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Review Article

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Cancer, Medicine and Treatment in Medicine and Science

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ABSTRACT

Cancer treatment and interventions in medicine have been known for decades. However, the problems associated with treatment medicines vary. This is the situation because chemotherapy and radiotherapy have been associated with side effects. Furthermore, plant and natural compounds can cause cancer to proliferate instead of inhibiting their growth. In addition, calcium stores have been said to play a significant role in cell membrane structure maintenance. This means that the medicines used in the treatment of cancers need to be scientifically evaluated in order to obtain a realistic spread of data across various cancers. In certain plant species, like *Callistemon* and *Bulbine* species, phytochemicals have proven to be both proliferative and inhibitory, indicating a synergistic as well as antagonistic effect to cancer tissue metastasis. Also, the proteins involved in cell death are affected by this dual function of cancer medicine. This paper would focus on cancer interventions and the science behind the philosophies already discussed in the literature.

KEYWORDS: interventions, dietary, membranes, pathways, substances, pharmaceutical, tissue damage, patient, cell death.

1. THE CONCEPT OF CANCER INTERVENTION

Cancer intervention is a concept known in medicine and science. It involves the use of different techniques, as well as, methods to treat cancers. Often this also takes into consideration the stage of cancer progression in patients, or infected persons. Cancer intervention also involves the use of different instrumentation (Singh, 2019). For example, in hospitals, surgical instruments are used for the removal of different cancers, such as breast cancer. Also, radiologists have specialised equipment to help diagnose and screen different cancers. This means that cancer intervention is also related to different dietary patterns patients are put on by health care professionals (read Hoareu and DaSilva, 1999; Singh, 2019). This often relates to whether or not patients are on chemotherapy or not. In most cases cancer is treated firstly therapeutically, with surgery being used as the last resort (Singh, 2019). In addition to many products available on the market to treat cancer, interventions for cancer can be a combination of both natural compounds as well as synthesised compounds from plants (Singh and Reddy, 2012). For example, curcumin has been used successfully in the treatment of lung cancer. However, studies have found that a person's dietary pattern also has an impact on cancer growth and development (Singh and Reddy, 2012).

2. THE PROBLEMS ASSOCIATED WITH CANCER AND TREATMENT MEDICINES

The problems associated with cancer and treatment medicines are many. One of the major problems with plant medicines is that they contain a conglomerate of other substances (Fukuda *et al*., 2006). This has been found to have an adverse effect on the arrest of certain types of cancer, including cancer of the larynx. Furthermore, it has been found in certain cancer cells that treatment medicines are not recommended for treatment since some are non anti-oxidants, or are proliferative in addition to the latter (Singh, 2019). Although some plant compounds have been found to have many medicinal properties, such as anti-bacterial, anti-cancer, anti-inflammatory, anti-nematicidal, amongst others, their anti-cancer activity is shadowed due to the mixture of stimulatory and inhibitory substances (Lee *et al*., 2004; Kavitha *et al*., 2010). This means that treatment medicines lack reliability for cancer treatment, and, that perhaps, this is related to the stages at which treatment is diagnosed in patients (Singh, 2019). Taxol and camptothecin, two natural anti-cancer compounds, have been found to be successful on all, if not most, cancer types. This includes the HeLa cancer cell line which has a very high multiplication rate (Skloot, 2010). Chemotherapy is considered one of the best ways to arrest cancer growth in patients; however, side effects are possible due to chemicals and their interaction with other blood components (Singh and Reddy, 2012). It has been suggested that radiotherapy can also help cure cancer, but, there are also side effects with this procedure. One would suggest that perhaps synthesised drugs that interfere with Ca^{+} and Na^{+}/K^{+} channels in the membranes of cancer cells, would be a way of arresting these cells. This suggestion is true since Ca^{+} is responsible for maintaining the structure of mammalian or eukaryote cell membranes (Singh, 2019). It's possible for chemotherapy to have adverse effects on healthy mammalian cells, since the high doses of chemicals pumped into the body can kill cancer as well as healthy proliferating cells.

3. THE PATHWAYS OF STIMULATION FOR CANCER CELL DEATH IN SCIENCE

There are 3 pathways of stimulation for cancer cell death in science, namely, the mitochondrial, endoplasmic reticulum and receptor-ligand mechanisms of cell death activities (Majno and Joris, 1995). These pathways are reliant on stimuli, either endogenous or by the body's own chemicals. When a receptor on the membrane of a cancer cell encounters a ligand (or substance), the substance triggers a cascade of events. Some of these events, which are related to all 3 pathways of cell death, involves the disruption of the cytoskeleton. The cytoskeleton, being a major cell framework structure, is pertinent as an indicator of cell death upon bax and caspase-3 activation (Singh and Reddy, 2012). These two proteins are signals for cell death in treated cancer cells. In the case of cancer cells treated with plant compounds, compounds can affect or alter entry of water into the cell. This may cause calls to dehydrate, resulting in cell death (Singh, 2019). However, in species of aloe, such as *Bulbine* sp, it has been found that due to the plants containing several phytochemicals, mitochondrial apoptosis is activated via the receptor-ligand mechanism. Since stimuli also affects the calcium stores in all mammalian cells, ER-apoptosis are simultaneously activated (Hengartner, 2000). However, in the pathway of stimulation for cancer cell death, p53 plays pivotal roles in cell cycle, meiosis and mitosis, regulation. However, all three pathways are dependent on compound utilisation for individual cancer cell types (Singh and Reddy, 2012).

4. THE PHARMACEUTICAL AND PHARMACOLOGY CONSIDERATIONS

There are many pharmaceutical and pharmacology consideration to envisage. These relate to the manner in which substances interact with the body (Singh, 2019). For example, certain food products have shown great promise in the regulation of p53 to inhibit cancer cell growth (Hoareu and DaSilva, 1999). This means that pharmaceutical, or medicinal industries, need to optimise protocols for drug commercialisation so that it benefits patients in a dose-friendly manner (Singh and Reddy, 2012). It's also imperative for these pharmaceutics not to harm the patient, or to cause tissue damage or cancer metastasis. This indicates that pharmaceuticals need to be manufactures with proper pharmacognostic indications to the patient so that ways to counteract adverse effects are known (Singh, 2019). Perhaps, combination drug therapies to counterfeit cancer spread, like in tuberculosis

research, can also be considered for the treatment of cancer with specific plant compounds. The pharmaceutical and pharmacology considerations are thus many and vast (Singh, 2019).

5. CONCLUSIONS AND PERSPECTIVES

The focus of this paper was on cancer medicine and treatment in medicine and science. Although it is not specifically restricted to cancer, it covers only some facets important to cancer science and medicine. This paper intertwined cancer intervention with plant and natural compounds in relation to the pharmaceutical and pharmacology considerations. It also highlights some key features, not all of them, of cell death mechanisms. This paper is important to the scientific community because it forms the basis for understanding cancer interventions and therapeutics in an evolving world. This paper also highlights the importance of considering cancer metastasis in the treatment of cancers, and the imperativeness of understanding the damage chemotherapy, for example, can cause on tissues and normal proliferating cells of the human body. Although this paper is not extensive, and does not cover all aspects of cancer biology, it's pertinent to understand the considerations, justifications and implications highlighted in this paper in order to get a world view on the issues concerning cancer treatment and interventions.

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