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Certified Hemodialysis Technologist/Technician (CHT) exam

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Question: 1

Peritoneal dialysis (PD) differs from hemodialysis in which of the following ways?

A. PD requires both vascular access and abdominal access
B. PD cannot be done at home
C. PD access is by an intra-abdominal catheter
D. Sterile dialysate is not required for PD

Answer: C

Explanation:
Hemodialysis requires vascular access since the blood flows out of the patient, through the dialysis machine's semipermeable membrane, and then back into the patient. The membrane keeps certain waste products or excess water from returning to the patient, while electrolytes and blood cells are returned. Peritoneal dialysis is performed with an intra-abdominal catheter without blood ever leaving the body. Vascular access is not required. The blood vessels of the abdominal cavity act as a filter similar to the semipermeable membrane used in hemodialysis. Peritoneal dialysis may be performed at home with a cycler machine to exchange fresh sterile dialysate, often overnight 7 days a week. Manual exchange of dialysate may also be done.

Question: 2

The main difference between an arteriovenous shunt (AVS) and an arteriovenous fistula (AVF) is an:

A. AVS is entirely within the arm.
B. AVF is entirely within the arm.
C. AVF is more likely to become clotted or infected.
D. AVF requires an external tube.

Answer: B

Explanation:
Since hemodialysis must be carried out repetitively, usually three times a week for 4 hours, repeated vascular access is required. Arterial blood is sent to the dialyzer and returned to the patient by an arm vein. Arteriovenous shunts connect the artery and vein by an external tube, which has a connecting port so that blood may be sent to the dialysis machine from the artery and returned to the vein. These shunts are subject to infection and clotting so that surgically implanted arteriovenous fistulas were developed, which connect artery and vein entirely within the arm. These are still standard for most dialysis patients.

Question: 3

Which of the following dialyzers is used currently?

A. Kiil
B. Flat plate
C. Coil
D. Hollow tube

Answer: D

Explanation:
Dialysis machines have evolved since their initial frequent use in the 1960s. The initial type, the so-called Kiil, consisted of 70 lb. flat plates covered by sheets of cellophane. They required cleaning and storage after each use, and membranes had to be replaced. The coil dialyzer was supported by a mesh screen coiled around a central core. It required complete sterilization with a large amount of blood in a canister that was bathed in the dialysate. The Gambro flat plate dialyzer used a new membrane type named cuprophane. These early machines were replaced by the so-called hollow fiber dialyzer, which is the type in use today. In this model, the blood flows through tiny hollow tubes (fibers) while the dialysate flows around the outside of these fibers. Biocompatible membranes, sophisticated alarms, and automatic functions characterize the modern dialyzer.

Question: 4

Which of the following kidney structures connects with and delivers urine directly to the ureter?

A. Pelvis
B. Calyx
C. Glomerulus
D. Cortex

Answer: A

Explanation:
The kidney is a fist-sized bilateral organ with a tough outer capsule. The most external portion of the organ is called the cortex. The renal medulla or interior portion of the kidney contains sections called pyramids with points referred to as papillae. Each papilla delivers urine into a receptacle-like calyx, which then transmits urine into the renal pelvis. The pelvis connects to the ureter and delivers urine for excretion. The functional unit of the kidney is the nephron, present in the cortex and extending into the medulla. The nephron is composed of a glomerulus, a tangled bunch of capillaries, which produces the glomerular filtrate, and a renal tubule, which acts on the filtrate to reabsorb water and exchange electrolytes. Blood is conducted to the glomerulus via an afferent arteriole and is filtered by the glomerular capillaries, which retain blood cells and large molecules, such as proteins. The blood is then returned by way of an efferent arteriole.

Question: 5

The glomerular filtration rate is an important index of renal function and in the normal adult is approximately:

A. 50 mL/min/1.73 m2.
B. 75 mL/min/1.73 m2.
C. 125 mL/min/1.73 m2.
D. 200 mL/min/1.73 m2.

Answer: C

Explanation:
The normal adult has a glomerular filtration rate (GFR) of about 125 mL/min, although there is some variability due to age and sex. Clinically, this value is often expressed as GFR/m2 body surface area. It is usually measured by the so-called creatinine clearance in which blood and urine creatinine concentrations and the urine volume are measured, and the GFR calculated. Little creatinine is reabsorbed by the renal tubules, thus making it a valuable standard for estimating glomerular function. In end stage renal disease, the GFR is often below 15 mL/min/1.73 m^2, and dialysis is required. Many drugs are excreted by the kidneys, and dosage adjustments based on GFR are often necessary.

Question: 6

All of the following substances are produced by the kidney EXCEPT:

A. renin.
B. aldosterone.
C. erythropoietin.
D. calcitriol.

Answer: B

Explanation:
In addition to its role in water and electrolyte balance and acid-base control, the kidney also produces substances that are of importance in erythropoiesis, vitamin D metabolism, and blood pressure control. Production of the hormone erythropoietin by juxtaglomerular renal cells is important in controlling red blood cell production in the bone marrow. In the presence of anemia, the resulting hypoxia stimulates the hypoxia-inducible transcription factor in these cells, and increased amounts of erythropoietin are produced. A decrease in renal perfusion leads to increased production of renin by the kidney; this enzyme catalyzes the conversion of angiotensinogen to angiotensin 1, which is subsequently converted to angiotensin 2 by an angiotensin-converting enzyme. The latter stimulates aldosterone secretion by the adrenal gland. The renin-angiotensin-aldosterone system is of great importance in the regulation of blood pressure. The active form of vitamin D, calcitriol, is also produced in the kidney.

Question: 7

The most likely cause of post-renal failure is:

A. severe dehydration.
B. nephrotoxic drug.
C. glomerulonephritis.
D. benign prostatic hypertrophy.

Answer: D

Explanation:
Acute renal failure (ARF) is usually classified by the anatomic location of the damage. Pre-renal failure typically is caused by hypotension, resulting from trauma, dehydration, or blood loss in which the renal blood flow is markedly diminished. Intrarenal failure is caused by intrinsic kidney diseases, such as glomerulonephritis or renal toxic drugs, such as certain antibiotics, chemotherapy agents, or radiologic contrast materials. Post-renal failure may be caused by problems distal to the kidney that cause obstruction to urine flow, such as ureteral calculi, kinked ureter, neoplastic invasion, or prostatic hypertrophy in men. ARF may proceed to chronic renal failure but may resolve with careful medical treatment and sometimes hemodialysis.

Question: 8

The most common cause of chronic kidney disease in the United States is:

A. diabetes.
B. hypertension.
C. glomerulonephritis.
D. polycystic kidney disease.

Answer: A

Explanation:
Diabetes mellitus is the commonest cause of chronic renal failure (CRF) in the United States. Because of the obesity epidemic, type 2 diabetes (90% of diabetic patients) is on the rise, and thus, there may be even more cases of CRF in the future. Diabetic nephropathy is most likely caused by endovascular damage to the renal vessels. Hypertension is the second leading cause of CRF. It is most often of the so-called essential type in which the exact cause is unknown. In the first few years of this decade, about 27% of patients on dialysis had kidney failure as a result of hypertension. Renal disease or renal artery stenosis may also cause hypertension with its deleterious effects. Additional causes of CRF include glomerular diseases and polycystic disease. Less common causes of CRF are cancer, kidney infections, AIDS, systemic lupus erythematosus, and sickle cell disease.

Question: 9

Which of the following conditions is LEAST likely to be caused uremia?

A. Itching
B. Edema (swelling) of the extremities
C. Anemia
D. Urinary tract infection

Answer: D

Explanation:
Uremia is the term given to a constellation of symptoms resulting from kidney failure, with a resultant buildup of waste products in the circulation (e.g., urea), Some of the typical symptoms include fatigue (often resulting from anemia, which is common in chronic renal disease), itching, myalgias, dyspnea or edema from fluid retention, skin pallor or yellowish cast, foamy urine (due to protein), and nocturia. Loss of protein in the urine greater than 3.5 g/d is referred to as the nephrotic syndrome and may be a cause of excessive fluid retention. Often these symptoms develop gradually so frequent inquiry of the patient is indicated. Hemodialysis may improve uremic symptoms, but it only reproduces about 15% of normal kidney function; thus, an increased frequency and duration of hemodialysis may be indicated if the symptoms persist. Urinary tract infections are caused by the introduction of bacteria, not by uremia.

Question: 10

All of following conditions are associated with chronic kidney failure EXCEPT:

A. low hemoglobin.
B. hypoparathyroidism
C. hyperkalemia.
D. hyperphosphatemia.

Answer: B

Explanation:
Numerous abnormalities of the blood, protein, and electrolytes occur in chronic renal failure. Anemia is very common due to frequent blood loss with resulting iron deficiency and diminished secretion of erythropoietin by the diseased kidney. Calcium absorption is impaired due to inadequate calcitriol, and phosphate is not adequately excreted by the tubules, resulting in elevated phosphate levels. A low calcium evel stimulates the parathyroid gland to produce more parathyroid hormone, producing so-called secondary hyperparathyroidism. This may result in calcium deposition in the heart and blood vessels. Elevated potassium levels are also quite common in these patients and may be life-threatening.

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