

Body Fluids

	%of Body weight	Markers	Major Cations	Major Anions
TBW	60%	Titrated water, D2O antipyrine	--	--
ECF	20%	Sulfate, Inulin, Mannitol	Na	Cl, HCO ₃
Plasma	5% (25% of ECF)	RISA (Radioactive iodinated Serum Albumin), Evans Blue	Na	Cl, HCO ₃
Interstitial Fluid	15% (75% of ECF)	ECF-plasma volume (indirect)	Na	Cl, HCO ₃
Intracellular Fluid	40%	TBW-ECF (indirect)	K (Mg is also an ICF Cation)	Organic Phosphate, Protein

60-40-20%(75-25%) RULE (WATER,ICF,ECF(IF,PLASMA)

Endocrine Function of the Kidneys

Erythropoietin (EPO)	From interstitial cells in peritubular capillary bed • Released in response to hypoxia → stimulates RBC proliferation in bone marrow • Chronic kidney disease (CKD) causes ↓ EPO → chronic anemia
Calciferol (Vitamin D)	• PCT converts 25-OH vitamin D ₃ → 1,25- (OH) ₂ vitamin D ₃ (calcitriol, active form) • Conversion is mediated by 1α- hydroxylase (which is upregulated by PTH)
Prostaglandins	Paracrine secretion vasodilates the afferent arterioles → ↑ RBF • NSAIDs block the renal protective prostaglandin synthesis → afferent arteriole constriction → ↓ GFR → Acute Kidney Injury (in low renal blood flow states)
Dopamine	From PCT cells • Promotes natriuresis • At low doses: dilates interlobular arteries, afferent arterioles, efferent arterioles → ↑ RBF • At high doses: acts as vasoconstrictor

Volume & Conc. Changes Across Compartments

	EXAMPLES	ECF Vol	ICF Volume	Osmolarity	Hematocrit	Plasma Protein
Isosmotic volume contraction	Diarrhea, Burn	↓	NC	NC	↑	↑
Hyperosmotic volume contraction	Sweating, Fever, Diabetes Insipidus	↓	↓	↑	NC	↑
Hypoosmotic volume contraction	Adrenal Insufficiency	↓	↑	↓	↑	↑
Isosmotic volume expansion	Infusion of Isotonic NaCl	↑	NC	NC	↓	↓
Hyperosmotic volume expansion	High NaCl Intake	↑	↓	↑	↓	↓
Hypoosmotic volume expansion	SIADH	↑	↑	↓	NC	↓

NEPHRON, RENAL CLEARANCE, RENAL BLOOD FLOW and GFR

Types of Nephron

Cortical Nephron 75% of Nephrons in the Renal Cortex. Short Loops of Henle and (+) Peritubular Capillaries

Juxtamedullary 25% of Nephrons in the Corticomedullary Junction. Long Loops of Henle and (+) Vasa Recta

• Structural and Functional Unit of the Kidneys



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