objectives

RENAL & ACID-BASE PHYSIOLOGY

INSTRUCTIONAL OBJECTIVES

Lecture 1: Glomerular filtration

At the end of this session, the students should be able to:

- Identify and describe that the mechanism of urine formation include three basic processes; glomerular filtration, tubular reabsorption and tubular secretion
- Identify and describe the ultramicroscopic structures of the glomerular filtration membrane
- Identify and explain why the capillary hydrostatic pressure is highest in the kidney compared to all other systemic capillaries and given the data. Calculate the net filtration pressure using parameters of Starling forces
- Describe the importance of the size of the capillary bed and pores
- Correlate between net filtration pressure along glomerulus and plasma flow
- Identify and describe the composition of the filtrate

Lecture 2: Glomerular filtration rate

At the end of this session, the students should be able to:

- Define GFR and quote normal value in men and women
- Identify and describe the factors controlling 6FR in terms of starling forces, permeability with respect to size, shape and electrical charges and ultra-filtration coefficient
- List the characteristics that a compound must have before it can be used for measuring GFR e.g. Inulin, creatinine etc.
- Given the data, calculate GFR in relation to renal hemodynamics

Lecture 3: Renal clearance

At the end of this session, the students should be able to:

- Describe the concept of renal plasma clearance
- Define clearance in term of volumes of plasma
- Use the formula for measuring renal clearance
- Use clearance principles for inulin, creatinine etc. for determination of GFR
- Explain why it is easier for a physician to use creatinine clearance Instead of Inulin for the estimation of 6FR
- Describe glucose and urea clearance
- Use PAH clearance for measuring renal blood flow
- Define and calculate filtration fraction (FF)
- Define filtration equilibrium

Lecture 4: Tubular Transportation & Na^+ Reabsorption

At the end of this session, the students should be able to:

- Define tubular reabsorption and tubular secretion
- Identify and describe mechanisms of tubular transport
- Describe tubular reabsorption of sodium and water
- Use the clearance principles for calculating reabsorption and or secretion
- Define and explain tubulo-glomerular feedback and glomerulotubular balance and describe its physiological importance

Lecture 5: Tubular Reabsorption of Glucose, Amino Acids, Urea & other Electrolytes

At the end of this session, the students should be able to:

- Identify and describe mechanism involved in Glucose reabsorption
- Study glucose titration curve in terms of renal threshold, tubular transport maximum, splay, excretion and filtration
- Identify the tubular site and describe how Amino Acids, HCO_3^-, $P0_4^-$ and Urea are reabsorbed
- Describe the movement of Urea into and out of the renal tubules

Lecture 6: Concentration of Urine & Countercurrent mechanism

At the end of this session, the students should be able to;

- Identify and describe that the loop of Henle is referred to as countercurrent multiplier and the loop and vasa recta as countercurrent exchange systems in concentrating and diluting urine
- Explain what happens to osmolarity of tubular fluid in the various segments of the loop of Henle when concentrated urine is being produced.
- Explain the factors that determine the ability of loop of Henle to make a concentrated medullary gradient
- Differentiate between water diuresis and osmotic diuresis
- Appreciate Clinical Correlates of diabetes mellitus and diabetes insipidus

Lecture7: Renal regulation of Body fluids volume and osmolarity

At the end of this session, the students should be able to:

- Identify and describe the role of the Sensors and Effectors in the renal regulation of body fluid volume
- Identify and describe the role of the Sensors and Effectors in the renal regulation of body fluid osmolality

Lecture 8: Micturition and Kidney Diseases

At the end of this session, the students should be able to:

- Identify and describe the Functional Anatomy of Urinary Bladder
- Describe the mechanism of filling and emptying of the urinary bladder
- Appreciate neurogenic control of the mechanism of micturition and its disorders.
- Describe acute and chronic renal failure and their effects on body.