

Regeneration

Definition: restoration of dead tissue with new tissue, *functionally and morphologically equivalent*

According to the ability of regeneration, we divide tissues into:

1. **permanent**, incapable of regeneration (cardiomyocytes, neurons, lens cells) – their damage and inability to regenerate (myocardial infarction, stroke) are the most common cause of death

myocardium and CNS – myocardium heals with scar and CNS with postmalacia pseudocyst and gliosis

2. **stable**, signs of mitotic activity show less than 1.5% cell, with limited regeneration ability, their regeneration is accelerated when damaged ([liver], kidney, endothelial, fibroblasts, smooth muscle)

glandular epithelia – liver, lining of kidney tubules, regenerate for a long time and only under certain conditions

3. **labile**, constantly regenerating - more than 1.5% cell shows mitotic activity (hematopoietic bone marrow, surface epithelium – skin, urogenital tract, cornea and intestinal mucosa, etc.), their constant renewal is essential for life

regeneration of *covering epitheliums* - by re-epithelialization from the cambium layer or from the surrounding area, in the case of a deeper defect, granulation tissue is formed first

exception is *gut*: even a deeper defect is only healed by re-epithelialization, because the cambium layer (Lieberkühn's crypts) is very deep and usually a part remains preserved, therefore after e.g. inflammation they do not remain in gut scars

adnexa do not regenerate, therefore the scar is dry, hairless

epithelium oral cavities regenerates quickly (if something doesn't heal, it's either tumor or the patient has immunity disorder)

The necessary conditions for epitheli regeneration are:

- **intact basement membrane** or system of reticular fibers as growth guide
- **preservation of the cambium layer** (e.g. stratum basale epidermis, cells of periportal fields of hepatic lobules)

In the early stage of regeneration, the regenerated epithelium consists of irregular cells with basophilic cytoplasm and frequent nuclear deviations (nuclei polymorphism, mitoses, multinucleation...).

The main stimuli for regeneration are apparently given by the decrease in growth inhibitors (so-called chalons) and the loss of contact inhibition of growth. The extent of regeneration has certain limits - for example, in the case of an extensive defect epidermis, the formation of fibrous granulation tissue overtakes epithelization, so to heal the defect, it is necessary to transplant "seedlings" epidermis to serve as epithelization centers.

Links

Related Articles

- Progressive Changes
- Repair
- Metaplasia
- Hyperplasia
- Hypertrophy

External links

- Regeneration (Czech Wikipedia)
- Regeneration (biology) (English Wikipedia)

Source

- PASTOR, Jan. *Langenbeck's medical web page* [online]. ©2004. [cit. 2010-10-6]. <<https://langenbeck.webs.com/>>.
- PROMOTED, Ctibor – ŠTEINER, Ivo. *General Pathology*. 1. edition. Galen, c2011. ISBN 978-80-7262-773-8.