

DOES IT PLAY A ROLE IN SUDEP?

By Dr Aoife Laffan, Research Fellow, St. James's Hospital

In 2009, Epilepsy Ireland awarded one of our first research funding scheme grants to Dr Yvonne Langan and colleagues at St James's Hospital to study the potential role played by heart rate variability & baroreflex sensitivity in sudden unexpected death in epilepsy. Here, research fellow Dr Aoife Laffan reports on the outcomes of the study.



Dr Laffan received the Kirker prize in Epilepsy this year from the Irish Neurological Association for her work on this project.



Dr Yvonne Langan, principal investigator on the SUDEP study.

reduced in people with epilepsy. We already know that if heart rate variability & baroreflex sensitivity are impaired in patients after a heart attack or in those with heart failure or diabetes, their risk of sudden death is increased and therefore this may also relate to sudden death in epilepsy.

A large network of structures are found within the brain that together make up part of the autonomic nervous system and control its two branches. Seizure activity may, over time, alter these structures and impair the body's ability to maintain a normal heart rate and/or blood pressure. If this occurs in association with a seizure and other factors such as breathing difficulties arise, this may unfortunately lead to SUDEP.

This study has confirmed previous work on heart rate variability, but baroreflex sensitivity has not been studied in epilepsy previously. Our work has therefore greatly added to current understanding of SUDEP.

It is important to note that while impaired autonomic function was found in the epilepsy group, this study did not identify particular individuals at risk based on their results, as other factors almost certainly play a role.

At present, there is unfortunately no prevention for SUDEP but risks can be minimised. Seizure control is important. Both family and friends are encouraged to educate themselves about first-aid measures to take in the aftermath of a seizure as this may be life-saving.

As part of this study, individuals with epilepsy were asked about their awareness of SUDEP and the large majority had not been informed. We hope to raise awareness through this study so that more people understand SUDEP and so that more research can be made possible, ultimately to prevent this devastating condition.

I would like to particularly thank the family and friends of Barbara Doyle, who sadly passed away from SUDEP in 2007. Without their fundraising, this study would not have been possible.

 <http://youtu.be/9HGup21K98E>

Mortality rates in epilepsy are 2-3 times higher than the general population. A proportion of these deaths are due to an underlying medical condition that presents with seizures, for example a stroke or a tumour, but some are directly related to epilepsy itself. The most common seizure-related death is sudden unexpected death in epilepsy, or SUDEP, which occurs in about 1 in every 1,000 people with epilepsy each year.

SUDEP is a sudden and unexpected death in an individual with epilepsy where no cause is found at autopsy. A number of studies have evaluated the risk factors associated with SUDEP and have found that those at greatest risk are patients with long-term, uncontrolled generalised tonic-clonic seizures. A terminal tonic-clonic seizure often accompanies SUDEP. It is also more likely to occur at night and newer evidence suggests that nocturnal seizures may also put an individual at higher risk.

What goes wrong to cause SUDEP however, is not fully understood. Various factors likely contribute to SUDEP in different individuals with a multi-factorial mechanism involving the heart, lungs and brain to varying degrees.

Dysfunction of the autonomic nervous system (ANS) and its control of the heart & lungs almost certainly play a role. The autonomic nervous system is responsible for the control of the internal organs and is something we are largely unaware of because it functions involuntarily and reflexively. The ANS consists of two major branches, sympathetic and parasympathetic, which can have opposing effects to one another. For example, the sympathetic nervous system increases heart rate and the parasympathetic nervous system decreases heart rate.

Our study aimed to examine the autonomic function of the heart in individuals with epilepsy compared to individuals without epilepsy and to compare any differences. Heart rate variability and baroreflex sensitivity are two methods for testing the autonomic function of the heart. Heart rate variability is simply the change in heart rate with every heartbeat. Baroreflex sensitivity is the body's ability to adapt to maintain a normal range of blood pressure values.

Our study examined 42 individuals with epilepsy and 42 individuals without epilepsy. We found that both heart rate variability & baroreflex sensitivity are