

# Development of the endocrine system

Individual organs belonging to the endocrine system do not develop as a whole, but have different origins and arise independently.

## Development of the thyroid gland

The thyroid is established around the 24th day of development as an epithelial plug at the base of the pharynx between the *tuberculum impar* and the *copula*. It gradually grows caudally as a bilobed process. The base of the thyroid gland descends in front of the tongue and the cartilages of the larynx and reaches its definitive position in the seventh week of embryonic development. Initially, it is connected to the pharyngeal cavity by means of a *ductus thyroglossus*, which later disappears and a *foramen caecum* remains visible at the place of its beginning at the root of the tongue.

The thyroid gland begins to function at the end of the third month, when follicles with a colloidal substance appear. Thyroid **follicular cells** originate from the endoderm, **fascicular stroma and parafollicular C-cells** originate from the neural crest ectomesenchyme.

## Development of the adrenal glands

Adrenal glands arise from two bases - the **cortex** comes from mesoderm ori, **medulla** comes from neural ridge cells. During the **fifth week**, the mesothelial cells between the *radix mesentery* and the base of the gonads proliferate and grow into the surrounding mesenchyme. In the first wave of proliferation, large acidophilic cells are formed, which are the basis of the *primitive cortex* of the adrenal gland. This is followed by a second wave of mesothelial cells that surround the primitive cortex and form the *definitive cortex*. The cells of the primitive cortex produce steroids during the prenatal period, which are involved in the maintenance of pregnancy. They undergo regression postnatally.

The **adrenal medulla** is formed from neural crest cells that attach medially to the base of the cortex and form trabecular and striae. Fetal adrenal glands are 10 to 20 times larger than adult glands in relation to total body weight. They decrease with regression of the fetal cortex during the first year of life.

## Pituitary gland and pineal gland

Neurohypophysis develops from the **protrusion of the diencephalon in the region of the infundibula**. Adenohypophysis arises from the ectoderm Rathke's notch in the roof of the stomodeum, which grows dorsally, loses contact with the oral cavity during the second month and attaches to the infundibulum. The *pars intermedia* arises from the posterior wall of Rathke's pouch. The protrusion surrounding the stalk of the pituitary gland forms the *pars tuberalis*. The epiphysis is founded as a **thickening of the ependyma of the ceiling plate of the diencephalon** and will gradually form a solid organ reaching between the *colliculi superiores*.

## Parathyroid glands

Parathyroid glands arise from **endoderm cells of the third and fourth gill slits**, with the upper parathyroid gland originating from the dorsal spur of the fourth gill slit, the lower parathyroid gland from the dorsal spur of the third gill slit. During development, their bases move caudally and attach to the posterior surface of the thyroid gland.

## Links

### Related articles

- Brain development
- Development of the pharyngeal apparatus

### Used literature

- SADLER, Thomas W. Langmanova lékařská embryologie : Překlad 10. vydání. 1. vydání. Praha : Grada Publishing, a.s, 2011. 432 s. ISBN 978-80-247-2640-3.
- MOORE, Keith L – PERSAUD, T.V.N. Zrození člověka : Embryologie s klinickým zaměřením. 1. vydání. 2000. 564 s. ISBN 80-85866-94-3.