Clinical Pharmacology

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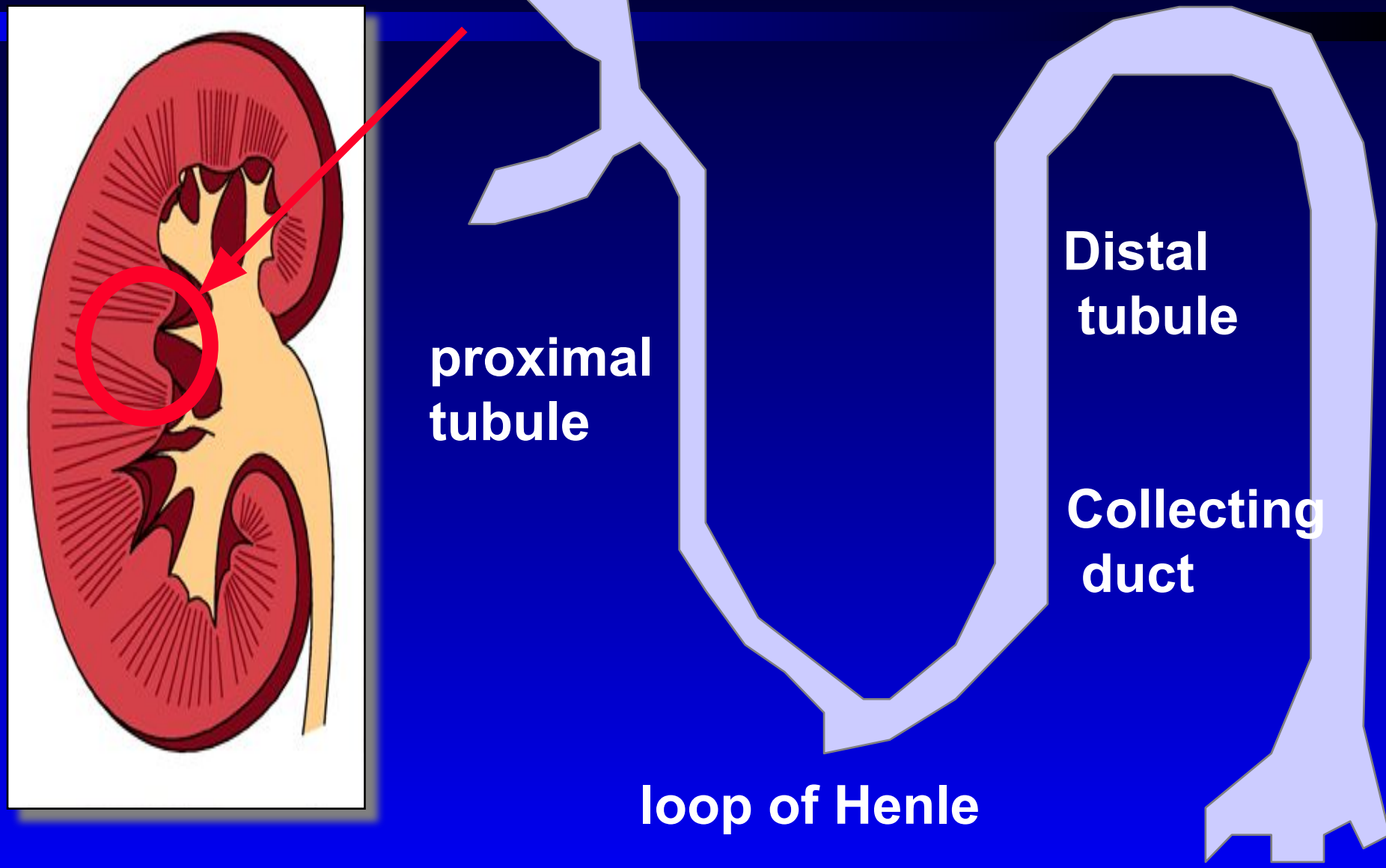
Cardiovascular/ Renal Pharmacology

- Diuretics
- Renal Vasodilators
- Urine PH manipulation

Nephron


proximal tubule
Distal tubule
Collecting duct
loop of Henle

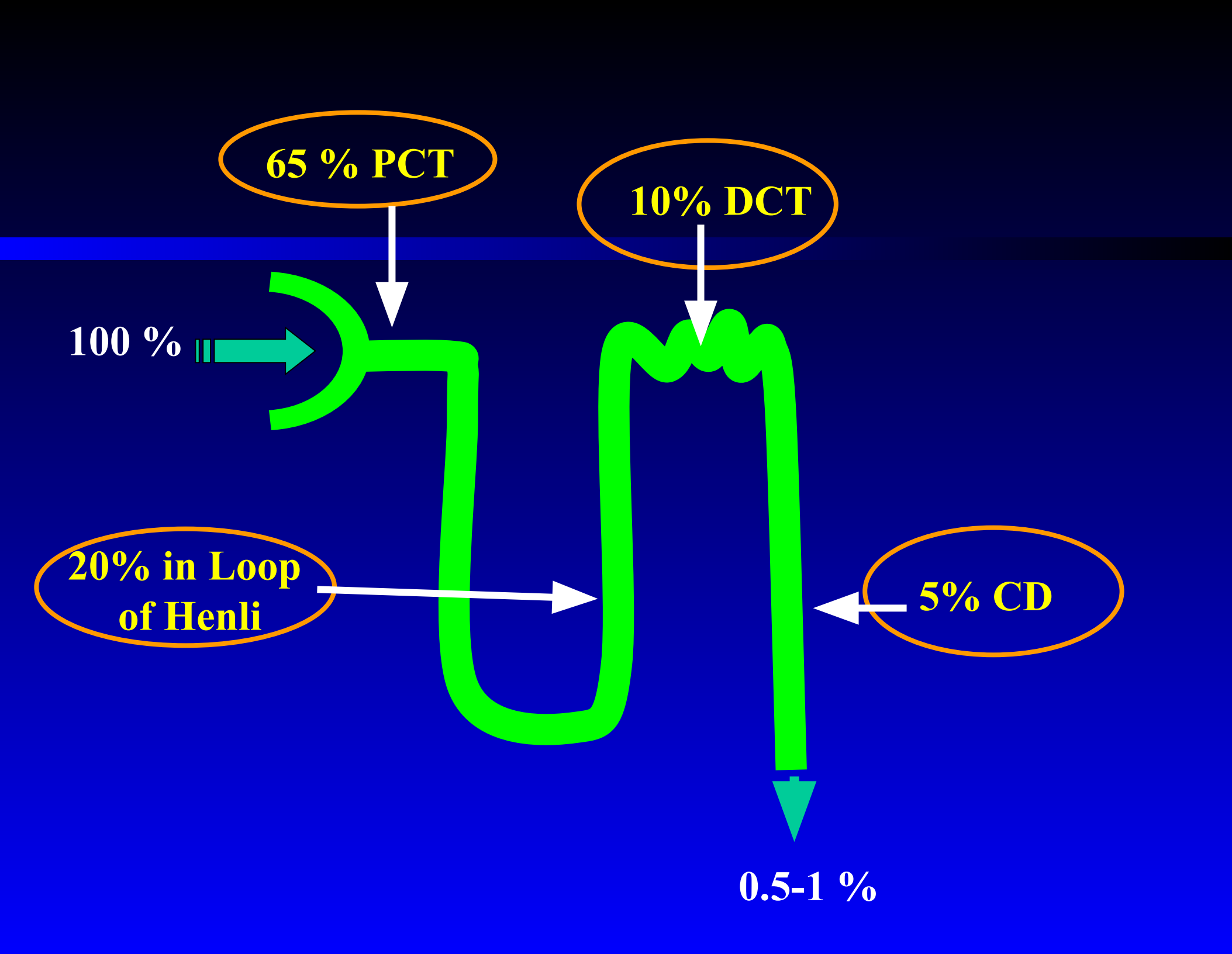
Renal Physiology

- GFR is 125 ml/min/day, so usually 200 L/day while urine out put is approximately 1 L/day, so 99% of GFR is reabsorbed and 1% is excreted.
- Water follows Na^+
- NaCl is reabsorbed by active process while H2O absorbed passively.

Renal Pharmacology

Normally sodium is reabsorbed:

- 65 % in PCT
- 20-25 % in Loop of Henle
- 10 % in DCT
- 5 % in CD


65 % PCT
10% DCT
100 %
20% in Loop of Henli
5% CD
0.5-1 %

1. Diuretics
2. Natriuretic
3. Aquaretics
4. Urearetics

1. *Diuretics:* are drug that increase urine volume by causing sodium and water excretion (by inhibiting sodium reabsorption in different sit in renal tubules).
2. Natriuretics: agents that cause an increase in renal sodium excretion.
3. Aquaretics: agent that increase excretion of solute-free water (by antagonising arginine vasopressin ‘ AVP-2’ receptors in the kidney.
4. Urearetics: agents that increase urine output and urea excretion (but not electrolytes)

Diuretics

Diuretics: are drug that increase urine volume by causing sodium and water excretion (by inhibiting sodium reabsorption in different sit in renal tubules).

Mechanism of Diuresis

Two basic mechanism for inducing diuresis:

1. Extrarenal mechanism
2. Renal mechanism

Diuresis - Extrarenal mechanism

A. Inhibition of ADH release:

- *Hypotension*
- *Al cohol intake*
- *Water depletion*

B. Enhancing COP (in case of HF) by *Digoxin or dopamine*

A. Mobilizing peripheral edema fluids (hypoprotenimia) by using *albumin*

Diuresis - Renal mechanism

In this setting, *diuretics* are agents that alter physiological renal mechanism that form urine in such away that there is increase in the flow of urine with greater excretion of Na (Natriuresis)

Principles important for understanding effects of diuretics

- Interference with Na^+ reabsorption at one nephron site leads to increased Na^+ reabsorption at other sites
- Increased flow and Na^+ delivery to distal nephron stimulates K^+ (and H^+) secretion

Principles important for understanding effects of diuretics

- Diuretics act only if Na^+ reaches their site of action. The magnitude of the diuretic effect depends on the amount of Na^+ reaching that site
- All, except k-sparing, act from the lumenal side of the tubular cellular membrane