เอกราช อริยะชัยพาณิชย์

Heart Failure and Transplant Cardiology

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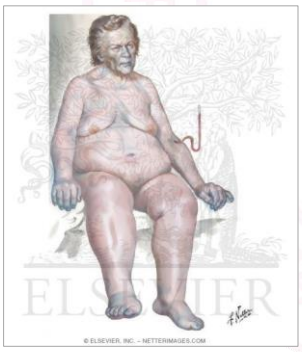
Disclosure

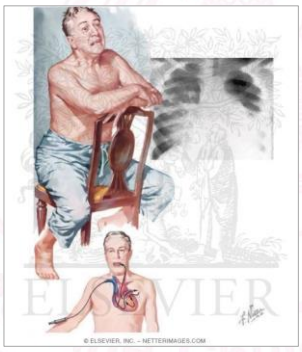
- Speaker, CME service:
  Merck, Otsuka, Servier
- Consultant, non-CME service:
  Novartis, Menarini

Agenda

- Definition
- Diagnosis
- Terminology
- Classification

What is heart failure ?





Frank H. Netter
(25 April 1906 – 17 September 1991)

Definition of HF

HF is a syndrome caused by cardiac dysfunction, generally resulting from myocardial muscle dysfunction or loss and characterized by either LV dilation or hypertrophy or both. Whether the dysfunction is primarily systolic or diastolic or mixed, it leads to neurohormonal and circulatory abnormalities, usually resulting in characteristic symptoms such as fluid retention, shortness of breath, and fatigue, especially on exertion. In the absence of appropriate therapeutic intervention, HF is usually progressive at the level of both cardiac function and clinical symptoms. The severity of clinical symptoms may vary substantially during the course of the disease process and may not correlate with changes in underlying cardiac function. Although HF is progressive and often fatal, patients can be stabilized and myocardial dysfunction and remodeling may improve, either spontaneously or as a consequence of therapy. In physiologic terms, HF is a syndrome characterized by either or both pulmonary and systemic venous congestion and/or inadequate peripheral oxygen delivery, at rest or during stress, caused by cardiac dysfunction.

3.1 Definition of heart failure

HF is a clinical syndrome characterized by typical symptoms (e.g. breathlessness, ankle swelling and fatigue) that may be accompanied by signs (e.g. elevated jugular venous pressure, pulmonary crackles and peripheral oedema) caused by a structural and/or functional cardiac abnormality, resulting in a reduced cardiac output and/or elevated intracardiac pressures at rest or during stress.

2. Definition of HF

HF is a complex clinical syndrome that results from any structural or functional impairment of ventricular filling or ejection of blood. The cardinal manifestations of HF are dyspnea and fatigue, which may limit exercise tolerance, and fluid retention, which may lead to pulmonary and/or splanchnic congestion and/or peripheral edema. Some patients have exercise intolerance but little evidence of fluid retention, whereas others complain primarily of edema, dyspnea, or fatigue. Because some patients present without signs or symptoms of volume overload, the term "heart failure" is preferred over "congestive heart failure." There is no single diagnostic test for HF because it is largely a clinical diagnosis based on a careful history and physical examination.

The clinical syndrome of HF may result from disorders of the pericardium, myocardium, endocardium, heart valves, or great vessels or from certain metabolic abnormalities, but most patients with HF have symptoms due to impaired left ventricular (LV) myocardial function. It should be emphasized

2010 HFSA; 2016 ESC; 2012 ACC/AHA; HF guideline

Definition of HF

คำจำกัดความ

ภาวะหัวใจล้มเหลวเรื้อรังเป็นกลุ่มอาการซึ่งมีสาเหตุจากความผิดปกติของการทำงานของหัวใจ อาจเกิดจากมีความผิดปกติของโครงสร้าง หรือการทำหน้าที่ของหัวใจก็ได้ มีผลทำให้หัวใจไม่สามารถสูบฉีดเลือดไปเลี้ยงร่างกาย หรือรับเลือดกลับเข้าสู่หัวใจได้ตามปกติ ผู้ป่วยภาวะหัวใจล้มเหลวเรื้อรังมีอาการที่สำคัญ 2 ประการ อาการแรกคือหายใจลำบากและอ่อนเพลีย อาการที่สำคัญอีกข้อเกิดจากการมีน้ำและเกลือคั่งในร่างกาย ทำให้ บวม

ภาวะหัวใจล้มเหลวเรื้อรังอาจเกิดจากความผิดปกติของเยื่อหุ้มหัวใจ กล้ามเนื้อหัวใจ ลิ้นหัวใจ หรือโรคของหลอดเลือด สาเหตุสำคัญคือโรคหลอดเลือดหัวใจตีบ โรคความดันโลหิตสูง และสำหรับประเทศไทยโรคลิ้นหัวใจรูห์มาติก (rheumatic) ยังพบได้บ่อยพอสมควร สิ่งสำคัญที่ต้องทำความเข้าใจก็คือภาวะหัวใจล้มเหลวเรื้อรังเป็นกลุ่มอาการ ไม่ใช่โรค ผู้ป่วยแต่ละรายมีการพยากรณ์โรคที่แตกต่างกัน ในการพิจารณาการรักษาจึงต้องให้การรักษาทั้งอาการ และโรคที่เป็นสาเหตุควบคู่กันไป

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Definition of HF

1. A syndrome caused by cardiac dysfunction
2. Leads to circulatory abnormalities and neurohormonal abnormality
3. Resulting in typical symptoms of

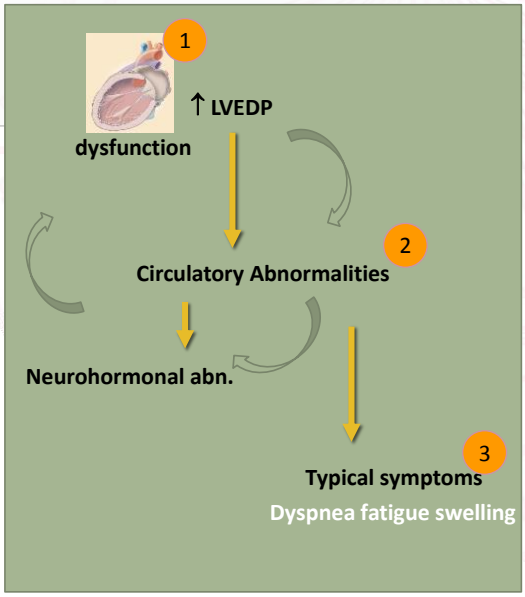
   Congestion

   Poor perfusion

a. Common pathway from any causes

b. Progressive, vicious cycle

c. Systemic maladaptation



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Diagnosis of HF

- Clinical diagnosis
- Lack of uniform diagnostic criteria
- Relying on physician to show

1. Cardiac dysfunction

   ↑ LVEDP, ↓CO, ↑filling pressure

2. Typical symptoms

   Dyspnea, fatigue, swelling

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Framingham Criteria for Congestive Heart Failure

Table 1. Criteria of CHF.*

Major Criteria

Paroxysmal nocturnal dyspnea or orthopnea
Neck-vein distention
Rales
Cardiomegaly
Acute pulmonary edema
S_3 gallop
Increased venous pressure ->16 cm of water
Circulation time ≥25 sec
Hepatojugular reflux

Minor Criteria

Ankle edema
Night cough
Dyspnea on exertion
Hepatomegaly
Pleural effusion
Vital capacity ↓ ⅓ from maximum
Tachycardia (rate of ≥120/min)

Major or Minor Criterion

Weight loss ≥4.5 kg in 5 days in response to treatment

*For establishing a definite diagnosis of congestive heart failure in this study, 2 major or 1 major & 2 minor criteria had to be present concurrently.


The New England Journal of Medicine

NEJM 1971

EF is important in classification of pts with HF because of differing patient demographics and response to therapies.

Table 3.1 Definition of heart failure with preserved (HFpEF), mid-range (HFmrEF) and reduced ejection fraction (HFrEF)

Type of HF		HFrEF	HFmrEF	HFpEF
CRITERIA	1	Symptoms ± Signs[a]	Symptoms ± Signs[a]	Symptoms ± Signs[a]
	2	LVEF <40%	LVEF 40–49%	LVEF ≥50%
	3	–	1. Elevated levels of natriuretic peptides[b]; 2. At least one additional criterion: a. relevant structural heart disease (LVH and/or LAE), b. diastolic dysfunction (for details see Section 4.3.2).	1. Elevated levels of natriuretic peptides[b]; 2. At least one additional criterion: a. relevant structural heart disease (LVH and/or LAE), b. diastolic dysfunction (for details see Section 4.3.2).

BNP = B-type natriuretic peptide; HF = heart failure; HFmrEF = heart failure with mid-range ejection fraction; HFpEF = heart failure with preserved ejection fraction; HFrEF = heart failure with reduced ejection fraction; LAE = left atrial enlargement; LVEF = left ventricular ejection fraction; LVH = left ventricular hypertrophy; NT-proBNP = N-terminal pro-B type natriuretic peptide.
[a]Signs may not be present in the early stages of HF (especially in HFpEF) and in patients treated with diuretics.
[b]BNP>35 pg/ml and/or NT-proBNP>125 pg/mL.

2016 ESC HF guideline

Issue of Diagnosis of HFpEF

- HF diagnosis is based on "typical symptoms" and "abnormal cardiac"
  - "typical symptoms" → BNP may help declare congestion
  - "abnormal cardiac" → LVEF ≥ 50%
    → Diastology grading is far from perfect
    → LAE, LVH, E/E' may from other causes
- Abnormalities of systolic and diastolic dysfunction coexist, irrespective of EF.

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HF with EF 40-50%

Table 3.1 Definition of heart failure with preserved (HFpEF), mid-range (HFmrEF) and reduced ejection fraction (HFrEF)

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CRITERIA	1	Symptoms ± Signs[a]	Symptoms ± Signs[a]	Symptoms ± Signs[a]
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2016 ESC HF guideline

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BNP

- Derived from a common 108-amino acid precursor peptide of proBNP
- Numerous triggers include myocardial stretch
  - "A1C of HF"
- Useful to support clinical judgment for diagnosis of HF
  - Better for exclusion of HF more than diagnosis of HF
  - Can elevate from wide variety of cardiac and non-cardiac causes
- Useful for prognosis

BNPs is recommended for ruling-out HF

Non-acute setting

BNP	< 35 pg/mL
NT-proBNP)	< 125 pg/mL

Acute setting

BNP	< 100 pg/mL
NT-proBNP)	< 300 pg/mL

NPV of 94-98 %

PPV of 50-60 %

Table 8. Selected Causes of Elevated Natriuretic Peptide Concentrations

Cardiac

- Heart failure, including RV syndromes
- Acute coronary syndrome
- Heart muscle disease, including LVH
- Valvular heart disease
- Pericardial disease
- Atrial fibrillation
- Myocarditis
- Cardiac surgery
- Cardioversion

Noncardiac

- Advancing age
- Anemia
- Renal failure
- Pulmonary: obstructive sleep apnea, severe pneumonia, pulmonary hypertension
- Critical illness
- Bacterial sepsis
- Severe burns
- Toxic-metabolic insults, including cancer chemotherapy and envenomation

LVH indicates left ventricular hypertrophy; and RV, right ventricular.

2016 ESC HF guideline. 2012 AHA/ACC HF guideline

Classification of HF

Acute Chronic	rEF, pEF, mrEF (improved EF)	Stage A, B, C, D	Warm-Wet-Cold -Dry
NYHA fn class I, II, III, IV	Ischemic Non-ischemic	Left Ventricle Right Ventricle	Dilated Hypertrophic Restrictive
Endo / myo / epi	Backward / Forward failure	Low / High output	Systolic / diastolic failure

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Confusing terms

- Acute pulmonary edema ≠ acute heart failure
- Cardiomyopathy ≠ LV dysfunction ≠ heart failure
- Diastolic dysfunction ≠ HFpEF
  - The term diastolic dysfunction refers to abnormalities in LV filling secondary to altered compliance, relaxation, and/or recoil. Abnormalities in diastolic function can occur in the presence or absence of a clinical syndrome of heart failure and with normal or abnormal systolic function
- Systolic dysfunction ≠ HFrEF

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Acute pulmonary edema ≠ acute heart failure

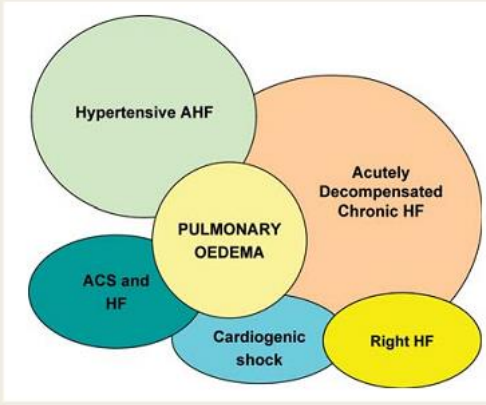
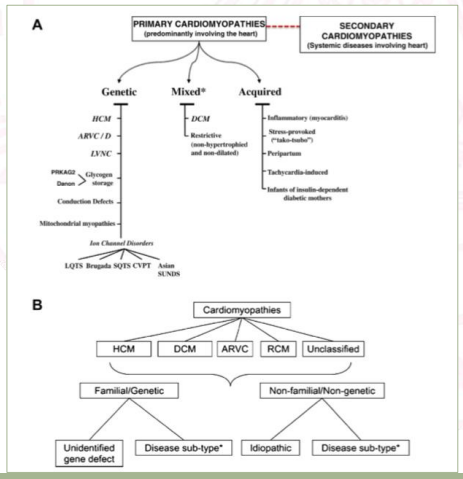


Figure 3 Clinical classification of acute heart failure. Modified from reference 205.

Cardiomyopathy is a pure myocyte disease

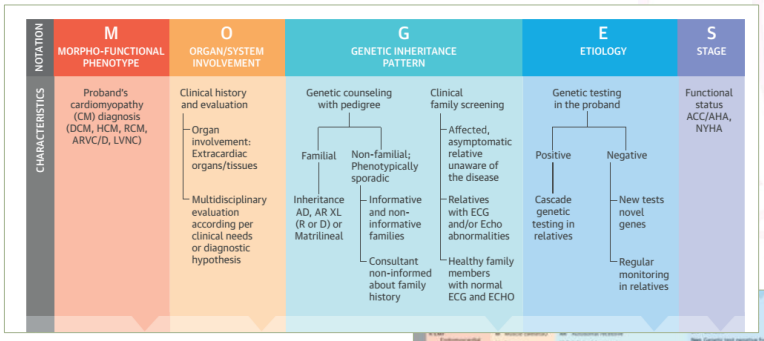
Cardiomyopathy

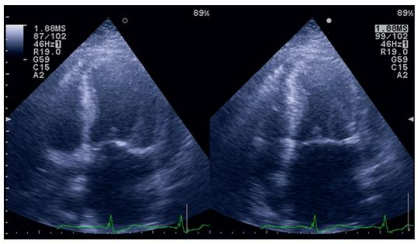
"a heterogeneous group of diseases of the myocardium associated with mechanical and/or electrical dysfunction, which usually exhibit inappropriate ventricular hypertrophy or dilatation, due to a variety of etiologies that frequently are genetic.



Circulation. 2006;113:1807-1816.
European Heart Journal 2008;29: 270–276.

The MOGE(S) Classification of Cardiomyopathy for Clinicians





$M_{H+D}\ O_{H}\ G_{AD}\ E_{G\text{-}MYH7[p.Val606Met]+LMNA[p.\ Asp254Gly]}\ S_{C\text{-}II}$

J Am Coll Cardiol 2014;64:304–18.

Dilated Cardiomyopathy

- Mixed myocyte disease after exclude primary cardiomyopathy
  - AHA Definitions and Classification of the Cardiomyopathies
- A large group of heterogeneous myocardial disorders, characterized by ventricular dilation and depressed myocardial contractility in the absence of abnormal loading conditions.
  - ACC/AHA HF guideline 2012
  - Valvular or hypertensive condition causing dilated LV should not be called DCM.
- Nonischemic CM ≠ DCM

Etiology of HF

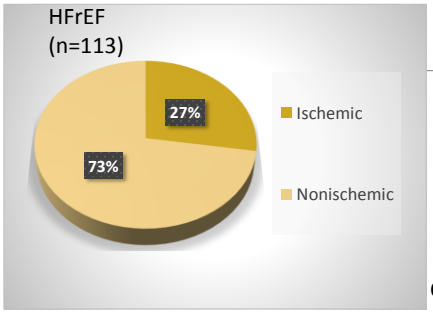
TABLE 1. FINAL DIAGNOSES IN 1230 PATIENTS WITH INITIALLY UNEXPLAINED CARDIOMYOPATHY.

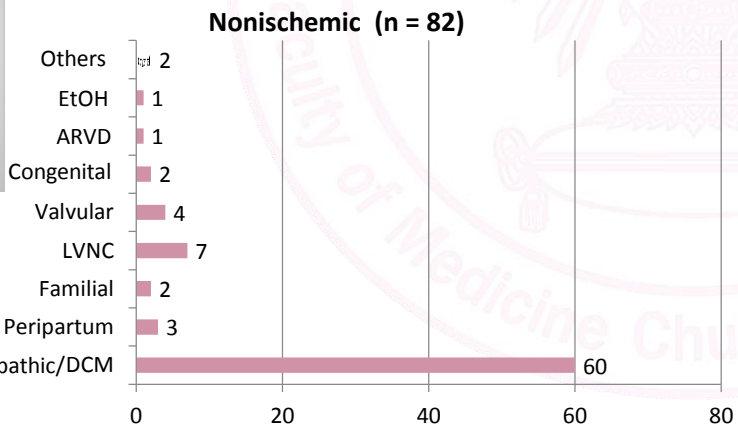
DIAGNOSIS	NUMBER (%)
Idiopathic cardiomyopathy	616 (50)
Myocarditis	111 (9)
Ischemic heart disease	91 (7)
Cardiomyopathy due to infiltrative myocardial disease	59 (5)
Amyloidosis	36
Sarcoidosis	14
Hemochromatosis	9
Peripartum cardiomyopathy	51 (4)
Cardiomyopathy due to hypertension	49 (4)
Cardiomyopathy due to infection with the human immunodeficiency virus	45 (4)
Cardiomyopathy due to connective-tissue disease	39 (3)
Scleroderma	12
Systemic lupus erythematosus	9
Marfan's syndrome	3
Polyarteritis nodosum	3
Dermatomyositis or polymyositis	3
Nonspecific connective-tissue disease	3
Ankylosing spondylitis	2
Rheumatoid arthritis	1
Relapsing polychondritis	1
Wegener's granulomatosis	1
Mixed connective-tissue disease	1
Cardiomyopathy due to substance abuse	37 (3)
Chronic alcohol abuse	28
Cocaine abuse	9
Cardiomyopathy due to doxorubicin therapy	15 (1)
Cardiomyopathy due to other causes	117 (10)
Restrictive cardiomyopathy	28
Familial cardiomyopathy	25
Valvular heart disease	19
Endocrine dysfunction	
Thyroid disease	7
Carcinoid	2
Pheochromocytoma	1
Acromegaly	1
Neuromuscular disease	7
Neoplastic heart disease	6
Congenital heart disease	4
Complication of coronary-artery bypass surgery	4
Radiation	3
Critical illness	3
Endomyocardial fibroelastosis	1
Thrombotic thrombocytopenic purpura	1
Rheumatic carditis	1
Drug therapy (not including doxorubicin)	
Leukotrienes	2
Lithium	1
Prednisone	1

N Engl J Med 2000;342: 1077-84

HF clinic:

King chulalongkorn Memorial Hospital





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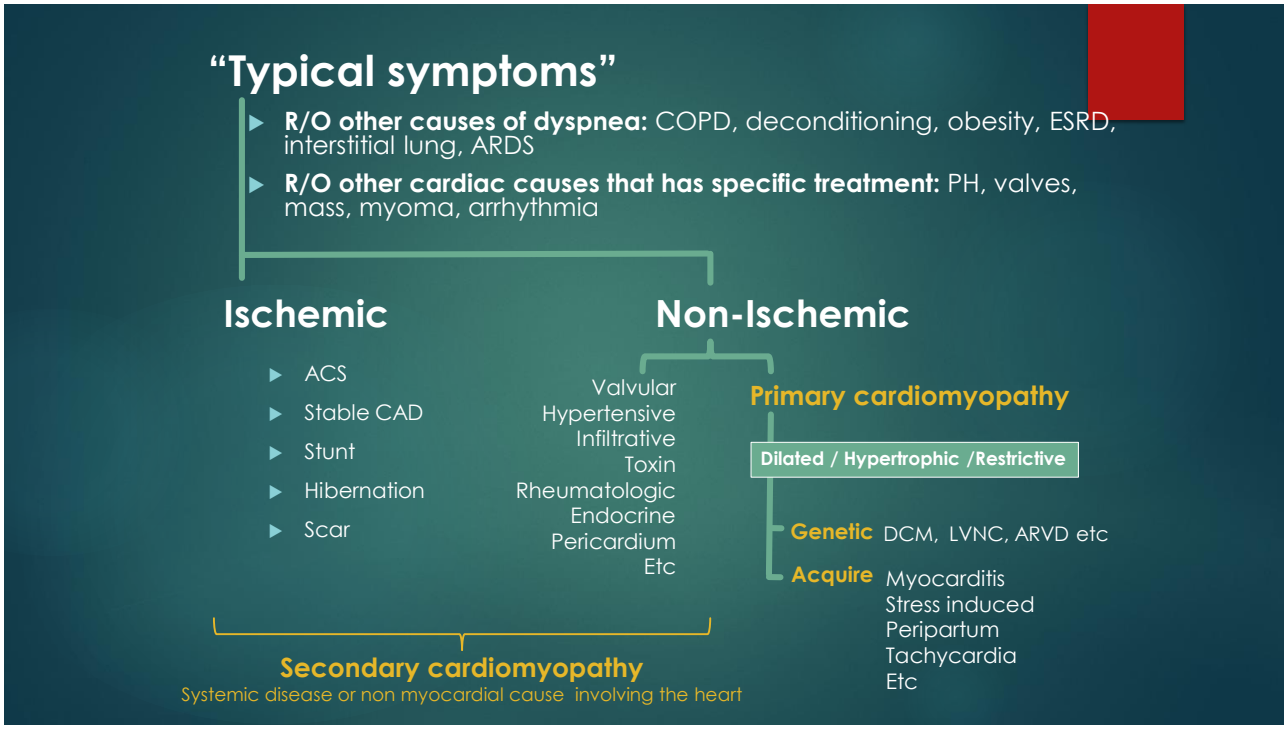
Puwanant S. Unpublished



Conclusion

- HF is a clinical syndrome cause by cardiac dysfunction and typical symptoms
- EF is commonly used to classified patients
- There are many causes/etiologies of HF
- Non-ischemic cardiomyopathy is not the same as DCM

Thank you

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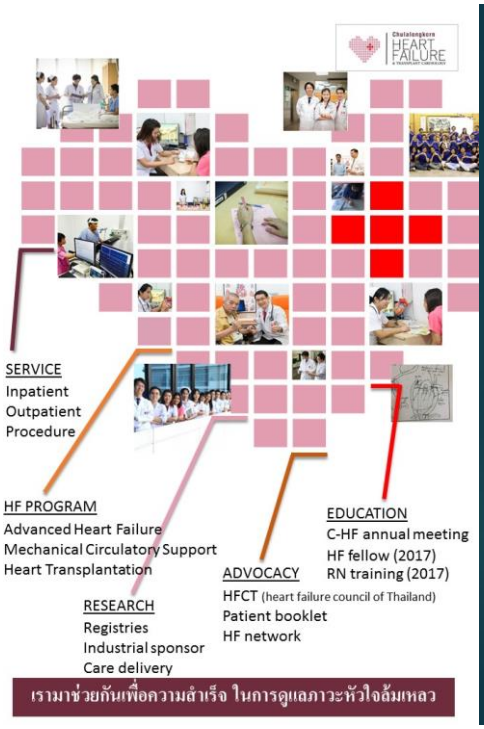

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เครื่องมือ

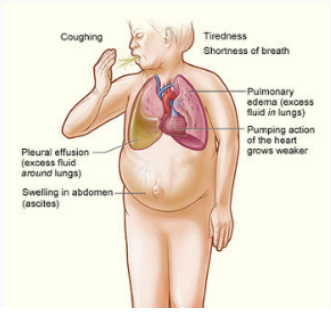
ภาวะหัวใจวาย

[ปิด]

จากวิกิพีเดีย สารานุกรมเสรี

ภาวะหัวใจวาย หรือ**ภาวะหัวใจล้มเหลว** (อังกฤษ: Heart Failure (HF)) มักใช้หมายถึง**ภาวะหัวใจวายเรื้อรัง** (อังกฤษ: chronic heart failure (CHF)) เกิดเมื่อหัวใจไม่สามารถสูบฉีดเลือดเพียงพอเพื่อคงการไหลของเลือดเพื่อสนองความต้องการของร่างกาย[1][2][3] คำว่า **โรคหัวใจเลือดคั่ง** (อังกฤษ: Congestive heart failure (CHF) หรือ congestive cardiac failure (CCF)) มักใช้แทนคำว่าหัวใจวายเรื้อรัง ได้[4] อาการและอาการแสดงโดยทั่วไปมีหายใจกระชั้น เหนื่อยเกิน และขาบวม[5] การหายใจกระชั้นมักเลวลงเมื่อออกกำลังกาย เมื่อนอนราบและเมื่อกลางคืนขณะหลับ[5] มักมีข้อจำกัดปริมาณการออกกำลังกายที่ผู้ป่วยทำได้ แม้รักษาอย่างดีแล้ว[6]

ภาวะหัวใจวาย (Heart failure)



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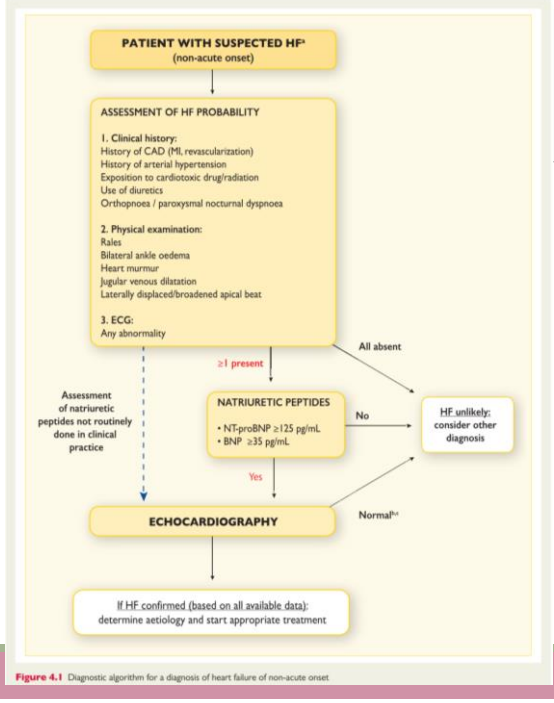

Figure 4.1 Diagnostic algorithm for a diagnosis of heart failure of non-acute onset

Echo dx criteria for HFpEF

The next step comprises an advanced workup in case of initial evidence of HFpEF/HFmrEF and consists of objective demonstration of structural and/or functional alterations of the heart as the underlying cause for the clinical presentation. Key structural alterations are a left atrial volume index (LAVI) >34 mL/m^2 or a left ventricular mass index (LVMI) ≥ 115 g/m^2 for males and ≥ 95 g/m^2 for females.[65,67,72] Key functional alterations are an E/e' ≥ 13 and a mean e' septal and lateral wall <9 cm/s.[65,67,70,72,80–84] Other (indirect) echocardiographically derived measurements are longitudinal strain or tricuspid regurgitation velocity (TRV).[72,82] An overview

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