DEFINITION

1. Cancer is a term which embraces a large number of different diseases, the common feature of which is a malignant tumour. This is a growth (neoplasm) which is not circumscribed but which infiltrates the surrounding tissues and metastasises (spreads to other sites in the body, thereby producing secondary deposits). Any tissue in the body may be affected.

2. Cancers are classified according to the tissue of origin. **Carcinoma** arises from epithelial tissue and **sarcoma** from connective tissue. The suffix-**blastoma** implies a tumour of embryonic origin.

3. **Mesothelioma** is a malignant tumour arising from the lining of the pleural or peritoneal cavity. It develops into a diffuse sheet of tumour and spreads both by direct infiltration of other thoracic or abdominal structures and by lymphatic drainage to the mediastinal or mesenteric nodes.

CLINICAL FEATURES

4. In pleural mesothelioma the onset of the disease is insidious with dull chest pain, breathlessness and asthenia being the most common symptoms. Less frequent symptoms are cough, weight loss and fever. Haemoptysis may occur but it is rare. Vocal cord paralysis and Horner's syndrome are signs of mediastinal encroachment. A characteristic finding on x-ray is a massive pleural effusion.

5. Peritoneal mesothelioma usually presents with vague abdominal symptoms or with weight loss. It may present with abdominal swelling, which may be massive, due to ascites.

AETIOLOGY

6. Cancer is not one disease but a group of widely different diseases. While some aetiological factors may be common to a number of different types of cancer, each type should be recognised to be an individual disease with its own specific aetiology.

7. The common feature of all cancers is the loss of control over normal cell division and differentiation. Cell division proceeds by a complex sequence of events. For this to be maintained in a normal way it must be strictly controlled. It has been found that certain regions of the chromosomes are vital to this control. These regions are called oncogenes. While the oncogenes perform normally, cell division and differentiation remain under control.

8. The process whereby oncogenes lose control of cell division and differentiation is known as activation. When this occurs cell division and differentiation become chaotic and neoplasia (carcinogenesis) ensues. The factors which activate oncogenes are numerous and varied, some being endogenous, others environmental. There is evidence that in most types of cancer a number of different factors play a part at different stages of the neoplastic process.

9. Some types of cancer are strongly genetically determined with a family history, for example retinoblastoma. In other types of cancer an external agent is the dominant factor, for example aniline dyes, which will cause carcinoma of the bladder in 100% of cases following sufficient exposure.

10. Some individuals are **genetically determined** to be more likely to develop cancer and there is a strong history of a certain type of cancer in their family of origin. Some cancers are more common in one sex than the other.

11. During life many **constitutional factors** are present which may activate oncogenes. These include humoral factors, immunological factors and the normal ageing process during which spontaneous changes affect the genes (somatic mutations).

12. For the most part, cancer is commoner at the extremes of life. This may be because the immune system is relatively less efficient in the young and the elderly. In addition, with increasing age, the summation of naturally occurring somatic mutations and any exposure to carcinogens may become sufficient to activate oncogenes.

13. **Environmental factors** play a part in the aetiology of some types of cancer. The following groups of factors have been identified:

    13.1. **Chemical**, for example aniline dyes and carcinoma of the bladder.

    13.2. **Physical** agents, for example asbestos and mesothelioma.

    13.3. **Ionising radiation** which when a certain dose is exceeded will cause cancer in some, but not all, tissues.

    13.4. **Ultraviolet radiation** which may cause cancer of the skin. Its tissue penetration is limited and so it does not cause cancer in the deeper tissues.

    13.5. Some specific **viruses** have been identified which play a part in the causation of particular types of cancer, for example hepatitis B and primary carcinoma of the liver.

    13.6. It has been suggested that a wide variety of other environmental factors may cause certain types of cancer. Many of these suggestions have been based on animal studies, in vitro experiments or on epidemiological studies with small samples or inadequate controls. These contentions are still at the stage of speculation.

14. Mesothelioma is associated with asbestos exposure in up to 90% of cases. The male:female ratio is 3:1 and most cases occur in the 40-60 year age group. Mesothelioma seldom occurs less than 15 years after asbestos exposure and the interval between exposure and disease onset may be 50 years. The type of asbestos is crucial with different types having variable degrees of malignancy potential. Tumours are less likely after exposure to white asbestos than with blue or brown asbestos. This association relates to the fibre structure and is a function of fibre persistence in the lung.

15. No other aetiological agent has been identified for mesothelioma. It is not caused by smoking nor is it linked to exposure to ionising radiation. The risk is much increased in smokers who are also exposed to asbestos.

CONCLUSION

16. Mesothelioma is a malignant tumour arising in the pleural cavity or peritoneum which is associated with exposure to asbestos dust. The course of the condition is unaffected by environmental factors other than those involved in its treatment.

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