

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. Malignant melanoma is a malignant tumour of the skin. Primary malignant skin tumours are divided according to their histology into epithelial, mesodermal and melanocytic tumours. Malignant melanoma is a pigmented tumour arising in the skin from epidermal melanocytes, from the junctional component of a cellular naevus or rarely within a blue naevus.
4. Four main types of skin malignant melanoma are recognised:
 - 4.1. **Superficial spreading melanoma** occurs most commonly on the trunk and the leg.
 - 4.2. **Acral-lentiginous melanoma** occurs on the palms and the soles.
 - 4.3. **Lentigo maligna melanoma** is a superficial tumour of sun exposed areas.
 - 4.4. **Nodular melanoma** is found anywhere on the body.
5. Malignant melanoma may arise in apparently normal skin although 20-50% arise in association with pre-existing melanocytic naevi. The average young adult has about 30 melanocytic naevi on his body and the majority of these are not premalignant.
6. Two groups of melanocytic naevi are known to be at risk of undergoing malignant change:-
 - 6.1. Congenital naevi of the bathing-trunk variety, in which estimates of the risk involved vary between 4 and 20%.
 - 6.2. Atypical or dysplastic naevi. These are usually multiple and in the main are familial.

CLINICAL MANIFESTATIONS

7. The earliest signs of malignant melanoma are colour change, either the appearance of pigmentation in apparently normal skin or the darkening of a pre-existing lesion. There may be altered sensation over the lesion and at a later stage bleeding from a pigmented lesion. Melanoma may occur beneath the nail bed. Lesions in the skin may be associated with a depigmented halo surrounding the lesion.

8. The condition may also arise in the choroid tract of the eye, in the mouth, the tongue and in the anal canal.

AETIOLOGY

9. 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.
10. 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.
11. 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.
12. 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.
13. 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.
14. 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).
15. 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.
16. **Environmental factors** play a part in the aetiology of some types of cancer. The following groups of factors have been identified:
 - 16.1 **Chemical**, for example aniline dyes and carcinoma of the bladder.
 - 16.2 **Physical** agents, for example asbestos and mesothelioma.

- 16.3. **Ionising radiation** which when a certain dose is exceeded will cause cancer in some, but not all, tissues.
- 16.4. **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.
- 16.5. 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.
- 16.6. 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.
17. Of the above, both genetic and environmental factors may be important in the aetiology of cancer of the skin.
18. Some genetically determined skin conditions predispose to skin cancer. There is evidence that the effect of a single carcinogen may differ from individual to individual. This is a function of genetic predisposition.
19. Chemicals are potent skin carcinogens. They may be ingested, inhaled or absorbed into the body. Agents which have been incriminated include arsenic, cutting oils, crude paraffin, creosote and mineral oil.
20. Ultraviolet light is an important environmental factor. The most damaging part of the spectrum is ultraviolet B light. Passage of the light through glass, or through air containing high concentrations of water, eliminates the carcinogenic potential. As a consequence, dry, sunny climates are the most dangerous. As much as 50% of ultraviolet B light reaches the skin by scatter from the sky or by reflection from sun and sea. Sunlight effects are cumulative and there are well recognised pre-malignant states.
21. Skin is susceptible to ionising radiation although much less so than tissues such as thyroid and breast. Doses of ionising radiation used therapeutically may produce skin malignancy.
22. Scar tissue is more susceptible to carcinogenic agents. Malignant transformations may occur in the borders of venous ulcers. Injury itself does not cause tumours in normal skin, although there is evidence that in skin previously exposed to a carcinogen an injury can localise and promote a tumour.
23. Of the types of malignant melanoma, the most common is superficial spreading melanoma. This usually presents in the fourth or fifth decade. There is a marked racial difference in the incidence of acral-lentiginous melanoma, which comprises about 10% of cases on white skin but 50% of melanomas in Japan. Nodular melanoma represents about 25% of cases. Lentigo maligna melanoma is the least common type and is found in the elderly.

24. Malignant melanoma is found most commonly in female Caucasian office workers of high socio-economic status. This is in contrast with the high risk groups for other skin malignancies.
25. There is strong evidence that ultraviolet light in strong, sharp doses is important in the aetiology of malignant melanoma. Heredity is also important and Celts, people with red or fair hair, albinos and those with xeroderma elasticum are at the greatest risk.
26. Malignant melanoma is not caused by climatic extremes, trauma, physical or mental stress or lowered resistance arising from hardship or other diseases. Its progress is independent of external factors other than medical treatment.

CONCLUSION

27. Malignant melanoma is a malignant tumour of the skin, the aetiological factors of which are described above. The course of the condition is unaffected by environmental factors other than those involved in its treatment.

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December 1992