Precancers

Definition

Precancer is a condition preceding the development of a malignant tumor – a standard morphological alteration of tissue in which the tumor process occurs statistically significantly more often than in healthy tissue of the same histogenetic origin and the same anatomical localization.

A common feature of precancerous conditions is the acceleration of cell proliferation, which creates a greater probability of a genetic error in the division of the initiated cell. Proliferations thus become precancerous when:

1. **metaplasias** (caused by long-term inflammatory irritation) - e.g. Barrett's esophagus , squamous metaplasia of the bronchial epithelium, leukoplakia in the oral cavity, intestinal metaplasia of the gastric mucosa
2. **inflammations** – e.g. pseudoepitheliomatous hyperplasia, formation of inflammatory hyperplastic polyps in the intestine during ulcerative colitis , HPV infection of the cervix
3. **hyperplasia of hormone-dependent organs** – endometrium, prostate, mammary gland

Some precancers also arise on the basis of **congenital developmental abnormalities** (e.g. cryptorchidism – undescended testes – in 90% of cases spermatogonia atrophy, in the remaining cases they turn into atypical cells that can transform malignantly, various hamartias , familial adenomatous polyposis, etc.)

Division

1. **stationary** - low risk of malignant transformation, does not need to have special microscopy or proliferative character from the beginning, includes pseudoepitheliomatous hyperplasia around chronic skin ulcers, retained testicular tissue at the beginning, Paget's disease
2. **progressive** – higher to high risk of malignant transformation, microscopic tissue and cell atypia, increased proliferation, this includes further development in the tissue of the retained testicle, dysplasia of the cervix, mammary gland, polyposis of the large intestine, myelodysplastic syndrome of the bone marrow
3. **preinvasive** - the highest degree of risk of malignant transformation (carcinoma in situ) - tissue and cellular atypia are identical to a malignant tumor, but the basement membrane is preserved, there is no invasion of surrounding structures and no metastases, this includes ca in situ of the epithelium of the cervix, ductal or lobular ca in situ mammary glands, etc.

Precancerous changes can develop in any tissue, they are best characterized in epithelial tissue, where progressive and some stationary precancers are referred to as dysplasia (loss of cell uniformity and oriented tissue organization - cells have different shapes and sizes, more basophilic nuclei, a shift in the nucleoplasmic ratio in favor of nuclei, more frequent mitoses - depending on the degree of cell atypia and the risk of transition to invasive cancer, they are divided into mild, moderate and severe), or intraepithelial neoplasia (as well as dysplasia, it is divided into three grades, designated I, II, III) - these can be:

- **cervical** (CIN)
- **vaginal** (VAIN)
- **vulvar** (VIN)
- **oral** (OIN)
- **prostatic** (PIN)

Perimalignant tissue changes

Changes in the surroundings of a growing tumor, which are the same as in precancer, on their basis, successive primary multiplicity can develop, even after the first tumor has been cured.

Examples of precancers

Cervical intraepithelial neoplasia (CIN)

It is a **dysplasia of the stratified squamous non-horny epithelium of the cervix** (portio vaginalis cervicis uteri) - they are distinguished here: stratum basale, spinosum et superficiale.

Microscopically, from the depth to the surface, the regularly stratified squamous epithelium is gradually replaced by undifferentiated cells resembling the epithelia of the basal layers.

According to the degree of involvement, dysplasia is divided into **light** (CIN I – affects less than 1/3 of the thickness), **medium** (CIN II – 2/3 of the thickness) and **severe** (CIN IIIa – almost the entire epithelium except for the superficial flattened layer), when the epithelium is replaced atypical cells throughout the range are already

carcinoma in situ (CIN IIIb)

Cervical CIN is often related to **HPV** (human papilloma virus) infection. This virus invades cells of the skin and mucous membranes and undergoes either a lytic (non-transforming HPV) or lysogenic (transforming HPV) cycle:

LSIL (Low-grade Squamous Intraepithelial Lesions)

- benign HPV lesions (verruca vulgaris, condyloma accuminatum, laryngeal papillomatosis) + CIN I
- corresponds to the lytic cycle, morphologically characteristic are *koilocytes* (large cells with a pyknotic hyperchromic nucleus and perinuclear brightening)

HSIL (High-grade)

- CIN II + CIN III + ca in situ
- corresponds to the lysogenic cycle, when the viral genome integrates into the genome of the host cell, it can progress to the stage of invasive cancer

Barrett's esophagus

See Barrett's esophagus for more detailed information .

It is a metaplasia of the mucosa of the distal esophagus (stratified squamous epithelium not keratinizing) into a **single-layered cylindrical epithelium resembling gastric mucosa** (junctional type - resembling normal cardiac mucosa, corporeal type - similar to the mucosa in the fundus and body of the stomach) or **intestinal mucosa with goblet cells**

The cause is long-term irritation of the mucous membrane during gastroesophageal reflux (reflux esophagitis - in case of sliding hiatal hernia, laxity of the lower esophageal sphincter, increased intra-abdominal pressure) or a decrease in the resistance of the gastric mucosa (smoking, alcohol).

It starts as inflammation (hyperplasia of cells of the basal layer, stretching of stromal papillae, inflammatory cellularization), erosions to ulcers can form, later dysplasia to metaplasia (which originates from pluripotent undifferentiated cells of original esophageal glands). This is a typical precancer, on the basis of which **adenocarcinoma** can develop .

Intestinal metaplasia of the gastric mucosa

In chronic atrophic gastritis (with the destruction of the gastric glands), the normal epithelium of the gastric mucosa (single-layer cylindrical of mucus-forming cells) can be replaced by **intestinal-type epithelium** :

- complete intestinal metaplasia – goblet cells , resorption cells (enterocytes), Paneth cells
- incomplete intestinal metaplasia – instead of resorptive cells, there are mucus-forming cells, increases the risk of stomach adenocarcinoma

Links

Related resource

- Verruca vulgaris (preparation)

References

- STRÍTESKÝ, Jan. *Pathology.* 1st edition. 2001. ISBN 80-86297-06-3 .