FAILURE

Matt Beecroft, MD

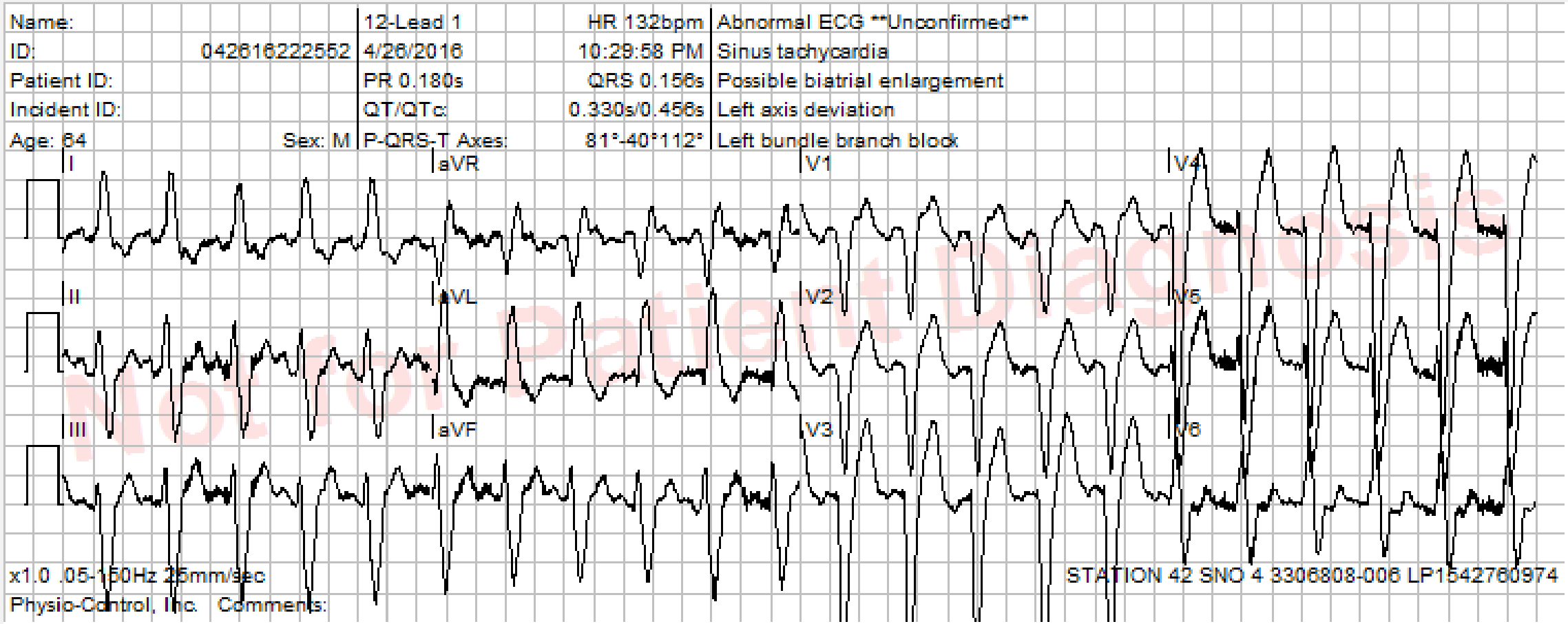
64 yo male with no real PMH

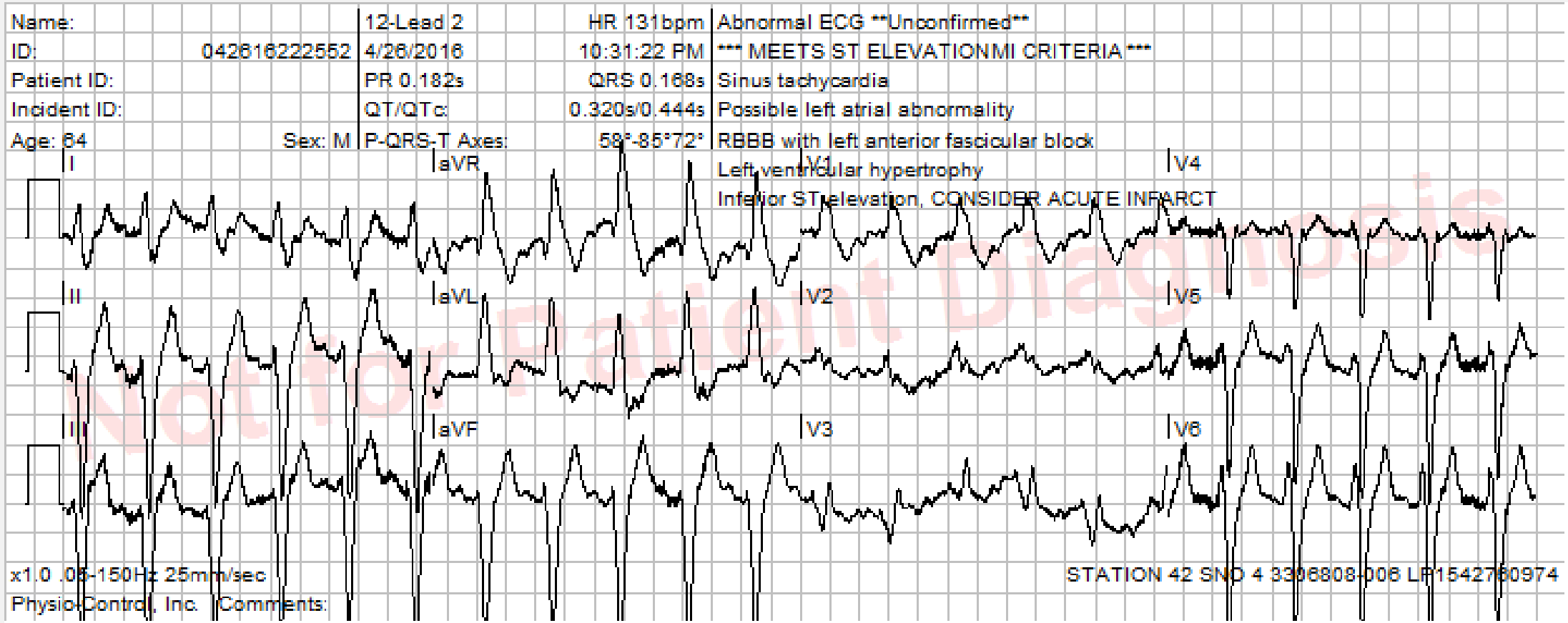
Sitting on couch when sudden onset SOB

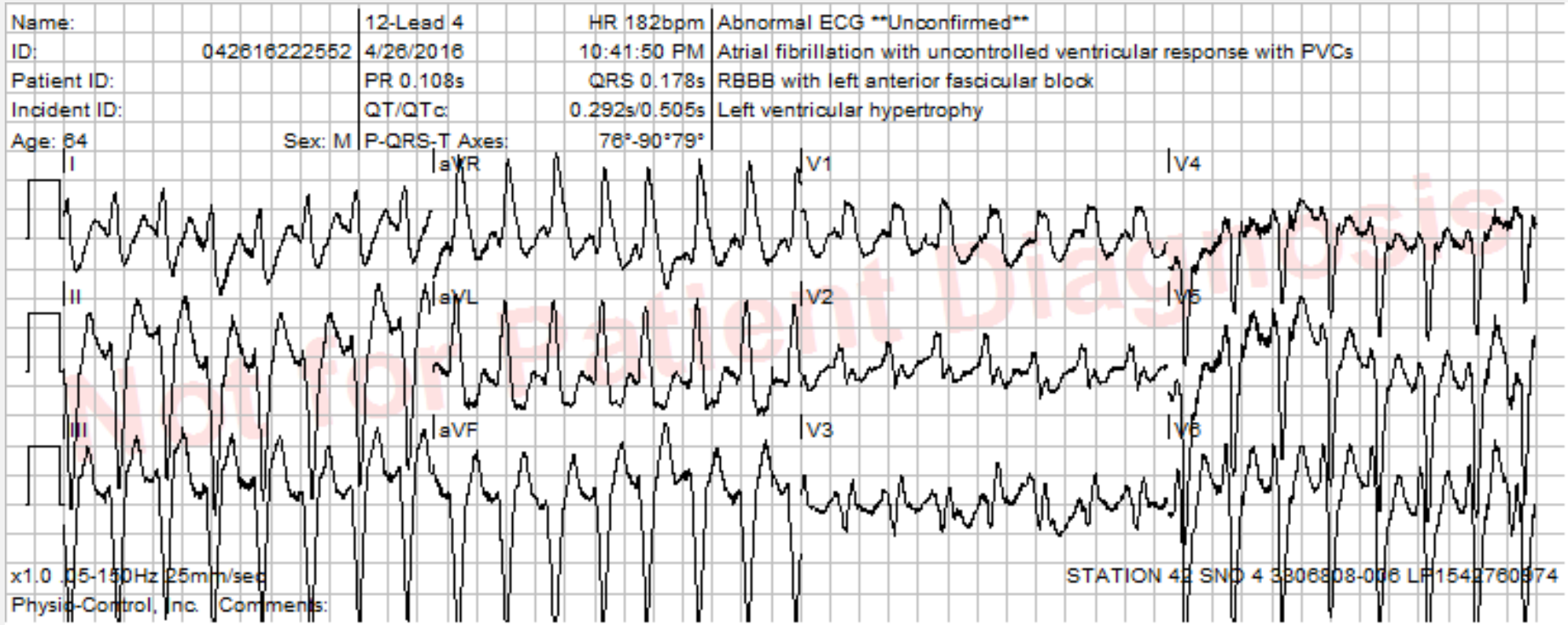
Says he's been sweaty

HR 131, RR 28, 132/96, 93%

FIRST PATIENT OF THE WEEKEND

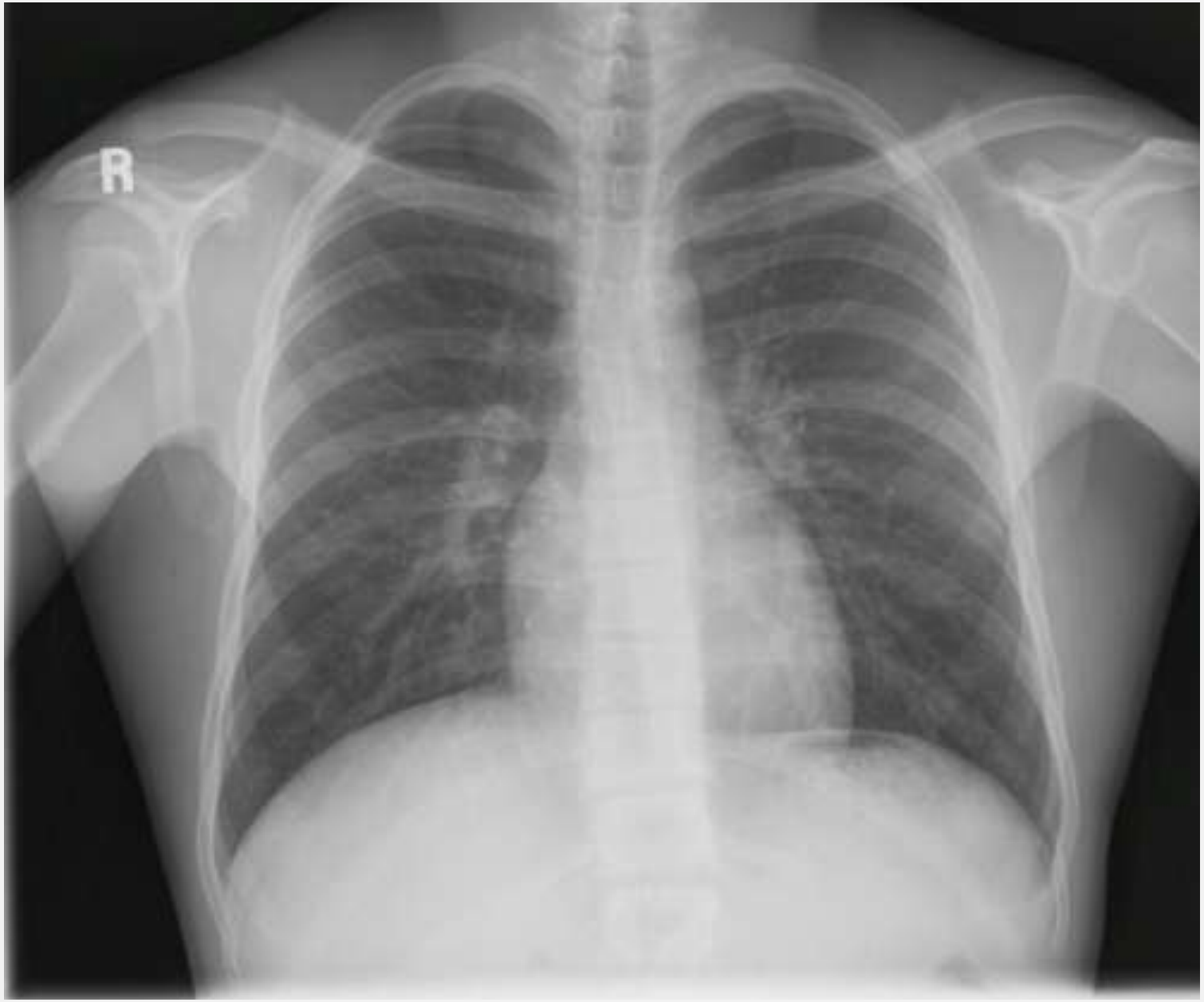

Name:
ID: 042616222552
Patient ID:
Incident ID:
Age: 64 Sex: M
12-Lead 1
4/26/2016
PR 0.180s
QT/QTc:
P-QRS-T Axes:
HR 132bpm
10:29:58 PM
QRS 0.156s
0.330s/0.456s
81°-40°112°
Abnormal ECG **Unconfirmed**
Sinus tachycardia
Possible biatrial enlargement
Left axis deviation
Left bundle branch block
I
II
III
aVR
aVL
aVF
V1
V2
V3
V4
V5
V6
Not for Patient Diagnostic
x1.0 .05-150Hz 25mm/sec
Physio-Control, Inc. Comments:
STATION 42 SNO 4 3306808-006 LP1542760974

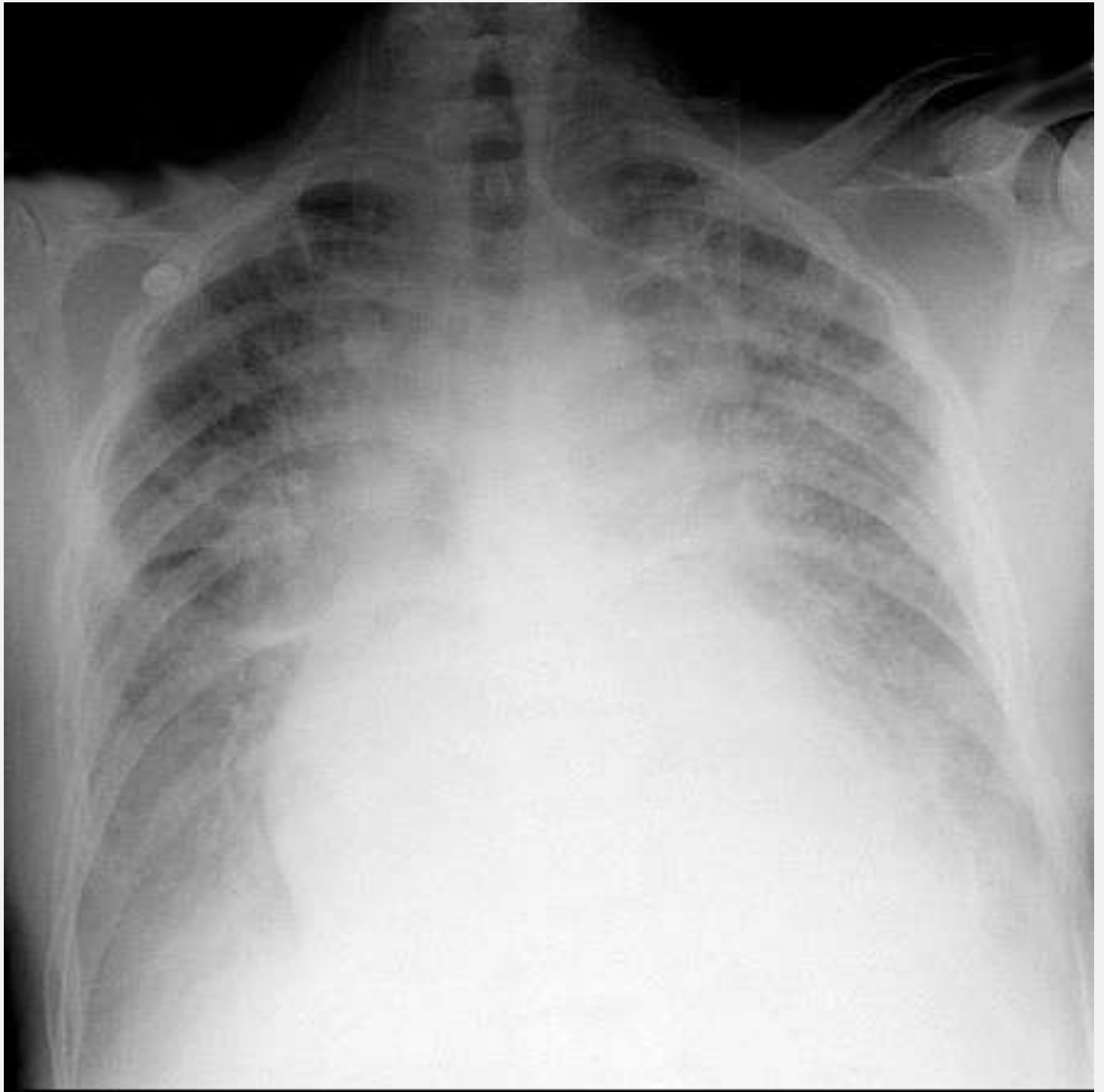

Name:
12-Lead 2
HR 131bpm
Abnormal ECG **Unconfirmed**
ID: 042616222552
4/26/2016
10:31:22 PM
*** MEETS ST ELEVATIONMI CRITERIA ***
Patient ID:
PR 0.182s
QRS 0.168s
Sinus tachycardia
Incident ID:
QT/QTc
0.320s/0.444s
Possible left atrial abnormality
Age: 64
Sex: M
P-QRS-T Axes:
58°-85°72°
RBBB with left anterior fascicular block
Left ventricular hypertrophy
Inferior ST elevation, CONSIDER ACUTE INFARCT
I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
x1.0 .05-150Hz 25mm/sec
STATION 42 SND 4 3306808-006 LR1542760974
Physio-Control, Inc.
Comments:
Not for Patient Diagnosis

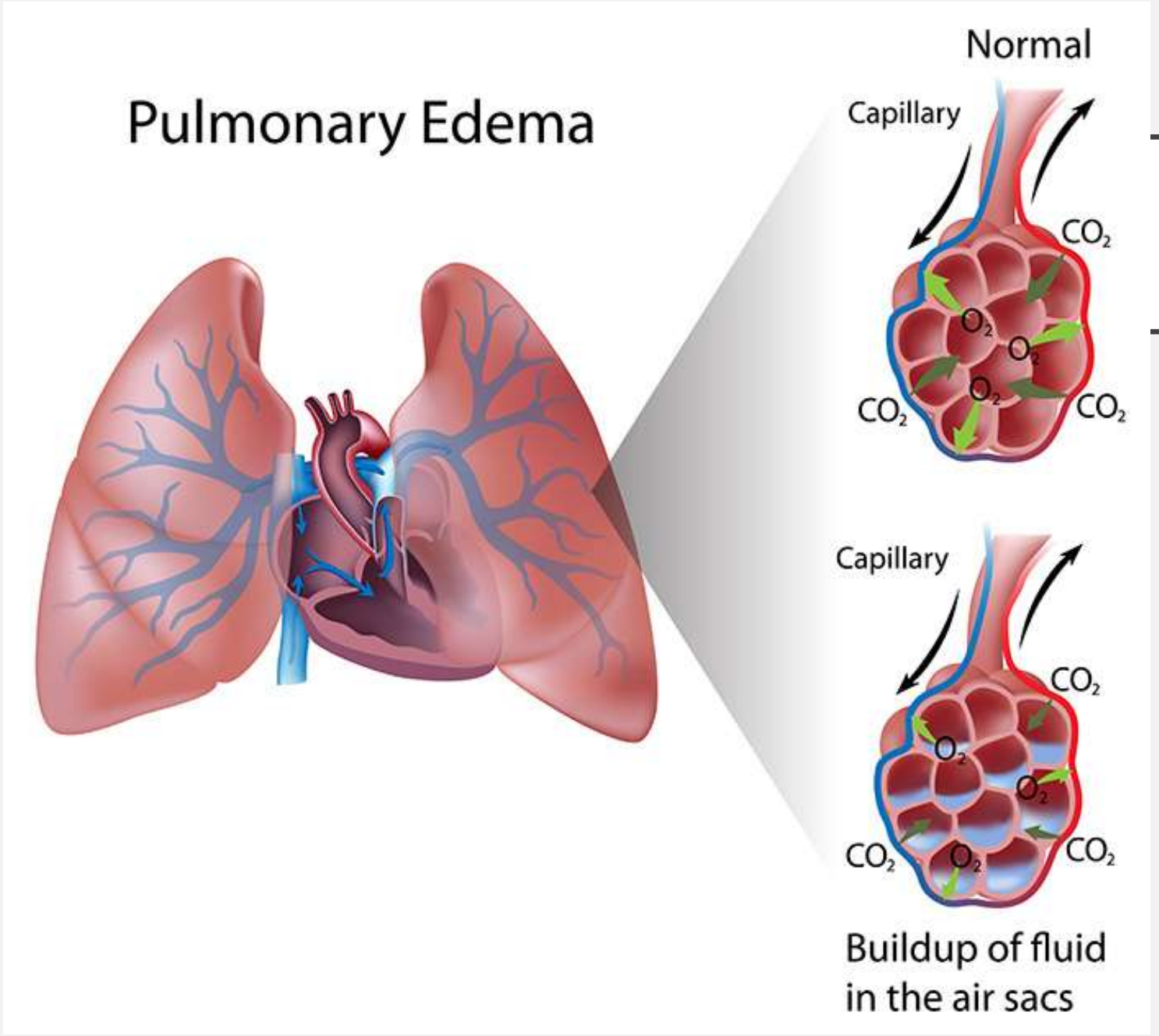

Name:
ID: 042616222552
Patient ID:
Incident ID:
Age: 64 Sex: M
12-Lead 4
4/26/2016
PR 0.108s
QT/QTc:
P-QRS-T Axes:
HR 182bpm
10:41:50 PM
QRS 0.178s
0.292s/0.505s
76°-90°79°
Abnormal ECG **Unconfirmed**
Atrial fibrillation with uncontrolled ventricular response with PVCs
RBBB with left anterior fascicular block
Left ventricular hypertrophy
I
II
III
aVR
aVL
aVF
V1
V2
V3
V4
V5
V6
x1.0 .05-150Hz 25mm/sec
Physio-Control, Inc. Comments:
STATION 42 SND 4 3306808-006 LF1542760874
Not for Patient Diagnosis

RE-EXAM

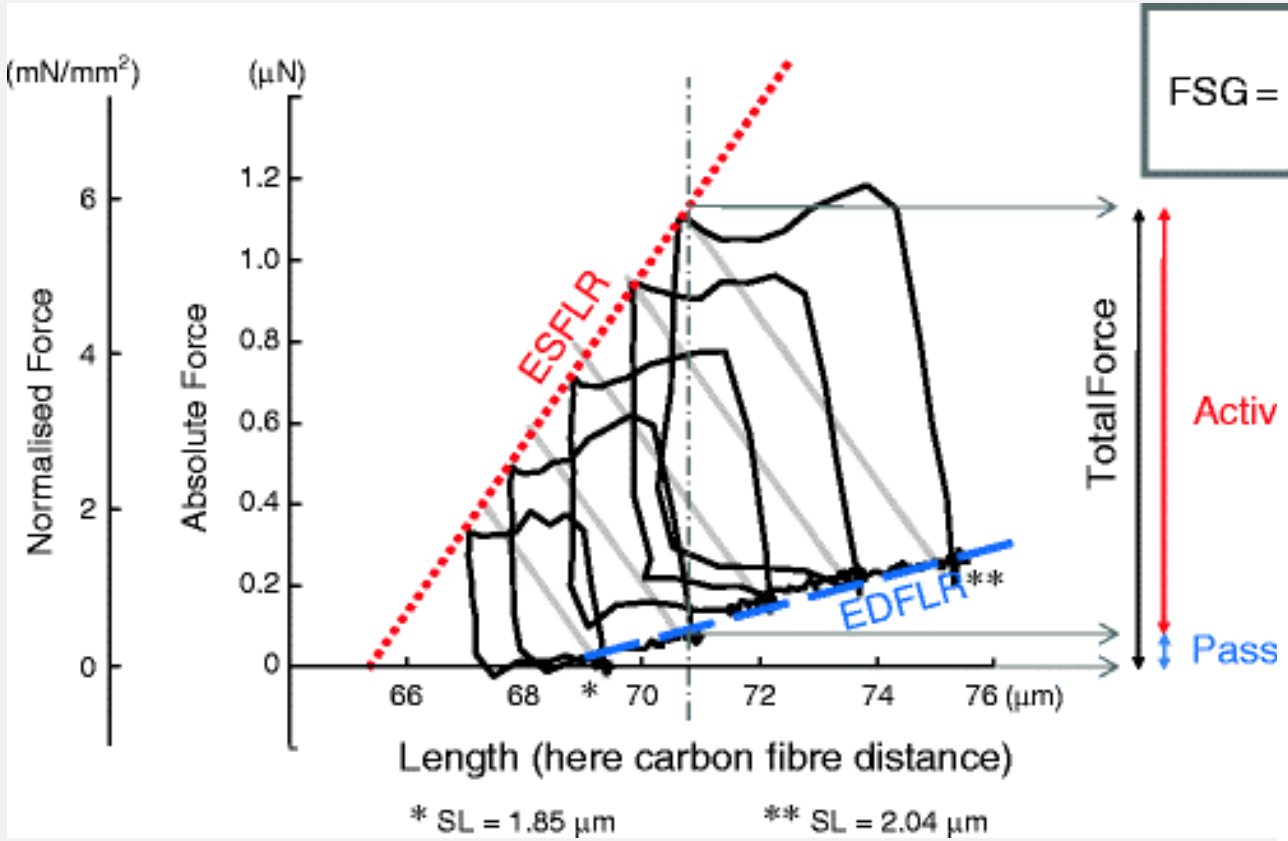
- BP 229/130, HR 180s irreg
- Sats 89%, RR 28
- What do you think his lungs sound like?

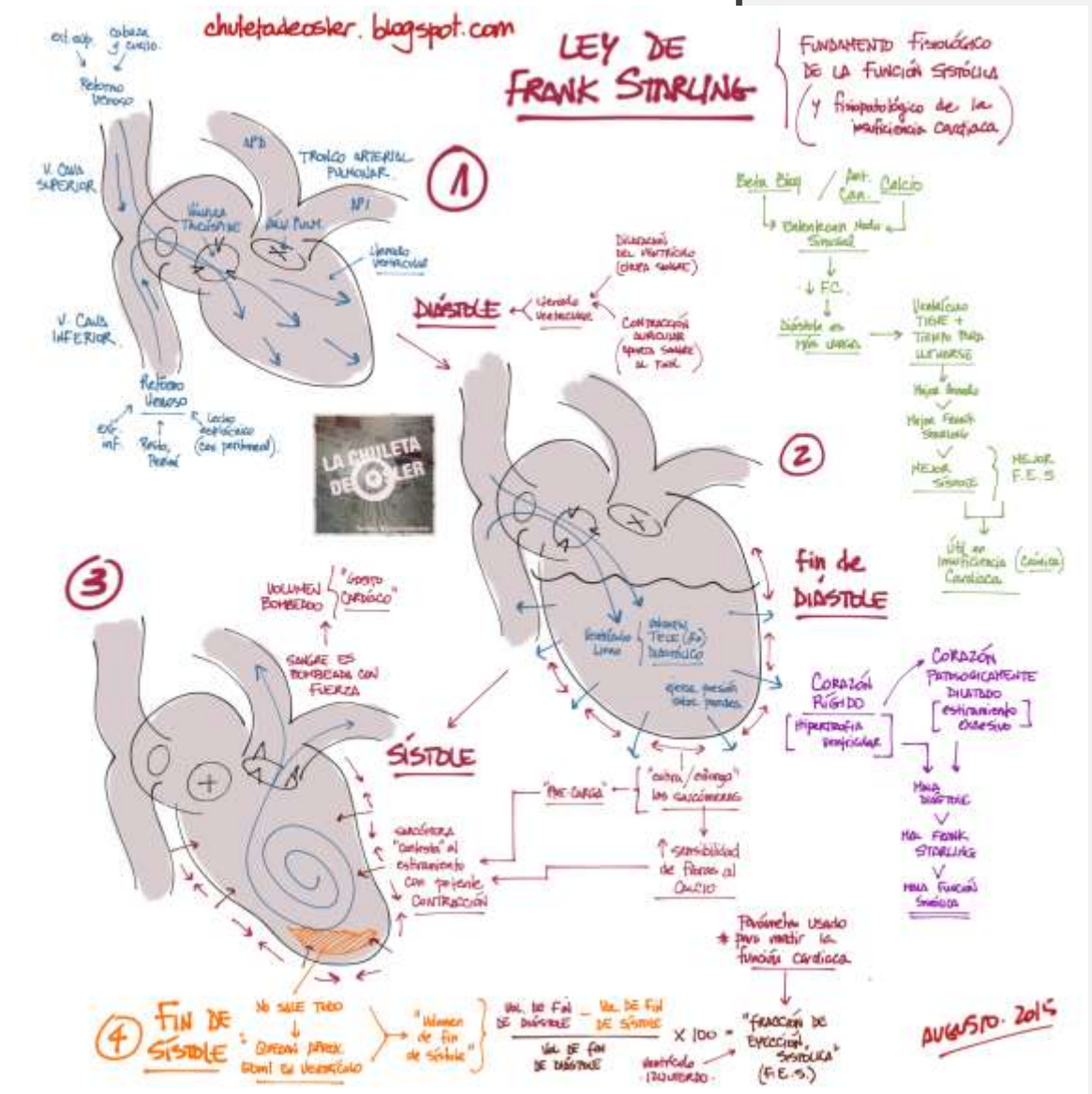

R

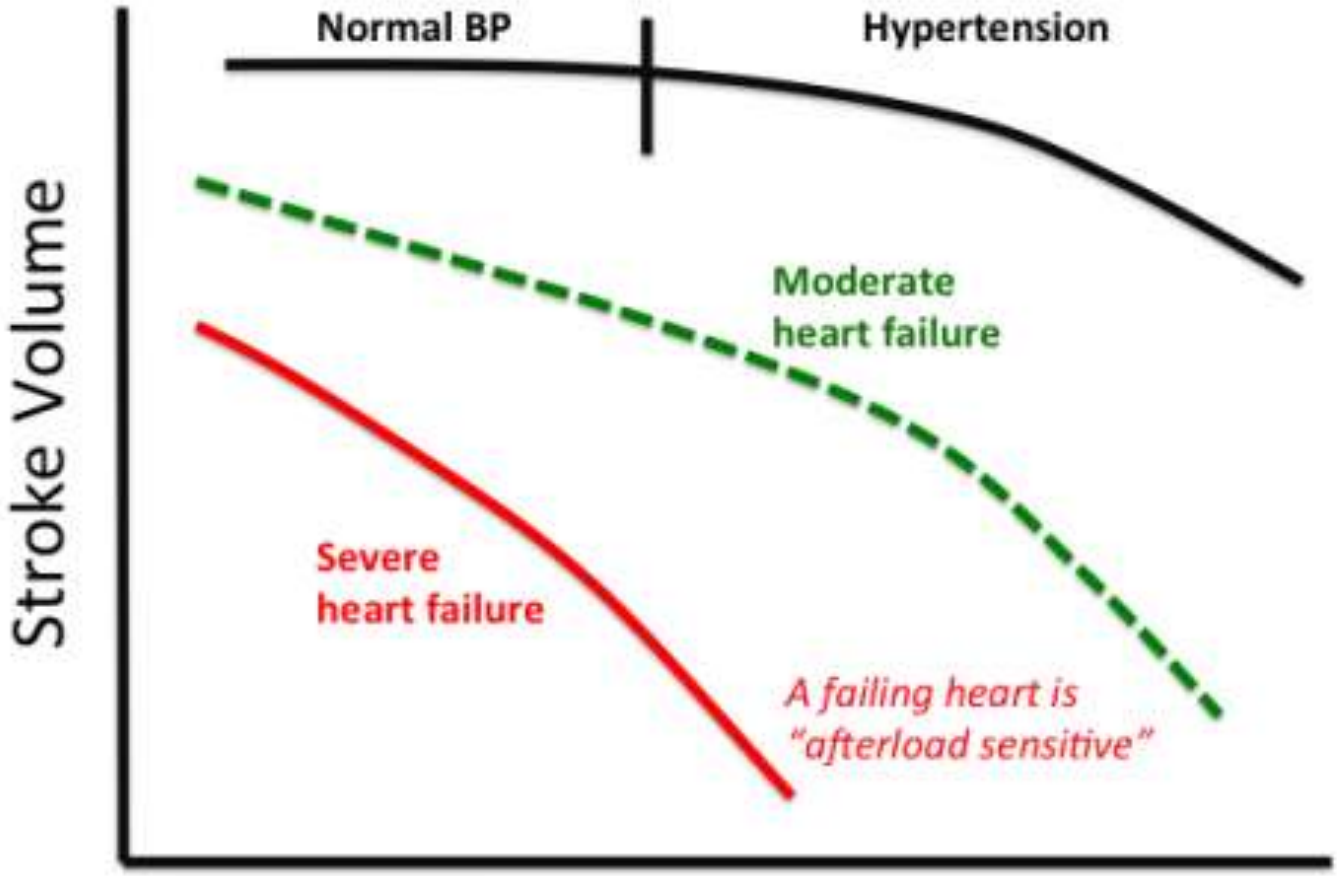



Pulmonary Edema
Normal
Capillary
CO_2
O_2
O_2
O_2
CO_2
CO_2
Capillary
CO_2
O_2
O_2
CO_2
O_2
CO_2
Buildup of fluid
in the air sacs

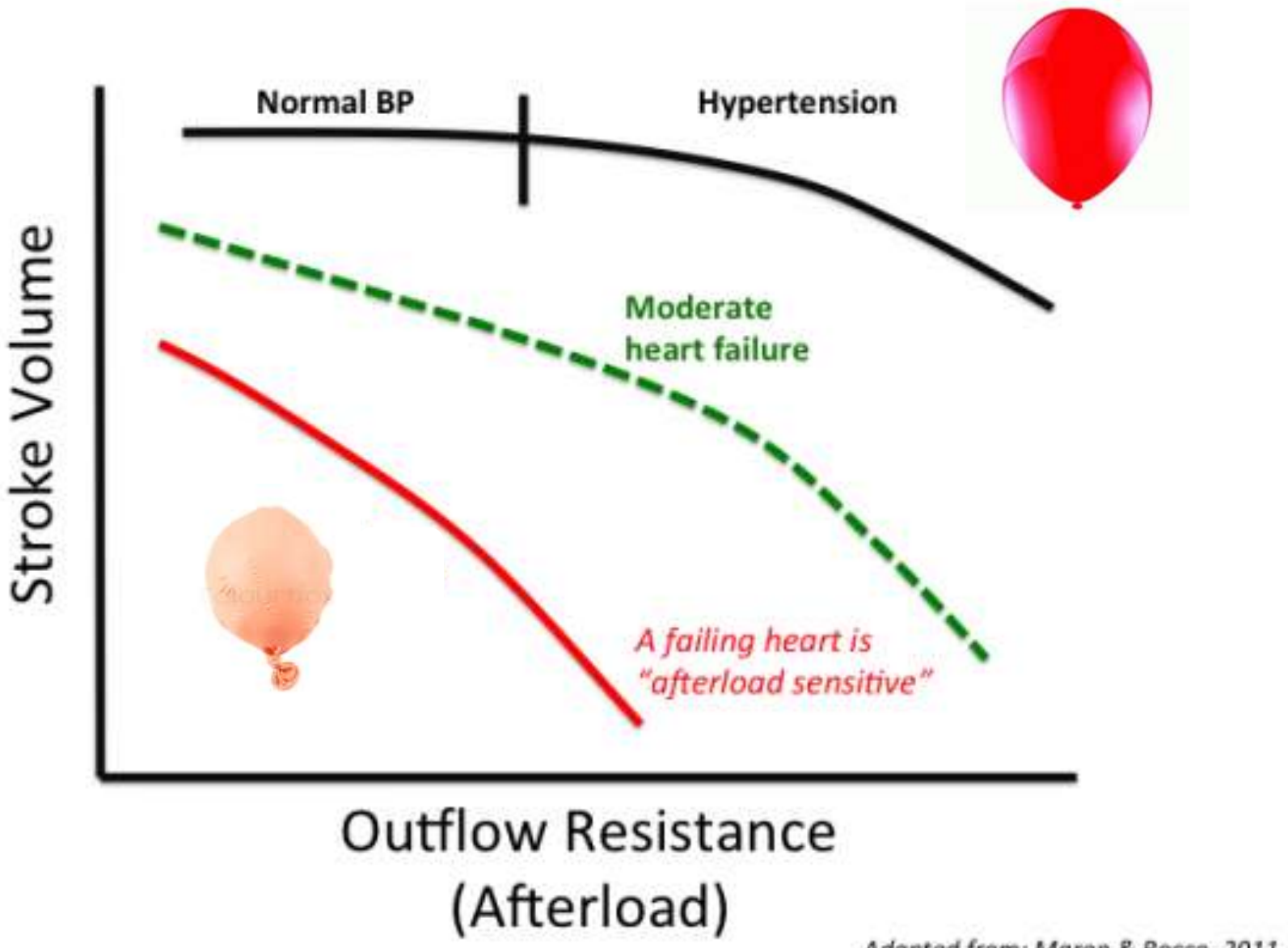
$$FSG = \frac{\text{ESFLR slope}}{\text{EDFLR slope}}$$







Adapted from: Maron & Rocco, 2011



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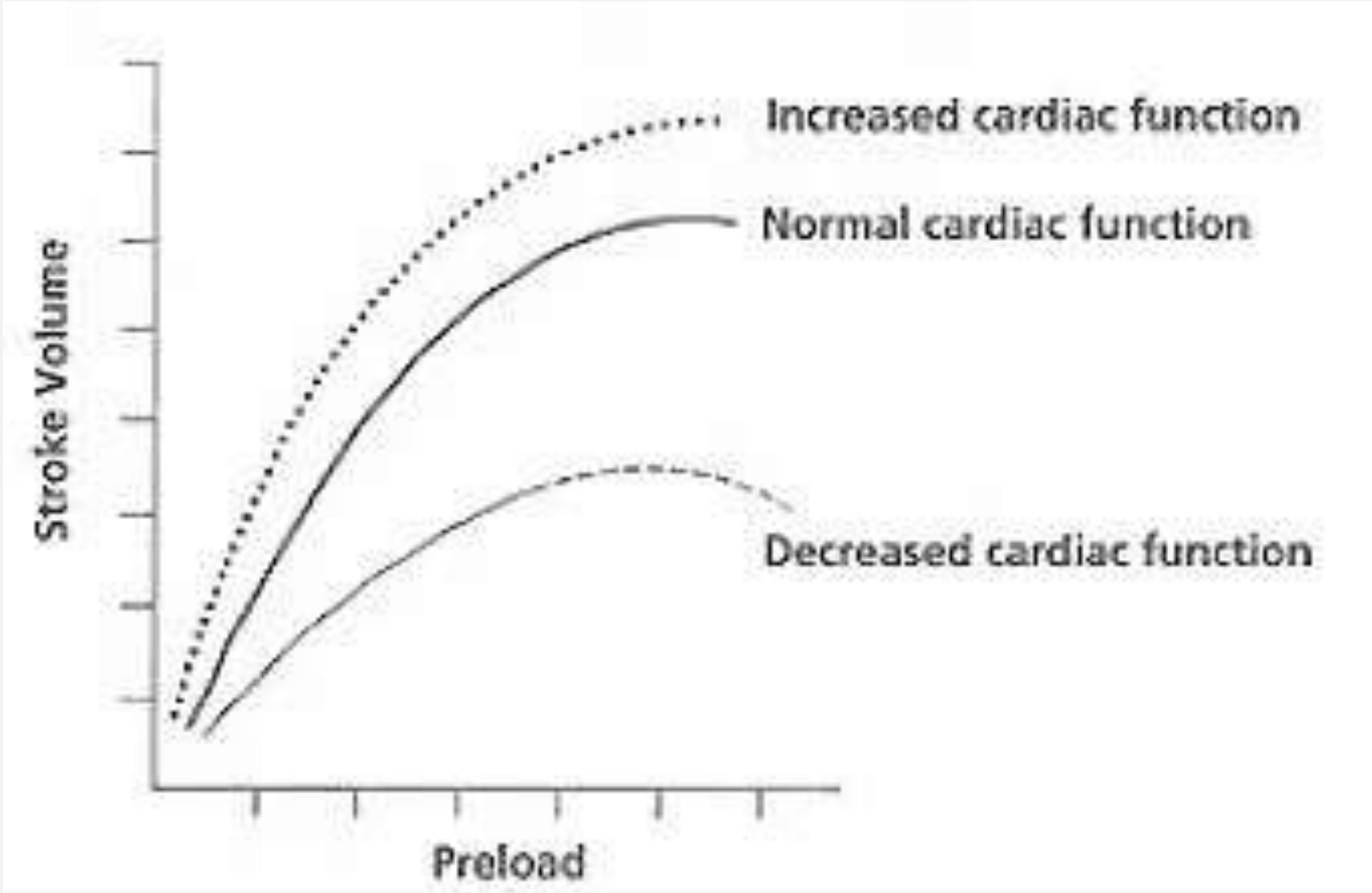
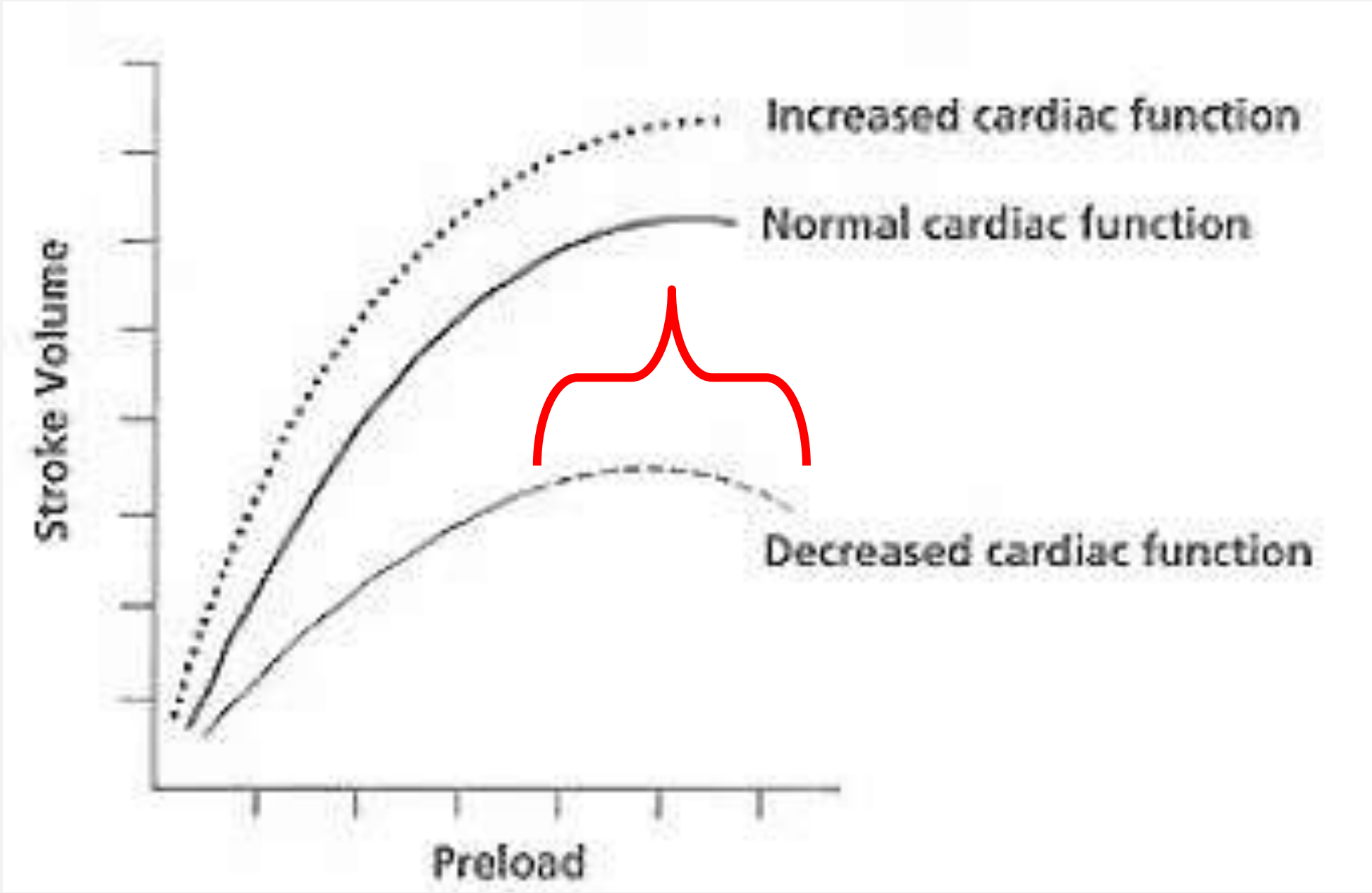

Increased cardiac function
Normal cardiac function
Decreased cardiac function
Stroke Volume
Preload


Increased cardiac function
Normal cardiac function
Decreased cardiac function
Stroke Volume
Preload

WHAT ABOUT THIS GUY?

- Suddenly worse SOB
- Diaphoresis
- Nausea
- Tripod

COPD VS CHF

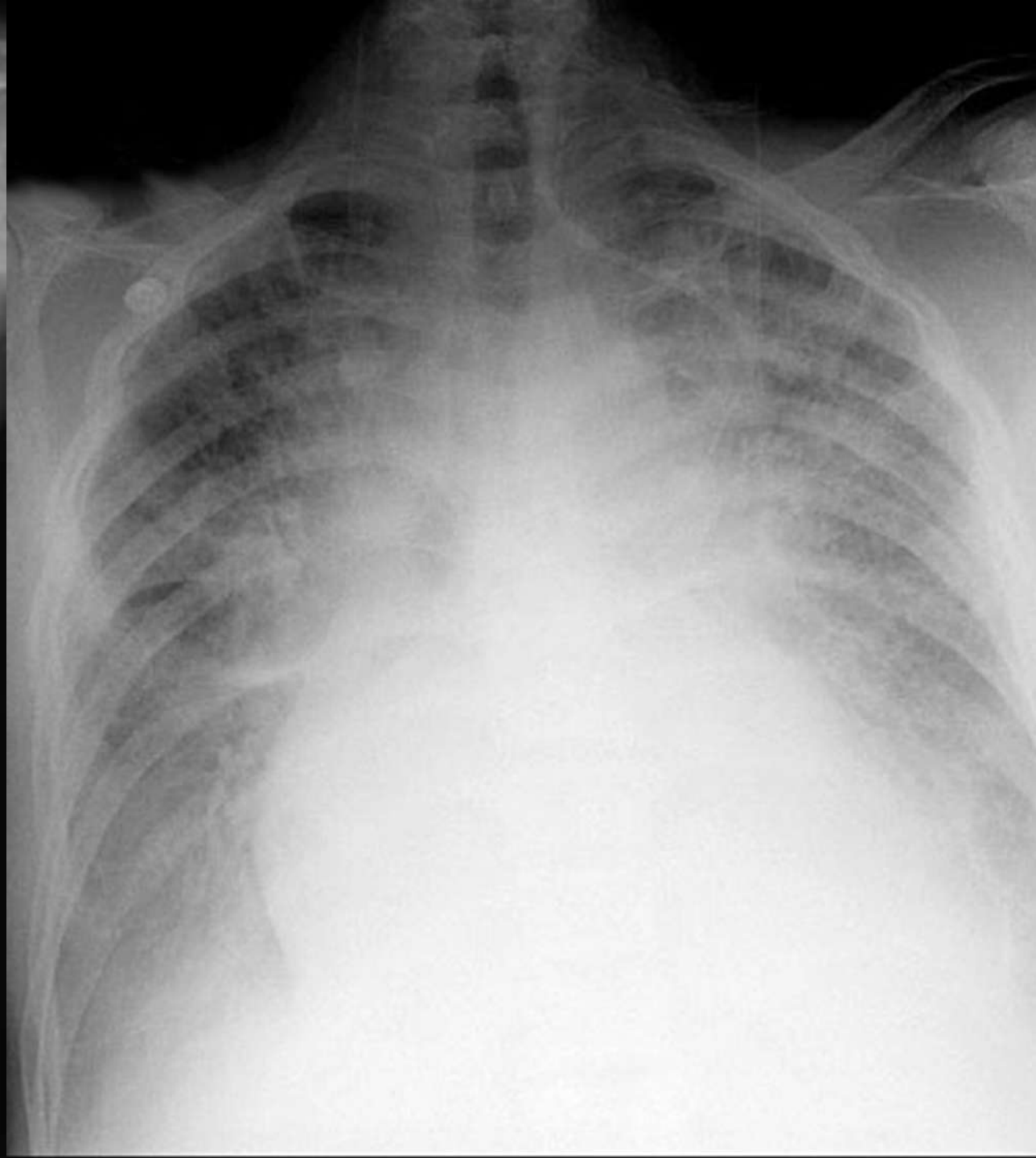
- Lasix vs steroids
- Nebs vs Nitro
- CPAP/BIPAP

UPON FURTHER QUESTIONING

- Hospitalized for this recently
- But not ill at all in the past few days
- Has had an MI in the past
- VS: 105, 178/68, 92%

UPON FURTHER QUESTIONING

- Hospitalized for this recently
- Has had an MI in the past
- VS: 105, 178/68, 92%
- Lisinopril, HCTZ
- Symptoms started when he laid down



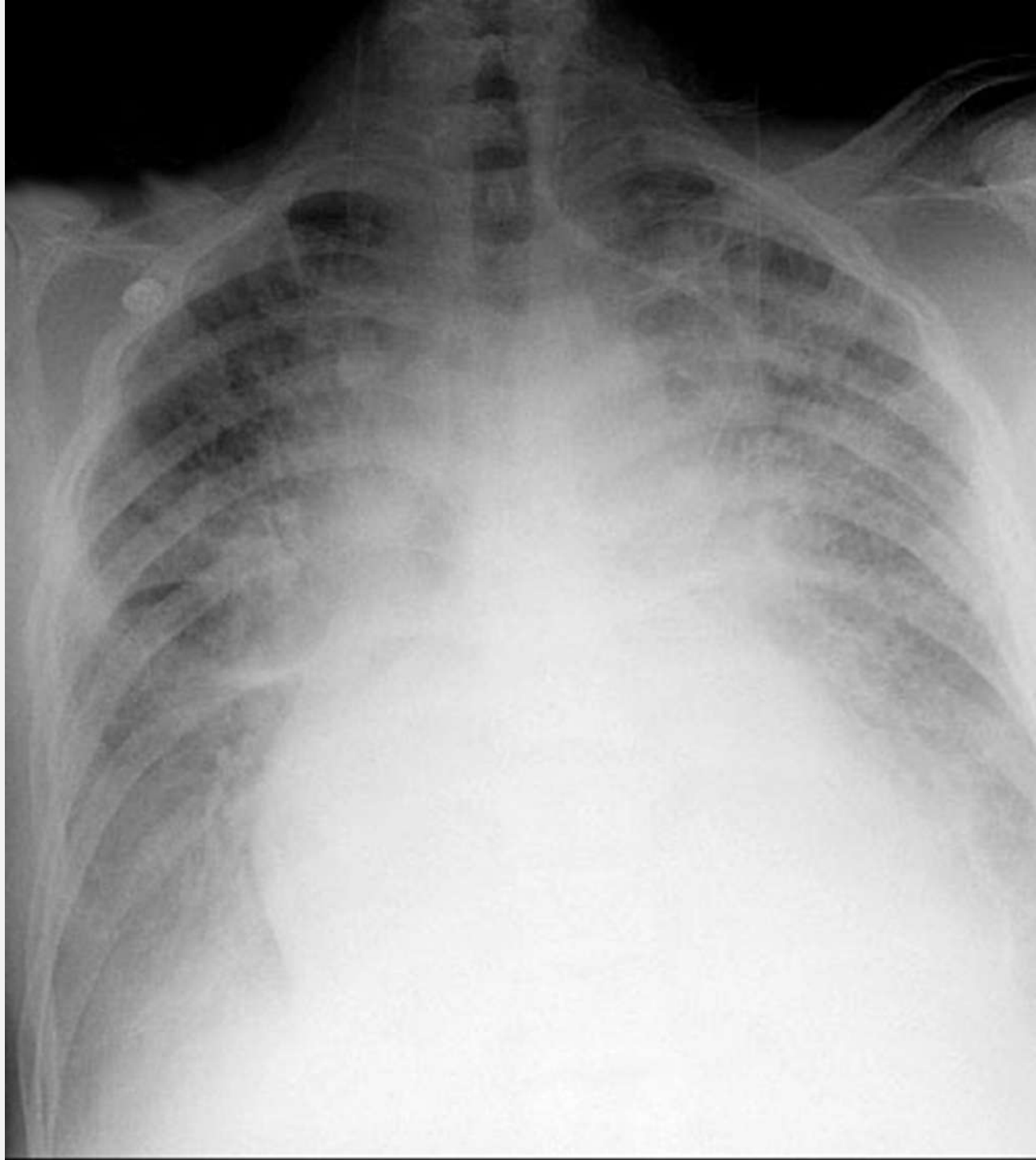
IS THIS CHF??

- How does position effect you?
- Dry weight? Weight gain?
- Legs bigger than normal?
- Smoke?
- Med list

FROTHY SPUTUM

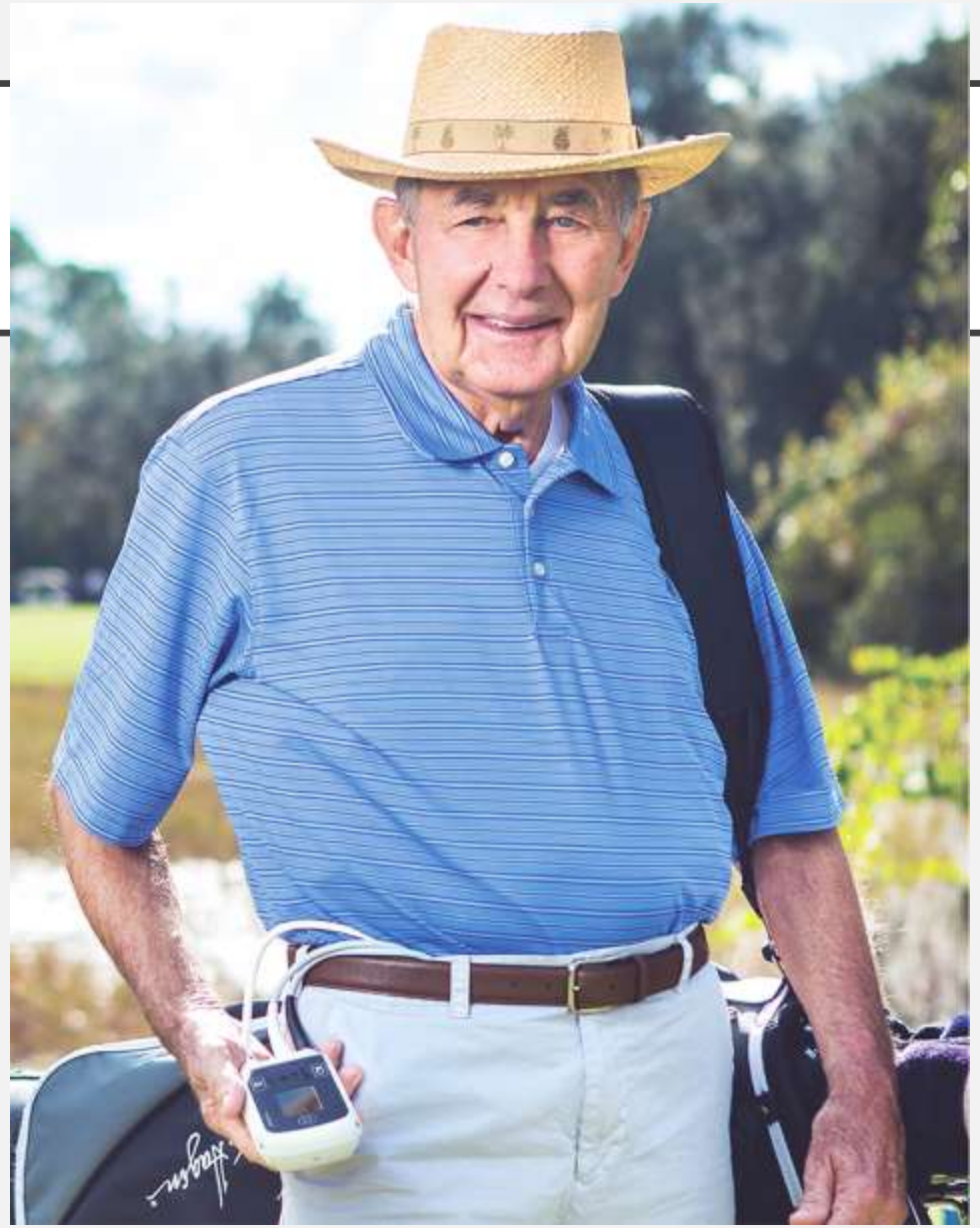
REMEMBER THIS GUY

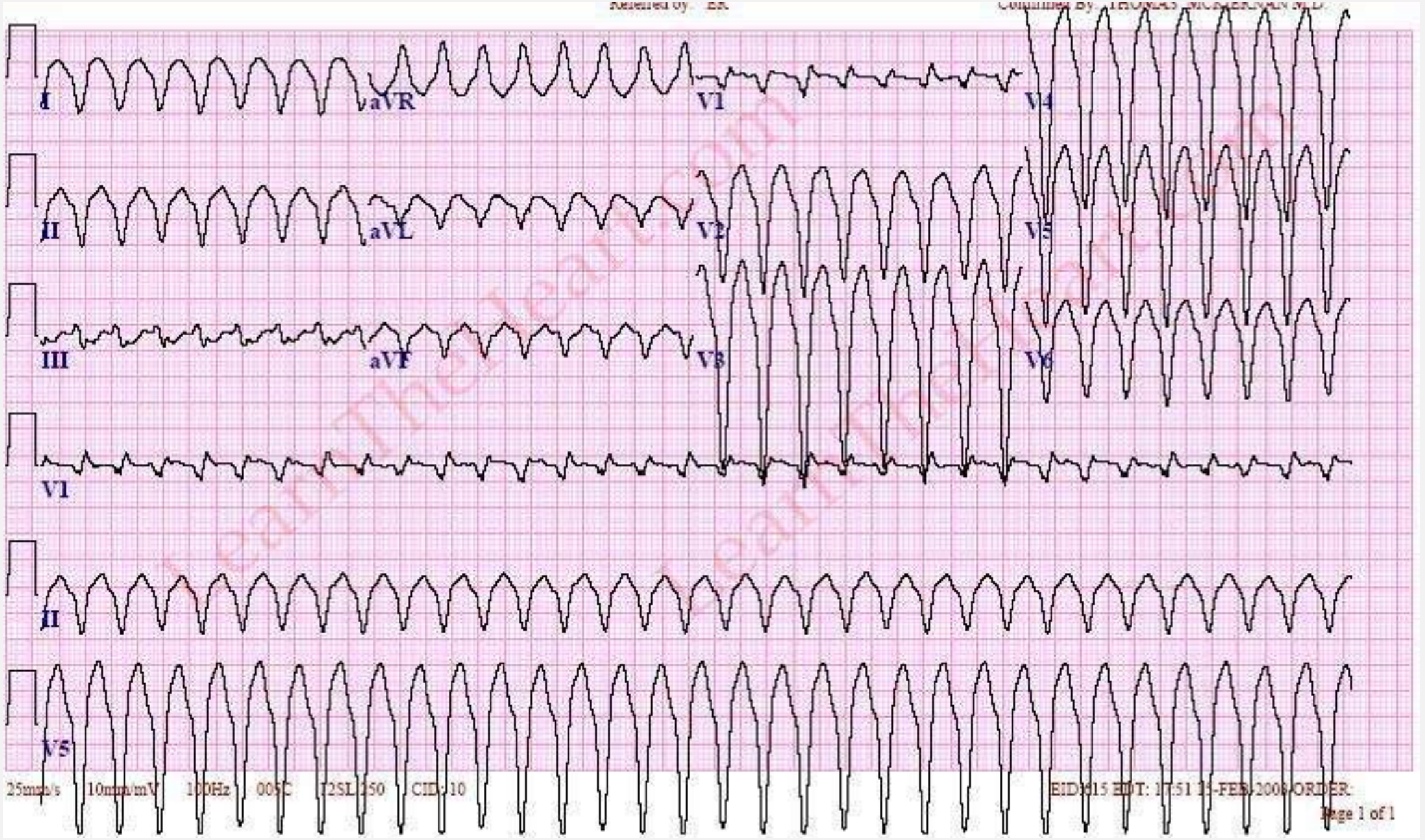
- BP 229/130, HR 180s irreg
- Sats 89%, RR 28
- What do you think his lungs sound like?

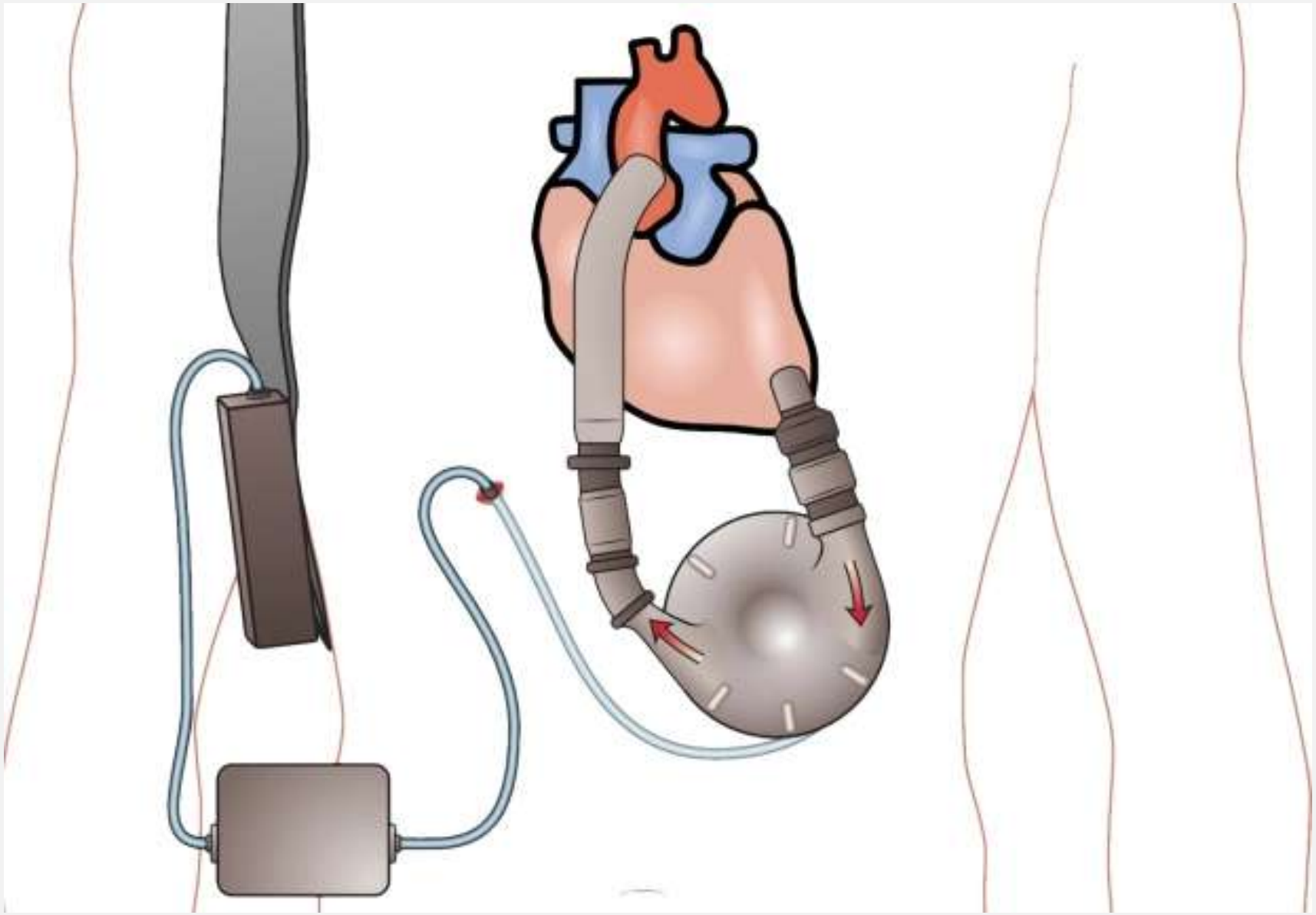


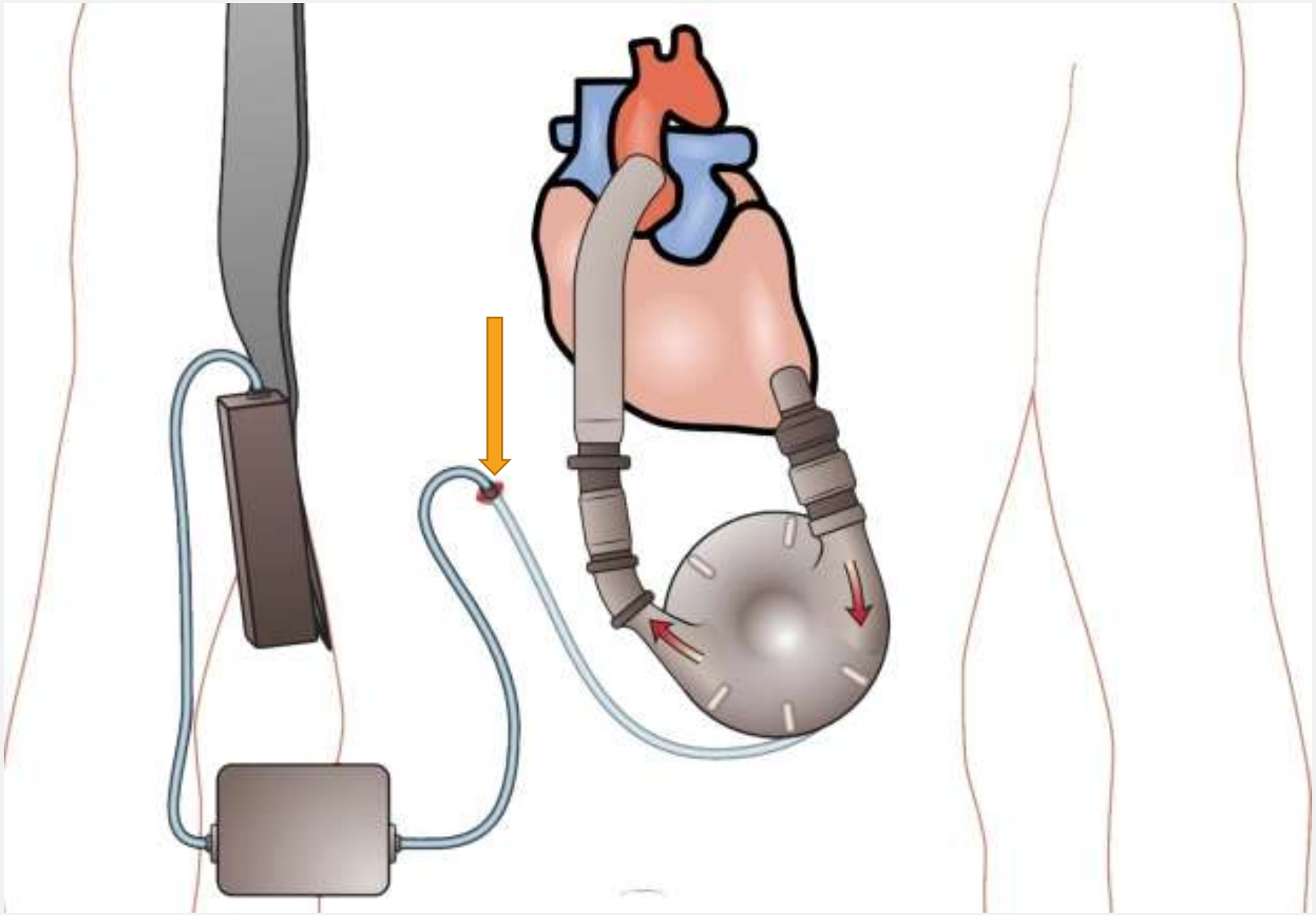
NEXT PATIENT

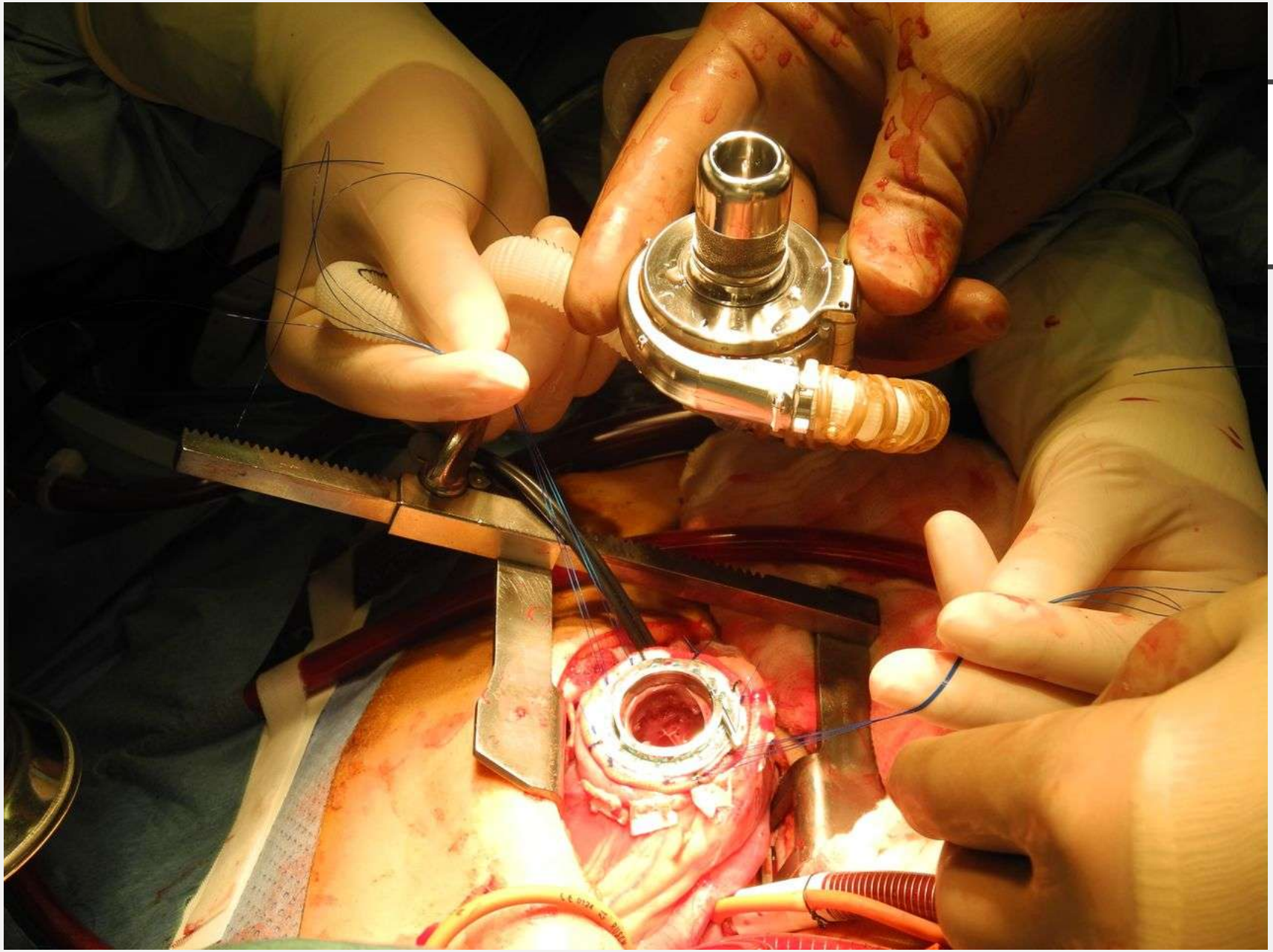
- 68 yo male with h/o dark stool for 2-3 days
- On Coumadin
- Weak and SOB today
- Diaphoretic, Pale but alert

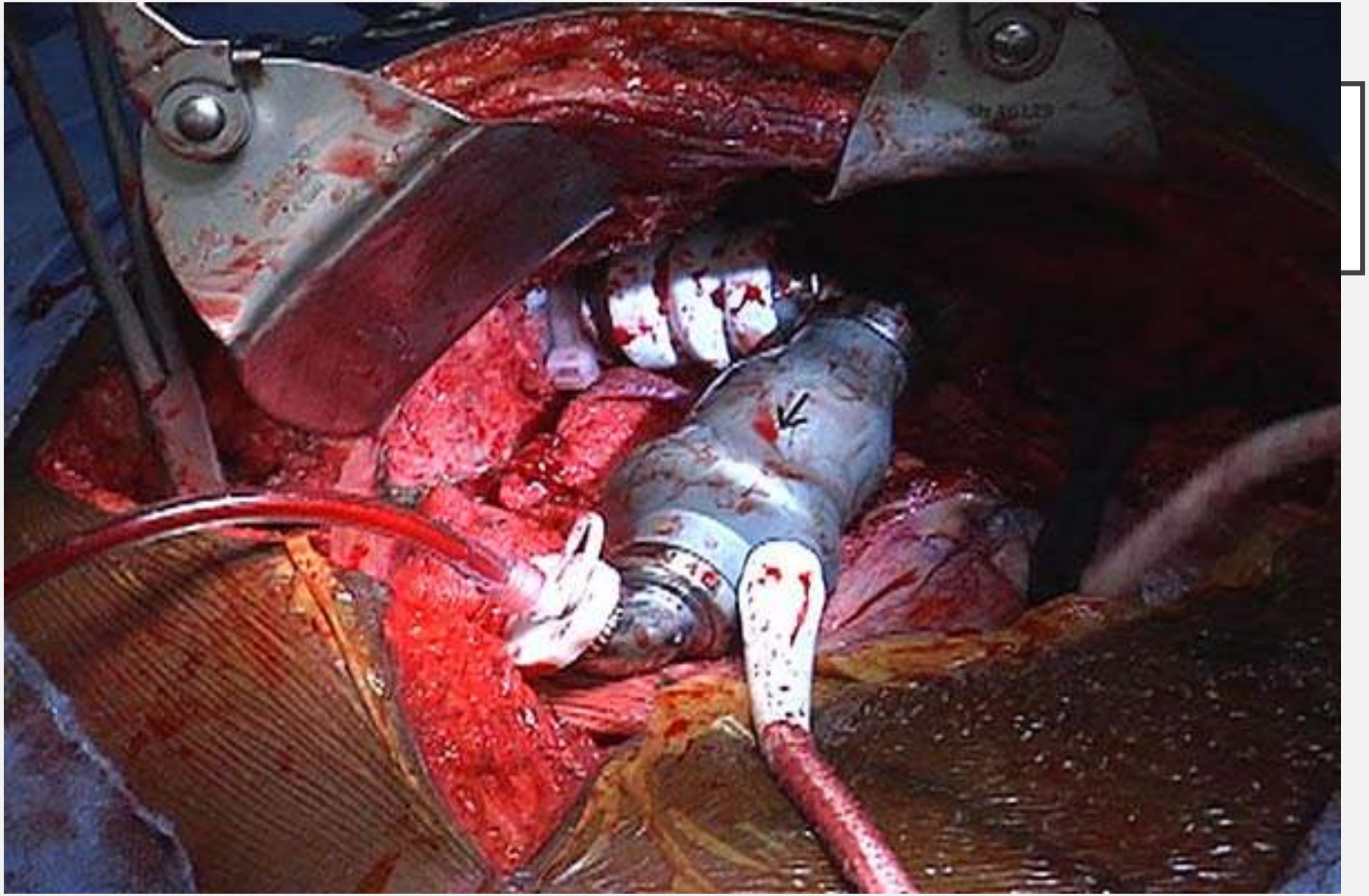



I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
V1
II
V5
25mm/s
10mm/mV
100Hz
005C
12SL 250
CID: 10
EID:015 EDT: 17:51 15-FEB-2008 ORDER
Page 1 of 1



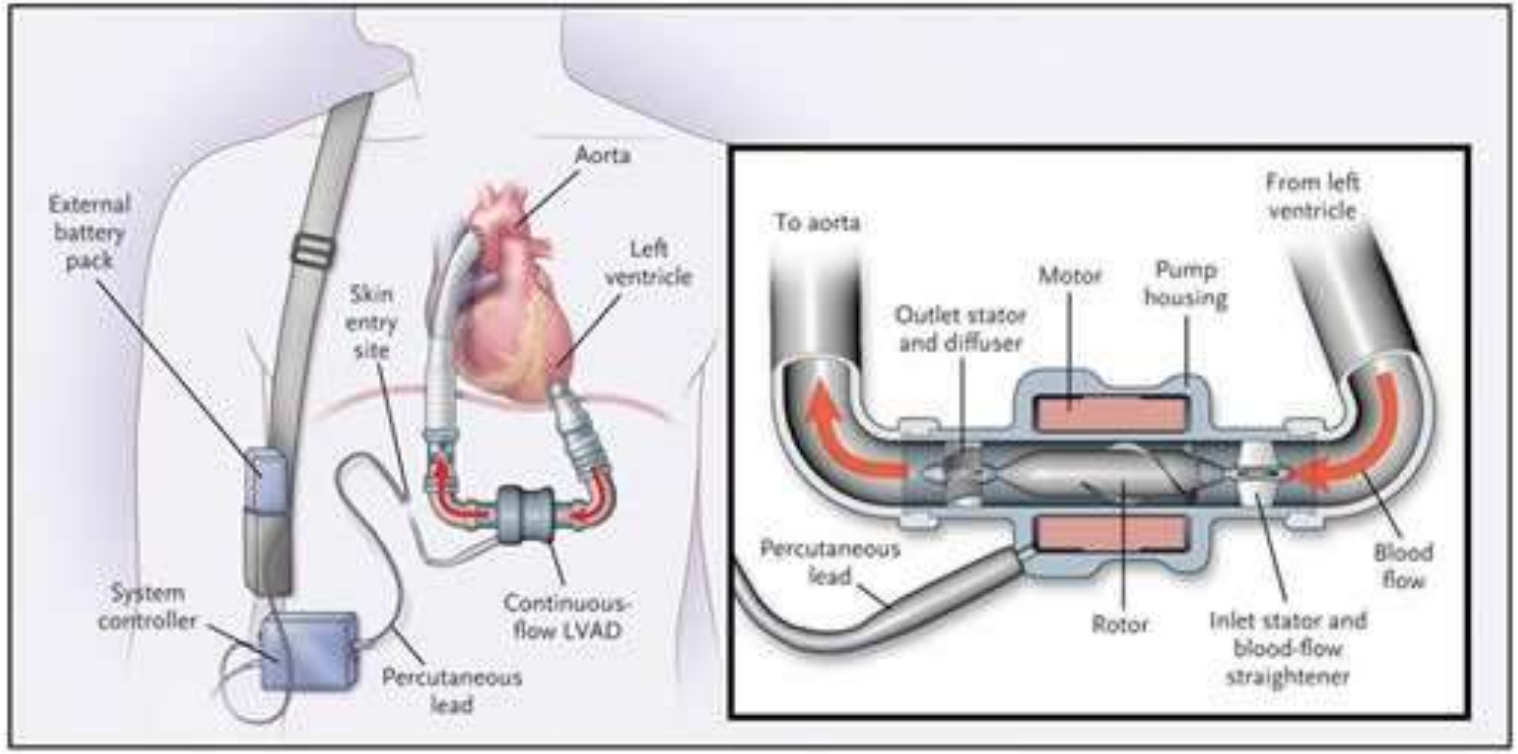






BASIC PRINCIPLES OF LVAD

- Unlike native heart, do not have the ability to respond physiologically
- **Afterload Sensitive**
- **Pre load dependent**
- **EKG independent**



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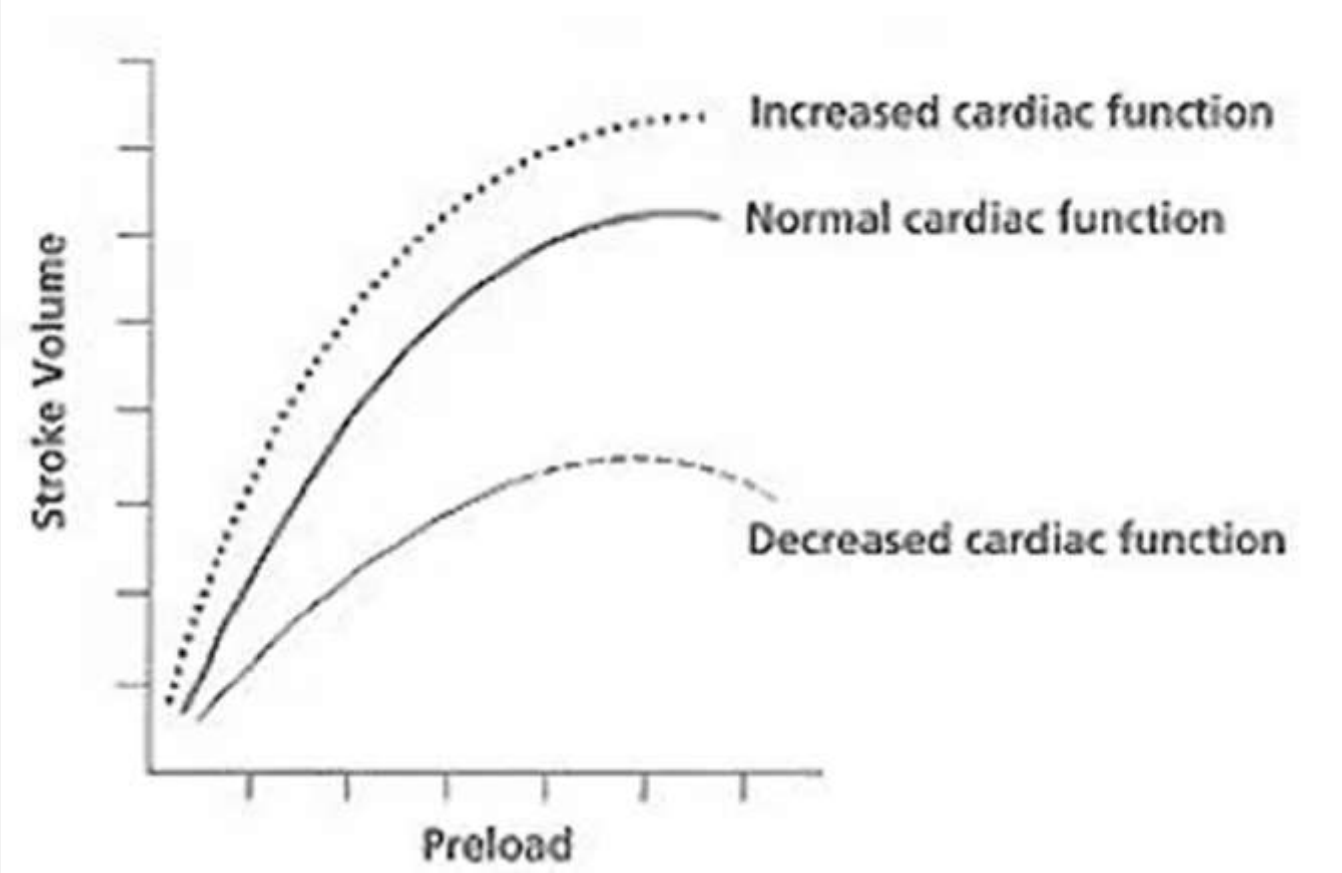

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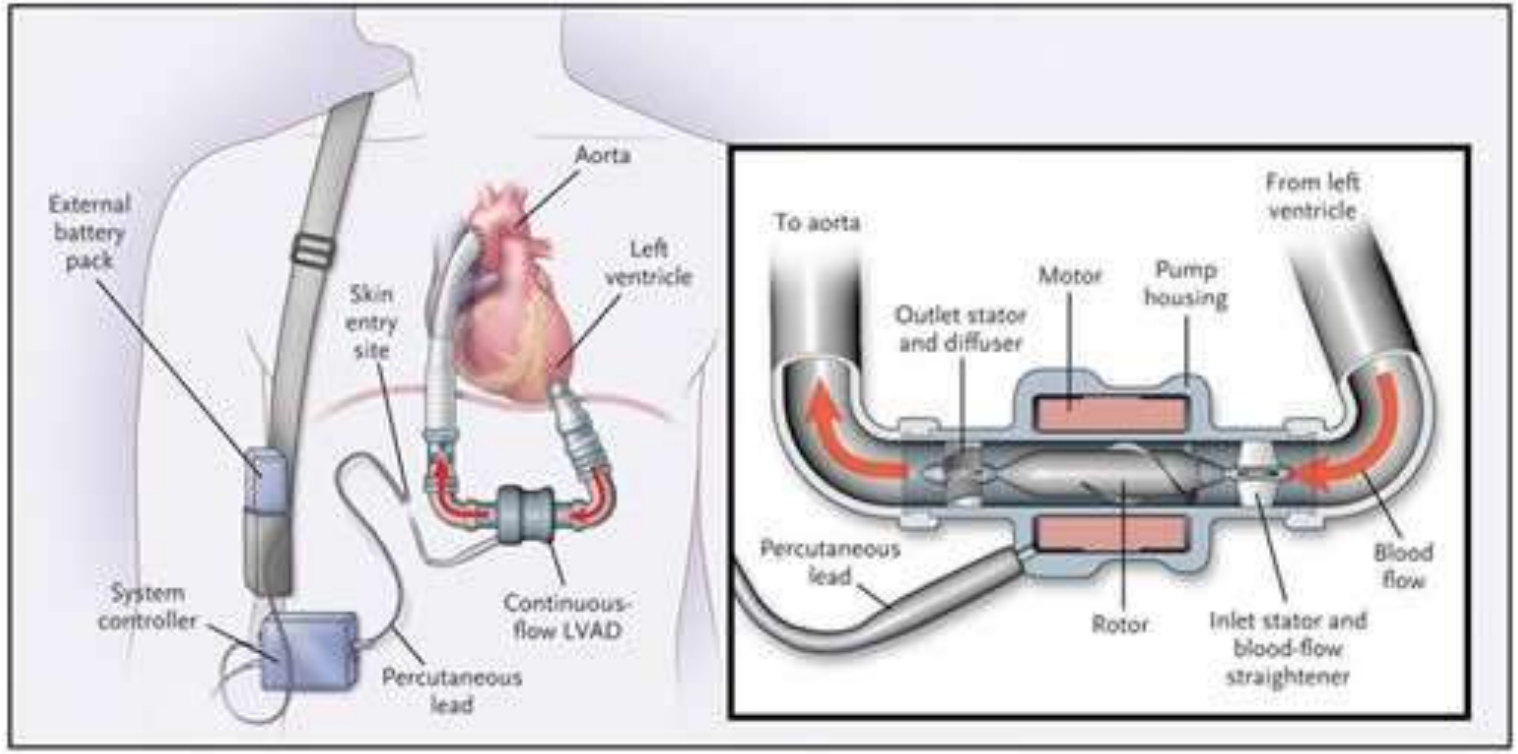


V-TACH WITH NO (?) PULSE

- First do no harm – don't cut or damage the cord
- How do you know if there is pressure

V-TACH WITH NO (?) PULSE

- First do no harm – don't cut or damage the cord
- How do you know if there is pressure
- Other vitals?
  - HR
  - Pulse Ox
  - RR

V-TACH WITH NO (?) PULSE

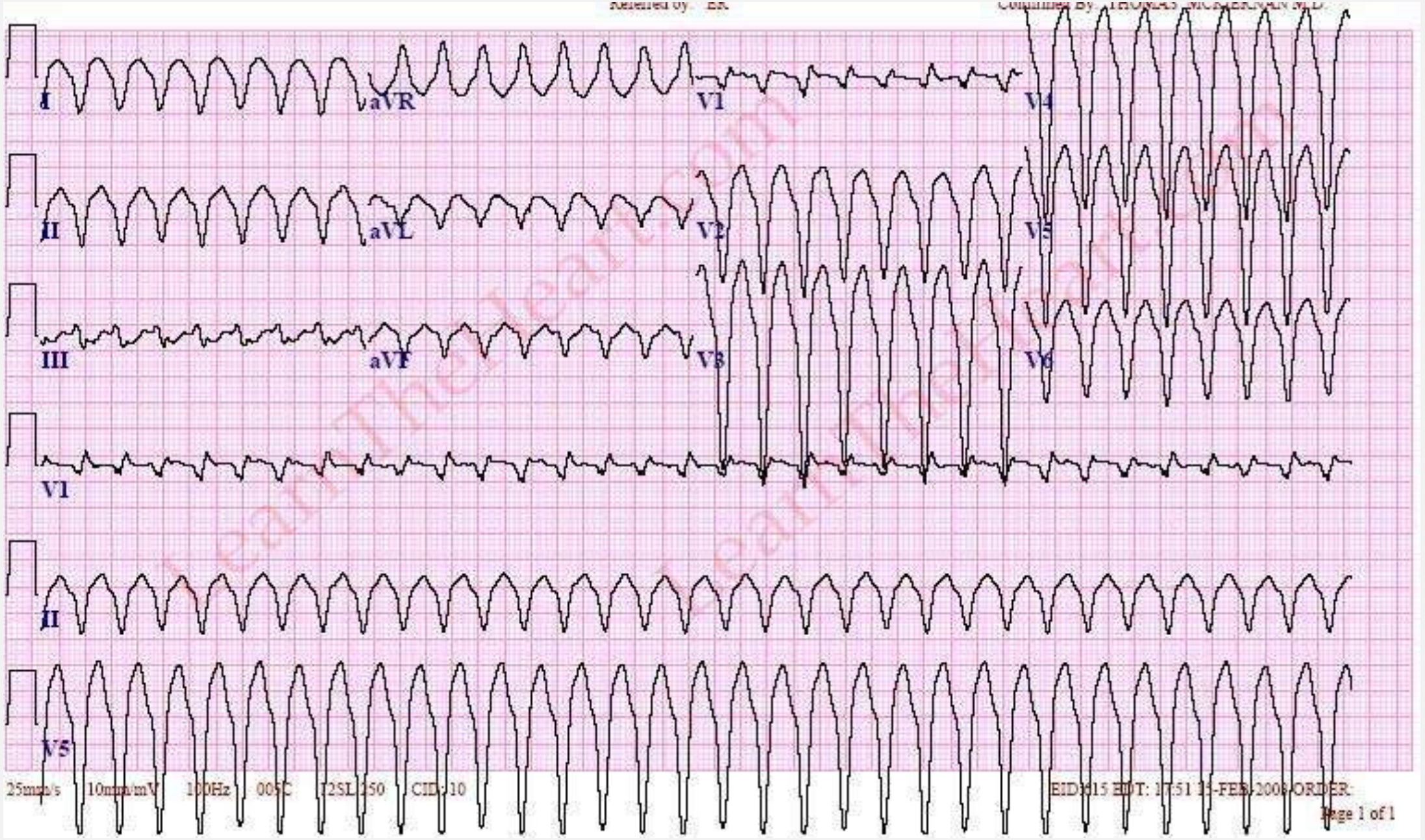
- First do no harm – don't cut or damage the cord
- How do you know if there is pressure
- If that doesn't work, then what?

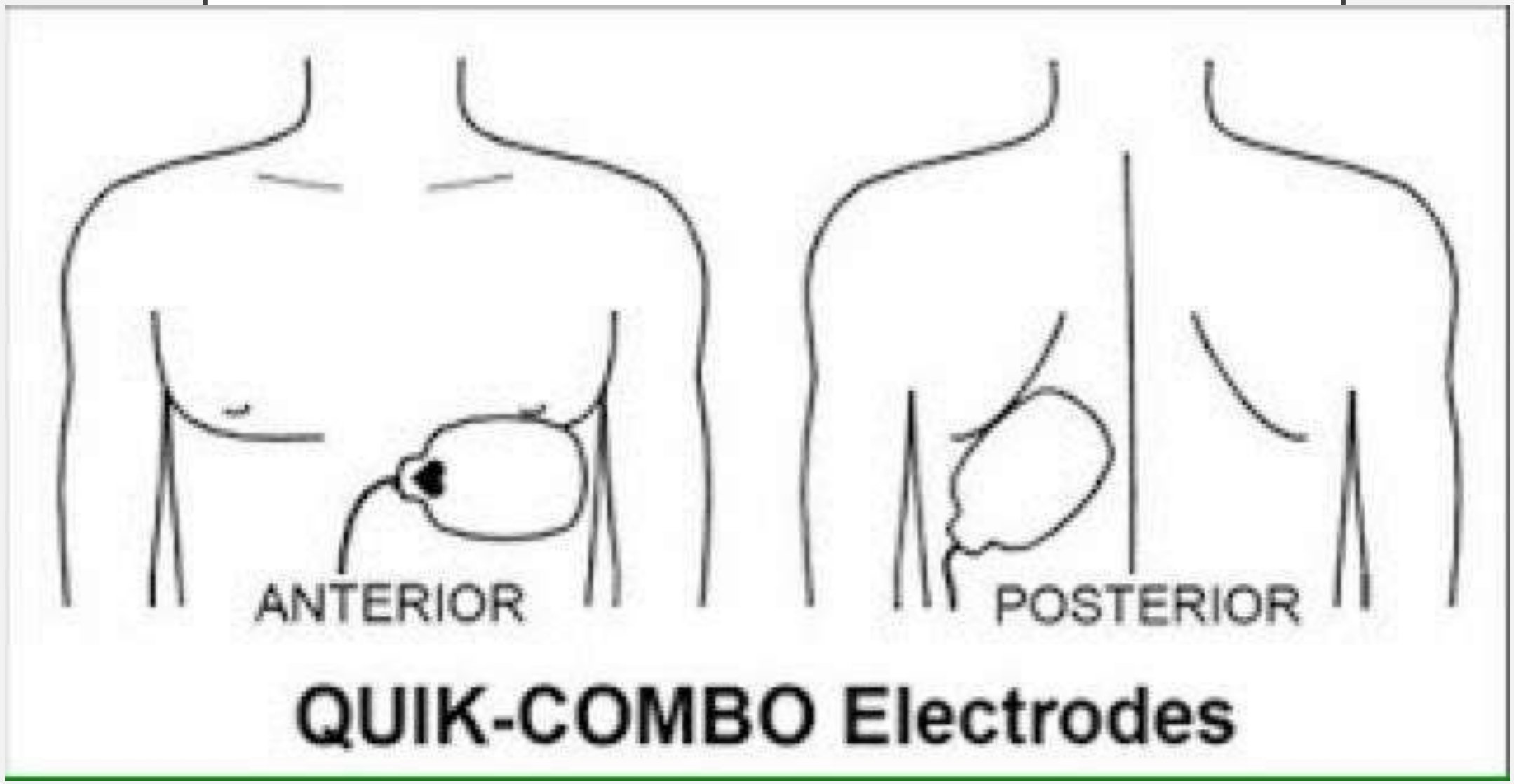
NEAR - SYNCOPE

- 68 yo male with h/o dark stool for 2-3 days
- On Coumadin
- Weak and SOB today
- Diaphoretic, Pale but alert
- Can’t palp a radial pulse

PUMP IS OFF

- Treating CHF
- BiPAP?
- Nitrates?
- Lasix?


I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
V1
II
V5
25mm/s
10mm/mV
100Hz
005C
12SL 250
CID: 10
EID:015 EDT: 17:51 15-FEB-2008 ORDER
Page 1 of 1

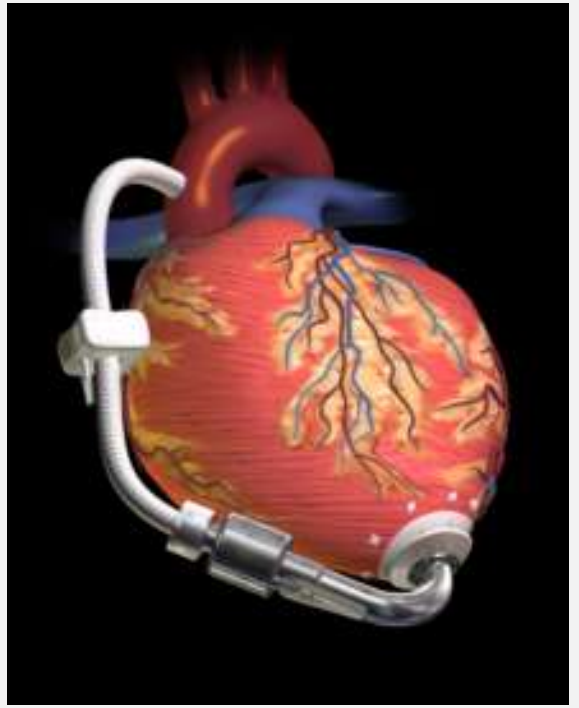

ANTERIOR
POSTERIOR
QUIK-COMBO Electrodes

V-TACH WITH NO (?) PULSE

- First do no harm – don't cut or damage the cord
- How do you know if there is pressure
- If that doesn't work, then what?
- What if the pump isn't making any noise and you suspect it failed?

TRANSPORT CONSIDERATIONS

- Bring their back up pack and back up power device
- Don’t dislodge the line
- In general, closest facility is okay but discuss with family and coordinator if you have time



MOST COMMON COMPLAINTS

- Sudden increase in power usage
- Bleeding: nasal, gastrointestinal, intracranial
- Clots: PE, MI, CVA
- Right-sided heart failure
- Pump infection
- #1 reason they die?

MOST COMMON COMPLAINTS

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- Bleeding: nasal, gastrointestinal, intracranial
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- Pump infection
- #1 reason they die - Sepsis

MOST COMMON COMPLAINTS

- Sudden increase in power usage
- Bleeding: nasal, gastrointestinal, intracranial
- Clots: PE, MI, CVA
- Right-sided heart failure
- Pump infection
- #1 reason they die – Sepsis

- 25% get infected at some point
- 10-15% annual stroke risk

CASES

- 74 yo with LVAD
- Chest pain for two hours
- SOB, diaphoretic
- A/0 x3 talking, looks only mildly ill
- Palpable pulse

CASES

- 74 yo with LVAD
- Chest pain for two hours
- SOB, diaphoretic
- A/0 x3 talking, looks only mildly ill
- Palpable pulse

APPROACH

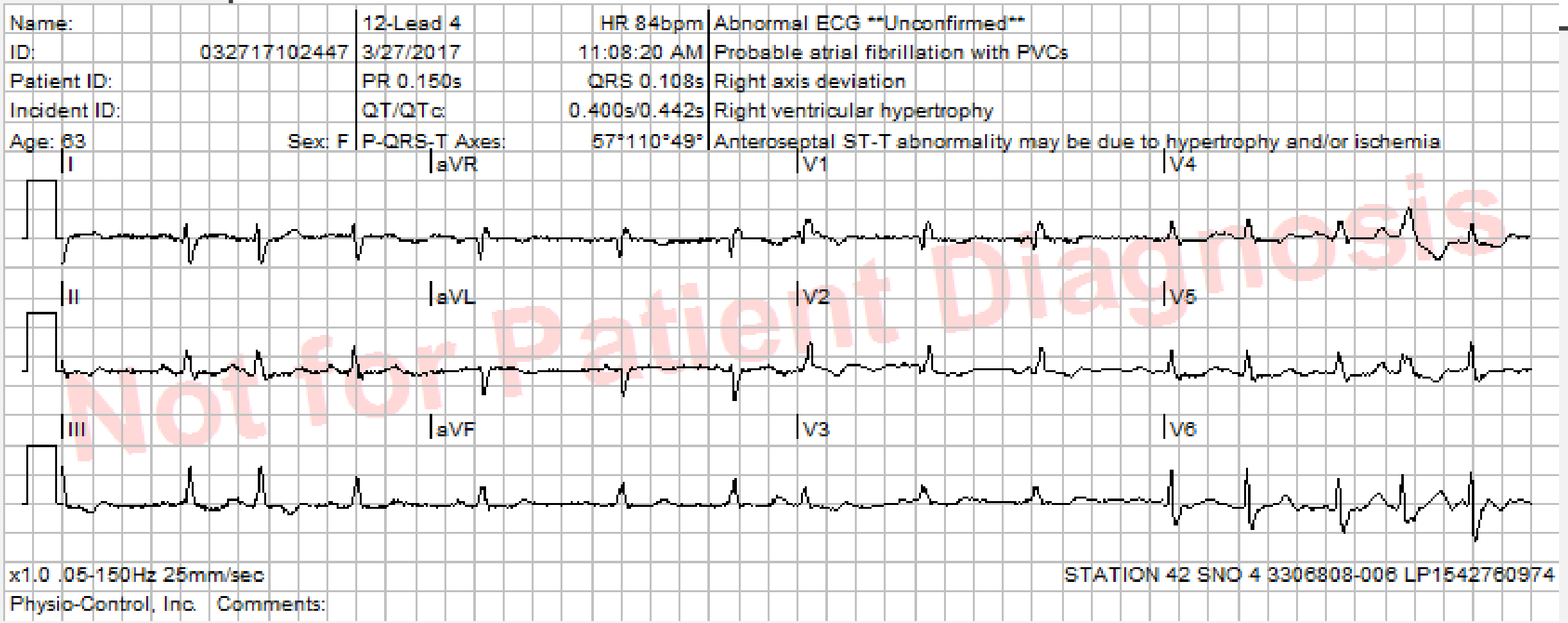
- LVAD patient with symptoms
- ABCs + LLF (Look, listen, feel)
- Look: alarms
  - If yes, ask for travel bag which may have: trouble shooting guide, hand pump (first generation), back up batteries
- Listen: most have a low hum, either stethoscope or ear on chest
- Feel: is it hot? Hot controller or hot pump

APPROACH

- After looking at pump, assess perfusion
- Manual BP to obtain a MAP
- If hypoperfused, think pre-load or afterload
  - Error on this side of pre-load
  - You can do a lot of damage by reducing afterload, usually reversible damage with preload
- ALCS for arrhythmias
  - Stable –unstable is clinical, same as with any other patient
- CPR?
  - Can't get deader than dead

WEAKNESS

- 63 yo female with h/o a fib and CHF
- Heavy diarrhea and weakness
- 108/68, 103, 17, 96%


Name:
ID: 032717102447
Patient ID:
Incident ID:
Age: 63 Sex: F
12-Lead 4
3/27/2017
PR 0.150s
QT/QTc:
P-QRS-T Axes:
HR 84bpm
11:08:20 AM
QRS 0.108s
0.400s/0.442s
57°110°49°
Abnormal ECG **Unconfirmed**
Probable atrial fibrillation with PVCs
Right axis deviation
Right ventricular hypertrophy
Anteroseptal ST-T abnormality may be due to hypertrophy and/or ischemia
I
aVR
V1
V4
II
aVL
V2
V5
III
aVF
V3
V6
x1.0 .05-150Hz 25mm/sec
STATION 42 SNO 4 3306808-006 LP1542760974
Physio-Control, Inc. Comments:
Not for Patient Diagnosis

WEAK

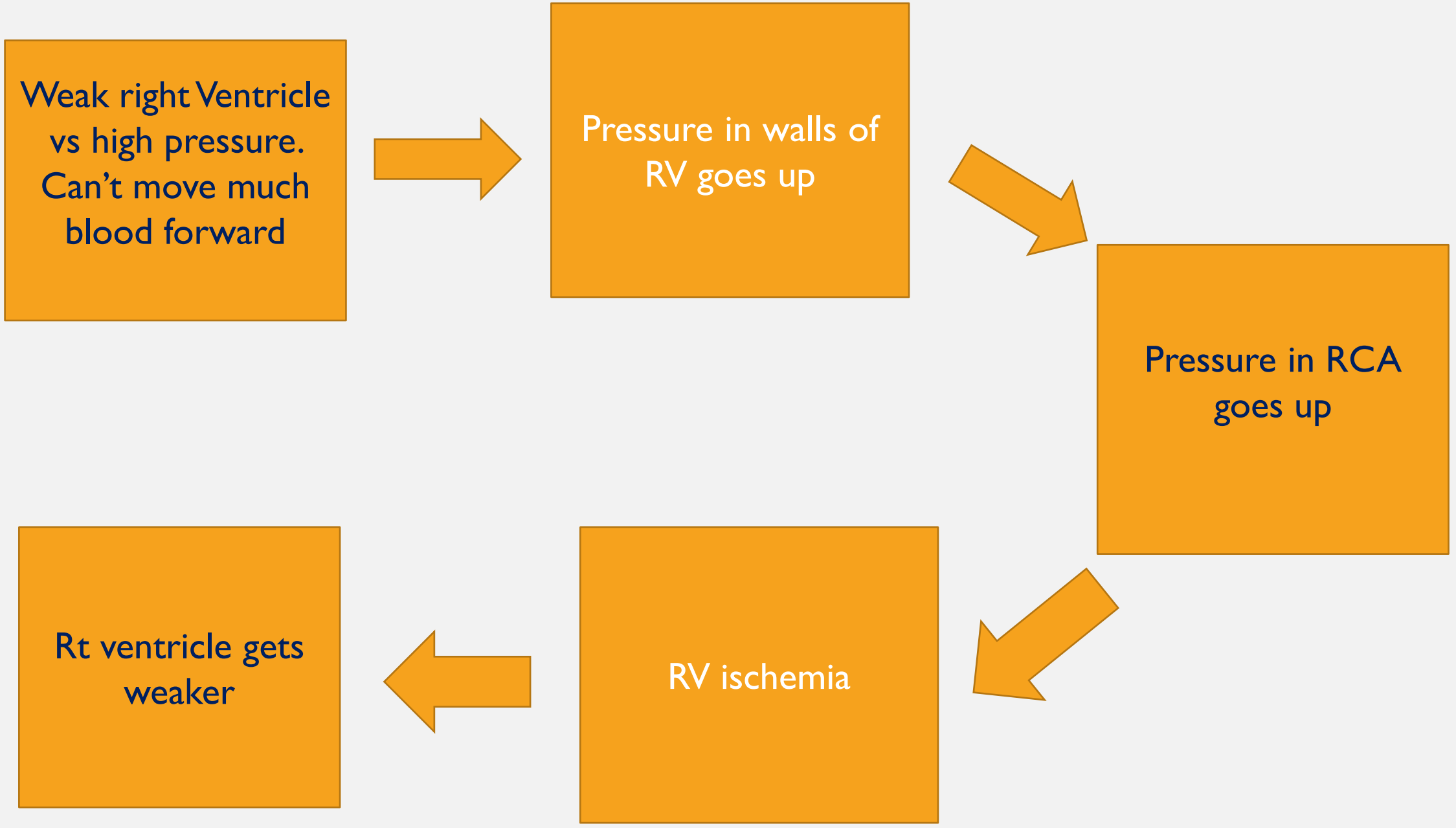
- Appeared weak and tired
- Pressure to 82/51
- HR between 80 and low 100s
- Now what?

WEAK

- Appeared weak and tired
- Pressure to 82/51
- HR between 80 and low 100s
- Now what?

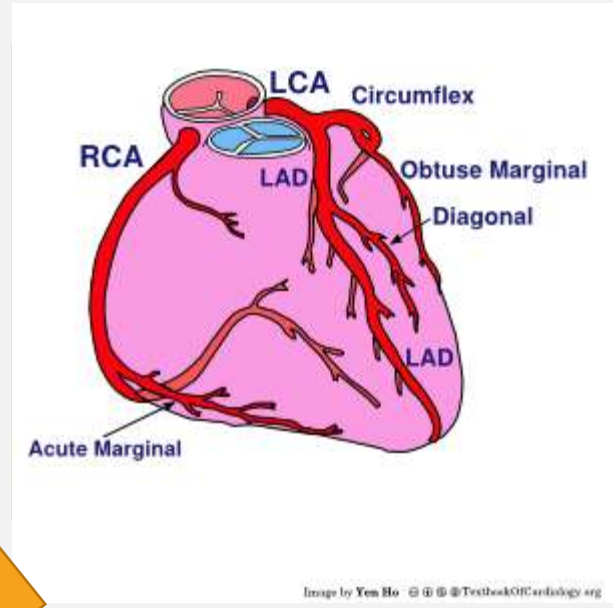
PULMONARY HYPERTENSION

- RV is more thin walled, more compliant, less afterload
- Doesn't adapt well to acute changes in pressure and volume


Weak right Ventricle vs high pressure. Can't move much blood forward
Pressure in walls of RV goes up
Pressure in RCA goes up
RV ischemia
Rt ventricle gets weaker

Weak right Ventricle Squeezes against high pressure

Pressure in walls of RV goes up

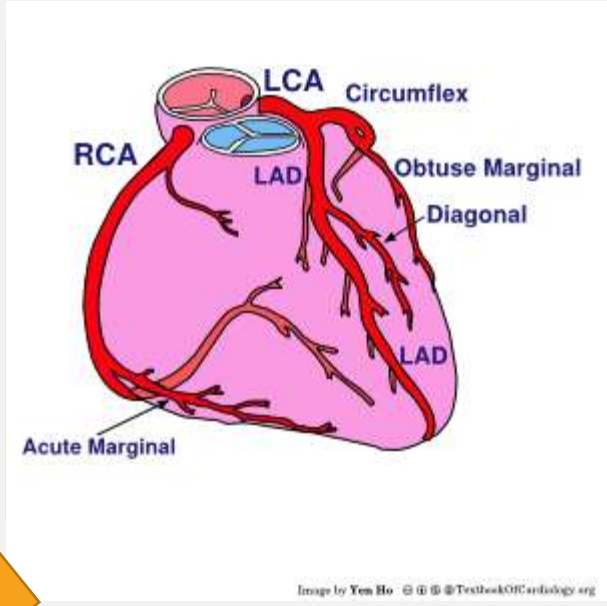


RV ischemia

Rt ventricle gets weaker

Weak right Ventricle Squeezes against high pressure

Pressure in walls of RV goes up



RV ischemia

MANAGE RV FAILURE

- Optimize volume status
  - Physical exam not reliable for volume status
  - Chronically thick RV means often have peripheral edema
- Hypoxia is a big deal
- Afib can be detrimental
- Best pressor?
- Beware intubation

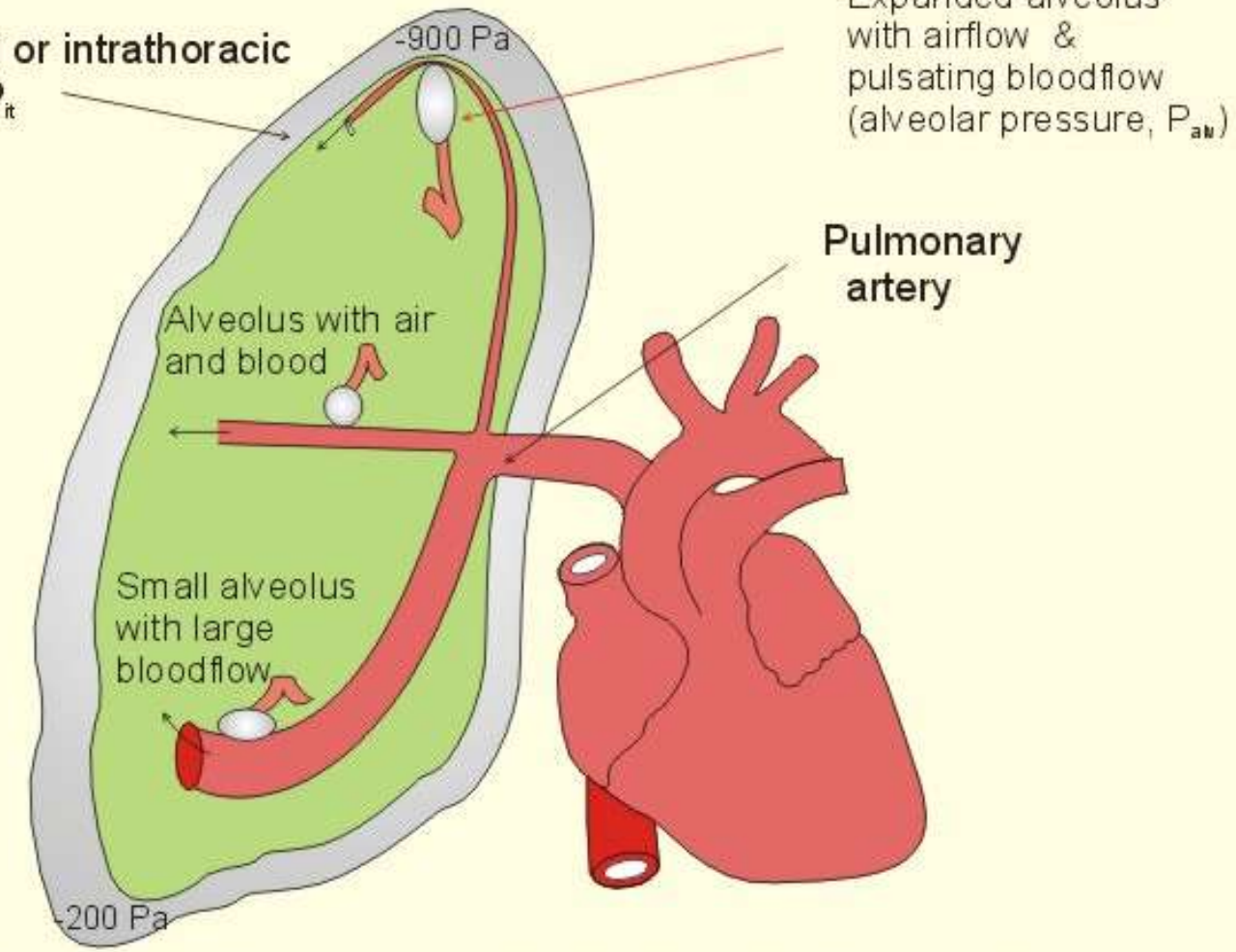
INTUBATING RV FAILURE

- Hypoxia
- Drop in blood pressure
- Positive pressure
- Fight the vent

INTUBATING RV FAILURE

- Hypoxia → increases pulmonary vasoconstriction
- Drop in blood pressure → decrease right coronary perfusion
- Positive pressure → Increased work of the ventricle
- Fight the vent → Increase intrathoracic pressure

Three Alveoli In The Upright Lung



The intrapleural pressure gradient is largest in the upper lung region

Fig.14-5

KM c

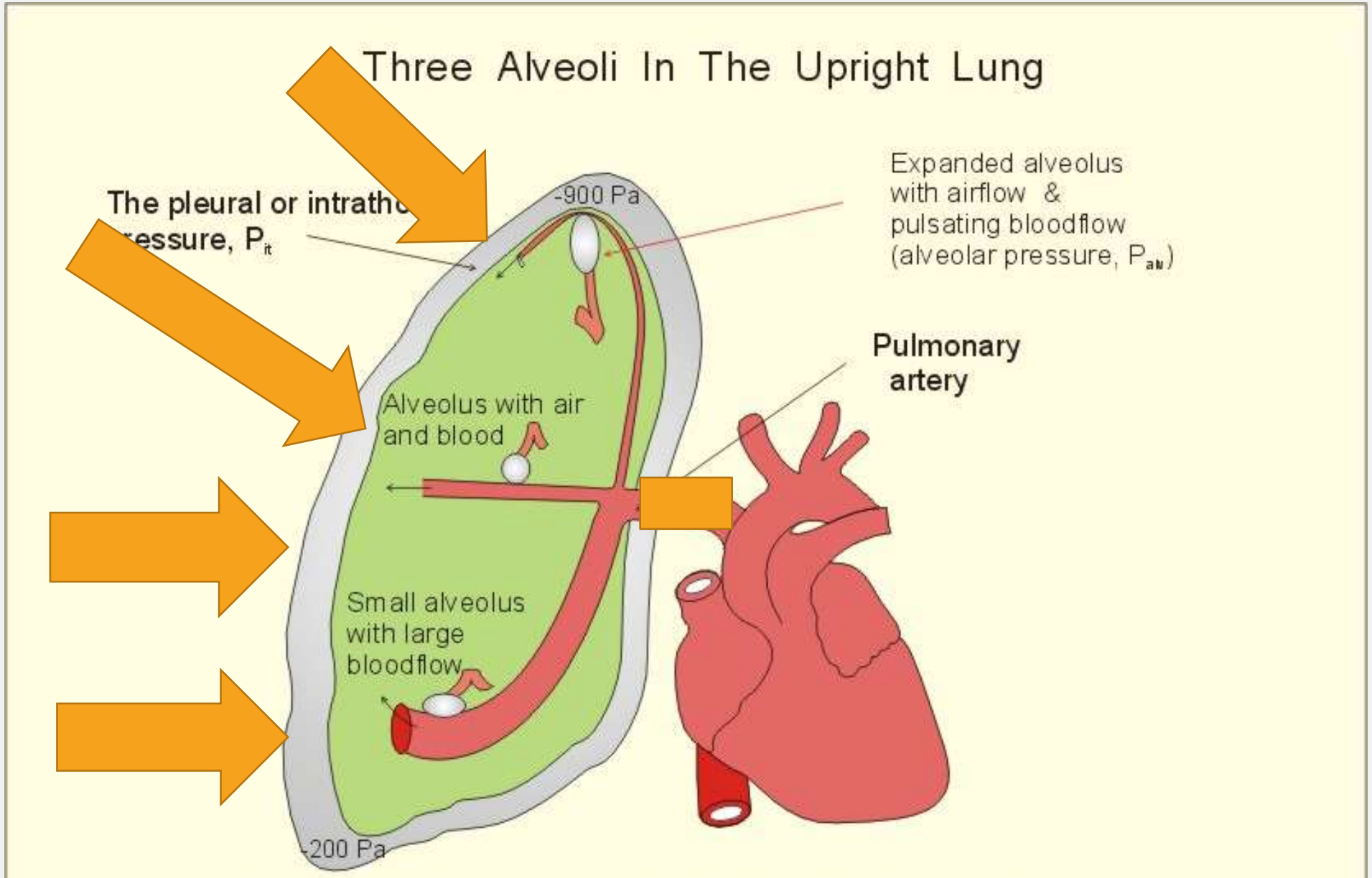


Fig.14-5

The intrapleural pressure gradient is largest in the upper lung region

KM c

MITIGATING TROUBLE

- Hypoxia – two sources of O2 – always
- Drop in blood pressure – Push dose pressors and early to pressors
- Positive pressure and fighting vent – minimize dyssynchronous breathing with fentanyl or ketamine

10:1

Push Dose epi

10:1

Drip Dose Epi

Dirty "Epi" Drip

1 mcg/mL

TREATMENT PEARLS

Don’t let them get hypoxic

Don’t let them get hypotensive

Don’t let them stay in an arrhythmia

Don’t initiate diuresis

Don’t intubate

HYPERTENSIVE EMERGENCIES

- 84 yo woke up suddenly
  sob, trouble breathing
- RR 30, HR 110, BP 220/120

HYPERTENSIVE EMERGENCIES

- 84 yo woke up suddenly
  sob, trouble breathing
- RR 30, HR 110, BP 220/120

HYPERTENSIVE EMERGENCIES

- 84 yo woke up suddenly sob, trouble breathing
- RR 30, HR 165, BP 220/120

HYPERTENSIVE EMERGENCIES

- 84 yo woke up suddenly sob, trouble breathing
- RR 30, HR 165, BP 90/50

HYPERTENSIVE EMERGENCIES

- 84 yo woke up suddenly
  sob, trouble breathing
- RR 30, HR 165, BP 110/56

HYPERTENSIVE EMERGENCIES

- 84 yo woke up suddenly sob, trouble breathing
- RR 30, HR 165, BP 110/56, temp 102

SUMMARY

- You can fix CHF exacerbations
- You can not fix CHF
- CHF patients get other things too
- Ask about exacerbating factors, look at
  - Legs
  - Med list
  - Neck
- Special cases of LVAD
  - Lean on the family
  - Treat the patient
- Special cases of Rt Heart failure
  - Be very careful with intubation
  - Keep pressure up, O2 up, and patient sedate