Preoperative Evaluation

Remember you are getting the patient ready more for the anesthesia and the post op course than the actual procedure.

OBJECTIVES

- 1. Define and explain the mnemonic AMPLE
- 2. Define the terms acute, sub acute and chronic.
- 3. Define the terms mortality and morbidity.
- 4. Identify the different types of cardiac stress testing and their significance to preop evaluation.

OBJECTIVES

- 5. Define a MET in relation to functional capacity
  - Identify those actions pertaining to 1 MET, 4 MET, and 10 MET.
- 6. Discuss the importance of preoperative Cervical spine assessment and clearance.
- 7. Identify signs and symptoms of autonomic Hyperreflexia.

OBJECTIVES

- 8. Identify and discuss the 5 “W’s” of post op fever.
- 9. Identify the causes of Decubitus ulcers.
- 10. Identify the most common cause of Ileus.
- 11. Identify the risk factors associated with Ileus.
- 12. Discuss the treatment of Ileus.

What Questions should be asked?

- A comprehensive history should be performed when and where possible.
- In emergent situations, the mnemonic AMPLE should be followed.
- A llergies
- M edications
- P ast medical history
- L ast meal
- E vents preceding the emergency

ALLERGY

- Should include not only food and medications but also problems with anesthesia and anesthetic agents.
- Difficulty with intubation, malignant hyperthermia, or previous reaction to an anesthetic agent.

Medications

- Identify any medication that may cause increased bleeding tendencies such as aspirin, warfarin (coumadin), alcohol, NSAIDS, chemotherapeutic agents, and anti-platelets drugs (plavix, effient).
- Necessary in those patient undergoing procedures on the central nervous system, cardiothoracic, urological, or regional anesthesia.

PAST MEDICAL HISTORY

- Identify conditions that significantly alter the surgical risk.
- These include cardiopulmonary disease, endocrine disorders, cirrhosis, renal disease, immunosuppression, and previous surgical procedures.

LAST MEAL

- When and what did they eat are two important questions to have answered.

EVENTS

- Focus on the seven cardinal signs of the symptom.
- Location of the complaint
- Quality of the symptom
- Quantity or severity
- Timing
- Setting
- Alleviating or aggravating factors
- Associated complaints
- Determine if the complaint is acute, subacute, or chronic.

ACUTE

- **Definition:** Acute is the medical term for an illness or medical problem that begins and progresses rapidly. It may also refer to an illness that begins and ends quickly. An acute illness usually starts and becomes a problem, sometimes a serious problem, very quickly.
- An example of an acute illness is a heart attack. A person may be fine one moment, but having a life-threatening medical emergency mere minutes later, requiring emergency medical attention.

CHRONIC

- **Definition:** From the Greek word *khronos*, which means lasting for a long time.
- Medical providers use the word chronic to describe symptoms, diseases or conditions that affect a patient for three months or longer, such as chronic pain, chronic fatigue or chronic indigestion. It can also be used to describe symptoms or problems that recur over a span of time (flares).
- Chronic medical problems that don't have the word "chronic" in them include heart disease, MS or multiple sclerosis, diabetes, or any condition or disease that can't be cured and instead must be managed.

SUBACUTE

- The term "sub acute" refers to a medical problem that is not exactly acute or chronic, rather somewhere in between.
- Pertaining to a disease or other abnormal condition present in a person who appears to be clinically well.

ELECTIVE PREOPERATIVE EVALUATION

- No documentation exists that links a reduction in mortality and morbidity to routine laboratory testing in otherwise healthy patients undergoing elective surgical procedures.

MORTALITY

- **Perioperative mortality** is mortality in relation to surgery, often defined as death within two weeks of a surgical procedure.
- An important consideration in the decision to perform any surgical procedure is to weigh the benefits against the risks

MORBIDITY

- *Morbidity* is a state of illness or lack of health that includes physical, mental, or emotional disability.
- *Operative morbidity* is the temporary or permanent disability observed during and after an operation. In The STS and EACTS Congenital Heart Databases, operative morbidity is defined as any morbidity that occurs during the time interval between OR Entry Date and Time and the end of the period of data collection.
- Importantly, the most successful operation is still associated with some degree of temporary disability. Therefore, an operation with zero morbidity is impossible to achieve, whereas an operation without complications may be achievable.

- The History and Physical is the *MOST* important preoperative evaluation that can be performed by the surgical team.

Functional Capacity

1 MET

Eat, dress, or use the toilet
Walk indoors around the house
Walk a block or two on level ground

4 METs

Light housework
1 flight of stairs
Run a short distance
Golf, bowling, dancing, doubles tennis

10 METs

Strenuous sports - swimming, singles tennis, football, basketball, skiing

Definition of MET

- A patient's functional capacity can be expressed in metabolic equivalents (METs).
- One MET equals the oxygen consumption of a 70-kg, 40-year-old man in a resting state.

FUNCTIONAL CAPACITY

- Poor functional capacity is associated with increased cardiac complications in noncardiac surgery.

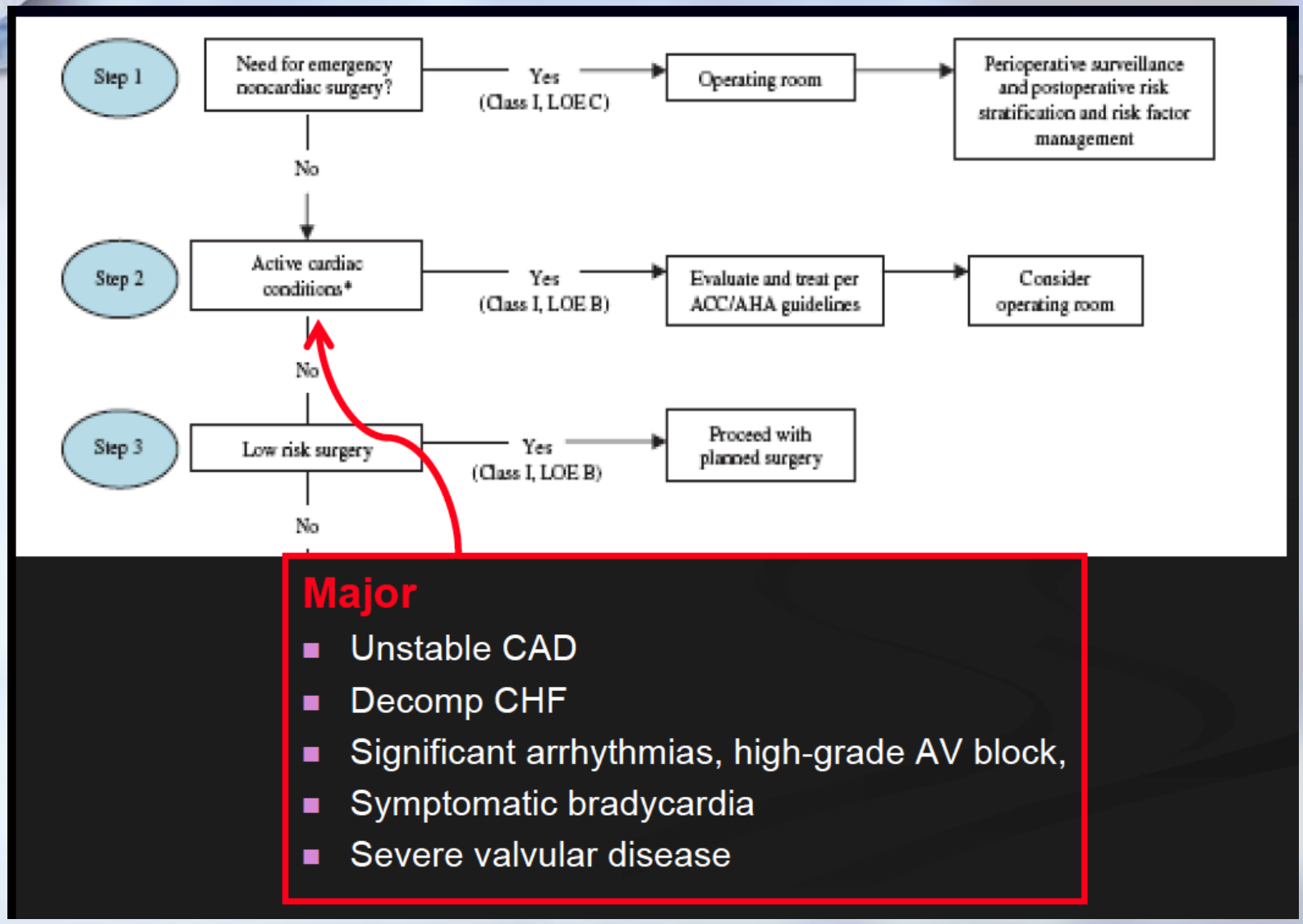
PREOP TESING INTRODUCTION

- Exercise and pharmacologic stress testing has evolved over the past 50 years
  - Evaluation of known or suspected CAD
  - Assessment of therapeutic effects of cardiac drugs
- Performed with EKG ± imaging
  - Echocardiography
  - Nuclear perfusion imaging
  - Cardiovascular magnetic resonance (CMR)

Introduction

- Stress imaging
  - Exercise
  - Pharmacologic methods
    - Dobutamine
    - Dipyridamole
    - Adenosine
- Myocardial imaging
  - Echocardiography
  - Sestamibi (radionuclide myocardial perfusion imaging)

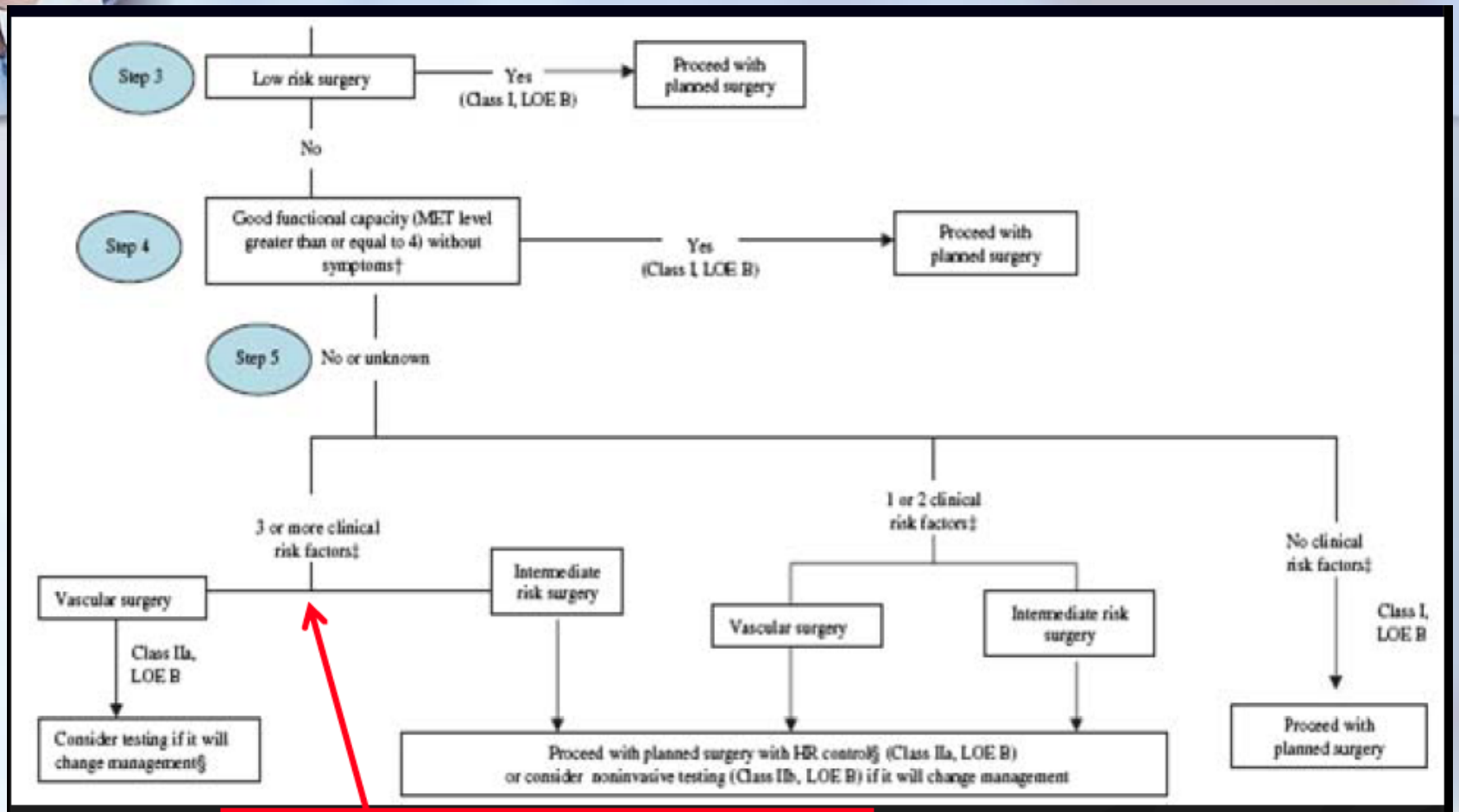
ACC/AHA: Algorithm



Major

- Unstable CAD
- Decomp CHF
- Significant arrhythmias, high-grade AV block,
- Symptomatic bradycardia
- Severe valvular disease

ACC/AHA: Algorithm



history of ischemic heart disease
history of compensated or prior HF
history of cerebrovascular disease
diabetes mellitus
renal insufficiency

Surgery-Specific Risk

High (risk >5%)

- Emergent major operations in elderly patients
- Aortic and major vascular surgery
- Prolonged procedures, fluid shifts, blood loss

Intermediate (risk < 5%)

- ENT surgery
- Intraperitoneal and intrathoracic surgery
- Carotid endarterectomy

Low (risk < 1%)

- Endoscopic procedures
- Cataract surgery
- Breast surgery

Exercise vs. Pharmacologic Stress Testing

- Exercise
  - Physiologic
    - Can relate symptoms to ischemia
  - DEPENDENT ON PATIENT ABILITY
  - Myocardial perfusion imaging dependent on maximal stress achieved
- Pharmacologic
  - Predictable blood flow response
    - Myocardial perfusion imaging is better
  - Symptoms cannot be linked to ischemia

Assessing Coronary Reserve

- Exercise Stress Testing
- Correlation between exertional symptoms perfusion
- Exercise duration and workload
- Presence and extent of EKG changes (ST depression or elevation, conduction abnormalities)

Exercise Stress Testing: Contraindications

- Absolute
  - AMI or unstable angina
  - Uncontrolled arrhythmia or hemodynamic compromise
  - Endocarditis
  - Severe AS
  - Decompensated CHF
  - PE or DVT
  - Non cardiac disorders (Renal disease, thyrotoxicosis, etc)
  - Physical disability
- Relative
  - Left main stenosis
  - Moderate valve stenosis
  - Electrolyte abnormalities
  - Moderate-Severe HTN or pHTN
  - Tachy or bradyarrhythmias
  - Mental impairment
  - High degree AV block

Exercise Protocols

- Treadmill or bike
- Incremental increase in METs
  - Optimal duration: 6-12 minutes
  - Bruce protocol: validated, large increase in work requirements
- Must achieve ≥ 85% peak predicted HR
  - **Peak HR = 220 – Age**

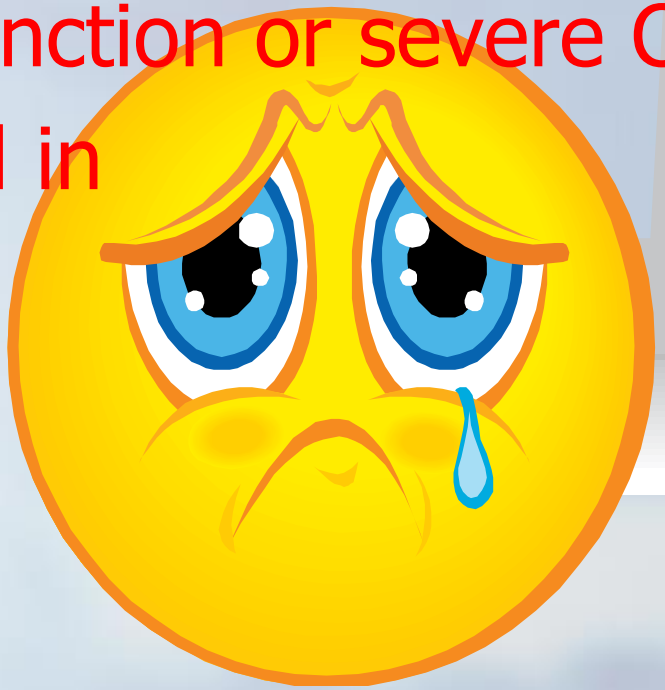
Exercise Protocols

- Termination will happen:
  - Decrease SBP
  - Significant arrhythmias
  - Angina
  - CNS symptoms
  - Subject's request
  - Fatigue, SOB, claudication
  - Less serious arrhythmias (SVT)
  - Bundle branch block

Dobutamine Stress Test

- Achieve peak HR > 80-85% predicted
- May cause dangerous ventricular arrhythmias, particularly in patients with poor LV function or severe CAD
- Contraindicated in

aortic aneurysms



Radionuclide Myocardial Perfusion Imaging

- Advantages
  - Risk stratification and management of known or suspected CAD
  - Well-validated ability to detect severe CAD
  - Reproducible
  - Assess LV size
  - Accurate determination of extent of CAD
  - Assess Viability
  - Prognosis and assessment of therapy after ACS
- Disadvantage
  - Increased cost
  - Radiation exposure
  - Artifact due to soft tissue or diaphragmatic attenuation
  - If LBBB has low specificity because high portion of false positives

Myocardial Perfusion Imaging

- Thallium
  - More extensive validation for detecting viable myocardium
- Sestamibi
  - Superior image quality in obese or female patients
  - Measure resting LV function

Take aways

- Exercise stress testing moderate sensitivity and specificity
  - Can correlate symptoms
  - **Must be adequate**
- Pharmacologic stress test
  - More predictable change in coronary blood flow
  - Less patient dependent
- Myocardial perfusion imaging can improve risk stratification
  - Provides information on ventricular function at rest and with stress
  - Localizes area of decreased perfusion

Testing

- Perform testing that is necessary to the preparation of each individual patient.
- Not all patients will require blood work or chest x-rays
- Consider CBC on patients with history of anemia, Jehovah Witness, or chronic disease.
- BMP or Chem studies on patients with history of renal impairment or diuretic therapy and at least Serum Creatinine in all patients over the age of 40.

Testing

- EKG in all patients over the age of 40 or any type of cardiac history.
- PFT's in all patients undergoing thoracic and upper abdominal surgery and those patients with moderate to severe COPD. Will need complete study with spirometry and diffusion capacity (DLCO). A DLCO of less than 40% signifies high risk for thoracic and upper abdominal procedures.
- Robotic procedures requiring steep Trendelenberg may require clearance for patients with glaucoma.
- Pregnancy test in all women of child bearing age.

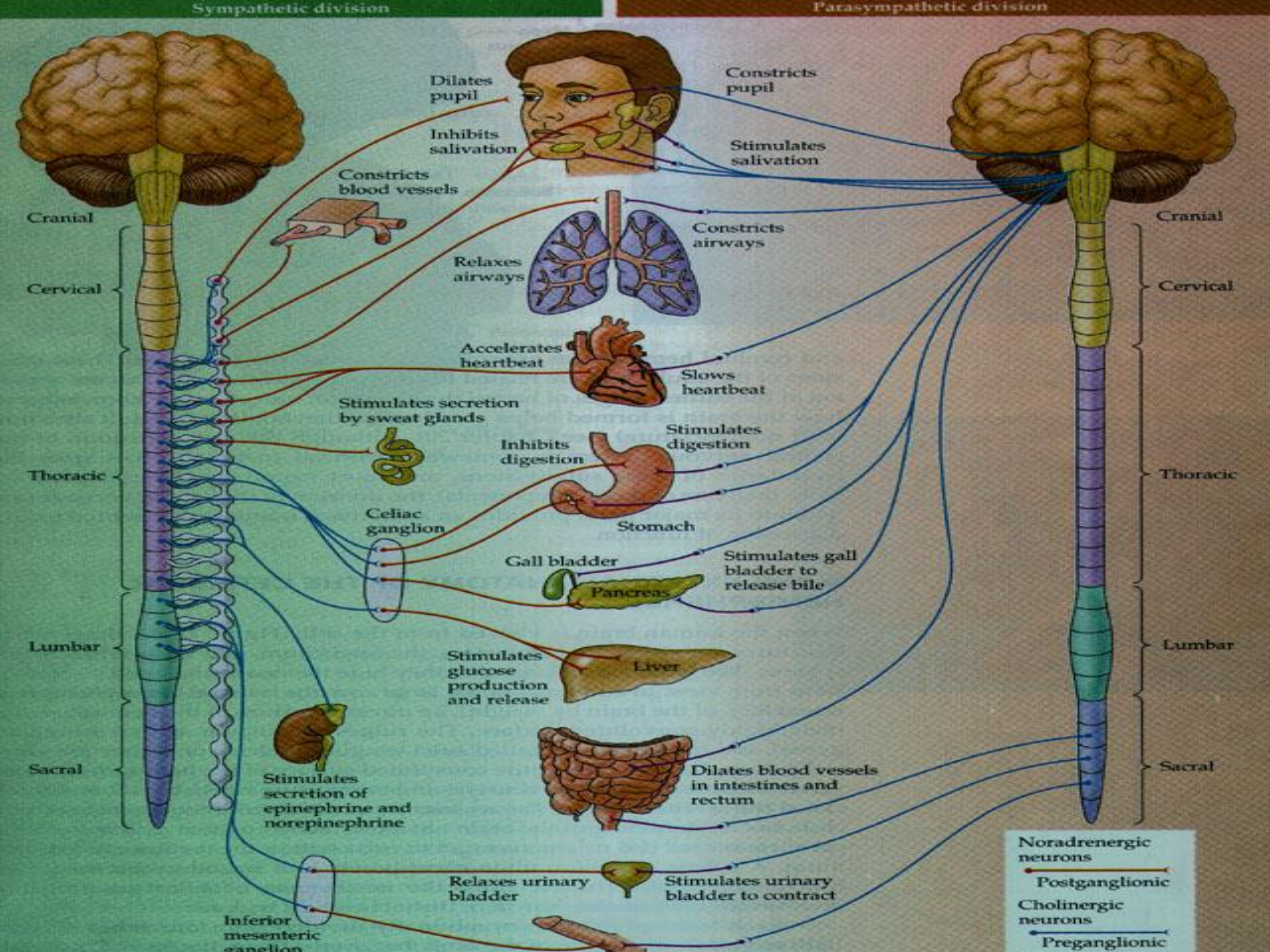
Testing

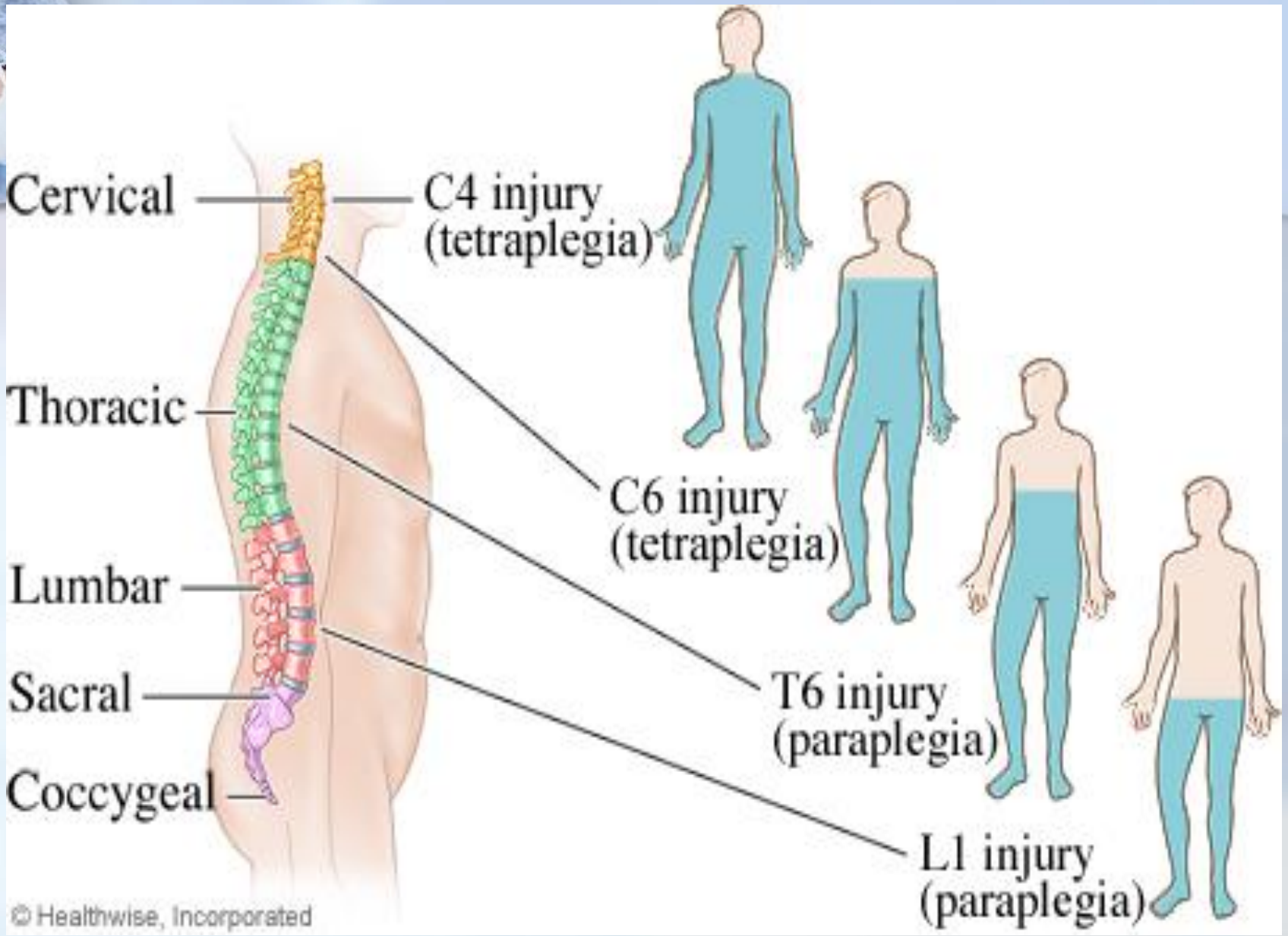
- Other tests may need performed depending on findings in H&P ie urinalysis, carotid duplex, LFT's, ABG's and more complex CT or MRI scans.

Cervical Spine Assessment

- Cervical spine flexion/extension films in all patients with RA, Down Syndrome, previous C-spine injury or C-spine surgery and any disease process that causes ligament laxity. (Marfan syndrome and Ehlers-Danlos syndrome).

  Need to assess for instability with regards to intubation. Will need neurosurgery clearance and most likely an awake fiber optic intubation or if applicable and LMA airway.


Sympathetic division
Parasympathetic division
Dilates pupil
Inhibits salivation
Constricts blood vessels
Constricts pupil
Stimulates salivation
Constricts airways
Relaxes airways
Accelerates heartbeat
Slows heartbeat
Stimulates secretion by sweat glands
Inhibits digestion
Stimulates digestion
Stomach
Celiac ganglion
Gall bladder
Pancreas
Stimulates gall bladder to release bile
Liver
Stimulates glucose production and release
Stimulates secretion of epinephrine and norepinephrine
Dilates blood vessels in intestines and rectum
Relaxes urinary bladder
Stimulates urinary bladder to contract
Inferior mesenteric ganglion
Cranial
Cervical
Thoracic
Lumbar
Sacral
Noradrenergic neurons
Postganglionic
Cholinergic neurons
Preganglionic


Cervical
Thoracic
Lumbar
Sacral
Coccygeal
C4 injury (tetraplegia)
C6 injury (tetraplegia)
T6 injury (paraplegia)
L1 injury (paraplegia)
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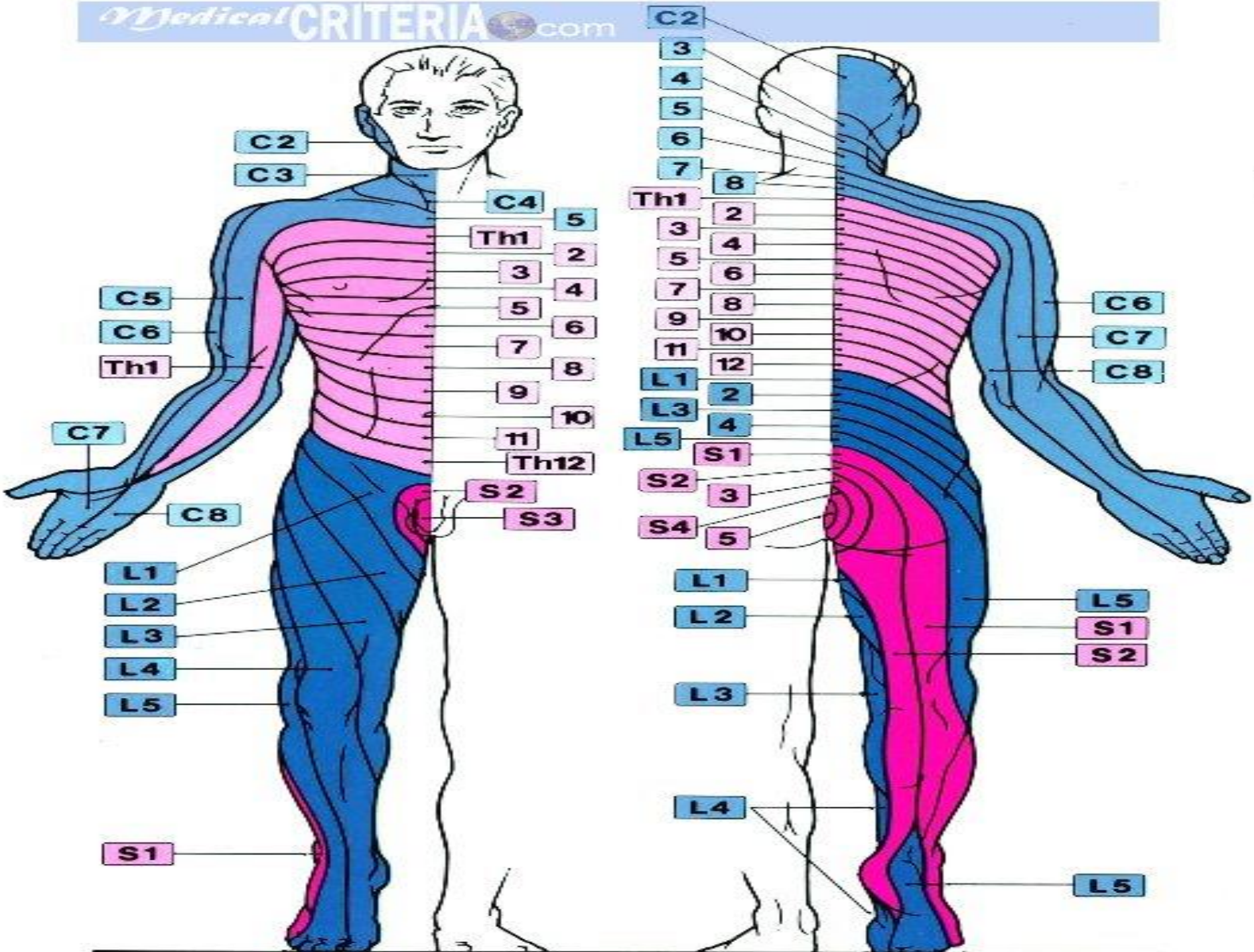


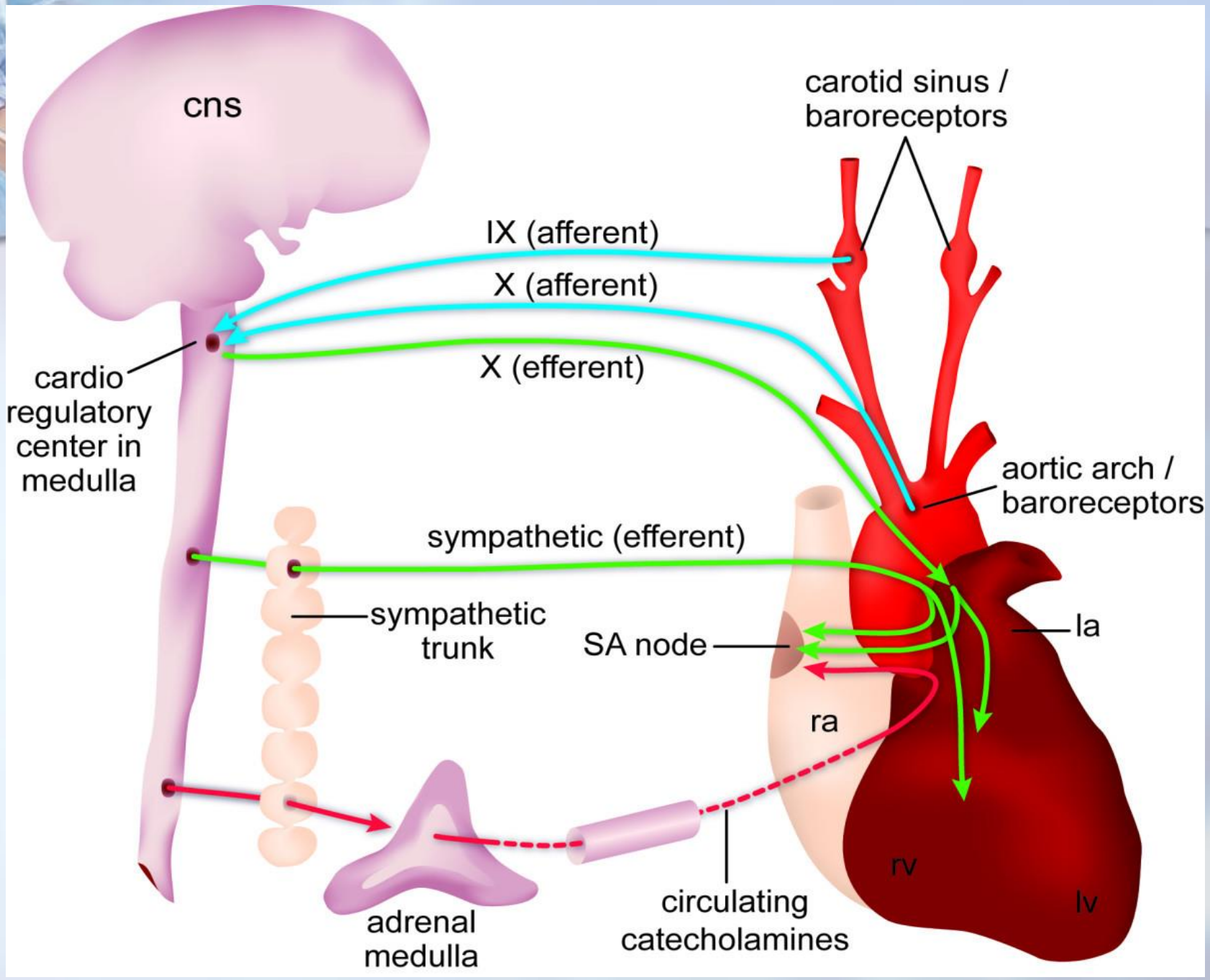
Autonomic Hyperreflexia

- Injury at or above T7 most drastic (lower lesions less so if at all)
- 6mo -2yrs from time of injury
- Acute sympathetic hyperreactivity s/p stimuli BELOW level of lesion (exogenous or endogenous)
  - Most common stimuli: distention of hollow viscus (bladder/rectum)
  - Sx: sweating; facial flushing; chronic UTIs (can't empty bladder →calculi); headache; severe acute HTN, bradycardia, arrhythmias/heart block, vasodilatation above lesion, vasoconstriction below

- 66-85% prevalence in SCI population
- Most commonly intraop but reported post op
- Magnitude of response proportional to magnitude of stimuli
- Greater with increasing distance from cord lesion

Pathophysiology

- Afferent nerves from hollow organs and cutaneous sensory endings ascend through spinothalamic tract and dorsal columns
- Reflex motor efferents are sympathetic neurons in lateral horns (target blood vessels and viscera)
- Normally painful stim reflex attenuated to some extent
- In high cord injury, inhibition signal cannot reach sympathetic efferents below lesion, but can reach them above lesion. Left with sympathetic overload below lesion (vasoconstriction) and inhibited sympathetic output above lesion (vasodilatation).
- HTN from below lesion sensed by aortic arch/carotid sinus. Reflex vagus nerve still intact b/c does not travel down spinal cord.
  - Results in bradycardia with overall hypertension


cns
carotid sinus /
baroreceptors
IX (afferent)
X (afferent)
X (efferent)
cardio
regulatory
center in
medulla
aortic arch /
baroreceptors
sympathetic (efferent)
sympathetic
trunk
SA node
la
ra
rv
lv
adrenal
medulla
circulating
catecholamines

In patients with chronic high spinal lesions, the only intact efferent component of this baroreflex pathway is the vagus (therefore may not respond to hypovolemia with tachycardia).

Another important time this sole vagal response becomes apparent is with tracheal suctioning (reports of bradycardia and cardiac arrest). Also accentuated during hypoxemia.

Prevention/Treatment

- The HTN is centrally mediated myoneural transmission, not from increased catecholamines
  - alpha-blockers not effective
- Spinal anesthesia to block spinal cord afferent impulses
  - Some say reliable; others say technically difficult given spinal cord injury
- Epidural unreliable at times (sacral sparing in urologic surgery)

..continued

1. Stop stimulus
2. Deepen anesthesia (also helps blunt afferent pathway)
3. Empty bowel/bladder if possible
4. Control HTN with Sodium Nitroprusside

POST OP COMPLICATIONS

- Post operative Fever
- Keloids and hypertrophic scars
- Decubitus ulcers (pressure ulcers)
- Ilieus

Post op fever

- Mnemonic of the five W's
  - Wind
  - Water
  - Wound
  - Walking
  - Wonder drugs/whopper

WIND

- Atelectasis is usually the cause of fever in the first 24-48 hours.

  treatment involves prevention.

  -patients should be instructed to stop smoking at least 2 weeks before any thoracic or abdominal procedure.

  -instruction on incentive spirometry (IS) preop and post op. Should be done 10 times an hour at a slow and easy pace.

  -post op breathing treatments and percussion therapy also can be added.

WATER

- Urinary tract infections usually occur in 48-72 hours postoperatively. Can be caused by indwelling foley catheters or genitourinary instrumentation.
  - Patients will complain of dysuria, frequency or urgency.
  - Treatment is based on culture and sensitivity report.
  - May require ID consult.

WOUND

- Most common cause of post op fever after 72 hours.
  - Staphylococcus aureus most common pathogen.
  - Superficial infections involve the skin and subcutaneous tissue.
  - Deep infections involve the areas below the fascia.
  - Intra-abdominal abscesses require surgical debridement or percutaneous drainage, or both in combination with appropriate antibiotics.
    - Percutaneous drainage can be performed as either CT or US guided and must be uniloculated to be amenable to this procedure.

WALKING (thrombophlebitis)

- Superficial thrombophlebitis most commonly associated with intravascular catheters.
- Deep thrombophlebitis can be associated with indwelling central lines or DVT.
- Thrombophlebitis of the lower extremity may be associated with Homan's sign, nonspecific, or unilateral edema of an extremity is a more specific indicator of deep vein thrombophlebitis.

WONDER DRUGS

- Related to anesthetics, sulfa-containing antibiotics, and others are implicated in drug fever that develops 1 week postoperatively.
- This is a diagnosis of exclusion and should be considered when faced with a negative sepsis workup.

WHOPPER

- Refers to the presence of a postoperative abscess.
- More common in patients that underwent abdominal procedure.

KELOIDS AND HYPERTROPHIC SCARS

- Both involve an imbalance between collagen deposition and degradation.
- More common in African Americans and Asians.
- Hypertrophic scars
  - Limited to original boundaries.
- Keloids
  - Extend beyond the original wound or trauma

KELOIDS AND HYPERTROPHIC SCARS

- Treatment
  - No single treatment modality has been shown to be effective.
  - Topical Kenalog, 40 mg/ml in a dosage of 2 ml every 6-8 weeks has been shown to be effective. It may cause dermal atrophy, and hypopigmentation.
  - Excisional surgery has a high recurrence rate.

DECUBITUS ULCERS

- Related to pressure and shear forces over bony prominences.
  - Most patients who develop DC's have an inability to change position and thus sustain long periods of uninterrupted pressure with subsequent tissue ischemia.
  - Treatment is multimodal with removal of the pressure source, nutritional support and surgical intervention.
  - Reconstructive procedures are performed only after tissue cultures are negative.

ILEUS

- **Ileus** is a disruption of the normal propulsive ability of the gastrointestinal tract.
- Ileus is commonly defined simply as bowel obstruction. However, it is defined as a decreased motor activity of the GI tract due to non-mechanical causes.
- Decreased propulsive ability may be broadly classified as caused either by bowel obstruction or intestinal paralysis. However, there are instances where there are symptoms and signs of a bowel obstruction, but with absence of a mechanical obstruction, mainly in *acute colonic pseudoobstruction*, also known as Ogilvie's syndrome.

Symptoms of Ileus

- moderate, diffuse abdominal discomfort
- constipation
- abdominal distension
- nausea/vomiting, especially after meals
- lack of bowel movement and/or flatulence
- excessive belching

Risk factors

- Prior gastrointestinal surgery or other GI procedures is the most common risk factor
- electrolyte imbalance
- diabetic ketoacidosis (DKA), and other causes of metabolic acidosis
- hypothyroidism
- medications (e.g. opiates or antimuscarinics)
- severe illness (Inflammation with peritonitis)
- spinal cord injury (SCI), those with injury above thoracic vertebrae 5 (T5) will have hypomotility problems within the bowel

Treatment

- Traditionally, nil by mouth was considered to be mandatory in all cases, but now it is recognized that gentle feeding by enteral feeding tube may help to restore motility by triggering the gut's normal feedback signals, so this is the recommended management initially.
- When the patient has severe, persistent signs that motility is completely disrupted, nasogastric suction and parenteral nutrition may be required until passage is restored. In such cases, continuing aggressive enteral feeding causes a risk of perforating the gut.
- There are several options in the case of paralytic ileus. Most treatment is supportive. If caused by medication, the offending agent is discontinued or reduced. Bowel movements may be stimulated by prescribing lactulose, erythromycin or, in severe cases that are thought to have a neurological component (such as Ogilvie's syndrome), neostigmine.
- If possible the underlying cause is corrected (e.g. replace electrolytes).
- General surgery consult is necessary early on in case there is a need for surgery to correct the problem.