Visceral Pain

I. Characteristics of visceral pain
   A. Know the distinct clinical features of visceral pain (Vecchiet et al 1993; Mayer and Gebhart 1994; Gebhart 1995; Cervero and Laird 1999).
      1. Be aware of the diffuse localization of visceral pain and referral to somatic sites.
      2. Be aware of mechanistic differences between somatic and visceral pain.
      3. Be aware of the relationship between the clinical features of visceral pain and the underlying neurobiology.
   B. Know the general organization of the visceral pain system.

II. Peripheral mechanisms (Cervero 1994; Gebhart 2000)
   A. Know the anatomical organization of visceral innervation.
      1. Be aware of differences in innervation between visceral and somatic structures.
      2. Be aware of differences in density of innervation between visceral and somatic structures.
   B. Know the properties of visceral nociceptors (Ness and Gebhart 1990).
      1. Be aware that stimuli adequate for activation of visceral nociceptors differ from stimuli adequate for activation of somatic nociceptors.
      2. Be aware of location in tissue of visceral nociceptors.
      3. Be aware that visceral nociceptors are polymodal.
      4. Be aware of the neurochemistry of visceral sensory neuron cell bodies.

III. Central mechanisms (Ness and Gebhart 1990; Cervero and Laird 1999)
   A. Know pattern of termination of visceral afferent fibers in the spinal cord.
      1. Be aware of differences in the areas of spinal cord projection between visceral and somatic nociceptors.
      2. Be aware of differences in segmental distribution and spread between visceral and somatic nociceptors.
   B. Know properties of spinal neurons that receive visceral input.
      1. Be aware of viscerosomatic and viscero-visceral convergence onto spinal neurons.
      2. Be aware of convergent cutaneous receptive fields of visceroreceptive spinal neurons.
   C. Know mechanisms of central sensitization of visceroreceptive spinal neurons.
      1. Be aware of the role of neuroactive peptide transmitters (e.g., substance P and calcitonin gene-related peptide) and excitatory amino acids in central sensitization of visceroreceptive spinal neurons.
2. Be aware of second-messenger pathways in visceroreceptive spinal neurons (e.g., nitric oxide, MAP kinase, etc.) in central sensitization of visceroreceptive spinal neurons.

D. Know ascending pathways in the spinal cord that convey visceral nociceptive information to supraspinal sites.
   1. Be aware of the spinothalamic pathway.
   2. Be aware of the dorsal column pathway.

E. Know the differences in supraspinal sites that receive visceral and cutaneous nociceptive input.

IV. Visceral pain modulation
   A. Know descending modulatory influences on visceroreceptive spinal neurons.
   B. Know peripheral and central mechanisms of visceral pain modulation.

REFERENCES