The Definition And Meaning Of Apoptosis

Apoptosis goes early back into the 1970's where kinetic studies of development of tumour growth stated that cell loss from cancerous tumours were high and rates that were observed show less than 5% predicted of tumour growth that of measurements of proliferation (Kerr et al., 1972; Wyllie et al., 1980) Vast impact on tumour growth could have been from the changes from the loss of cell factor. However, this was suggested that the cause of cell loss was due to necrosis, a type of programme for cell death (Wyllie et al., 1970) Kerr et al (1972) concluded that the high percentage of cell loss in cancerous tumours was due to apoptosis. Further studies suggested that high frequency of apoptosis contribute to high rate of cell loss malignant tumours and possible increase in tumour progression (Kerr et al., 1994)

Apoptosis is a physiological process that has a natural mechanism to programme the death of cells (Daniel & Korsmeyer., 2004) Apoptosis eliminates cells that are aged, damaged or that have mutated and may cause threat to the living body (Walsh., 2014) However, dysregulation can disrupt the balance between the death of cells and cell proliferation, this can lead to disease such that of cancers (Thompson., 1995; Daniel & Korsmeyer., 2004) Apoptosis can be triggered in a cell through two different pathways. The intrinsic and extrinsic pathway that activates through a stimuli. The intrinsic pathway to apoptosis are expressed through DNA damage, deprivation of growth factor and cytokine. (Zaman et al., 2014) Furthermore, the intrinsic mechanisms from apoptosis consists of the mitochondrial proteins and is tightly regulated from a group of proteins; the Bcl-2 family, in which if consist of DNA damage, they have oncogenes that are upregulated, therefore stimulating the intrinsic pathway (Jing et al., 2015) Consistent with the regulation of apoptosis, cancer cells are able to become resistant to the apoptotic pathway from the dysregulation of Bcl-2 proteins. This is an advantage to cancer cells they can achieve survival through 2 different mechanisms, these are down regulation of pro-apoptotic proteins or having an increase of Bcl-2 expression (Letai., 2008)

The extrinsic pathway consist of signal molecules known as ligands , these bind with transmembrane death receptors such as FAS ligands which will target the cell and trigger multiple receptors to aggregate the surface of the target cell (Csipo et al., 1998) An adapter protein, Fas associated death domain protein (FADD) recruits a caspases 8 initiator protein. This forms a death inducing signal to initiate the degradation of a cell (Adrian et al., 2002) from signal of the apoptotic pathway, cancer may arise from its dysfunction, research suggests that cancerous tumours can develop often in the intrinsic pathway than of extrinsic pathway, this could be due to the tumours being mutated to p53 protein (Johnstone et al., 2002).