

# Embryonic development of the Bladder and Urethra

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## Embryology of the Urinary System

### Bladder and Urethra

During the 4th to the 7th weeks of development, the cloaca divides into the urogenital sinus anteriorly and the anal canal posteriorly. The urorectal septum is a layer of mesoderm between the primitive anal canal and the urogenital sinus. The tip of the septum will form the perineal body.

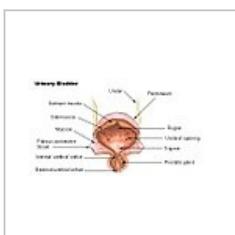
Three portions of the urogenital sinus can be distinguished:

- The upper and larger part is the urinary bladder. Initially the bladder is continuous with the allantois, but when the lumen of the allantois is obliterated, a thick fibrous cord, the urachus, remains and connects the apex of the bladder with the umbilicus (in the adult: median umbilical ligament).
- The pelvic part of the urogenital sinus is a narrow canal which in the male gives rise to the prostatic and membranous parts of the urethra.
- The phallic part of the urogenital sinus. It is flattened from side to side, and as the genital tubercle grows, this part of the sinus will be pulled ventrally (differs greatly between the two sexes).

During differentiation of the cloaca, the caudal portions of the mesonephric ducts are absorbed into the wall of the urinary bladder. Consequently, the ureters, initially outgrowths from the mesonephric ducts, enter the bladder separately.

As a result of ascent of the kidneys, the orifices of the ureters move farther cranially; those of the mesonephric ducts move close together to enter the prostatic urethra and in the male become the ejaculatory ducts. Since both the mesonephric ducts and the ureters originate in the mesoderm, the mucosa of the bladder formed by incorporation of the ducts (the trigone of the bladder) is also mesodermal. With time, the mesodermal lining of the trigone is replaced by endodermal epithelium, so that finally, the inside of the bladder is completely lined with endodermal epithelium.

The epithelium of the urethra in both sexes originates in the endoderm; the surrounding connective and smooth muscle tissue is derived from visceral mesoderm. At the end of the third month, epithelium of the prostatic urethra begins to proliferate and forms a number of outgrowths that penetrate the surrounding mesenchyme. In the male, these buds form the prostate gland. In the female, the cranial part of the urethra gives rise to the urethral and paraurethral glands.



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## **References**

Sadler, T.W.: Langman's Medical Embryology. 12th ed., Lippincott Williams & Wilkins, 2012