

# Overview of Renal Function

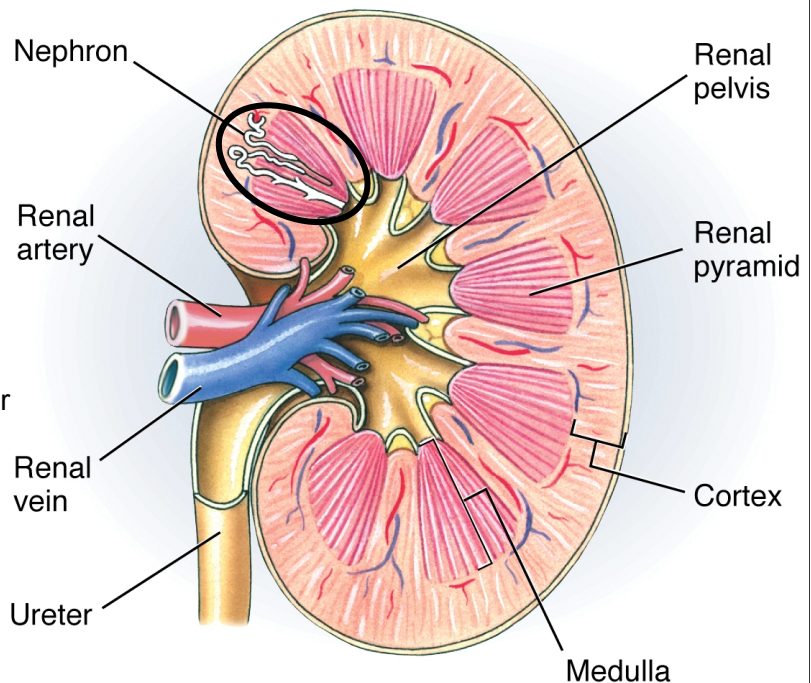


Kidney

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## Anatomy/Function of the Kidney

- Structure/Function
  - 1% of body mass
  - 25% of resting cardiac output
  - Passes total blood volume every 4-5 minutes
  - Filters 180 l per day and reabsorbs 178.5 l of it
  - Produces 1.5 l of acidic (pH~6) urine per day
  - 5% increase in filtration would generate 9 l urine per day!
  - Regulation of kidney ensures that this does not happen.

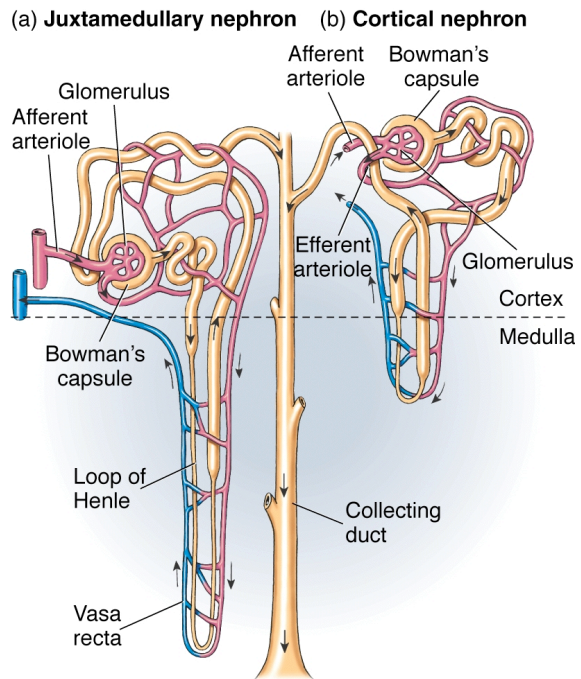


Kidney

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# Nephron Structure

- 1 million nephrons/kidney
- Glomerulus:
  - Closed end of tubule forms a bowl
  - Surrounded by capillaries inside Bowman's capsule
- Tubule components
  - Proximal tubule
  - Loop of Henle
  - Distal tubule
- Collecting duct passes urine to renal pelvis
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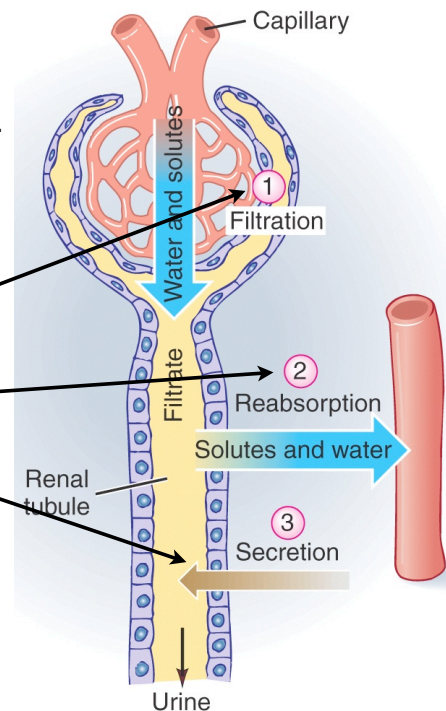


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# Functional Overview of the Nephron

- Contents:
  - Water + urea, NaCl, KCL, phosphates, etc.
  - Color and odor product of diet, e.g., asparagus
- Process:
  1. Filter everything out (and take back what is worth keeping)
  2. Reabsorption of water and salts
  3. Secretion of additional unwanted substances

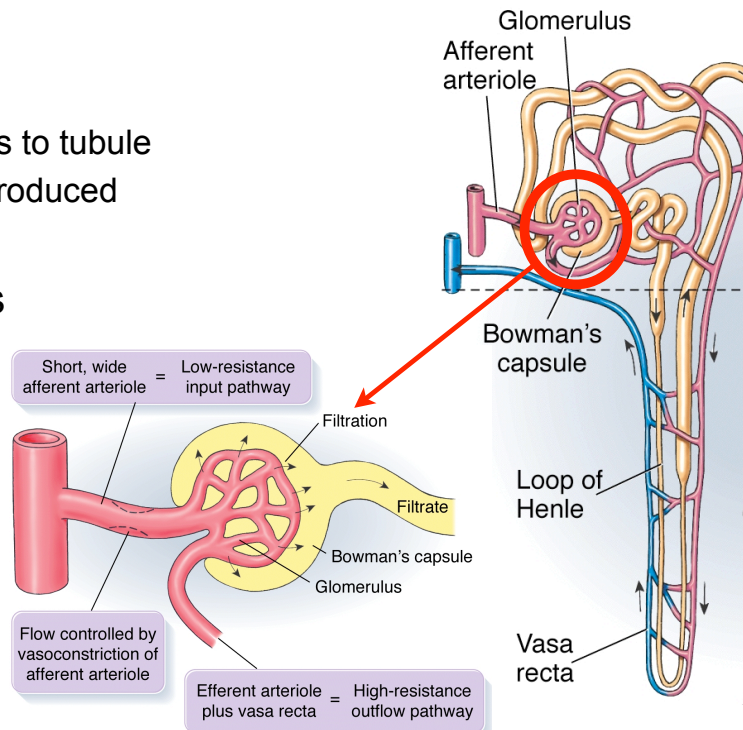


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# Renal Circulation

- Afferent arteriole
- Glomerulus
  - 10% of blood fluid filters to tubule
  - 100 ml/minute filtrate produced
- Efferent arteriole
- Secondary capillaries
  - Loops: vasa recta
- Veins



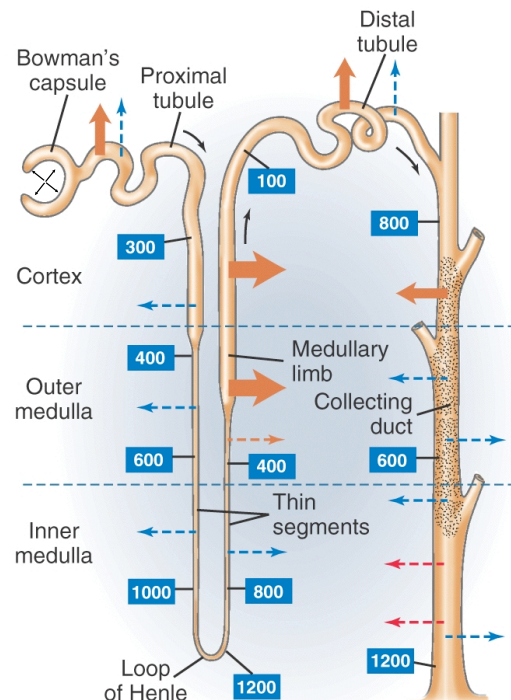
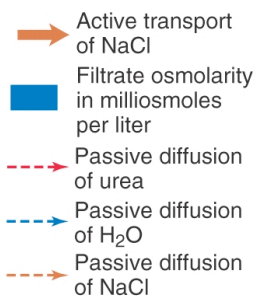
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# Nephron Functional Overview

- Most water and minerals taken out of the filtrate
- Each region of tubule has different function
- “Renal clearance”
  - Amount of plasma from which a substance is **completely** removed from the body [ml/min]
  - Function of filtration, reabsorption, and secretion



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