1138. Elevated exhaled carbon dioxide may be due to which of the following?

a. Increased dead space ventilation
   Dead space is the area of the lung that are ventilated but not perfused. Increased dead space ventilation would lead to a decrease in exhaled carbon dioxide.

b. Hypothermia in a non-shivering patient
   Hypothermia in a non-shivering patient leads to a decrease in metabolic rate and thus a decrease in carbon dioxide production. Decreased carbon dioxide production results in decreased exhaled carbon dioxide.

c. Compensated metabolic alkalosis
   An increase in arterial carbon dioxide as part of a compensatory reaction to metabolic alkalosis, would result in an increase in exhaled carbon dioxide.

d. Major pulmonary embolism
   Decrease in pulmonary blood flow due to a large pulmonary embolus would decrease exhaled carbon dioxide.

e. Decrease in cardiac output
   A decrease in cardiac output would cause a decrease in exhaled carbon dioxide due to a decrease in perfusion.

Correct answer is: c

Anesthesia: Inhalational Anesthesia: Effects of Inhalational Anesthesia on Organs and Systems:
Respiratory System: Carbon Dioxide
Reference: page 692

1154. The most important mechanism related to heat loss during anesthesia is by:

a. Radiation
   Radiation is the loss of energy (heat) in the form of electromagnetic radiation to cooler objects in the room. It is responsible for 60-70% of the body's heat loss.

b. Conduction
   Conduction represents loss of heat to objects in contact with the patient's body. This effect is small unless objects become wet.

c. Convection
   Convection is loss of heat due to air currents crossing the patient. This effect is minimized by simply covering the patient.

d. Evaporation
   Evaporation is heat loss due to insensible fluid losses, sweating and humidification of airway gases. After radiation, it is the most significant form of heat loss.

e. Unwarmed gases
   Failure to warm gases can lead to a significant loss because airway humidification represents 25% of heat loss.

Correct answer is: a

Anesthesia: Inhalational Anesthesia: Effects of Inhalational Anesthesia on Organs and Systems:
Temperature
Reference: page 695
1157. Local anesthetics exert their pharmacologic effect by acting on which of the following anatomic locations?

a. Neuron cytoplasm
   Local anesthetics exert their effects by blocking sodium channels present on the nerve cell membrane.

b. Neuron mitochondria
   Local anesthetics exert their effects by blocking sodium channels present on the nerve cell membrane.

c. Neuron membrane sodium ion channels
   Sodium ions move through specialized pores or channels. This process is related to membrane stabilization. Local anesthetics block these pores preventing propagation of electrical impulses.

d. Axonal transport system
   Local anesthetics exert their effects by blocking sodium channels present on the nerve cell membrane.

e. Neural junction
   Local anesthetics exert their effects by blocking sodium channels present on the nerve cell membrane.

Correct answer is: c

Anesthesia: Conduction Anesthesia: Pharmacodynamics
Reference: page 700

1163. The duration of a local anesthetic is related to all of the following EXCEPT:

a. The pKa of the local anesthetic
   This is false. The pKa of a local anesthetic is most closely associated with the speed of onset and not the duration of action.

b. Protein binding
   This is true. Highly protein bound local anesthetics have long durations of action. Please choose another answer.

c. The addition of vasoconstrictors
   This is true. The addition of vasoconstrictors decreases the uptake of local anesthetics into the bloodstream, thereby increasing the duration of action. Please choose another answer.

d. Location of injection.
   This is true. Local anesthetics injected into highly vascular areas such as the epidural space tend to be taken up in the bloodstream and metabolized quickly. Local anesthetics injected into areas with less vascularity will have a longer duration. Please choose another answer.

e. Mass of the drug injected
   This is true. The product of the concentration and the volume of the drug is the mass of the drug. The larger the mass of the drug injected, the longer the duration of action. Please choose another answer.

Correct answer is: a

Anesthesia: Conduction Anesthesia: Pharmacokinetics
Reference: page 700
1166. The decrease in blood pressure immediately after the performance of a spinal anesthetic is most likely due to:

a. Decreased venous tone and preload
   Spinal anesthesia produces a dramatic decrease in venous tone resulting in a decreased preload. In addition, there is a moderate decrease in systemic vascular resistance.

b. Direct trauma to the spinal cord
   Direct spinal cord trauma would be a very rare occurrence as spinal anesthesia is traditionally performed at a level below the termination of the spinal cord.

c. Myocardial ischemia
   Although myocardial ischemia may be a cause of hypotension, the most common reason for the above presentation would be decreased venous return due to the spinal anesthetic.

d. Local anesthetic toxicity
   Local anesthetic toxicity is very rare during spinal anesthesia given the relatively small volume of drug administered.

e. Left ventricular volume overload
   Left ventricular volume overload would be a rare cause of hypotension in the situation presented. A spinal anesthetic would decrease symptoms of left ventricular volume overload.

Correct answer is: a

Anesthesia: Conduction Anesthesia: Neuraxial Blockade
Reference: page 271

607. Administration of exogenous erythropoietin:

a. Is appropriate treatment for the anemia of chronic renal failure
   The anemia of chronic renal failure has many causes, one of which is decreased or absent production of erythropoietin. The administration of erythropoietin causes a dose-dependent rise in hematocrit.

b. Does not allow more frequent blood donation
   The administration of erythropoietin allows more frequent blood donation.

c. Will not cause polycythemia in normal individuals
   Progenitor cells are sensitive to the administration of erythropoietin and produce increased reticulocytes even in the face of a normal hematocrit. Exogenous erythropoietin can thus stimulate a polycythemia.

d. Has no effect on the anemia of chronic disease
   Anemia of chronic disease is associated with low levels of endogenous erythropoietin and responds to exogenous administration.

e. Corrects the uremic bleeding diathesis
   The bleeding diathesis in uremia is due to abnormal platelet function. Although erythropoietin does stimulate platelet production, the platelet function will be abnormal secondary to the uremia. The main treatment of uremic bleeding is dialysis.

Correct answer is: a

Hematology (Clinical uses of erythropoietin)
Reference: page 550
609. Which of the following statements is correct concerning the ASH genotype?

a. Is determined by two genes
   Each allele produces a co-dominantly inherited enzyme.

b. Results in six possible phenotypes
   There are six possible genotypes, but only four phenotypes. (AA/AH=A; BB/BH = B; AB;HH=0).

c. Has an equal frequency of all genotypes
   Type O occurs in 47% of population; Type A- 41%; Type B-9%; Type AB - 3%.

d. Can be determined in all cases by routine blood typing
   Routine blood typing determines the phenotype, not the genotype. For example, routine blood typing
determines that an individual is blood type A (phenotype). The genotype of that patient could be
either AA or AH.

e. Is linked to the Rh system
   the Rh system pertains to separate red cell surface antigens. There are six common antigens in this
system, but the "Rh positive or negative blood" refers to the presence or absence of the D
antigen.

Correct answer is: a  
Section on The ASH system
Reference: page 552

1068. Responses to acute anemia include:

a. an increase in heart rate
   This is one of the first clinical signs of significant hemorrhage or an acute anemia.

b. a decrease in stroke volume
   Cardiac output increases by increase in stroke volume as well as heart rate, in response to
adrenergic stimulation.

c. decreased tissue oxygen extraction
   Increased oxygen extraction is observed.

d. coronary artery vasoconstriction
   Coronary artery vasodilation is observed.

e. decreased reliance on the dissolved component of DO2
   As hematoctrit falls below critical levels, the dissolved component of DO2 assumes increasing
importance.

Correct answer is: a  
Physiologic Response to Anemia and Transfusion
Reference: page 559
1076. Transfused red blood cells:
   a. Have a higher oxygen affinity than native red blood cells
      Transfused erythrocytes have a higher oxygen affinity and hence do not release oxygen to the
      tissues as well.
   b. Immediately restore oxygen consumption to critical tissues
      Because transfused erythrocytes are less able to release oxygen, restoration of oxygen delivery and
      hence consumption is delayed.
   c. Have a better ability to pass through the microcirculation
      Stored erythrocytes are less deformable and hence less able to traverse the microcirculation
   d. Shift the oxygen-hemoglobin dissociation curve to the right
      The decrease in 2,3 DPG results in a shift to the left.
   e. Correct answer is: a

Hematology: Storage Defects
Reference: page 557

1079. Massive transfusion:
   a. Is defined as transfusion of at least one blood volume within 24 hours
   b. Leads to a clinically-significant dilutional coagulopathy in all cases
      Clinically significant coagulopathy is less common than previously thought, due to ability of
      individual to compensate.
   c. Is characterized by elevations in D-dimer levels
      D-dimer levels are elevated in DIC but normal in the dilutional coagulopathy sometimes seen after
      massive transfusion; this is one of the points used to differentiate the two entities.
   d. Does not produce toxic levels of citrate
      Metabolic effects of citrate may be observed with massive transfusion.
   e. Is the recommended treatment for DIC
      The treatment of DIC involves treating the underlying cause and selectively correcting the
      coagulopathy.
   e. Correct answer is: a

Hematology: Massive Transfusion
Reference: page 563