***Stroke***

A stroke occurs when the blood flowing to the brain is interrupted, depriving brain cells of oxygen and nutrients and ultimately resulting in their death. Most commonly, this happens as the result of an artery becoming blocked by clotted blood (ischaemic stroke). Alternatively, a stroke can be caused by the rupture of a blood vessel in the brain (haemorrhagic stroke). With an estimated 60, 000 strokes occurring every year in Australia, stroke remains a leading cause of adult disability[1] and costs the Australian economy approximately $2.14 billion every year[2].

Stroke is a highly variable disease, no two people are affected in exactly the same way. How patients are affected by a stroke depends on a variety of factors, including the type of stroke suffered, the size of the stroke and the particular area of the brain which is affected. The most common outcome after stroke is weakness or lack of movement on one side of the body, otherwise known as hemiparesis[3]. Between 50-80% of stroke survivors are affected in this way. Because the right half of the brain predominantly controls movement on the left side of the body and vice versa, hemiparesis occurs on the *opposite* side of the body to the stroke. Neither side of the body is unaffected after stroke however, with more subtle changes consistently found on the seemingly 'good' side of the body[4].

There are a number of factors which are believed to contribute to the disabling post-stroke condition hemiparesis. After a stroke, when some of the brain's cells have died, the signal generated in the brain and sent to the muscles to perform every movement is reduced. This decreased drive from the brain to the muscles makes it difficult to initiate and control voluntary movements. Not only are there changes in the way the brain communicates with the body, but there are also distinct changes in how different parts of the brain communicate with one another. While the brain is made up of two halves or hemispheres, it is known that there are very strong connections linking the two hemispheres and enabling them to exert mutual influence on one another. This inter-brain communication is particularly important during movement, to enable the two sides of the body to move either together or separately, depending on the task[5]. After stroke, a signaling imbalance between the two hemispheres of the brain develops, whereby the stroke-affected hemisphere is persistently suppressed by the non-stroke hemisphere. This imbalance further decreases the 'drive' from the brain to the muscles during attempted movement, and so is thought to contribute to post-stroke hemiparesis[6].

In addition to hemiparesis, other common effects of stroke include:

i) Altered sensation and/or difficulty feeling touch, temperature and vibration on the skin
ii) Changes in muscle tone which can result in muscles being tight and stiff, or loose and floppy
iii) Problems with swallowing
iv) Difficulty understanding or expressing language
v) Cognitive changes, which affect thinking and remembering
vi) Fatigue
vii) Changes in mood and the ability to control emotions

Just as there are changes in the brain that underlie post-stroke impairments, it is now known that recovery after stroke is also mediated by changes in the brain. 'Plasticity' refers to the brain's capacity for change, even during adulthood. The growth of new brain cells, the formation of new pathways in the brain, changes in the strength of existing brain pathways and the recruitment of additional brain areas are some of the many mechanisms thought to underlie brain plasticity and play a role in stroke recovery[7]. It is by enhancing these natural processes in the brain that rehabilitation is thought to promote recovery after stroke.

*References:*


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