

Excretion and Kidney Video Lectures: Table of Contents

Kidney 1: Excretion – General Considerations (35:37 min:sec)

0:00	Introduction
0:25	Excretion: Universal Need, General Principals (Excretion v. Defecation).
1:59	Excretion – Waste: Metabolic Products, "Nitrogenous Waste", Toxins
5:28	Excretion – Waste: Nitrogenous Waste Ammonia, Urea, Uric Acid, Adaptational advantages (balancing toxicity, water balance, metabolic costs)
8:45	Excretion – Waste: Nitrogenous Waste v. Water Balance. Aquatic / Terrestrial Adaptations
11:15	Excretion – Waste: Excretory Systems – Multiple , Multifunctional
12:35	Excretion – Osmoregulation: Contributing molecules and ions, body v. environmental osmolarity, isosmotic v hyperosmotic v hypoosmotic, SW – FW – Terrestrial Conditions and Solutions
16:32	Excretion – Osmoregulation: Definitions of molarity and osmolarity
18:32	Excretion – Osmoregulation: Osmotic Balance, Strategies in different environments. Examples of body salt/ion concentrations, osmolarities in SW, FW, terrestrial environments.
23:15	Excretion – Osmoregulation: Water Balance in Changing / Dynamic Environments
28:19	Excretory Systems – Universal Design: (1) Filtration, (2)Active Secretion, (3) Active Resorption.
30:59	Excretion – (1) Filtration, (2)Active Secretion, (3) Active Resorption.
32:02	Summary of Excretion: Detoxification and Water Balance

Kidney 2: Mammalian Kidney, Making a Concentrated Urine (on next page)

Kidney 3: Excretion – Regulation (19:59 min:sec)

0:00	Introduction
0:16	Osmoregulation: Vasopressin (ADH or AVP), action on distal tubules and collecting ducts (Aquaporin and Urea Transporter regulation).
4:17	Blood Pressure (decrease): Juxtaglomerular Apparatus (JGA): renin, angiotensin, aldosterone
9:00	Blood Pressure (decrease): JGA – temporal dynamics of response pathways
11:35	Blood Pressure (increase): Atrial Natriuretic Peptide (ANP)
13:46	Blood Pressure: Interactions between ANP and JGA
14:39	Distal Tubule – JGA feedback: Macula Densa Regulation of NO (Nitric Oxide); Regulation of Renin
17:20	Glucagon – glucose recovery Parathyroid Hormone – Ca ⁺⁺ , PO ₄ ⁻ recovery
18:35	Monitoring the body – interactions of systems

Kidney 2: Mammalian Kidney, Making a Concentrated Urine (46:49 min:sec)

0:00	Introduction
0:16	Overview: Urine Formation Filtration, Active Secretion, Active Reabsorption
3:36	Overview: Urine Concentration Renal Pyramids, H ₂ O recovery by Osmosis, Na ⁺ and Urea Conc. Gradients
6:47	Nephron: Fundamental Unit of Kidney: (1) Glomerulus and Bowman's Capsule, (2) Proximal Tubule, (3) Loop of Henle, (4) Distal Tubule, (5) Collecting Ducts. Volumes filtered, Volumes Recovered
10:23	FILTER: Glomerulus, Bowman's Capsule, Podocytes
13:32	Picture (drawing): Glomerulus and Bowman's Capsule
13:43	Picture (drawing): Glomerulus and Bowman's Capsule, detailing podocytes
13:55	Picture (drawing): Podocytes ("high magnification")
14:08	EM (Electron Micrograph) of Podocytes and "Filtration Slits"
14:23	PROXIMAL TUBULES. Substances recovered and secreted, structure, transport mechanisms
18:00	EM of Proximal Tubule
18:09	EM of Proximal Tubule, showing microvilli
18:22	DISTAL TUBULES: Substances recovered and secreted, structure, transport mechanisms. Interaction with Glomerulus (feedback)
21:03	Picture (drawing): interaction between Distal Tubule and Glomerulus (Macula Densa, Glomerular arterioles).
21:51	COLLECTING DUCTS: Recovery of H ₂ O, Na ⁺ and Urea. Aquaporins, Urea Transporters and Vasopressin.
26:05	Summary of Filtration, Active Secretion and Active Reabsorption: roles played by glomerulus/Bowman's capsule, Proximal and Distal Tubules and Collecting Ducts.
27:50	LOOP of HENLE: Establishing the Concentration Gradient in the Renal Pyramids: differential properties. [Overview]
32:10	Loop of Henle: Mechanisms responsible for establishing Concentration gradient in Renal Pyramid. [Details]
35:09	Loop of Henle: Mechanisms responsible for establishing Concentration gradient in Renal Pyramid. [Reiteration]
39:08	COLLECTING DUCTS: Facilitated Osmosis. Vasopressin sensitive membrane permeability to H ₂ O via Aquaporins
41:34	COLLECTING DUCTS: Urea Transporters, Contribution of Urea to Concentration Gradient in Renal Pyramids.
44:07	Roll of Loop of Henle in forming a concentrated Urine where Urine Osm is greater than blood Osm. Terrestrial Adaptation.