

Causes of tumor growth

A **tumor** refers to a set of tissue cells that grows uncontrollably independently of the body's own control.

Oncology (from Greek *ογκος* – swelling; *λογος* – science) deals with the issue of tumors, cancers, their diagnosis and therapy. Nowadays, the study and issue of tumors is not only the goal of oncology, but of many other medical disciplines, such as hematology, clinical biochemistry, imaging methods, pathology and many others, including molecular biology and genetics. Cancer is currently the cause of about a third of deaths in developed countries. In order to combat this problem, medical science must know, study and reveal the causes causing tumor growth and try to prevent it, correctly diagnose it, or choose the appropriate therapy.

The **causes of tumor growth** (carcinogens) include:

- external environmental factors
 - physical – e.g. ionizing radiation including UV radiation
 - chemical – e.g. polycyclic hydrocarbons (e.g. from fossil fuels), aromatic amines and azo dyes, some substances produced by fungi (aflatoxins), heavy metals
 - biological, mainly viral – e.g. HBV (causes liver cancer); EBV (causes Burkitt's lymphoma, Hodgkin's lymphoma), etc.
- lifestyle
 - smoking – accounts for about 28--39% of all tumours (Europe, 2008)
 - nutritional factors – about 30% share of mortality from cancer; both quality (various additives, food modifications) and quantity (obesity) play a role
 - low physical activity – effect demonstrated mainly on colon cancer
 - alcohol

Molecular basis of tumor formation

Part of the tumor transformation of cells is a **DNA mutation**. It occurs due to the effect of various factors mentioned above (physical, chemical, biological, but also hormonal – a disorder of hormonal regulation can lead to long-term tissue stimulation). Oncogenic effect has a mutation that hits any gene falling into one of the following three groups:

- protooncogenes (stimulate growth)
- tumor suppressor genes (suppress tumor growth)
- mutator genes (DNA repair).

Genetic **predisposition** is often involved in the formation of tumors. It may be an inherited defective variant of any of the above genes. Some genetic polymorphisms are manifested by a high incidence of certain tumors, eg.

- hereditary breast and ovary tumors – mutations in BRCA 1, BRCA 2 genes
- hereditary non-polyphonic colorectal cancer – Lynch syndrome
- familial adenomatous polyposis – mutation of the APC gene.

The likelihood of tumor transformation also increases **with age** due to genomic changes related to cellular aging.

Links

Literature used

- PROMOTED, Ctibor and Ivo ŠTEINER, et al. *General pathology*. 1st edition. Praha : Galén, 2011. 290 s. Chapter 13 : General Oncology. p. 133-190. ISBN 978-80-7262-773-8.
- ADAM, Zdeněk and Marta KREJČÍ. *General oncology*. 1st edition. Praha : Galén, 2011. 385 s. Chapter 1 : Risk factors for tumor formation. p. 1-34. ISBN 978-80-7262-715-8.

External links

- Article Tumor in Wikipedia

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