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Interictal epileptic activity in epilepsy patients and its impact on simulated driving

Objective: To analyze effects of interictal epileptic activity (IEA) on reactivity and aspects of the fitness to drive in epilepsy patients.

Methods: Adolescent and adult patients with demonstration of focal or generalized bursts of IEA in electroencephalography (EEG) readings within 1 year prior to inclusion irrespective of medication performed a car driving test on a laptop, a single light flash test or drove in a realistic simulator while electroencephalography (EEG) was simultaneously recorded. Reaction times (RTs), virtual crashes, or lapses ($RT \geq 1$ s in the car or flash test), and additionally breaking distances in the realistic simulator were measured in an IEA burst-triggered fashion during IEA and compared to RTs and breaking distances obtained in normal EEG within the same individual session.

Results: IEA significantly prolonged RT and virtual crashes. Breaking distances in the simulator were significantly prolonged by IEA, but had to be mathematically speed-adjusted as breaking distances are dependent on initial speed and patients drove the simulator at variable velocities. The number of antiepileptic drugs (AED) correlated with prolonged RTs during normal EEG but not with IEA-associated RT prolongation or crashes/lapses.

Significance: IEA prolonged RTs to varying extents in all tests, dependent on IEA type. IEA-associated crashes in the car test were significantly more frequent than during normal EEG. Significant breaking distance prolongations may indicate IEA relevance beyond a driving simulator context. AEDs somewhat reduced psychomotor speed, but it was mainly the IEA that contributed to an excess of virtual accidents.

Biography

Heinz Krestel has completed his Medical School from Munich University, Germany, and his Post-doctoral studies at the Max-Planck Institute of Medical Research, Heidelberg, generating a genetic mouse model for epilepsy. He has been Senior Neurologist for Neurology and Pediatric Neurology at Bern University Hospital, Switzerland, and is Co-leader of its Driving & Epilepsy Research Team. His second focus is Epilepsy Genetics. He has published 20 papers in reputed journals, won a poster award at the World Neurology Congress in 2013, has been cited by Reuters Health and served as Reviewer for *Journal of Neurology*.

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