

#### Background:

Traumatic brain injury (TBI) is a common cause of epilepsy. The risk of epilepsy after a first post-traumatic seizure varies in the literature. Our aim was to analyze the risk of epilepsy in individuals after a first post-traumatic seizure and identify individuals fulfilling the 2014 International League Against Epilepsy proposed criteria of epilepsy already after a first seizure. The main hypothesis was that trauma severity would be a significant risk factor.

#### Material and Methods:

Register-based cohort study, including all individuals hospitalized with a TBI between 2000-2010. We also included three controls per case matched on age and sex without TBI. We identified individuals with an ICD-code for seizure occurring > 7days after the trauma and analyze the risk of a following epilepsy diagnosis within 10 years, using Kaplan-Meier estimator. We also performed stratified analyses for trauma severity and time from trauma to seizure.

#### Results:

The 10-years risk of epilepsy was 41.0 % (95%CI: 38.5-43.6) after TBI. The corresponding risk in the control group was 33.0 % (95%CI: 29.9-36.1). Focal cerebral injuries inferred the highest risk, 62.5% (95%CI: 53.9-71.1). For injury types concussion or skull fracture the risk was not significantly higher than in the control group.

#### Conclusion:

The risk of epilepsy was elevated after a first seizure after TBI compared to controls. The risk increased with the severity of the injury, but our preliminary results indicate that even a severe type of TBI does not on its own indicate that a first seizure constitute epilepsy. More individual prediction models are needed. First seizures after concussion or fractures of the face and skull do not have an increased risk compared to the control group.