Development of the muscular system

Muscle development in general

- **Skeletal muscle** arises from the para-axial mesoderm, which forms somites from the occipital to the sacral landscape and is partially segmented into somitomeres in the head region. It forms the trunk musculature along the spine and sends derivatives to the body wall and limbs.
- **Smooth muscle** arises from the splanchnic mesoderm, namely the mesoderm of the lateral disc and the cells of the neural bar.
- **Cardiac muscle** originates from the cardiogenic mesoderm of the splanchnopleura.
- **Exceptions** are m. sphincter and dilator pupillae, which arise from the neuroepithelium of the eyecup.

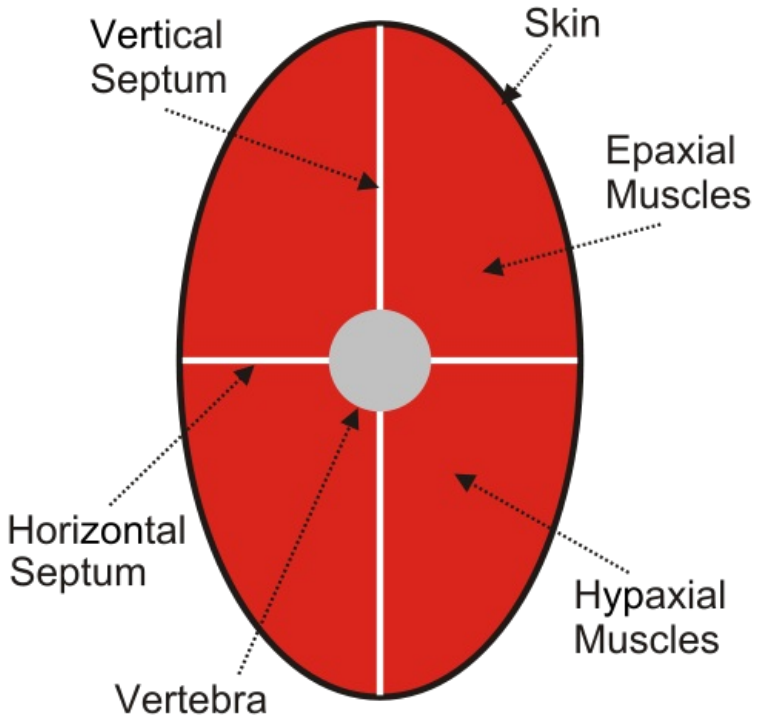
Development of the epaxial and hypaxial compartments

The muscles develop from the somites, their lateral parts. This differentiates into dermomyotomes. At the end of the 1st month, the myotomes send out ventral processes that grow into the body wall between the bases of the skin and the somatopleura. Each myotome divides into an epaxial compartment (dorsal) and a hypaxial compartment (ventral). The remnant septum that originally separated the two groups of muscles is then the fascia. Myotome differentiation proceeds in a craniocaudal direction. In the course of differentiation, the myotome cells transform into myoblasts, which group into longitudinal columns and fuse into multinucleated syncytia. Syncytia are the basis of muscle fibres. In their cytoplasm, transversely annealed **myofibrils** differentiate and gradually increase in number (eventually filling almost the entire **cytoplasm**).

Muscle differentiation

The dorsal trunk musculature has different origins and development in different layers. The epaxial muscles include the so-called deep dorsal muscles: they develop from the epaxial parts of the myotomes (in. by the dorsal branches of the spinal nerves). In the deepest layer, the segmental arrangement is preserved, while in the superficial layers there is partial fusion of materials from two or more adjacent segments. The spinocostal muscles originate from the ventral processes of the myotomes, which have moved dorsally (corresponding to the intercostal muscles). The two superficial layers of the dorsal muscles are originally limb muscles (**m. trapezius**, **m. levator scapulae**, **mm. rhomboidei**) and extended their origins to the trunk only secondarily.

The ventral trunk musculature arises from the hypaxial processes of the myotomes, so originally also has a segmental arrangement. It receives innervation from the ventral branches of the spinal nerves. The original segmental arrangement is preserved in the thoracic region (**mm. intercostales**). Most of the cervical muscles are formed by the fusion of multiple ventral myomeres, and thus have a plurisegmental origin.



A general diagram of the development of the dorsal and ventral muscle groups

Muscle development disorder

In a developmental disorder, a muscle may be reduced or missing completely. In the case of m.pectoralis major we speak of the so-called **Poland's anomaly**.

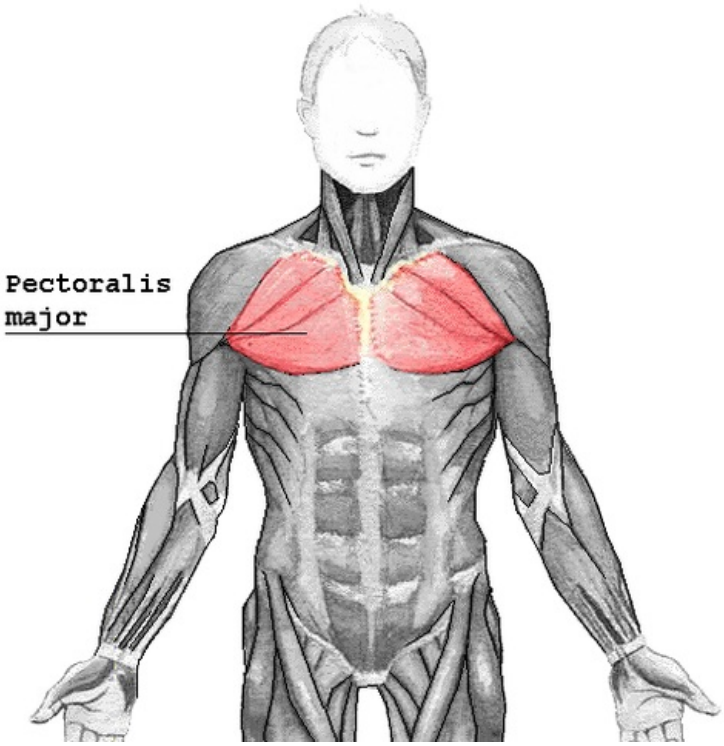
Links

Related articles

- Development of the skeleton/skull and axial skeleton
- Limb development

Bibliography

- SADLER, Thomas, W. *Langmanova lékařská embryologie.* 1. české edition. Grada Publishing, a.s, 2011. 414 pp. ISBN 978-80-247-2640-3.



Big pectoral muscle