HEART FAILURE

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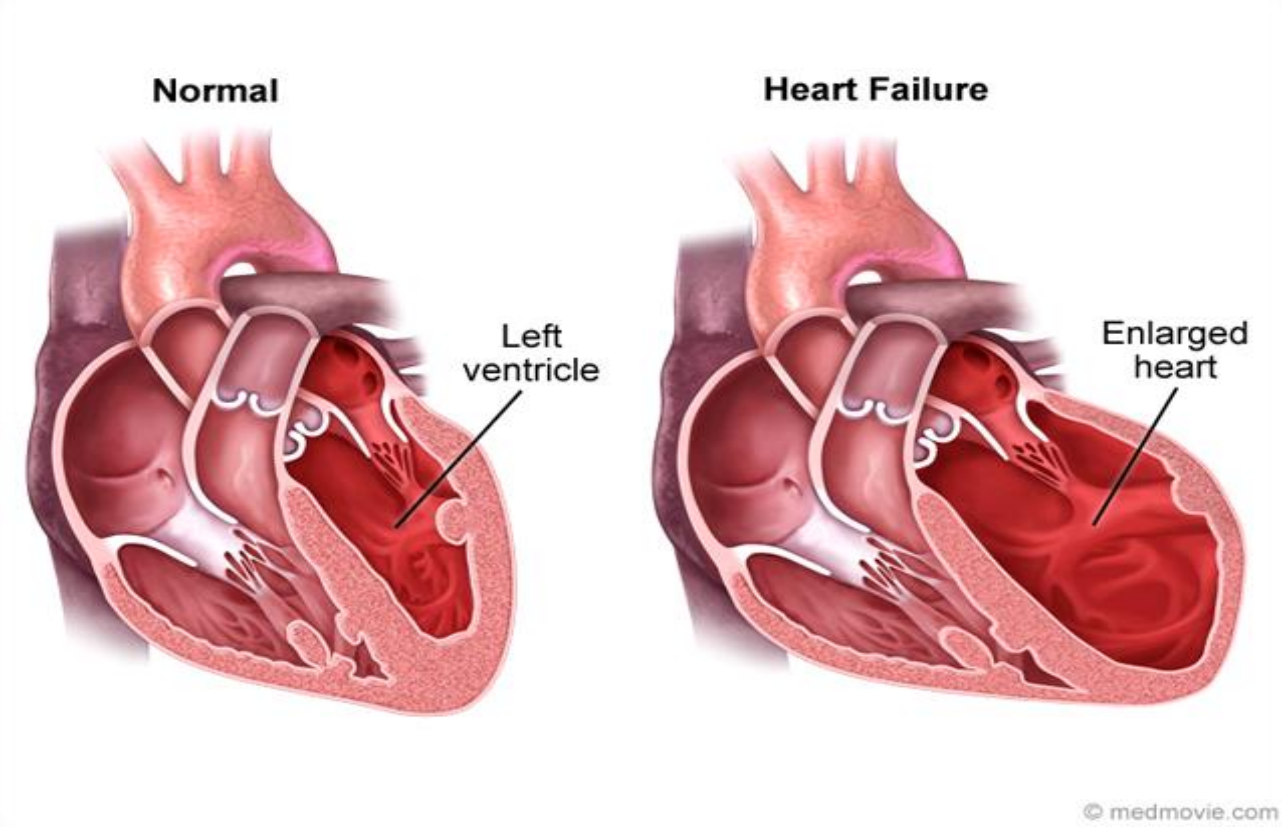
NT Cardiac

Heart Foundation

Heart Failure Definition:

- **Complex clinical syndrome** that can result from any structural or functional cardiac disorder that impairs the ability of the heart to fill with or eject blood.ACC/AHA 2005



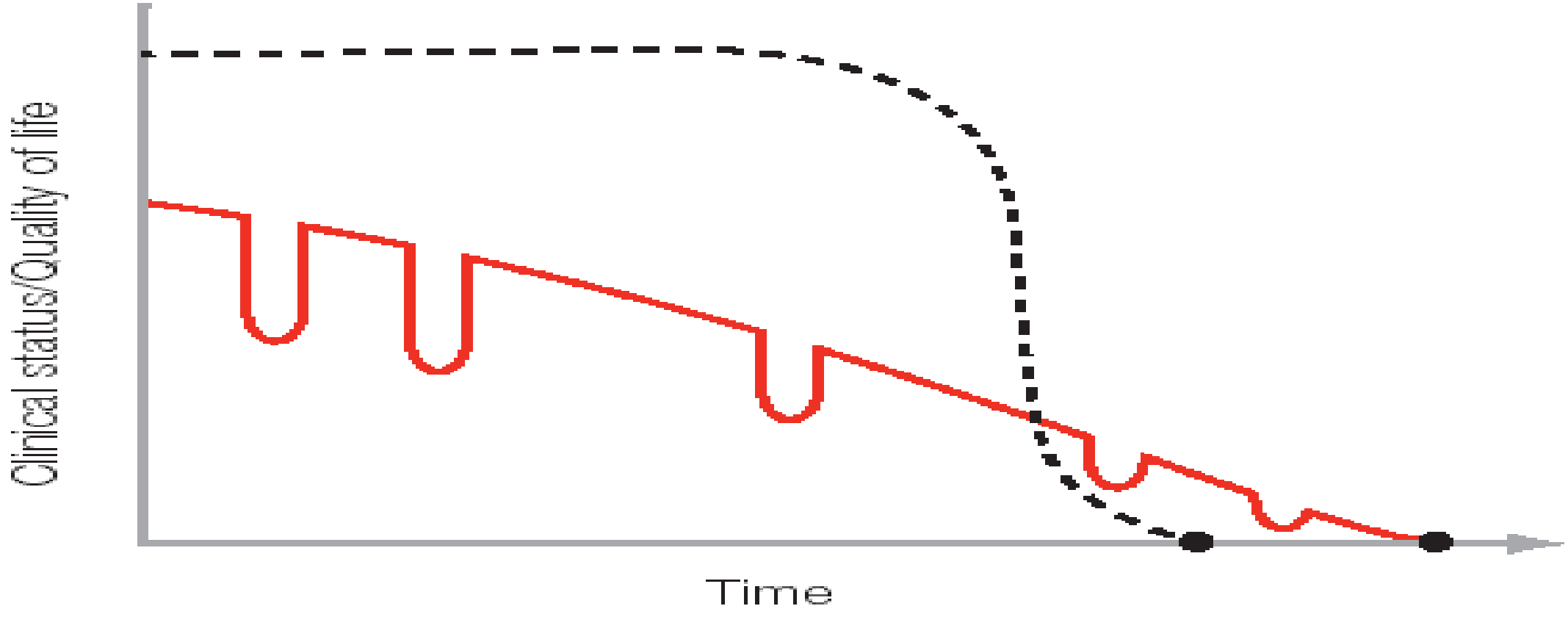
Heart Failure Terminology

- **Systolic Heart Failure - HFREF**
- Diastolic Heart Failure – HFPEF
- Mixed Systolic and Diastolic HF
- Left Heart Failure
- Right Heart Failure
- Biventricular Failure
- Chronic Compensated HF
- Acute Decompensated HF
- **Acute Pulmonary Oedema** - “ A Medical Emergency”

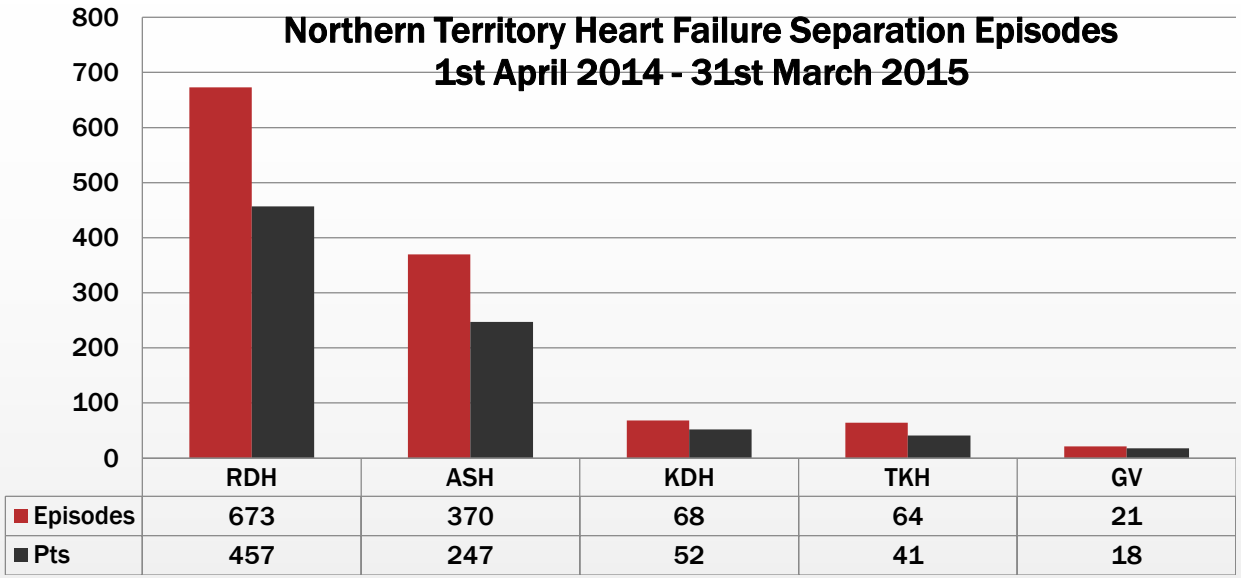
Significance of Heart Failure

- **Common**
  - prevalence increased sharply with age
  - ≈ 30 000 new cases each year (Aust) CSANZ/NHF02
  - incidence growing with aging of the population
  - 12/100 cases see in GP consultations . NHF06
- **Costly**
  - Characterised by relapsing course, represents 1-2% of hospitalisations, average stay 8 days (Aust)
  - Consistently makes up 1-2% of the total health care budget in Western countries (Aust) Krum et al.Med J Aust01
  - Takes up 1 billion out of 5 billion P/A chronic cardiovascular disease budget
- **Serious and Life threatening**

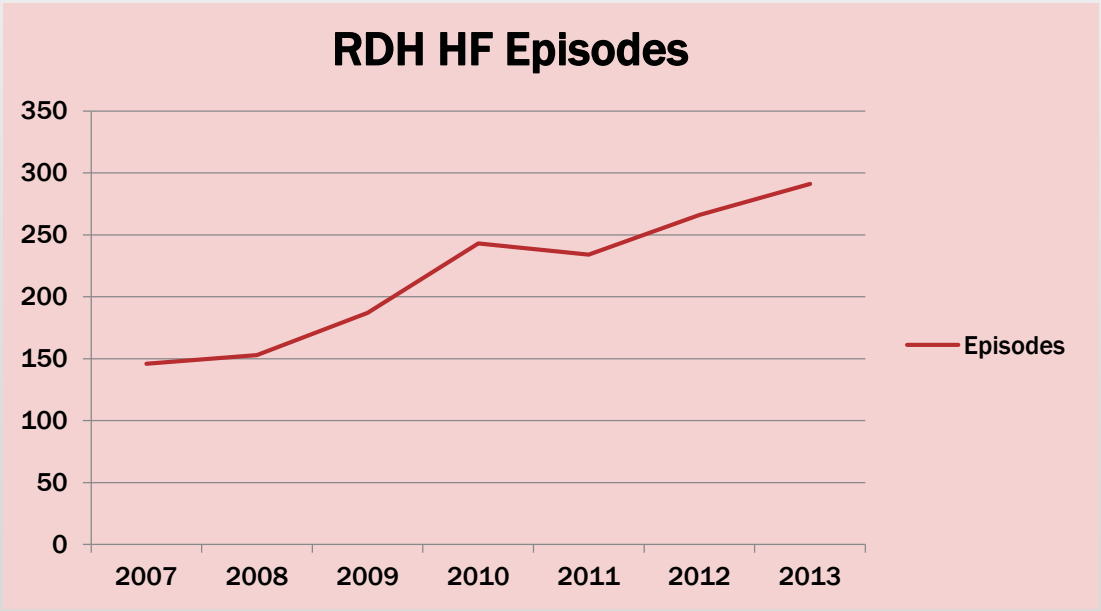
Typical trajectory of illness in CHF compared to a terminal malignancy

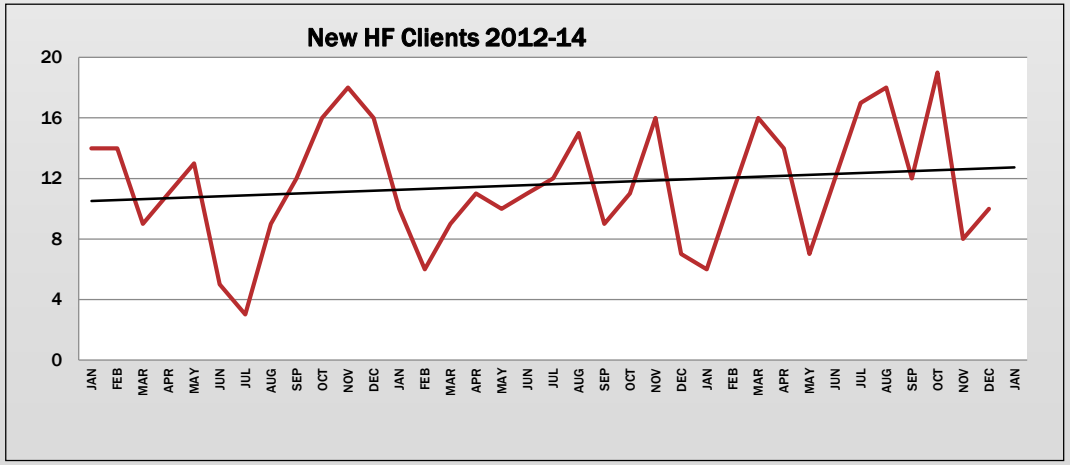


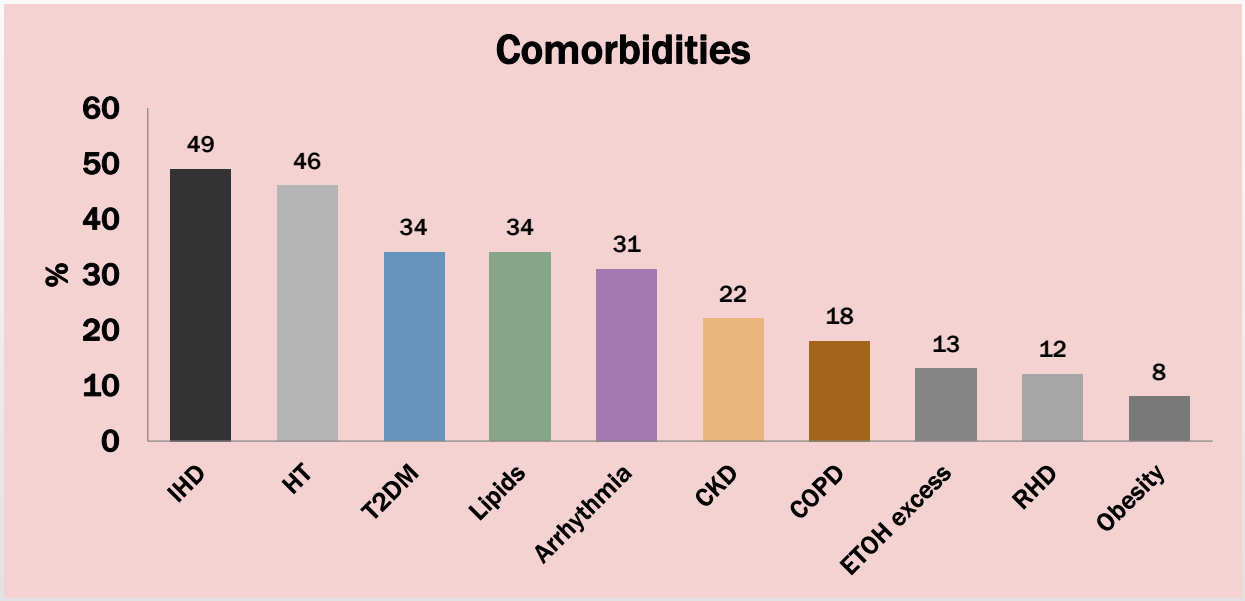
Adapted from Lynn J, 1997[44]

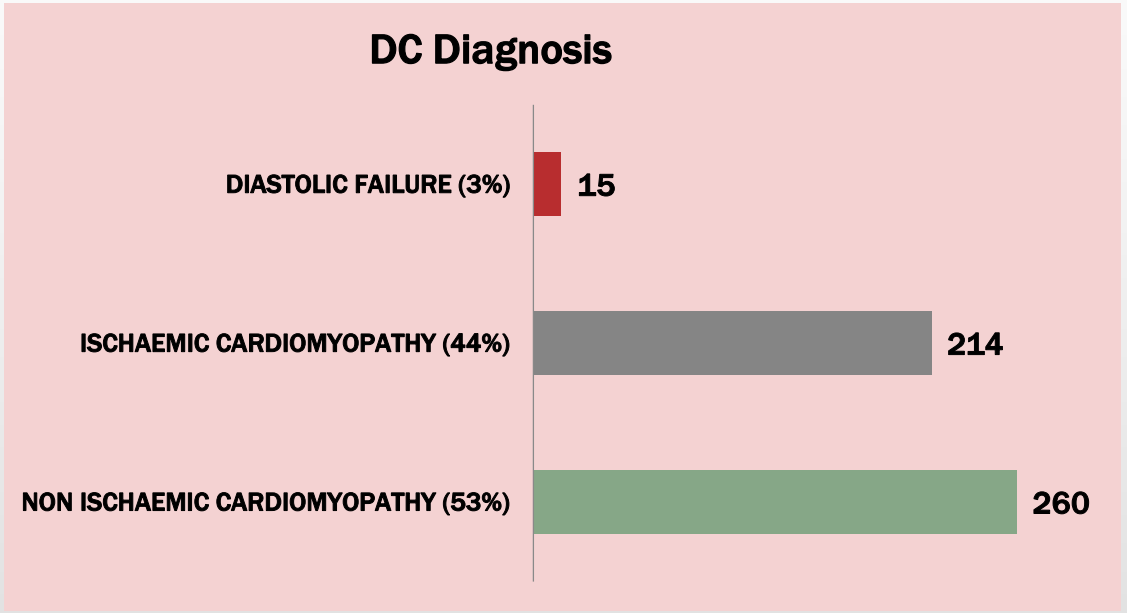


	RDH	ASH	KDH	TKH	GDH	Total
Episodes	673	370	68	64	21	**1196**
Patients	457	247	52	41	18	**815**
Pts with Multiple Episodes	**110**	**70**	11	11	3	**205**
Min	2	2	2	2	2	
Max	**30**	**9**	4	7	2	
Ave	3	2.9	2.5	3.1	2	





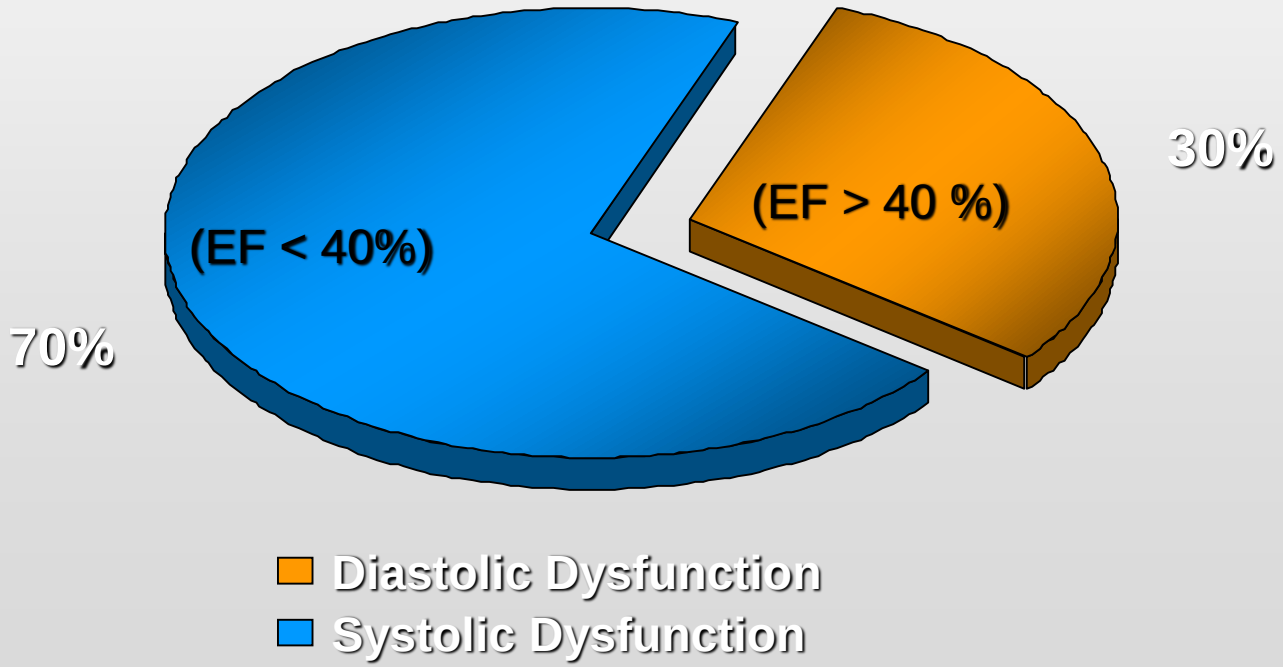

Comorbidities
%
60
50
40
30
20
10
0
49
46
34
34
31
22
18
13
12
8
IHD
HT
T2DM
Lipids
Arrhythmia
CKD
COPD
ETOH excess
RHD
Obesity


DC Diagnosis
DIASTOLIC FAILURE (3%)
15
ISCHAEMIC CARDIOMYOPATHY (44%)
214
NON ISCHAEMIC CARDIOMYOPATHY (53%)
260

Left Ventricular Dysfunction

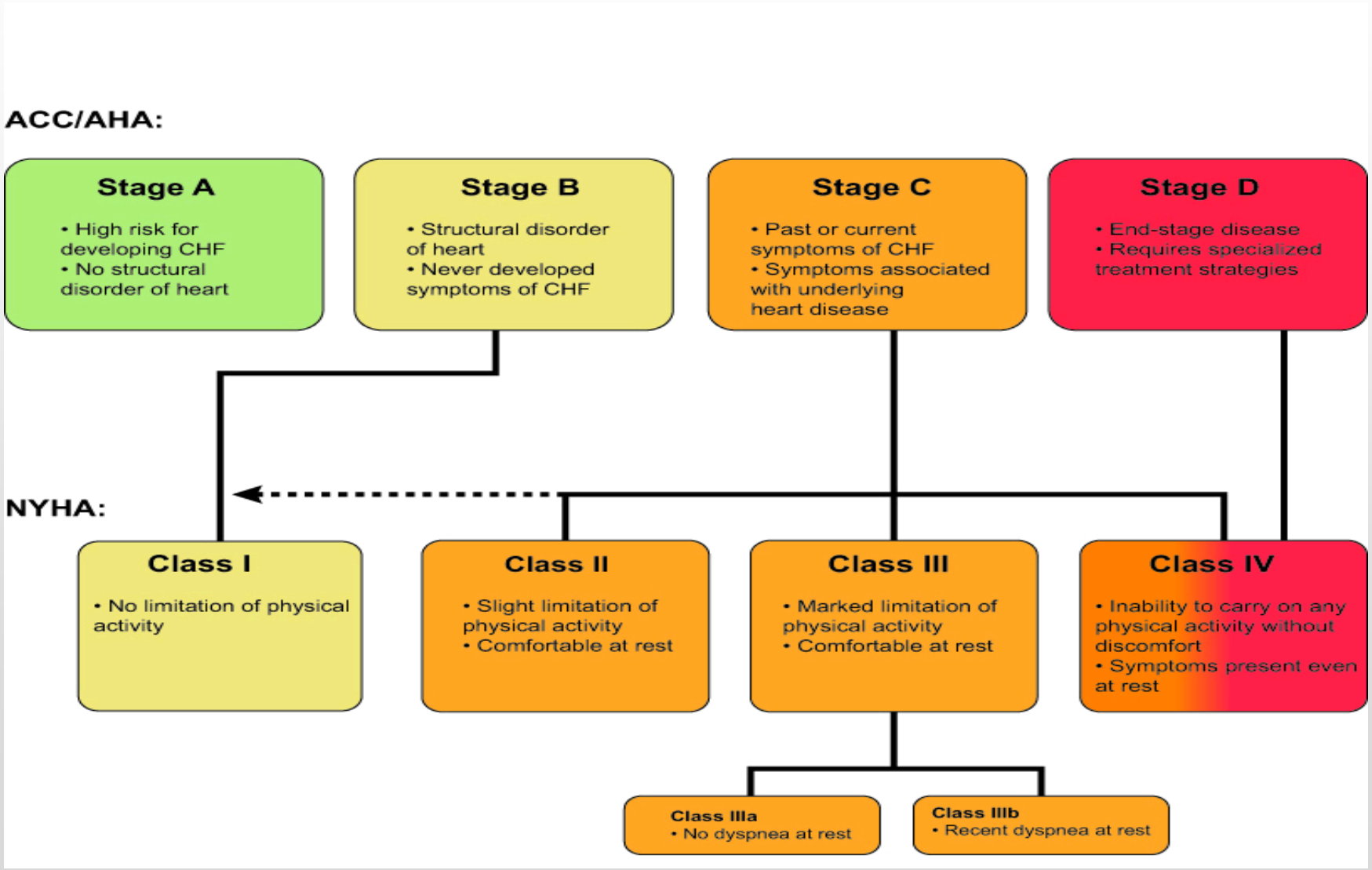
- **Systolic:** Impaired contractility/ejection
  - Approximately two-thirds of heart failure patients have systolic dysfunction[1]

- **Diastolic:** Impaired filling/relaxation

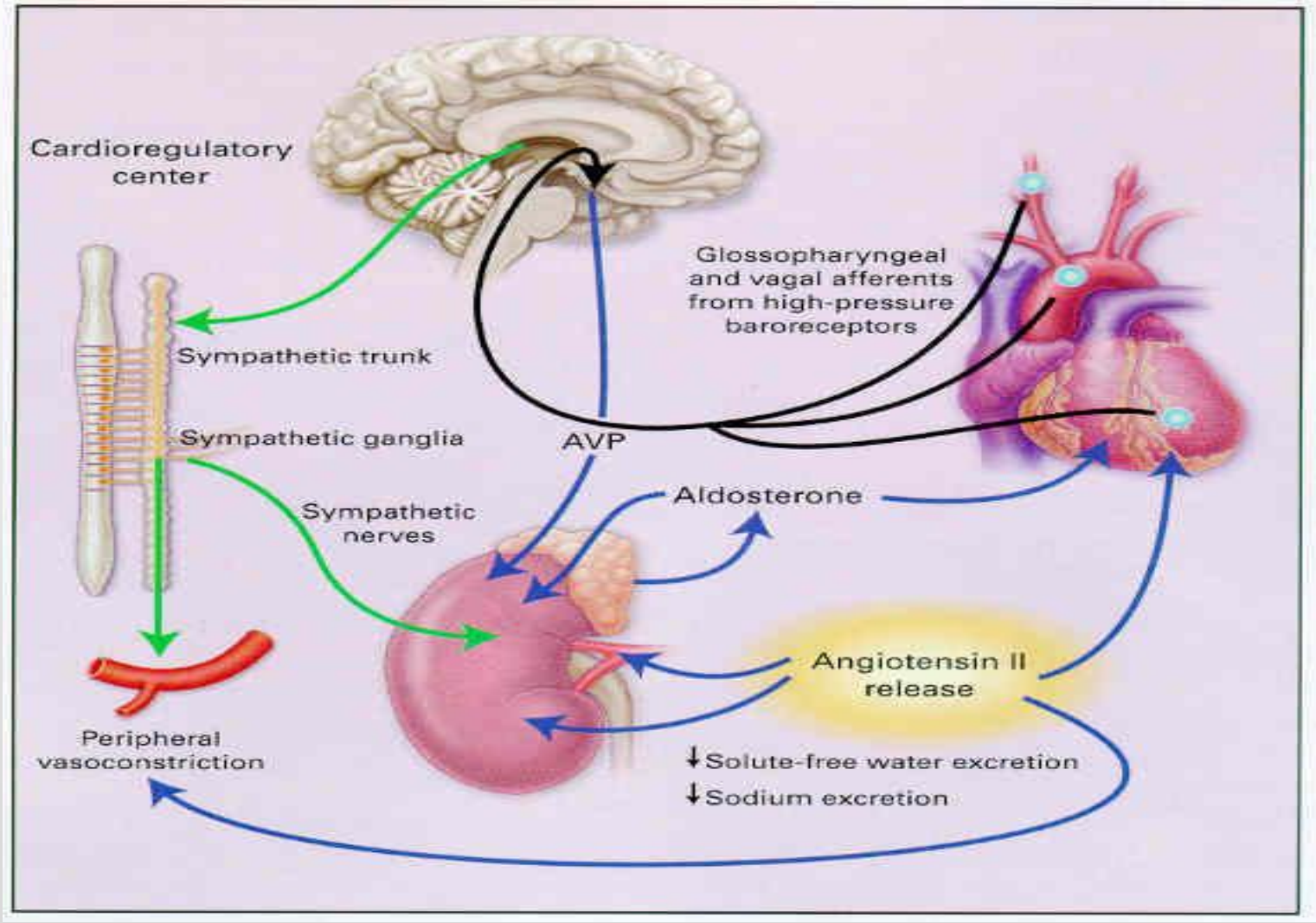


1 Lilly, L. Pathophysiology of Heart Disease. Second Edition p 200

ACC/AHA HF classification



Pathophysiology of heartfailure
Hormones and haemodynamics



nejm341(8)1999

Diagnosis of heart failure

The diagnosis of HF-REF requires three conditions to be satisfied:
1. Symptoms typical of HF
2. Signs typical of HF[a]
3. Reduced LVEF
The diagnosis of HF-PEF requires four conditions to be satisfied:
1. Symptoms typical of HF
2. Signs typical of HF[a]
3. Normal or only mildly reduced LVEF and LV not dilated
4. Relevant structural heart disease (LV hypertrophy/LA enlargement) and/or diastolic dysfunction (see Section 4.1.2)

HF = heart failure; HF-PEF = heart failure with 'preserved' ejection fraction; HF-REF = heart failure and a reduced ejection fraction; LA = left atrial; LV = left ventricular; LVEF = left ventricular ejection fraction.

[a]Signs may not be present in the early stages of HF (especially in HF-PEF) and in patients treated with diuretics (see Section 3.6).

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Symptoms and signs typical of heart failure (1)

Symptoms	Signs
Typical	***More specific***
Breathlessness	Elevated jugular venous pressure
Orthopnoea	Hepatojugular reflux
Paroxysmal nocturnal dyspnoea	Third heart sound (gallop rhythm)
Reduced exercice tolerance	Laterally displaced apical impulse
Fatigue, tiredness, increased time to recover after exercise	Cardiac murmur
Ankle swelling	

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Symptoms and signs typical of heart failure (2)

Symptoms	Signs
Less typical	***Less specific***
Nocturnal cough	Peripheral oedema (ankle, sacral, scrotal)
Wheezing	Pulmonary crepitations
Weight gain (>2 kg/week)	Reduced air entry and dullness to percussion at lung bases (pleural effusion)
Weight loss (in advanced heart failure)	Tachycardia
Bloated feeling	Irregular pulse
Loss of appetite	Tachypnoea (>16 breaths/min)
Confusion (especially in the elderly)	Hepatomegaly
Depression	Ascites
Palpitations	Tissue wasting (cachexia)
Syncope	

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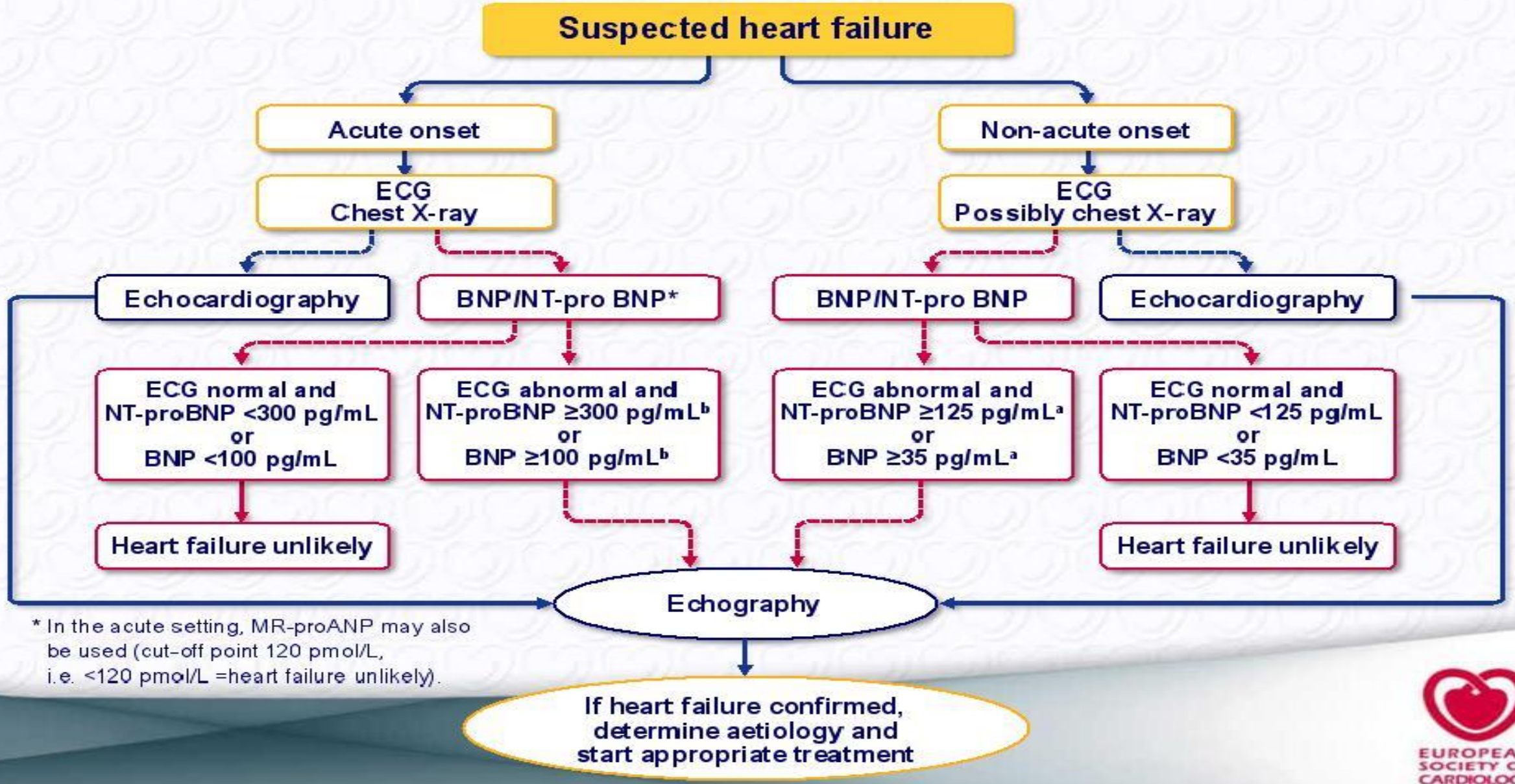
Diagnostic flowchart for patients with suspected heart failure-showing alternative 'echocardiography first' (blue) or 'natriuretic peptide first' (red) approaches.



* In the acute setting, MR-proANP may also be used (cut-off point 120 pmol/L, i.e. <120 pmol/L =heart failure unlikely).

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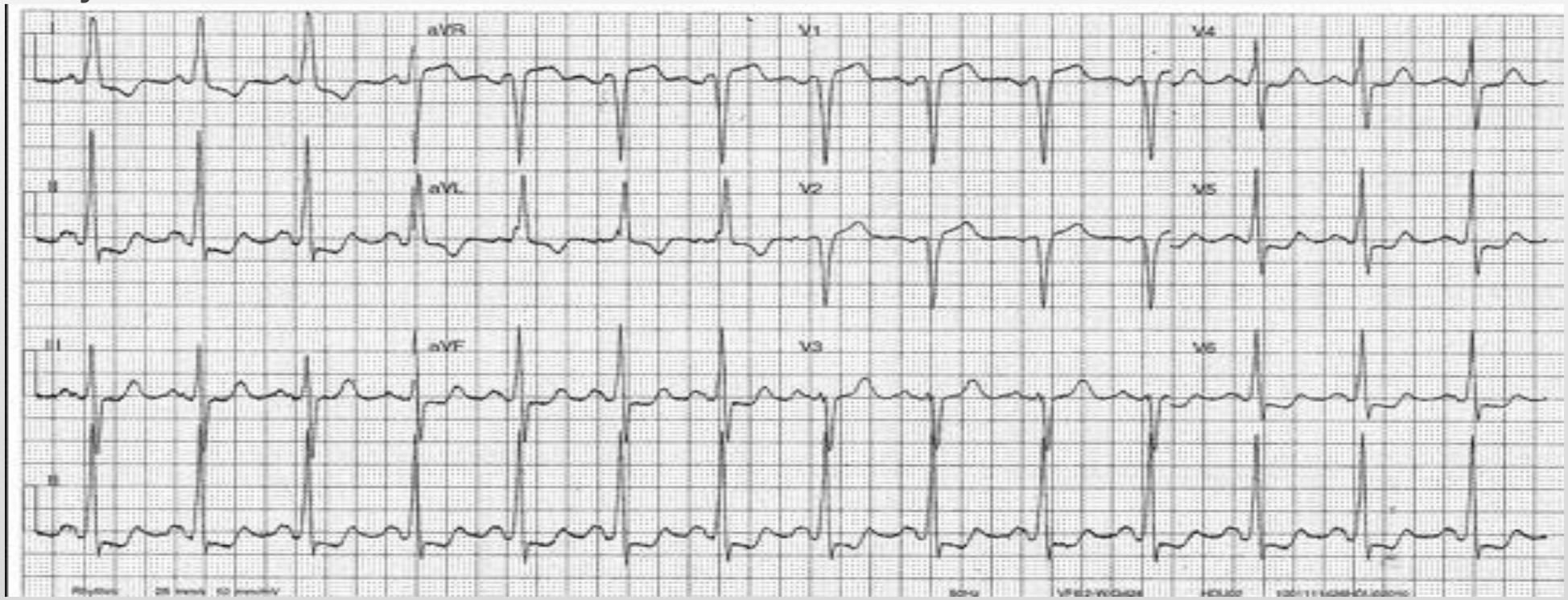
ECG

- Important to look for underlying
  - Ischaemia
  - Arrhythmias



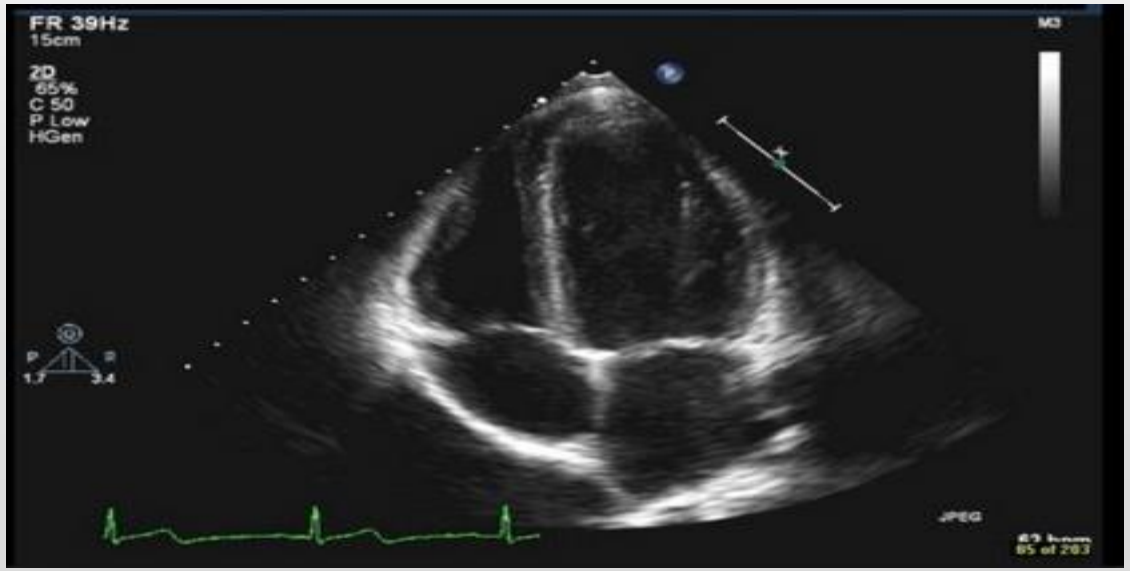
Imaging: Chest x-ray

- Enlarged cardiac silhouette
- Pulmonary edema
- Pulmonary congestion
  - Interstitial opacity
  - Kerley B lines
  - Peri-bronchial cuffing
- Pleural effusions, typically bilateral

Imaging: Echo

- * **single most useful investigation***

- Provides information regarding;
  - Ejection fraction
  - Diastolic dysfunction
  - Wall motion abnormalities
  - Chamber sizes
  - Pulmonary HTN
  - Ventricular dysynchrony



Echocardiography

Recommendations	Class	Level
Investigations to consider in all patients		
Transthoracic echocardiography is recommended to evaluate cardiac structure and function, including diastolic function (Section 4.1.2), and to measure LVEF to make the diagnosis of HF, assist in planning and monitoring of treatment, and to obtain prognostic information.	I	C

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Laboratory Data

- **FBC**
  - Anemia, infection can precipitate ADHF
- **Urea/electrolytes**
  - Hyponatremia- poor prognostic sign
  - Elevated creatinine- impaired renal perfusion
- **LFT**
  - May be elevated due to congestive hepatopathy
- **Troponin**
  - Ischemia can precipitate HF
  - Troponin may be mildly elevated in HF as well from demand ischemia

HF- Causes

- Loss of myocardium
  - Infarction
  - Myocarditis (inflammatory, viral)
  - Myopathy (genetic, peripartum, alcohol, toxic)
  - Idiopathic
- Pressure load
  - Hypertension
  - Aortic stenosis
  - Obstructive sleep apnea
- Volume load
  - Mitral/Aortic regurgitation
- Abnormal myocardium
  - Hemochromatosis
  - Sarcoid
  - Amyloid
  - HCM
- Tachycardia

HF- Treatment

Aims

i) reduce mortality - Improve survival

ii) reduce morbidity – improve quality of life

iii) prevent further cardiac damage

HF- Treatment: non-pharmacological

- Education, discussion, counseling
- Exercise and rehabilitation
  - exercise program for CHF, and keep active
  - improves functional capacity and symptoms
  - In meta-analysis n=801, reduced mortality and time to death or hospitalisation

  ExTraMATCH *BMJ*04
  - 20-30min/day 3-5 days/week, low intensity (60-80% peak HR)
- Dietary measures
  - salt (mainly class III/IV)
  - fluid (mainly class (III)IV, ≈1.5L/day)
  - alcohol (1-2/day)
- Weight control

Lifestyle and non-pharmacological / device / surgical interventions

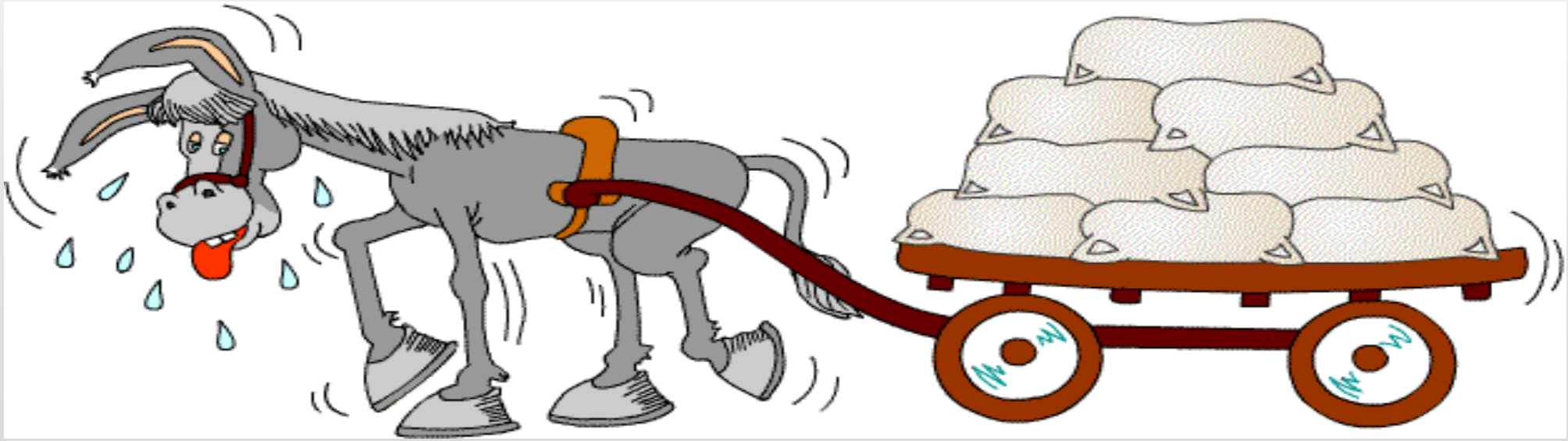
Recommendations	Class	Level
It is recommended that regular aerobic exercise is encouraged in patients with heart failure to improve functional capacity and symptoms.	I	A*
It is recommended that patients with heart failure are enrolled in a multidisciplinary-care management programme to reduce the risk of heart failure hospitalization.	I	A*

* O'Connor CM, Whellan DJ, Lee KL, Keteyian SJ, Cooper LS, Ellis SJ, Leifer ES,Kraus WE, Kitzman DW, Blumenthal JA, Rendall DS, Miller NH, Fleg JL, Schulman KA, McKelvie RS, Zannad F, Pin˜a IL; HF-ACTION Investigators. Efficacy and safety of exercise training in patients with chronic heart failure: HFACTION randomized controlled trial. JAMA 2009;301:1439–1450.
Piepoli MF, Conraads V, Corra U, Dickstein K, Francis DP, Jaarsma T, McMurray J, Pieske B, Piotrowicz E, Schmid JP, Anker SD, Solal AC, Filippatos GS, Hoes AW, Gielen S, Giannuzzi P, Ponikowski PP. Exercise training in heart failure: from theory to practice. A consensus document of the Heart Failure Association and the European Association for Cardiovascular Prevention and Rehabilitation. Eur J Heart Fail 2011;13:347–357.

Treatment: Pharmacological

The Donkey Analogy

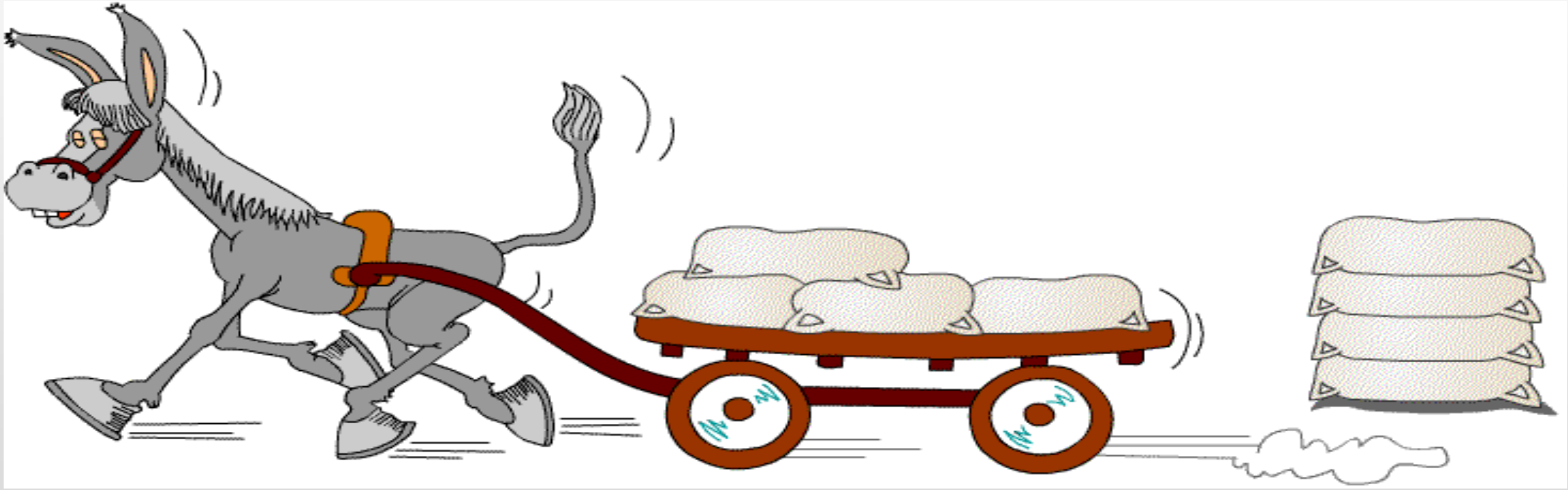
Ventricular dysfunction limits a patient's ability to perform the routine activities of daily living…



Treatment Systolic CHF: Pharmacological

Diuretics, ACE Inhibitors, AII blockers, Nitrates

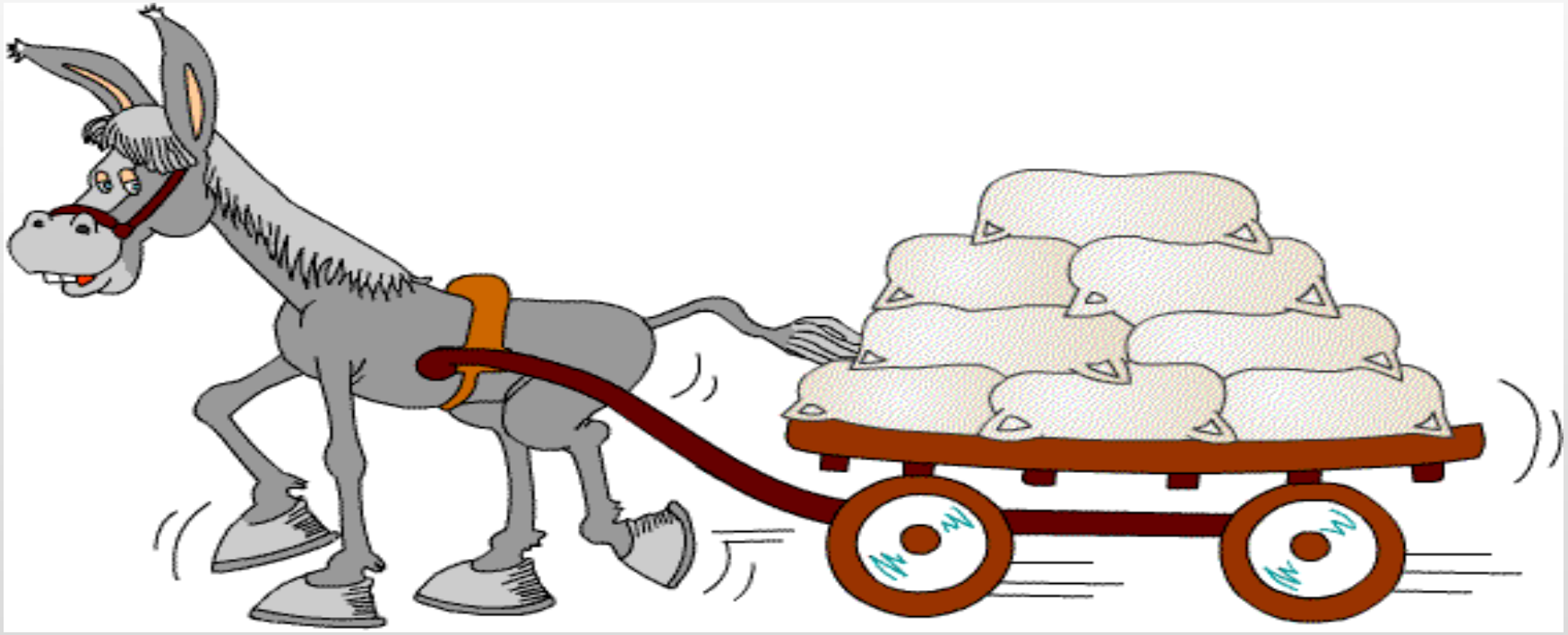
Reduce the number of sacks on the wagon (LV- after load and pre load reduction)



Treatment Systolic CHF: Pharmacological

ß-Blockers, Ivabradine

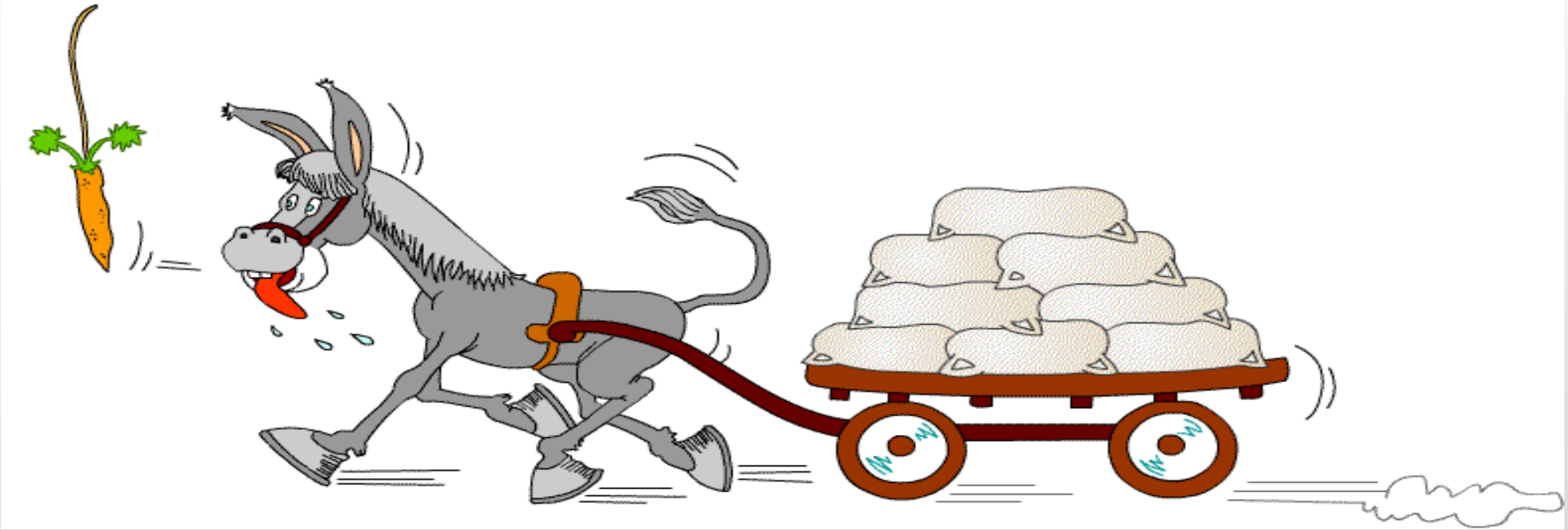
Limit the donkey's speed, thus saving energy (Reduce Heart Rate)



Treatment Systolic CHF: Pharmacological

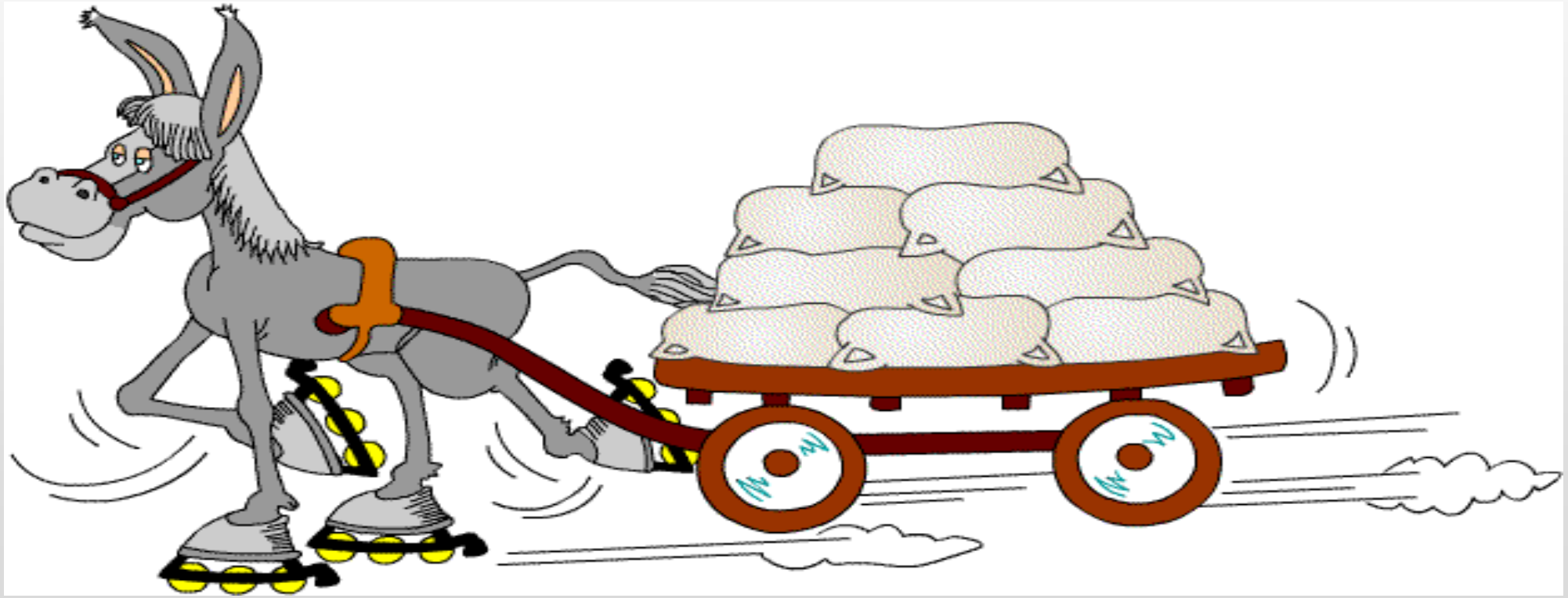
Digoxin, inotropes

Like the carrot placed in front of the donkey (Improve LV contractility)

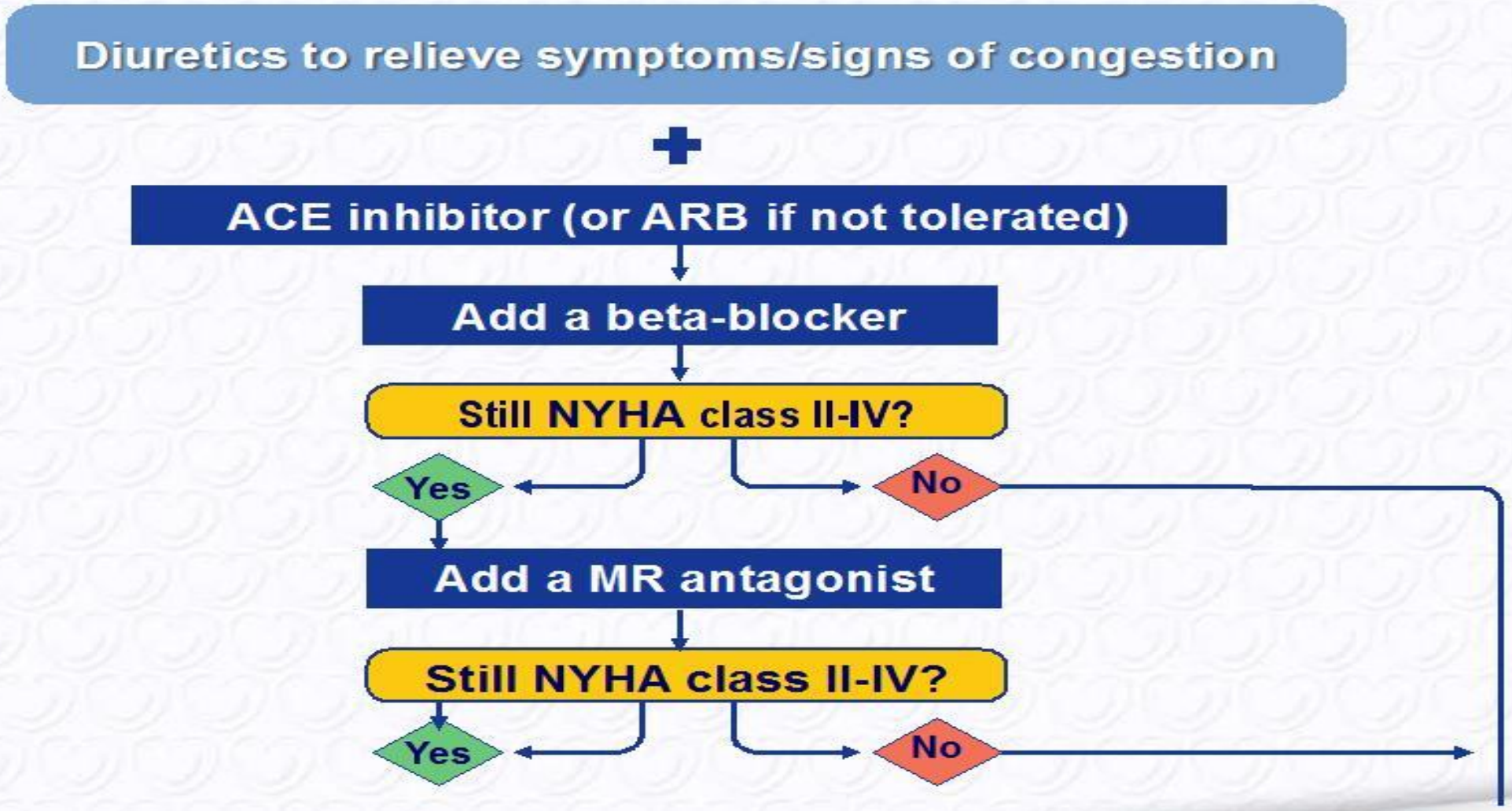


Treatment: Device
CRT and BIV-ICD

Increase the donkey's (heart) efficiency



Initial pharmacological therapy



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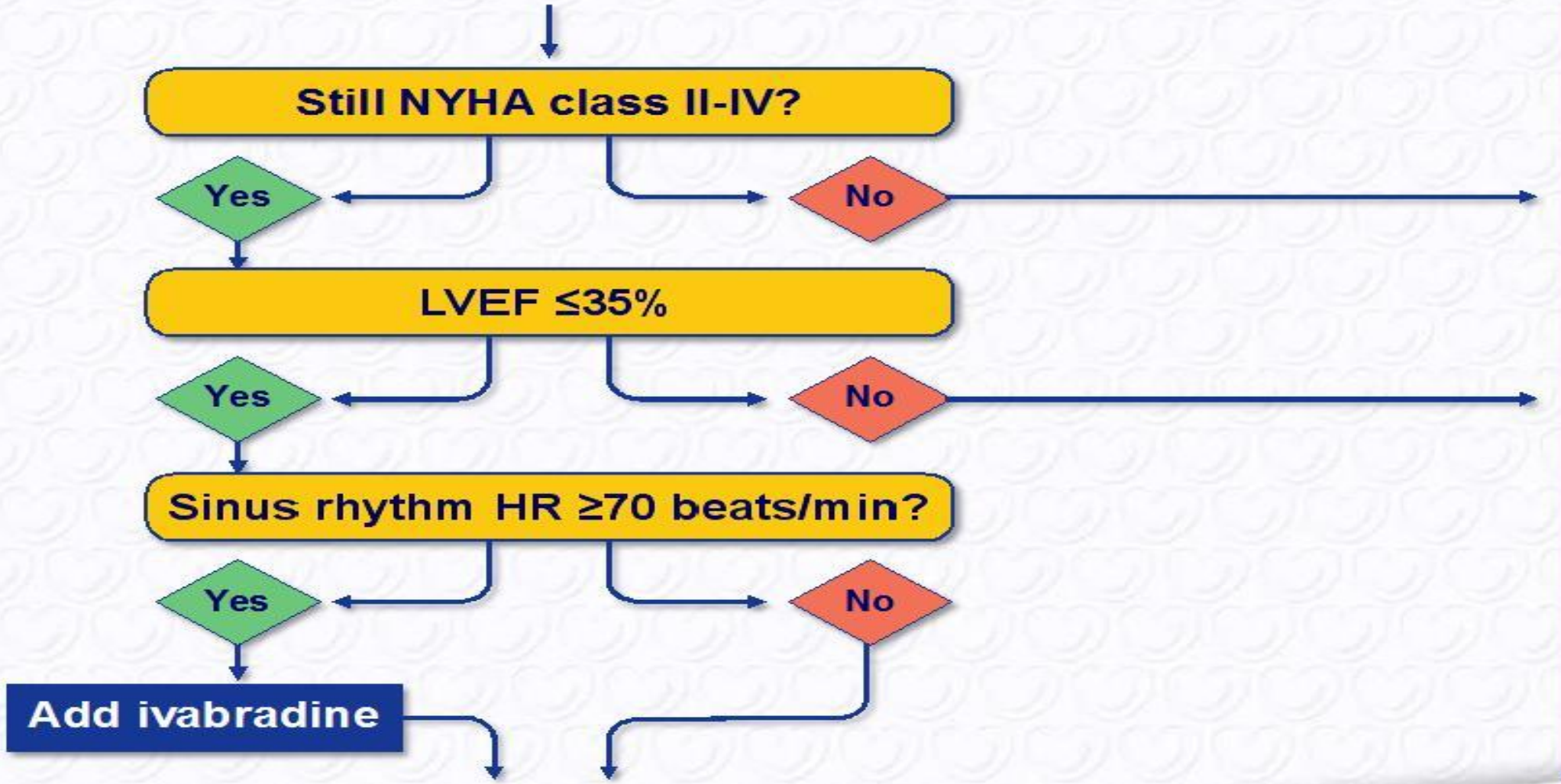
Pharmacological therapy – Next step



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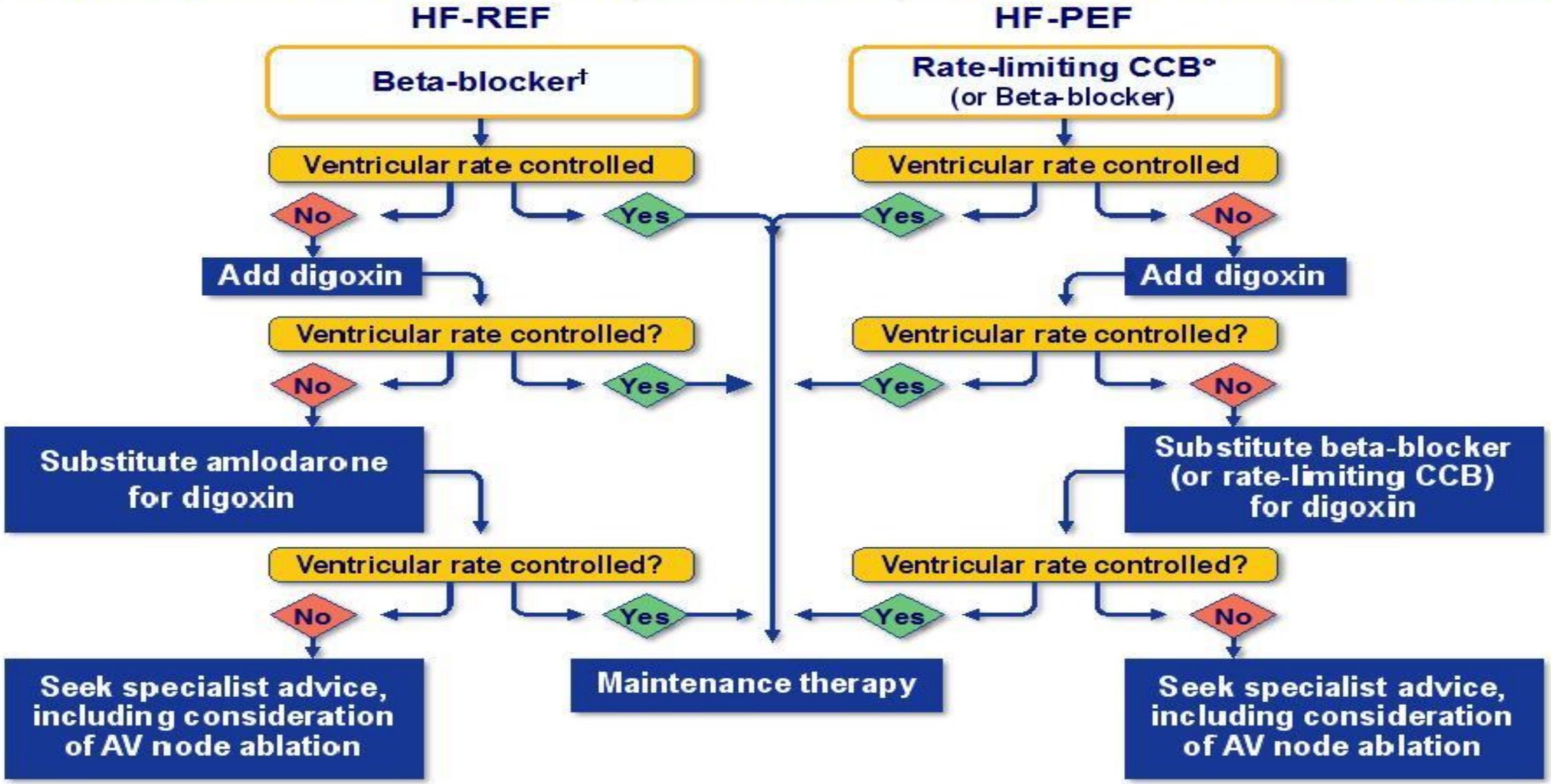
Ventricular rate-control in persistent/permanent atrial fibrillation



*Thrombo-embolism prophylaxis should also be considered in parallel.
† Beta-blocker treatment can cause worsening in acutely decompensated patients with HF-REF (see section on acute heart failure). - ° Rate-limiting CCBs should be avoided in HF-REF.

AV = atrioventricular; CCB = calcium-channel blocker; HF-PEF = heart failure with preserved ejection fraction; HF-REF = heart failure with reduced ejection fraction.

Drugs to avoid or use with caution in HF

- **Antiarrhythmic agents** (apart from β-blockers, digoxin and amiodarone)
  - proarrhythmic , negative inotropic, and increased mortality.
- **Calcium antagonists**
  - Verapamil and diltiazem
  - Dihydropyridine ie amlodipine and felodipine ok if HT or angina
- **Tricyclic antidepressants** and type-I antiarrhythmics
  - because of their proarrhythmic potential.
- **Non-steroidal anti-inflammatory drugs** (NSAIDs) , (COX)-2 inhibitors
  - can inhibit the effects of diuretics and ACEIs
- **Corticosteroids**
  - salt and water retention
- **Thiazolidinediones**, metformin
  - with caution

Management of co-morbidities

- Anaemia
- Angina
- Asthma/COPD
- Cachexia
- Cancer
- Depression
- Diabetes mellitus
- Erectile dysfunction
- Gout
- Hyperlipidaemia
- Hypertension
- Iron deficiency
- Kidney dysfunction
- Obesity
- Prostatic obstruction
- Sleepdisturbance/ sleep disordered breathing

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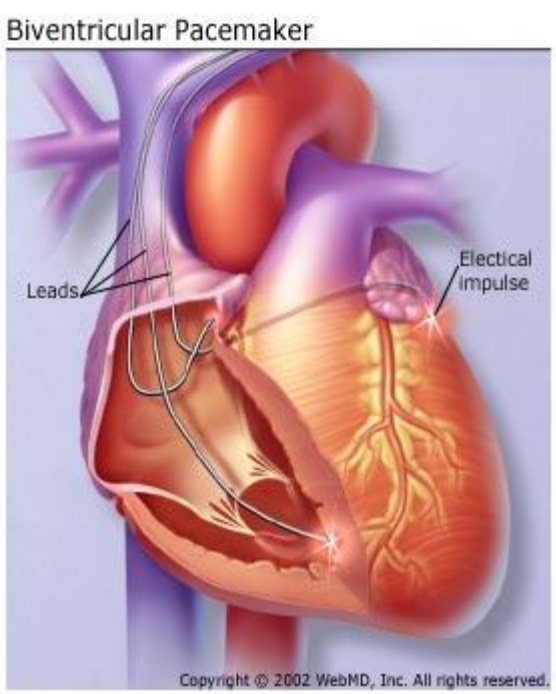
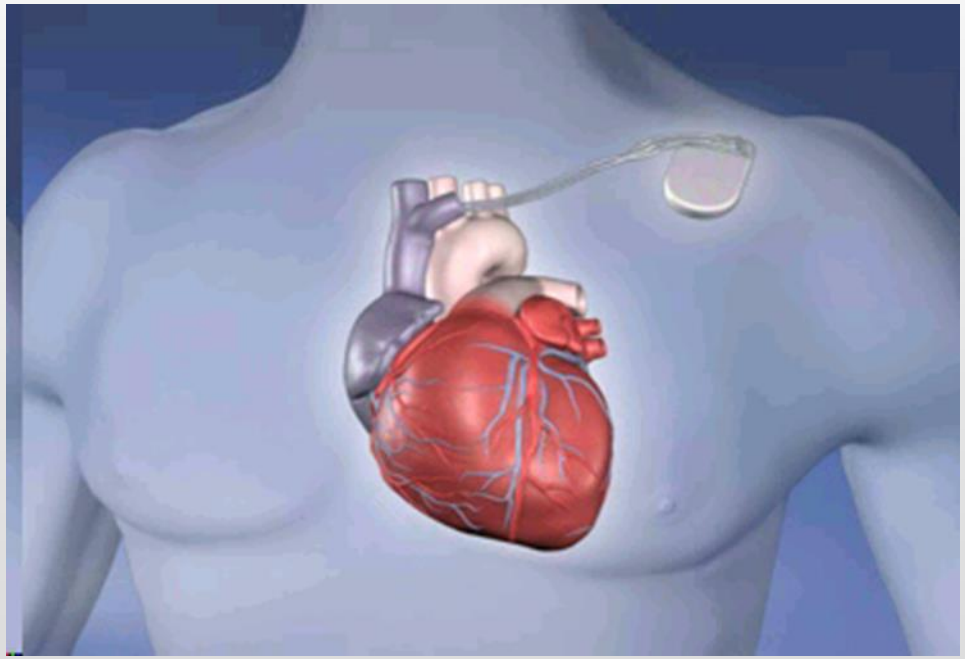
Treatment: Device

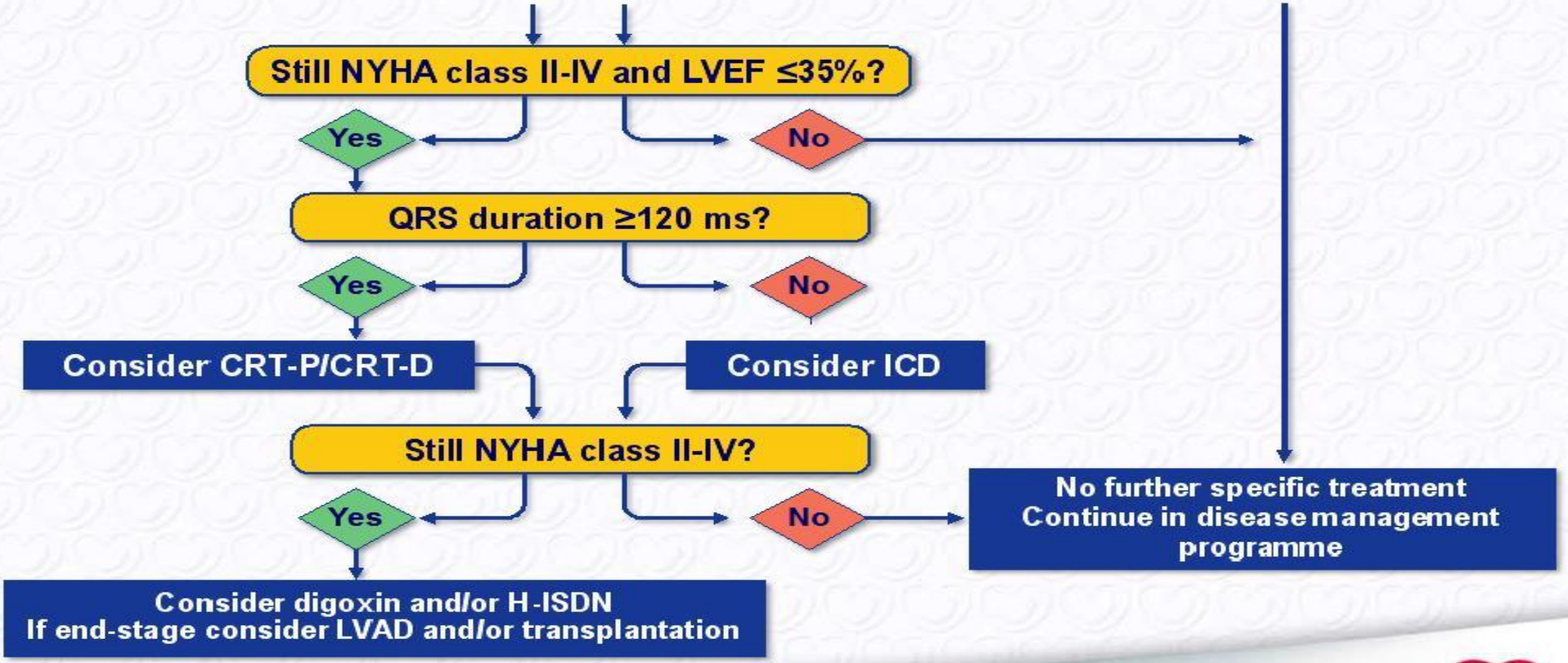
Cardiac Resynchronisation Therapy (CRT) and ICD





LBBB: reduces LV contractile efficiency, increases MR

When to consider CRT and ICD



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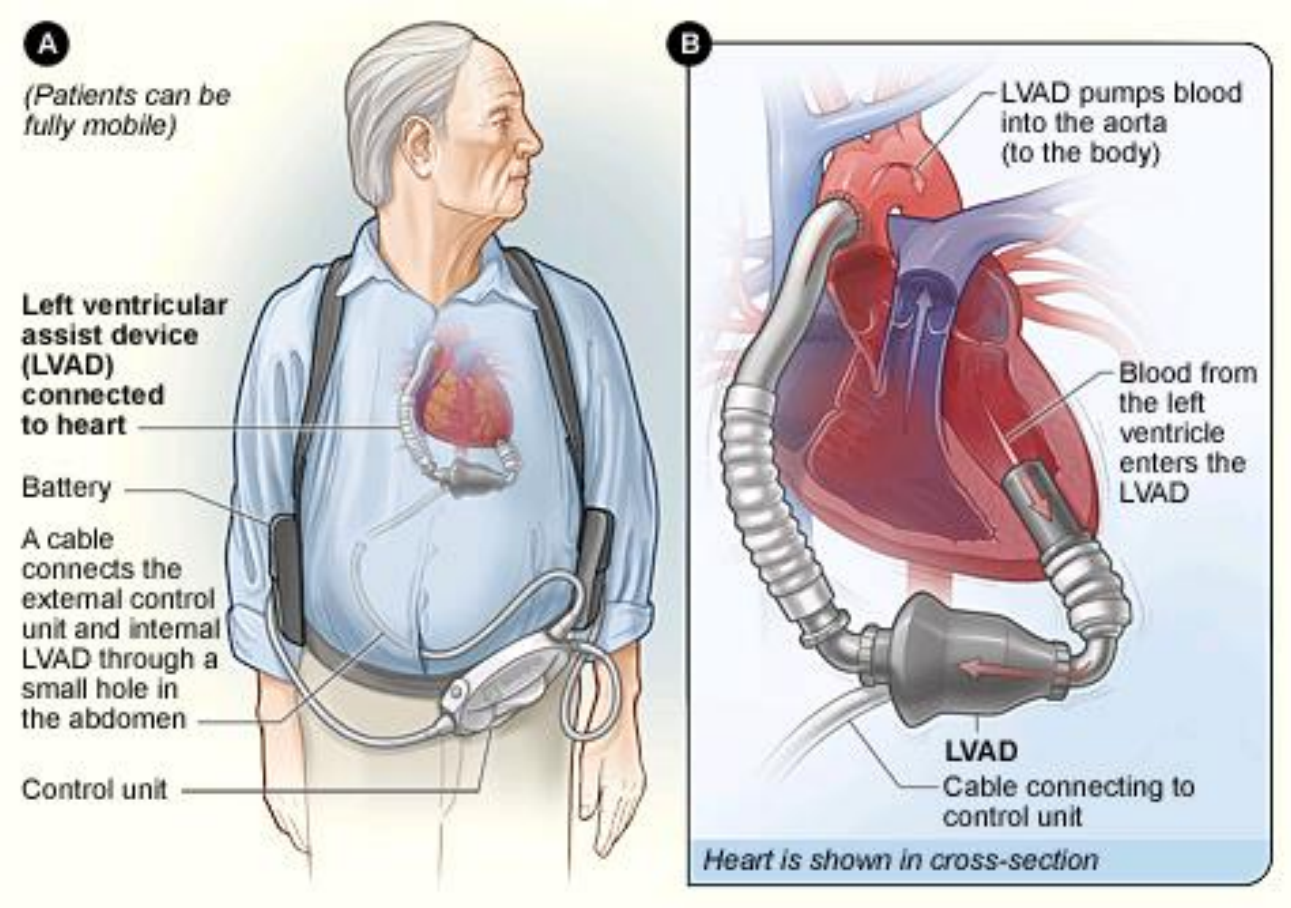
Advanced therapies

- **Consider referral to Heart Transplant units** - in highly selected cases , many patients die while awaiting and unlikely option for many NT patients
- Ventricular Assist Device
- Heart Transplant
- Artificial heart

Left Ventricular Assist Device (LVAD)



Artificial heart

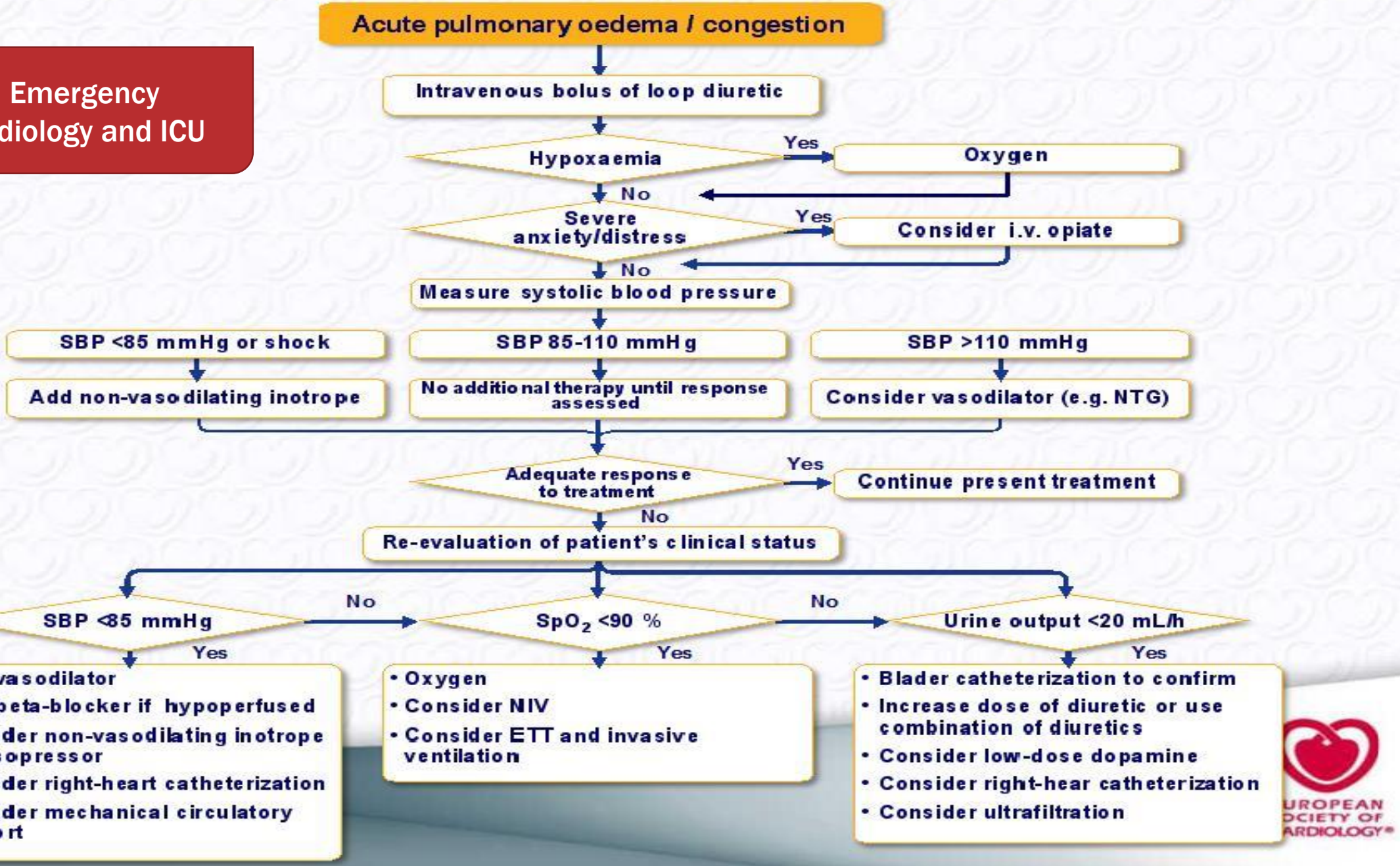
Figure 13: A picture of the Abiocor artificial heart.

HF & Palliative care

- **Should be considered if strong possibility of death within 12 months**
- **Strong markers of impending mortality**
  - advanced age
  - recurrent hospitalisation for decompensated heart failure and/or a related diagnosis
  - New York Heart Association Class IV symptoms
  - poor renal function
  - cardiac cachexia
  - low serum sodium concentration
  - refractory hypotension necessitating withdrawal of medical therapy
- **Decision should involve MDT - Primary care , cardiology and Palliative care**

Algorithm for management of acute pulmonary oedema/congestion

Medical Emergency
Involve Cardiology and ICU



APO/ADHF - Treatment (Pneumonic)

- U - Upright Position
- N - Nitrates
- L -Lasix
- O -Oxygen
- A - ACE, ARBs, Amiodorone
- D - Digoxin, Dobutamine
- M - Morphine
- E -Extremities

HF- Conclusion

- HF is Common
- Not curable but treatable
- “Malignant” condition with poor prognosis
- **Prevention is the key!**
- Early Dx and EBTx can improve QOL, Survival
- Newer therapeutic options - if stuggling
- Never hesitate to ask for specialist help in MX