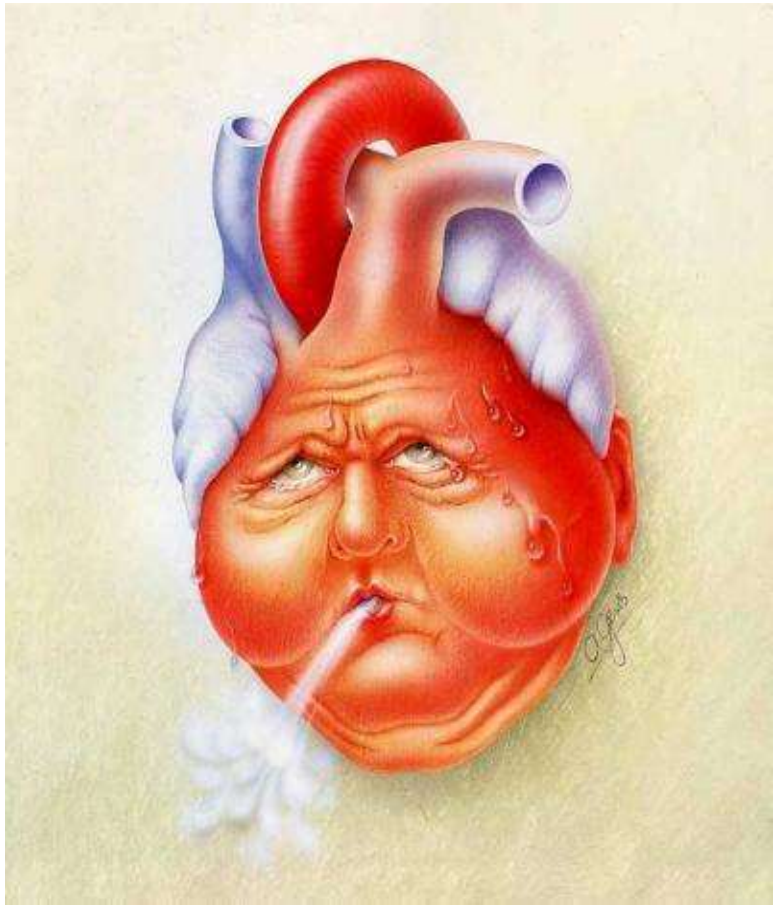
School of Pharmacy
UNIVERSITY OF WISCONSIN-MADISON

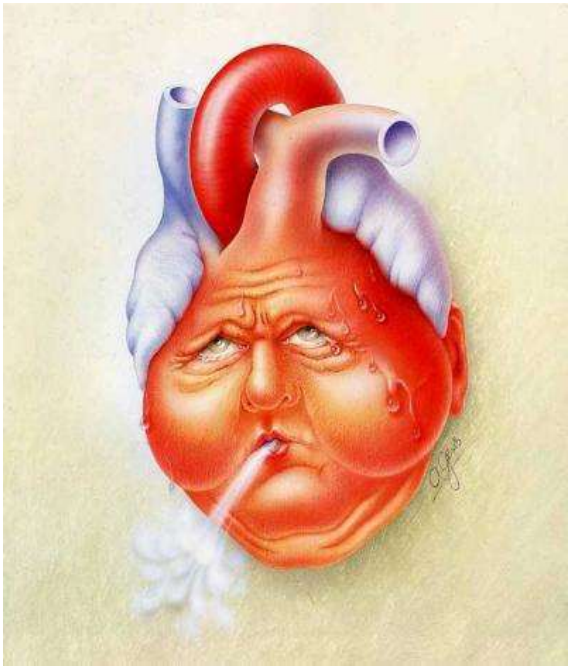
Part 2: Chronic Heart Failure Continued

Karen Kopacek, M.S., R.Ph.
Associate Professor (CHS)
Spring 2021



HF Part 2

- Review of fundamentals
- Signs of HF
- Patient Evaluation
- Causes of Exacerbation
- Patient case



Objectives for Part 2

- Describe the signs of **congestion and hypoperfusion.**
- Identify exacerbating factors that can worsen heart failure.
- Apply this information to a patient case.

Neurohormonal Activation in Setting of Hypotension/Heart Failure

BP = CO X PVR CO = HR X SV

SV determined by preload, afterload, and contractility

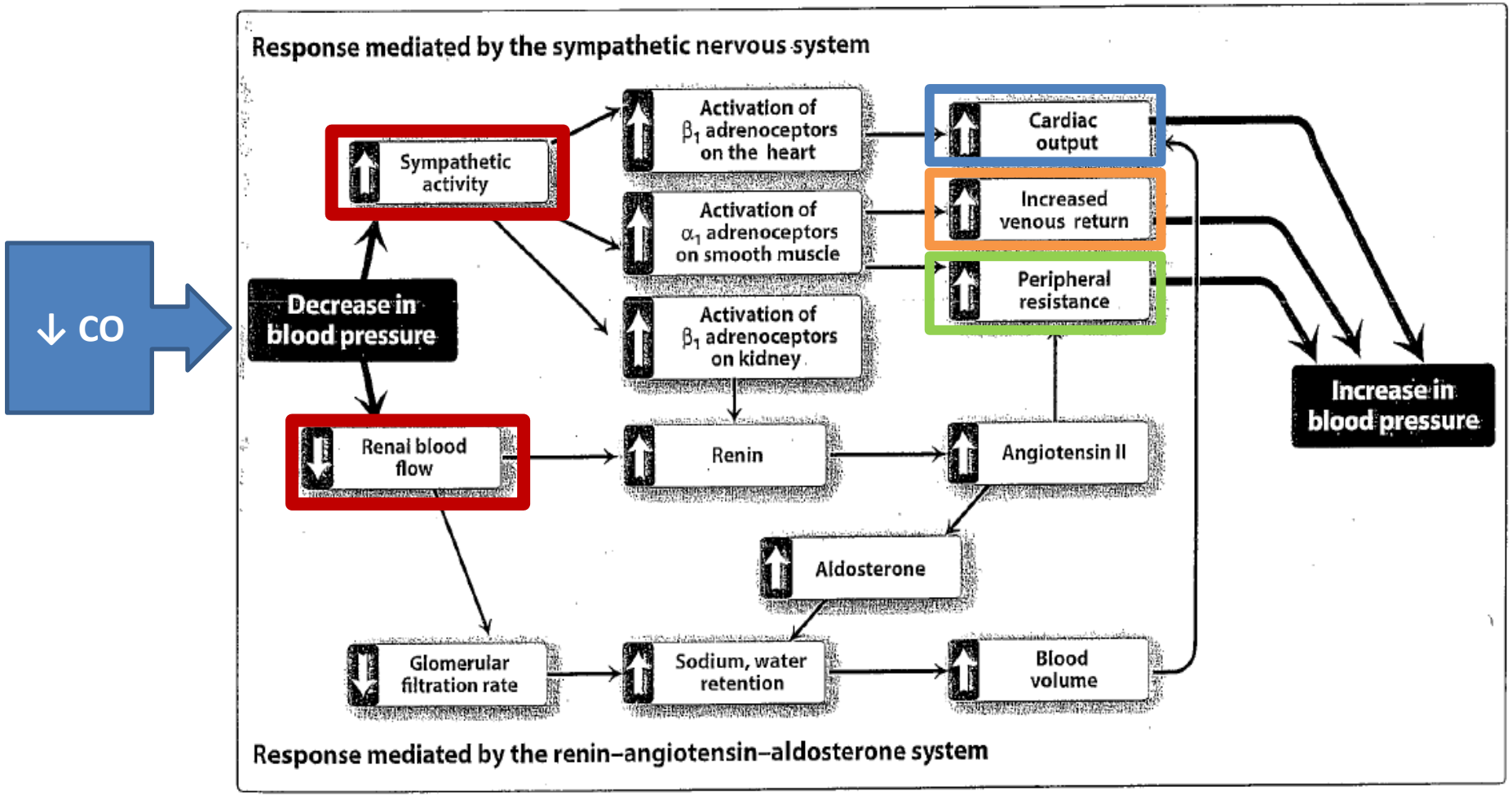
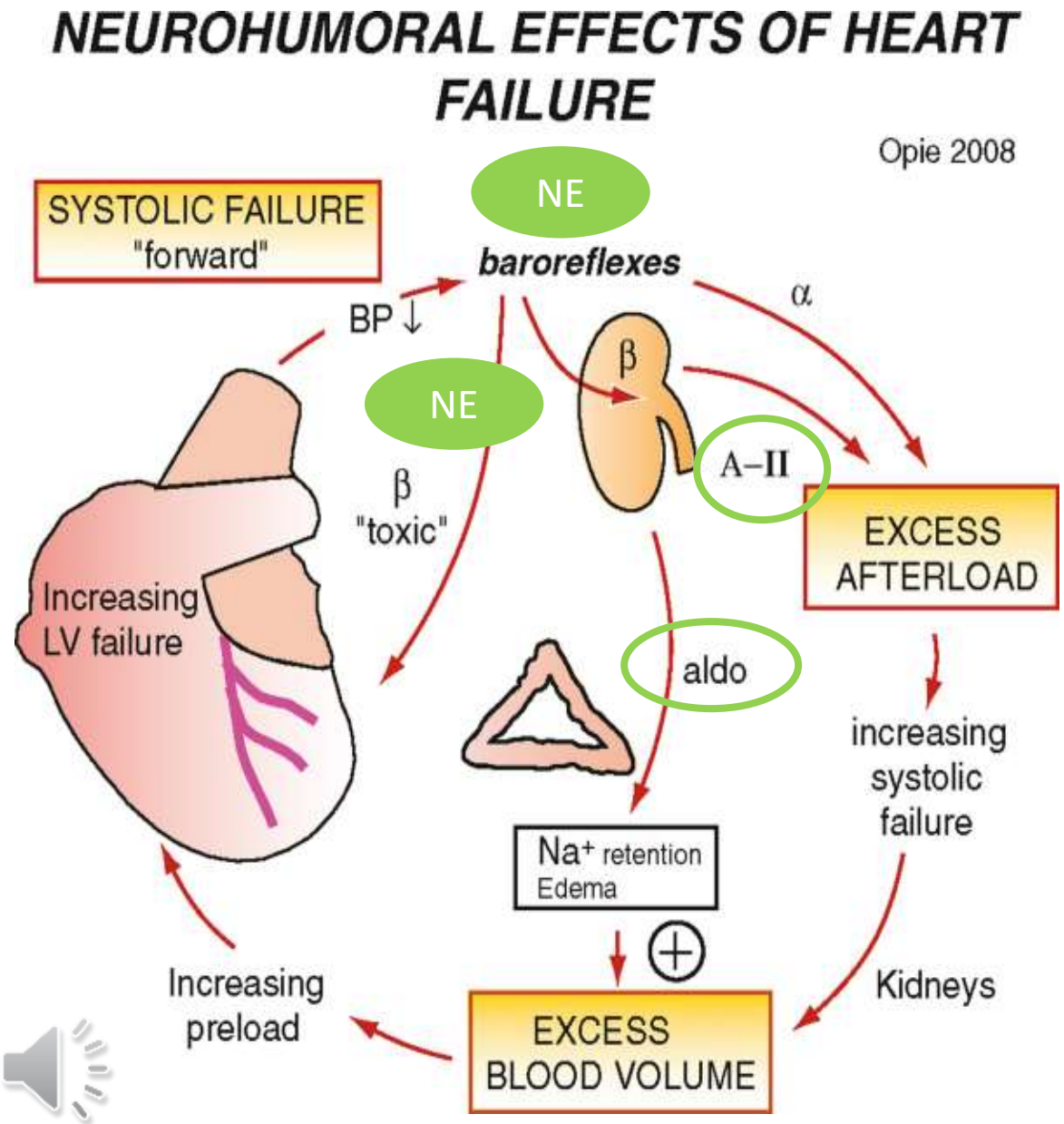


Figure 17.4



BP = CO x PVR

CO = HR X SV

SV determined by preload, afterload, and contractility

What two systems play compensatory roles in HF?

What system (not pictured on this slide) works against RAAS to improve s/sx of HF?

Adapted from Drugs for the Heart, 7th Edition. Figure 5.8

HF Physical Findings (Signs)

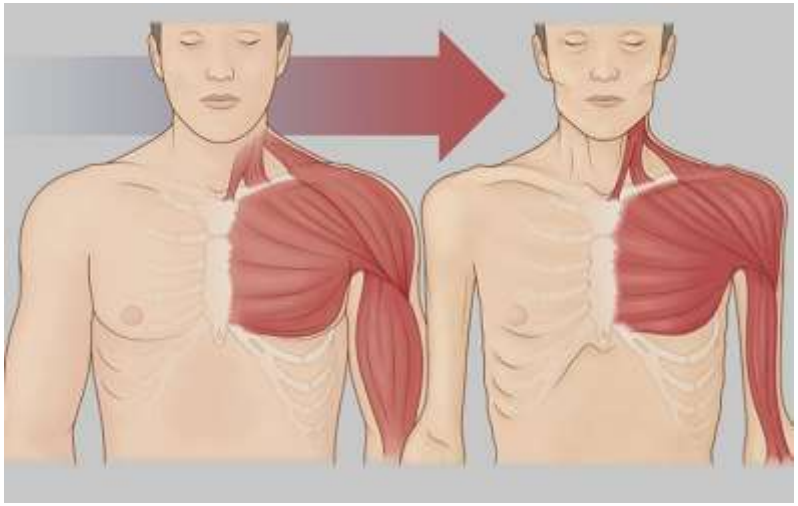
- **Peripheral edema:** due to venous congestion in dependent areas
  - ankle/pedal, low back (sacral)
- **Hepatomegaly:** due to hepatic congestion
- **Jugular Venous Distention (JVD):** right internal jugular neck vein distension noted at 45°
  - Elevated Jugular Venous Pressure – measured as cm water, > 4 cm above sternal angle indicative of increased right atrial pressure
- **Hepatojugular reflux (HJR):** elicit JVD by pressing and releasing in a quick fashion over the liver
  - Indicates hepatic congestion; displacement of volume from abdomen into jugular vein

HF Physical Findings Continued

- **Renal insufficiency**
  - increased SCr due to drop in GFR
- **Cardiomegaly**
- **Tachycardia:** compensatory increase in CO
- **Heart sounds:**
  - S_3 gallop: low pitched extra heart sound secondary to increased preload in left ventricle
  - S_4 gallop: low pitched extra heart sound secondary to atrial contraction against a non-compliant ventricle

HF Physical Findings Continued

- **Pulmonary rales:** Inspiratory crackles due to fluid in alveolar space
- **Cyanosis:** hypoxemia, blue tinged tongue, lips, nail beds
- **Cardiac cachexia:** unintentional weight loss

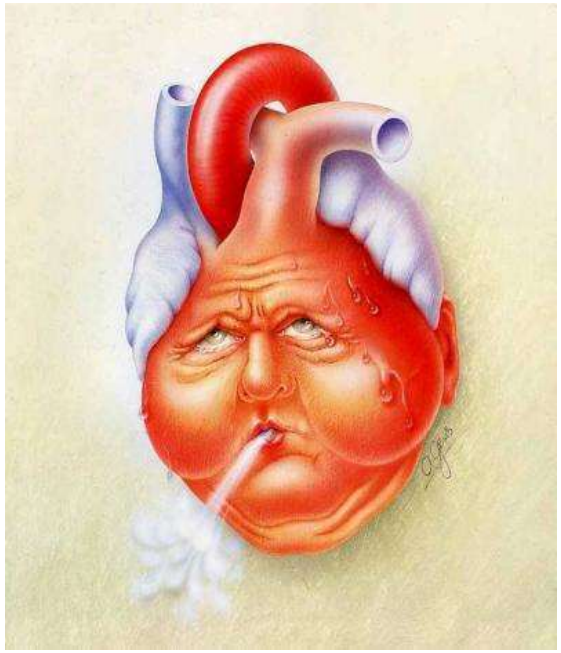


HF Diagnosis- S/Sx

Framingham Criteria for Diagnosis of HF	
Major Criteria:	**Minor Criteria:**
Acute pulmonary edema, cardiomegaly, HJR, JVD, paroxysmal nocturnal dyspnea/orthopnea	Ankle edema, dyspnea on exertion, hepatomegaly, nocturnal cough, pleural effusion, tachycardia (HR > 120 bpm)
HF is present in patients with at least two major criteria or one major and two minor criteria	

HF Part 2

- Signs of HF
- **Patient Evaluation**
- Causes of Exacerbation
- Patient case



Patient Evaluation

- History and Physical
- Laboratory Assessment:
  - CBC w/diff
  - Urinalysis
  - Electrolytes (Na+, K+, Mg++, and Ca++)
  - SCr, BUN
  - Fasting blood glucose, A1c
  - Liver function tests (LFT)
  - Thyroid Stimulating Hormone (TSH)

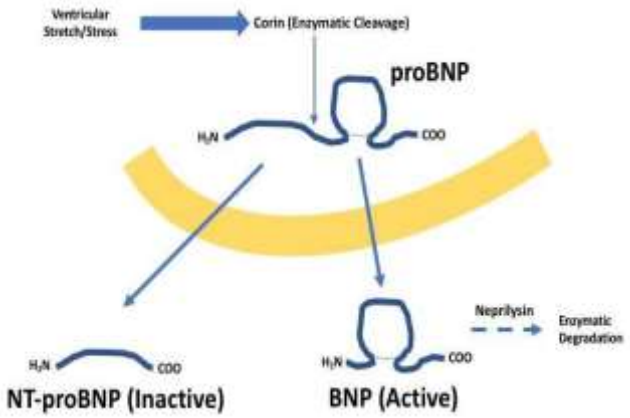
Useful Reference Labs – UW Health

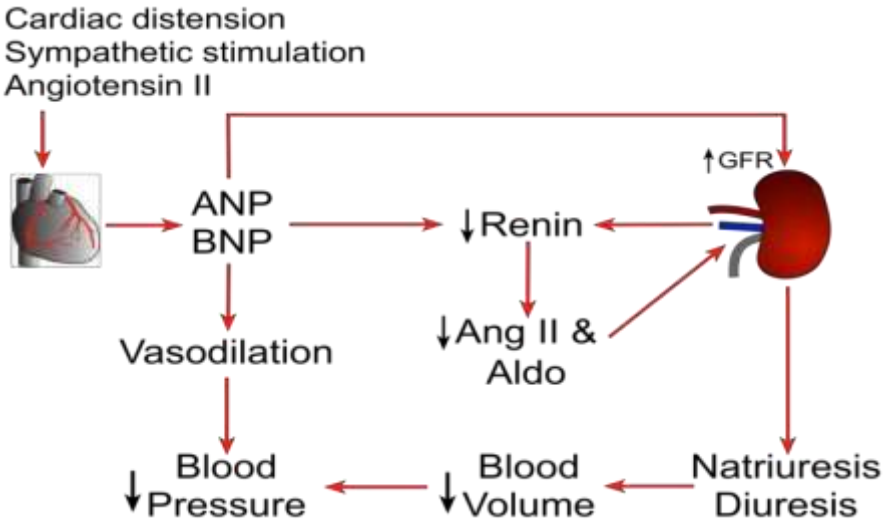
- Sodium 136-145
- Potassium 3.5-5.1
- BUN 9-20
- Scr 0.7-1.2
- Glu (fasting) 70-99
- Mg 1.6-2.6
- Ca 8.4-10.2
- Hemoglobin (M) 13.6-17.2
- Hemoglobin (F) 11.6-15.6
- HCT (M) 40-52
- HCT (F) 34-46
- Plt count 160-370 K/uL

https://www.uwhealth.org/lab-test-directory/

Patient Evaluation Continued

- Laboratory Assessment continued:
  - B-type Natriuretic Peptide (BNP)
    - **BNP (< 100 pg/mL) and NT-proBNP (< 300 pg/mL)**
    - Useful for differentiating between dyspnea due to HF or from other causes
      - Less elevated in HFpEF and in obese patients
      - More elevated in older adults, patients with renal dysfunction, PE

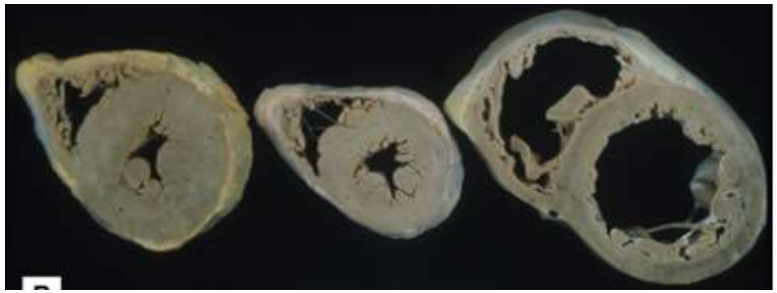




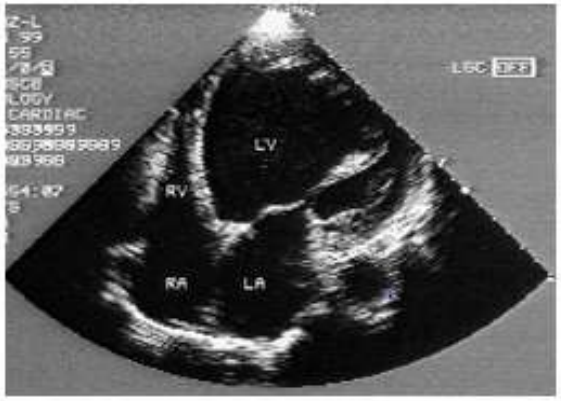
School of Pharmacy
UNIVERSITY OF WISCONSIN-MADISON

Patient Evaluation Continued

- Diagnostic testing:
  - 12-lead EKG
  - Chest x-ray
  - Echocardiogram (ECHO):
    - Visualize heart size, wall motion, valve function
    - Determine EF, ventricular filling pressures
  - Cardiac catheterization with coronary angiogram, possible PCI

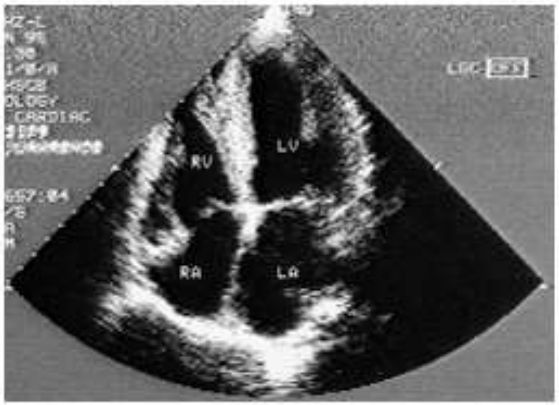


ECHO Findings: HF*r*EF and HF*p*EF



Two-dimensional ECHO showing a four-chambers view of the heart in a patient with HFrEF. Note the dilated LV.

Key: LV= left ventricle; RV= right ventricle; RA= right atrium; LA= left atrium

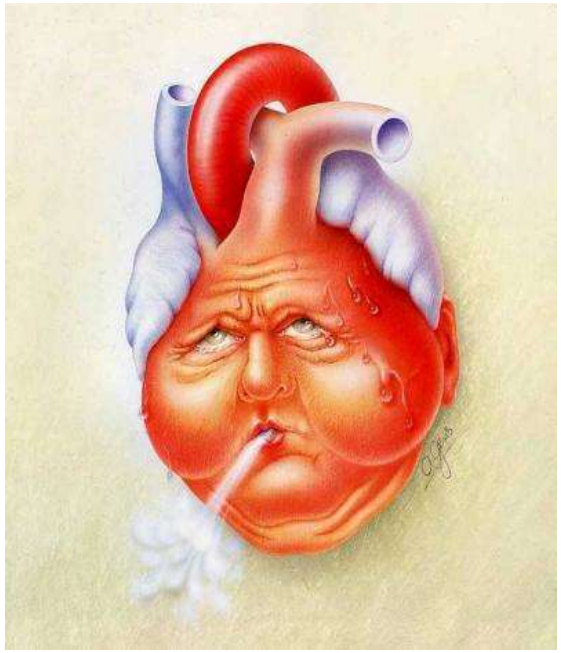


Two-dimensional ECHO showing a four-chambers view of the heart in a patient with HF*p*EF. Note the normal LV size with hypertrophy.

Shamsham F, Mitchell J. Am Fam Physician 2000;61:1319-1328.

HF Part 2

- Signs of HF
- Patient Evaluation
- **Causes of Exacerbation**
- Patient case



School of Pharmacy
UNIVERSITY OF WISCONSIN–MADISON

Factors that Exacerbate HF

- Infection / fever
- Uncontrolled HTN
- Renal failure
- Pulmonary Embolism
- Fluid overload
- Medication non-adherence
- Thyrotoxicosis

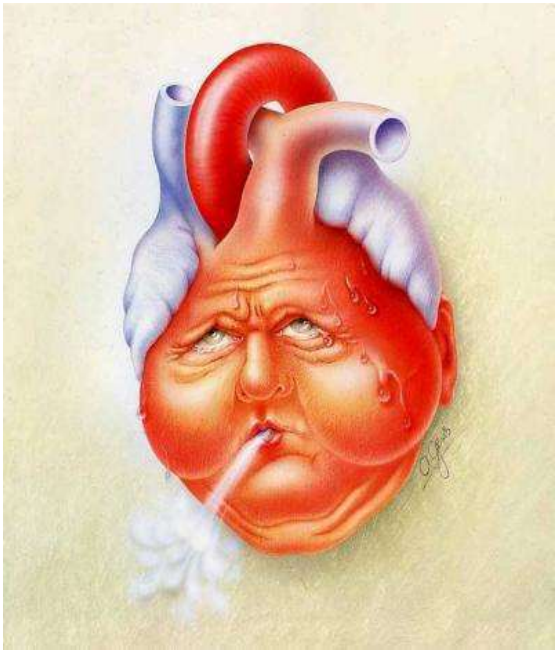
- Anemia
- Excessive salt intake
- Ischemia
- Arrhythmias
- Respiratory insufficiency
- Obesity
- Emotional stress
- Ethanol ingestion
- Pregnancy

Meds that Exacerbate HF

- **Negative Inotropic Effects**
  - Antiarrhythmics (1A, 1C, III)
  - Beta-blockers (initially)
  - Non-DHP CCB
  - Itraconazole, terbinafine
  - Carbamazepine, TCAs
- **Cardiotoxic agents (examples)**
  - Doxorubicin, daunomycin
  - Cyclophosphamide, paclitaxel
  - TNF-alpha inhibitors
  - Sorafenib, sunitinib
  - Stimulants
- **Beta-1 stimulation**
  - Alpha blockers
- **Unknown**
  - DPP-4 inhibitors
- **Na+/H_20 Retention**
  - Steroids
  - NSAIDS, COX-2 inhibitors
  - Thiazolidinediones
  - Androgens
  - Estrogens
  - Sodium-containing drugs (nafcillin sodium)

Page RL et al. Circ 2016 COI:10.1161/CIR.0000000000000426

HF Part 2



- Signs of HF
- Patient Evaluation
- Causes of Exacerbation
- **Patient case**

Part 3: Goals and Non-Drug Therapies

HF Case: Part 2

- SB is a 64 yo female who presents to clinic complaining of SOB with getting dressed and difficulty sleeping at night due to coughing.
- She notices her ankles are swollen and her socks leave a pronounced mark on her legs.
- She feels nauseous and gets full after eating only half of her meals.
- She can't exercise lately due to fatigue and weakness.

HF Case Continued

- Physical exam:
  - Vitals: BP 128/72 mmHg, HR 72 bpm, RR 16 breaths/min
  - Ht: 66 inches, wt 71 kg ("dry" weight 68kg)
  - HEENT: JVP 10cm water
  - Heart: RRR, S3 present
  - Abd: soft, nontender, normal bowel sounds
  - Ext: 2+ pitting edema bilaterally
  - Lungs: CTA
- Chest X-ray: cardiomegaly
- ECHO: EF 20%

Question #1

- Which type of HF does this patient have?
  a. HFrEF
  b. HFpEF

- Describe what is happening in the heart based on the type of HF SB has.

Question #2

- Which of SB's signs and physical findings indicate the presence of congestion?
  a. BP
  b. Nausea with eating
  c. Cardiomegaly
  d. JVP
  e. HR

HF Case Continued

Home medications include:

- Atorvastatin 40mg po qhs
- Diltiazem SR 240mg po bid
- Isosorbide mononitrate 120mg po qam
- Nitroglycerin 0.4mg SL PRN CP
- Lansoprazole 30mg po qhs
- Aspirin 81mg po qday
- Ibuprofen 400mg po PRN headaches