

***Automated detection of hypoglycemia-induced EEG changes recorded by subcutaneous electrodes in subjects with type 1 diabetes--the brain as a biosensor.***

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**AIMS:** Hypoglycemia unawareness is a common condition associated with increased risk of severe hypoglycemia. We test the hypothesis that specific changes in the electroencephalogram (EEG) during hypoglycemia can be recorded by subcutaneous electrodes and processed by a general mathematical algorithm, and that hypoglycemia associated EEG changes appear before the development of severe hypoglycemia. **METHODS:** Fifteen patients with type 1 diabetes were exposed to insulin-induced hypoglycemia and EEG was recorded. The cognitive function was evaluated by repeated cognitive testing. Insulin infusion was terminated when plasma glucose reached 1.8mmol/l or when the subjects showed obvious signs of cognitive dysfunction. EEG was analyzed by an automated mathematical algorithm with a predefined threshold of hypoglycemia. **RESULTS:** Hypoglycemia associated EEG changes were detected by the mathematical algorithm in all subjects. Plasma glucose at the time of EEG changes above the threshold value ranged from 2.0 to 3.4mmol/l and occurred 29+/-28min (range 3-113min) before termination of insulin infusion. **CONCLUSIONS:** Hypoglycemia associated EEG changes could be detected by an automated mathematical algorithm in all subjects exposed to insulin-induced hypoglycemia. In 12 of 15 patients, EEG changes occurred before severe hypoglycemia as evaluated by the cognitive testing.

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