

Department of morphology and  
general pathology

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# **CHRONIC HEART FAILURE**

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Roman Ursan, MD, Senior lecturer

peripheral vascular  
resistance

cardiac output

total blood volume

HR

vascular diameter

arterial elasticity

blood viscosity

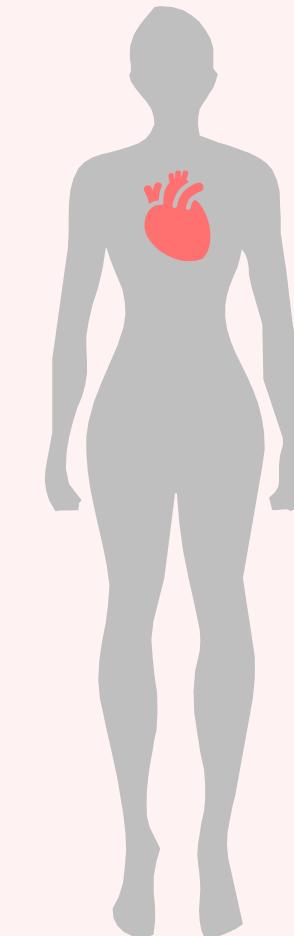
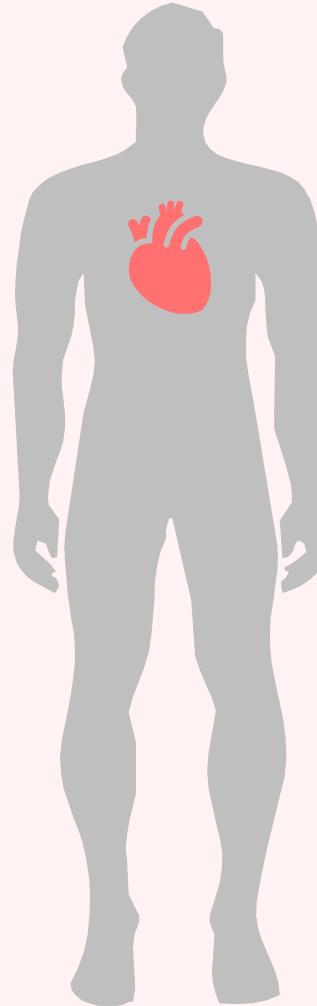


Blood pressure

**Ejection fraction = (cardiac output/end-diastolic volume)\*100%**

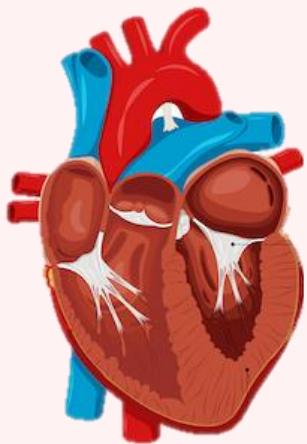
cardiac output = end-diastolic volume — end systolic volume

CO = 70 ml  
EDV = 115 ml  
EF ≈ 60%



CO = 50 ml  
EDV = 85 ml  
EF ≈ 60%

# CLASSIFICATION OF HEART FAILURE SYSTOLIC FUNCTION



**CHF with preserved EF**  
 $> 50\%$

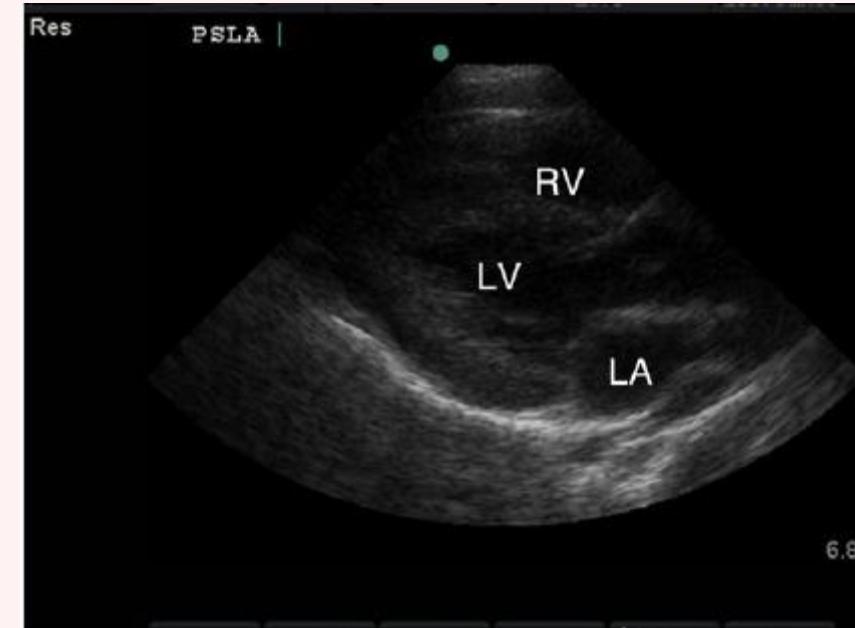


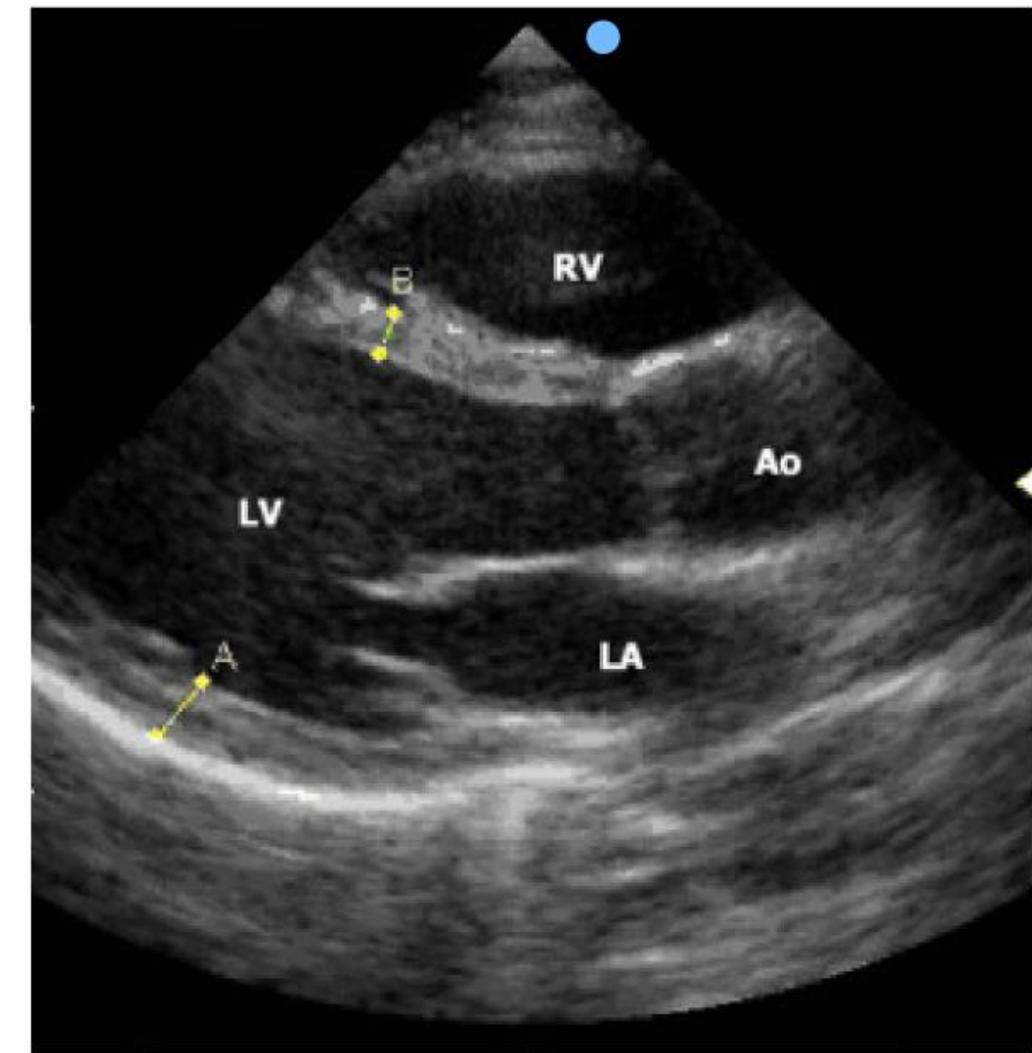
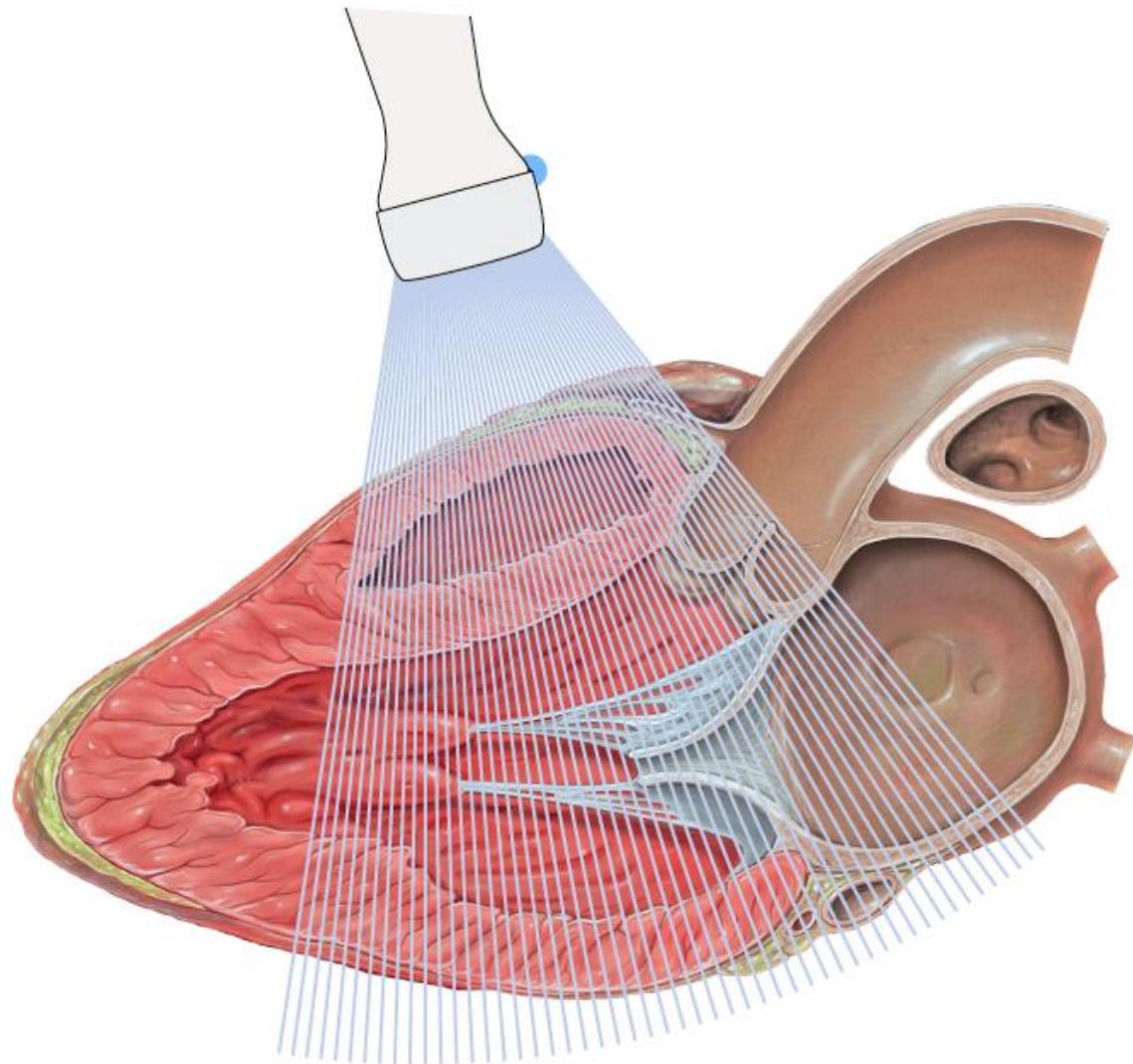
**CHF with mildly reduced EF**  
 $40-50\%$

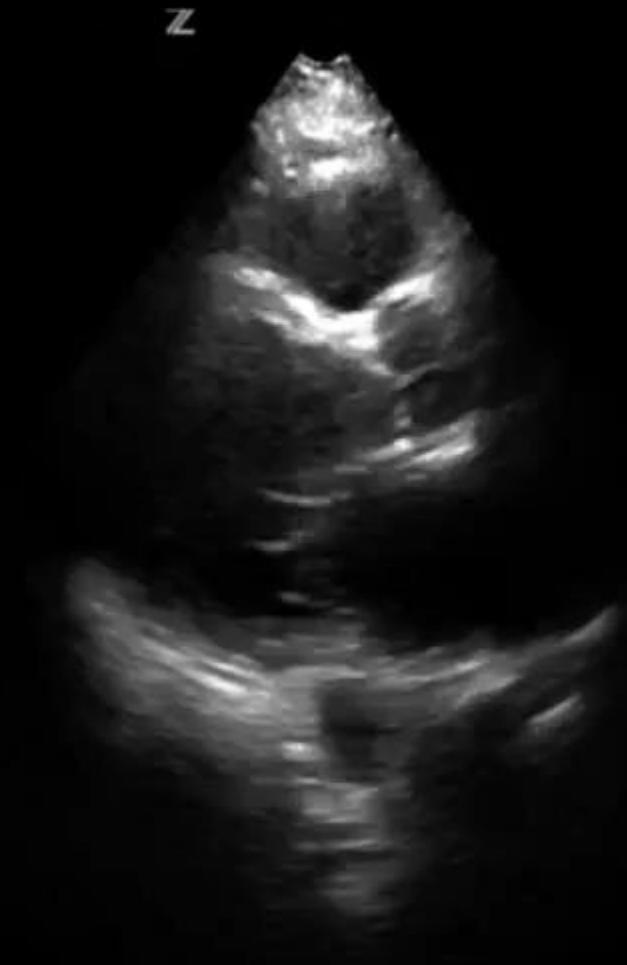


**CHF with reduced EF**  
 $< 40\%$

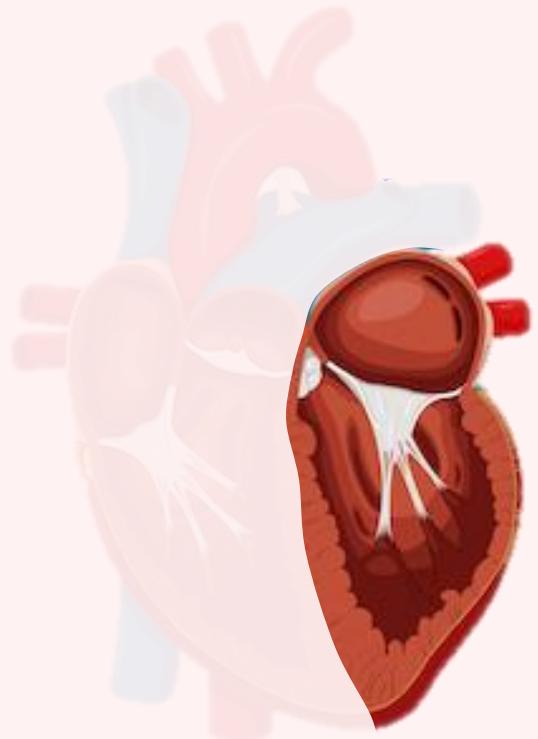
# Parasternal position of the ultrasound transducer (probe)



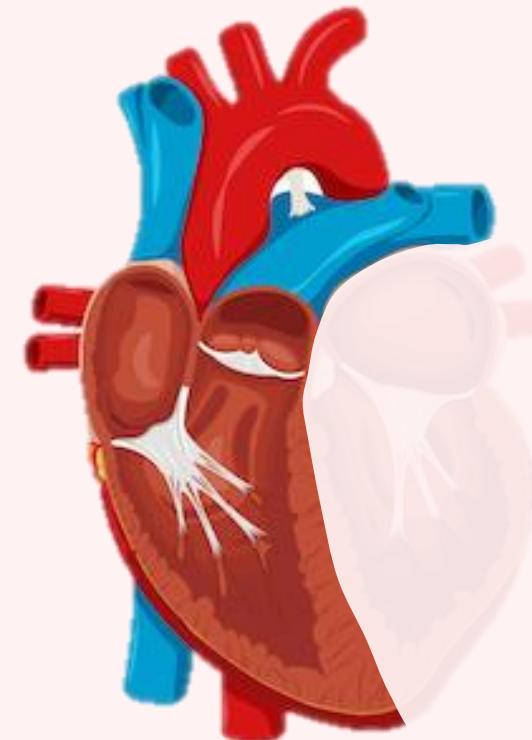




# CLASSIFICATION OF HEART FAILURE INVOLVED CHAMBERS



left-sided



right-sided

# MAIN CAUSES OF CHF

1. CAD

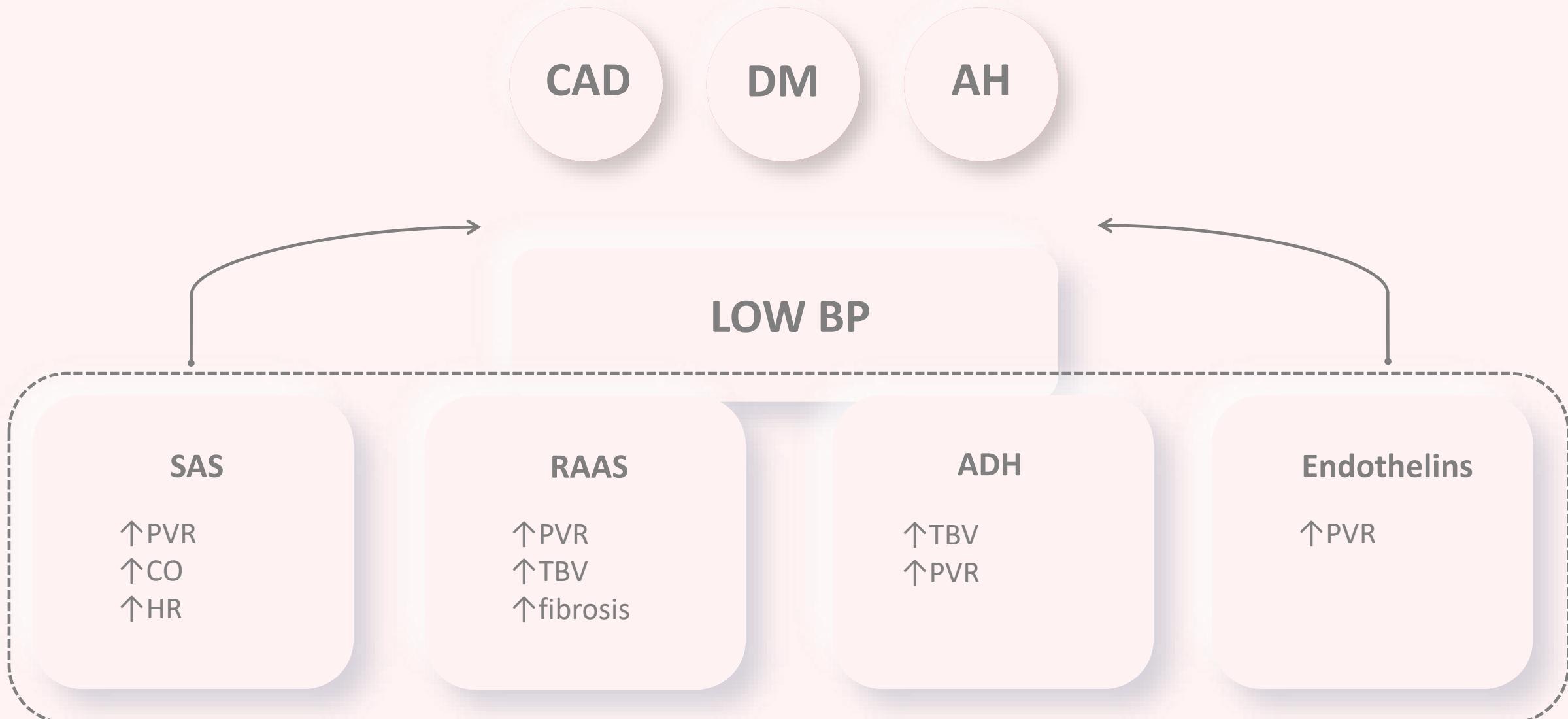
2. ARTERIAL HYPERTENSION

3. DIABETIS MILLITUS

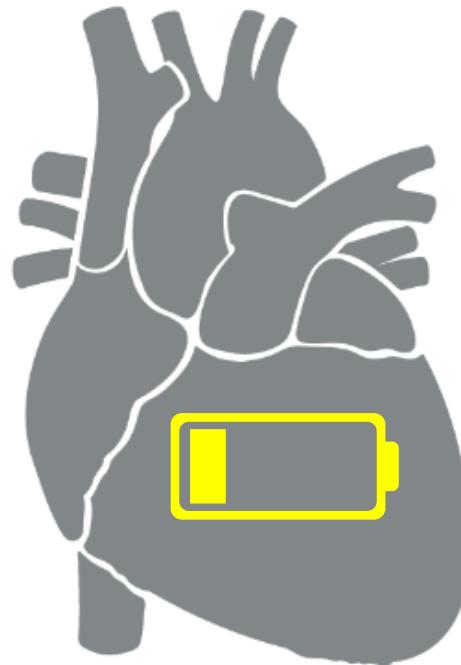
4. VALVULAR DISEASE

5. CARDIOMYOPATHY

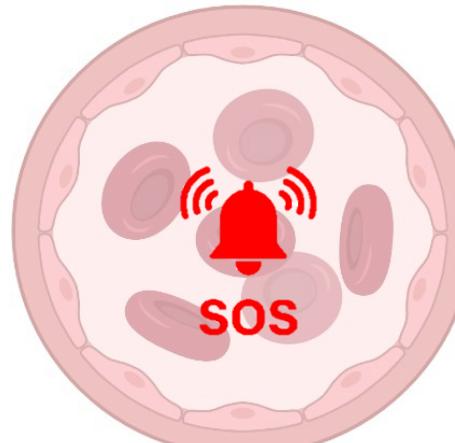
# CHF PATHOGENESIS



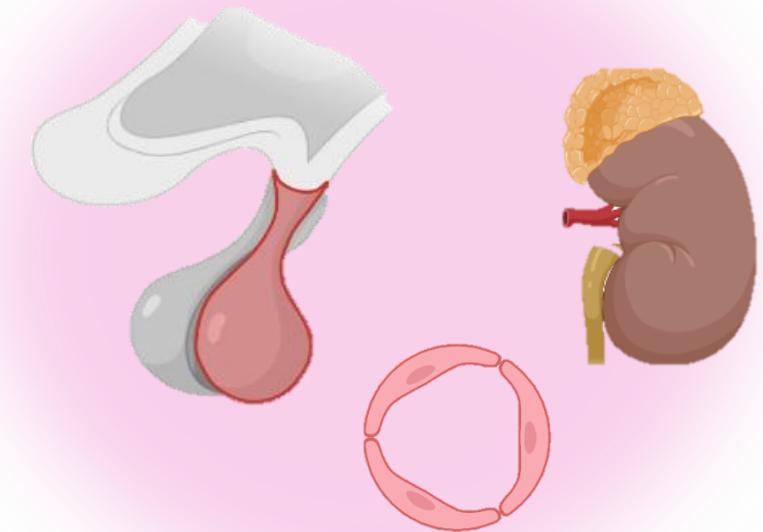
## CHF REDUCED EF



## HYPOTENSION

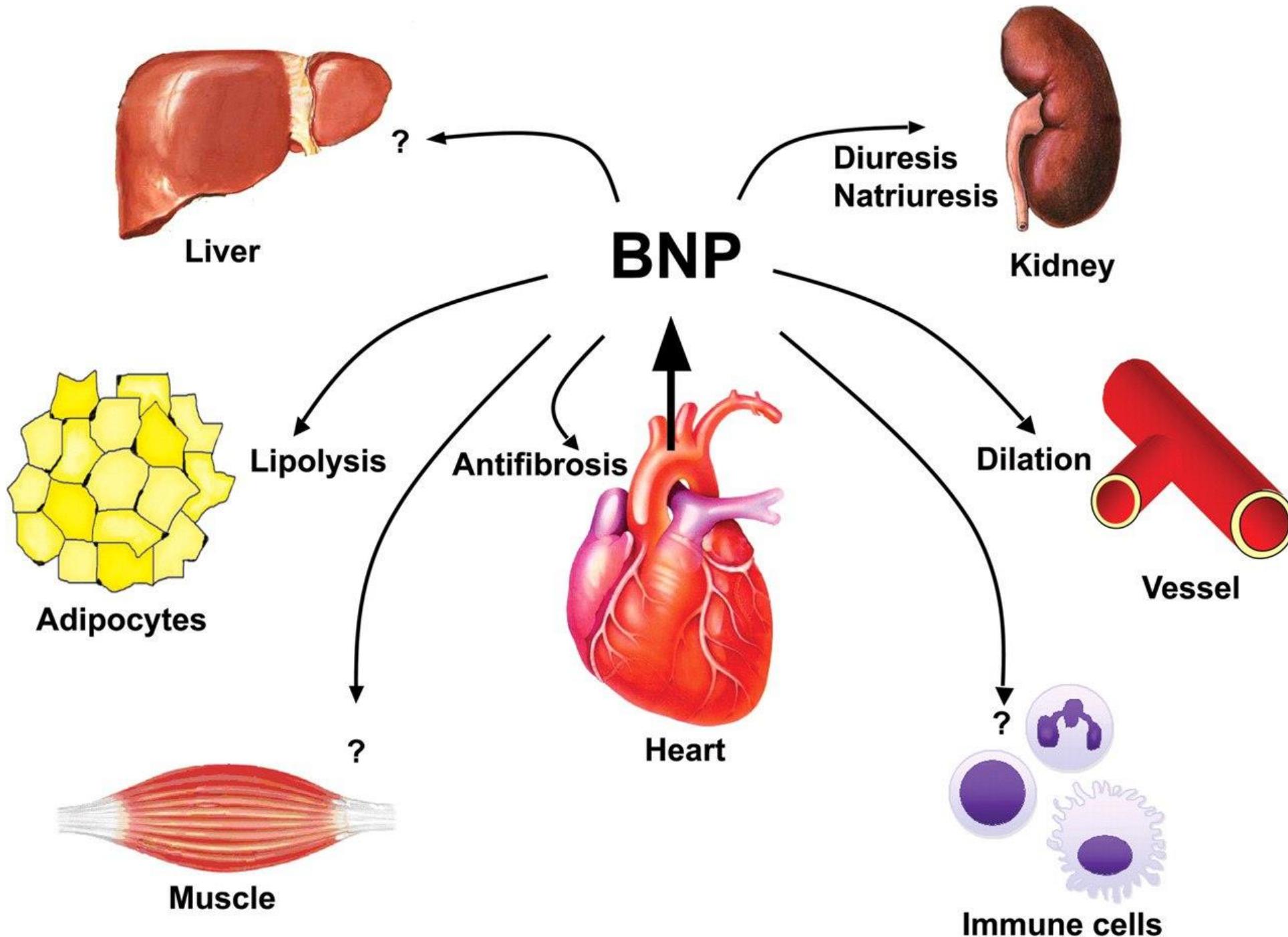


## SUSTAINING SYSTEMS: SYMPATHETIC SYSTEM, RAAS, ADH, ENDOTHELINS



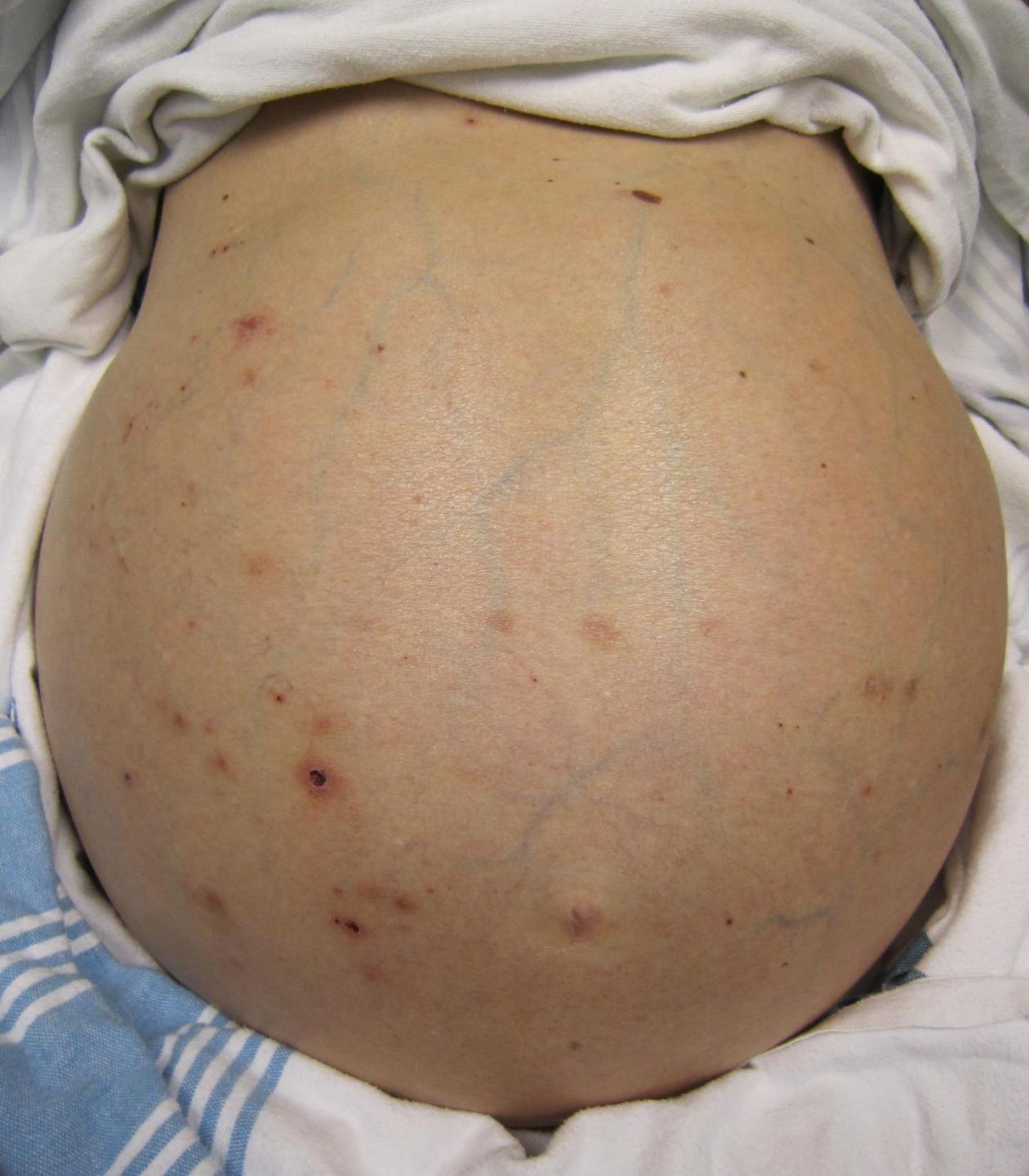
increasing heart rate = increasing ATP demand  
increasing vascular resistance = increasing afterload  
increasing blood volume = increasing preload





Right sided heart failure



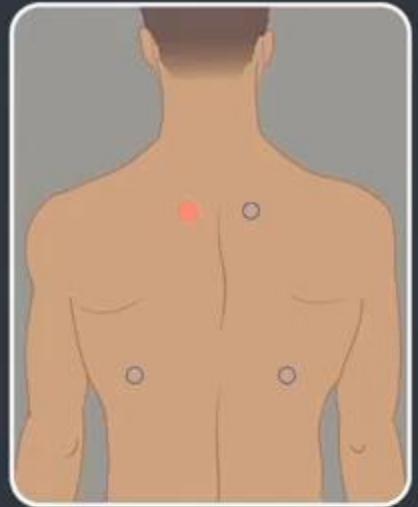




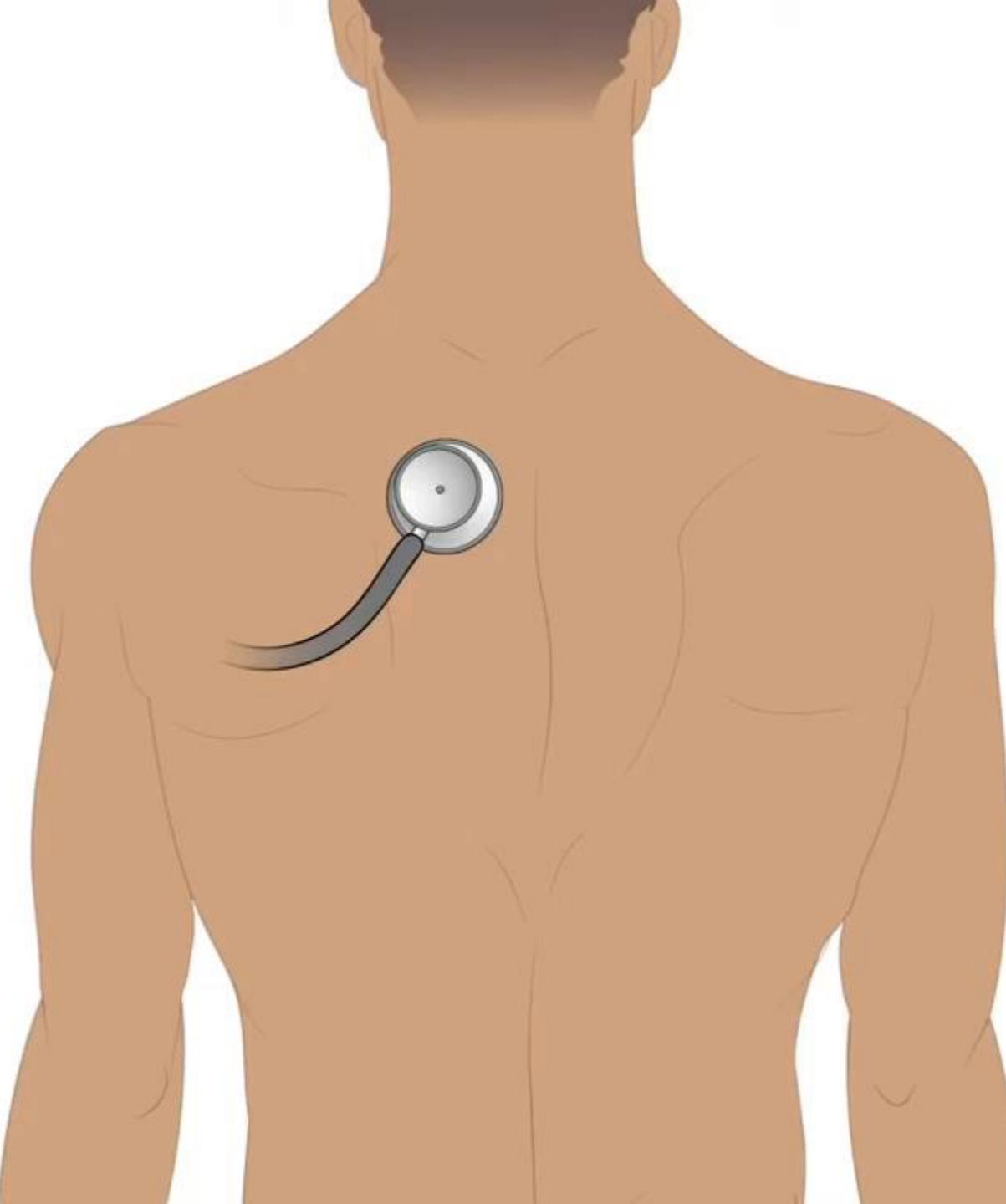




# Left-sided heart failure



Fine crackles  
(rales)



00:00

