Brain Cancer – The basics

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27/06/2013

Cancer

Cancer is a major public health problem not only in Australia but in many other parts of the world. In 2010, there was an estimated 114,000 new cases of cancer diagnosed in Australia and it is estimated that 1 in 2 Australians will be diagnosed with cancer by the age of 85[1]. Even though it has been determined that approximately 15,000 more people die every year from cancer compared to 30 years ago, progress in the fields of scientific and medical research has seen the survival rate for many cancer patients increase by at least 30 percent in this time. Even with this improvement, the overall number of cases of cancer diagnosed in Australia over the next decade is expected to rise as a result of an increase in size and age of our population.

What is Cancer ?

The human body must continually make new cells as it repairs or replaces damaged cells as a result of injury or due to being drained of its normal functions. The normal healthy cells are required to carry out specific tasks for the body and there are boundaries that these cells must perform within to ensure the body works normally. Infrequently, changes can occur within cells that lead to them acting in an uncharacteristic and uncontrollable manner as change into cancer cells. They will grow in an unrestrained fashion, often as lump and in some cases spread to other parts of the body. The lump (or 'tumour') can either be classified as a benign (non-cancerous) or malignant (cancerous) mass. Benign tumours do not usually invade other organs of the body, as it will usually grow within the primary organ. A malignant tumour will grow and spread to other parts of the body forming a secondary or metastatic cancer at a distant site within another organ.

Brain Cancer

The human brain is a very complex organ that weighs approximately 1.5 kilograms and is enclosed within the skull. It is the control centre of the body and coordinates activities and functions that we carry out in our lives every day. Our thoughts, memories, feelings and actions in response to the world around us is a product of the processes that occur within the brain. The brain itself is composed of at least 50 billion cells[2], but is different from cells in some other organs in that they cannot be replaced once injured or damaged. It is recognized that there are more than 40 types of brain cancer and each year in Australia, more than 1,400 new cases of brain cancer are diagnosed[1].

As is the case with other medical conditions, the actual diagnosis of brain tumours is based upon the clinical presentation of the patient, imaging studies and subsequent confirmation by laboratory tests. As there is no current routine screening for brain cancer, the initial discovery of the cancer is based upon the neurological disturbance caused by the location within the brain. Symptoms which can arise as an effect of brain cancer may be localized such as

weakness, seizures or sensory loss. In addition, symptoms may also be 'global' such as headache, mood changes, mental status, nausea, vomiting, slowing of reflexes, loss of balance or impaired consciousness.

Brain cancers can begin within the brain and are therefore classed as primary tumours, however cancer cells that have travelled to the brain from other organs are regarded as secondary or metastatic cancers. Primary tumours may be a benign cancerous mass but can be life threatening due to the pressure caused on the rest of the brain as the tumour grows. In many cases, these tumours can be successfully removed to alleviate the symptoms. Malignant and secondary (or metastatic) brain cancers are usually more life threatening as they can be faster growing, more invasive as they form ' thin roots' in the tissue of the brain and are therefore very hard to completely remove. Surgery, radiotherapy and chemotherapy can be used to treat brain cancers. They are generally based on a scale which relates on their ability to grow within the neighbouring brain tissue as well as the speed of their growth. There are four grades, I, II, III and IV, with the lower grade (I and II) being the slower growing tumours and the higher (III and IV) the fastest. It is not fully understood what initiates the growth of brain cancers, whether it is an inherited or genetic condition or exposure to sources of chemical or radiation. There is continued research into determining the triggers for brain cancer growth, as well as discovering novel treatments which can be used to treat patients who present with brain cancer.

References:

1. Cancer Council Australia (2010)
2. Herculano-Houzel, Suzana (2009). "The human brain in numbers: a linearly scaled-up primate brain". Frontiers In Human Neuroscience.