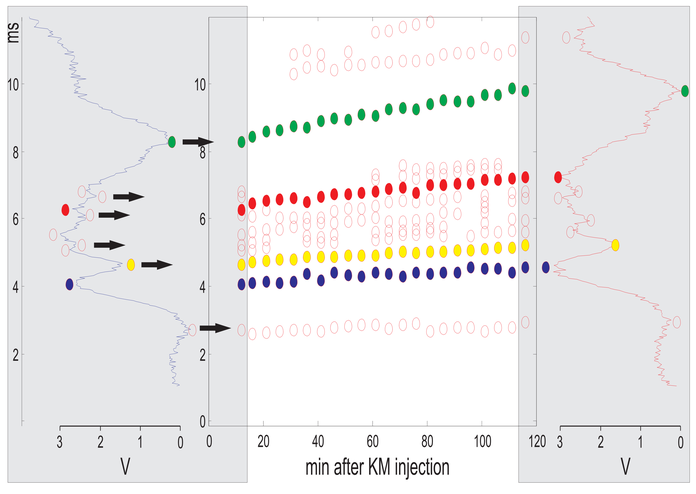
Note that two subsequent SEPs are very similar but that there is a progressive evolution of the SEP components.

6. The composition of SEP components differ in the early stages of the anaesthesia compared from those observed in the late stages.



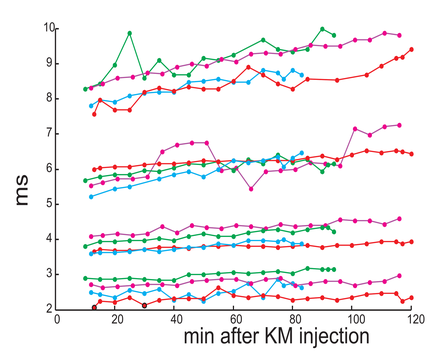
Just before arousal, components at 10 ms decomposes in two single components, while two single components at 7 ms tended to merge.

7. The signal propagation tends to slow down during the course of the anaesthesia.

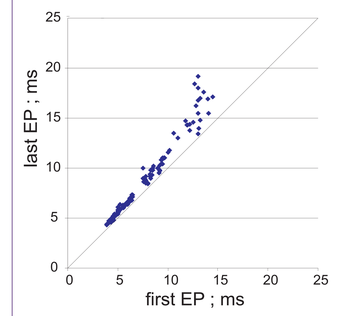


Note that the propagation is at its lower level just before the animal awakes.

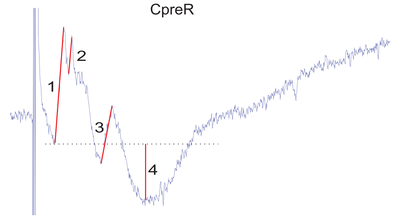
8. The latencies increase is observed in different experiments as well as in different components.

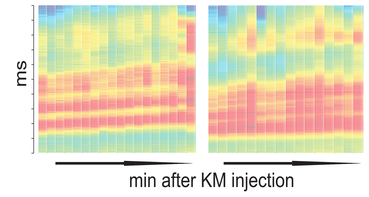


9. All components of the latest SEP recording are delayed when compared to the earliest SEP recording.

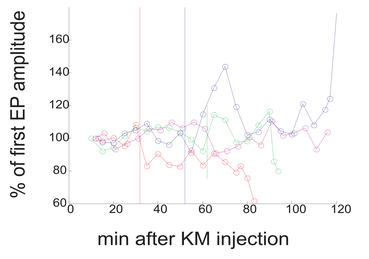


10. In contrast to late components, the amplitude of early SEP components vary moderately during the course of anaesthesia.





	component (mean+SD)			
experiment		2	3	4
1	3.1+-0.2	1.7+-0.2	2.3+-0.2	-3.4+-0.1
2	3.4+-0.3	1.4+-0.2	0.9+-0.2	-2.8+-1.4
3	3.0+-0.5	1.9+-0.1	0.8+-0.2	-3.8+-1.0
4	4.5+-0.5	0.8+-0.4	2.6+-0.3	-3.1+-0.6
5	3.2+-0.2	1.3+-0.1		0.7+-0.1
6	4.9+-0.4	1.4+-0.2	2.9+-0.5	-2.3+-0.7



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