

## **Program:**

### **Module 1:**

- **Definition and Classification**
- **Epidemiology of Heart Failure**
- **Pathophysiology of Heart Failure**
- **Specific Diseases causing Heart Failure and practical case studies**

### **Module 2:**

- **Diagnosis and Investigation of HF and Practical Case Studies**
- **Treatment of Heart Failure and Practical Case Studies**



# **HeFSSA GP Program: Investigating the Patient with Ankle Swelling and Shortness of Breath**

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***[www.hatter.uct.ac.za](http://www.hatter.uct.ac.za)***

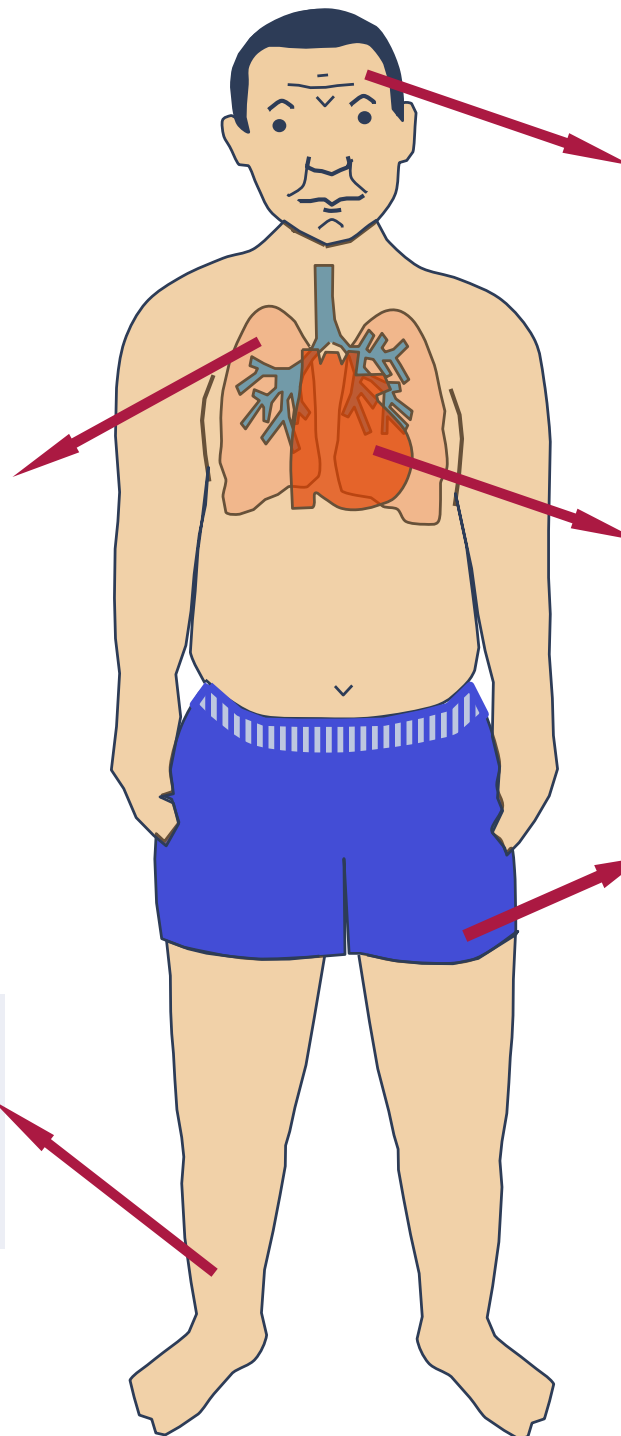


# **PRESENTATION OUTLINE**

- ❖ **Definition of heart failure**
- ❖ **Presentation and differential diagnosis**
- ❖ **ECG**
- ❖ **Echocardiography**
- ❖ **Biomarkers as diagnostic and prognostic tool**
- ❖ **Investigation of co-morbidities**



Shortness of breath – even at rest – caused by fluid backing up in the lungs (congestion)



Dizziness and weakness (especially when standing up quickly) caused by less blood reaching the brain

Awareness of heart beat caused by the heart beating faster to pump enough blood to the body

Tiredness, especially with activity, caused by less blood getting to the major organs and muscles

Swelling (oedema) of feet, legs, and abdomen and rapid and unexplained weight gain caused by poor heart function and circulation, which causes retention

Breathing problems 27.07.10



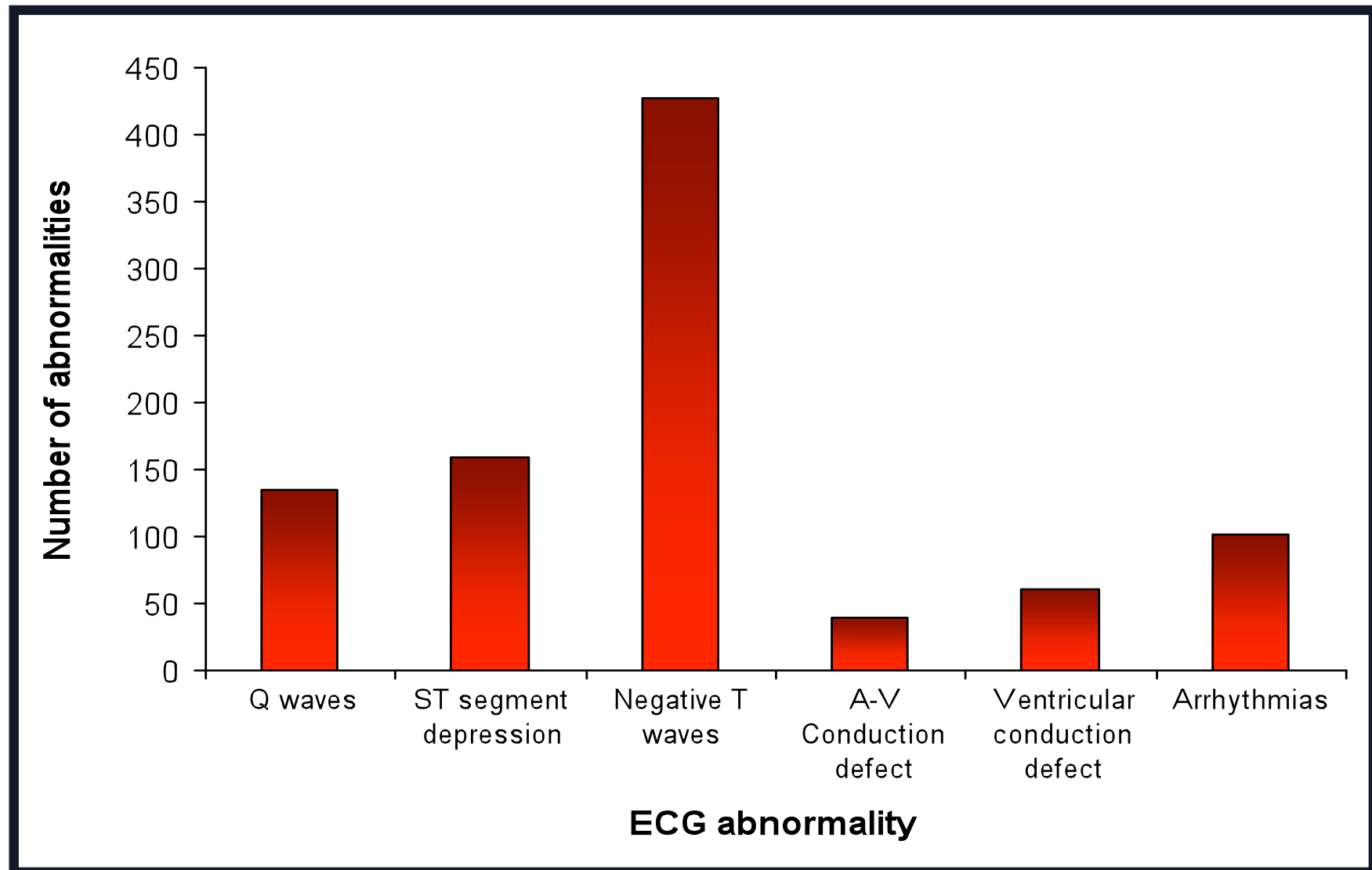
# **Investigations**

## **Electrocardiogram**

- ❖ **Most patients with CHF due to systolic dysfunction have a significant abnormality on ECG**
- ❖ **Normal ECG has a 95% neg. predictive value**
- ❖ **Evidence of**
  - ❖ **Ischaemic heart disease**
  - ❖ **Left Ventricular Hypertrophy (LVH)**
  - ❖ **Arrhythmias e.g. atrial fibrillation**
  - ❖ **DCMO - limb leads low voltage/precordial LVH, wide QRS, LBBB**



# Frequency of major ECG abnormalities in 853 heart failure patients (Heart of Soweto Study data)

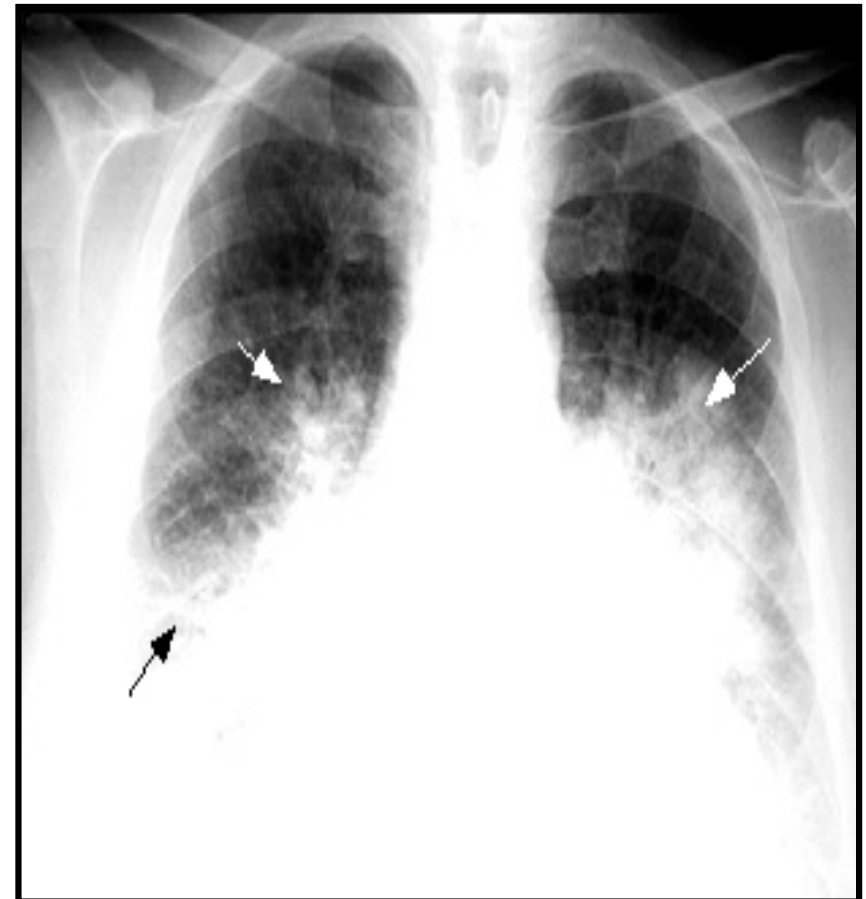




# Investigations

## CXR

- ❖ Diff. HF from lung dx
- ❖ CTR>50%
- ❖ Upper lobe diversion
- ❖ Interstitial oedema ( elevated LV filling pressure)
- ❖ Pleural effusions
- ❖ Kerley-B (increased lymphatic pressure e.g. MS or chronic HF)





# Investigations

## Routine Blood Tests

- ❖ Full blood count – Anaemia
- ❖ Blood urea nitrogen and creatinine/estimated glomerular filtration rate – renal dysfunction
- ❖ Electrolytes – Hyponatraemia, hypokalemia, hyperkalemia
- ❖ Albumin – Hypoalbuminemia
- ❖ Blood glucose – Diabetes mellitus
- ❖ Thyroxine (in patients with AF or who are >65 y and the heart failure has no obvious etiology – Hyper- and Hypothyroidism)





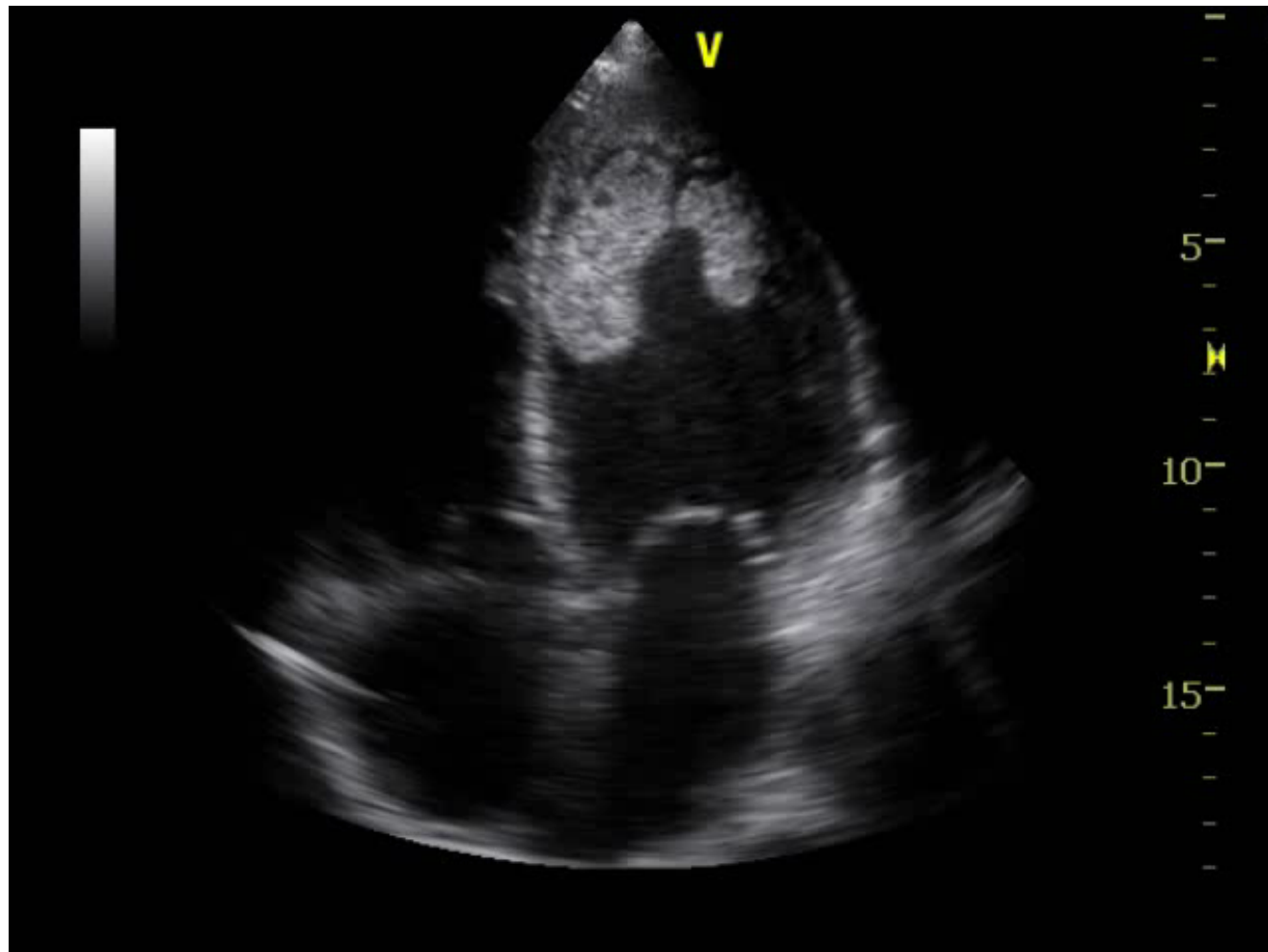
# Investigations

## Echocardiography

- ❖ Essential in all newly diagnosed
- ❖ Detect
  - LV size & EF
  - Wall thickness / “texture”
  - Regional wall motion abnormality
  - Valve diseases
  - Pericardial disease
  - Septal shunts
  - RV size, pressures & function
  - LV thrombus
- ❖ Expensive/Expertise

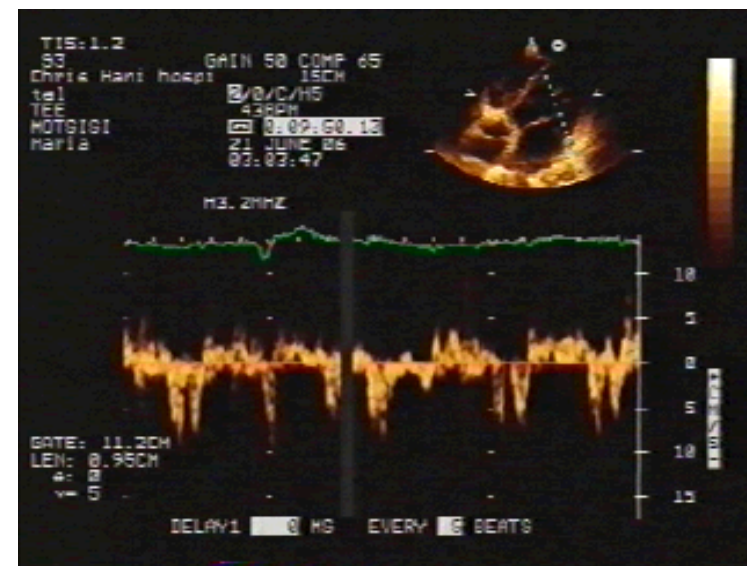
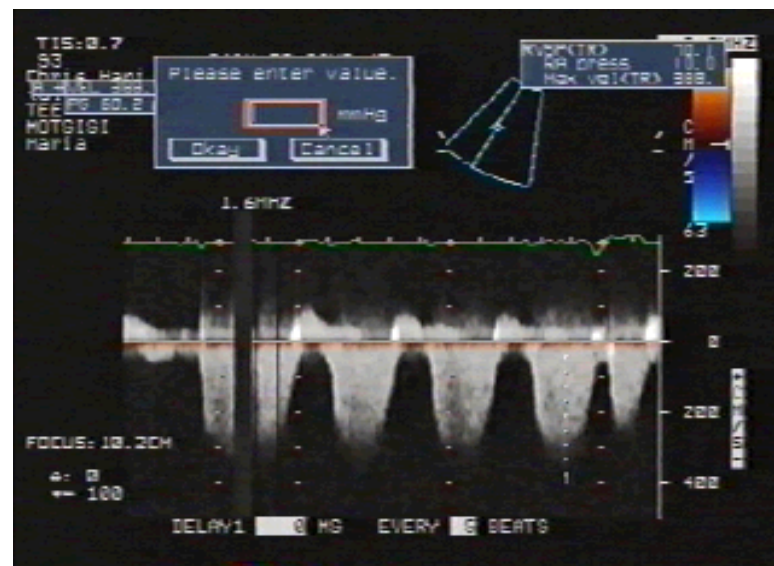
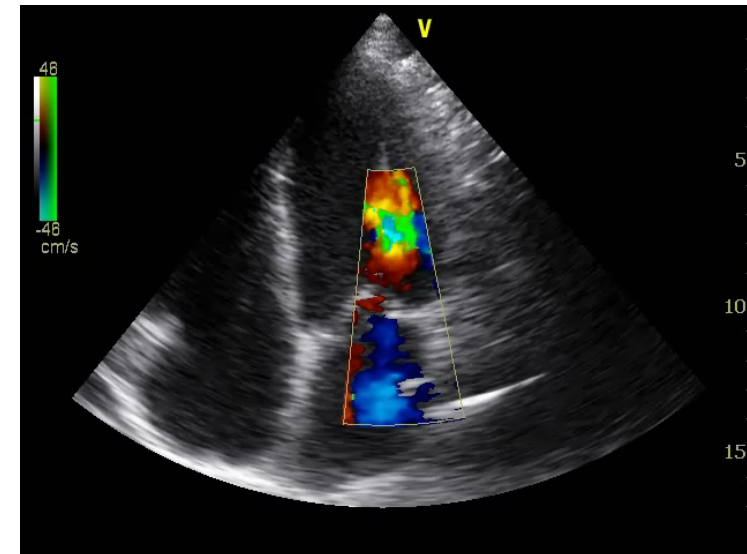
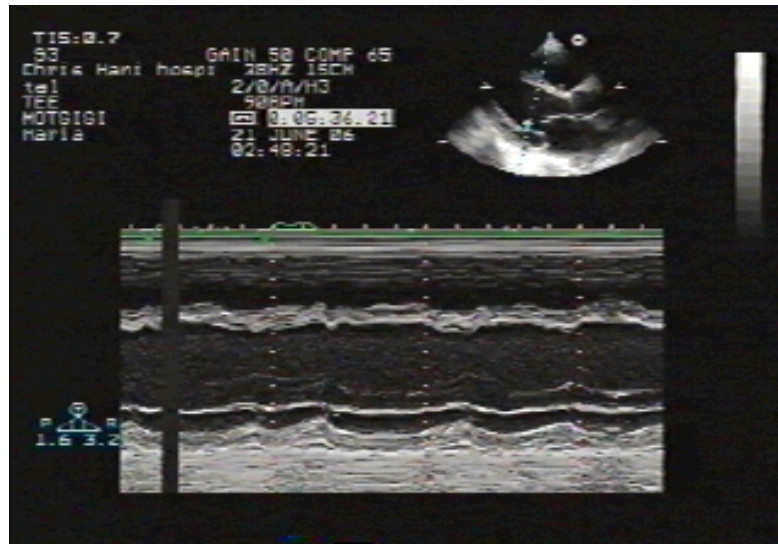


# LV Thrombus Postpartum





# Severe left ventricular dysfunction, mitral regurgitation and pulmonary hypertension





# **Cardiac Magnetic Resonance** **Imaging**

- ❖ **CMR is a versatile, highly accurate, reproducible, non-invasive imaging technique for assessment of cardiac chambers**
- ❖ **Gold standard for accuracy of assessment of volumes, mass and wall motion**
- ❖ **Use of paramagnetic contrast as gadolinium provides evidence of inflammation and scarring**



# **Biomarkers as Diagnostic and Prognostic Tool**

**Definition of a biomarker:**

- ❖ **A biological molecule that can be identified in a particular disease**

**Purpose of a biomarker:**

- ❖ **Aid in the diagnosis of a disease**
- ❖ **Potentially save costs for expensive imaging studies**
- ❖ **Assess severity and prognosis of a condition**
- ❖ **Monitor response to treatment**

**Requirement of a biomarker:**

- ❖ **Specific**
- ❖ **Stable**



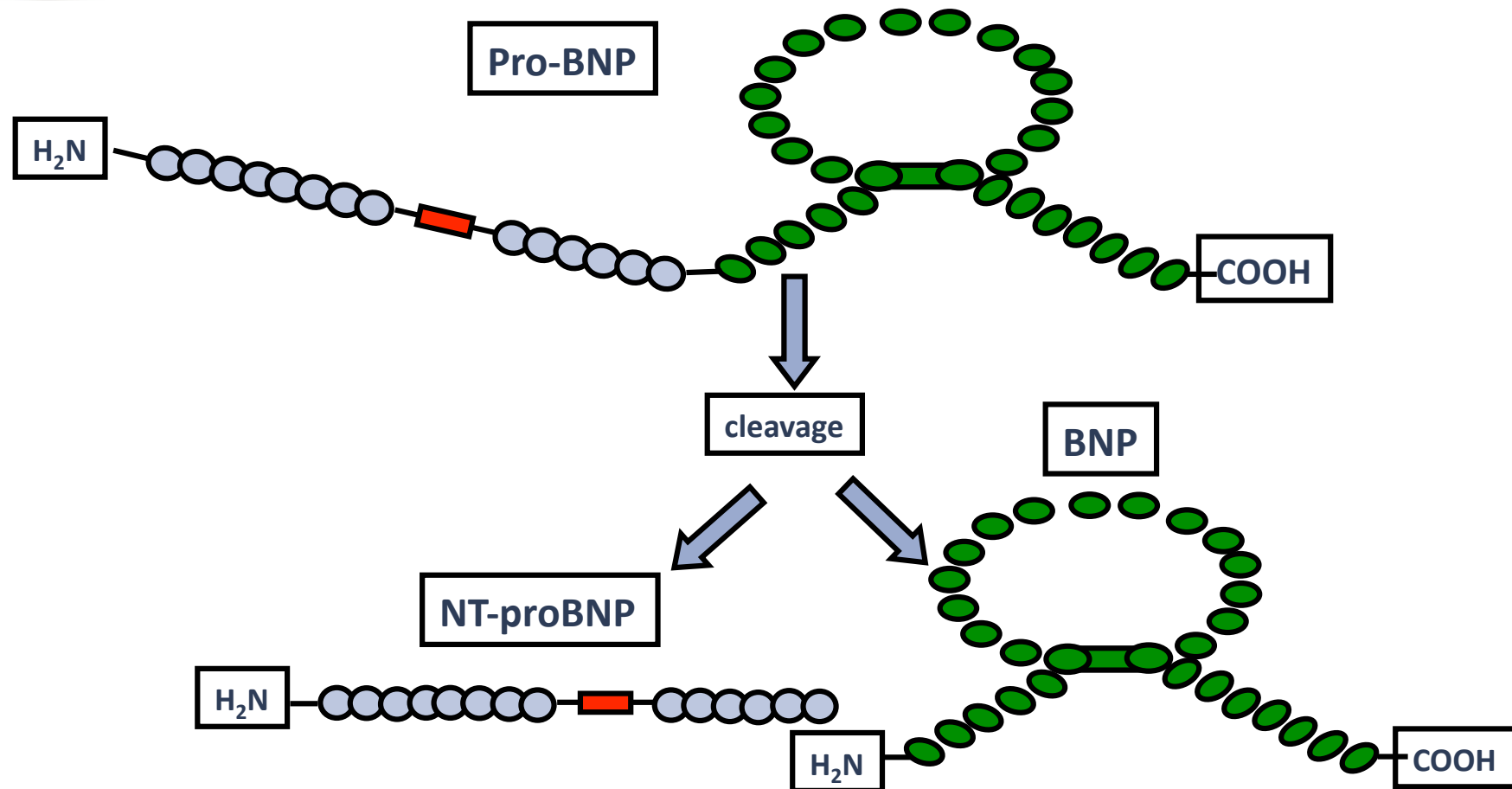
# Types of Natriuretic Peptides

Three types of natriuretic peptides have been:

- ❖ **B-type natriuretic peptide (BNP)**
- ❖ **Atrial natriuretic peptides (ANP)**
- ❖ **C-type natriuretic peptides (CNP)**
  - **CNP is structurally distinct from ANP and BNP.**
  - **CNP is expressed to a much greater extent in the central nervous system and vascular tissues than in the heart**
  - **Functions as a potent vasorelaxant**
  - **Inhibitor of vascular smooth muscle proliferation and endothelial cell migration**



# BNP & NT-PROBNP





# Role and Function of ANP and BNP

	<b>ANP</b>	<b>BNP</b>
Source	Atria ++++ Ventricle +	Ventricle ++++ Atria +
Release	Stored in granules	Released in bursts regulated by gene transcription
Stimulus	Myocyte stretch ++++ Endothelin-1 + Nitric Oxide + Angiotensin II +	Myocyte stretch ++++ Endothelin-1 + Nitric Oxide + Angiotensin II +
Binding site	Natriuretic receptor-A	Natriuretic receptor B
Relation to chamber pressure	More related to atrial pressure	More related to ventricular pressure



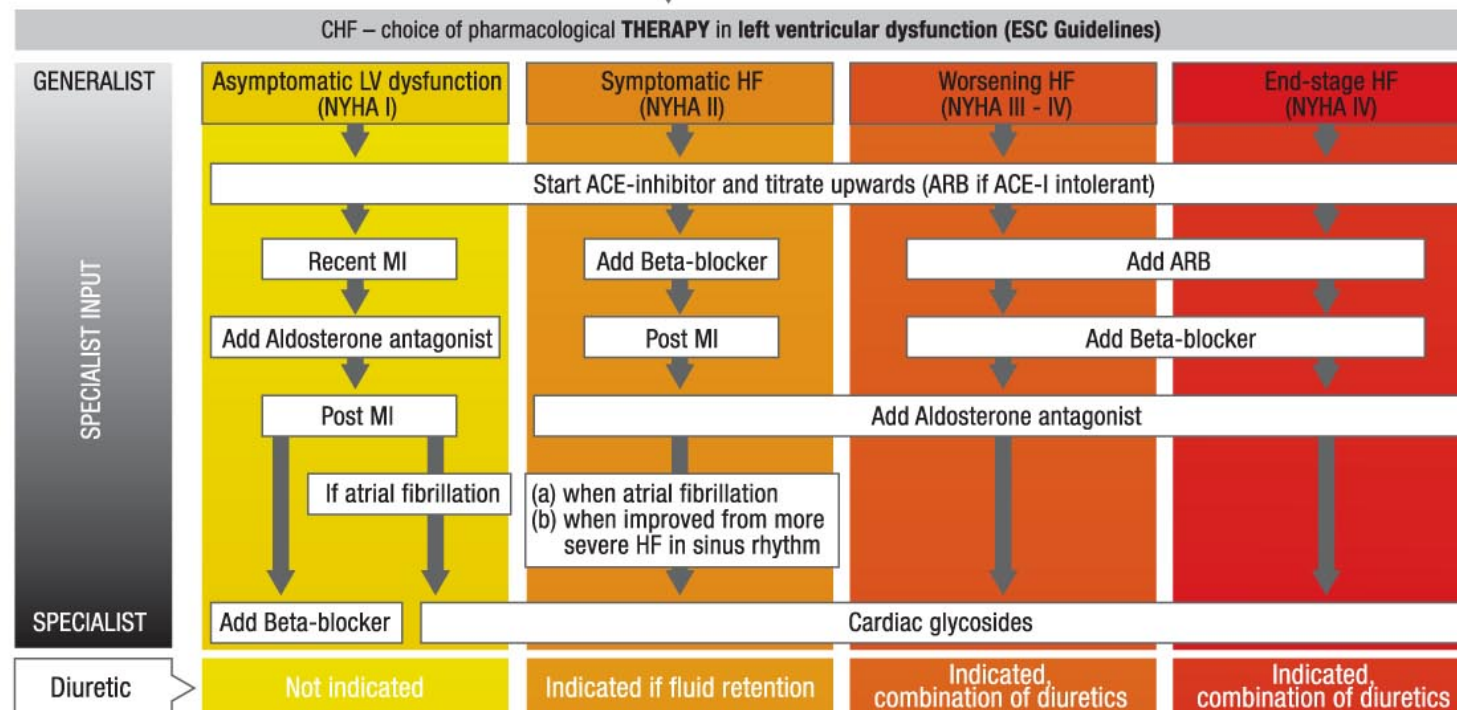
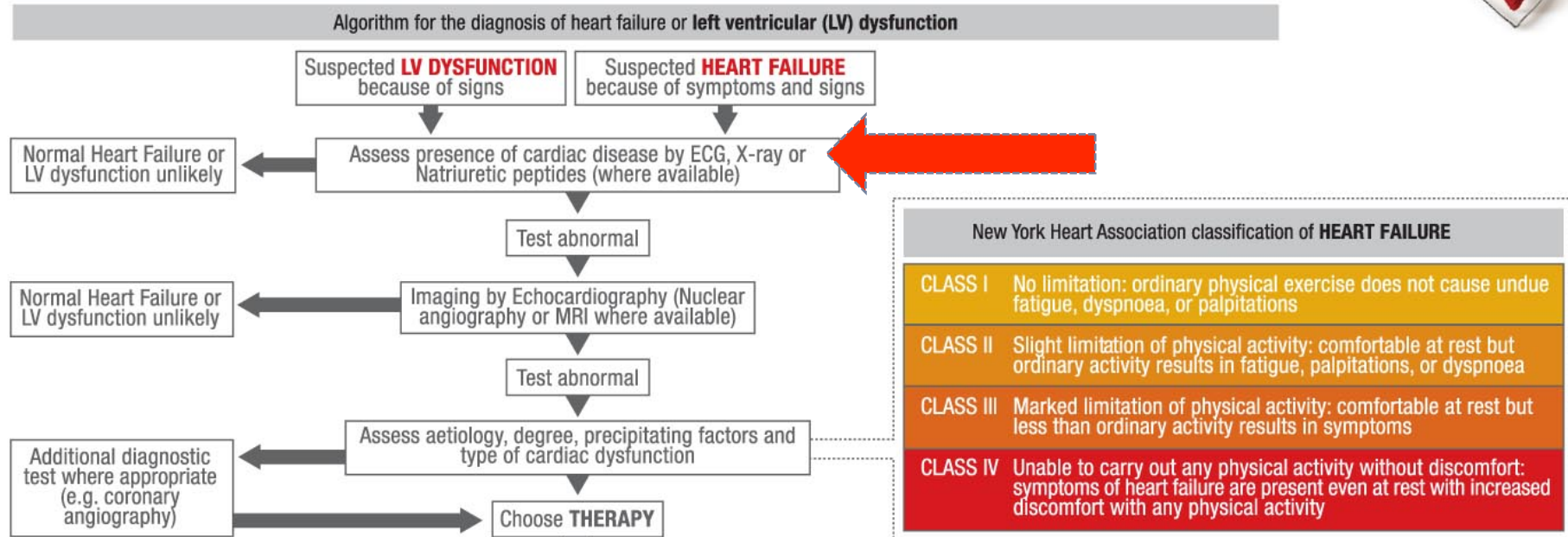


# **BNP in Diagnosis of Heart Failure**

- ❖ Diagnosis of heart failure:

BNP > 400pg/ml or NT-proBNP > 2000 pg/ml heart failure is likely, indication for echocardiography

- ❖ Conditions other than heart failure associated with elevated natriuretic peptides:  
e.g. advanced age, renal dysfunction, liver cirrhosis, sepsis, right heart failure





# Study Group “Peripartum Cardiomyopathy” of the Heart Failure Association of the ESC

<http://www.escardio.org/communities/JFA/committees/peripartum-cardiomyopathy/Pages/welcome.aspx>



European Journal of Heart Failure (2010) 12, 767–778  
doi:10.1093/eurjhf/hfq120

## POSITION STATEMENT

### **Current state of knowledge on aetiology, diagnosis, management, and therapy of peripartum cardiomyopathy: a position statement from the Heart Failure Association of the European Society of Cardiology Working Group on peripartum cardiomyopathy**

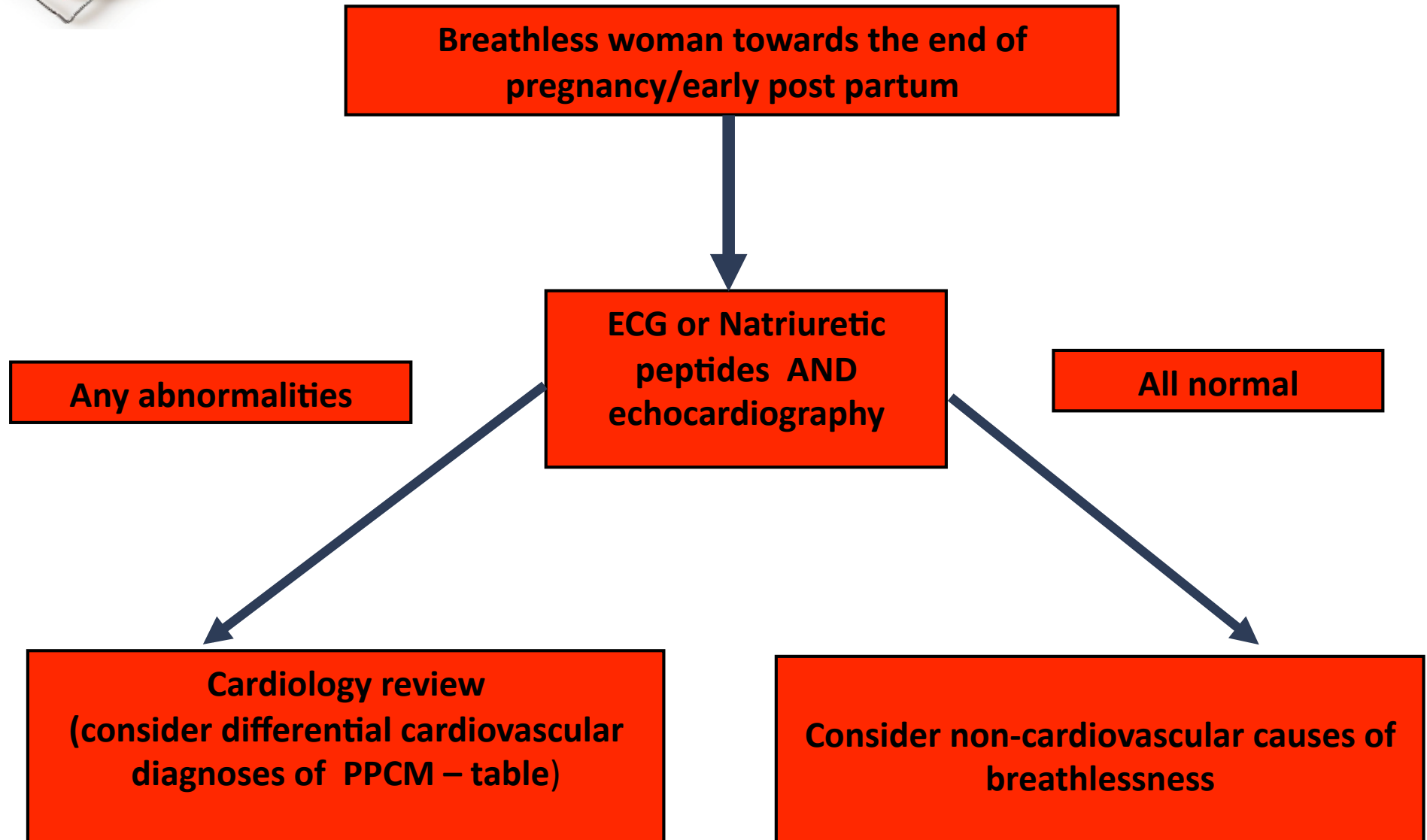
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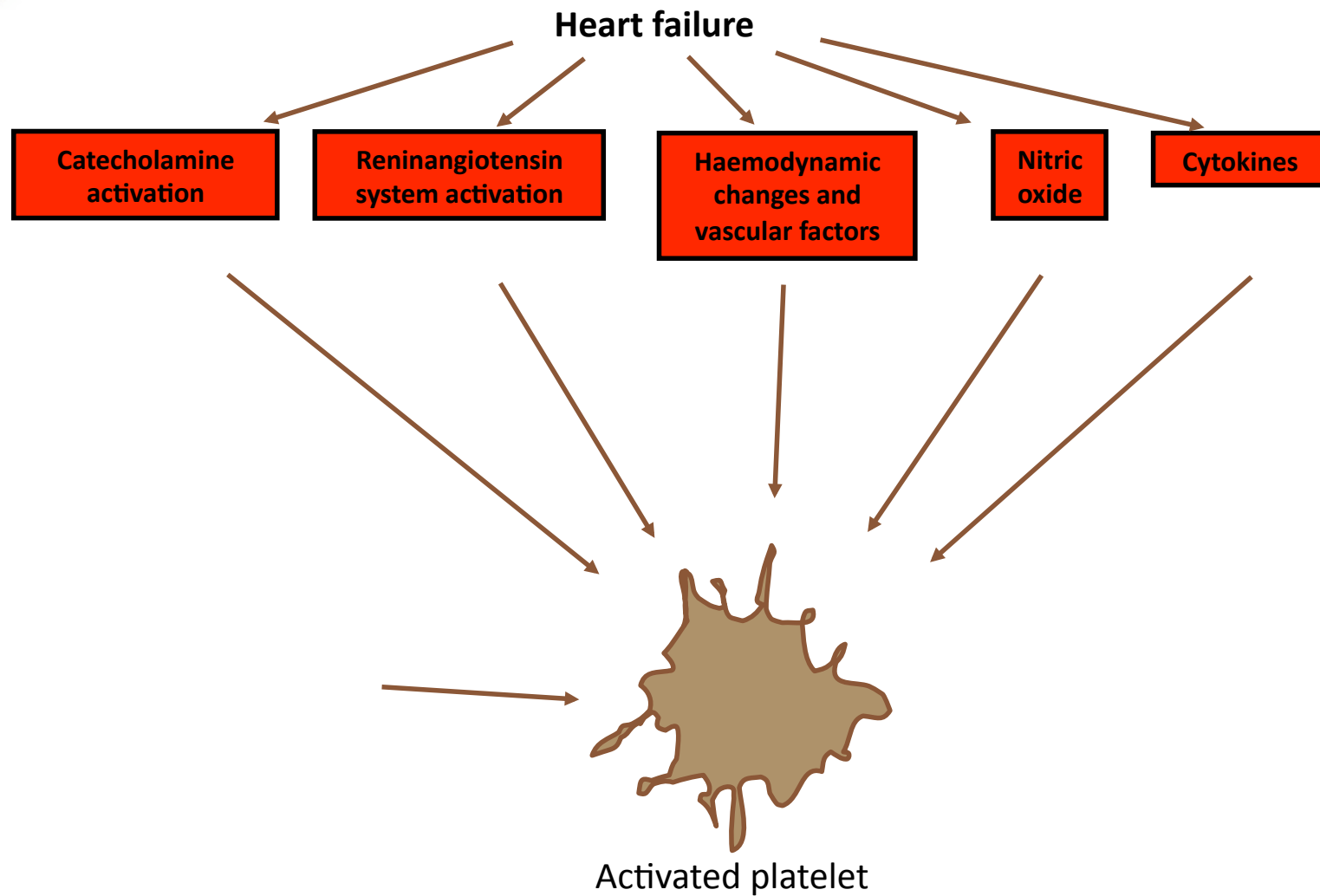


# Figure 1: Exclusion of PPCM in the breathless woman towards the end of pregnancy / early post partum





# Anticoagulation in Heart Failure



Possible mechanisms of platelet activation in heart failure.



# **Anticoagulation in Heart Failure**

- ❖ **Heart failure is associated with increased risk of venous thromboembolism, stroke and sudden death (5% versus 0.5% in normal population).**
- ❖ **Dilated cardiac chambers, poor contractility, regional wall motion abnormality, and concomitant atrial fibrillation may predispose to thrombus.**
- ❖ **Benefit of antiplatelet agents in patients with ischaemia well documented. However, at present no indication for anti-platelet therapy in patients with HF of non-ischaemic cause (WASH and WATCH trial).**



# **Renal Dysfunction and Anaemia in** **HF**

❖ **In patients with heart failure anaemia and renal dysfunction is:**

- **Common**
- **Under-recognised**
- **Its significance is rarely appreciated**
- **Has a number of pathophysiologic mechanisms**
- **Deteriorates progressively**
- **May worsen with ACE-I/ARB**





# Awareness

## Symptoms that may signal heart failure

### Breathing difficulties

- Shortness of breath from walking stairs or simple activities (dyspnea)
- Trouble breathing when resting or lying down
- Waking up breathless at night (paroxysmal nocturnal dyspnea)
- Needing more than two pillows to sleep (orthopnea)

### Fatigue / Exercise intolerance

- Tiring easily
- Swelling of feet, ankles or legs (edema)
- General feeling of fatigue

### Coughing

- Frequent coughing
- Coughing that produces mucus or pink, blood-tinged sputum
- Dry, hacking cough when lying flat in bed

## Heart failure risk factors

- **High Blood pressure**
- **Prior heart attack**
- **History of heart murmurs**
- **Enlarged heart**
- **Diabetes**
- **Family history of enlarged heart**

These symptoms are common and may represent other diseases. If you experience any of these symptoms or face any of these risk factors, please consult your doctor or pharmacist.

References:

1. National Heart, Lung and Blood Institute website. [www.nhlbi.nih.gov](http://www.nhlbi.nih.gov)
2. American Heart Association website. "New Heart Failure Guidelines Address Prevention and Progression." [www.americanheart.org](http://www.americanheart.org)

**For more information visit [www.heartfailurematters.org](http://www.heartfailurematters.org)**

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## **GLOBAL SURVEY OF MEDICAL SPECIALIST MANAGEMENT OF CHRONIC HEART FAILURE**

**There are wide variations in the management of heart failure, both within and between countries. Whereas these have been documented to some extent in Western countries, there are no data on cardiologists awareness and perception of heart failure management in developing countries, in which heart failure is or soon will be of major importance.**

**This survey aims to describe the diagnosis, different forms of care and the treatment of heart failure across a wide variety of countries by cardiologists and other specialists who manage heart failure patients.**

**The English version of the GAPS-HF questionnaire is now online and ready to be completed. The questionnaire can be accessed through the WHFS website ([www.whfs.org](http://www.whfs.org)) or directly by using this web address which will bring you to the log-in page of the questionnaire:**

**<http://gaps-hf.whfs.org>.**

**There are no right or wrong answers to these questions. Therefore, please simply respond according to your usual practice. All questionnaires will be dealt with strictly confidentially and all responses will be dealt with anonymously. If requested, you will be informed about the results of this questionnaire.**



# **Conclusion**

- ❖ **Early heart failure is often missed**
- ❖ **Heart failure is a symptom and not a diagnosis. The cause need to be established**
- ❖ **ECG and Echocardiography are important tools**
- ❖ **NT-proBNP and BNP are well established markers ruling out heart failure in daily practice**
- ❖ **Creating Awareness is important**