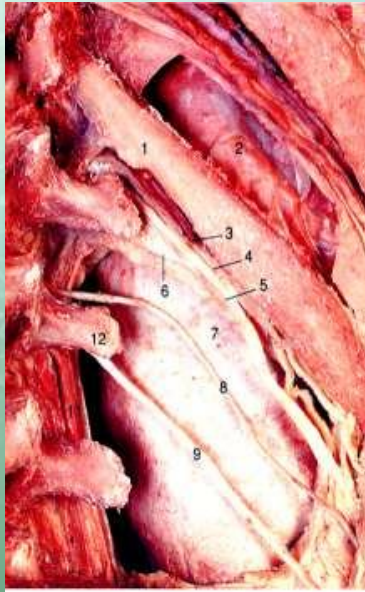


# 肾功能障碍

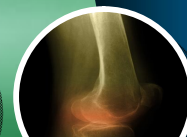
# Renal insufficiency





- **Physiology** 肾脏的主要生理功能
- **Pathophysiology** 肾功能障碍的主要表现
- **Acute Renal Failure** 急性肾功能衰竭
- **Chronic Renal Failure** 慢性肾功能衰竭
- **Uremia** 尿毒症

# 临床案例



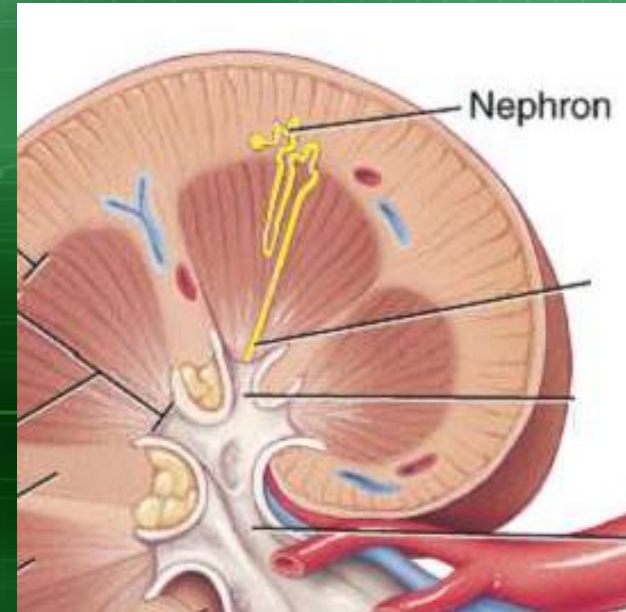
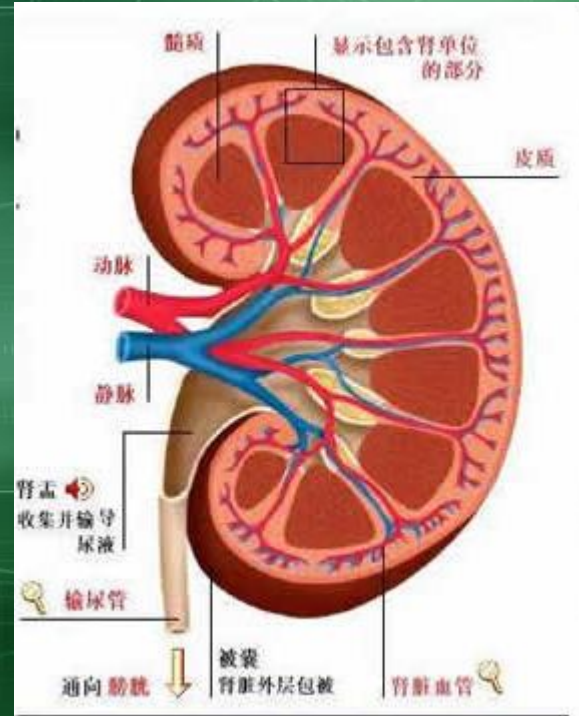
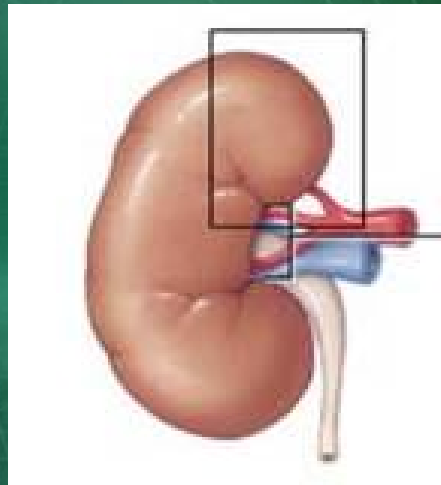
- 患者, 男, 19岁, 战士。在参加5km越野跑训练跑至终点后当即晕倒, 经急诊处置后醒转, 自觉胸闷、心慌, 四肢肌肉沉重酸痛。在中队卧床2d, 不能进食, 生活不能自理, 每天尿量不足200ml, 为深浓茶色。当地卫生院考虑为急性肝炎, 急诊送上级医院。
- 查体: 血压 140/100 mmHg, 呼吸 28次/min, 心率 68次/min。神清, 表情淡漠, 尿浓如茶, 尿潜血++, 尿蛋白++, 血钾 8.1mmol/L。
- 立即给予吸氧, 静脉推注葡萄糖酸钙, 并拟给予10%葡萄糖500ml加胰岛素14U静滴, 患者突然出现心室纤颤, 心跳骤停, 意识丧失。使用电击除颤, 心脏起搏3次未奏效, 全力抢救1h后无效而死亡。

# 肾脏的主要生理功能

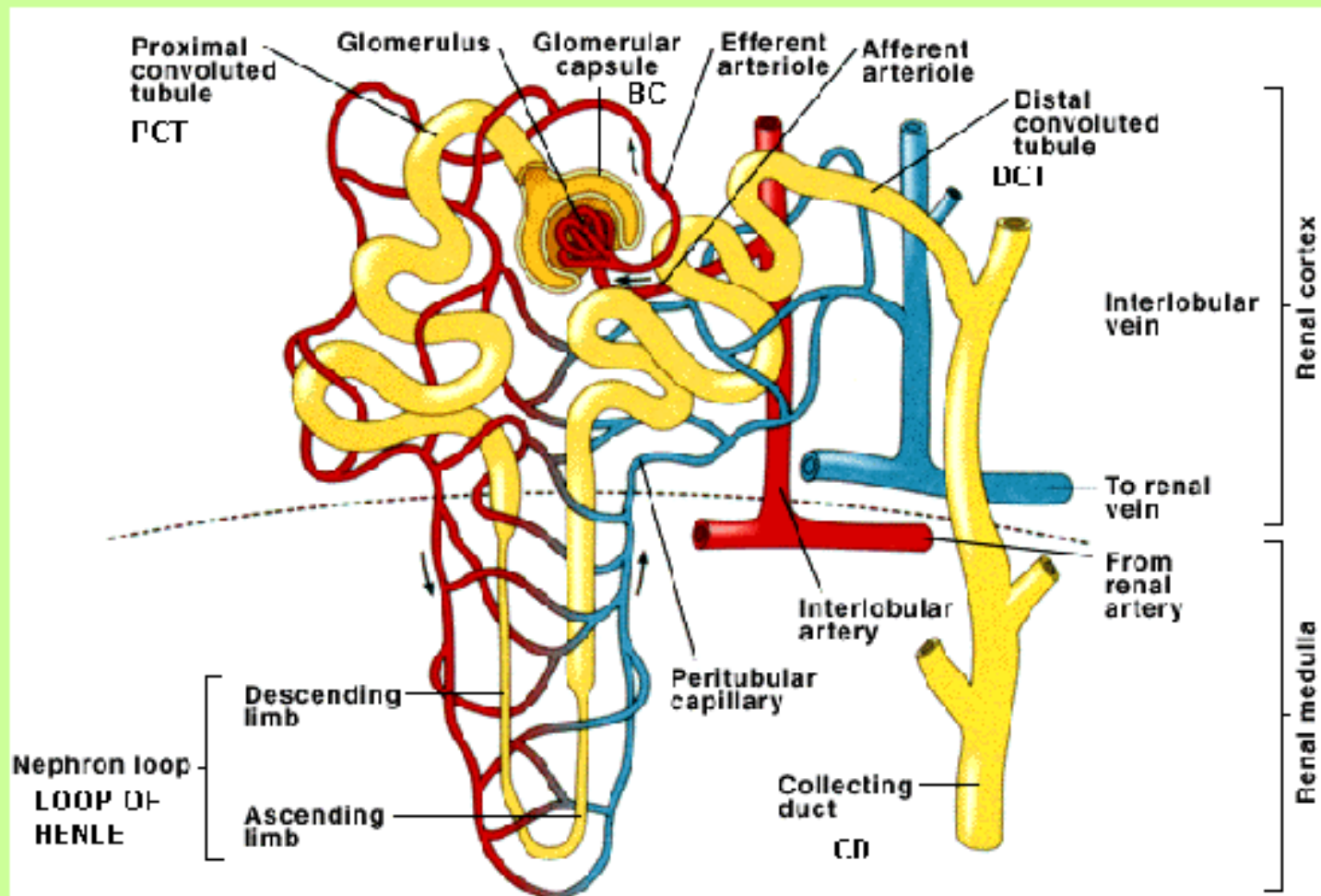


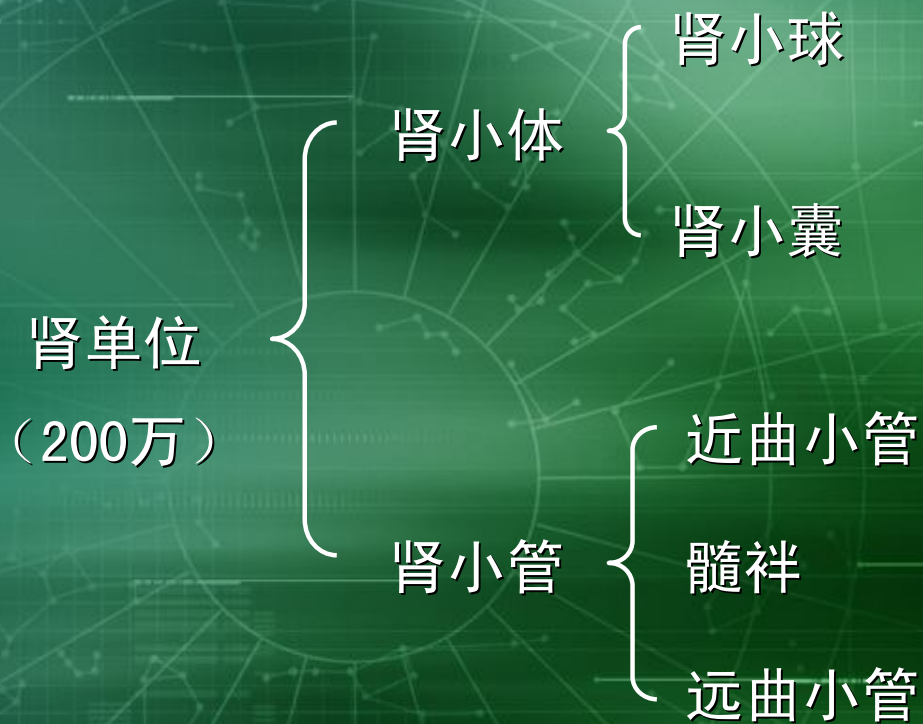
- 排泄功能
- 调节水、电解质和酸碱平衡以及维持血压
- 内分泌功能：  
分泌肾素、促红细胞生成素、前列腺素和生成 $1,25(\text{OH})_2\text{VitD}_3$

# 肾脏的解剖结构



# NEPHRON STRUCTURE





滤过：  
生成原尿

重吸收、分泌  
浓缩、稀释尿液

## 肾单位的组成

# 肾功能障碍的主要表现及机制



## 一 肾小球功能障碍

- GFR降低 · 肾小球滤过膜通透性改变

## 二 肾小管功能障碍

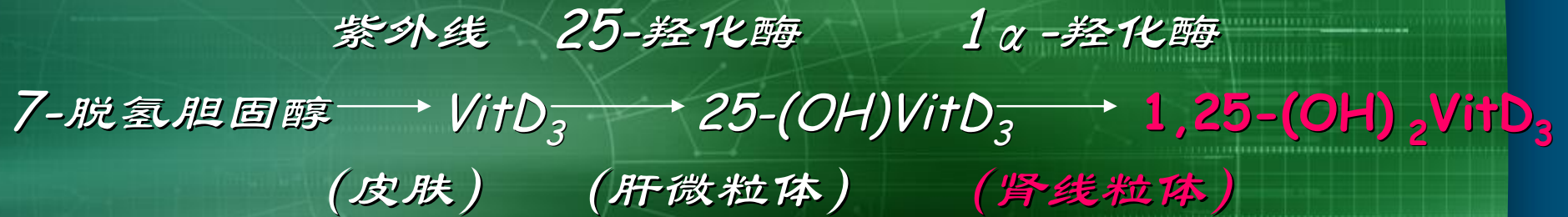
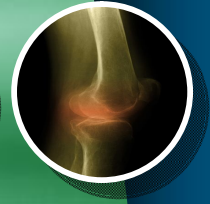
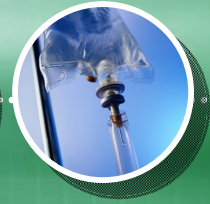
- 尿液浓缩障碍 · 水、电解质、酸碱平衡紊乱
- 其它

## 三 肾内分泌功能障碍

- 肾性高血压 (RAAS, KKPGS)
- 肾性贫血 · 肾性骨营养不良 · 其它

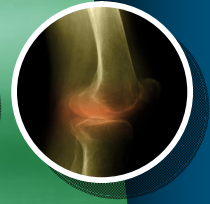
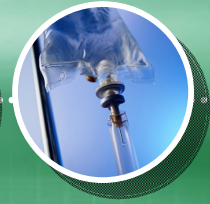


# 体内VitD<sub>3</sub>的代谢过程

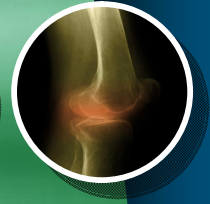


# 急性肾功能衰竭

Acute Renal Failure, ARF



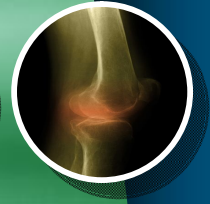
- 定义 Definition
- 病因与分类 Etiology & classification
  - 肾前性 Prerenal failure
  - 肾性 Intrinsic renal failure
  - 肾后性 Post(obstructive) renal failure
- 发病机制 Pathogenesis
- 临床表现 Clinical manifestation
- 治疗 Therapy



## Definition

- Acute renal failure (ARF) is defined as a precipitous and significant (>50%) decrease in glomerular filtration rate (GFR) over a period of hours to days, with an accompanying accumulation of nitrogenous wastes in the body.

# 急性肾功能衰竭的定义



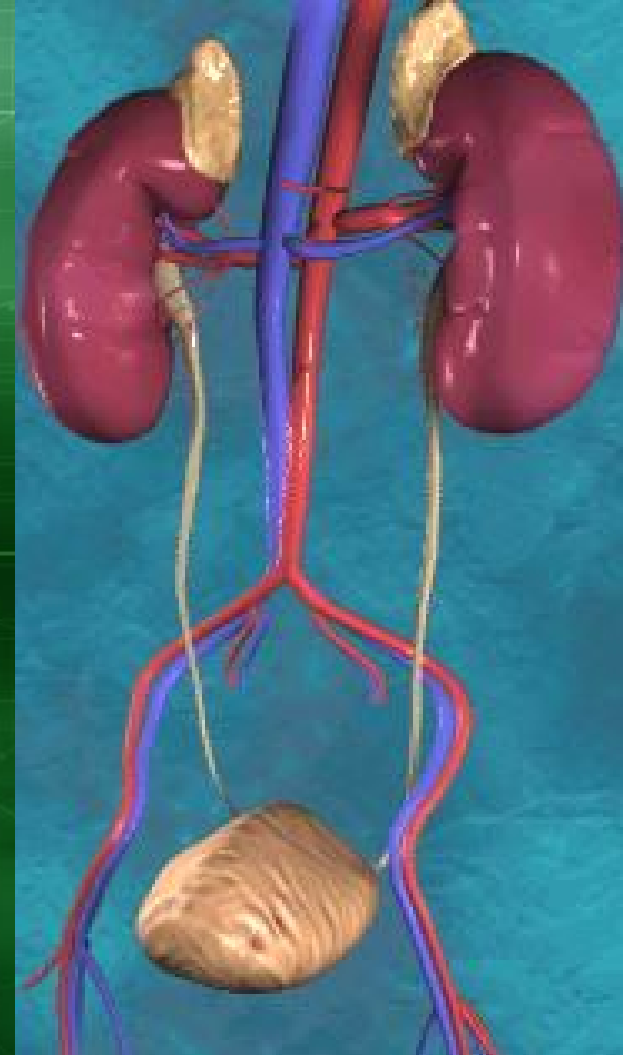
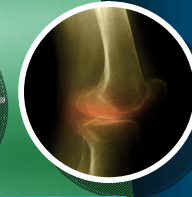
急性肾功能衰竭（acute renal failure, ARF）是指各种病因引起（双侧）肾脏在（短期内）泌尿功能急剧降低，导致机体内环境出现严重紊乱的病理过程和临床综合症。

肾泌尿功能障碍表现为GFR迅速下降，出现少尿、无尿；内环境紊乱主要表现为氮质血症、高钾血症和代谢性酸中毒。

急性肾功能衰竭根据尿量减少与否，分为少尿型（oliguric ARF, 成人每日尿量少于400ml）和非少尿型（nonoliguric ARF, 成人每日尿量大于400ml）两种类型。急性肾衰病情凶险，临床较常见，但若及时诊治，预后较好。

# Etiology

- **Pre-renal (~70% of cases)**  
resulting from impaired blood flow to or oxygenation of the kidneys.
- **Intrinsic-renal (~25% of cases)**  
resulting from injury to or malformation of kidney tissues.
- **Post-renal (<5% of cases)**  
resulting from obstruction of urinary flow between the kidney and urinary meatus.



# Causes

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- Prerenal failure - Diseases that compromise renal perfusion
  - Decreased effective arterial blood volume - Hypovolemia, CHF, liver failure, sepsis
  - Renal arterial disease - Renal arterial stenosis (atherosclerotic, fibromuscular dysplasia), embolic disease (septic, cholesterol)



• Intrinsic renal failure - Diseases of the renal parenchyma, specifically involving the renal tubules, glomeruli, interstitium

- ATN - ischemia, toxins (eg, aminoglycosides, radiocontrast, heme pigments, cisplatin, myeloma light chains, ethylene glycol)
- Interstitial diseases - Acute interstitial nephritis, drug reactions, autoimmune diseases (eg, systemic lupus erythematosus [SLE]), infiltrative disease (sarcoidosis, lymphoma), infectious agents (Legionnaire disease, hantavirus)
- Acute glomerulonephritis
- Vascular diseases - Hypertensive crisis, polyarteritis nodosa, vasculitis