The hazards of surgical smoke

1. The odor of surgical smoke is caused by:
   1. a psychogenic response to the presence of smoke
   2. chemical byproducts of tissue pyrolysis and destruction
   3. a natural consequence of the warming up of the tissue
   4. entirely by the production of carbon monoxide

2. Most of the particulate matter within carbon dioxide laser-produced surgical smoke is smaller than:
   1. 0.1 µm
   2. 1.1 µm
   3. 5 µm
   4. 12 µm

3. Research has demonstrated that surgical smoke can contain:
   1. particulate matter that is usually 5 µm in size
   2. an odor caused only by carbon monoxide
   3. intact viral deoxyribonucleic acid (DNA)
   4. carboxyhemoglobin

4. Some of the toxic gases within surgical smoke are known carcinogens including:
   1. benzene, toluene, acrolein
   2. methane, propene, free radicals
   3. carbon monoxide, butene, acetylene
   4. isobutene, methane, phenol

5. Which of the following filters is usually present in a modern surgical smoke evacuator?
   1. high efficiency particulate air (HEPA) filter
   2. prefilter
   3. ultra-low-penetration air (ULPA) filter
   4. Occupational Safety and Health Administration (OSHA) approved N-95 filter

6. What type of filter is needed to remove the odor caused by surgical smoke?
   1. ULPA filter
   2. HEPA filter
   3. special prefilter
   4. charcoal filter

7. The 3 systems available to remove surgical smoke are:
   1. in-line filter, smoke evacuator, centralized smoke evacuation system
   2. smoke evacuator, suction line, air circulation
   3. suction line, in-line filter, centralized smoke evacuation system
   4. smoke evacuator, Gomco suction, in-line filter

8. Surgical smoke should not be evacuated directly into the suction line within a surgical suite because:
   1. the suction flow is too forceful from the wall or ceiling suction
   2. particulate matter from the surgical smoke can occlude and corrode the suction pipes and contaminate the building
   3. a wall or ceiling suction is not always available
   4. a smoke evacuator is always available

9. A regular surgical mask usually filters particulate matter down to ____ µm in size, while a high filtration surgical mask filters down to ____ µm in size.
   1. 3 µm, 0.5 µm
   2. 5 µm, 0.1 µm
   3. 5 µm, 3 µm
   4. 3 µm, 0.12 µm

10. An in-line suction filter should be placed:
    1. only between the suction canister and the patient
    2. anywhere along the suction tubing
    3. only between the suction canister and wall outlet
    4. at the end of the suction wand
11. What advantages of effective pain relief have been demonstrated in addition to patient comfort?
   1. faster payment of hospital bills after discharge
   2. fewer unplanned hospital admissions after outpatient surgery
   3. reduction in pulmonary and vascular complications
   4. lower average plasma cortisol levels

12. Which types of stimuli are nociceptors normally triggered by?
   1. humoral, hormonal, pH (acid base)
   2. noxious, painful
   3. mechanical, thermal, chemical
   4. somatic, visceral

13. Hyperalgesia is caused by:
   1. excessive stimulation of the nociceptor
   2. nociceptor adaptability
   3. polymodal stimulation of the nociceptor
   4. genetic defect in the nociceptor

14. One type of sensory hypersensitivity is allodynia, which is defined as:
   1. a lower pain threshold
   2. an increased response to noxious stimuli
   3. pain produced by a stimulus that would not normally produce it
   4. pain produced by a combination of all 3 types of stimuli

15. Secondary hyperalgesia is a hypersensitivity to pain:
   1. that occurs after the wound is healed
   2. due to an unusually nonpainful stimulus
   3. in undamaged tissue surrounding injured area
   4. due to excessive patient preoccupation with pain

16. What effect does continuous noxious stimuli have on the endocrine system?
   1. breakdown of antidiuretic hormone to amino acids
   2. decreased aldosterone levels
   3. hypoglycemia
   4. increased cortisol levels

17. What fraction of the dose of morphine necessary to alleviate pain after the development of postoperative hyperalgesia is needed to prevent the formation of central hypersensitivity?
   1. same dose
   2. half the dose
   3. one tenth the dose
   4. one thousandth the dose

18. Which of the following gives evidence of preemptive analgesia?
   1. epidural morphine gives better analgesia than same dose of intramuscular morphine
   2. spinal fentanyl after noxious stimulus gives better analgesia than epidural fentanyl before noxious stimulus
   3. analgesic given before noxious stimulus gives better analgesia than same analgesic given after the noxious stimulus
   4. combination of opioids and nonsteroidal anti-inflammatory drugs (NSAIDs) gives better analgesia than opioids alone

19. Administering epidural morphine to lumbar laminectomy patients before surgical incision rather than after the completion of surgery has been shown to delay the first request for postoperative pain medication from ___ hours, in the late administration group, to ___ hours in the early administration group.
   1. 10 hours, 12 hours
   2. 8.5 hours, 20 hours
   3. 10 hours, 48 hours
   4. there is no difference in the time to first request for pain medication

20. What changes in postoperative pain have been observed in patients who have received either ketamine or fentanyl along with pentothal for induction of general anesthesia compared with those who received only thiopental?
   1. patients who received thiopental and ketamine needed no postoperative meperidine
   2. patients who received only thiopental needed roughly twice as much meperidine postoperatively
   3. patients who received thiopental and fentanyl had no change in postoperative meperidine requirements
   4. patients who received only thiopental needed less meperidine postoperatively

Asthma: An anesthetic update

21. Common features of an asthmatic episode in the awake patient include all EXCEPT:
   1. chest tightness
   2. malaise
   3. tachypnea
   4. dyspnea

22. Features of an asthmatic episode in the anesthetized patient commonly include:
   1. mucus hypersecretion
   2. high inspiratory pressure
   3. hypoxemia
   4. all of the above

23. From 1980 to 1996, the number of Americans with asthma increased by:
   1. 10%
   2. 25%
3. 50%
4. 75%

24. Which of the following biochemical mediators produces airway edema, bronchoconstriction, and mucus hypersecretion and is central to the pathogenesis of asthma?
1. calcium ions
2. antitrypsin
3. leukotrienes
4. adhesion molecules

25. Which of the following statements is true regarding nonimmunologic asthma?
1. patients usually demonstrate elevated serum IgE
2. associated with a strong family history of asthma
3. accounts for more than 50% of asthma cases
4. none of the above

26. Which of the following drugs is most useful when treating acute bronchospastic attacks?
1. theophylline
2. β₂ agonists
3. mast cell inhibitors
4. leukotriene modifiers

27. Which of the following drugs is most useful when treating persistent asthma episodes?
1. corticosteroids
2. β₂ agonists
3. mast cell inhibitors
4. leukotriene modifiers

28. Which of the following should be avoided in the anesthetized pregnant asthmatic patient?
1. ephedrine
2. antacids
3. high concentrations of oxygen
4. parenteral β₂ agonists

29. Which of the following induction drugs is a bronchodilator?
1. thiopental
2. ketamine
3. etomidate
4. thiamylal

30. All of the following neuromuscular blocking agents are associated with histamine release EXCEPT?
1. mivacurium
2. atracurium
3. rocuronium
4. curare

31. The primary reason(s) for the increase in the prevalence of latex allergy in healthcare workers (HCWs) are:
1. routine use of latex gloves
2. alterations in glove production
3. improved diagnosis and treatment
4. all of the above

32. The most common reaction reported in HCWs wearing latex gloves is:
1. type I sensitivity reaction
2. type IV sensitivity reaction
3. irritant contact dermatitis
4. rhinitis and asthma

33. In an operating room, the primary source of allergens for HCWs is:
1. exposure to latex surgical equipment
2. aerosolization of latex particles from gloves
3. protective masks manufactured from latex
4. residual latex particles in the environment

34. The cause of IgE-mediated reactions from exposure to latex products is:
1. hypersensitivity to cornstarch powder
2. chemical reaction from compounding agents
3. low molecular weight soluble proteins
4. exposure to antioxidant solutions

35. Which of the following food products has a high degree of cross-sensitivity with latex allergy?
1. avocado
2. melon
3. grape
4. peanut

36. The most significant factor(s) that contribute to latex sensitivity in HCWs is/are:
1. frequency and duration of exposure
2. latex protein source
3. amount of latex protein in the product
4. all of the above

37. The most sensitive clinical test to detect IgE antibodies is:
1. AlaSTAT
2. CAPS
3. skin prick test
4. Hycor

38. Which of the following synthetic gloves has the least effective barrier protection?
1. nitrile
2. neoprene
3. vinyl
4. styrene
39. One effective strategy to reduce the level of latex allergen in an operating room environment is the use of:
1. laminar air flow
2. low-allergen latex gloves
3. chemical disinfectants
4. barrier protective masks

40. One of the most promising clinical advances in the treatment of latex allergy that can provide elimination of symptoms is:
1. immunotherapy
2. pharmacotherapy
3. skin allergy testing
4. latex-reduced environments

**Thermoregulation: Anesthetic and perioperative concerns**

41. What type of heat loss is described as “the loss of energy through radiant electromagnetic waves in the infrared spectrum involving no direct contact”?
1. evaporation
2. conduction
3. convection
4. radiation

42. Since water is capable of holding a large amount of heat energy, surgical patients experience massive heat loss through:
1. humidifying dry gases then exhaling out the scavenger
2. evaporation from large thoracic or abdominal incisions
3. infusion of intravenous fluids
4. sweating from excessive surgical draping

43. Heat redistribution from the core to periphery that occurs during the first 45 to 90 minutes after induction of general anesthesia can reduce measured core temperature by up to:
1. 0.5°C
2. 1°C
3. 1.5°C
4. 2°C

44. Which of the following statements concerning the effects of anesthetic agents on the body’s ability to regulate temperature is correct?
1. nitrous oxide depresses the vasoconstriction threshold greater than equal concentrations of isoflurane
2. induction of anesthesia with propofol causes less peripheral vasodilation than induction with an inhalation agent
3. the vasoconstriction threshold is reduced 3°C/percent isoflurane
4. patients induced with ketamine were a full degree cooler 60 minutes after induction compared with patients induced with propofol

45. What is the most effective noninvasive method of patient warming?
1. circulating water mattress
2. heated humidifier in the breathing circuit
3. heat and moisture exchanger in breathing circuit
4. forced-air warming blanket

46. How much longer does atracurium neuromuscular block last in a patient who is 34°C compared with one who is normothermic?
1. no difference, it does not depend upon organ elimination
2. 50% longer
3. 150% longer
4. 50% shorter

47. Hypothermia affects the activity of which of the following?
1. prothrombin time (PT) only
2. PT and platelets only
3. platelets and partial thromboplastin time (PTT) only
4. PT, PTT, and platelets

48. Which of the following statements reflects the reported incidence of angina in postoperative vascular surgery patients comparing hypothermic and normothermic patients?
1. incidence of angina was 50% in hypothermic patients compared with 25% in normothermic patients
2. incidence of angina was 18% in hypothermic patients compared with 1.5% in normothermic patients
3. incidence of angina was 7% in hypothermic patients compared with 3% in normothermic patients
4. there was no difference in the incidence of angina in hypothermic patients compared with normothermic patients

49. The likelihood of burning a patient during active warming is a function of which of the following factors?
1. fuel source, ignition source, oxygen
2. temperature, skin surface circulation, duration of exposure
3. type of warming device and temperature setting
4. rate of heat transfer and part of body applied to

50. According to a 1994 closed claims study, the majority of burns that occurred during anesthesia were caused by:
1. a warm intravenous bag placed against the skin
2. placing a forced-air warmer hose under the drapes
3. setting circulating warming mattresses on high
4. leaving patients being warmed unattended

A pathway toward safer anesthesia: Stereochemical advances

51. All the following are types of stereoisomers EXCEPT:
   1. geometric
   2. structural
   3. optical
   4. conformational

52. Stereochemistry deals primarily with:
   1. the interactions of compounds not originating within the plant or animal kingdoms
   2. the affinity of molecules for water
   3. the spatial arrangement of atoms and/or molecules and the resultant physical properties
   4. catalytic properties of organometallic compounds

53. Optical isomers are defined as:
   1. structurally superimposable molecules
   2. molecules that are able to twist, contort, or fold
   3. identical 2-dimensional compounds that change the direction of polarized light
   4. molecules with identical structural and empirical formulas with different 3-dimensional spatial arrangements of atoms and/or molecules

54. Stereoselectivity refers to:
   1. incomplete receptor agonism
   2. administration of auditory medications
   3. receptors are able to distinguish between stereoisomers
   4. left-handed chiral compounds

55. Potential benefits of stereochemically pure medications include all the following EXCEPT:
   1. greater safety index
   2. increased medication cost(s)
   3. minimizing toxic effects
   4. increased potency

56. Levobupivacaine appears to:
   1. be equally potent with similar onset and duration of action compared with bupivacaine
   2. demonstrate increased central nervous system toxicity
   3. produce more seizures and apnea compared with bupivacaine
   4. be less potent than bupivacaine

57. Geometric isomers:
   1. have identical empirical and structural formulas
   2. arise from restricted molecular rotation around a carbon
   3. are always chiral compounds
   4. only act as catalysts

58. Optical isomers:
   1. are biologically useful only as the + enantiomer
   2. are exclusively R and L- designated enantiomers
   3. have 2 independent descriptive designators
   4. are always designated as S and D- together

59. As 1 of 10 geometric isomers of atracurium, cisatracurium demonstrates all of the following EXCEPT:
   1. is 5 times more potent
   2. produces significantly less histamine release
   3. degradation
   4. causes 5 times higher laudanosine plasma levels

60. Dexmedetomidine, the dextrorotatory optical isomer of medetomidine, is accurately described by all the following EXCEPT:
   1. is a potent alpha_2-adrenoceptor agonist
   2. produces significant sedation, analgesia, and anxiolysis
   3. is an imidazole compound
   4. results in profound respiratory depression and hypotension