



NEHRU MEMORIAL COLLEGE (AUTONOMOUS)

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1. INTRODUCTION Cancer is a complex disorder which caused from abnormal multiplication of the cells in the body. Abnormal cells may unit together to form a tumor or proliferate throughout the body and initiating abnormal growth at other sites through blood and lymph systems.

1.1. Hall marks of cancer Six essential alterations in the cell physiology lead to cancerous growth. They are independence in growth signals, ignorance of anti-growth signals, escape from programmed cell death, unlimited proliferation potential, invading nearby tissues, metastasis and angiogenesis (formation of new blood vessels). Each of these physiological changes are novel properties of cancer cell acquired during development and these are the hall marks shared by most and perhaps all types of cancer cells (Hanahan and Weinberg, 2000).

1.2. Causes of cancer Cancer is a multistep disease incorporating physical, environmental, metabolic, chemical and hereditary factors. These factors play a direct or indirect role in the induction and deterioration of cancer. The cancer risk factors are modifiable life style and environmental risks which include both external factors and internal factors (WHO, 2010). The external factors are chemicals, radiation, tobacco consumption, dietary factors and some infectious organisms. Cancer causing internal factors are inherited mutations (hereditary), imbalance of hormones, immune conditions and mutations that occur from metabolism (WHO, 2010). International Agency for Research on Cancer (IARC) identified many cancer causing factors, which includes tobacco (Charlton, 2004), sunlight, pharmaceuticals (Brambilla et al., 2012), hormones (Vandenberg et al., 2012), alcohol consumption, bacteria (Kostic et al., 2013), some parasites (IARC, 1994), fungi, salted fish (Yu et al., 1989) and wood dust (Acheson et al., 1968; IARC, 2012). Earlier, several authors reported that viruses have carcinogenicity effect. They are human immune deficiency virus (Shiramizn et al., 1994), T-cell lymphotropic virus (Gallo et al., 1991), Hepatitis C virus (Lee et al., 2010), Hepatitis B virus (Beasley et al., 1981), Epstein Barr virus (Shah and Young, 2009), human papilloma virus (Tommasino, 2014) and human herpes virus (Guihot et al., 2006). The American Institute for Cancer Research (AICR) and the World Cancer Research Fund have mentioned some additional causative agent of cancer which are red meat (Domingo and Nadal, 2017), beta carotene (Heinonen et al., 1994), low fiber diet (Aune et al., 2011), processed meats (Chan et al., 2011), obesity (Renehan et al., 2008), not breast feeding (Beral et al., 2002), increased adult height (WCRF and AICR, 2011) and sedentary life styles.

1.3. Epidemiology of cancer Cancer is the second leading cause of death, after cardiovascular disease (Jemel et al., 2007) and most progressive and destructive disease causing mortality to all over the world. In spite of good advancements in diagnosis and treatment, cancer is still a big threat to human society (Kotnis et al., 2005). About 8.2 million deaths and approximately 14.1 million new cases of cancer were reported around the world in 2012 (Stewart and Wild, 2014) of these 7.4 million cases were in men and 6.4 million cases in women. This number is expected to increase to 24 million by 2035 (Ferlay, 2013). Similarly, the World Cancer Report (WCR) stated that cancer rates are set to increase at an alarming rate globally. The rate of cancer was about 1.8 times higher in developed countries than the undeveloped countries (Ferlay, 2013). In India, there were 5.56 lakhs cancer-related deaths in the year 2010. Out of which, 71% of cancer patients were of the age group between 30-69 years (Kaur, 2014). The most common cancer among Indian men is lung cancer which associated with tobacco usage. In Indian women, the breast cancer is the first most common cancer, the second being cervical cancer (Mallath et al., 2014; Hemavathy and Julius, 2016). In Tamil Nadu, a total of 1,85,660 cancer cases were reported by Tamil Nadu Cancer Registry Project (TNCRP) (2014) between 2012 and 2014. It revealed 53,363 new cancer cases in Tamil Nadu. Out of this, there were 23,149 men and 30,214 women. Chennai has the highest incidence rate among all the 39 districts in the state. The incidence rate was highest (120.4) in Chennai, while it was lowest (30.9) in Nilgiris.

1.4. Mechanism of cancer cell formation Normal cells divide in an orderly way. They die when they are worn out or damaged, and new cells take their place. Cancer cells start to grow out of control and keep on growing and making new cells. They crowd out normal cells. This causes problems in the part of the body where the cancer started. A normal cell becomes cancerous cell by the process of mutation induced by any carcinogenetic agent. When a mutation occurs, proto oncogene of normal cell gains of function and the tumor suppressor gene losses their function. These both gene alterations can lead to cell become cancerous.













1.5. Classification of cancer Cancers are classified based on their primary site of origin or their histological or tissue types. Based on primary site of origin, cancer is classified into specific types like breast cancer, lung cancer, prostate cancer, liver cancer, kidney cancer, oral cancer, brain cancer, blood cancer and skin cancer. Based on tissue types cancers may be grouped into ten major categories viz., carcinoma (begins in the skin); sarcoma (begins in the connective tissue); osteoma (begins in the bone); Fibroma (begins in the fibrous tissues); Glioma (begins in the connective tissues in the brain and the central nervous system); Melanoma (begins in the certain types of pigmented moles found on the skin); Leukemia (begins in the bone marrow and causes abnormal white blood cells); Lymphoma (begins in the immune system), Myeloma (begins in the plasma cells of bone marrow), teratoma (arise from cell-rest derived in the morula stage itself) and mixed types (two or more components of the cancer).

1.6. Lung cancer Lung cancer is a type of carcinoma which arising from respiratory epithelium of bronchi, bronchioles and alveoli. It is the reason for second leading cause of death among the







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