

Biological characteristics of tumors

Biological behaviour of tumors means mainly its behaviour towards the host. Based on this, we distinguish two extreme forms:

- **benign tumors** – non-malignant, its behaviour is biologically favourable
- **malignant tumors** – malignant, its behaviour is biologically unfavourable

This division stems from the macroscopic appearance. Tumors that were originally indicated as benign had signs of well-formed capsule and allowed a relatively safe surgical removal. Nowadays we know that even though a well-formed capsule means generally a small possibility of spreading, it is not a certain sign. An ability of a tumor to spread is considered a sign of malignancy, a much better correlate are histopathological findings and eventually molecular markers.

Other categories can be found next to the previous classification:

- **semimalignant tumors, border-line tumors** – tumors of uncertain biological behaviour
- **pre malignancy, precancerosis** – condition that is not tumorous, but has a high risk of turnover to a malignant tumor
- **topically malignant tumors** – tumors that are benign in their behaviour, but grow in places, where the expansion endanger the life of patient; typically those are intracranial tumors

Some benign tumors can develop into malignant tumors over time, e.g. intestinal polyps are places with the risk of developing an intestinal carcinoma, other benign tumors have the same risk of malignant turnover like a healthy tissue, e.g. uterine leiomyoma. Ultimately, number of malignant tumors can start in a healthy tissue. Thus, it is certainly not possible to claim that a benign tumor is a precursor to a malignant tumor, although this is sometimes the case.

Benign tumors

In general, benign tumors are characterized by its slow compact growth and do not spread. However, it is important to keep in mind exceptions, e.g. malignant bone tumors can grow relatively slowly.

Macroscopic appearance

- sharply outlined from the surroundings, usually spherical, ovoid
- epithelial tumors are mostly off-white and rigid
- mesenchymal tumours are usually like the epithelial
- often encapsulated, the encapsulation is caused by the compression of the surrounding tissues

Characteristics and spreading

- slow growth
- does not create metastasis
- expansive growth, i.e. the tumor grows as a whole, compresses the surrounding

Complications

- oppression of the surrounding tissue - limited movement of a joint, atrophy of the surrounding
- can cause an intracranial hypertension in a brain
- surge of hormones (pheochromocytoma, hypophysial adenoma)
- bleeding (hemangioma)
- pain (osteoid osteoma)

Malignant tumors

Malignant tumors are usually characterized rather by its blurred borders, they spread, necrosis occurs more often in the parenchyma. The whole growth is more often precipitous, histologically, with the development of cancer, the similarity with the initial tissue can gradually disappear.

Macroscopic appearance

- blurred outline from the surroundings, tumor and healthy tissue cannot be certainly identified
- epithelial carcinoma - off-white, rigid
- mesenchymal - sarcoma appear like a fish meat
- necrosis and bleeding occur more often in the parenchyma

Biological properties

- relapse
- fast growth
- spread to the surrounding
- create metastasis
- cachectizing behaviour (the patient loses weight)

Malignant tumor spreading

Spread is one of the basic properties of a malignant tumor. For didactic and practical reasons, a distinction is made between continuous spread, in which the continuity of the tumor mass is maintained, and discontinuous spread, in which distant secondary tumors arise.

Continuous spread

The basic types of spread are:

- **infiltrace** - nádorové buňky se vmísí mezi nenádorové, ale neničí tkáň
- **invaze** - vnikání do okolní tkáně a destrukce tkáně
- **infiltration** - tumorous cells mixes with the non-tumorous cells, but does not destroy the tissue
- **invasion** - entering the surrounding tissue and its destruction

Special cases are:

- **perineural spread** - growth of the tumor along nerves
- **angioinvasion** (angipathy) and **lymphangioinvasion** (lymphangiopathy) - ingrowth into blood vessels

These cases are of particular clinical importance, because in the case of a surgery, it will significantly affect its extent and the chance of success. The element of perineural spread or angioinvasion therefore plays an important role in staging, and in many tumors the finding of this invasion means worse staging.

Discontinuous spread

There are three basic types according to the route of spread:

- **lymphogenic** - mainly epithelial tumors, into the descending lymph nodes, later it can spread further
- **hematogenous** - mesenchymal tumors and late stage epithelial, most commonly affected are liver, lung, bone, and brain
- **porogenic** - hollow organs (urinary tract), on the pleura or the peritoneum, it can also be an artificial spread during the operation (the threat of implanted metastases by e.g. puncture biopsy of fragile Grawitz kidney tumor)

The spread of metastases is relatively characteristic of some tumors. Sometimes the first manifestation of a tumor may be the clinical manifestation of metastasis, e.g. bronchogenic carcinoma often manifests itself in neurological symptoms caused by metastatic brain damage (epileptic seizure, incontinence, ...). In terms of target tissue, metastases are sometimes divided into:

- **homotopic** - metastases are to the same tissue as the primary tumor
- **heterotopic** - metastases are to a different tissue than the one from which the primary tumor originates

Links

Použitá literatura

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