

URINARY SYSTEM

revised 12 April 2016

S & M p. 703-, Martini's 5th: 942-982, 6th: 971-1045, 7th: 952-1023, 8th: 966-1009, 9th: 954-, 10th: 972-987

Generates, maintains opt'm cond'ns (homeostasis) in body by selective retention, excretion.

REGULATES plasma composition

blood volume

pH

ionic concentration (electrolytes)

EXCRETES variety of metabolic products:

urea (21 g/d),

uric acid (0.5 g/d),

creatinine (1.8 g/d) (breakdown of muscles)

First in anterior: **mesonephros: pronephric duct** drains (later: **mesonephric duct**)

METANEPHROS: forms in 5th week, out pockets from mesonephric duct.

cloaca develops into **bladder**

ANATOMY: R kidney is lower than L due to liver, both retroperitoneal: (p 976 & 977)

adipose capsule mass of perirenal fat (brown fat): cushion, collagen fibers support renal fascia: 2x layer (ant.= peritoneum), **attaches** to abdominal wall

renal capsule layer of collagen fibers surround organ

renal hilus medial indentation contains **renal arteries, veins and ureter**

cortex extensions called **renal columns** pass into medulla

(p. 977) **arcuate arteries and veins** separate the cortex from medulla

medulla consists of **renal pyramids**, tips called **papillae**.

minor and major calyces, renal pelvis receive and direct urine into ureter

Ureter retroperitoneal, attached to rear abdominal wall

Bladder derived from cloaca; urinary trigone; transitional epithelium; internal & ext. urinary sphincters

Urethra mucous membrane, it and bladder lined with transitional epithelium. Urethritis

KIDNEY FUNCTION:

Three ways solutes in blood might be treated: 1) excrete, 2) discard part, 3) save

NEPHRON STRUCTURE: functional unit of the kidney (p 978-979, 981)

renal corpuscle combination of capsule and glomerulus

bowman's capsule cup shaped, receives filtrate, parietal v visceral layer

glomerulus 20% of blood becomes filtrate, pushed thru by heart filtration membrane: **podocytes, filtration slits, fenestrated endothelium** ("windowed") pores thru which filtrate is passed

proximal conv'd tbls (P 980) possesses microvilli, most solutes resorbed
loop of Henle establishes salt gradient
descending limb thin, permeable to water
ascending limb thick, imperm. to water, Na/K pump Na⁺ out

distal convoluted tubule ions saved/thrown
(forms **juxtaglomerular complex** with afferent arteriole)

collecting tubule water retained/thrown, osmolarity adjusted
peritubular capillaries pick up saved solutes and water
vasa recta surround loop of Henle, pick up water and NaCl

FUNCTION: (p table 985- 987)

All blood in body filtered 60x /day,

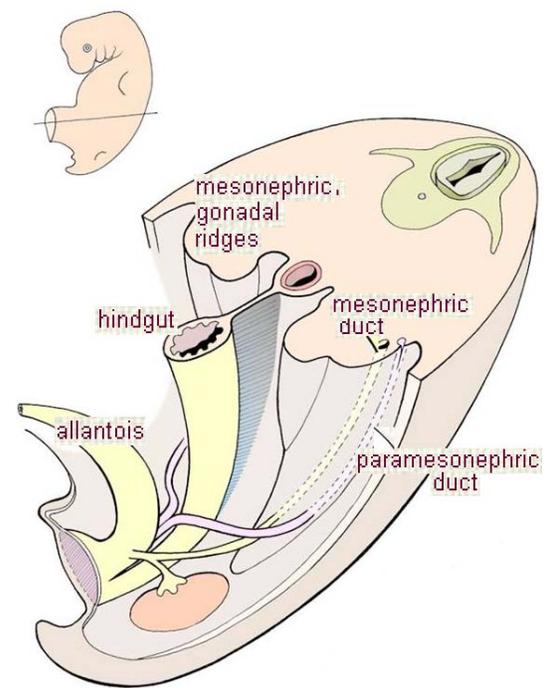
45 gallons filtrate produced,

1 to 1½ gallons urine produced per day,

released by **micturition**

Water diffuses freely thru walls of nephron except:

- 1) ascending loop of Henle,
- 2) collecting duct in absence of antidiuretic hormone



Cut Section of Kidney

