Epilepsy

Epilepsy is a group of neurological disorders, characterized by recurrent seizures – brief periods of uncontrolled electrical activity in the brain, which may last a few seconds to a few minutes. Epilepsy affects approximately 50 million people worldwide, and it is estimated that up to 10% of people will have a single seizure during their lifetime. Broadly speaking the epilepsies can be divided into two main groups, generalized epilepsies and focal epilepsies. Seizures experienced by patients with generalized epilepsy involve the whole brain, whereas in patients with focal epilepsy seizure activity is restricted to a specific area of the brain.

Generalised seizures may be:

Absence seizures – These mostly affect children and adolescents and are characterized by brief periods of loss of consciousness, typified by staring behaviour, with no loss of posture. These seizures are often very brief, lasting approximately 5-10 seconds.

Tonic-Clonic seizures – These seizures involve loss of consciousness, body stiffening or collapse and limb jerking. Patients who experience a tonic-clonic seizure may bite their tongue or experience incontinence of urine during the seizure.

Tonic seizures – Typically involves the stiffening of the body and limbs. Consciousness is usually preserved during these seizures, although if the patient is standing, they may fall to the ground. These seizures are usually of short duration (less than 30 seconds)

Clonic seizures – Are typified by jerking of the limbs, which may involve one or both sides of the body. Seizure duration can vary.

Myoclonic seizures – Also known as myoclonic jerks, are brief jerks of the limbs, lasting a second or two. These seizures typically occur shortly after waking, and commonly begin in childhood although they can occur at any age.

Atonic seizures – Are characterized by the patient suddenly dropping to the ground. The patient usually remains conscious, and seizures typically last less than 15 seconds. Patients often injure themselves during these 'drop attacks' and therefore protective headwear is advisable.

Focal seizures are divided based on the level of impaired consciousness and may be:

Simple partial seizures without motor involvement– patients may experience a strange smell or taste, an abnormal emotional response (sudden fear/joy). Consciousness is not impaired.

Simple partial seizures with motor involvement – patients may experience repetitive hand/arm movements, lip-smacking/chewing or unusual eye movements. Consciousness is not impaired.

Complex partial seizures – patients will experience similar symptoms to simple partial seizures, but with the addition of impaired consciousness. It is also relatively common for complex partial seizures to secondarily generalize – meaning the seizure evolves to involve the whole brain.

Diagnosis
The causes underlying the development of epilepsy are not well understood. Some epilepsies have a large genetic component, but the majority of epilepsies arise without an easily identifiable cause. Insults to the brain including birth trauma, febrile seizures, encephalitis, meningitis, brain tumours and traumatic brain injuries have been linked to the development of epilepsy.

Diagnosis of epilepsy is made after **two** unprovoked spontaneous seizures. Depending on the clinical manifestation of the disease, diagnosis can be made based purely on interview with the patient (and their family). Alternatively the patient may be required to undergo a test to monitor their brain activity (an electroencephalogram, or EEG) to look for signs of epilepsy. The patient may also be required to undergo brain scans to look for abnormalities in their brain that may be causing their epilepsy.

Treatment
Following a diagnosis of an epileptic syndrome, the patient will be commenced on anti-epileptic drugs (AEDs) to prevent further seizures. The AED(s) prescribed to the patient will vary depending on the frequency and type of seizures experienced. Approximately 70% of patients become seizure free whilst on AEDs. Patients whose epilepsy is not controlled despite trials of multiple AED treatments are termed “drug-resistant”. For these patients a number of other treatments are available to control their seizures, these include the ketogenic diet, Vagal nerve stimulators, deep brain stimulators, and surgical resection of the seizure-causing region.
The ketogenic diet is a common treatment for children with disabling seizures. It relies on a high fat, low carbohydrate diet. The mechanism by which it controls seizures is not well understood.
Vagal nerve and deep brain stimulators are surgically implanted devices which have been shown to reduce seizure frequency in patients with drug-resistant epilepsy. Currently the mechanism by which these stimulators control seizures is not well understood, although it is suggested they reduce excitability in the brain, therefore decreasing the chance of seizures developing.
Lastly surgical resection of the seizure-causing region of the brain is a common treatment for patients with certain forms of drug-resistant focal epilepsy. This procedure is reliant on the accurate identification of the seizure-causing region – which may show up as abnormal on brain scans, or may be the area initiating the abnormal brain activity.

Prognosis
The majority of patients with epilepsy are able to live normal lives, with few or no restrictions on their activities. For the purposes of driving it is necessary that patients seizures are controlled, and necessary precautions need to be taken when working in environments which may pose a threat to life such as at height or in water.
Female patients who are considering starting a family should consult their doctor prior to becoming pregnant, so their AEDs can be adjusted (if necessary) to pose minimum risk to the unborn child. However, the majority of woman with epilepsy do not experience difficulties with conception, carry to full-term pregnancy without incident, and the majority of babies born to woman with epilepsy do not have birth defects.