

# Carcinoid tumors

- Location and presentation
  - **Small intestine**
    - Abdominal pain, intestinal obstruction, tumor, GI bleed
  - **Rectal**
    - Bleeding , constipation , diarrhea
  - **Bronchial**
    - Asymptomatic
  - **Thymic**
    - Anterior mediastinal masses
  - **Ovarian and testicular**
    - Masses discovered on physical examination or ultrasonography
  - **Metastatic**
    - In the liver, hepatomegaly

# Carcinoid tumors

- Secreted products
  - **Gastrin, insulin, somatostatin**, motilin, neurotensin, tachykinins (substance-K, substance-P, neuropeptide-K), glucagon, gastrin-releasing peptide, vasoactive intestinal peptide, pancreatic peptide
  - Biologically active peptides (corticotropin, calcitonin, growth hormone)
  - **Prostaglandins**
  - **Bioactive amines (Serotonin)**

# Carcinoid tumors

- Carcinoid syndrome
  - Symptoms
    - Flushing (Head, neck, upper thorax)
      - precipitated by stress, alcohol, exercise, certain foods such as cheese, catecholamines, and serotonin reuptake inhibitors.
    - Diarrhea
    - Pruritus
    - Lacrimation
    - Hypotension
    - Bronchoconstriction

# Carcinoid tumors

- Carcinoid syndrome
  - Carcinoid heart disease
    - Fibrosis involving the endocardium, primarily on the right side.
      - Tricuspid regurgitation
  - Left side lesions with pulmonary involvement or right-to-left shunt.
    - Pulmonic stenosis is predominant
    - Carcinoid triad is cardiac involvement with flushing and diarrhea

# Carcinoid syndrome

## *Heart*

- pulmonic and tricuspid valve thickening and stenosis
- endocardial fibrosis

## *Skin*

- cutaneous flushes
- apparent cyanosis

## *Liver*

- hepatomegaly

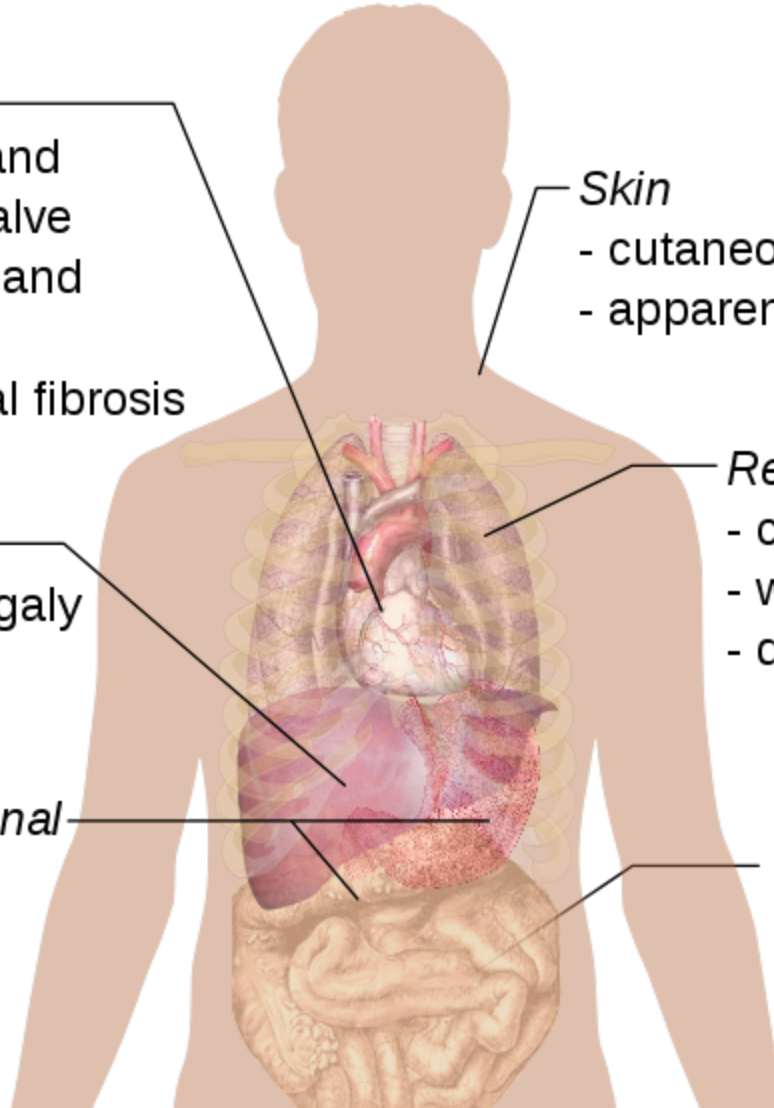
## *Respiratory*

- cough
- wheezing
- dyspnea

## *Gastrointestinal*

- diarrhea
- cramps
- nausea
- vomiting

retro-peritoneal and pelvic fibrosis



# Carcinoid tumors

- **Carcinoid Syndrome**

- Diagnosis

- Urinary or plasma serotonin or its metabolites in the urine.
      - > 30mg of 5-hydroxyindoleacetic acid (HIAA) per 24 hr in urine. (normal 3-15mg/24hr)
      - False-positive in serotonin-rich foods, ex. bananas, pineapple, walnuts, pecans, avocados, and hickory nuts
      - Medications: cough syrup containing guaifenesin, acetaminophen, salicylates, or L-dopa.

# Carcinoid tumors

- Carcinoid syndrome
  - Complications: Carcinoid crisis
    - Intense flushing, diarrhea, abdominal pain,
    - Cardiovascular manifestations include tachycardia, hypertension, or hypotension.
    - If not adequately treated, can be fatal.
    - May occur spontaneously or be provoked by stress, chemotherapy, Succinylcholine induced fasciculations

# Carcinoid tumors

- Carcinoid syndrome
  - Agents associated with carcinoid crisis
    - Drugs That May Provoke Mediator Release
      - **Succinylcholine, Mivacurium, d-Tubocurarine, Atracurium**
      - **Epinephrine, Norepinephrine, Dopamine, Isoproterenol, and Thiopental**



# Carcinoid tumors

- Carcinoid syndrome
- Agents associated with carcinoid crisis
  - Drugs not known to release Mediators
    - Propofol, Etomidate, Vecuronium, Cisatracurium, Rocuronium, Sufentanil, Alfentanil, Fentanyl, Remifentanil
    - All inhalation agents
      - » Desflurane may be the better choice in patients with liver metastasis because of its low rate of metabolism

# Carcinoid tumors

- Carcinoid Syndrome Management of Anesthesia
  - high serotonin level is associated with delayed awakening.
  - Administration of octreotide prior to tumor manipulation to attenuate adverse hemodynamic responses
  - Epidural analgesia is safe if pt adequately treated with octreotide.
    - Avoid hypotension
    - Use opioids as adjuncts
  - Invasive arterial blood pressure monitoring during the intraoperative management is necessary
  - Ondansetron, a serotonin antagonist, is a useful and logical antiemetic choice

# Carcinoid tumor

- Carcinoid Syndrome Treatment
  - Long acting somatostatin analogues (Octreotide)
  - Anxiolytics
  - H-1 and H-2 blockers for histamine release
  - Benadryl and steroids to inhibit bradykinin
  - Aprotinin (Kallikrein inhibitor) to treat hypotension
  - Symptomatic therapy