SCOREBUILDERS

SPOTLIGHT *Series*

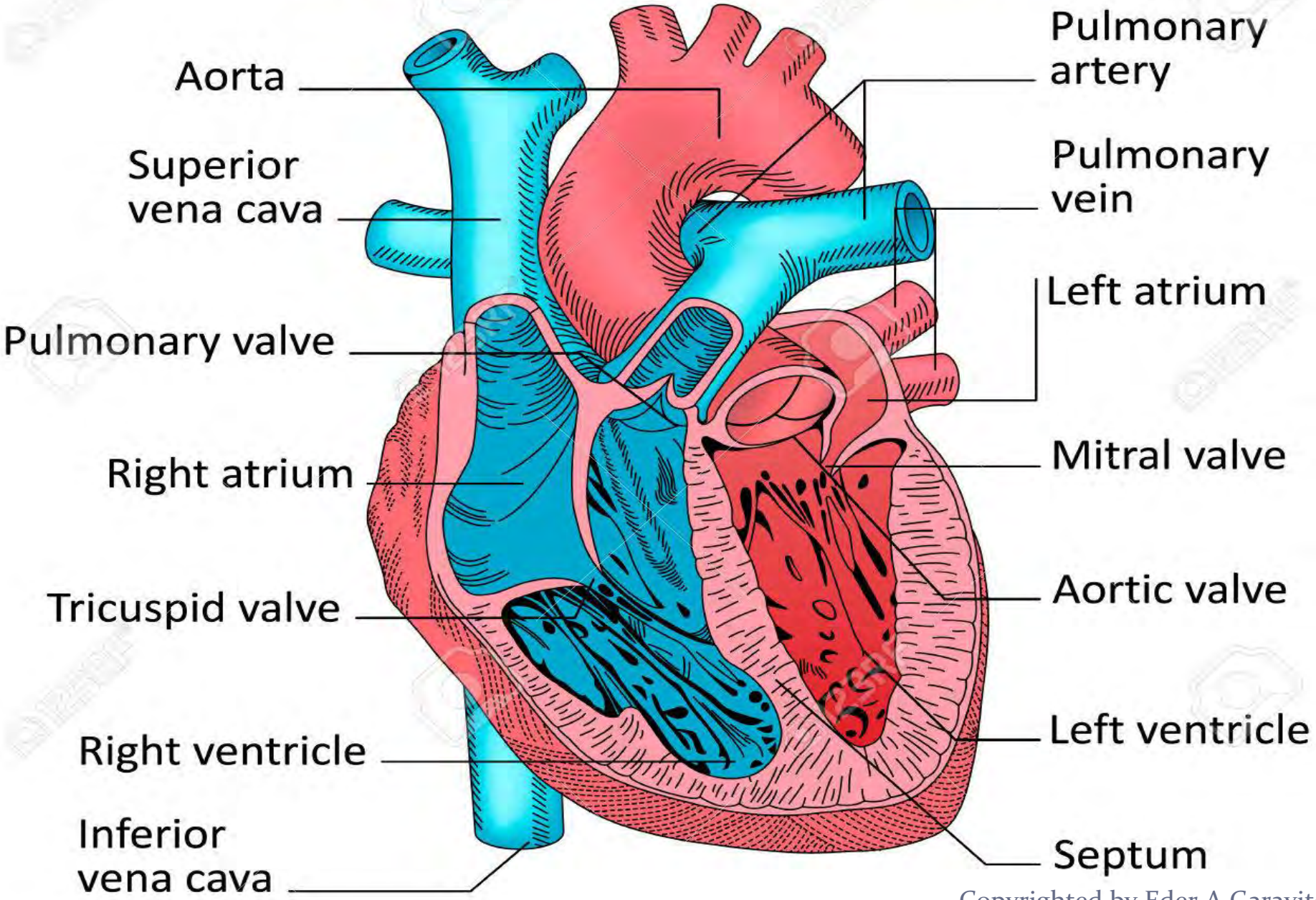
Cardiovascular and Pulmonary Systems Review: A comprehensive review of the cardiovascular and pulmonary systems from a therapist's perspective

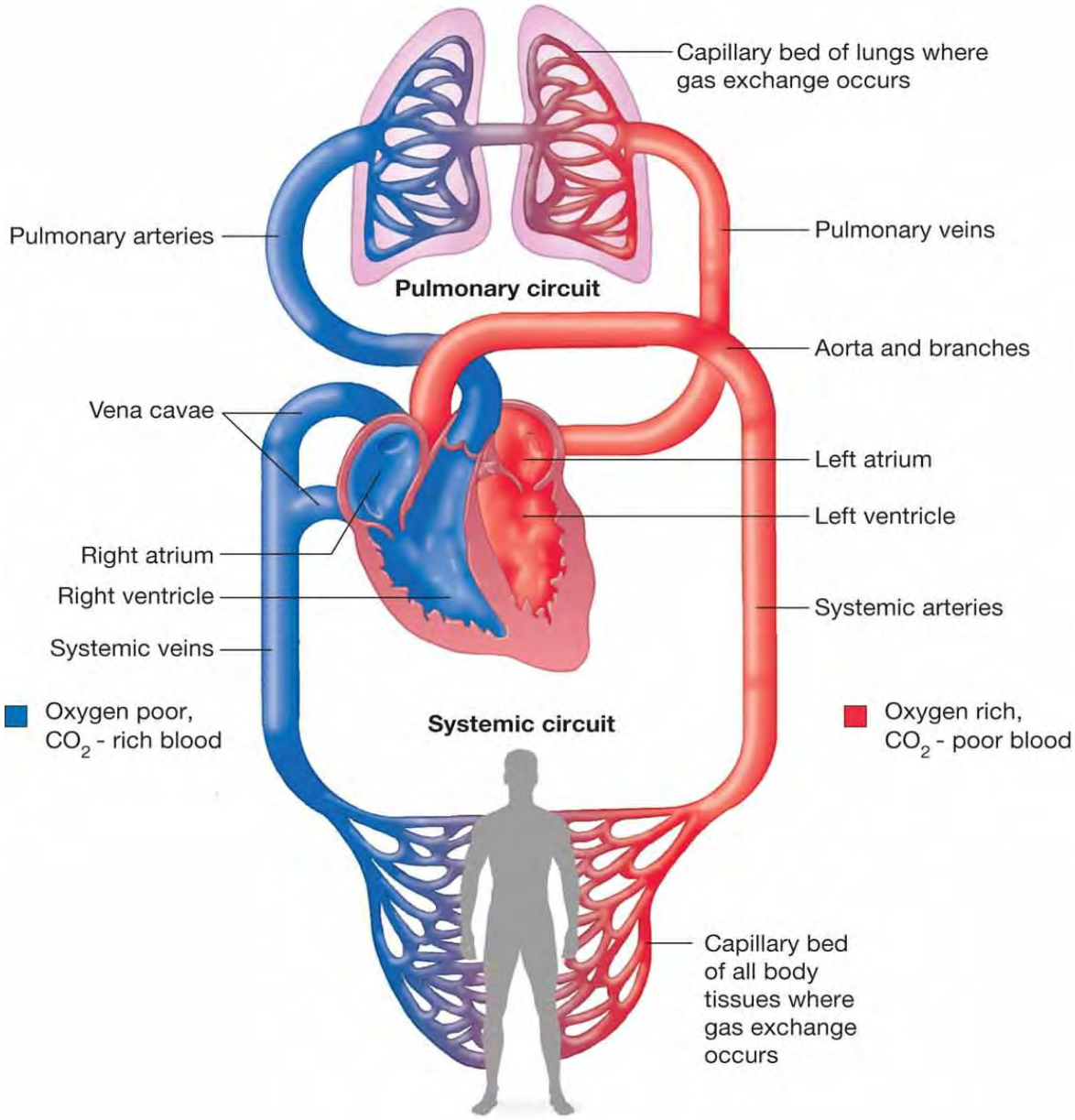
Presented by Eder Garavito, PT, DPT, CCS

Topic Overview

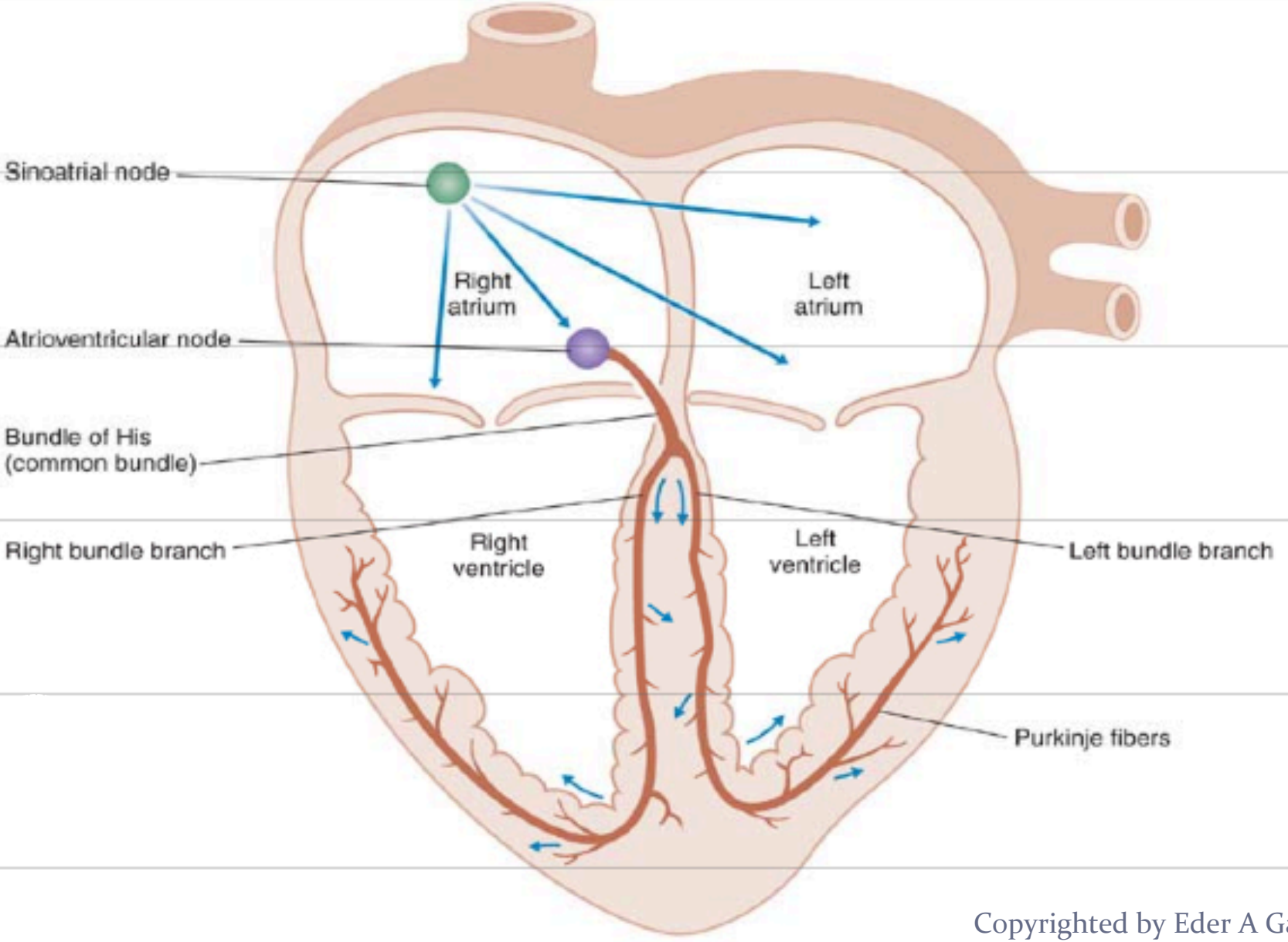
- Cardiac Anatomy and Electrophysiology
- Pulmonary Anatomy and Physiology
- Common Cardiac/Pulmonary Pathologies
- Cardiac and Pulmonary Pharmacology
- Lab Values
- Cardiac Treatment Indications/Contraindications
- Pulmonary Treatment Indications/Contraindications
- Case Study #1
- Case Study #2
- Q/A

ANATOMY OF THE HEART



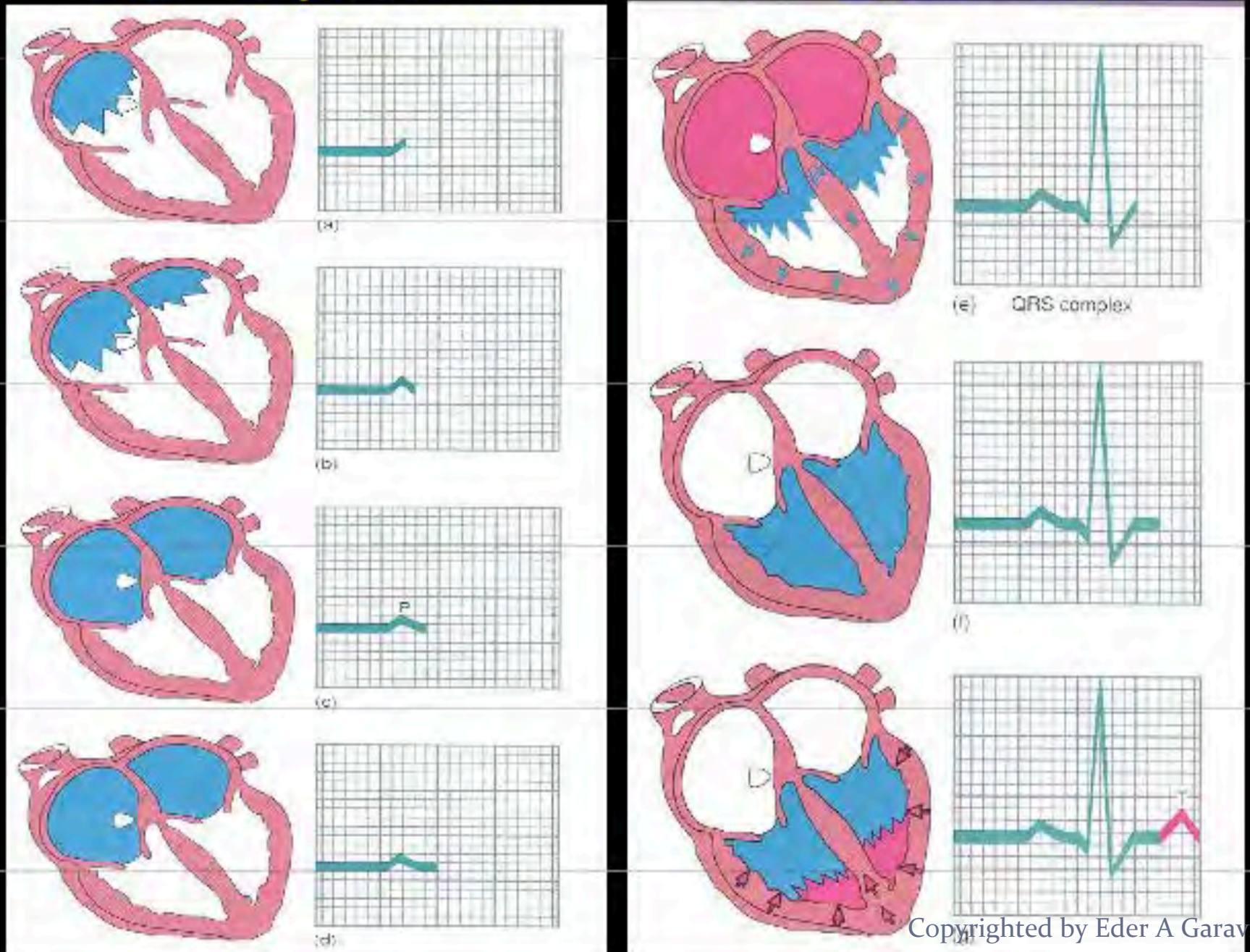


REVIEW: Conducting Tissues of the Heart

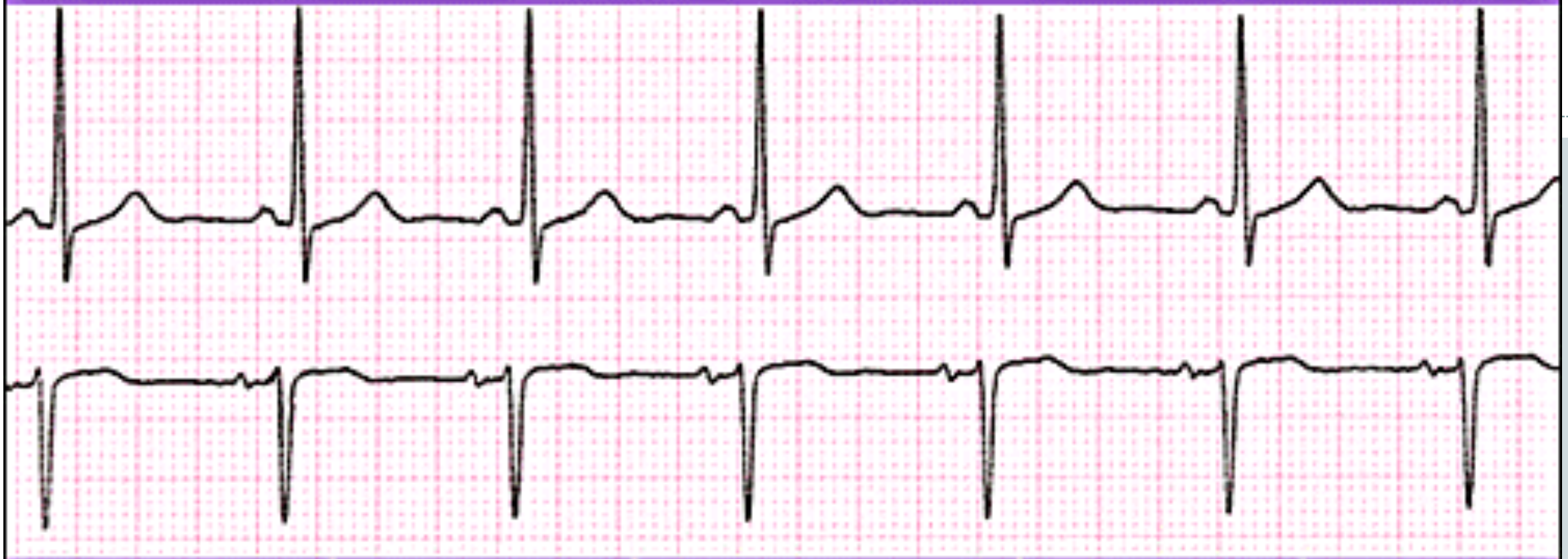


Blue = depolarization

Red = repolarization

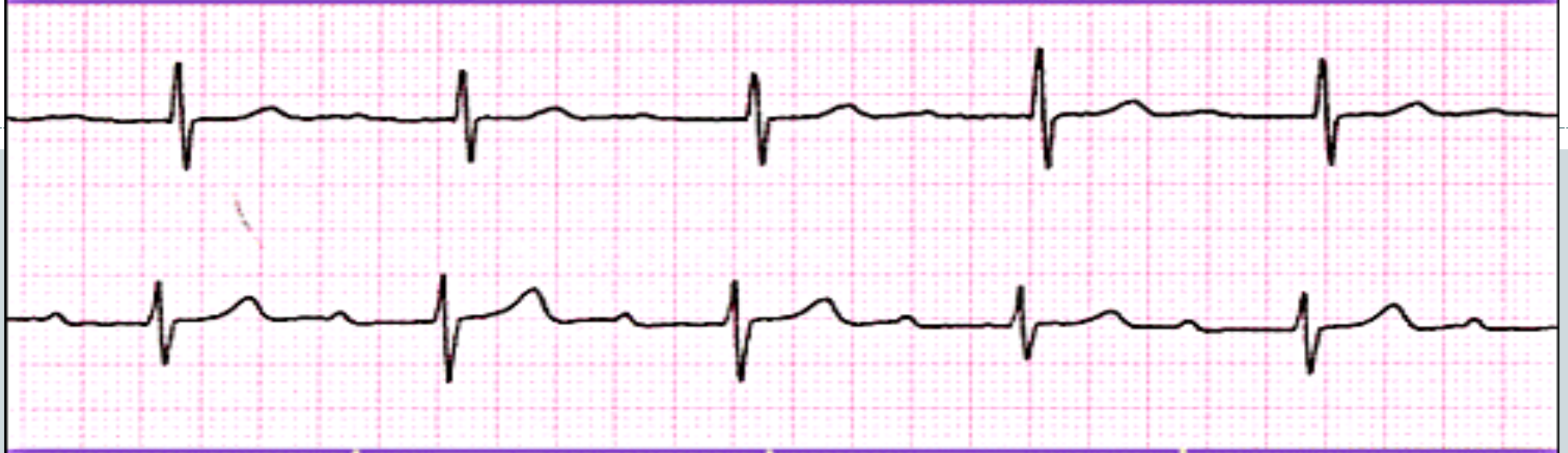


Normal Sinus Rhythm



Heart Rate	Rhythm	P Wave	PR interval (in seconds)	QRS (in seconds)
60-100 bpm	Regular	Before each QRS, identical	.12 to .20	<.12

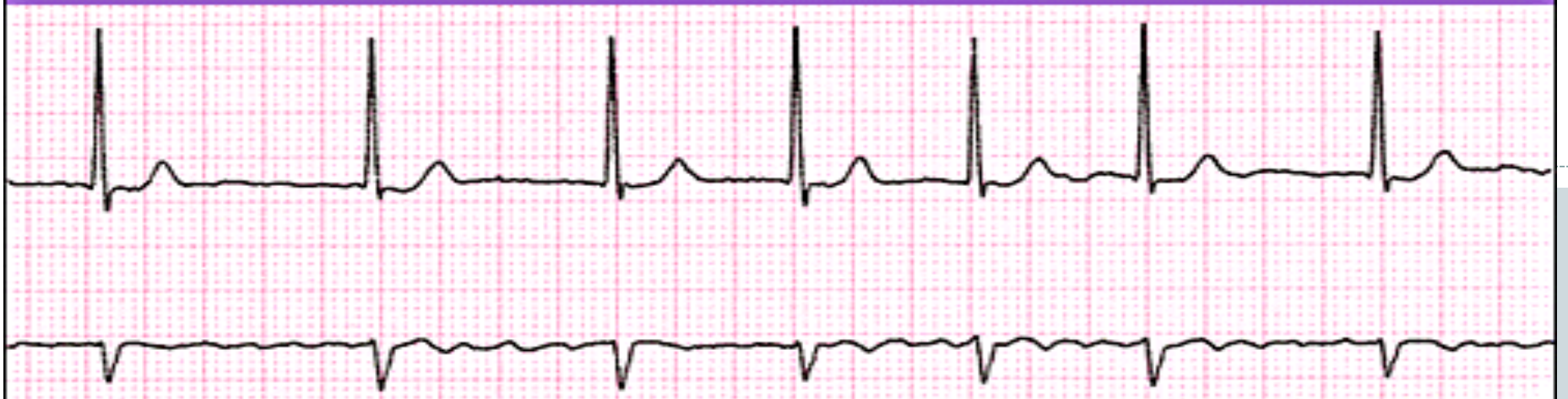
First Degree AV Block



P Wave	PR Interval (in seconds)	QRS (in seconds)	Characteristics
Before each QRS, identical	>.20	>.12	Regular rhythm

- NSR with PR interval >.20
- Occurs when the impulse is initiated in the SA note but delayed to the AV node.
- However, impulse may be initiated by AV node itself as well, thus lengthening the PR interval.
- Usually a benign rhythm existing without any symptoms unless bradycardia is present in conjunction.
- **Causes** include, CAD, RHD, infarction, reactions to digoxin or beta blockers.
- **Treatment** is usually not warranted unless block is a result of medications.

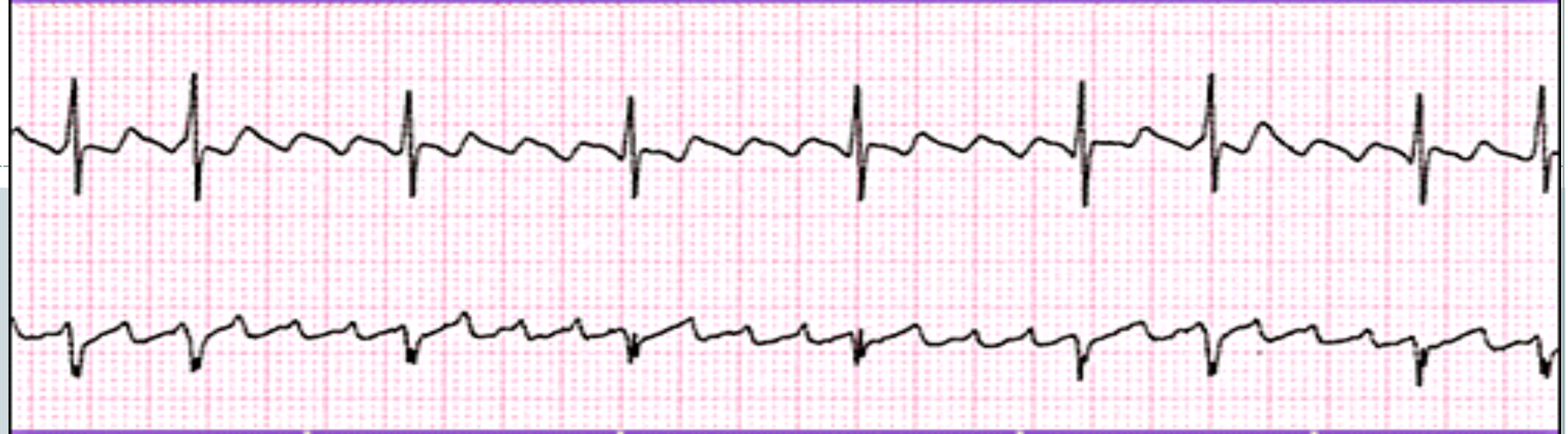
Atrial Fibrillation



Heart Rate	Rhythm	P Wave	PR interval (in seconds)	QRS (in seconds)
A: 350-650 bpm V: Slow to rapid	Irregular	Fibrillatory (fine to course)	N/A	<.12

- Erratic quivering of atria caused by multiple foci emitting impulses constantly.
- No foci actually depolarize atria so no P wave is present.
- *If R-R is irregularly irregular, always assume Afib until ruled out.*
- Considered benign if ventricular response is less than 100bpm at rest
- Atrial kick is absent, therefore up to a 30% reduction in CO
- Thrombi may develop = strokes
- **Causes** include by advanced age, CHF, ischemia or infarction, cardiomyopathy, digoxin, renal failure, drug use, stress, pain, and RHD to name a few.
- **Treatment** by cardioversion, digoxin, antiarrhythmic medication, verapamil.
- Patients will be on Warfarin or Coumadin prophylactically (hematoma formation).

Atrial Flutter



Heart Rate	Rhythm	P Wave	PR interval (in seconds)	QRS (in seconds)
A: 220-430 bpm V: <300 bpm	Regular or variable	Sawtoothed appearance	N/A	<.12

- Rapid succession of atrial depol. Caused by an ectopic focus in atria.
- P waves look identical to one another – "Sawtooth" appearance
- QRS Normal, R-R may vary depending on atrial firing.
- Usually not life threatening but may lead to Afib.
- Usually no SxS present – CO is not compromised if HR < 100bpm at rest.
- **Causes** include rheumatic disease, mitral valve disease, CAD or MI, stress, drugs, renal failure, hypoxemia, and pericarditis.
- **Treatment** includes Beta blockers or cardioversion.

Ventricular Tachycardia (3 or more consecutive beats)

Heart Rate	Rhythm	P Wave	PR interval (in seconds)	QRS (in seconds)
<100	Regular	Absent or not related	N/A	≥ .12

- Occurs due to rapid firing by a single ventricular focus with increased automaticity.
- P waves are absent and QRS complex wide and bizarre.
- Symptoms include lightheadedness and syncope w/a very weak pulse.
- **Causes** include ischemia, infarction, CAD, hypertensive heart disease, reaction to medications. Can happen to athletes because of electrolyte imbalance.
- **Treatments** include lidocaine, cardioversion or defibrillation.
- **EMERGENT SITUATION** – CO is greatly diminished as is BP.
- **Ventricular firing rate of 100-250bpm – Can be a precursor to Vfib!**

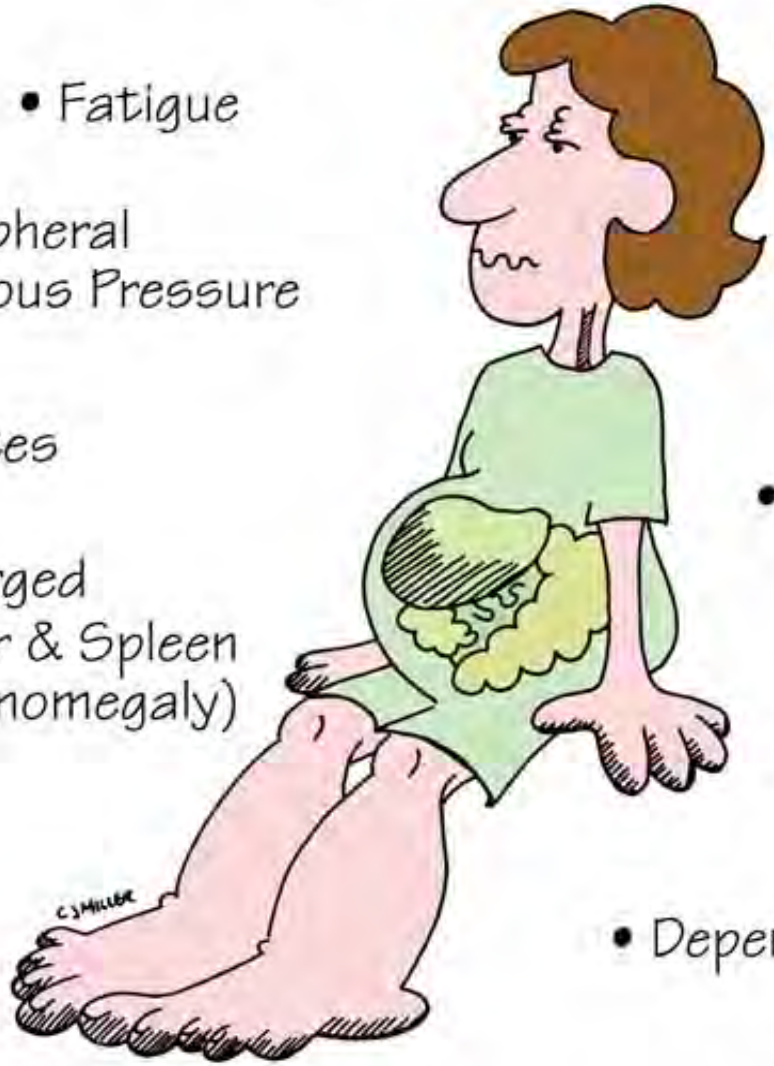
Ventricular Fibrillation

Heart Rate	Rhythm	P Wave	PR interval (in seconds)	QRS (in seconds)
300-600	Extremely irregular	Absent	N/A	Fibrillatory baseline

- Erratic quivering of the ventricular muscle resulting in **NO CARDIAC OUTPUT**
- Multiple ectopic foci fire, creating asynchrony – Zigzag pattern on ECG
- **Causes** are the same as Vtach because Vfib is usually the sequel to Vtach.
- **Treatment** includes defibrillation as quickly as possible followed by CPR, supplemental O2, and immediate injection of medications.

RIGHT SIDED ♥ FAILURE

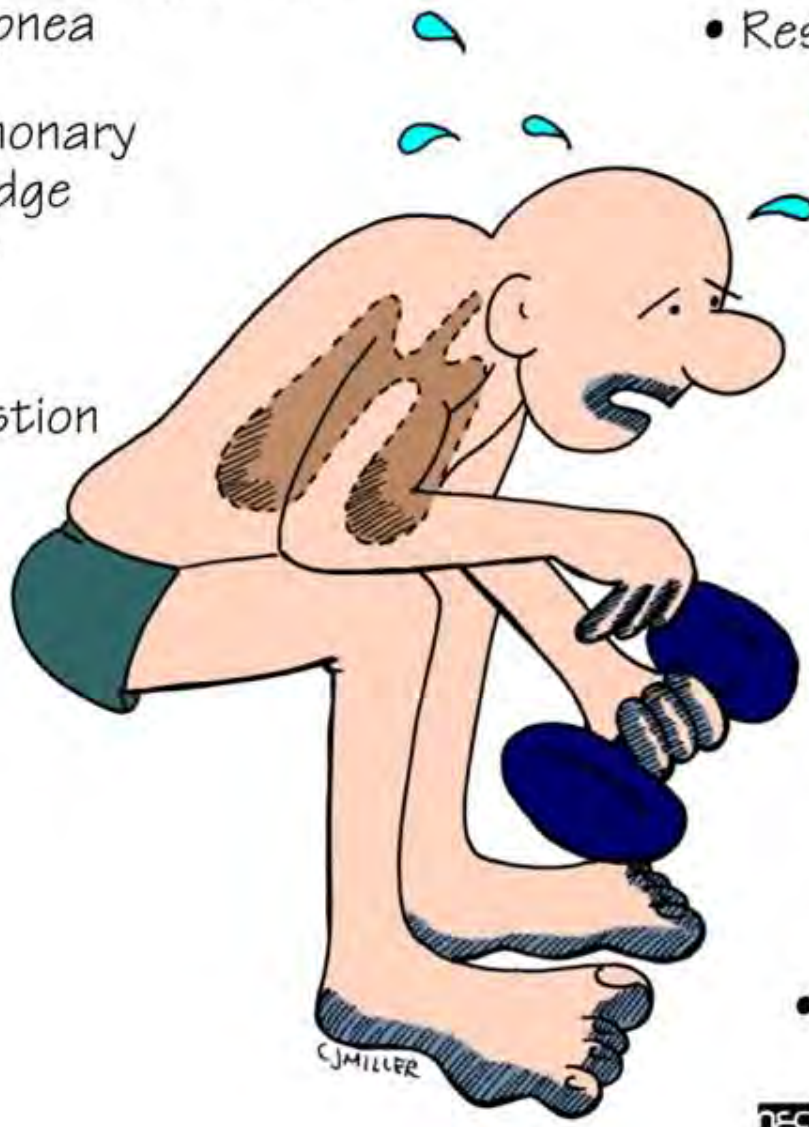
(Cor Pulmonale)



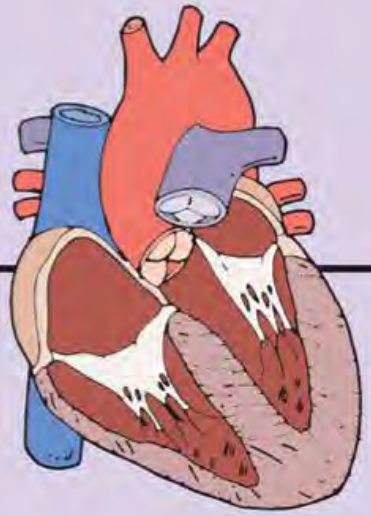
- Fatigue
- ↑ Peripheral Venous Pressure
- Ascites
- Enlarged Liver & Spleen (Hepatosplenomegaly)
- May be secondary to chronic pulmonary problems (COPD)
- Distended Jugular Veins
- Anorexia & Complaints of GI Distress
- Weight Gain
- Dependent Edema

LEFT SIDED ♥ FAILURE

- Paroxysmal Nocturnal Dyspnea
- Elevated Pulmonary Capillary Wedge Pressure
- Pulmonary Congestion
  - Cough
  - Crackles
  - Wheezes
  - Blood-Tinged Sputum
  - Tachypnea



- Restlessness
- Confusion
- Orthopnea
- Tachycardia
- Exertional Dyspnea
- Fatigue
- Cyanosis



- Right heart failure
  - Congestion of peripheral tissues
    - Dependent edema and ascites
    - GI tract congestion
      - Anorexia, GI distress, weight loss
    - Liver congestion
      - Signs related to impaired liver function
- Left heart failure
  - Decreased cardiac output
    - Activity intolerance and signs of decreased tissue perfusion
  - Pulmonary congestion
    - Impaired gas exchange
      - Cyanosis and signs of hypoxia
    - Pulmonary edema
      - Orthopnea
      - Cough with frothy sputum
      - Paroxysmal nocturnal dyspnea

THE FOUR STAGES OF CONGESTIVE HEART FAILURE

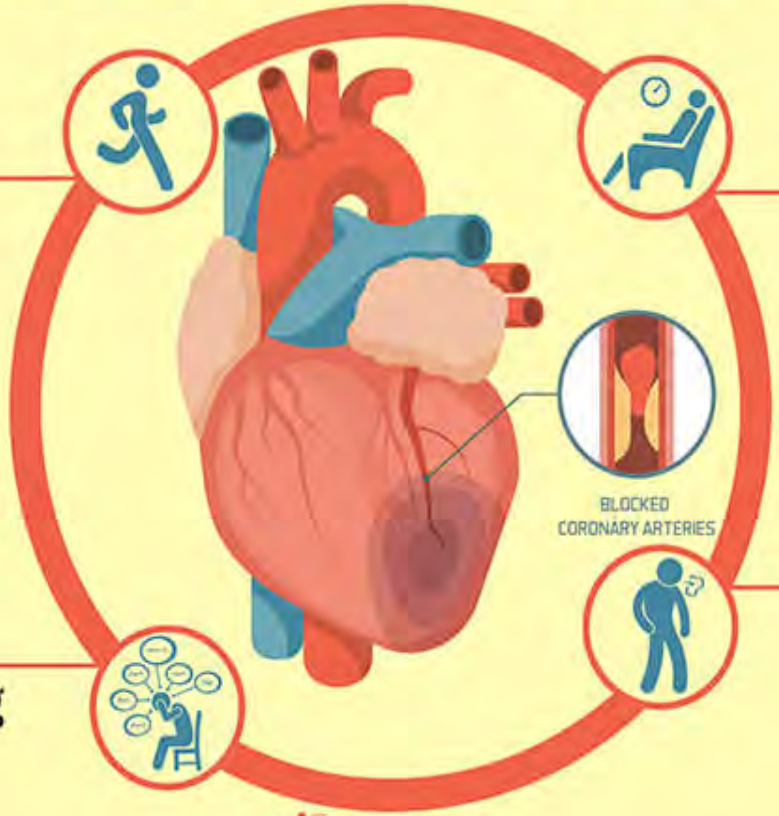
STAGE 1

Breathlessness or tiredness (with brisk walk, a jog or taking flights of stairs)

STAGE 2

Comfortable when resting

Heart races or breathlessness when walking a block or taking the stairs



STAGE 4

Heart and breath go faster even at rest

Tiredness even while sitting

Anxiety and palpitations almost all the time

STAGE 3

Palpitation or tiredness with simple tasks like getting up from the sofa and walking over to the kitchen

sepalika

Beta Blockers

- Atenolol
- Propanolol
- Metoprolol
- Sotolol
- Carvidelol
- Timodol
- Nadolol
- Labetolol

- Lowers Mortality in patients with an MI
- Slows progression of HF
- Lowers HR and BP

- Heat intolerance
- Impotence
- Hair Growth
- Dizziness
- Weakness
- Exercise complications

Calcium Channel Blockers

- Diltiazem
- Nifedipine
- Verapamil
- Amlodipine
- Felodipine
- Nicardipene
- Nimodipine

- Tx of hypertension, arrhythmias and angina
- Lowers BP
- Slows HR
- Dilates Coronary Arteries

- Leg Swelling
- Constipation
- Dizziness
- Weakness

Angiotensin Converting Enzyme Inhibitors (ACE Inhibitors)

- Enalapril
- Lisinopril
- Catopril
- Accupril
- Quinapril
- Benazopril
- Fosinopril

- Prolongs life in patients with CHF
- Lowers BP
- Decreases work of the heart by reducing vascular resistance

- Cough
- Hyperkalemia
- Contraindicated for some patients with renal disease/ insufficencies

Angiotensin Receptor Blockers (ARBs)

- Losartan
- Valsartan
- Candesartan
- Irbesartan

- Prolongs life of patients with CHF
- Lowers BP
- Decreases work of the heart by reducing vascular resistance

- Hyperkalemia
- Contraindicated for some patients with renal disease/ Insufficiencies
- Metallic taste in mouth
- Rash

Inpatient Exercise Guidelines:

Don't start exercise if:

Terminate Exercise If:

VARIABLE	ACSM*	AACVPR**	SHS***	ACSM	AACVPR	SHS
Pulse Rate	120 b/min	-----	< 50 b/min > 120 b/min	Post MI 20 b/min above rest	Post MI 30 b/min above rest	Med/Surg Pt 30 b/min above rest
Pulse Rate	-----	-----	-----	Post CABG 30 b/min above rest	Post CABG 30 b/min above rest	Post MI/CHF 20 b/min above rest
Respiration	-----	-----	> 30 b/min	-----	-----	-----
SBP	> 200 mm/Hg	-----	< 80 mm/Hg > 180 mm/Hg	> 220 mm/Hg	10 mm/Hg drop	20 mmHg drop > 200 mm/Hg
DBP	> 110 mm/Hg	> 110 mm/Hg	-----	> 110 mm/Hg	> 110 mm/Hg	> 120 mm/Hg
SPO_2	< 88 % (breathing room air)	-----	< 90% No Pulm. Dis. < 85% Pulm. Dis.	Titrate to maintain @ ≥ 90%	-----	-----
Hematocrit	-----	-----	< 25%	-----	-----	-----
Hemoglobin	-----	-----	< 8.0 g/dl	-----	-----	-----
INR	-----	-----	> 6.0	-----	-----	-----
Glucose			<60 g/dl >400 g/dl	-----	-----	-----
Platelets	-----	-----	< 25,000 ul	-----	-----	-----
RPE				13	13	

RATING OF PERCEIVED EXERTION (RPE)

Borg's Scale (Gunner borg 1982):	Modified Borg Scale:
6-	0- at rest
7- very, very light	1- very easy
8-	2- somewhat easy
9- very light	3- moderate
10-	4- somewhat hard
11- fairly light	5- hard
12-	6-
13- somewhat hard	7- very hard
14-	8-
15- hard	9-
16-	10- very, very hard
17- very hard	
18-	
19- very, very hard	
20-	

Blood

Albumin (Alb)	3.5 - 5.0	Creatinine	0.6 - 1.5	Lymphocytes	20 - 40
Alk Phos	20 - 90	D-dimer	0 - 0.5	Magnesium (Mg)	1.5 - 2.5
ALT	10 - 30	Eosinophils	1 - 4	MCV	80 -100
Ammonia	9.5 - 49	GFR	Above 90	Monocytes	2 - 8
Amylase	23 - 85	Glucose	70 - 110	Neutrophils	40 - 60
AST	8 - 46	Glucose Tolerance Test (GTT)	Start: 70 -100 (1hr) Below 200 (2hr) Below 140 (3hr) Below 120	pH	7.35 - 7.45
Bands	3 - 7			Plt Count	100 - 400
Basophils	0 - 2	HDL	Above 50	Potassium (K+)	3.5 - 5.0
Bicarb (HCO3)	22 - 26	Hematocrit (Hct)	(M) 41 -50 (F) 36 - 44	Protein	6.0 - 8.3
Bilirubin, Direct	0 - 0.3			PT	9 - 12
Bilirubin, Total	0.3 -1.2	Hemoglobin (Hgb)	(M) 13 - 18 (F) 12 - 16	PTT	24 - 45
BNP	0 - 100			Red Blood Cells (RBCs)	(M) 4.7 - 6.1 (F) 4.2 - 5.4
BUN	7 - 20	HgbA1c	5.6 - 7.5		
Calcium (Ca+)	8.5 - 10.5	INR	0.8 - 1.2	RDW	0 - 14.5
Chloride (Cl-)	95 - 105	Iron (Fe)	60 - 170	SaO2 (Oxygen)	95 -100
Cholesterol, Tot	Below 200	Lactic Acid (Lactate)	(Art) 0.5 -1.6 (Ven) 0.5 - 2.2	Sodium (Na+)	135 -145
CK or CKMB	3.5 - 5.0			Triglycerides	Below 150
CO2 (Blood Gas)	35 - 45	LDL	Below 130	Troponin	0 - 0.015
CO2 (CMP/BMP)	20 - 29	Lipase	0 - 160	WBCs	5 -10

Urine

Bacteria	Negative	Color	Yellow - Amber	pH	4.5 - 8.0
Bilirubin	Negative	Glucose	Negative	Protein	0 - 20
Blood (Hgb)	Negative	Ketones	Negative	RBCs	0 - 3
Casts	0 - 5	Leukocytes	Negative	Specific Gravity	1.01 - 1. 03

Blood

Albumin (Alb)	3.5 - 5.0
Alk Phos	20 - 90
ALT	10 - 30
Ammonia	9.5 - 49
Amylase	23 - 85
AST	8 - 46
Bands	3 - 7
Basophils	0 - 2
Bicarb (HCO3)	22 - 26
Bilirubin, Direct	0 - 0.3
Bilirubin, Total	0.3 -1.2
BNP	0 - 100
BUN	7 - 20
Calcium (Ca+)	8.5 - 10.5
Chloride (Cl-)	95 - 105
Cholesterol, Tot	Below 200
CK or CKMB	3.5 - 5.0
CO2 (Blood Gas)	35 - 45
CO2 (CMP/BMP)	20 - 29

Creatinine	0.6 - 1.5
D-dimer	0 - 0.5
Eosinophils	1 - 4
GFR	Above 90
Glucose	70 - 110
Glucose Tolerance Test (GTT)	Start: 70 -100 (1hr) Below 200 (2hr) Below 140 (3hr) Below 120
HDL	Above 50
Hematocrit (Hct)	(M) 41 -50 (F) 36 - 44
Hemoglobin (Hgb)	(M) 13 - 18 (F) 12 - 16
HgbA1c	5.6 - 7.5
INR	0.8 - 1.2
Iron (Fe)	60 - 170
Lactic Acid (Lactate)	(Art) 0.5 -1.6 (Ven) 0.5 - 2.2
LDL	Below 130
Lipase	0 - 160

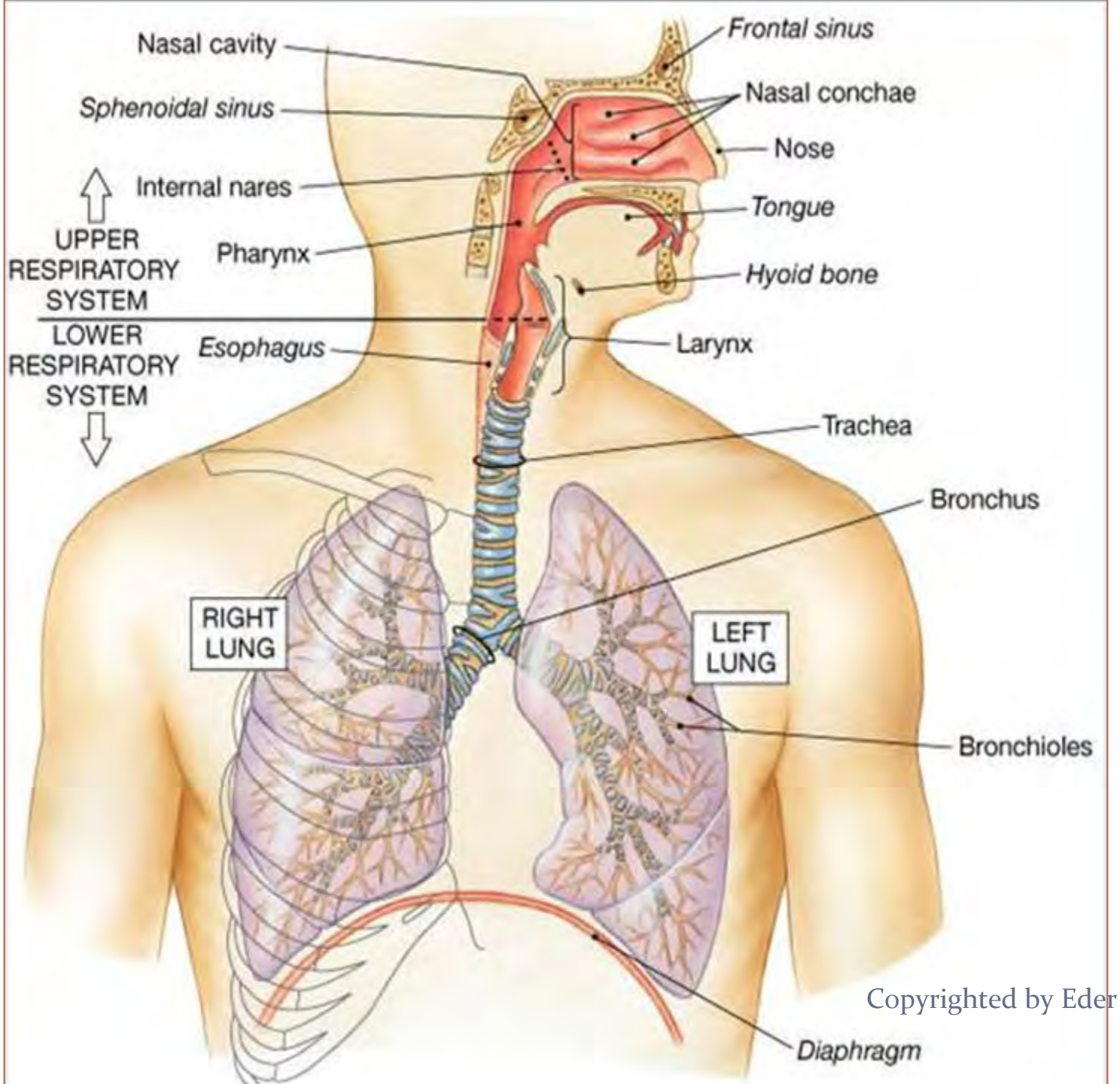
Lymphocytes	20 - 40
Magnesium (Mg)	1.5 - 2.5
MCV	80 -100
Monocytes	2 - 8
Neutrophils	40 - 60
pH	7.35 - 7.45
Plt Count	100 - 400
Potassium (K+)	3.5 - 5.0
Protein	6.0 - 8.3
PT	9 - 12
PTT	24 - 45
Red Blood Cells (RBCs)	(M) 4.7 - 6.1 (F) 4.2 - 5.4
RDW	0 - 14.5
SaO2 (Oxygen)	95 -100
Sodium (Na+)	135 -145
Triglycerides	Below 150
Troponin	0 - 0.015
WBCs	5 -10

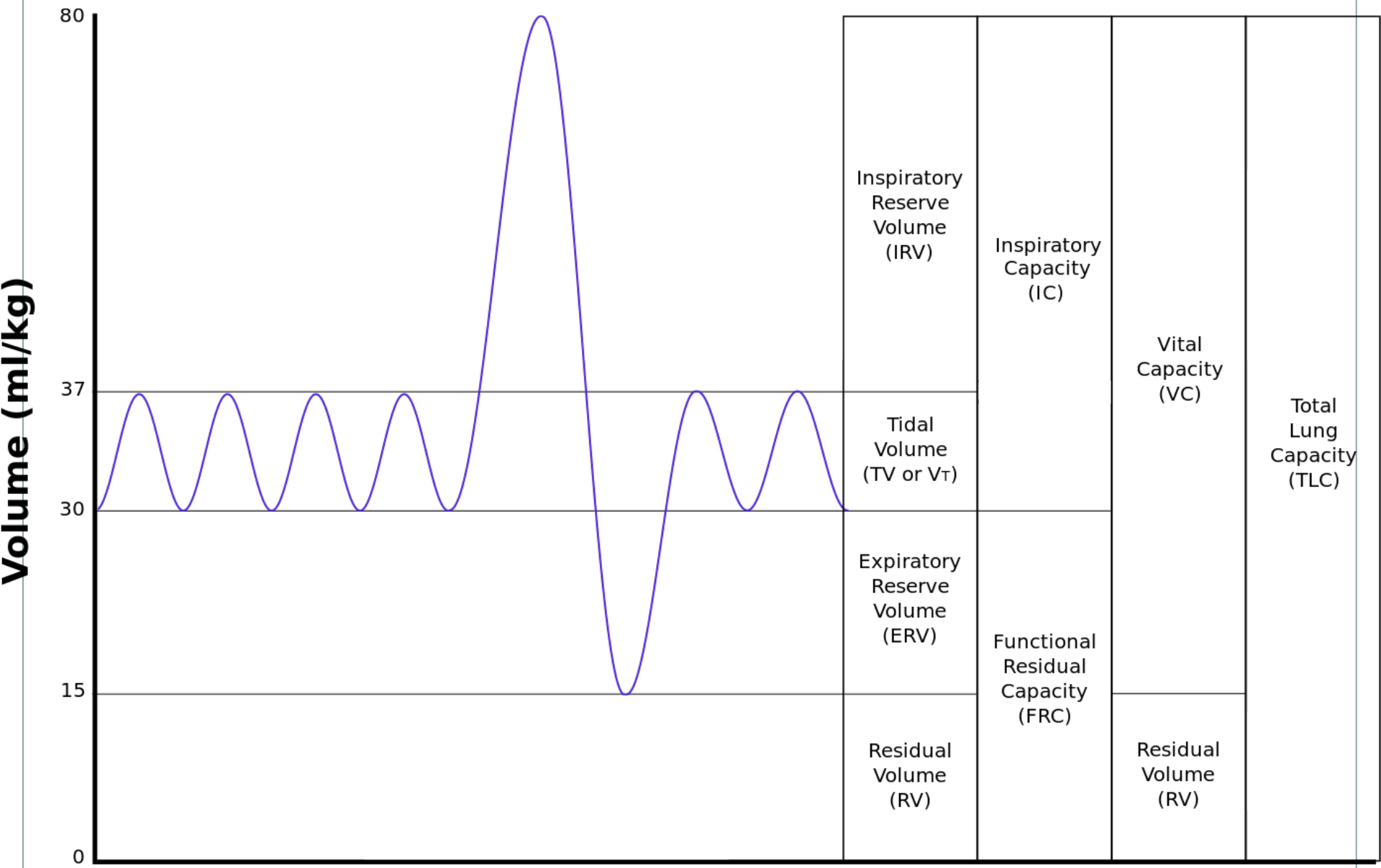
Urine

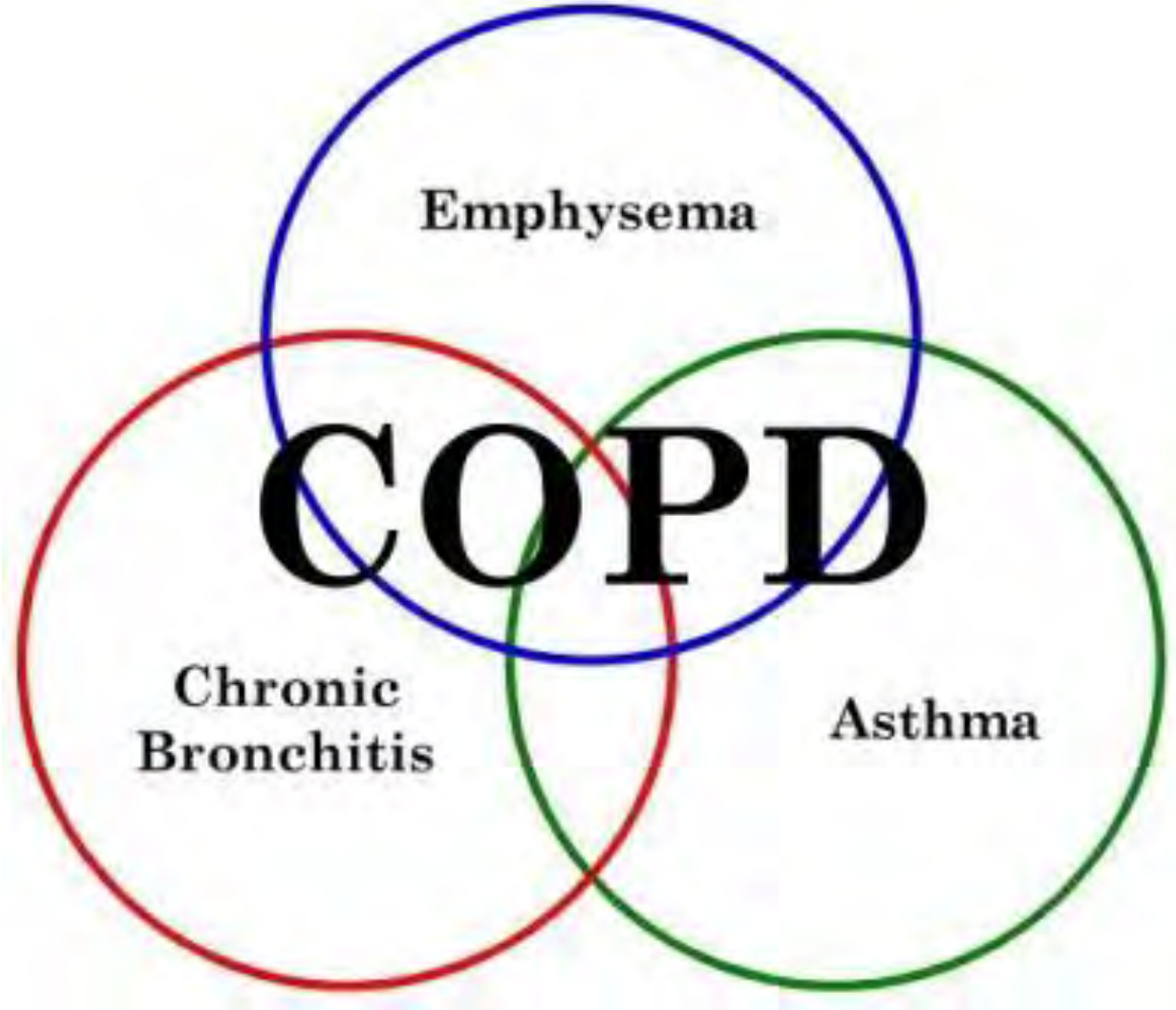
Bacteria	Negative
Bilirubin	Negative
Blood (Hgb)	Negative
Casts	0 - 5

Color	Yellow - Amber
Glucose	Negative
Ketones	Negative
Leukocytes	Negative

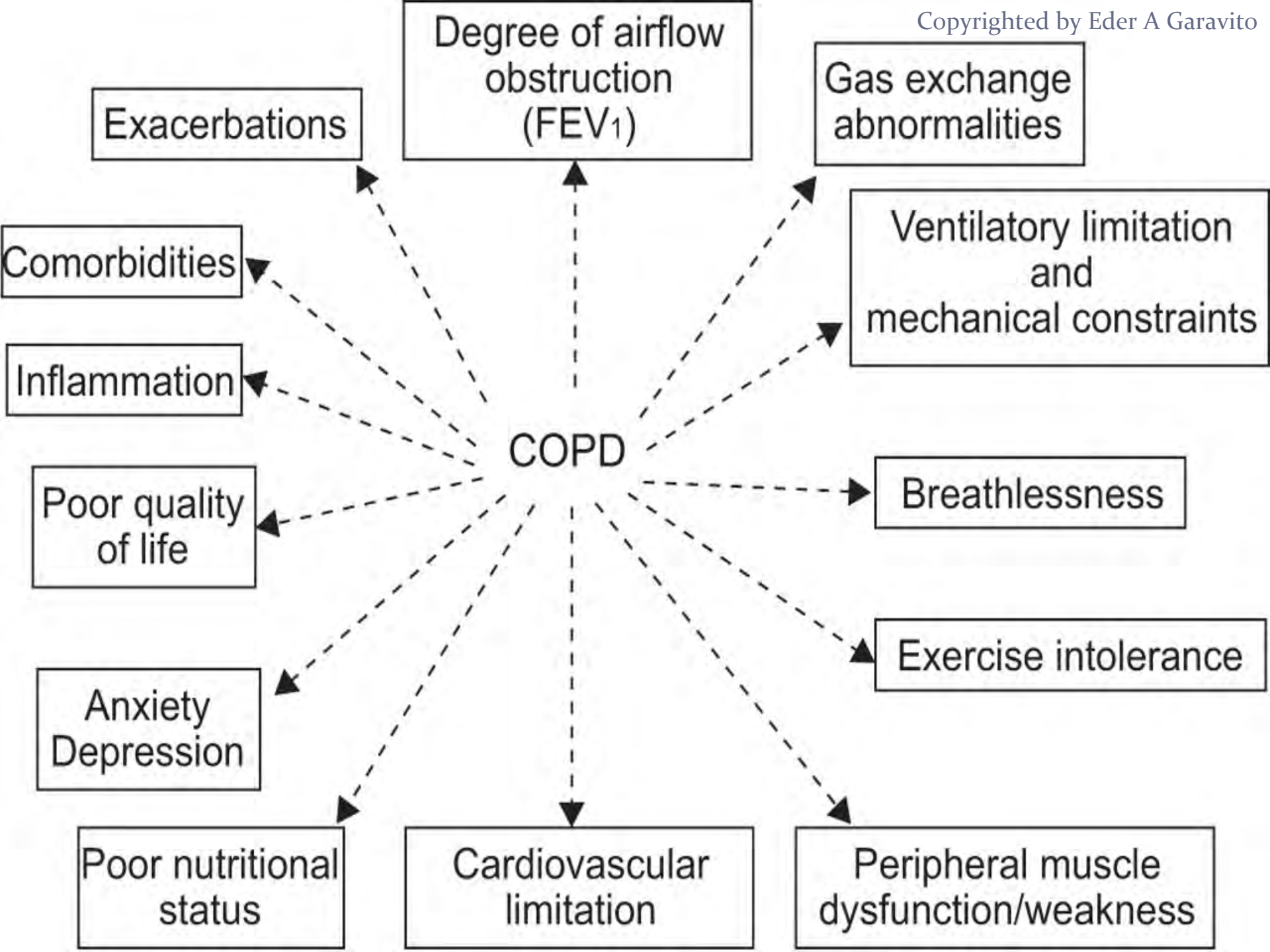
pH	4.5 - 8.0
Protein	0 - 20
RBCs	0 - 3
Specific Gravity	1.01 - 1. 03







Also includes cystic fibrosis, bronchiolitis obliterans, and brionchietasis



COPD

CHRONIC AIRFLOW LIMITATION

"EMPHYSEMA AND CHRONIC BRONCHITIS"

- Easily Fatigued
- Frequent Respiratory Infections
- Use of Accessory Muscles to Breathe
- Orthopneic

- Wheezing
- Pursed-Lip Breathing
- Chronic Cough
- Barrel Chest
- Dyspnea
- Prolonged Expiratory Time
- Bronchitis - Increased Sputum
- Digital Clubbing

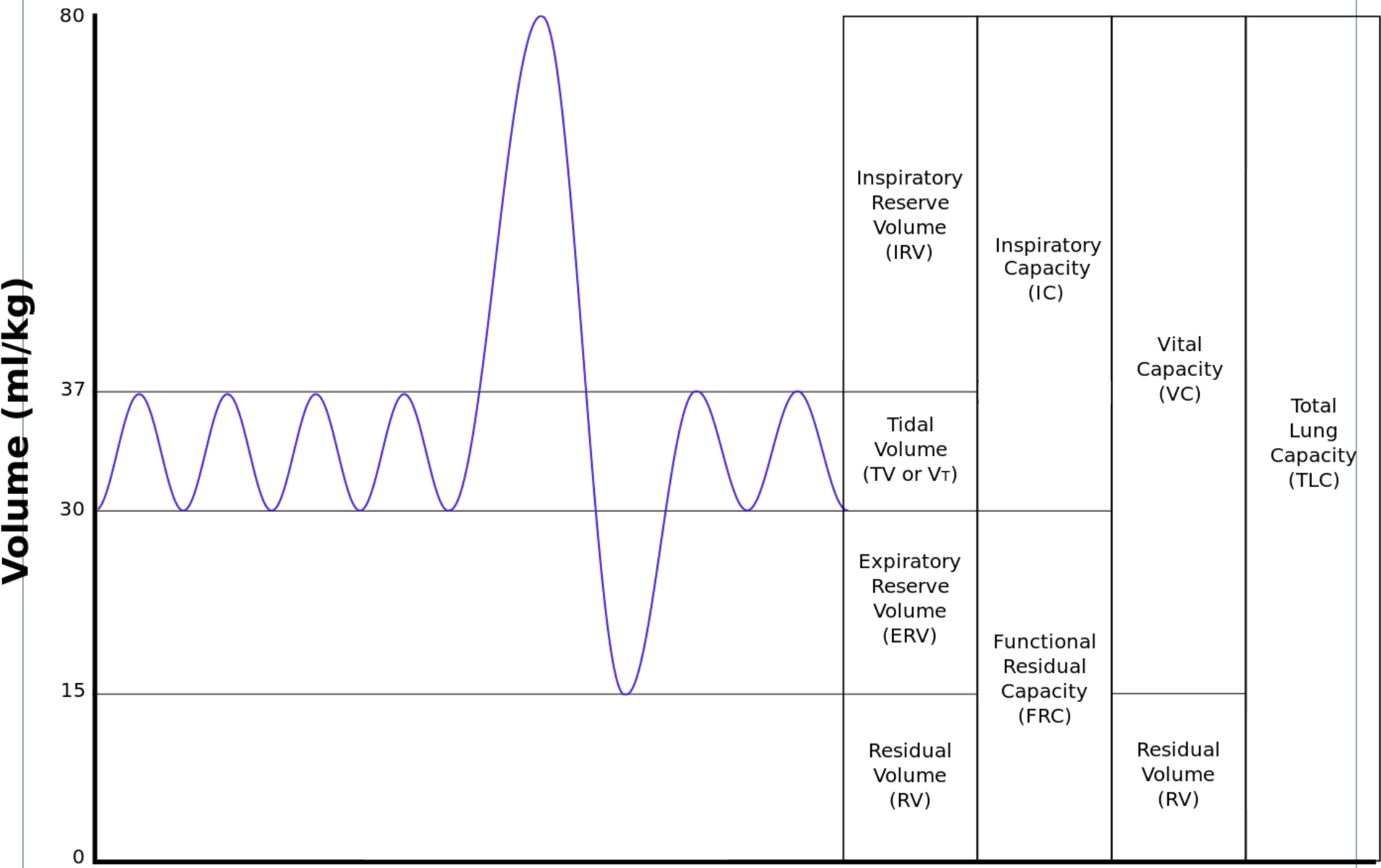
- Cor Pulmonale (Late in Disease)
- Thin in Appearance

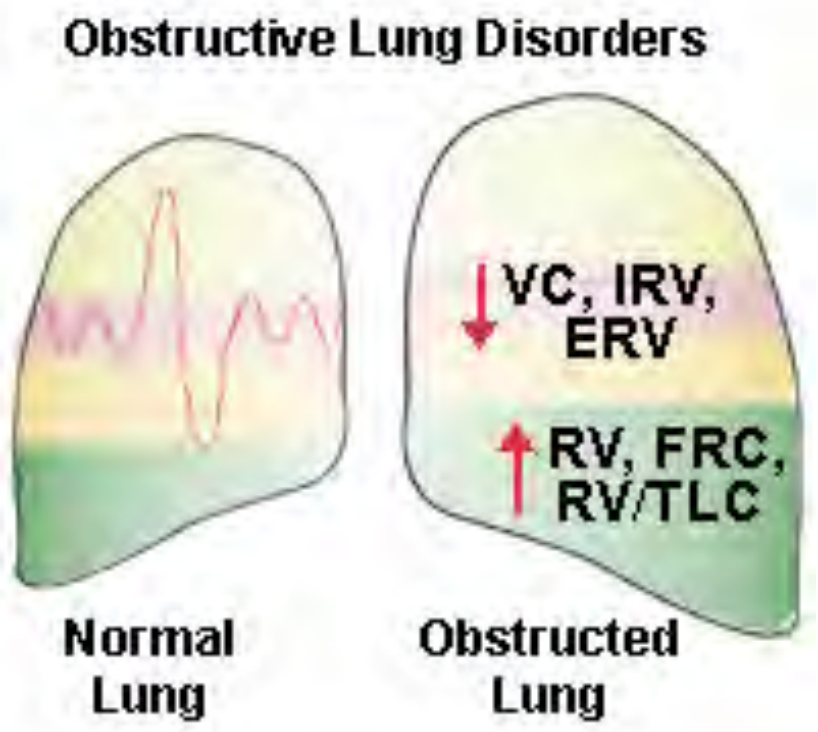
Restrictive Lung Diseases

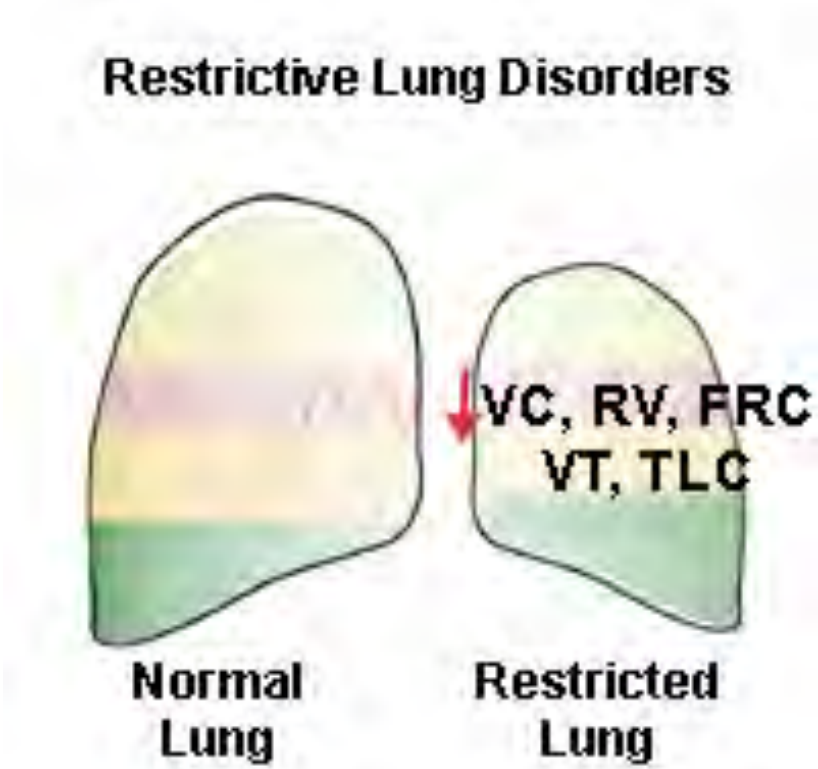
- Acute Respiratory Distress Syndrome (ARDS)
- Scoliosis
- Obesity
- Pregnancy
- Idiopathic pulmonary fibrosis
- Sarcoidosis
- Pneumoconiosis
- Neuromuscular diseases
  - Guillain-Barre, Multiple Sclerosis

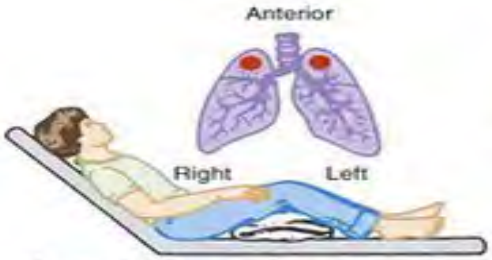
OBSTRUCTIVE VS. RESTRICTIVE

Obstructive disorders	Restrictive disorders
• **Characterized by:** reduction in airflow. • So, shortness of breath → in exhaling air. (the air will remain inside the lung after full expiration) 1. COPD 2. Asthma 3. Bronchiectasis	• **Characterized by** a reduction in lung volume. • So, Difficulty in taking air inside the lung. (DUE TO stiffness inside the lung tissue or chest wall cavity) 1. Interstitial lung disease. 2. Scoliosis 3. Neuromuscular cause 4. Marked obesity



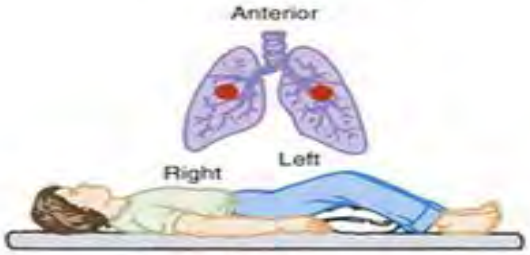






Anterior upper segment (upper lobes)

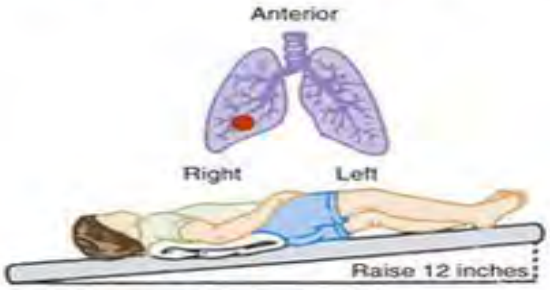
Posterior apical segment



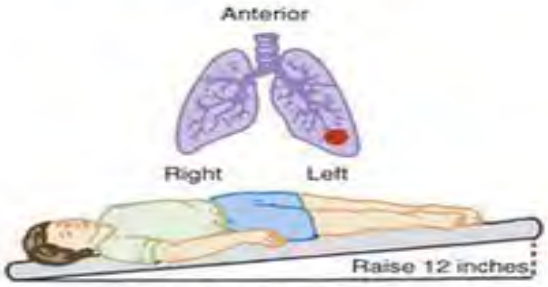
Anterior segments

Right posterior segment

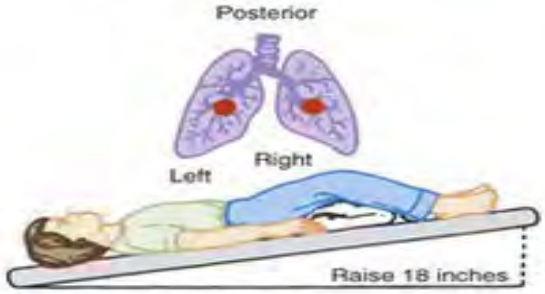
Left posterior segment



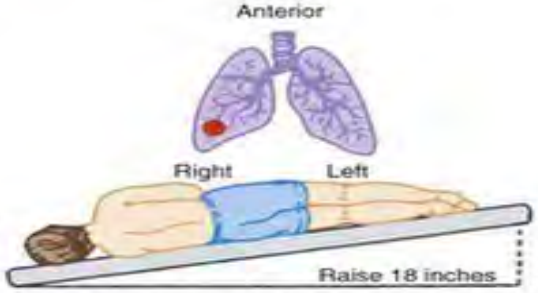
Right middle lobe



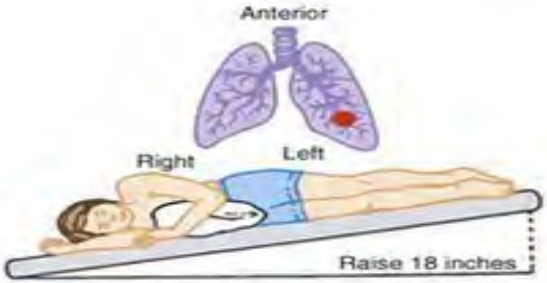
Left lingular



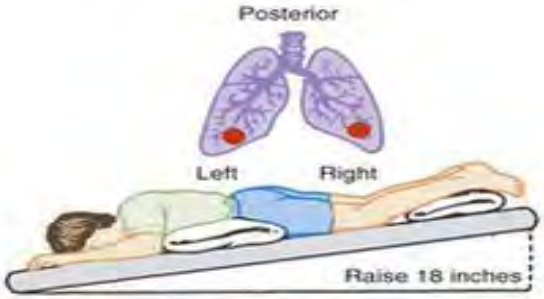
Anterior segments (lower lobes)



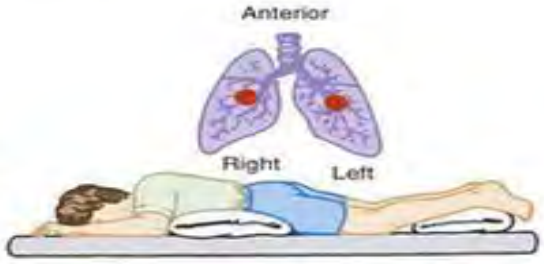
Right lateral segment



Left lateral segment



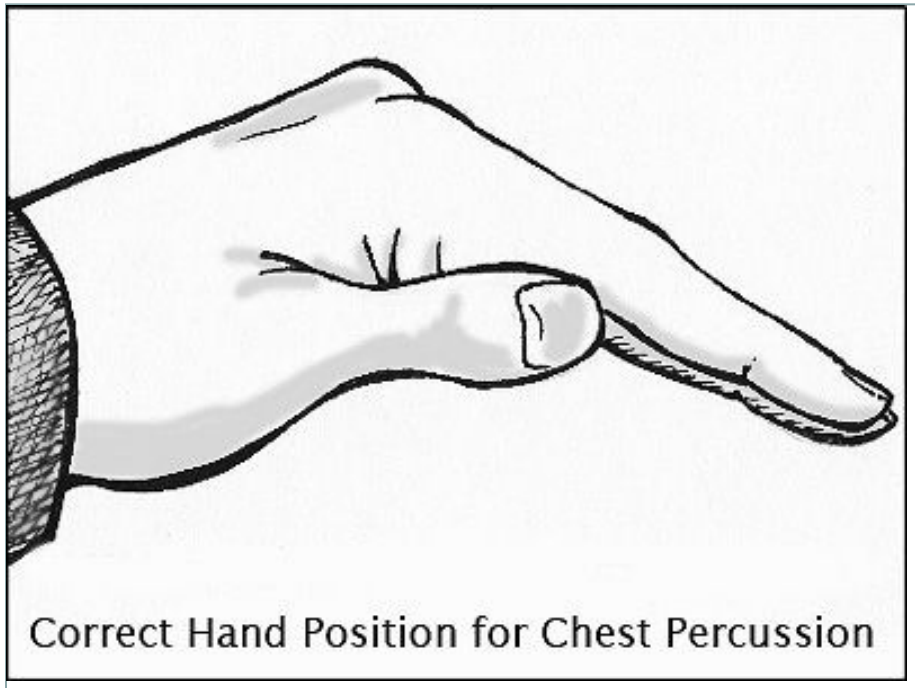
Posterior segments



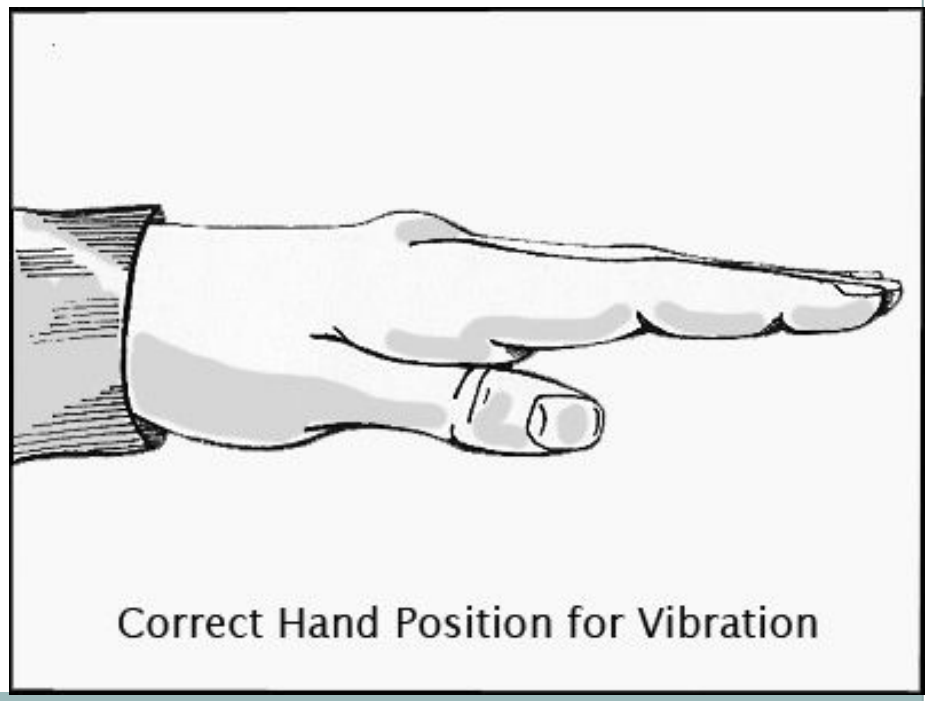
Superior segments

Airway Clearance Techniques

- Postural drainage
- Percussion
- Vibration/Shaking
- Active Cycle of Breathing
- Autogenic Drainage
- Positive Expiratory Pressure Devices
  - Acapella, Flutter Valve, Spirometry
- High Frequency Chest Compression
  - Bed modules, Vest



Correct Hand Position for Chest Percussion



Correct Hand Position for Vibration

Relative Contraindications to Postural Drainage

- Severe hemoptysis
- Severe pulmonary edema
- Congestive Heart Failure
- Large Pleural Effusion
- Pulmonary Embolism
- Rib Fractures
- Pneumothorax
- Cardiac arrhythmias
- Recent MI
- Severe hyper or hypotension
- Unstable angina
- Severe Obesity
- Osteoporosis
- INR higher than 1.0

Absolute Contraindications to Postural Drainage

- Respiratory or cardiac arrest
- Upper airway obstruction
- Hypotensive shock
- Uncontrolled upper GI bleeding
- Agitation/confusion
- Multiple organ failure
- Inability to swallow
- Spinal instability
- Recent barotrauma
- Increased ICP >20
- Subcutaneous Emphysema
- Patient declines

Pulmonary Thromboendarterectomy : A Case Study

54- year-old female presents to the Emergency Department at Duke University Hospital with chief complaint of shortness of breath.

History of Present Illness

Mrs. Bonnie Alder is a 54 y.o. Female with history of DMII, HTN, hypothyroidism and now thought to have CTEPH. Presents to Duke ED for elective admission for further work-up and determination of surgical vs medical management. She was diagnosed in Texas after noting acute, significant shortness of breath while sight seeing. She was diagnosed with subacute and chronic pulmonary emboli on CTA 7/15/2016. She also had an echo at that time that revealed significant right sided heart failure. As part of her work up she had a LHC with normal coronaries. She has since also developed lower extremity edema for which she has been managed with furosemide (Lasix) 20 mg PO daily . She denies any fevers, chills, chest pain, cough, or wheezing. She has since been anticoagulated with Apixiban (Eloquis) BID. Other than shortness of breath with exertion and lower extremity edema, complete ROS otherwise negative. She has been using 2L O2 NC with exertion since her diagnosis of PE.

Review of Systems

- Constitutional – Positive for Malaise/Fatigue, negative for fever/chills
- HEENT – Negative
- Respiratory – Labored, positive for SOB, negative for coughing, hemoptysis, or wheezing
- Cardiovascular – Positive for leg swelling, negative for chest pain, palpitations, orthopnea, claudication and PND
- GI/GU – Negative
- MSK – Negative
- Integumentary – Negative
- Neurological - Negative

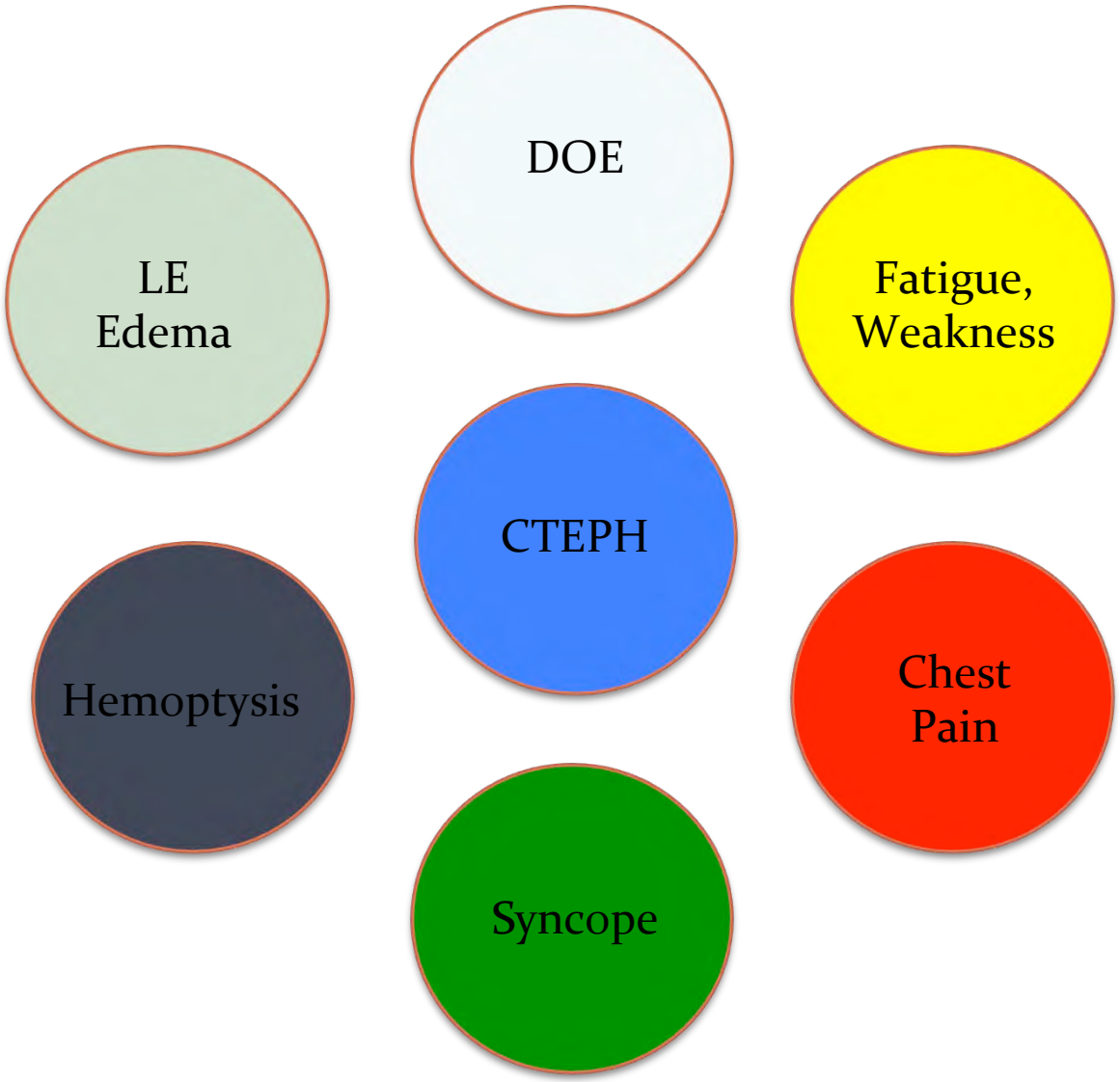
Lab Values

7/25/2018	7:23 am
PH	7.19
Pco2	92 mmHg
Hco3	22.0 mmol/l
Po2	72 mmHg
Spo2	89%
Fio2	37%

Why is Mrs. Adler Feeling Sick?

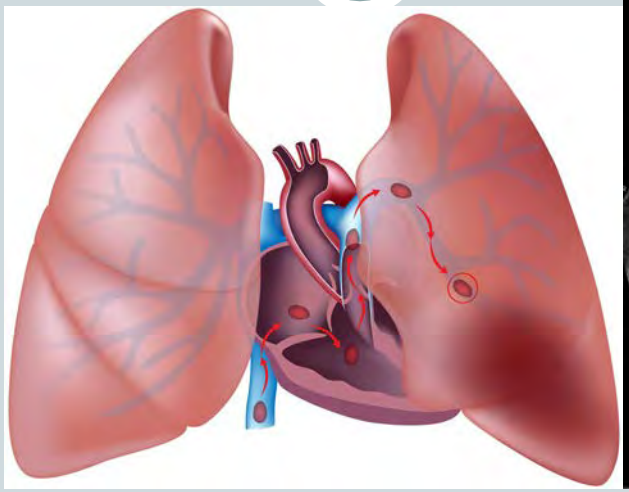
Probable Cause

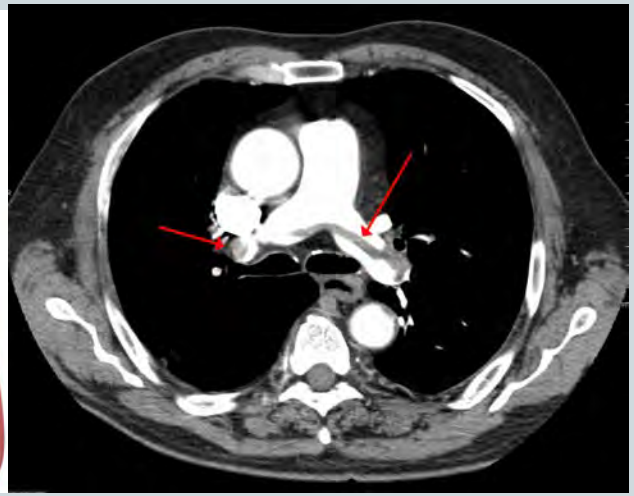
Signs and symptoms have been found to be secondary to right-sided heart failure and pulmonary hypertension as a consequence of chronic thromboembolic pulmonary hypertension (CTEPH)


DOE
LE Edema
Fatigue, Weakness
CTEPH
Hemoptysis
Chest Pain
Syncope

Diagnosis

Chronic Thromboembolic Pulmonary Hypertension in setting of saddle embolus (pulmonary embolism)





Medical Management

- Immediate admission to CCU for initiation of Flolan
- Pulmonary Angiogram
- Heart Catheterization
- Assessment by CTICU surgery team for PTE

In the Operating Room

PTE Surgery Video

Hospital Course

- 7/25/2018 – Voluntary admission to ED
- 7/25/2018 – Hospital Admission to Pulmonary Unit
- 7/27/2018 – Admission to CCU
- 7/30/2018 – OR for PTE
- 7/30/2018 – Transfer to CTICU
- 8/01/2018 – Extubated, PT/OT initial consults

Initial Snapshot: What should I Expect?

Patient Presentation and Monitoring Equipment

Patient Presentation Day 1

- Median Sternotomy
- Pain
  - Deep breathing
  - Coughing
  - Sneezing
- Lethargic
- Somnolent
- Debilitated
- Disoriented
- Discouraged
- SOB

Lines/Leads/Monitoring

- Telemetry
- PAC/Swan Ganz
- Arterial Line + CVP
  - Transducer/Pressure bags
- Oxygen delivery device
  - iNO/Velitri
- Continuous Pulse Ox
- Central Line/IVs
- Epidural
- Chest Tubes/Drains
- Catheter
- SCDs

What do I do Now?!?!?

Can We Mobilize Too Early?

Studies have documented muscle atrophy and other detrimental muscular changes within 72 hours of ICU patient physical inactivity.

83% of patient time in ICU is spent lying in bed

73% of patients considered “able” to ambulate by PTs did not ambulate or receive a PT consult

Can We Mobilize Too Early?

- Early mobility in an ICU setting has led to:
  - Decreased incidence of ICU acquired delirium
  - Decreased duration of mechanical ventilation
    - ETT, tracheostomy, BiPAP, CPAP
  - Shorter length of stay in the ICU
  - Improved scores in functional outcomes
    - Barthel Index
    - Increased ambulation distance
    - Improvement in functional mobility
  - Drastically reduce medical expenses/costs

Plan of Care

How to progress activity in the ICU:

- PROM/AROM/AAROM
- Bed mobility
  - Rolling, log rolling, sidelying to sitting, supine to sitting
- Sitting on EOB
  - Assessing Vitals
    - RR, HR/PR, BP, Physical presentation
- Functional mobility
  - Sit to stand, bed mobility
    - From EOB, from chair/recliner, from bed/chair position
- Ambulation
  - AD -> Least restrictive AD -> No AD
- Stair training, car transfers (Very rare in ICU)

Back to Mrs. Adler…

So what did we do with Mrs. Adler???

Plan of Care

- 8/01/2018 – Initial Evaluation
  - Sternotomy
  - Extubated on 12L02 via HFNC
  - Lethargic
    - Oriented x3
  - Following commands appropriately
  - PAC/Swan Catheter removed 3 hrs prior
  - VSS in supine
  - Hospital bed turned into a chair
    - MAP change from 63-49mmHg in sitting
      - OOB mobility deferred
  - Bed therex and education
    - Family, RN, Patient

Plan of Care

- 8/02/2018
  - Patient oriented x4. More interactive
  - Pain score 7/10 – Lichert Scale
  - Bed turned into chair position
    - MAP drop from 65-59mmHg, pt asymptomatic
  - Pt transferred from sit to stand with mod assist x1
    - MAP drop to 49mmHg, pt symptomatic
  - Pt transferred to bedside recliner with mod assist x1
    - Educated on seated therex
    - Recommended ted hose for future sessions

Plan of Care

- 8/03/2018
  - Pain rating 3/10 – Lichert Scale
  - Bed -> chair, VSS
  - Pt stood with min assist with Swedish Walker
    - Ambulated 50’ with min assist x1.
    - MAP ~55-59mmHg, pt asymptomatic
    - Spo2 92-94% on 6Lo2 via NC
- 8/04/2018
  - O2 weaned to 3Lo2 via NC
  - Ambulated 200’ with Swedish Walker
    - Spo2 ~94%

Plan of Care

Plan of Care

- 8/05/2018
  - Patient transferred to SDU
- 8/08/2018
  - Pt transferred back to CTICU 2/2 unresponsiveness in setting of hypercarbia
- 8/09/2018 – Pt re-evaluation 2/2 bounce back to ICU
  - Ambulated 400' with Swedish Walker 3L02 via NC
- 8/10/2018
  - Patient transferred back to SDU

Plan of Care

- 8/13/2018
  - Patient remains in SDU
  - Weaned to room air
    - Spo2 93-95% at rest, 92-93% during exertion
  - Pain 2/10 – Lichert Scale
  - Ambulating 900’ at a time with Rolling Walker

- 8/14/2018
  - Patient ambulated 600’ with no AD and CGA
  - Patient ascended/descended 10 stairs with CGA
  - Patient discharged from PT (not from hospital)
    - Recommend home with intermittent assistance and outpatient pulmonary rehabilitation

Plan of Care

8/15/2018

Patient Discharged Home With Husband

Transcatheter Aortic Valve Replacement: A Case Study

67 y.o. Caucasian male who presented to Dr. Rogers for evaluation for TAVR with symptoms of dyspnea, fatigue and severe shortness of breath.

History of Present Illness

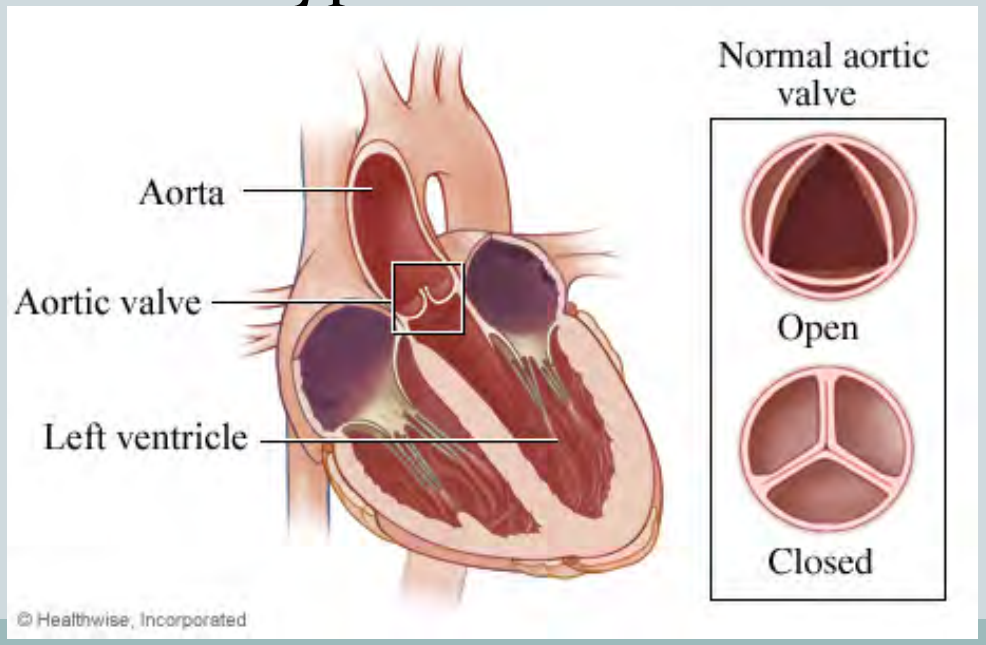
- Nathan Hicks is a 67 y.o. Caucasian male who presented to Dr. Rogers for evaluation for TAVR with symptoms of dyspnea, fatigue and severe shortness of breath. He has a h/o COPD accompanied by concomitant aortic stenosis that has been closely monitored by his cardiologist. He now complains of shortness of breath that makes him unable to walk 10 feet without the need for oxygen (NYHA class IV). He uses 3L02 at home and wears a CPAP at night, but states that sometimes he has to lay in bed all day with his CPAP because that is the only way he can breathe. He has been seen by a pulmonologist, who reports there is no significant decrease in his lung function. Mr. Hicks has been hospitalized 3 times in 2018, with the last two times being within December. These admissions were all due to shortness of breath with the need for diuresis.
- He was evaluated in TAVR conference and deemed too high risk for SAVR. As such, he presented for his preoperative evaluation.

Past Medical History

- Cataracts, bilateral
- Cellulitis – BUE
- COPD (chronic obstructive pulmonary disease)
- *CPAP Use*
- Diabetes mellitus type 2, uncomplicated
- Glaucoma – Right Eye
- Gout
- Macular degeneration of both eyes
- Oliguria
- Prostatic hypertrophy

Assessment/Impression

- Aortic stenosis – Severe
- Bicuspid aortic valve
- Morbid obesity with BMI of 40.0-44.9, adult
- Diabetes mellitus type 2



Review of Systems

- **General appearance:** alert and cooperative, NAD.
- **Neurologic:** Alert and oriented X 3, normal strength and tone.
- **HEENT:** Head: Normocephalic, atraumatic, without obvious abnormality.
- **Neck:** no adenopathy, no carotid bruit, no JVD and trachea midline
- **Pulmonary:** clear to auscultation bilaterally. Positive for dyspnea on exertion
- **Heart:** regular rate and rhythm, soft crescendo decrescendo murmur S1, S2, no S3 present, rub, or gallop.
- **Hem/lymphatic:** Negative for history of DVT or PE, or easy bruising
- **Abdomen:** soft, non-tender; bowel sounds normal; no masses, no organomegaly
- **Extremities: 2+ edema on the BLE,** extremities normal, atraumatic, no cyanosis. Positive for numbness or tingling fingers/ feet
- **Pulses:** 2+ radial, PT/DP equal bilaterally
- **Skin:** dry, flaky, warm

TAVR Video

Patient Presentation and Monitoring Equipment

Patient Presentation Day 1

- Femoral Wound/Incision
- Pain
  - Active
    - Hip Flexion
    - Hip Extension
    - Hip Abduction
- Lethargic
- Debilitated

Lines/Leads/Monitoring

- Telemetry
- Arterial Line + CVP
  - Transducer/Pressure bags
- Oxygen delivery device
  - Nasal Cannula 2Lo2
- Continuous Pulse O2
- Central Line/IV's
- Catheter
- SCDs

Plan of Care

How to progress activity in the ICU:

- PROM/AROM/AAROM
- BLE Sensation/swelling/capillary refill
- Bed mobility
  - Rolling, log rolling, sidelying to sitting, supine to sitting
- Sitting on EOB
  - Assessing Vitals
    - RR, HR/PR, BP, Physical presentation
- Functional mobility
  - Sit to stand, bed mobility
    - From EOB, from chair/recliner, from bed/chair position
- Ambulation
  - AD: Least restrictive AD -> No AD
- Stair training, car transfers, DC planning (Very rare in ICU)

Plan of Care

How to progress activity in the ICU:

- Sit to stand
  - From EOB, bed/chair
    - AD? – Assess functional status
      - Compare current LOF to PLOF
- Ambulate
  - Least restrictive AD
  - Monitor
    - Pain
    - BP, RR, HR, SpO2
    - Activity tolerance – How far can pt ambulate

Plan of Care

How to progress activity in stepdown unit:

- Progress functional mobility
  - Bed mobility
  - Sit to stand transfers
  - Functional transfers
    - Bed <-> Chair, Commode, WC, etc
  - Stair training
  - Wean AD

Plan of Care

4 days post-op Patient Discharged Home With Wife With No AD

Questions?

Feedback? Let Us Know!

We would love to get your general feedback on today's session and ideas for subject matter for future Spotlight Sessions!

SPOTLIGHT *Series*

Good Luck and Thanks for Tuning In!

Visit our website www.scorebuilders.com for more information on our entire PT and PTA

SCOREBUILDERS