**p538 - White matter network abnormalities are associated with cognitive decline in chronic epilepsy**

**Vaessen M1,2, Jansen J1, Vlooswijk M1, Hofman P1, Majoie M2, Aldenkamp A1,2, Backes W1**

1Maastricht University Medical Center, Maastricht, Netherlands, 2Epilepsy Center Kempenhaeghe, Heeze, Netherlands

**Purpose:** Patients with chronic epilepsy frequently display cognitive co-morbidity. These patients might have widespread network abnormalities outside the epileptic zone, which might affect a variety of cognitive functions as well as global intelligence. We aimed to study the role of white matter connectivity as a neuronal correlate of cognitive decline.

**Method:** Thirty-nine patients with non-symptomatic localization-related epilepsy and twenty-three age-matched healthy controls were included for diffusion MRI at 3 Tesla and neuropsychological (IQ) assessment. Whole brain white matter networks were constructed from fiber tractography and weighted graph theoretical analysis was performed to determine white matter connectional abnormalities associated with epilepsy and cognitive decline. Fiber tract volume was used to model individual differences in connection efficacy.

**Results:** Patients with severe cognitive impairment showed lower clustering (a measure of brain network segregation) and higher path length (a measure of brain network integration) compared to the healthy controls and patients with little or no cognitive impairment. Whole brain white matter volume was found to be normal in the patient group. Correlation analyses revealed that IQ and the degree of cognitive impairment were strongly associated with clustering and path lengths.

**Conclusion:** This study reveals neurobiological evidence for impaired white matter connectivity which is associated with cognitive decline in patients with chronic epilepsy. As whole brain white matter volume was preserved in the patient group, our results suggest an important role for the network topology, in terms of volume contribution of different white matter fiber bundles, in epilepsy and cognitive decline.

**Session Details**
- **Session Title:** Poster session: neuroimaging I
- **Session Date:** 30 August 2011