Imagine you can't breathe, your lungs are being starved of oxygen. Now think of this on the micro scale; not as a human but as a collection of cells that form you as a human. Oxygen deprivation of brain cells is what happens during a stroke. The blood vessels that carry oxygen and other nutrients necessary for the survival of brain cells become blocked or burst, leaving these cells starved of oxygen and other nutrients. As a result, brain cells die. Within minutes, the part of the brain affected by the oxygen and nutrient deprivation can be left permanently damaged.

There are two major types of stroke. An ischemic stroke is the result of a blocked blood vessel, known as a blood clot. A haemorrhagic stroke is the result of a burst blood vessel, commonly called a brain bleed. Both types of stroke result in an area of brain damage known as a cerebral infarct.

No two strokes are the same; the location and the size of the cerebral infarct vary immensely and as a result, the effects of a stroke vary immensely from one person to the next. While functioning as a whole, the brain is separated into areas that perform different functions. Different brain areas are responsible for functions such as movement, speech, decision-making, and emotion. Different blood vessels service these different areas of the brain, and therefore, the area of the brain at which the block or burst occurs, will determine the functions that are affected after the stroke. Some commons effects of a stroke include problems controlling and coordinating voluntary movements, problems with speech, and problems perceiving one side of the body and the environment.

The impairment of voluntary control and coordination of movements is one of the most common outcomes of stroke. It's also one of the most debilitating outcomes of stroke. While our ability to execute precisely coordinated actions with our hands typically goes unnoticed - little (if any) conscious thought goes into buttoning a shirt, using a knife and fork, pouring a glass of wine – when these abilities are compromised, for example following stroke, their importance is brought into sharp focus. Indeed, it becomes blatantly obvious just how important voluntary movements are for an individual's independence.

The motor cortex is the part of the brain that controls all voluntary movements. The motor cortex in the left side of the brain controls all the muscles on the right side of the body, and the motor cortex in the left side of the brain controls all the muscles on the right side of the body. Typically, following stroke problems with voluntary movements occur on one side of the body – the side of the body that is opposite to the damaged brain area. While some spontaneous recovery of voluntary motor control occurs in the first few months after a stroke, many stroke survivors are left with continuing impairments in the control and coordination of voluntary movements.

Although part of the brain is damaged following stroke, the surrounding, undamaged brain areas are capable of changing. The ability of the surrounding brain areas to change is known as plasticity. Plasticity involves the strengthening of connections between undamaged brain cells. Recent research has shown that plasticity in the brain areas surrounding the cerebral infarct is associated with improvements in voluntary movement control in stroke patients. Current research aiming to improve recovery of voluntary movements following stroke is combining cutting edge techniques for inducing plasticity in the brain with physical training. The aim of this therapy is to increase muscle strength and reinforce effective movements through plasticity.

Research into the risk factors, preventative treatments, and rehabilitation of the effects of stroke is critical, but one message stands out: in the situation where you suspect you or someone you are with is having a stroke, *you must act fast*. From the onset of a stroke, every minute counts. The sooner the stroke is diagnosed and treated, the smaller the cerebral infarct. As the Brain Foundation states: "time lost is brain lost". After all, you would act extremely quickly if you felt as though you couldn't get any oxygen into your lungs.