

Epilepsy in the Developing Brain: The size of the challenge in the EU

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- Antiepileptic drug trials and development in children - Catherine Chiron (France)
- Developmental neuropathology in epilepsy - Maria Thom (UK)
- Epilepsy and early brain development - Heiko Luhmann (Germany)
- Neurocognitive development in paediatric epilepsy - Patrick Van Bogaert (Belgium)

The problems I

- Annual rate of 5-7 new epilepsy cases per 10,000 children from birth to 15 years
- Unclear whether early seizures are (per se) the cause of long-term neurological deficits. There are suggestions from animal models. Unknown mechanisms.
- Malformations of cortical development, alterations of ion channel or developmental genes, inherited metabolic conditions, head trauma, CNS infection/inflammation, hypoxic/ischemic conditions account for 45% of cases. Etiology remains obscure in the remaining (most) cases.

The problems II

- Antiepileptic drugs (AEDs) which are used to treat seizures in infants, children and pregnant women may affect brain development as some of their molecular targets also regulate developmental processes.
- Cognitive impairment likely results from the combined effects of etiology, the use of AEDs, and the epileptic activity. No studies have addressed this issue.
- Childhood epilepsy has remarkable causal heterogeneity and age related expression but new AEDs are designed for adulthood, using animal models of adult epilepsy; clinical trials of novel AEDs in pediatrics are scarce

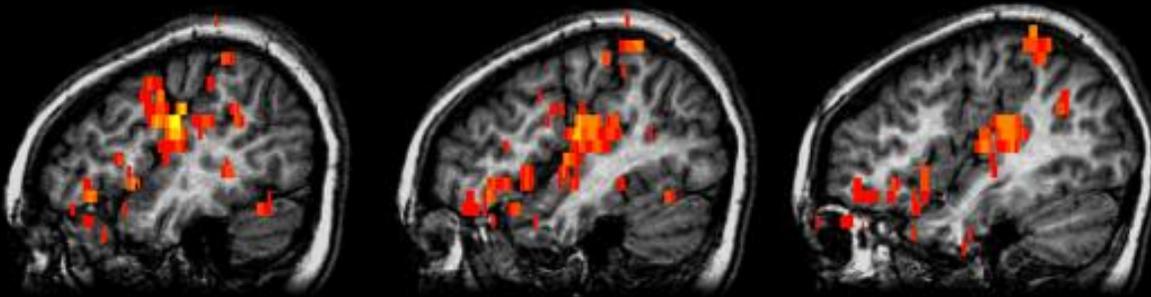
What needs to be improved ?

- Better predict time of remission of age related conditions
- Targeting epileptogenic neurons and mechanisms
- There is a latency from genetic mutation or developmental abnormality to seizures later in life. Can we devise preventative strategies? How can genetic discoveries translate into treatment options?
- How do abnormal epileptogenic networks may interfere with normal brain function?
- Biomarkers of drug resistance and of cognitive dysfunction associated with epileptic activity
- Which epigenetic factors contribute to epileptogenesis and epileptic seizures?

- What are the research priorities and what are short/medium/long-term objectives ?

- How to achieve the goals

Spoken language understanding



Sensitive right hand

