

Terminal Heart Failure

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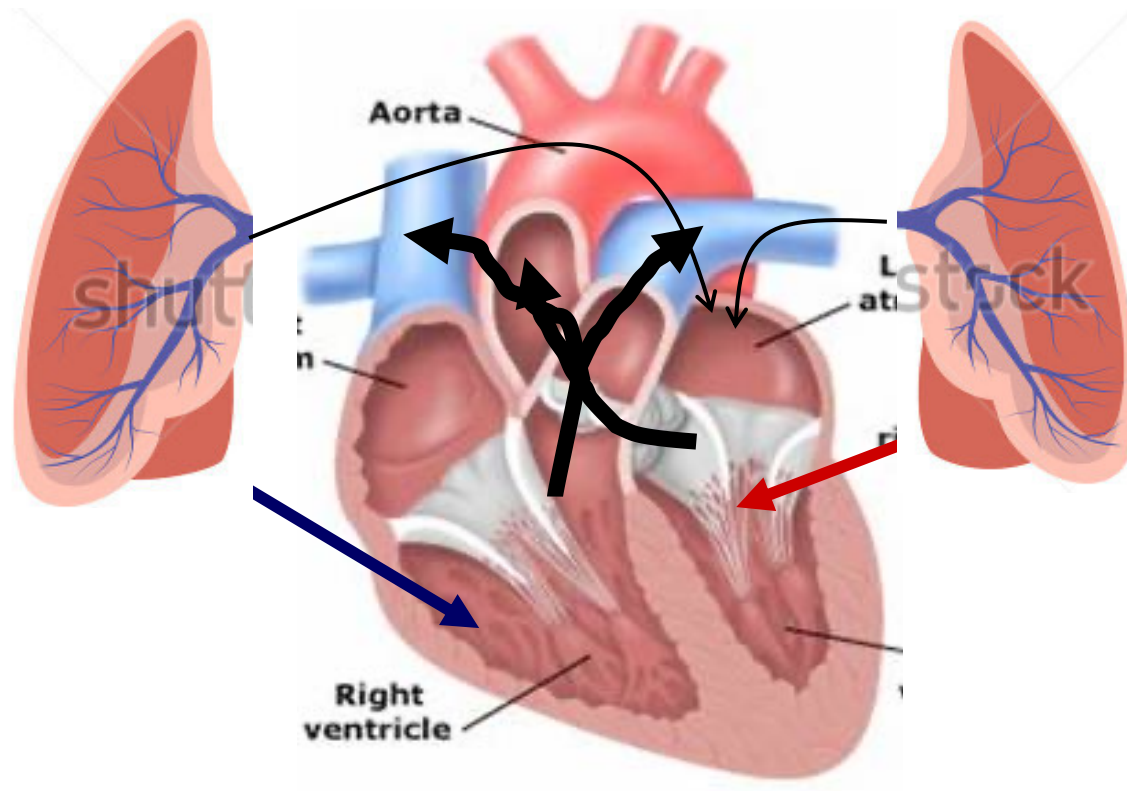
UNIVERSITY OF COPENHAGEN

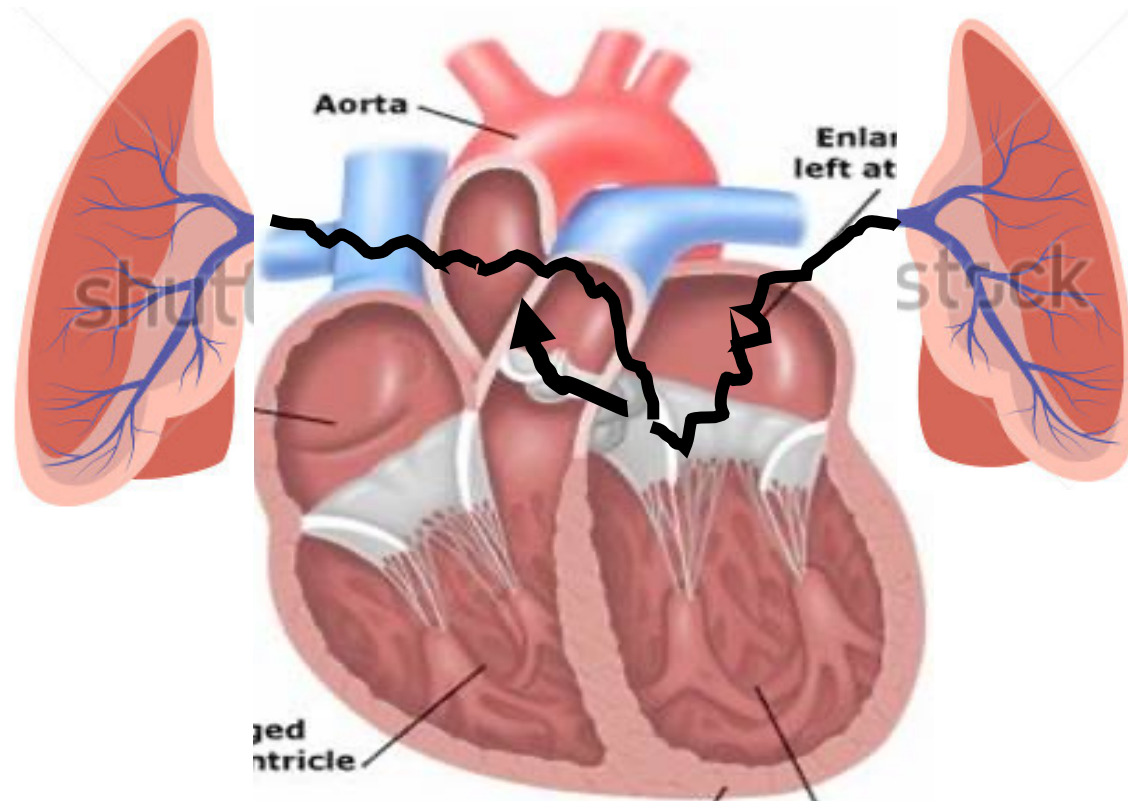


mdom0002@regionh.dk

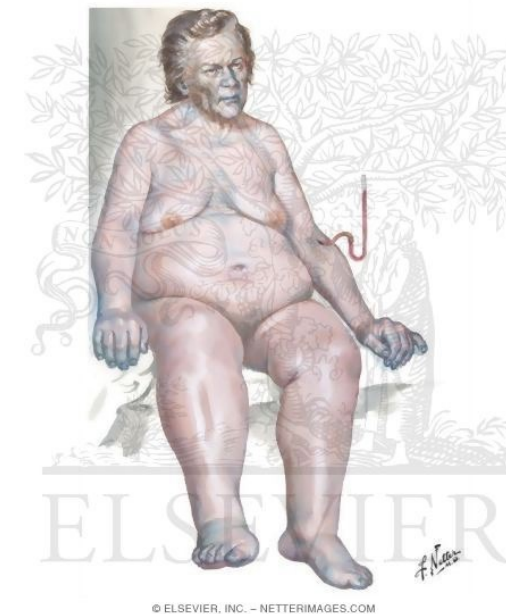
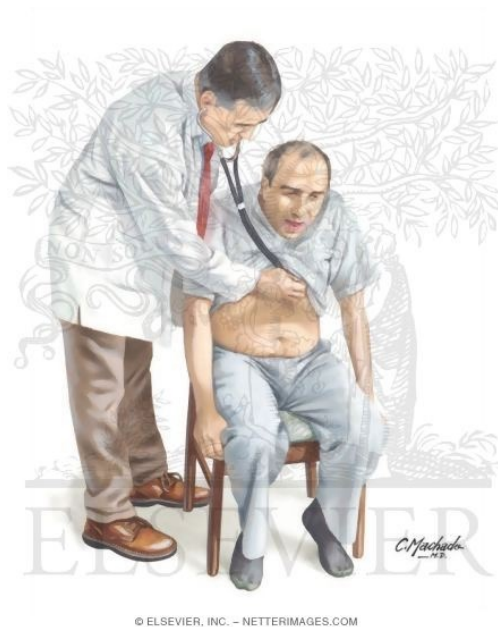
- ☐ **What is Heart Failure?**
- ☐ **Heart Failure features**
- ☐ **Compensatory mechanisms**
- ☐ **Clinical evolution**
- ☐ **Can we identify terminal heart failure?**

What is Heart Failure?





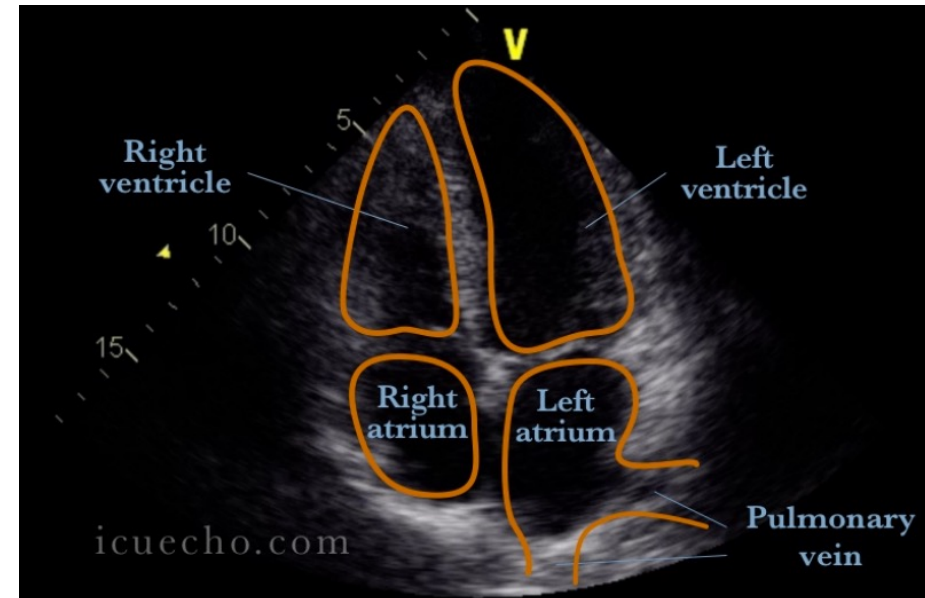
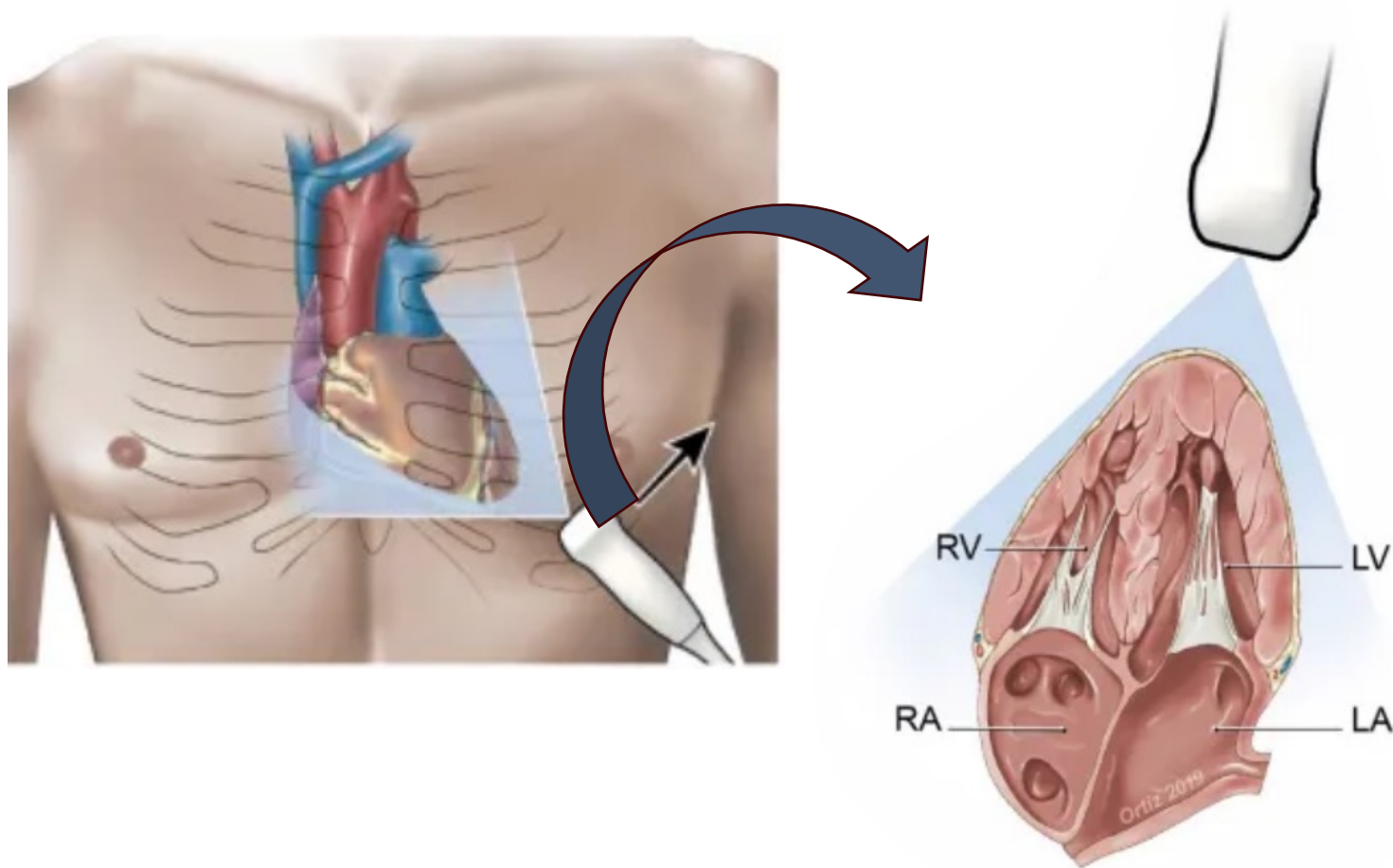
Heart Failure features



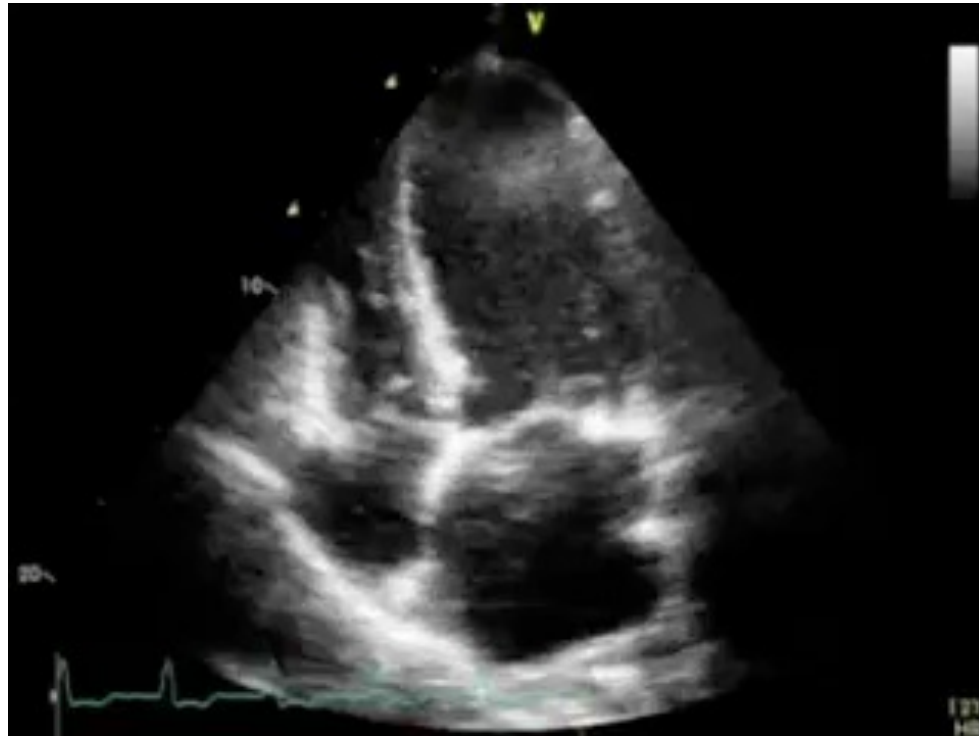


HJERTEFORENINGEN

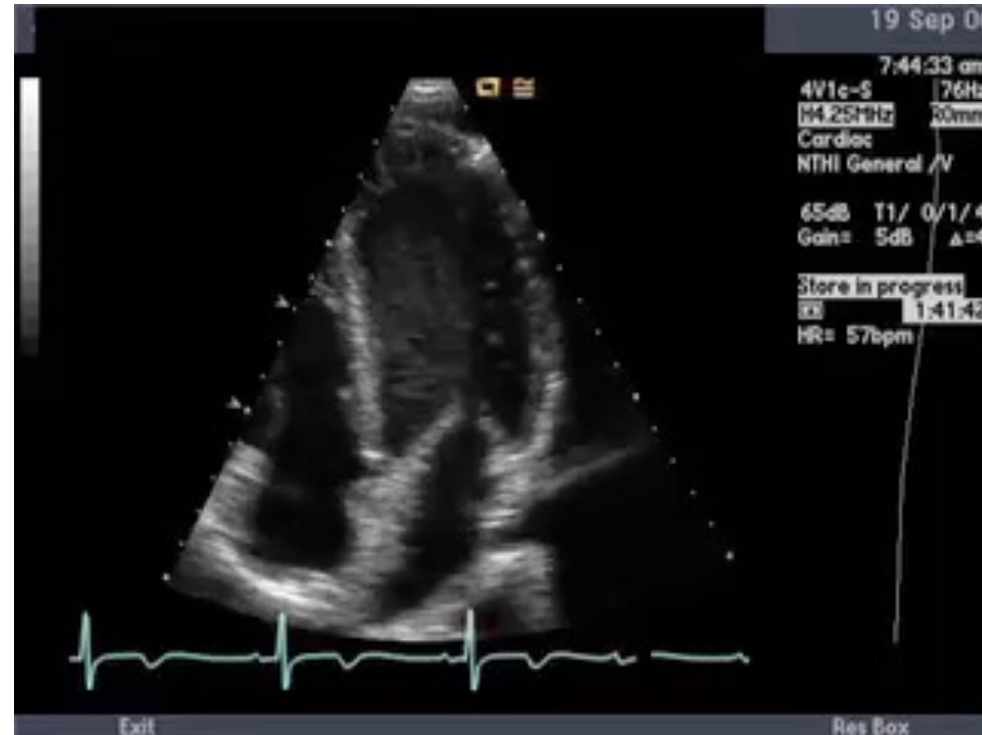




Reduced ejection fraction



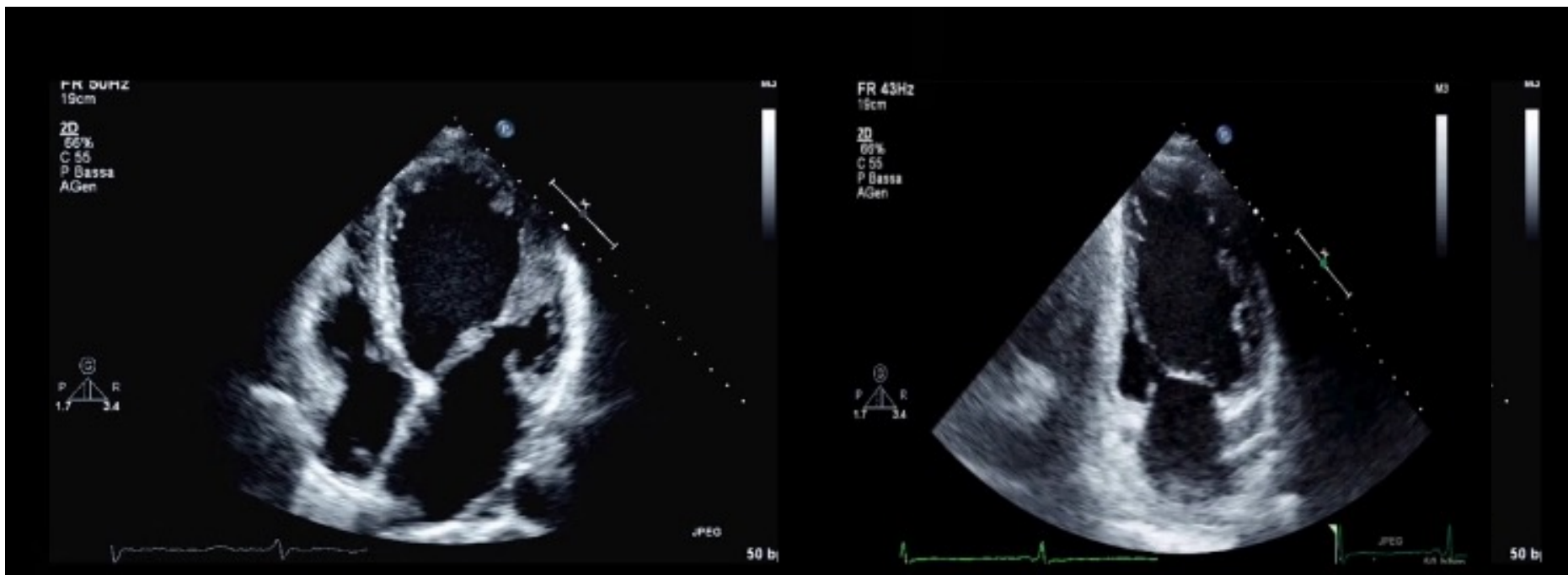
normal



Reduced ejection fraction
HFrEF

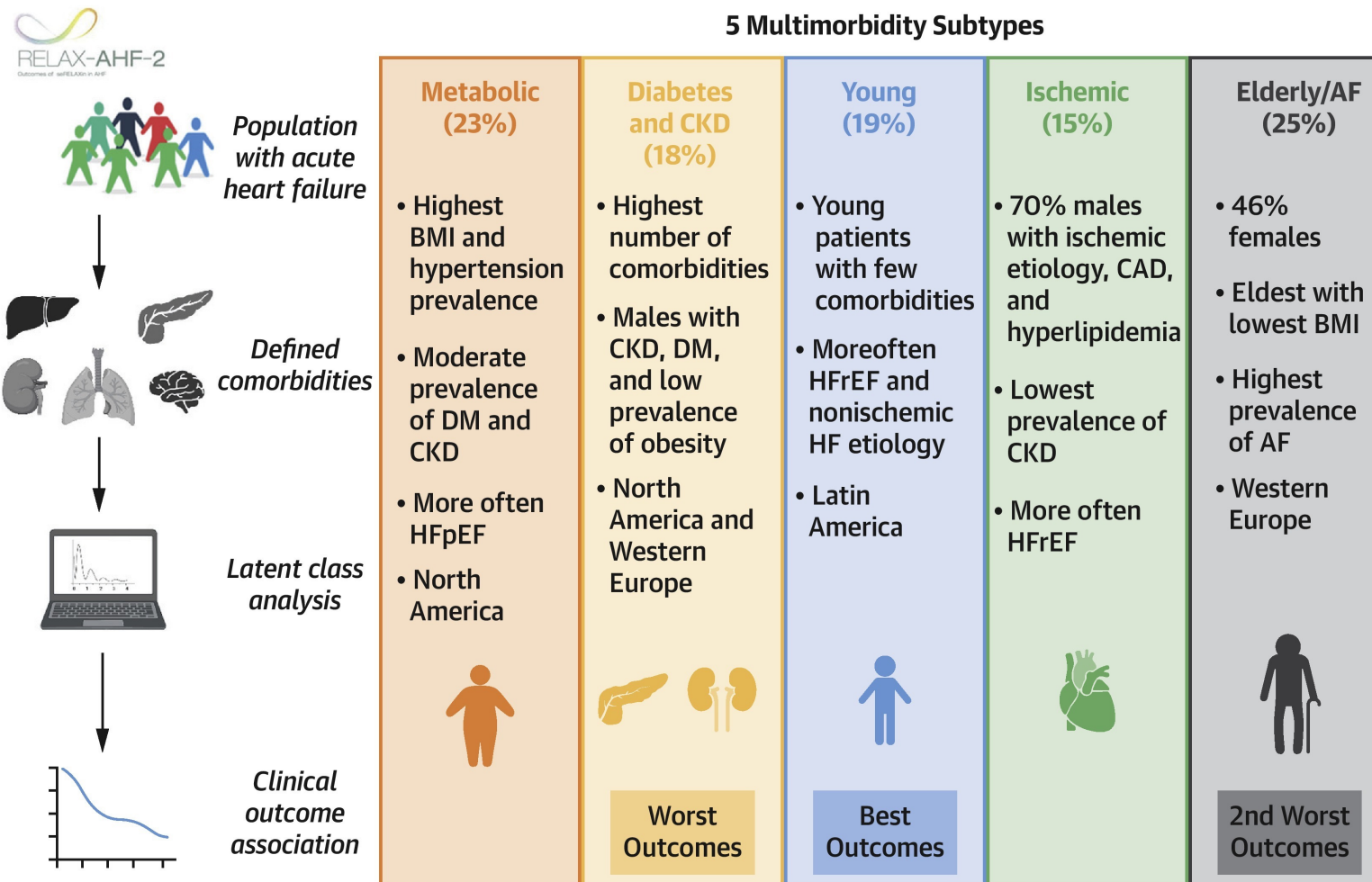
normal

Preserved ejection fraction
HFpEF



CENTRAL ILLUSTRATION: Multimorbidity in Acute Heart Failure

Distinct Comorbidity Clusters in Patients With Acute Heart Failure: Data From RELAX-AHF2

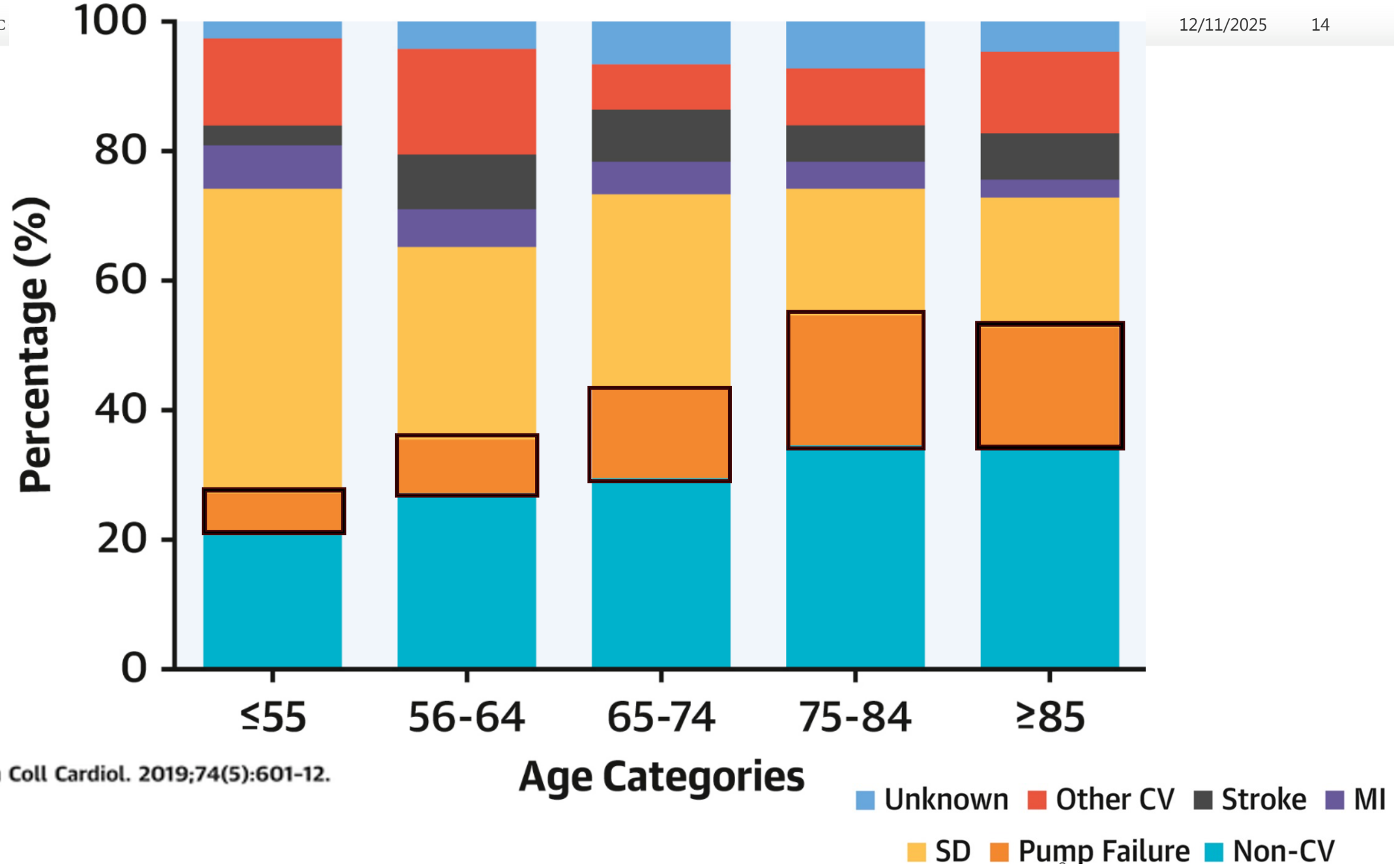


Gomez KA, et al. JACC Heart Fail. 2024;12(10):1762-1774.

CENTRAL ILLUSTRATION: Age-Related Differences in Patients With Heart Failure With Preserved Ejection Fraction

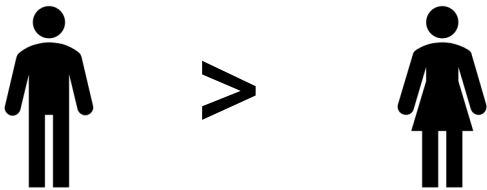
Young Heart Failure With Preserved Ejection Fraction	Elderly Heart Failure With Preserved Ejection Fraction
	
Clinical characteristics <i>Men</i> ↑ Obese	Clinical characteristics <i>Women</i> ↑ Atrial fibrillation, hypertension, renal disease
Cardiac structure and function ↑ Concentric hypertrophy ↑ Filling pressures ↑ Left ventricular volume	Cardiac structure and function ↑ Left atrial size
Clinical outcomes ↑ Cardiovascular cause of death ↑ Sudden cardiac death	Clinical outcomes ↑ Noncardiovascular cause of death

Tromp, J. et al. J Am Coll Cardiol. 2019;74(5):601-12.



Tromp, J. et al. J Am Coll Cardiol. 2019;74(5):601-12.

- Prevalence of HF in the Swedish population
- Impact of age and multimorbidity



- Increasing impact of socioeconomic depravity

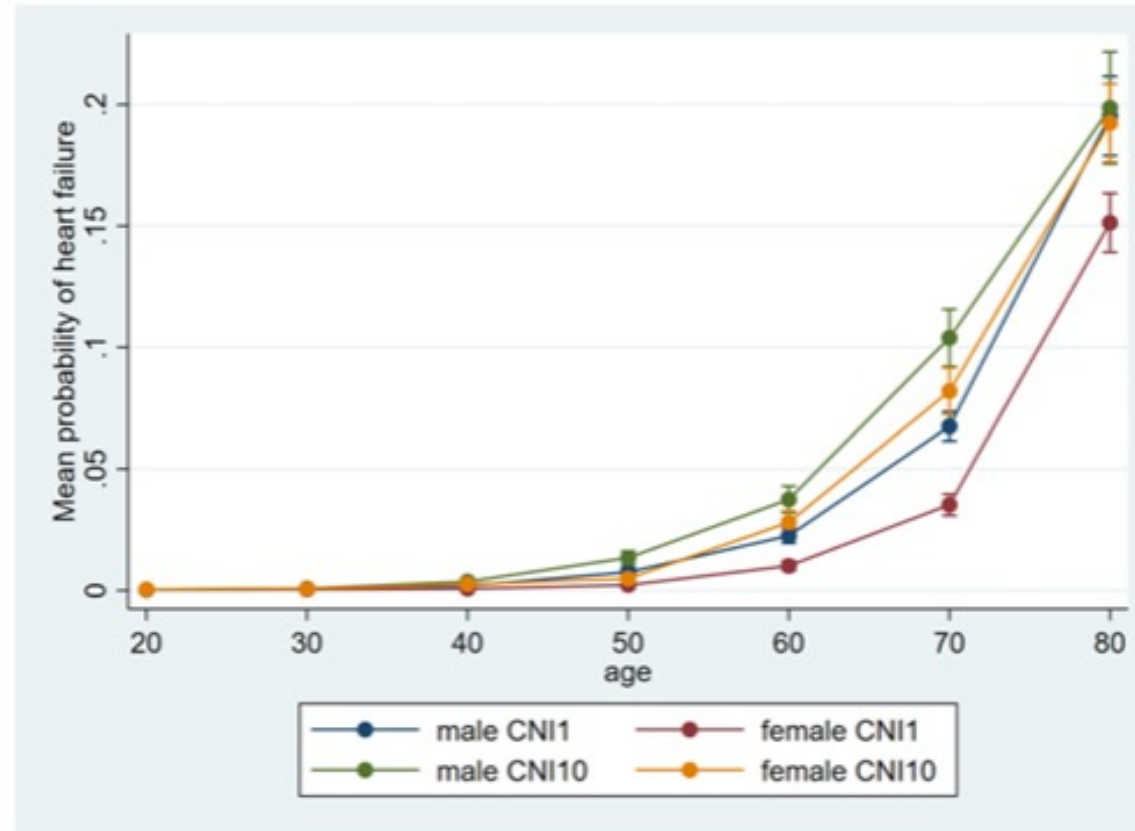
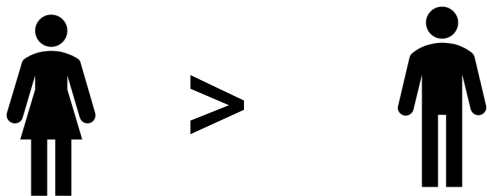
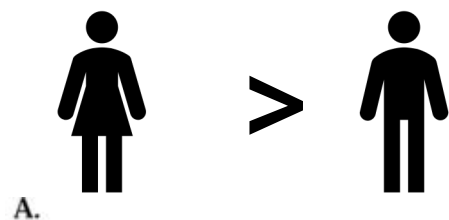


Figure 3. Disparities in mean probability of heart failure between the genders in the most affluent and deprived CNI (Care Need Index) percentile with 95% confidence intervals, using Delta method.

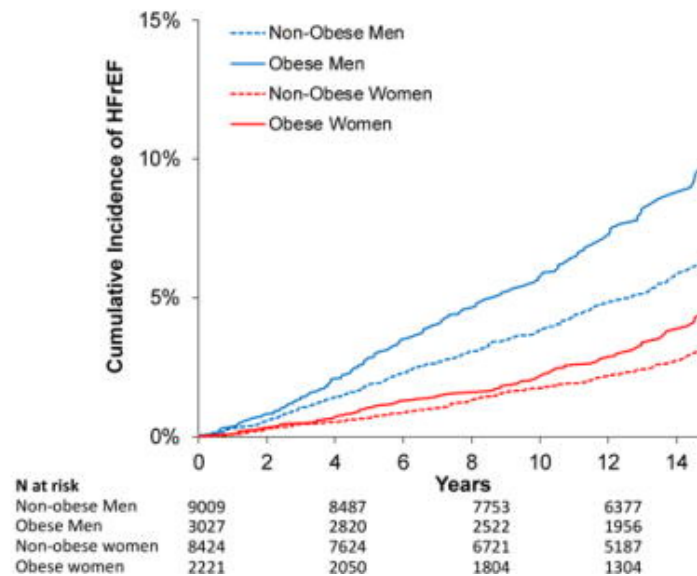
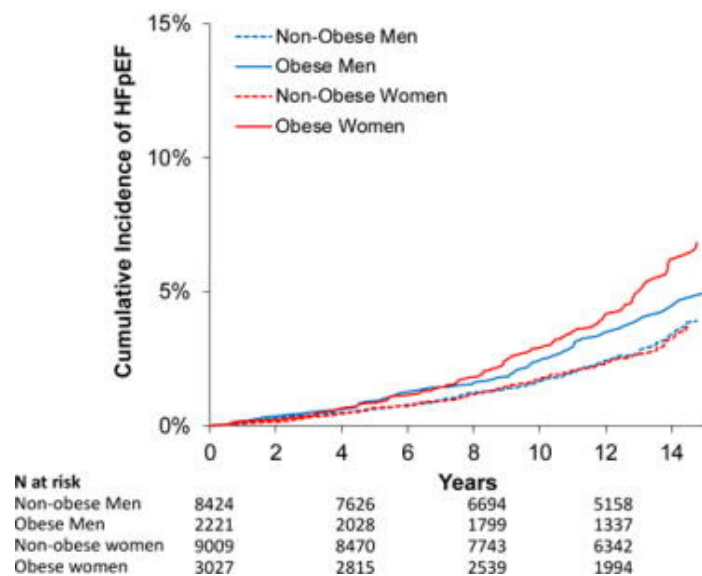
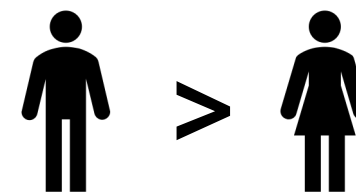
Scholten et al. Scandinavian Journal of Primary Health Care, 41:2, 160-169

- Obesity has stronger impact in women to develop HFpEF

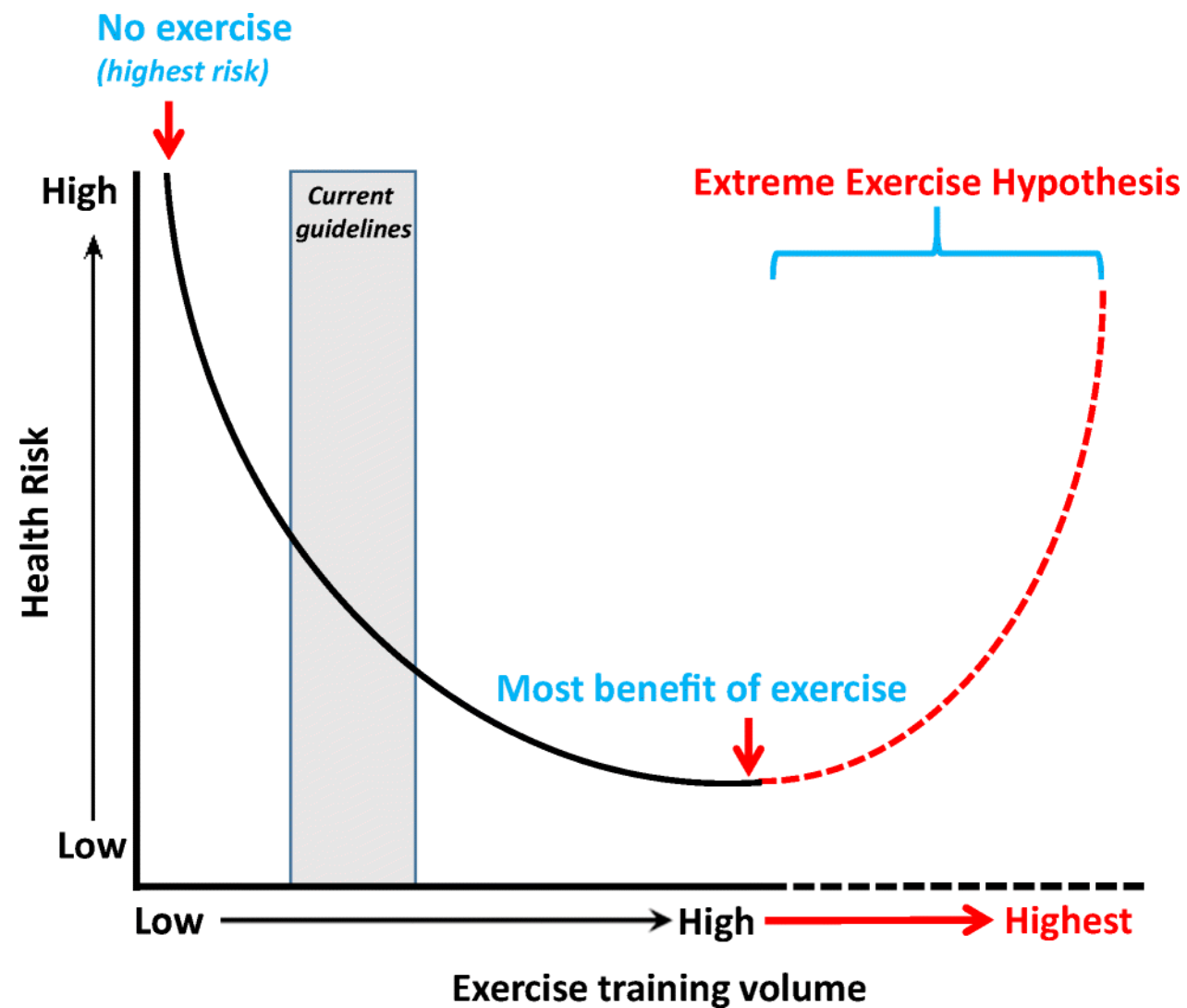


B.

- Men have a higher risk to develop HFrEF than women
- Obesity has specially detrimental impact in men

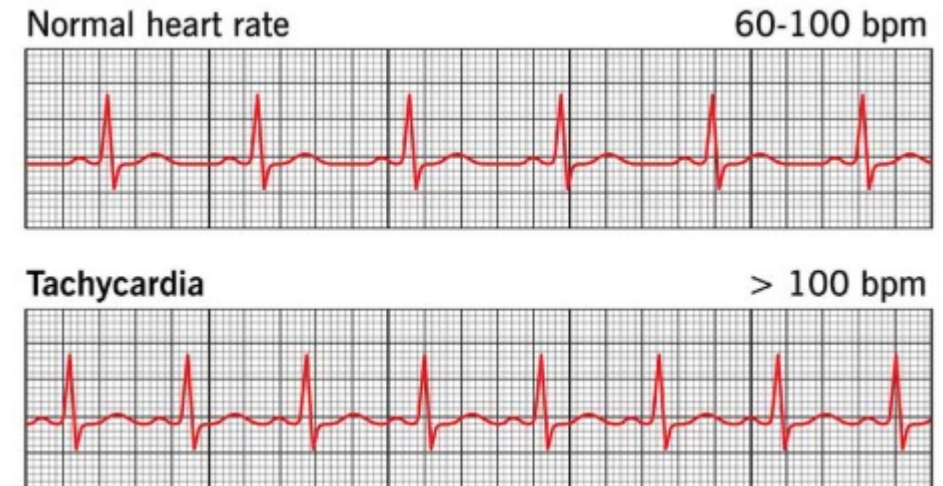
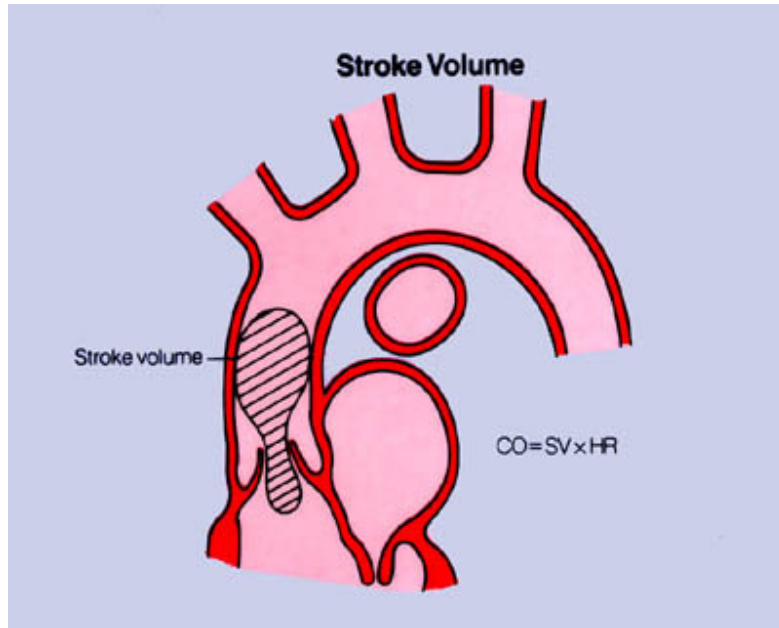


Savgi et al. JACC Heart Fail. 2018 Jul 11;6(8):701–709



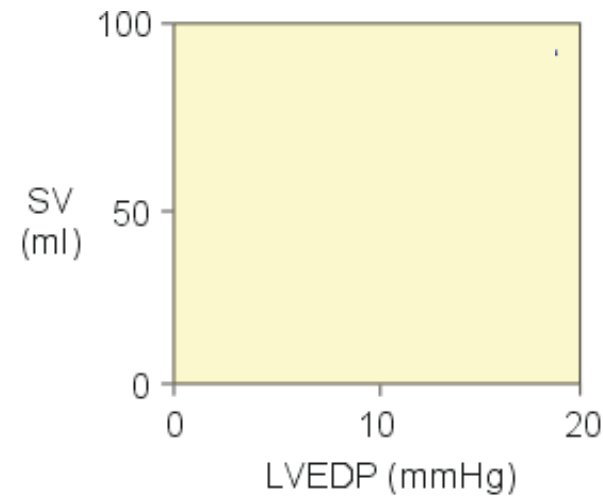
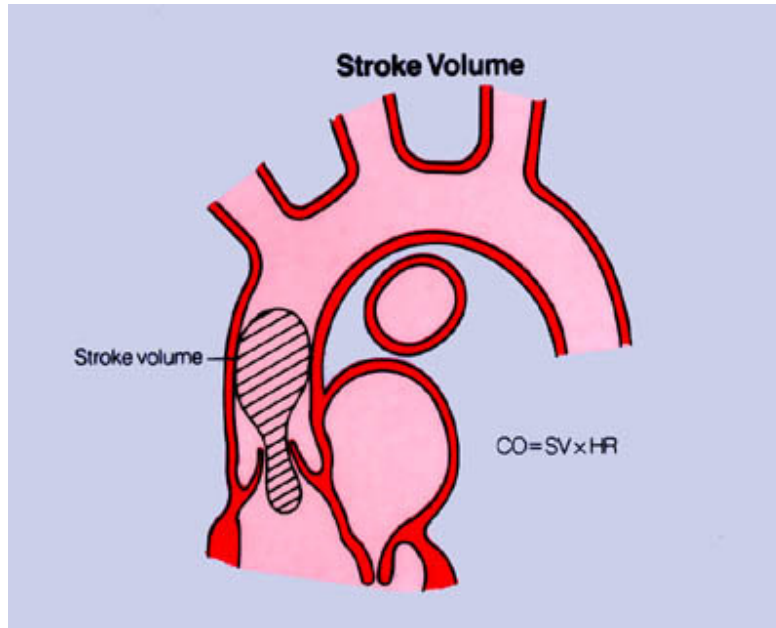
Eijsvogels TMH et al. Curr Treat Options Cardio Med (2018) 20: 84

Compensatory mechanisms



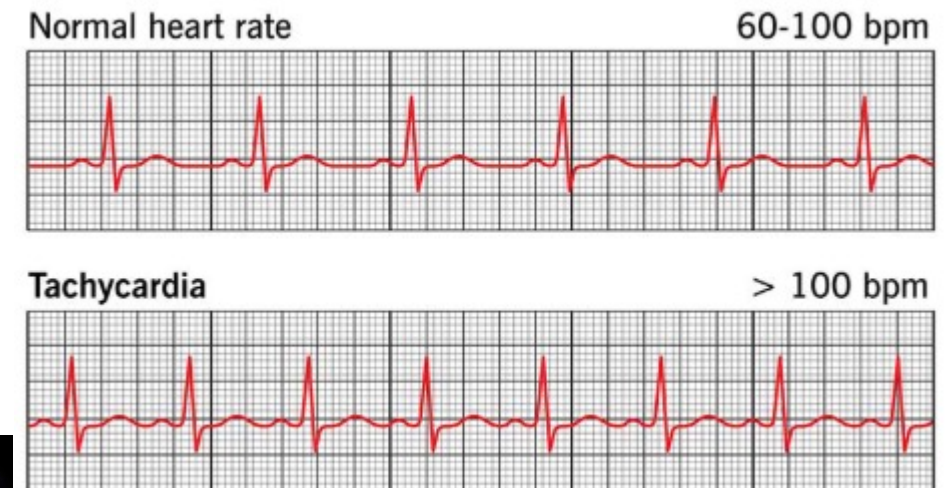
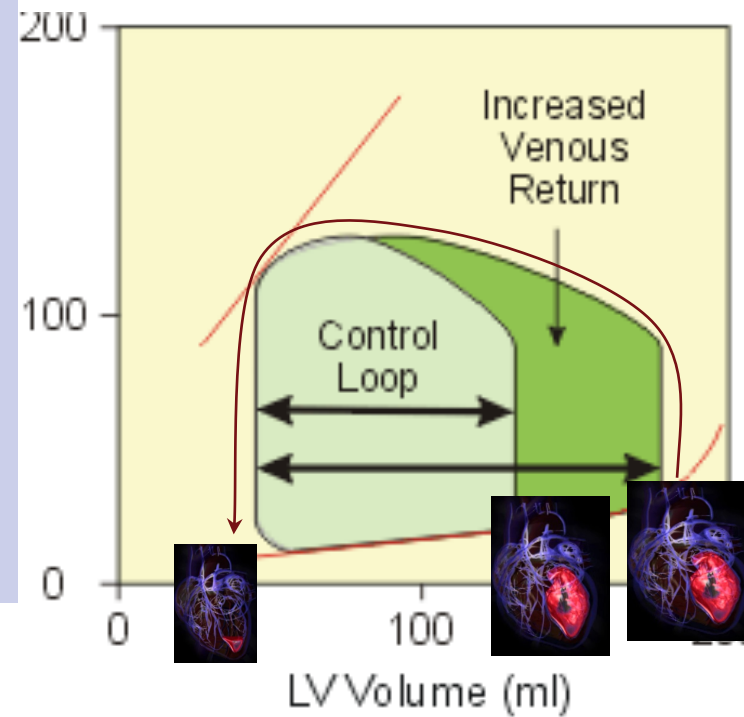
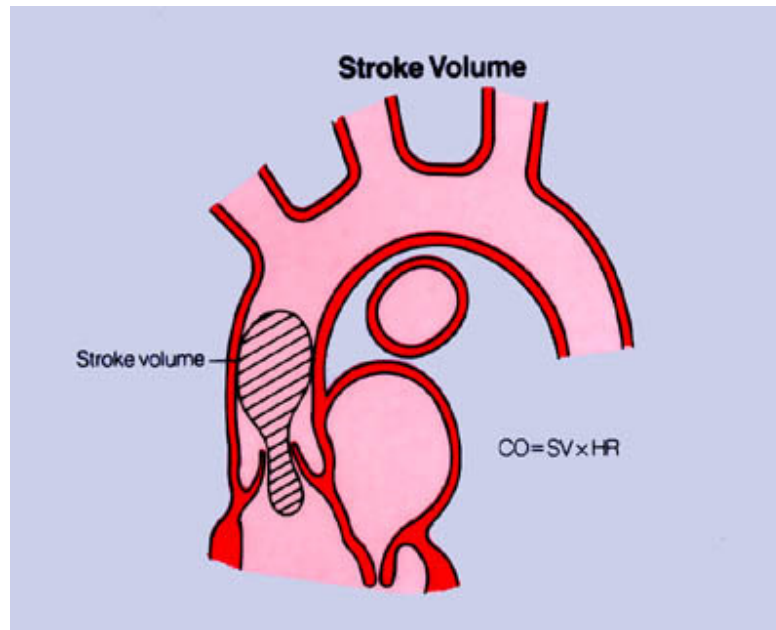
Cardiac Output = Stroke Volume x Heart Rate

Frank-Starling mechanism



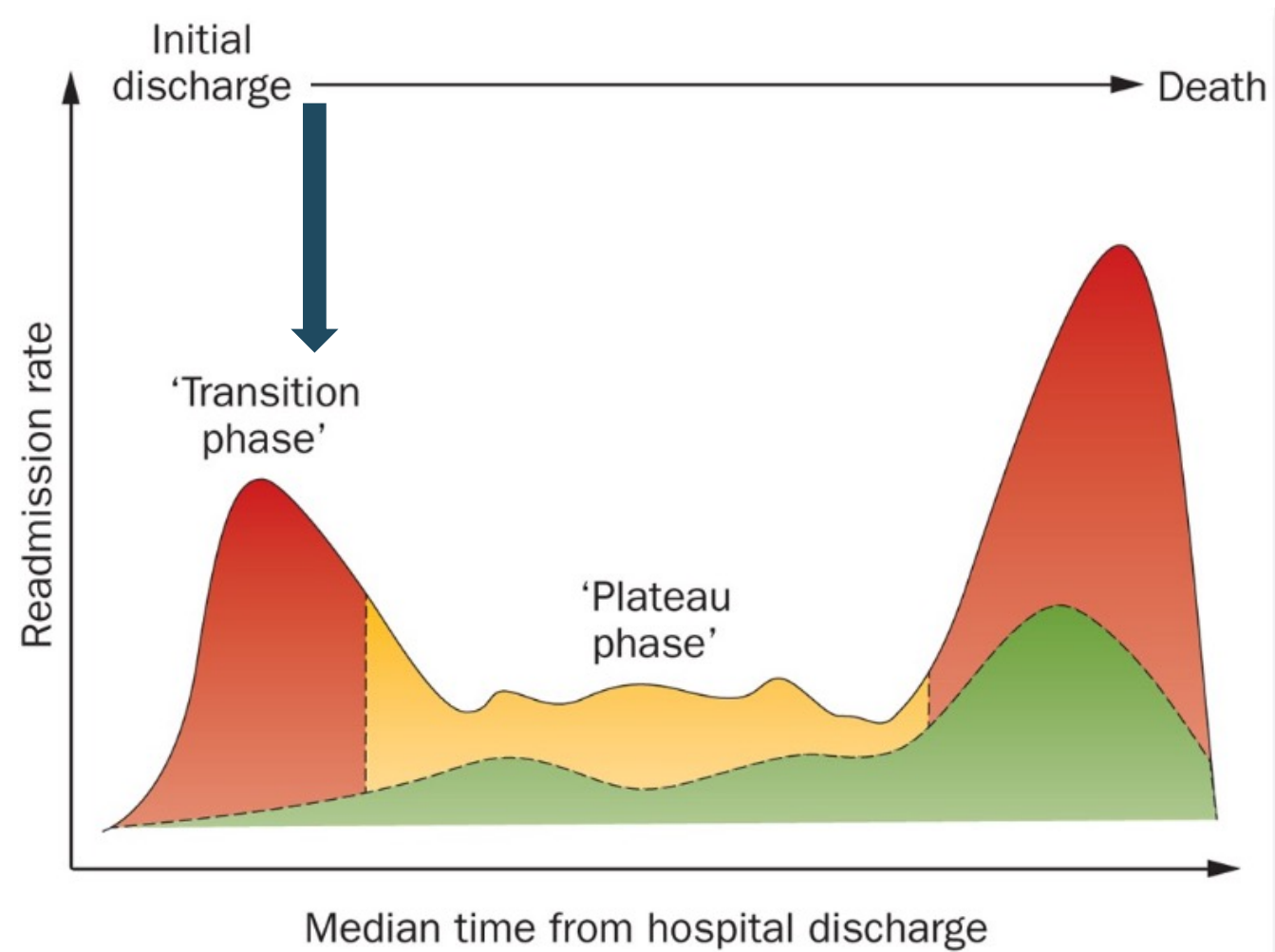
Cardiac Output = Stroke Volume x Heart Rate

Frank-Starling mechanism



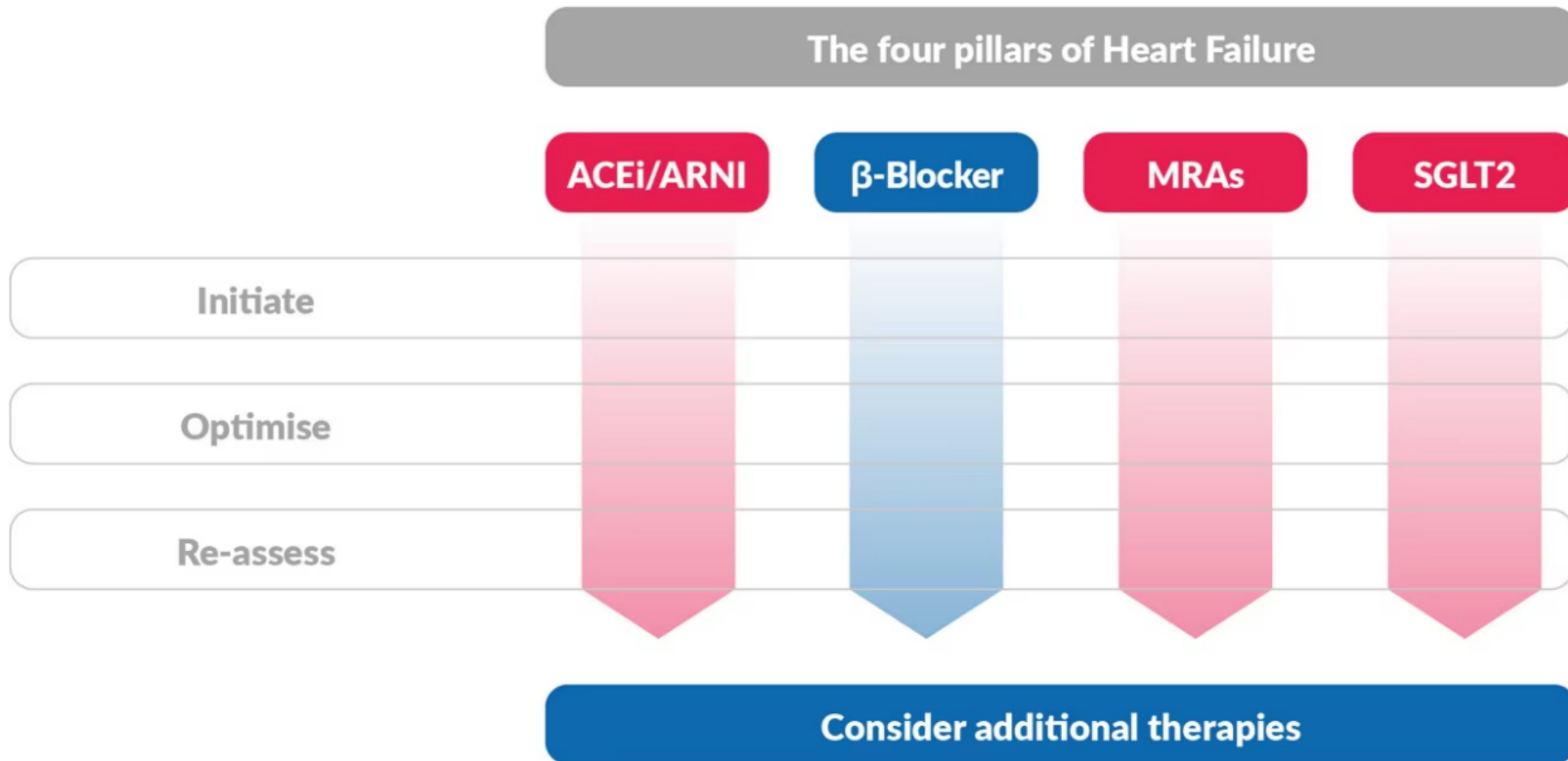
Cardiac Output = Stroke Volume x Heart Rate

Clinical Evolution

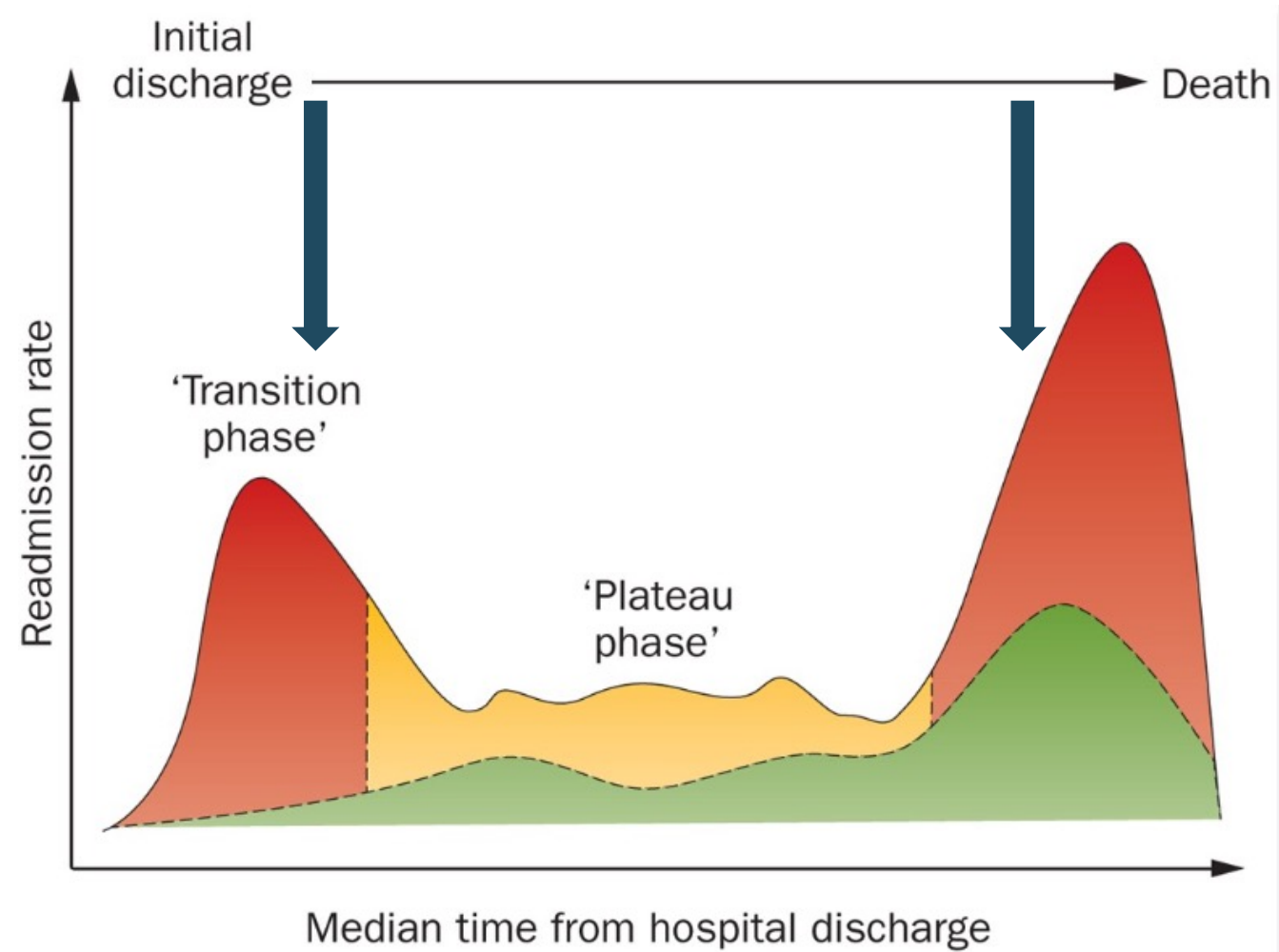


Greene, S., Fonarow, G., et al. *Nat Rev Cardiol* 12, 220–229 (2015)

<https://doi.org/10.1038/nrcardio.2015.14>



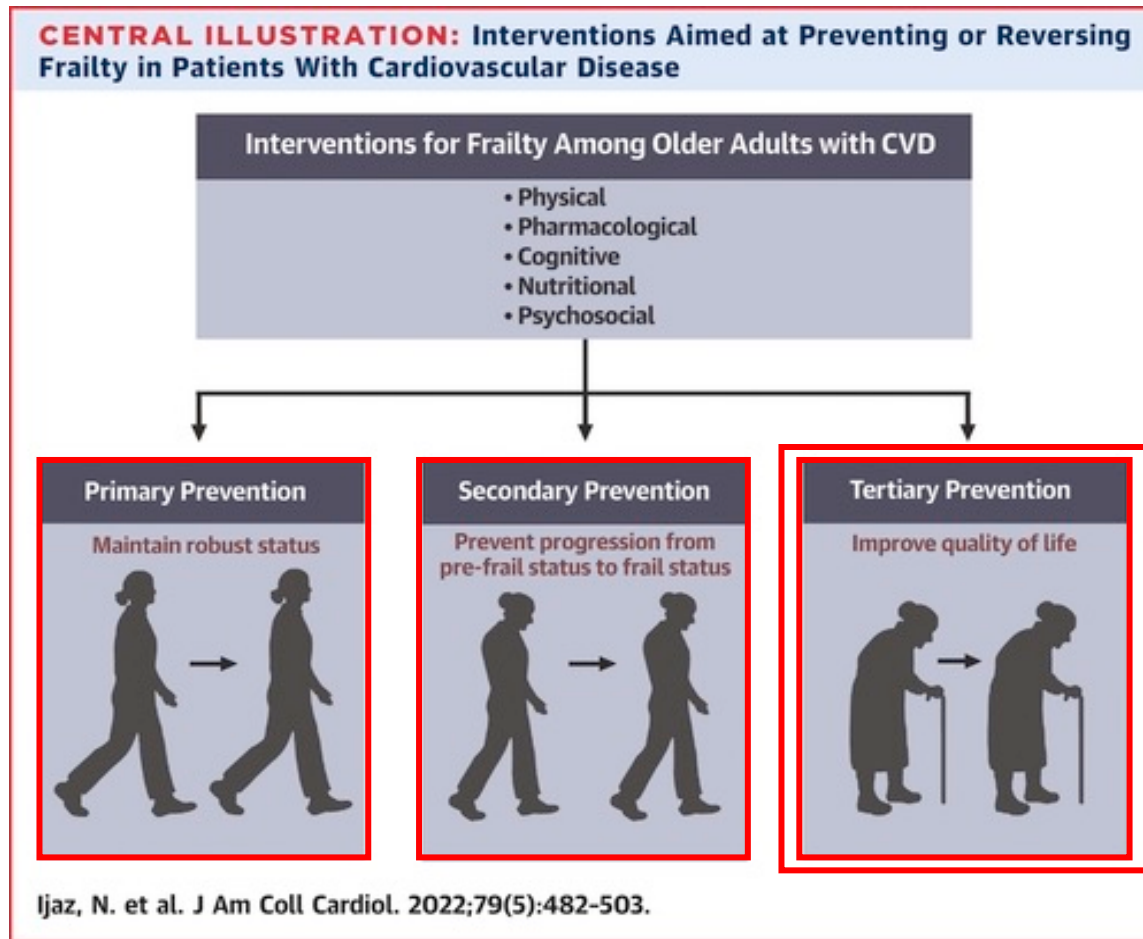
ACEi, angiotensin-converting enzyme inhibitor; **ARNi**, angiotensin receptor–neprilysin inhibitor; **MRA**, mineralocorticoid receptor antagonist; **SGLT2**, sodium glucose cotransporter-2 inhibitor

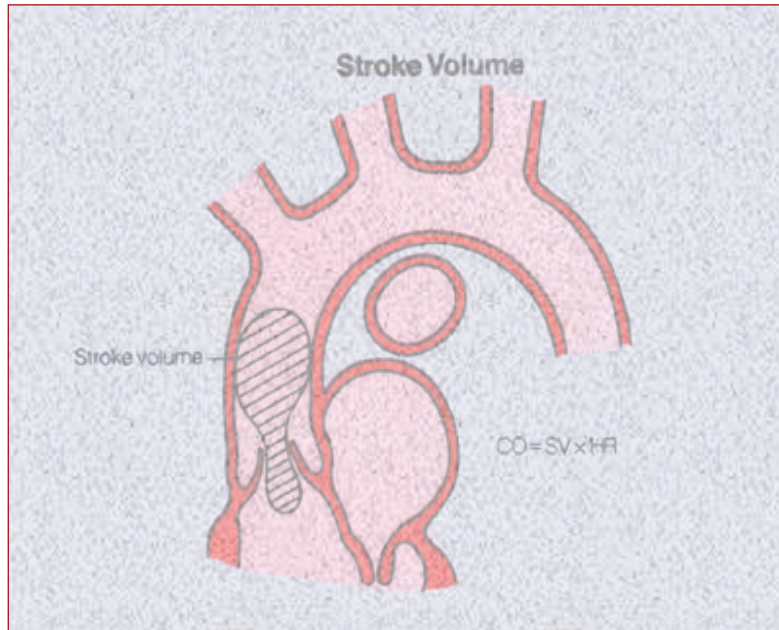


- Readmissions
- Weight loss
- Anemia
- Impaired kidney function

Greene, S., Fonarow, G., et al. *Nat Rev Cardiol* 12, 220–229 (2015)

<https://doi.org/10.1038/nrcardio.2015.14>

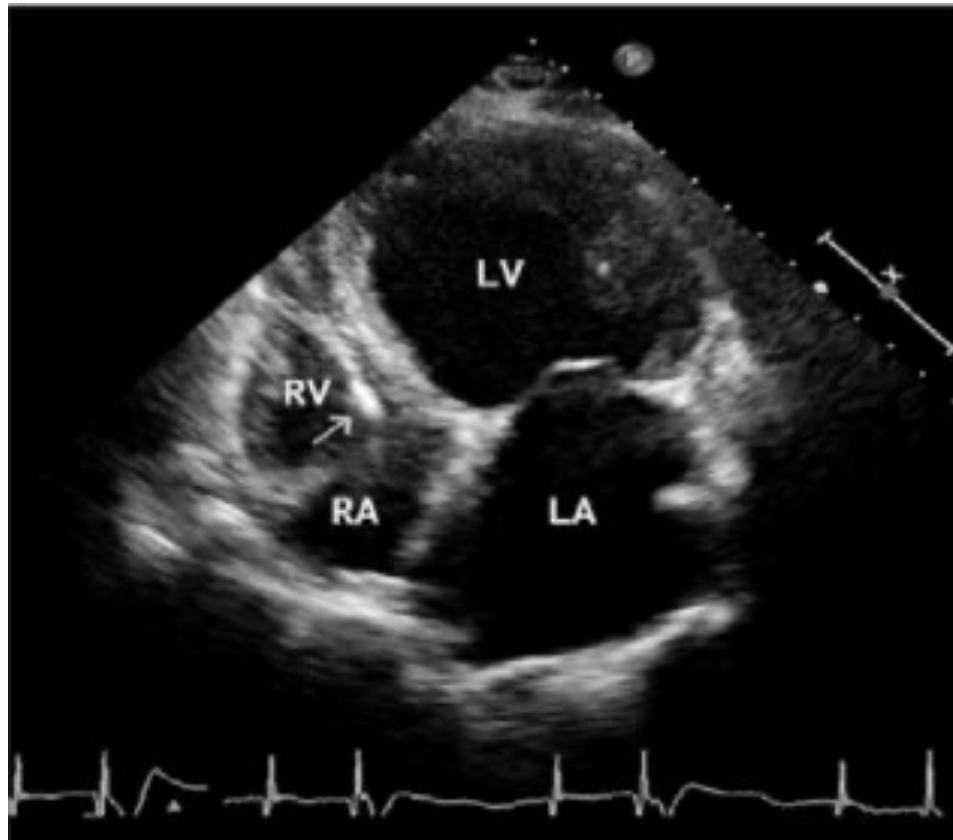




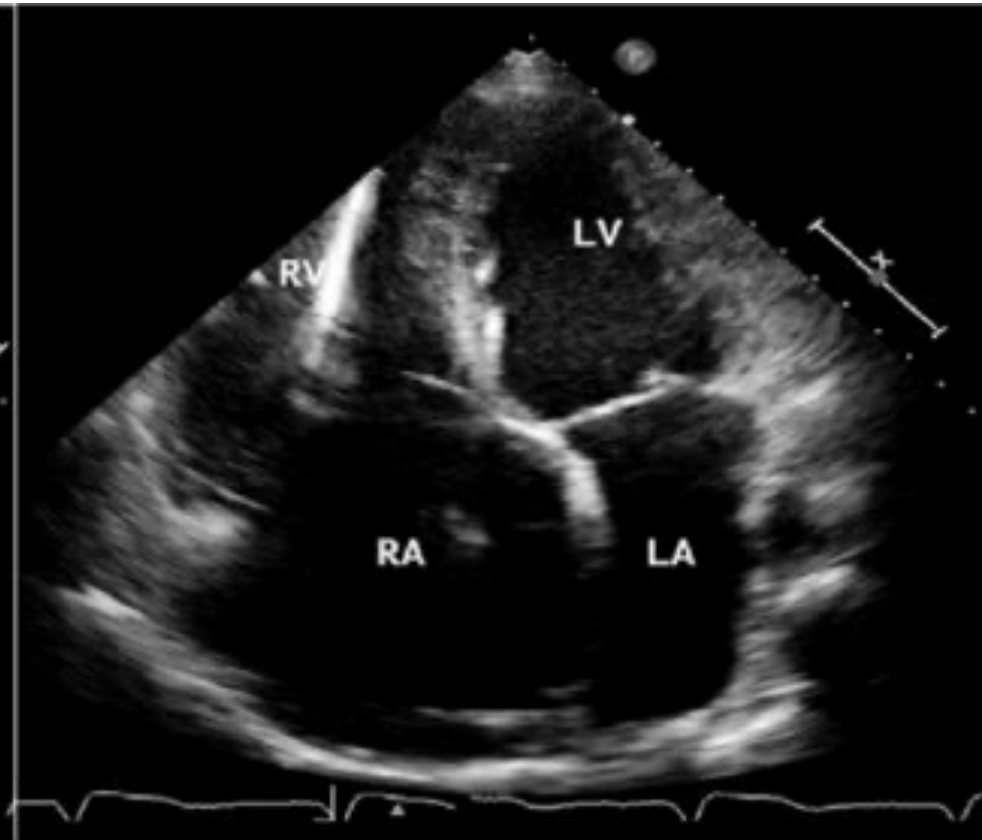
Cardiac Output = Stroke Volume x Heart Rate

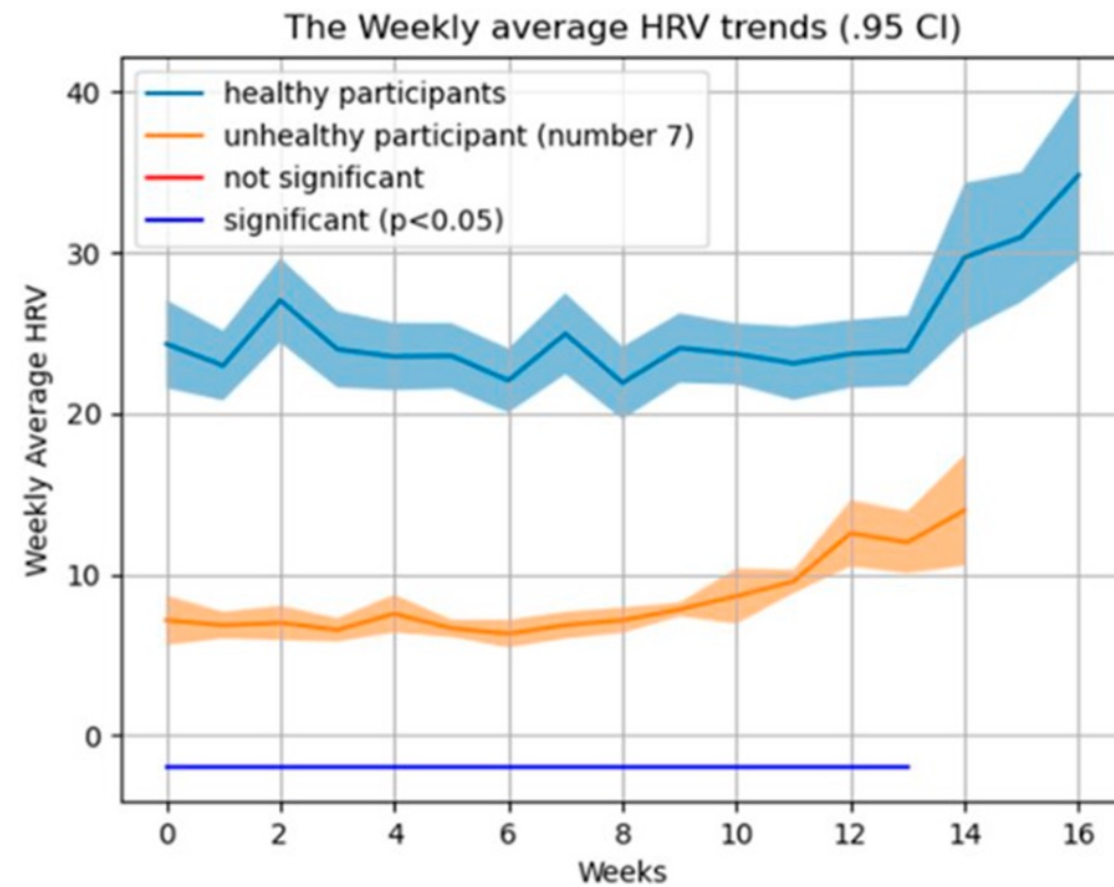
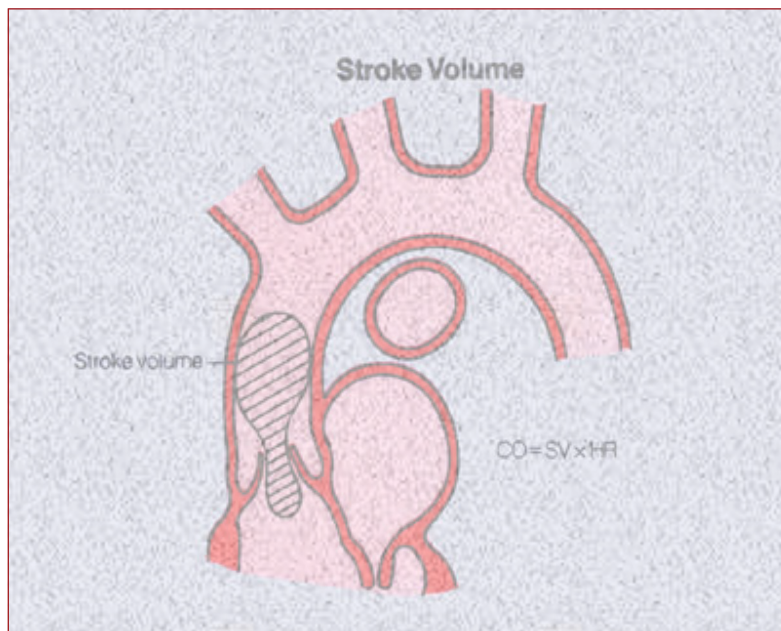
End-stage Heart Failure Dilated cardiomyopathy

HFrEF



HFpEF

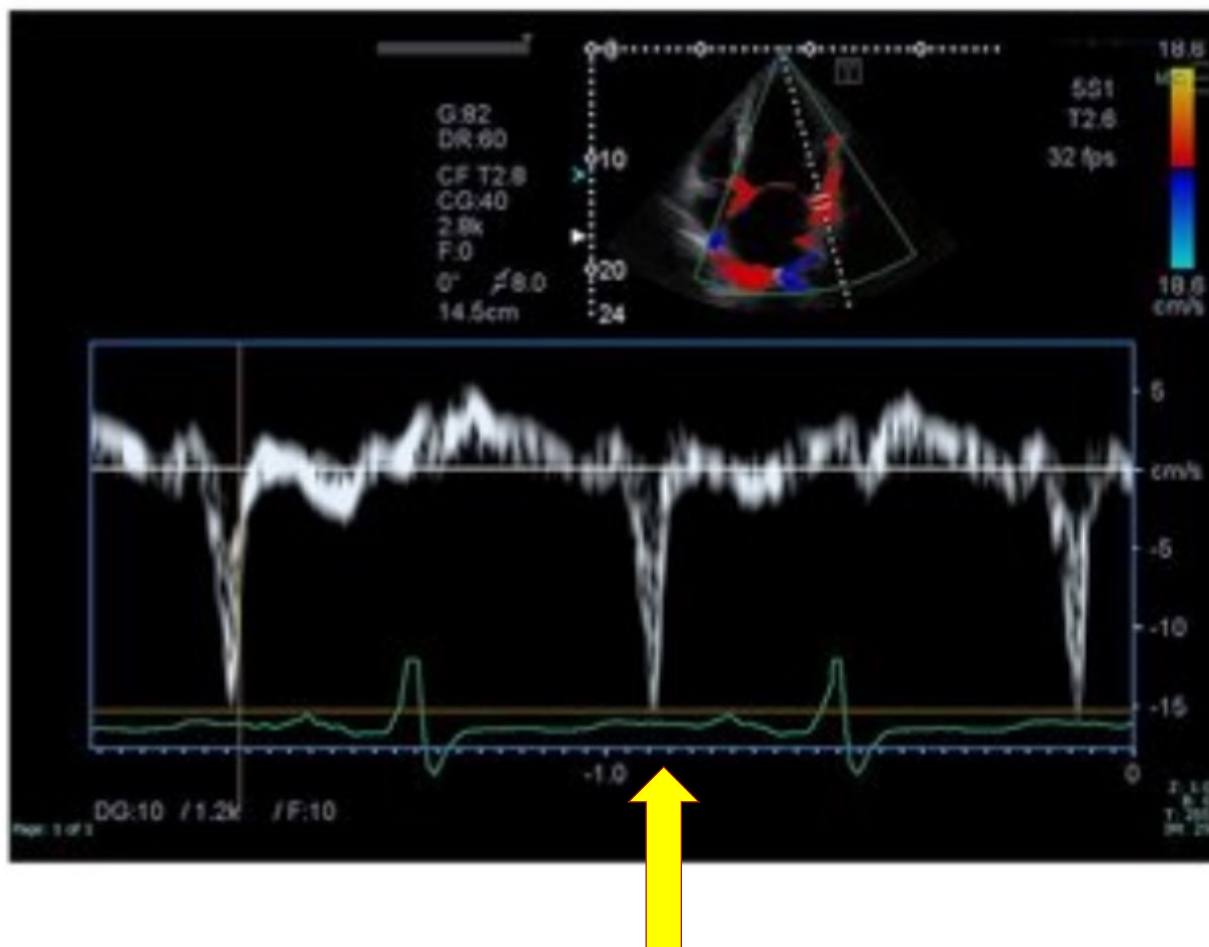




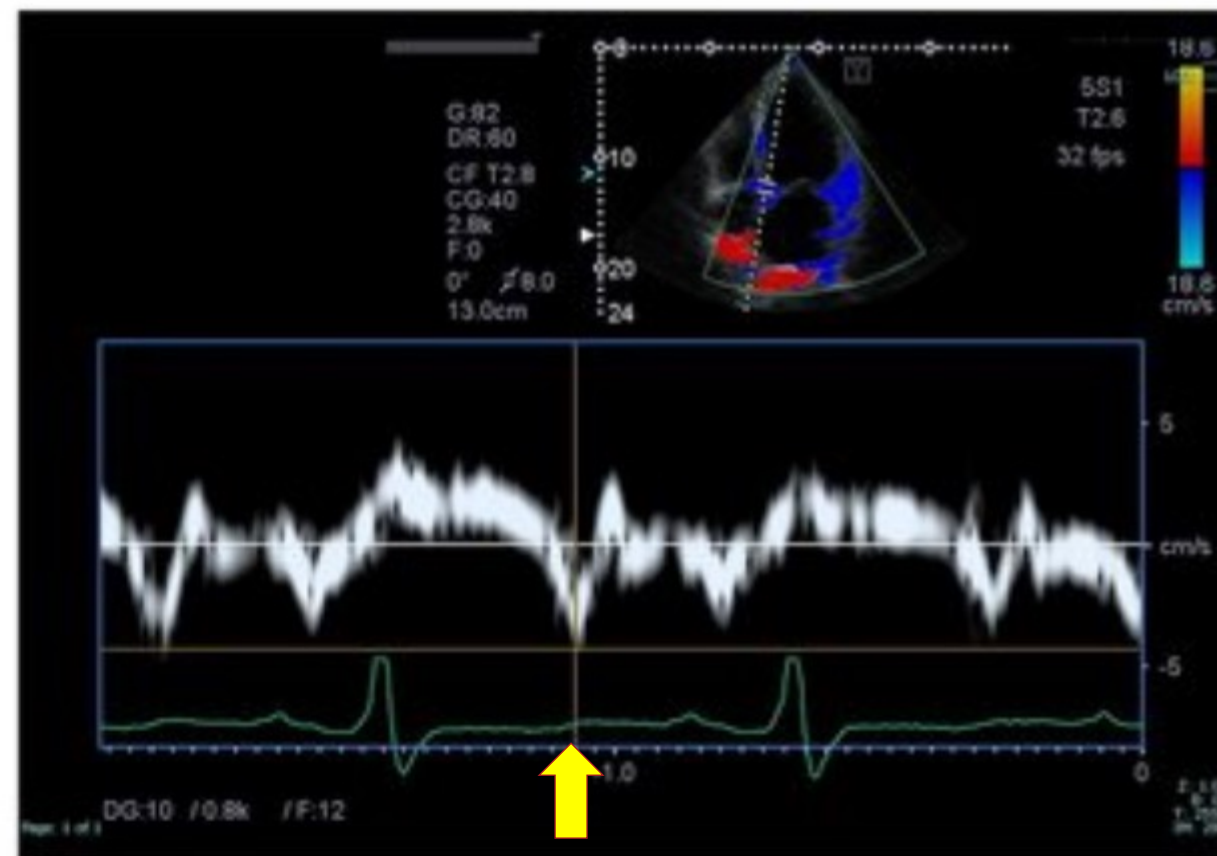
Sharifi-Heris 2023 – Frontiers in Physiology, doi: 10.3389/fphys.2023.1293946

Can we identify terminal heart failure?

normal

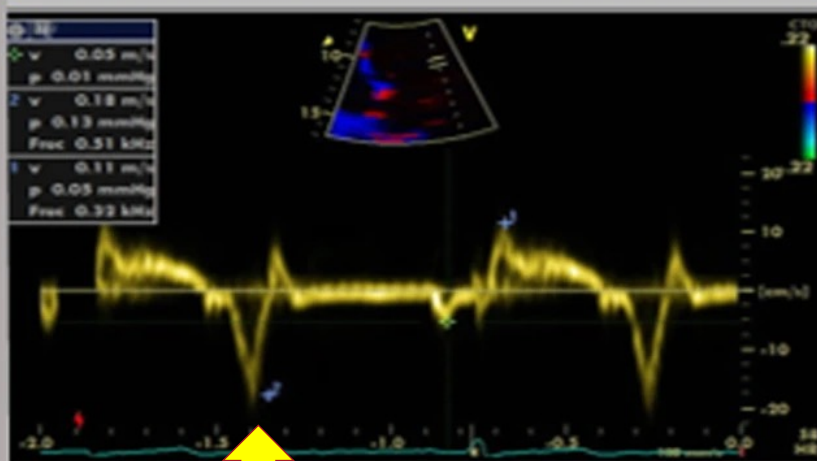


failing heart

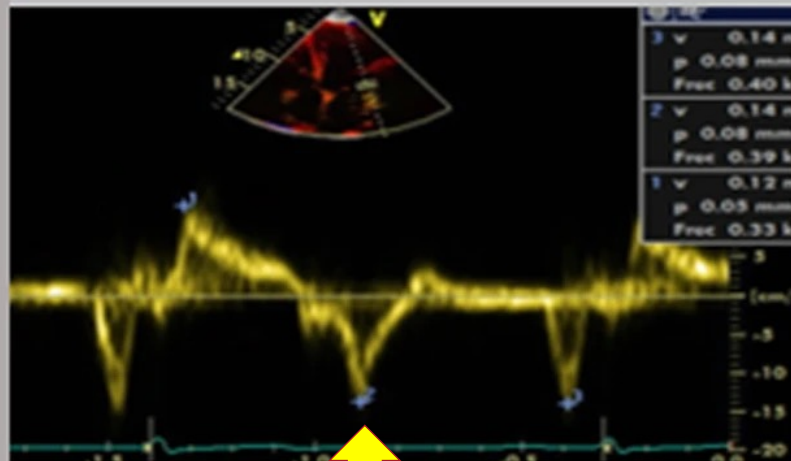


Can we identify terminal heart failure ?

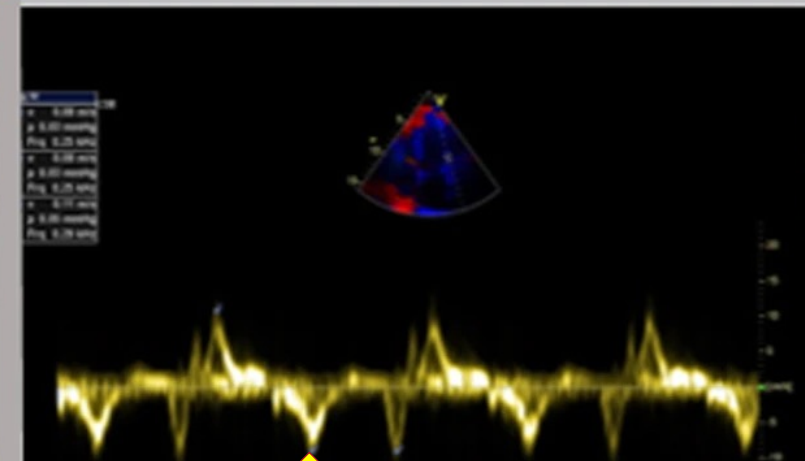
< 40 years



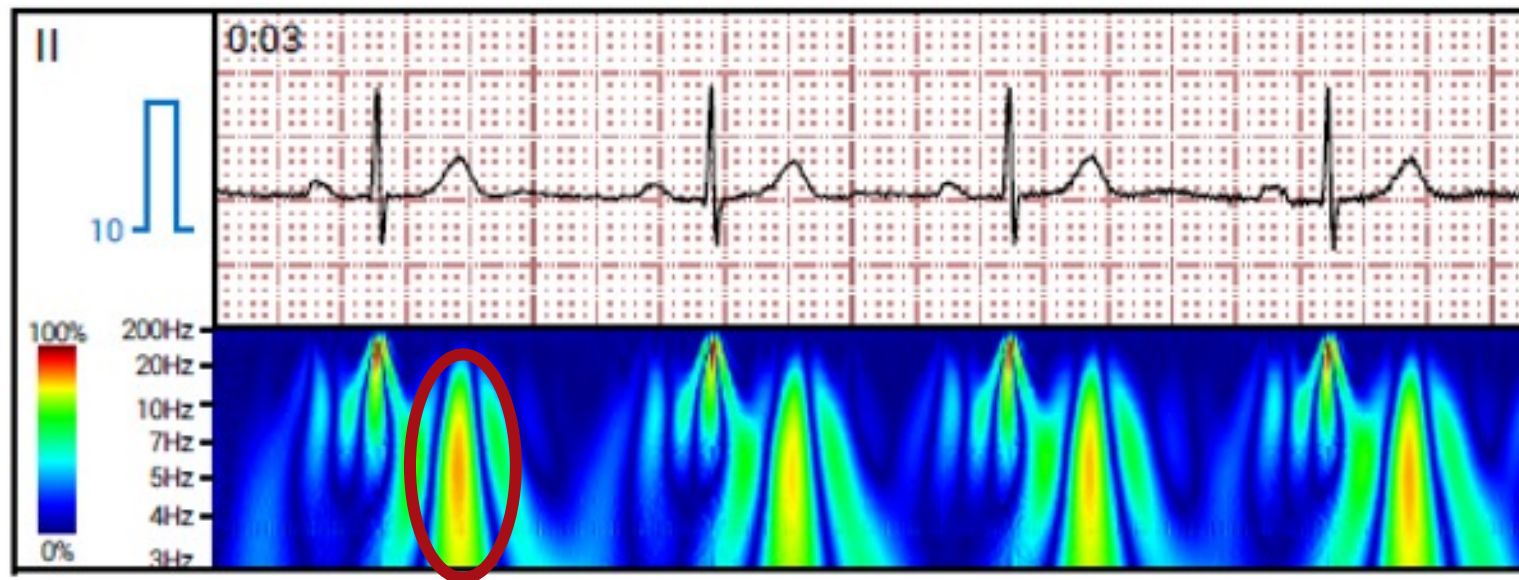
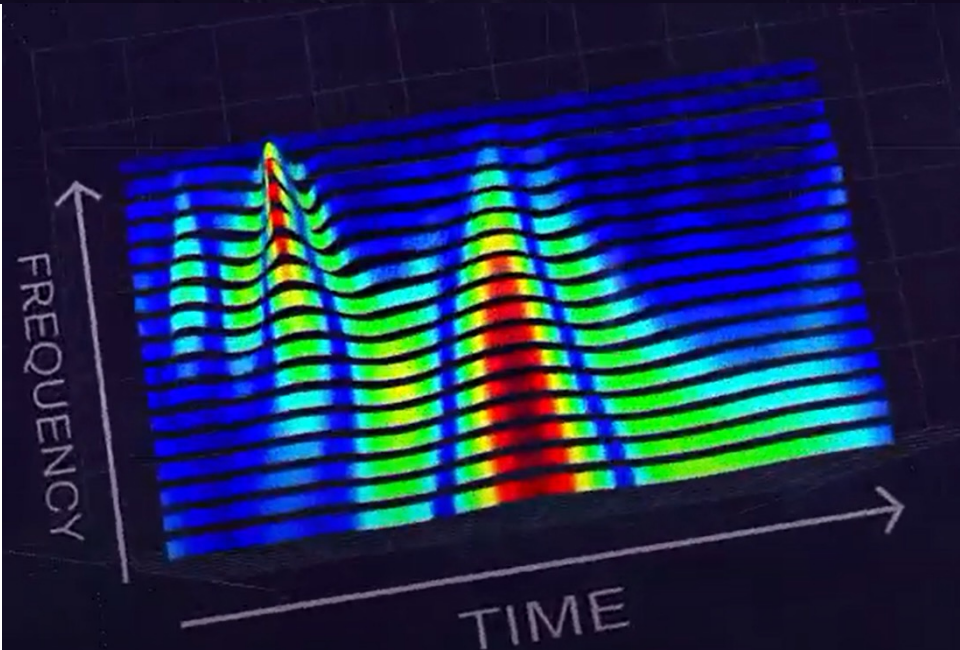
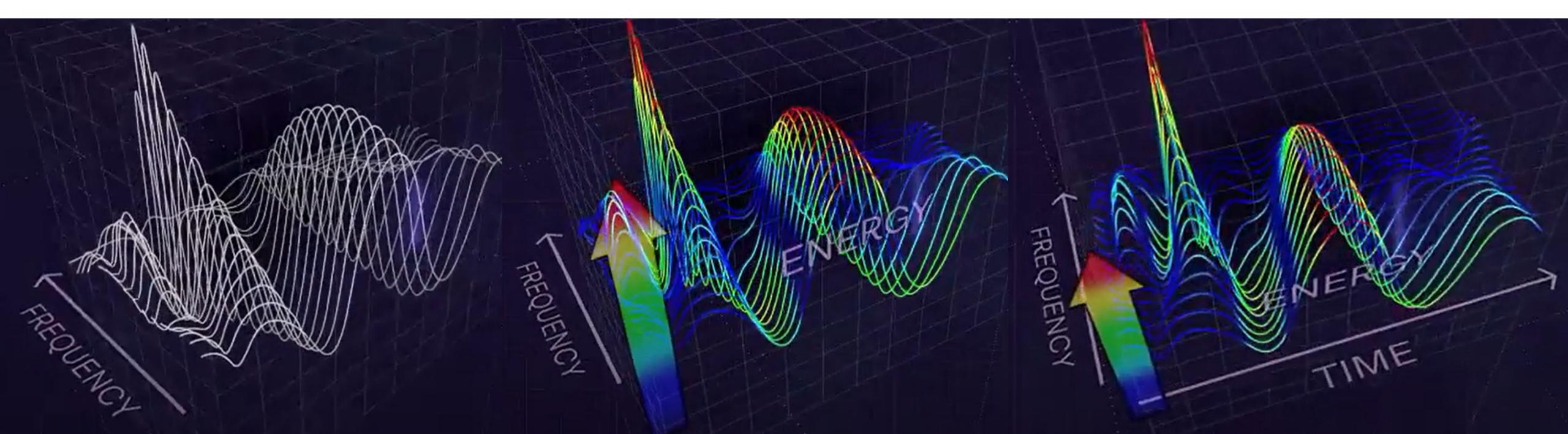
41 – 50 years



> 50 years



Can we identify terminal heart failure ?



Can we identify terminal heart failure ?

CADYSH clinical study



Tissue displacement



wavECG



Heart rate variability

Can we identify terminal heart failure ?

CADYSH clinical study



Heart rate variability



Under each heading, please tick the ONE box that best describes your health TODAY.

MOBILITY

- I have no problems in walking about ☒
- I have some problems in walking about ☐
- I am confined to bed ☐

SELF-CARE

- I have no problems with self-care ☒
- I have some problems washing or dressing myself ☐
- I am unable to wash or dress myself ☐

USUAL ACTIVITIES (e.g. work, study, housework, family or leisure activities)

- I have no problems with performing my usual activities ☐
- I have some problems with performing my usual activities ☒
- I am unable to perform my usual activities ☐

PAIN/DISCOMFORT

- I have no pain or discomfort ☐
- I have moderate pain or discomfort ☐
- I have extreme pain or discomfort ☒

ANXIETY/DEPRESSION

- I am not anxious or depressed ☐
- I am moderately anxious or depressed ☒
- I am extremely anxious or depressed ☐

CADYSH clinical study



Disch.



Hypothesis:

Left ventricle tissue and heart rate variability do not improve after correction of water overload on patients with terminal heart failure

Can we identify terminal heart failure ?



Questions & comments?

Chest (precordial) leads: V1–V6

