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Cognitive tasks as provocation methods in routine EEG: a multicentre field study

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COGNITIVE TASKS AS PROVOCATION METHODS IN ROUTINE EEG: *A MULTICENTER FIELD STUDY.*

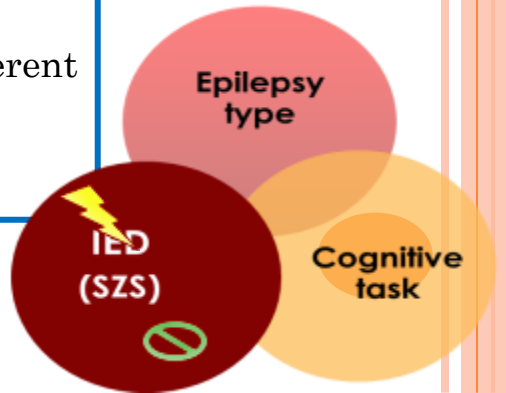
General aims: To evaluate the efficacy of cognitive tasks to induce interictal epileptiform discharges (IEDs) in an unselected population of patients referred for EEG evaluation with clinical diagnosis /suspicion of epilepsy

Specific aims:

- To evaluate the proportion of patients showing either a significant increase or an exclusive presentation of IEDs associated with cognitive tasks
- To explore a potential relationship between specific activation of IEDs and epilepsy type or syndrome

Secondary aims:

- To assess the presence of inhibitory responses to cognitive tasks in different epilepsy types



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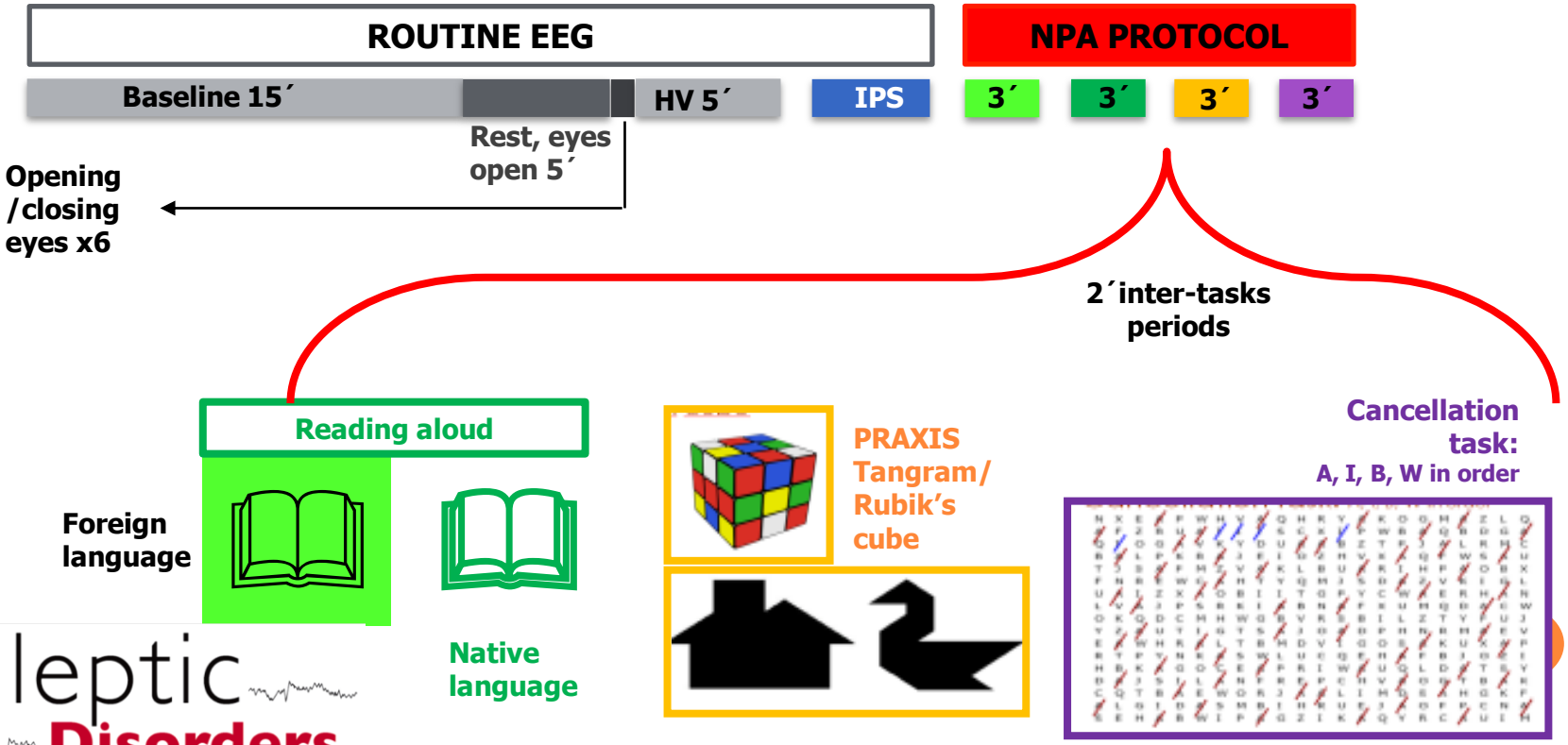
EEG protocol: conditions and temporal sequence



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Activation and inhibition of IEDs

Data processing:

- Manual counting of IEDs in 3-min time windows.
- Baseline values (95% CI) calculated for each patient.
- Statistically significant activation and inhibition were defined when the number of IEDs during a certain task was respectively above or below the 95% CI.
- Seizures were also counted as activation.
- Inhibition was assessed only in cases with baseline IEDs (lower limit 95%CI ≥1).

Main results:

- IEDs were seen in 255/429 EEG recordings (59.4%).
- 212/429 presented IEDs during baseline (rest, closed eyes).
- In only 7 patients, IEDs were exclusively seen in association with a cognitive task.
- 6 patients presented with seizures.
- Statistically significant activation by at least one cognitive task was observed in 15.6% of recordings.
- Inhibition could be assessed in 98 cases.
- Statistically significant inhibition during at least one cognitive task was seen in 89.8% of these cases.

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IED Modulation by different conditions according to Epilepsy Type

- IED activation by intermittent photic stimulation was associated with generalized epilepsy.
- IED activation by cognitive tasks (particularly by praxis) was more frequently seen in focal epilepsies, but did not reach statistical significance.
- Inhibition of IEDs was frequently found during cognitive tasks and also during the rest period with eyes open; no differences arose between epilepsy types.

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Conclusions

- Adding a brief NPA protocol to the standard EEG, testing reading and visuomotor coordination, slightly increased its sensitivity in patients with either focal or generalized epilepsy.
- It is recommended to reserve cognitive stimulation for patients with a suspicion of cognitive reflex epilepsy, or with a history of seizures precipitated by different types of cognitive processes, and use longer exposure times than those in the present study.
- In the era of precision medicine, individual patterns of IED activation and inhibition by different tasks and stimuli could be of use to design tailored strategies to avoid or abort seizures

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