Lay Summary

BRAIN UK Ref: 12/010

The brain in Sudden and Unexpected Death in Epilepsy (SUDEP): new insights from pathology

Dr Maria Thom, University College London

Epilepsy is the commonest serious neurological condition and SUDEP is the leading cause of premature death in people with epilepsy. The mechanisms are unknown and there are few neuropathology based studies. Our research in the last few years, utilising the tissue from Brain UK resources, has shown that in many patients with SUDEP there is an underlying lesion in the brain which has caused their seizures. This is called symptomatic epilepsy. In the first part of our study funded by CURE our aim was to look at acute changes in the brain which could occur in SUDEP using markers of inflammation (CD163, HLA-DR0, gliosis (GFAP), acute neuronal injury due to hypoxia (low oxygen levels) (HIF-1α) and blood brain barrier (BBB) disruption (IgG, Albumin) in regions of the brain that are vulnerable in epilepsy and that we know are important for autonomic functions (those that automatically regulate the heart rhythm and respiration). These included tissue samples from the hippocampus, medulla and amygdala. We used tissue from our own resources and also from Brain UK and included 45 post mortem cases: 24 SUDEP, 5 epilepsy without SUDEP controls and 16 non-epileptic sudden death controls. Our initial studies have shown that their expression in SUDEP cases are not different from these seen in control groups. The second part of our study, which is funded by NIH and is part of the Centre for SUDEP Research (CSR), is addressing chronic alterations in these brain regions.

Publications:

Date	Publication title
2016	Audit of Practice in Sudden Unexpected Death in Epilepsy (SUDEP) Post Mortems and Neuropathological Findings
2017	Neuropathology of SUDEP: Role of Inflammation, Blood-Brain Barrier Impairment, and Hypoxia
2018	The Ventrolateral Medulla and Medullary Raphe in Sudden Unexpected Death in Epilepsy
2019	Hippocampal Morphometry in Sudden and Unexpected Death in Epilepsy
2019	Characterisation of Medullary Astrocytic Populations in Respiratory Nuclei and Alterations in Sudden Unexpected Death in Epilepsy
2020	Medullary tyrosine hydroxylase catecholaminergic neuronal populations in sudden unexpected death in epilepsy
2020	MRI and pathology correlations in the medulla in sudden unexpected death in epilepsy (SUDEP): a postmortem study
2020	Neuropeptide depletion in the amygdala in sudden unexpected death in epilepsy: A postmortem study