SIGNS AND SYMPTOMS OF CARDIOVASCULAR SYSTEM DISEASES

1) Syndrome of arterial hypertension.
2) Syndrome of coronary insufficiency.
3) Syndrome of heart failure.

LECTURE IN INTERNAL MEDICINE PROPAEDEUTICS

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Plan of lecture

Syndrome of Arterial hypertension:

- Definition
- Classification
- Causes
- Clinical picture
- Diagnosis

Syndrome of coronary insufficiency:

- Definition
- Classification
- Causes
- Clinical picture
- Diagnosis

Syndrome of heart failure:

- Definition
- Classification
- Causes
- Clinical picture
- Diagnosis

Syndrome of arterial hypertension

(Arterial) hypertension: definition

- Hypertension (HTN or HT), also known as high blood pressure or arterial hypertension, is a chronic medical condition in which the blood pressure in the arteries is elevated
- Hypertension is having a blood pressure higher than 139 over 89 (≥ 140 and/or ≥ 90) mmHg for most adults; different criteria apply to children

http://www.medicalnewstoday.com/articles/150109.php#what_is_hypertension https://en.wikipedia.org/wiki/Hypertension

(Arterial) hypertension: types

- Primary (essential) hypertension (90% cases), defined as high blood pressure with no obvious underlying cause

- Secondary hypertension (10% cases), , defined as high blood pressure due to an identifiable cause, such as chronic kidney disease, narrowing of the aorta or kidney arteries; endocrine disorders such as excess aldosterone, cortisol, catecholamines overproduction, etc.

http://http://https://en.wikipedia.org/wiki/Hypertension

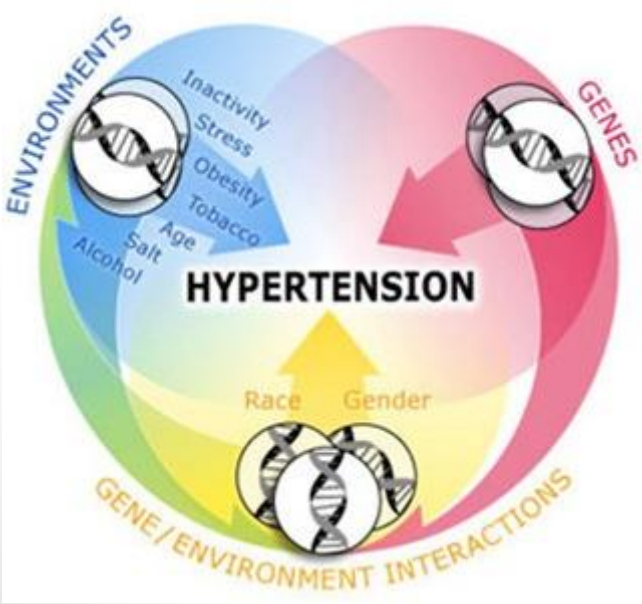
(Arterial) hypertension: classification of blood pressure (mm Hg) for adults

Category	Systolic	Diastolic
Normal	90–119	60–79
High normal (Prehypertension)	120–139	80–89
Stage 1 hypertension	140–159	90–99
Stage 2 hypertension	160–179	100–109
Stage 3 hypertension (Hypertensive emergency)	≥180	≥110
Isolated systolic hypertension	≥140	<90

https://en.wikipedia.org/wiki/Hypertension

(Arterial) hypertension: causes of primary hypertension

- Hypertension results from a complex interaction of genes and environmental factors
- Numerous common genetic variants with small effects on blood pressure have been identified as well as some rare genetic variants with large effects on blood pressure, but the genetic basis of hypertension is still poorly understood



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http://http://www.mayoclinic.org/diseases-conditions/high-blood-pressure/basics/symptoms/con-20019580 https://en.wikipedia.org/wiki/Hypertension

(Arterial) hypertension: causes of secondary hypertension

- Kidney disease
- Cushing's syndrome
- Hyperthyroidism
- Hypothyroidism
- Acromegaly
- Conn's syndrome
- Hyperaldosteronism (other causes)
- Hyperparathyroidism
- Pheochromocytoma
- Obesity
- Sleep apnea
- Pregnancy
- Drug-induced
- Etc.

http://knowmedge.com/blog/wp-content/uploads/2014/04/Medical-Mnemonics-Secondary-Causes-Hypertension.png
http://http://www.mayoclinic.org/diseases-conditions/high-blood-pressure/basics/symptoms/con-20019580 https://en.wikipedia.org/wiki/Hypertension

(Arterial) hypertension: hypertensinogenic (risk) factors

- Age
- Race
- Sex
- Family history
- Obesity
- A sedentary lifestyle
- Insulin resistance
- Using tobacco
- High alcohol intake
- High salt intake
- Stress
- Dyslipidemia
- Low potassium intake
- Low calcium intake
- Too little vitamin D in diet
- Certain chronic conditions

http://circ.ahajournals.org/content/101/3/329.long

(Arterial) hypertension: stratification of total cardiovascular disease risk

Other risk factors, asymptomatic organ damage or disease	Blood Pressure (mmHg)			
	High normal SBP 130–139 or DBP 85–89	Grade 1 HT SBP 140–159 or DBP 90–99	Grade 2 HT SBP 160–179 or DBP 100–109	Grade 3 HT SBP ≥180 or DBP ≥110
No other RF		Low risk	Moderate risk	High risk
1–2 RF	Low risk	Moderate risk	Moderate to high risk	High risk
≥3 RF	Low to Moderate risk	Moderate to high risk	High Risk	High risk
OD, CKD stage 3 or diabetes	Moderate to high risk	High risk	High risk	High to very high risk
Symptomatic CVD, CKD stage ≥4 or diabetes with OD/RFs	Very high risk	Very high risk	Very high risk	Very high risk

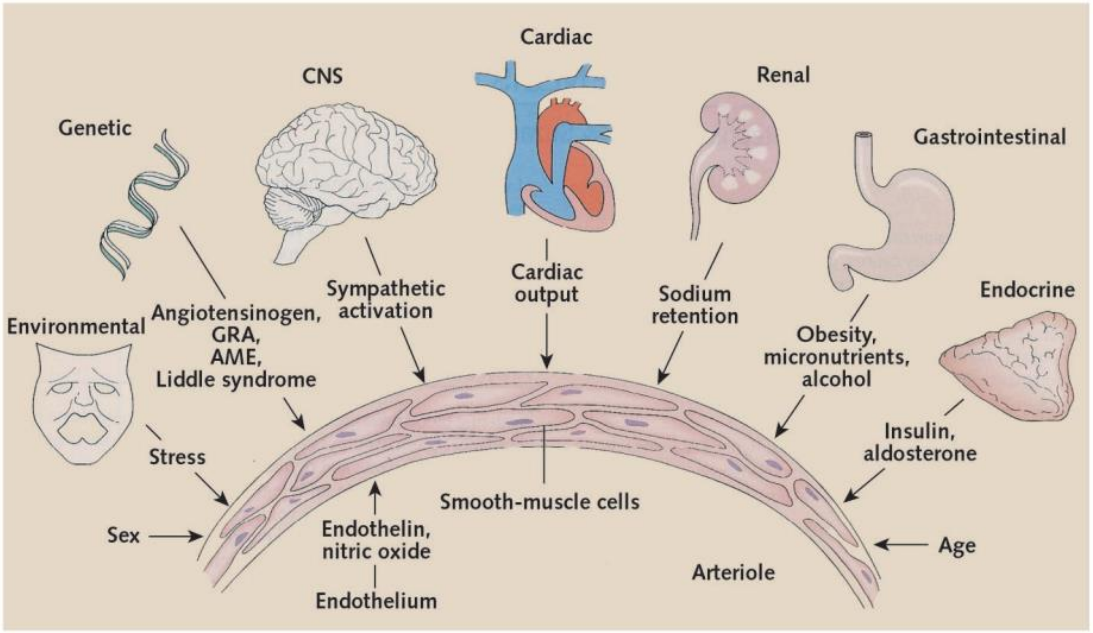
BP = blood pressure; CKD = chronic kidney disease; CV = cardiovascular; CVD = cardiovascular disease; DBP = diastolic blood pressure; HT = hypertension; OD = organ damage; RF = risk factor; SBP = systolic blood pressure.

http://d1vzuwdl7rxiz0.cloudfront.net/content/ehj/34/28/2159/F1.large.jpg

(Arterial) hypertension: pathophysiology

Key factors:

- Abnormal Na transport
- Increased sympathetic nervous activity
- Increased renin-angiotensin-aldosterone system activity
- Vasodilator deficiency



AME - apparent mineralocorticoid excess; CNS - central nervous system; GRA - glucocorticoid-remediable aldosteronism

http://www.the-aps.org/mm/publications/journals/pim/oparil-pdf.pdf

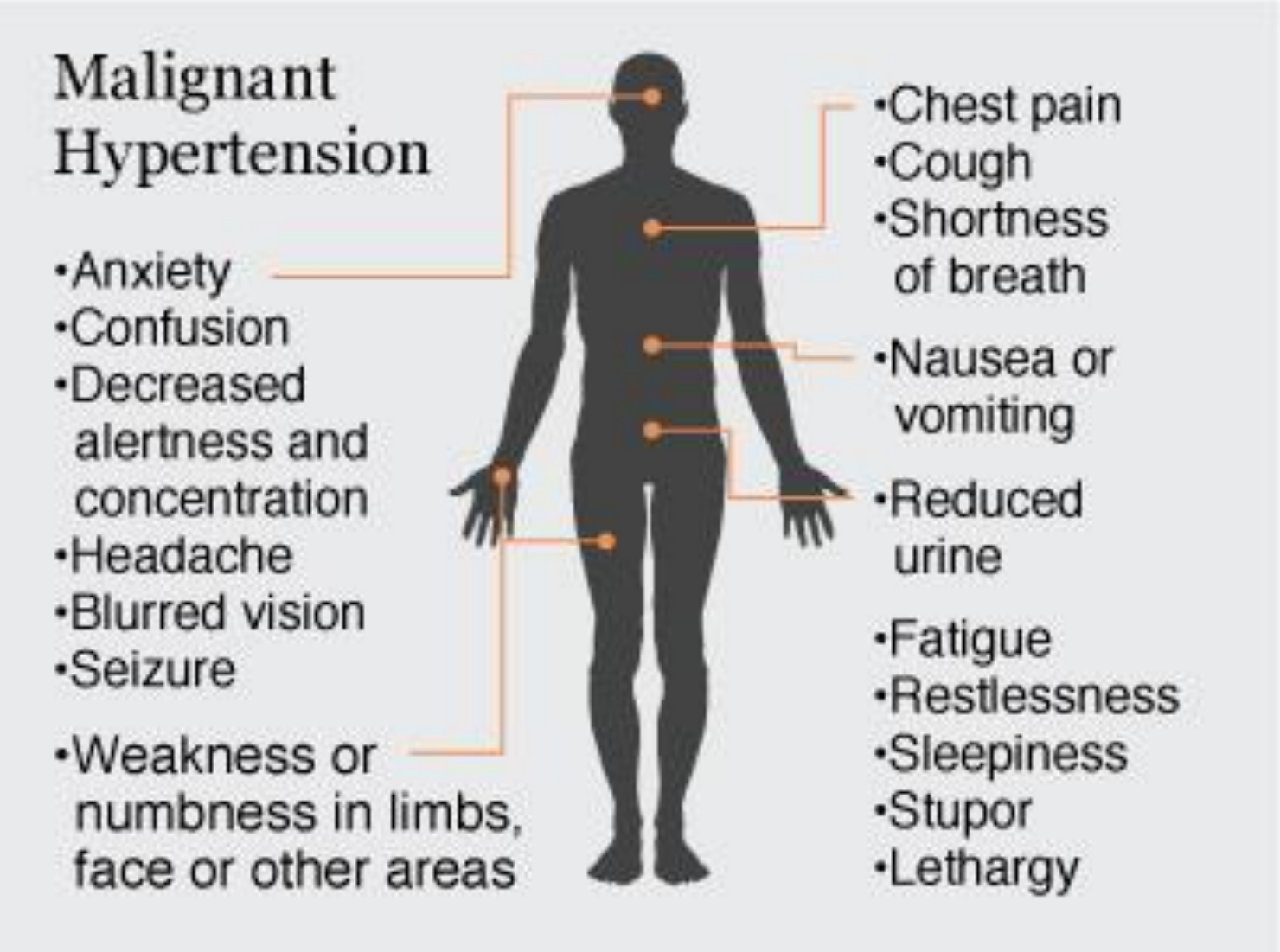
(Arterial) hypertension: signs and symptoms

- Most people with high blood pressure have no signs or symptoms, even if blood pressure readings reach dangerously high levels

- A few people with high blood pressure may have headaches, shortness of breath or nosebleeds, but these signs and symptoms aren't specific and usually don't occur until high blood pressure has reached a severe or life-threatening stage

http://www.webhealthjournal.com/common-symptoms-signs-of-high-blood-pressure/
http://http://www.mayoclinic.org/diseases-conditions/high-blood-pressure/basics/symptoms/con-20019580 https://en.wikipedia.org/wiki/Hypertension

(Arterial) hypertension: signs and symptoms



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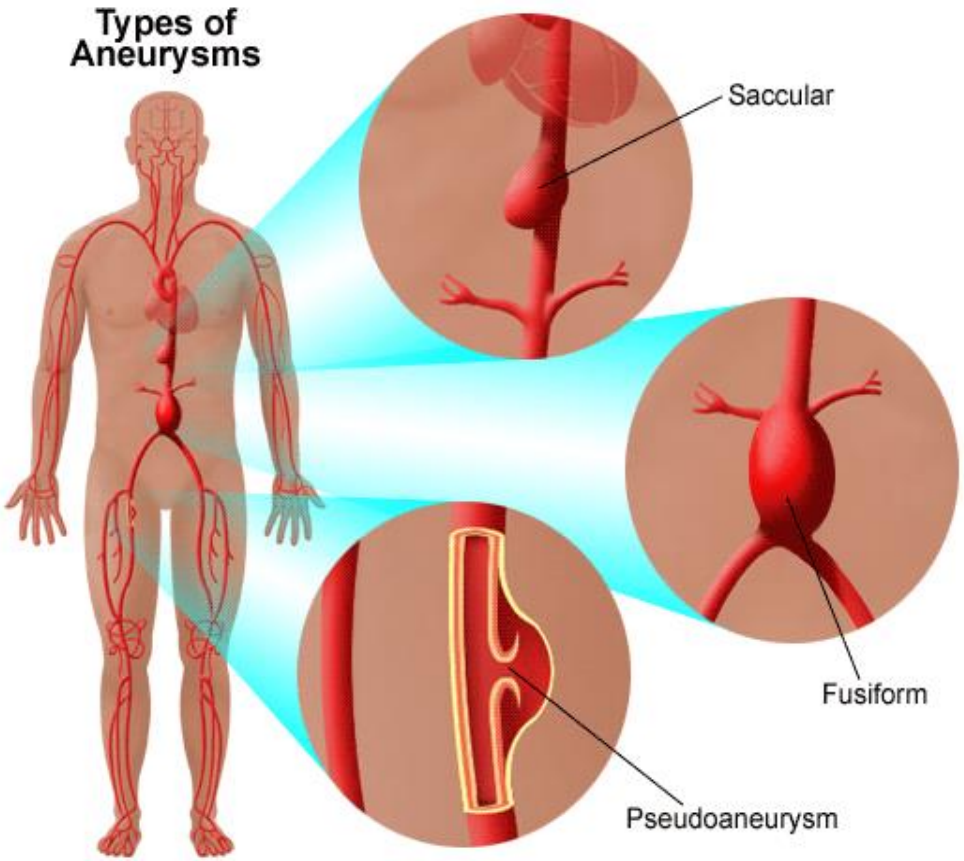
http://http://www.mayoclinic.org/diseases-conditions/high-blood-pressure/basics/symptoms/con-20019580 https://en.wikipedia.org/wiki/Hypertension

(Arterial) hypertension: main complications

- Hypertensive heart disease
- Coronary artery disease
- Stroke
- Aortic aneurysm
- Peripheral artery disease
- Chronic kidney disease
- Chronic heart failure
- Hypertensive retinopathy



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http://http://www.mayoclinic.org/diseases-conditions/high-blood-pressure/basics/symptoms/con-20019580 https://en.wikipedia.org/wiki/Hypertension

(Arterial) hypertension: medical history 1

- The known duration of hypertension and previously recorded levels
- Any history or symptoms of coronary artery disease (CAD), heart failure (HF)
- Other relevant coexisting disorders (e.g., stroke, renal dysfunction, peripheral arterial disease, dyslipidemia, diabetes, gout)
- Family history of any of these disorders

http://http://www.mayoclinic.org/diseases-conditions/high-blood-pressure/basics/symptoms/con-20019580 https://en.wikipedia.org/wiki/Hypertension

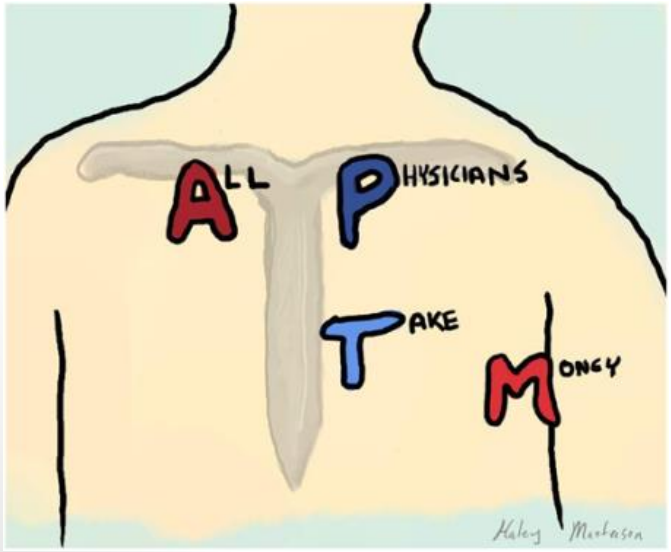
(Arterial) hypertension: medical history 2

- Social history includes exercise levels and use of tobacco, alcohol, and stimulant drugs (prescribed and illicit)
- A dietary history focuses on intake of salt and stimulants (e.g., tea, coffee, caffeine-containing sodas, energy drinks)
- Lifestyle factors
- Current and previous medications

http://http://www.mayoclinic.org/diseases-conditions/high-blood-pressure/basics/symptoms/con-20019580 https://en.wikipedia.org/wiki/Hypertension

(Arterial) hypertension: physical examination 1

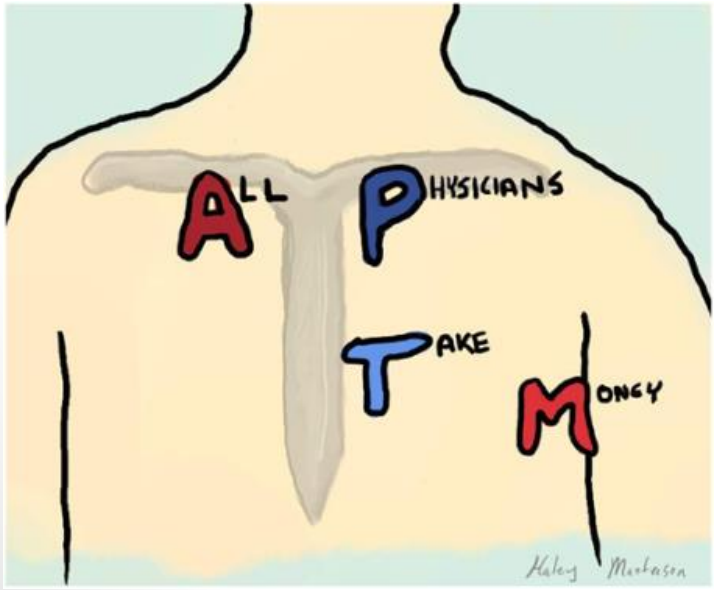
- Height, weight, and waist circumference
- Funduscopic examination for retinopathy
- Auscultation for bruits in the neck and abdomen (a unilateral renal artery bruit may be heard in slim patients with renovascular hypertension)
- Full cardiac, respiratory, and neurologic examination



http://www.firstaidteam.com/4457/mnemonic-monday-positions-of-heart-auscultation
http://http://www.mayoclinic.org/diseases-conditions/high-blood-pressure/basics/symptoms/con-20019580 https://en.wikipedia.org/wiki/Hypertension

(Arterial) hypertension: physical examination 1

- Heart auscultation (a 4th heart sound is one of the earliest signs of hypertensive heart disease)
- The abdomen palpation for kidney enlargement and abdominal masses
- Peripheral arterial pulses investigation (diminished or delayed femoral pulses suggest aortic coarctation, particularly in patients < 30)



http://www.firstaidteam.com/4457/mnemonic-monday-positions-of-heart-auscultation
http://http://www.mayoclinic.org/diseases-conditions/high-blood-pressure/basics/symptoms/con-20019580 https://en.wikipedia.org/wiki/Hypertension

(Arterial) hypertension: hypertensive crisis

- Severely elevated blood pressure equal to or greater than a systolic 180 or diastolic of 110 is referred to as a hypertensive crisis
- Hypertensive crisis is categorized as hypertensive urgency, according to the presence or absence of end organ damage
- The most affected organs include the brain, kidney, heart, aorta and lungs

https://s-media-cache-ak0.pinimg.com/736x/ed/ce/82/edce823cecd94c5554703f83bc956057.jpg
http://http://www.mayoclinic.org/diseases-conditions/high-blood-pressure/basics/symptoms/con-20019580 https://en.wikipedia.org/wiki/Hypertension

(Arterial) hypertension: diagnosis 1

- Multiple measurements of blood pressure (BP) to confirm
- Urinalysis and urinary albumin: creatinine ratio
- Blood tests: fasting lipids, hematocrit, creatinine, serum potassium (K), creatinine (or the corresponding estimated glomerular filtration rate), calcium, lipid profile, glucose
- Renal ultrasonography if creatinine increased

http://www.merckmanuals.com/professional/cardiovascular-disorders/hypertension/overview-of-hypertension#v932160

(Arterial) hypertension: diagnosis 2

- Evaluate for aldosteronism if K decreased
- ECG: If left ventricular hypertrophy, consider echocardiography
- Sometimes measurement of thyroid-stimulating hormone, T3-T4 hormones, cortisol
- Evaluation for pheochromocytoma or a sleep disorder if BP elevation sudden and labile or severe

http://www.merckmanuals.com/professional/cardiovascular-disorders/hypertension/overview-of-hypertension#v932160

(Arterial) hypertension: office blood pressure monitoring 1

- The patient should be seated comfortably with the back supported and the upper arm bared without constrictive clothing
- The legs should not be crossed
- The arm should be supported at the level of the heart, and the bladder of the blood pressure (BP) cuff should encircle at least 80% of the arm circumference

http://www.clevelandclinicmeded.com/medicalpubs/diseasemanagement/nephrology/arterial-hypertension/

(Arterial) hypertension: office blood pressure monitoring 2

- The BP measuring device should be deflated at the rate of 2 to 3 mm/sec, and the first and last audible sounds should be taken as the systolic and diastolic pressure respectively
- Neither the patient nor the observer should talk during the measurement

http://www.clevelandclinicmeded.com/medicalpubs/diseasemanagement/nephrology/arterial-hypertension/

(Arterial) hypertension: office blood pressure monitoring 3

- Measurements may be both while seated and after standing, to look for orthostatic or postural hypotension
- At least the first measurement should be done on the right and left arms

http://www.clevelandclinicmeded.com/medicalpubs/diseasemanagement/nephrology/arterial-hypertension/

(Arterial) hypertension: **office blood pressure** monitoring

Man getting his blood pressure taken at the **doctor's office**

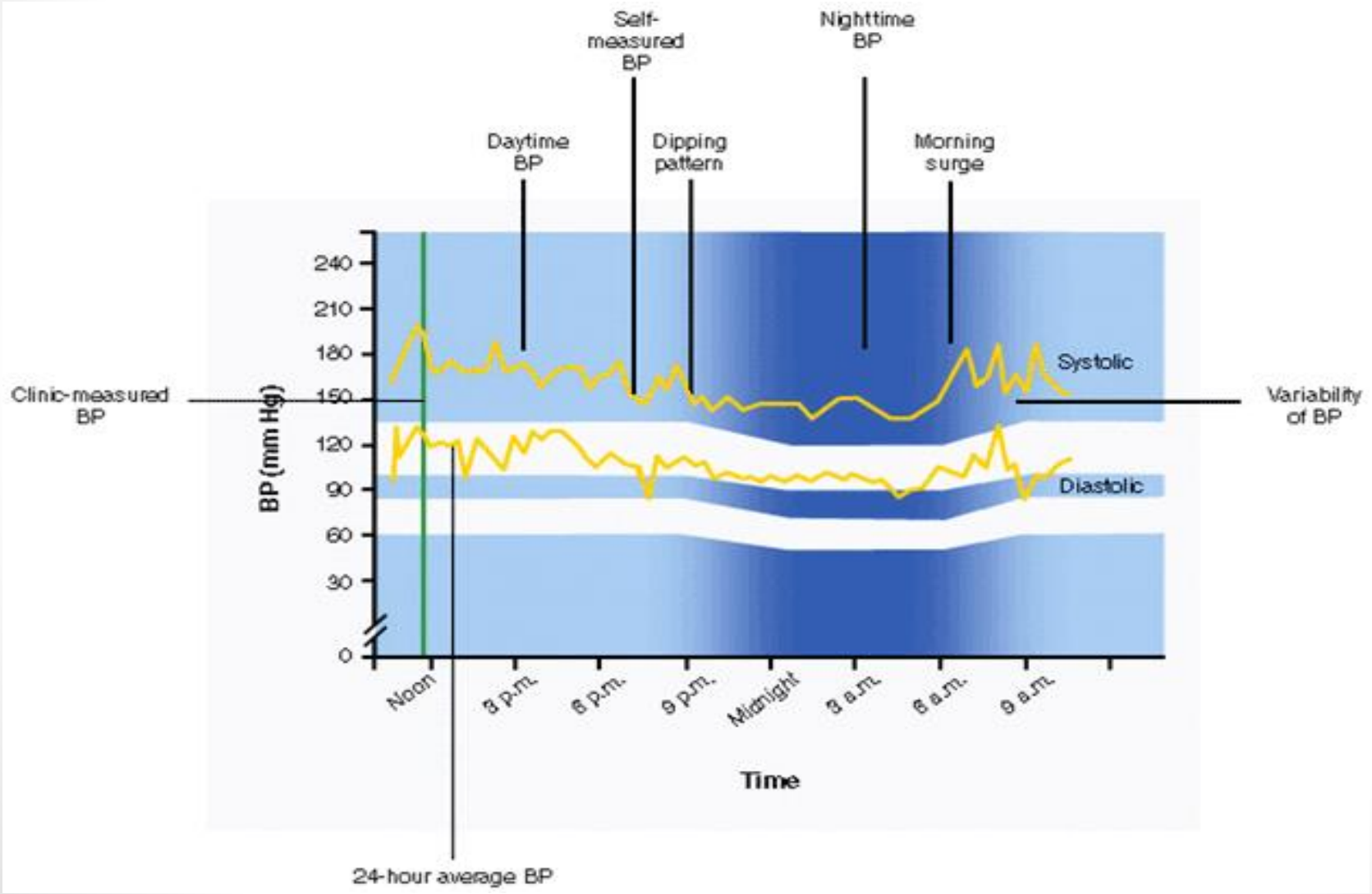
http://www.cdc.gov/dhdsp/images/hbp_patient.jpg

(Arterial) hypertension: ambulatory blood pressure monitoring 1

- The National Institute of Health and Clinical Excellence (NICE) guidelines recommend that a diagnosis of primary hypertension should be confirmed with 24-hour ambulatory blood pressure monitoring or home blood pressure monitoring rather than by relying solely on office blood pressure measurement

http://www.merckmanuals.com/professional/cardiovascular-disorders/hypertension/overview-of-hypertension#v932160

(Arterial) hypertension: ambulatory blood pressure monitoring



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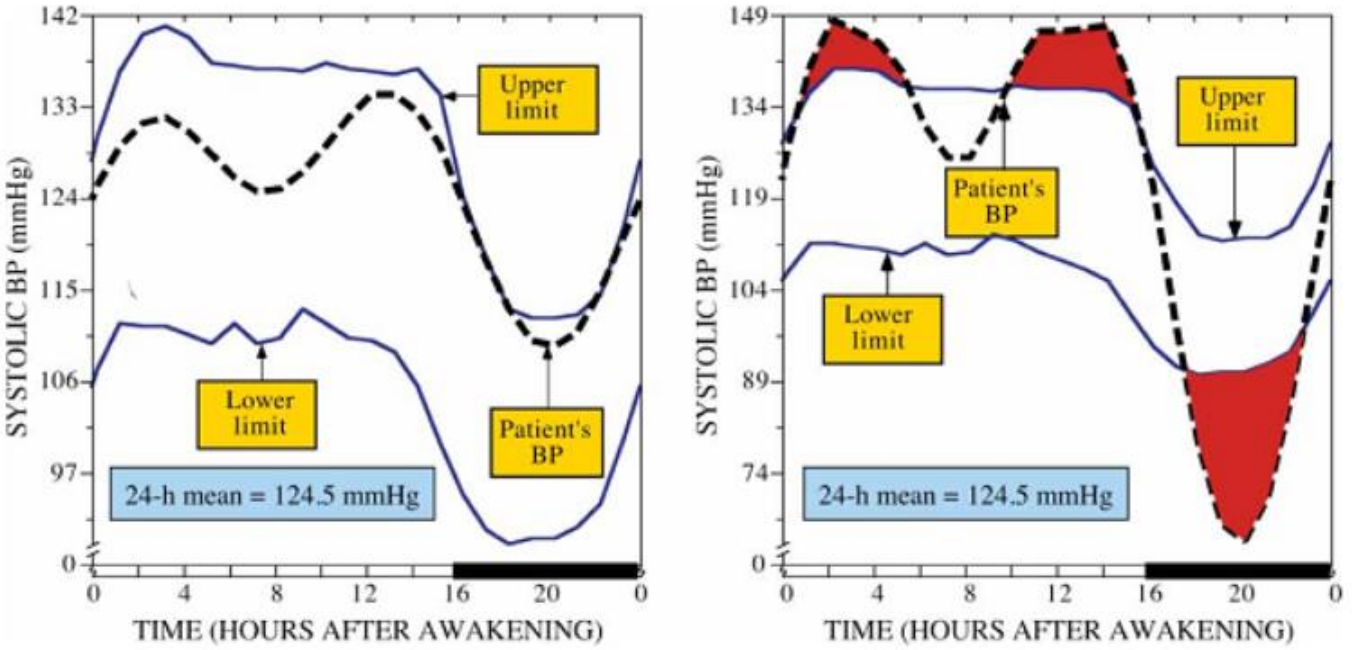
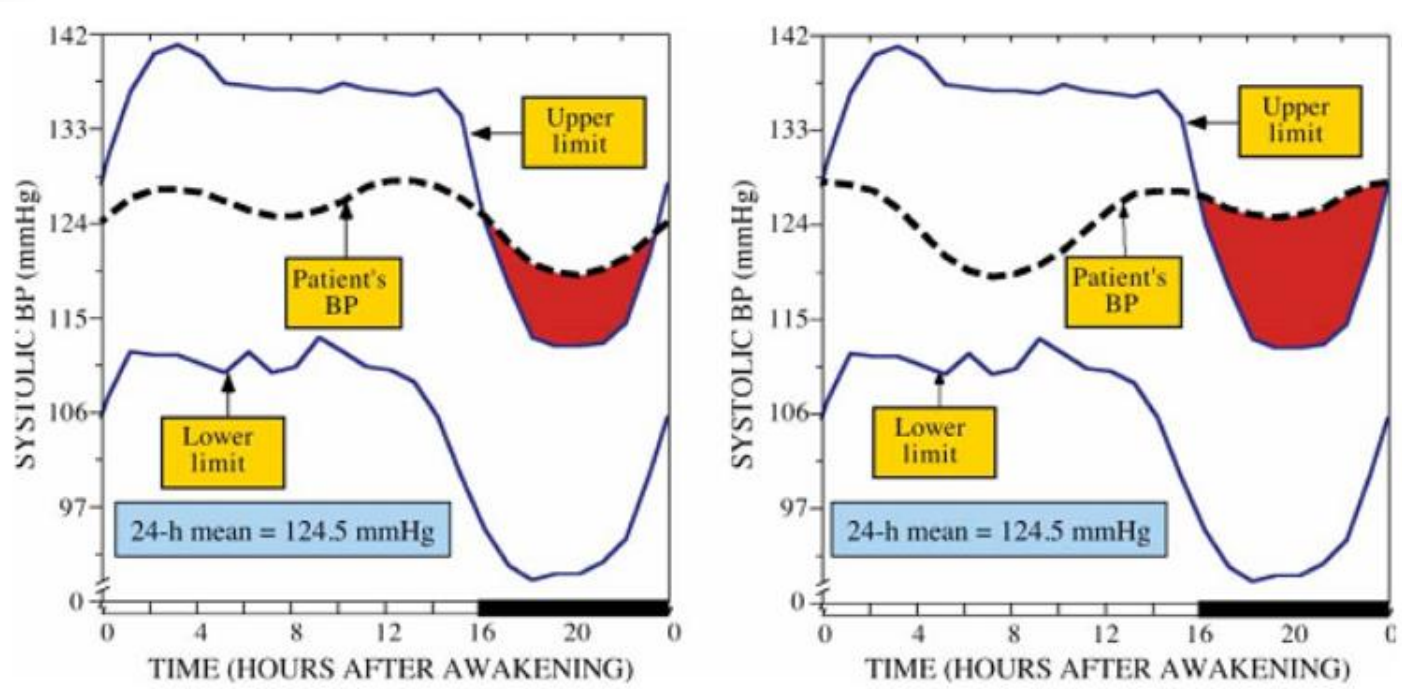
(Arterial) hypertension: ambulatory blood pressure monitoring



24-h SBP pattern (dashed thick lines) of a normotensive dipper subject (left) and a hypertensive extreme-dipper patient (right), plotted with respect to circadian time-specified tolerance limits(continuous thin lines)

http://www.ncbi.nlm.nih.gov/pubmed/23517220

(Arterial) hypertension: ambulatory blood pressure monitoring

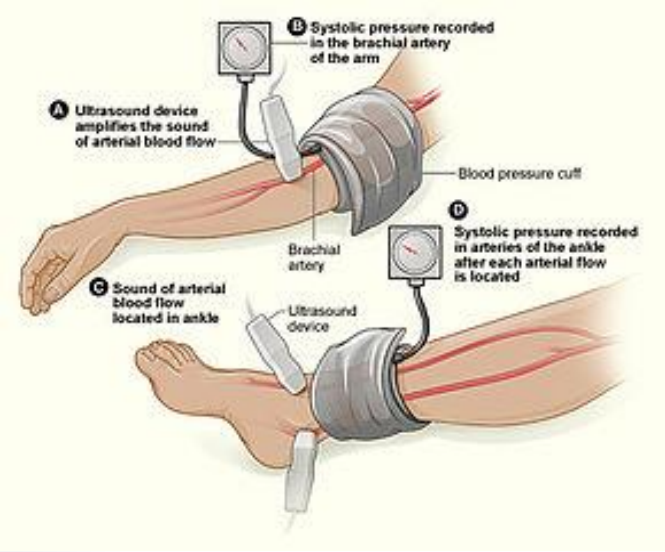


24-h SBP pattern (dashed thick lines) of a hypertensive non-dipper (left) and a hypertensive riser patient (right), plotted with respect to circadian time-specified tolerance limits (continuous thin lines), calculated from a reference population of normotensive individuals as a function of their rest-activity cycle and sex.

http://www.ncbi.nlm.nih.gov/pubmed/23517220

(Arterial) hypertension: ankle brachial index

- The ankle brachial pressure index (ABPI or ankle brachial index (ABI) is the ratio of the blood pressure in the lower legs to the blood pressure in the arms
- Compared to the arm, lower blood pressure in the leg is an indication of blocked arteries (peripheral artery disease or PAD) or secondary arterial hypertension due to aortic coarctation



https://en.wikipedia.org/wiki/Ankle_brachial_pressure_index

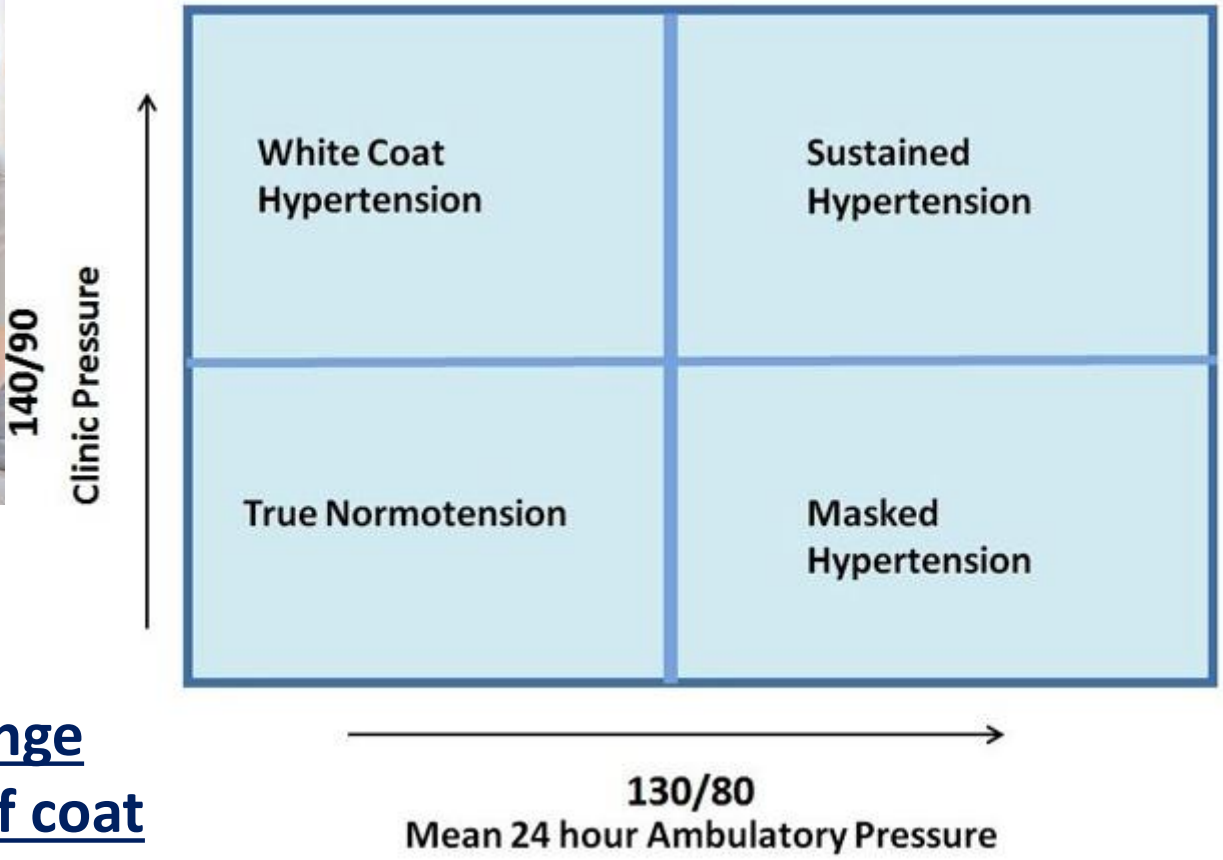
(Arterial) hypertension: ankle brachial index interpretation

ABPI value	Interpretation	Action	Nature of ulcers, if present
above 1.2	Abnormal vessel hardening from PVD	Refer routinely	Venous ulcer use full compression bandaging
1.0 - 1.2	Normal range	None	
0.9 - 1.0	Acceptable		
0.8 - 0.9	Some arterial disease	Manage risk factors	
0.5 - 0.8	Moderate arterial disease	Routine specialist referral	Mixed ulcers use reduced compression bandaging
under 0.5	Severe arterial disease	Urgent specialist referral	Arterial ulcers no compression bandaging used

ABPI - the ankle brachial pressure index

https://en.wikipedia.org/wiki/Ankle_brachial_pressure_index

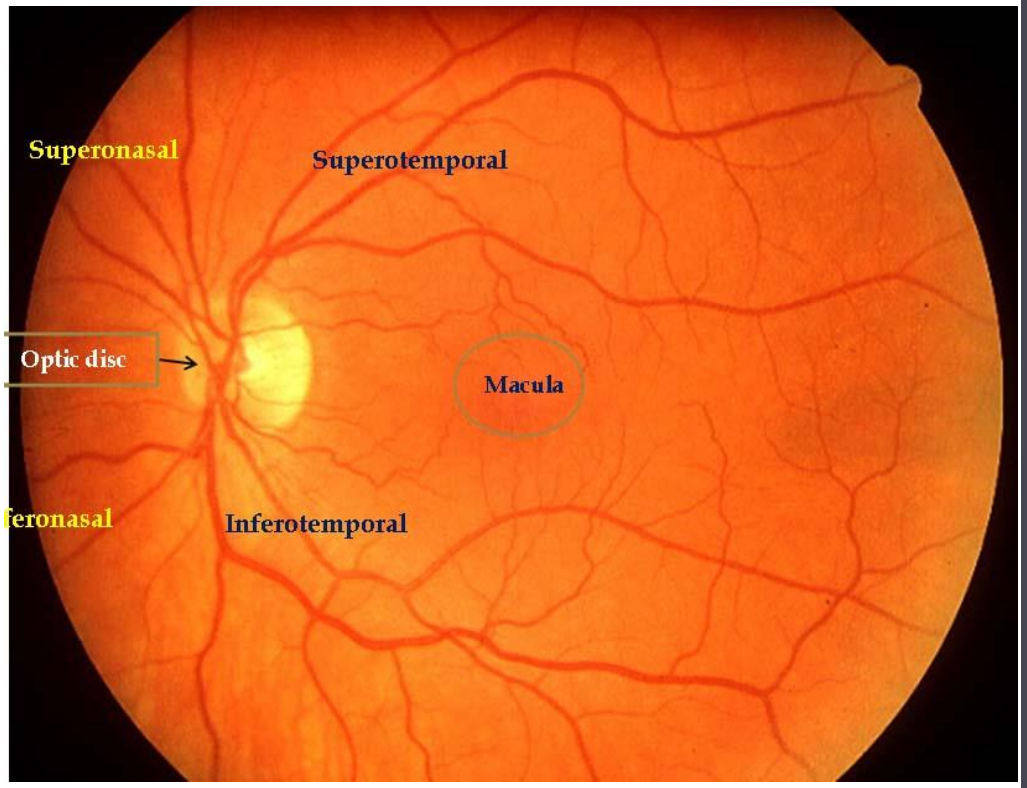
(Arterial) hypertension: patterns of blood pressure



The time of change color and model of coat

http://cdn3.healthcommunities.com/hcmedia/2011/06/bp-measurement-women.gif
http://www.clevelandclinicmeded.com/medicalpubs/diseasemanagement/nephrology/arterial-hypertension/#figure01

(Arterial) hypertension: ophthalmoscopy



Normal Fundus

http://pharmaworlds.com/wp-content/uploads/www.pharmaworlds.jpg http://intl.welchallyn.com/promotions/PanOptic/images/img_home_doctorPatient.jpg

(Arterial) hypertension: Keith Wagener Barker (KWB) grades of hypertensive retinopathy 1

- Hypertensive retinopathy is damage to the retina and retinal circulation due to high blood pressure
- KWB grades:

  1 - Arteriolar constriction/attenuation/sclerosis -`silver wiring` and vascular tortuosities

  2 - As grade 1 + Irregularly located, tight constrictions - known as `AV nicking` or `AV nipping`

  3 - As grade 2 + Retinal edema, cotton wool spots and flame-hemorrhages

  4 - As grade 3 + swelling of the optic disc (papilloedema) + macular star

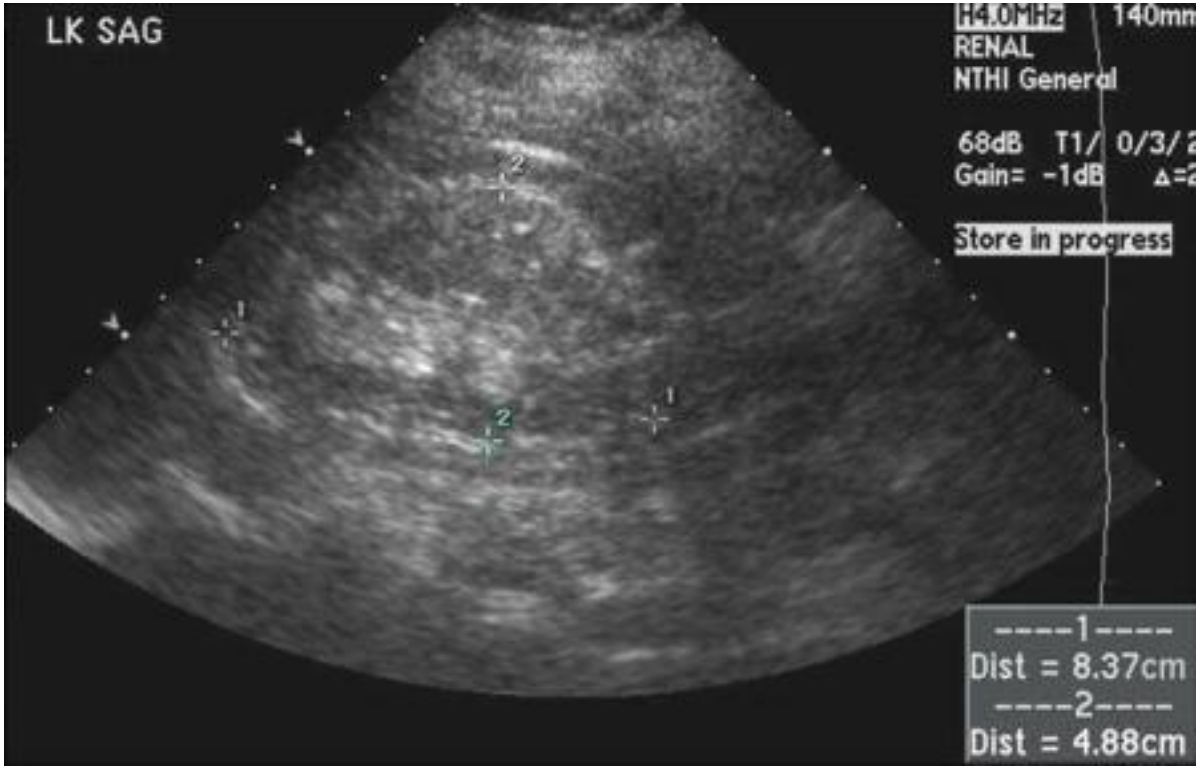
http://iovs.arvojournals.org/Article.aspx?articleid=2212632 https://en.wikipedia.org/wiki/Hypertensive_retinopathy

(Arterial) hypertension: hypertensive retinopathy

Peripapillary and periarteriolar retinal changes are apparent, including cotton wool spots, retinal hemorrhages, and exudates

http://iovs.arvojournals.org/Article.aspx?articleid=2212632 https://en.wikipedia.org/wiki/Hypertensive_retinopathy

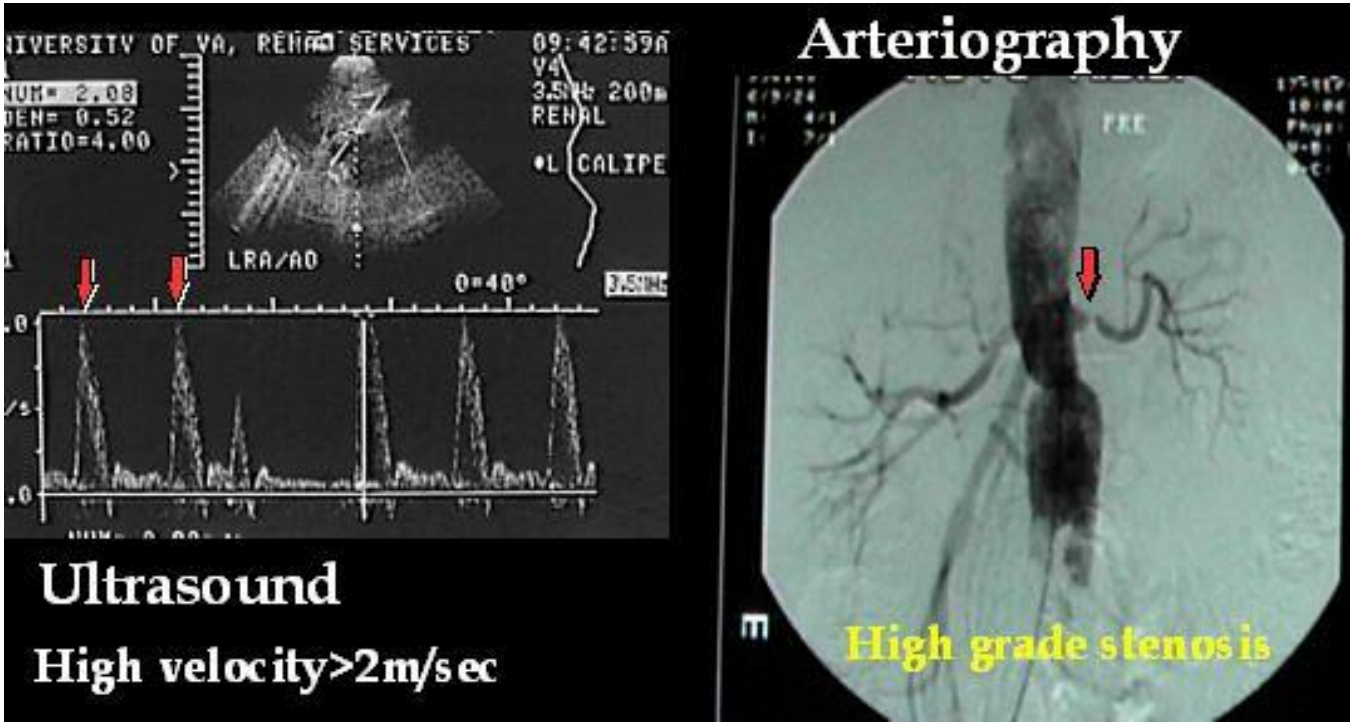
(Arterial) hypertension: renal sonography



The size of the left kidney is small (8.37 cm in length) and echogenicity of the kidney is increased in a patient with left renal artery stenosis

http://numonthly.com/956.fulltext

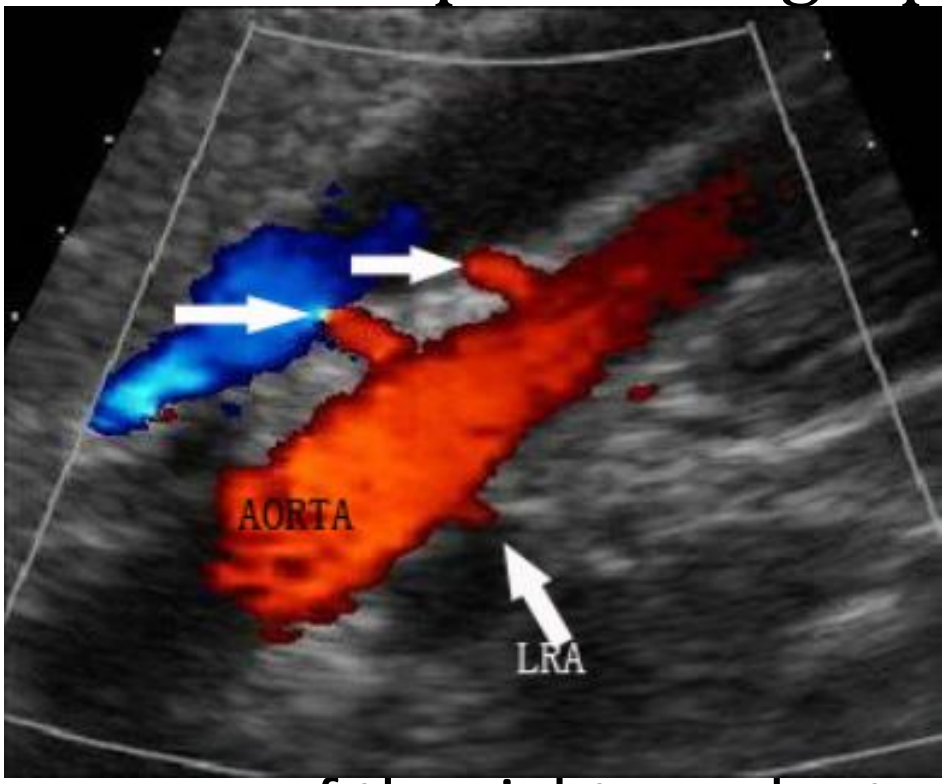
(Arterial) hypertension: combine renal artery Doppler ultrasound and arteriography



Renal artery Doppler ultrasound (1) screening for renal artery stenosis shows very high velocity flow at the level of the left renal artery origin from the aorta; subsequent arteriogram (2) shows tight stenosis at the left renal artery ostium

https://www.med-ed.virginia.edu/courses/rad/gu/kidneys/images/ras.jpg
https://edc2.healthtap.com/ht-staging/user_answer/avatars/987606/large/open-uri20130330-29617-1myknrg.jpeg?1386654286

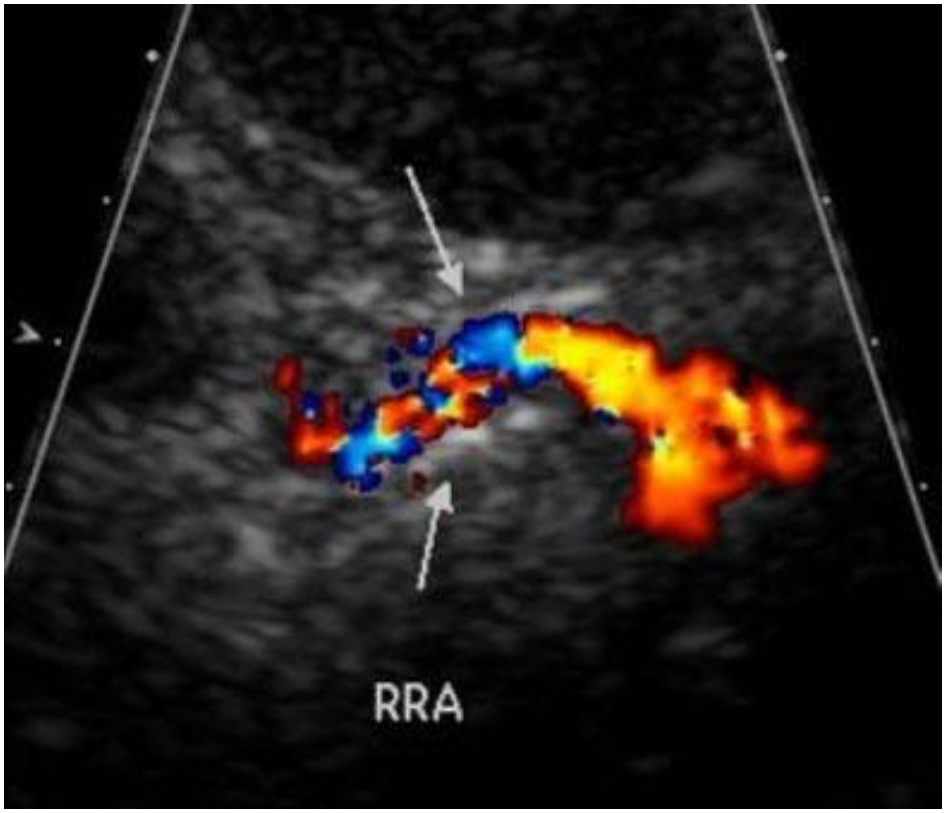
(Arterial) hypertension:
renal color duplex sonography



Normal appearance of the right renal artery, right accessory real artery, single left renal artery (arrows), and abdominal aorta on longitudinal view of color flow image. LRA, left renal artery

http://numonthly.com/956.fulltext

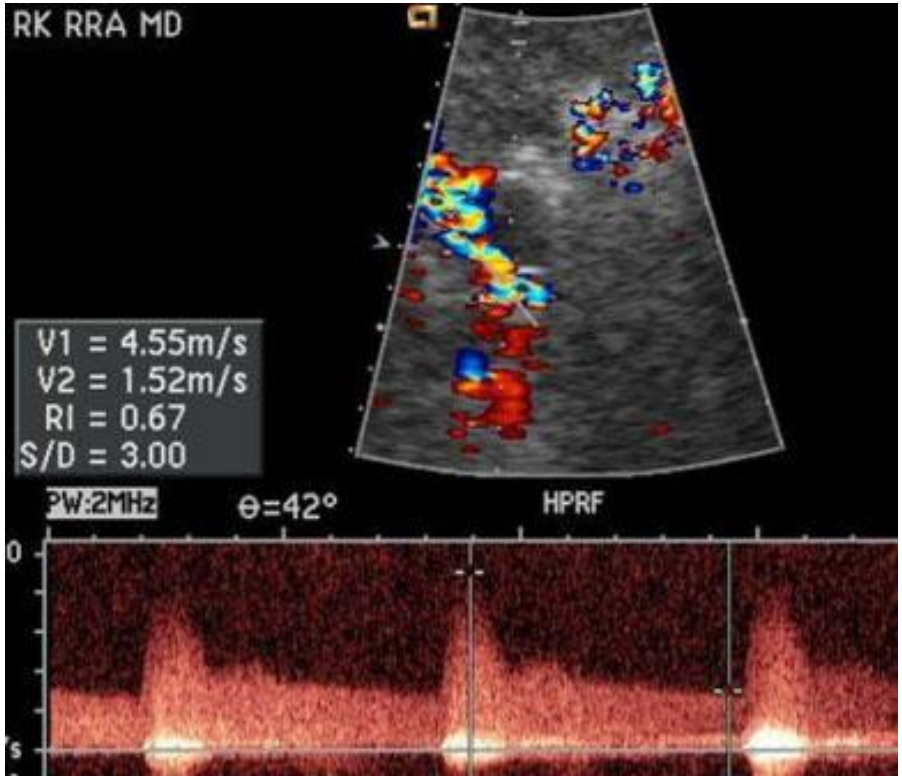
(Arterial) hypertension: renal color duplex sonography



Remarkably turbulent flow at the stenosis of the right proximal renal artery on longitudinal view of color flow image

http://numonthly.com/956.fulltext

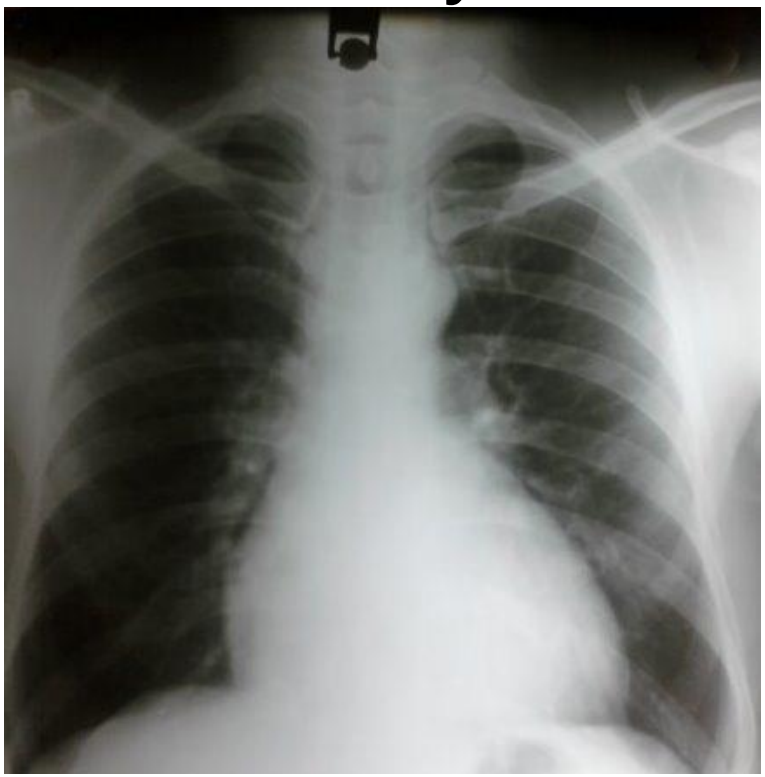
(Arterial) hypertension: renal color duplex sonography



Spectral Doppler demonstrated high peak systolic velocity (6.27 m/s) at the right renal artery with hemodynamically significant stenosis

http://numonthly.com/956.fulltext

(Arterial) hypertension: chest x-ray



The x-ray chest is suggesting a definite LV enlargement

http://www.merckmanuals.com/professional/cardiovascular-disorders/hypertension/overview-of-hypertension#v932160

Syndrome of coronary insufficiency

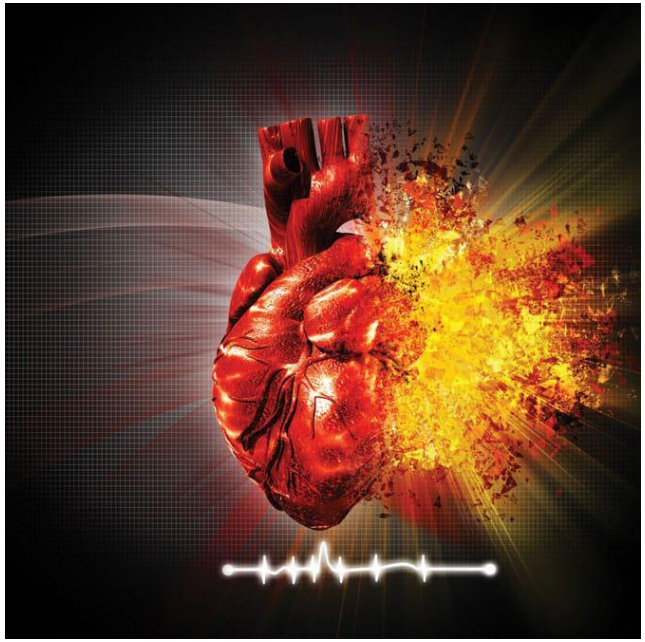
Definition

Coronary insufficiency (CI) is the state in which an imbalance occurs between the oxygen supply and demand, which prevents adequate maintenance of the metabolic needs of the myocardium, resulting in ischemia of several degrees of intensity

http:// http://highimpact.com/upload/project_headers/hr_MED07354-CORONARYINSUFFICIENCY.jpg http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0066-782X1999000100002

Classification 1

- acute (unstable angina, acute coronary syndromes)
- chronic (stable angina)



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https://www.specialistforum.co.za/wp-content/uploads/2014/02/Angina.jpg

Classification 2

- **Acute coronary syndromes (ACS)** are named according to the appearance of the ECG
  - Non-ST segment elevation myocardial infarction (NSTEMI)
  - ST- segment elevation myocardial infarction (STEMI)

https://en.wikipedia.org/wiki/Acute_coronary_syndrome

Classification 4

- Chronic coronary insufficiency (**stable angina** (angina pectoris, angina)) is the sensation of chest pain, pressure, or squeezing, often due to ischemia of the heart muscle from obstruction or spasm of the coronary arteries

- The term derives from the Latin angere ("to strangle")

- There is a weak relationship between severity of pain and degree of oxygen deprivation in the heart muscle

https://en.wikipedia.org/wiki/Acute_coronary_syndrome

Canadian Cardiovascular Society Functional Classification of Angina Pectoris

Class	Definition	Specific Activity Scale
I	Ordinary physical activity (eg, walking and climbing stairs) does not cause angina; angina occurs with strenuous, rapid, or prolonged exertion at work or recreation.	Ability to ski, play basketball, jog at 5 mph, or shovel snow without angina
II	Slight limitation of ordinary activity. Angina occurs on walking or climbing stairs rapidly, walking uphill, walking or stair climbing after meals, in cold, in wind, or under emotional stress, or only during the few hours after awakening, when walking more than 2 blocks on level ground, or when climbing more than 1 flight of stairs at a normal pace and in normal conditions.	Ability to garden, rake, roller skate, walk at 4 mph on level ground, have sexual intercourse without stopping
III	Marked limitation of ordinary physical activity. Angina occurs on walking 1 to 2 blocks on level ground or climbing 1 flight of stairs at a normal pace in normal conditions.	Ability to shower or dress without stopping, walk 2.5 mph, bowl, make a bed, play golf
IV	Inability to perform any physical activity without discomfort.	Anginal symptoms may be present at rest. Inability to perform activities requiring 2 or fewer metabolic equivalents without angina

http://www.clevelandclinicmeded.com/medicalpubs/diseasemanagement/cardiology/coronary-artery-disease/

Causes

- Atherosclerotic obstructive coronary insufficiency (Coronary Artery Disease - CAD) –main cause
- Cardiac valvular diseases (aortic stenosis)
- Hypertrophic cardiomyopathy
- Microvasculature diseases (diabetes mellitus, syndrome X)
- Anomalous origin of coronary arteries, and coronary fistulas

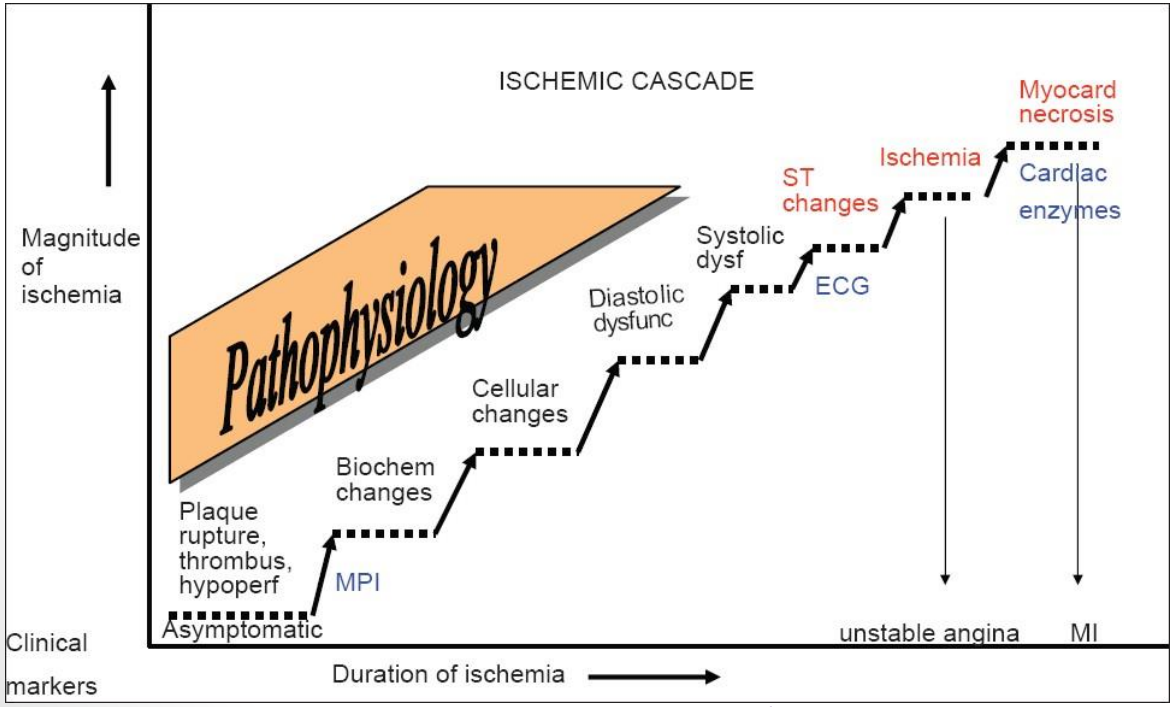
livemedical.net/images/coronary-artery-occlusion-due-to-plaque.jpg http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0066-782X1999000100002

Pathophysiology

Fundamental components

1. Endothelial dysfunction
2. Obstruction of the lumen of the vessel
3. Thrombosis at the location of the lesion

The decline of coronary reserve starts when lesions occupy at least 70% of the vessel diameter

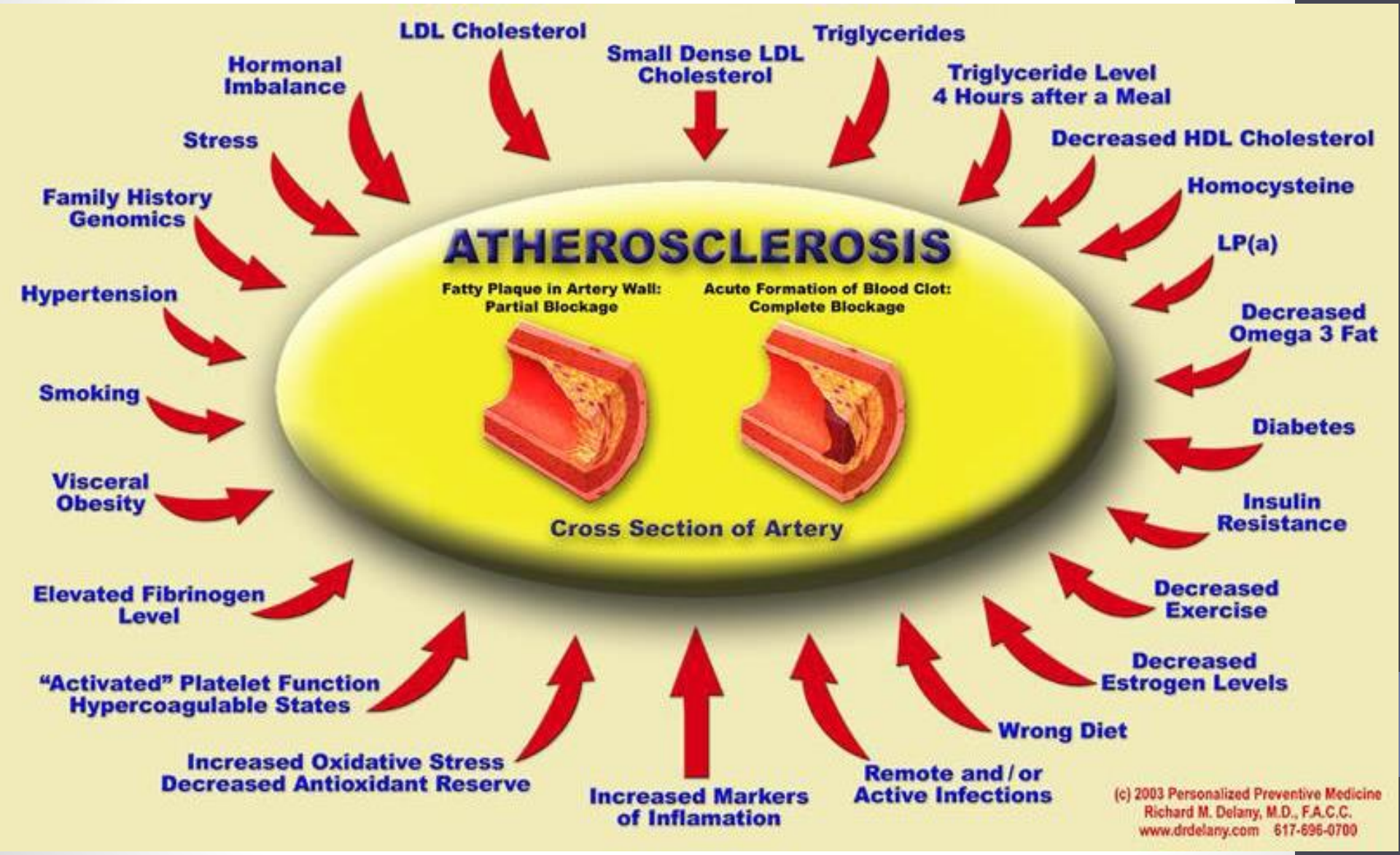


Depicts the myocardial ischemic cascade and stepwise changes, which occur at molecular and tissue level.

www.wjnm.org/article.asp?issn=1450-1147;year=2014;volume=13;issue=1;spage=6;epage=15;aulast=Padma

http://www.scielo.br/scielo.php?script=sci_arttext&pid=S0066-782X1999000100002

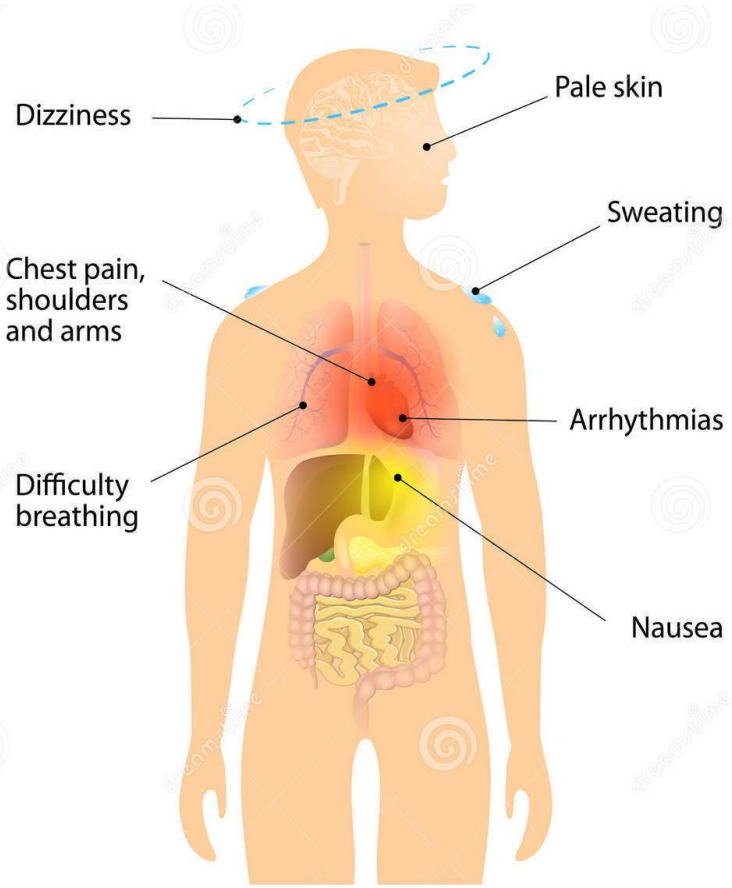
Risk factors



http://admin.itxpacks.com/pcpdelany/WebSite/MyImages/global-risk-powerpoint.modi_37.jpg

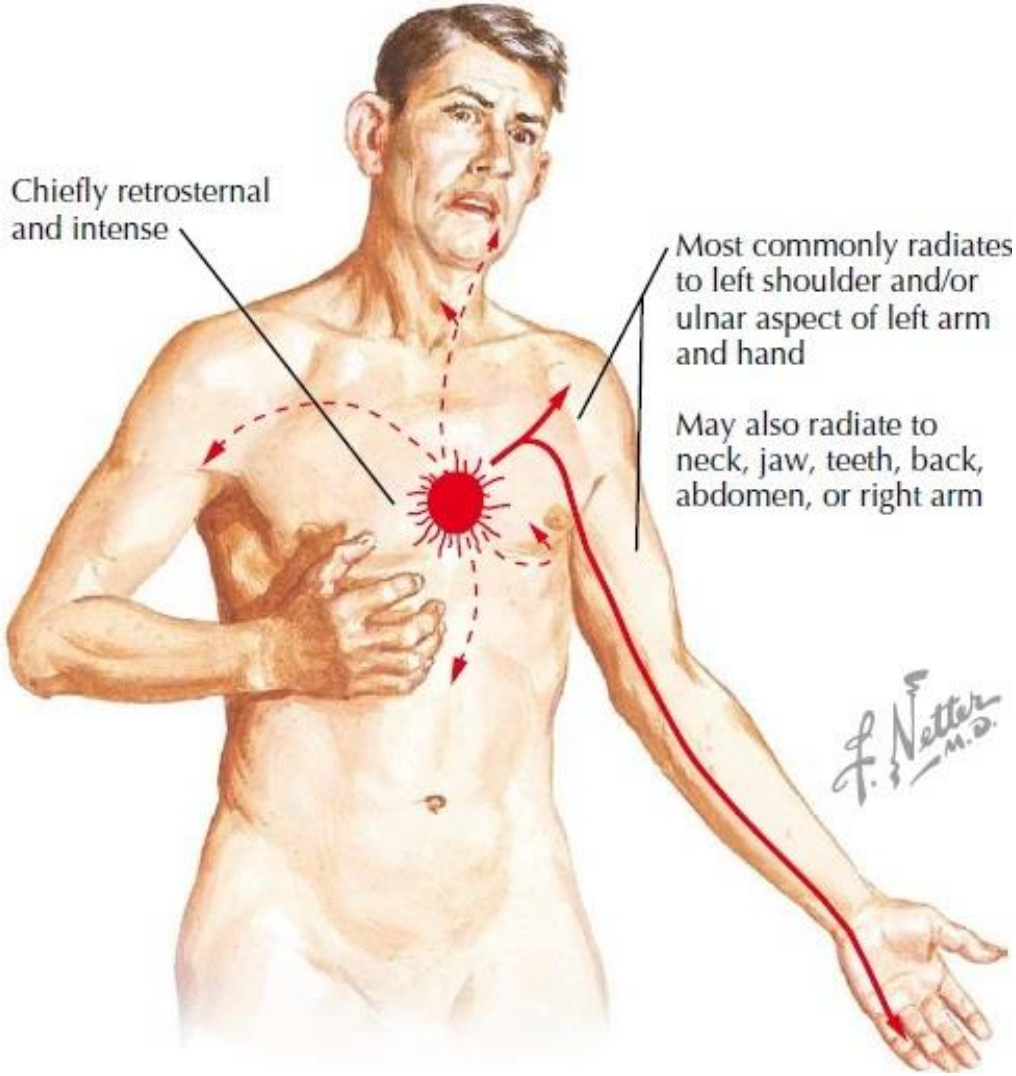
Clinical picture

- **Chest pain or discomfort**
- Shortness of breath
- Heart failure
- Irregular heartbeat
- Nausea
- Sweating
- Decreased exercise tolerance
- Etc.



http://thumbs.dreamstime.com/z/heart-disease-symptoms-signs-coronary-artery-cad-ischemic-ihd-also-known-as-atherosclerotic-52190105.jpg

Clinical picture



http://healthsciencedegree.info/heart-disease-chest-pain/

Clinical picture

Pain (Chest)	Cardiac	Pleuritic	Traumatic
D **Description:** • Can you describe the pain to me? (You need to determine it's nature.) • Is it there all the time ? Does it come and go? • Have you ever had this pain before? • What was it that time?	• Heavy • Tight • Squeezing • Dull	• Sharp • Catching • Stabbing	• Sharp • Catching • Stabbing
O **Onset:** • When did it start? • What were you doing at the time? • Did it come only suddenly or slowly?	• Gradual (Angina) • Sudden (UA/Infarct) • With Exercise (Angina) • At Rest (UA/Infarct)	• Gradual (Infection) • Sudden (Pneumothorax)	• Gradual (post trauma) • Sudden (post trauma)
L **Location:** • "Take one finger and point to the pain? • "Does it extend anywhere else" • If well localised palpate and visualise	• Poorly localised • Chest to back to jaw • Rarely changes with palpation	• Well localised • Usually chest wall • Usually changes with palpation / ventilation	• Well defined • Usually chest wall • Changes with palpation / ventilation
O **Other Signs and Symptoms:** • ""Do you fell nauseous? • (If yes) "Have you vomited" • "Do you feel SOB?" • "Have you noticed palpitations?" • "What came first, the discomfort or the (OSS)?"	• SOB % • Diaphoresis % • Palpatations %	• SOB (on exertion) • Chest infection (pro dromal)	• SOB (on exertion)
R **Relief:** • ""Have you taken anything for the discomfort?" • (If yes) "Has it helped?" • "Does it usually?" • "Does taking a deep breath make the pain bet-ter, worse or no different?" • "Does moving make the pain better, worse or no	• Relieved with Nitrates (Angina) • Unrelieved with Nitrates (UA/Infarct) • Poor relief with NSAIDS • Poor relief with position	• Unrelieved with Nitrates • Mild relief with NSAIDS • Some relief with position	• Unrelieved with Nitrates • Mild relief with NSAIDS • Some relief with position

https://prehospitalresearcher.files.wordpress.com/2013/06/dolor-for-chest-pains-e1370077515315.png

Clinical picture

A man experiences shortness of breath.

https://en.wikipedia.org/wiki/Coronary_artery_disease

Clinical picture

Ventricular fibrillation.

https://upload.wikimedia.org/wikipedia/commons/f/f1/Ventricular_fibrillation.png

Clinical picture

Nausea.

http://cdn1.medicalnewstoday.com/content/images/articles/290/290196/woman-curled-up-with-nausea.jpg

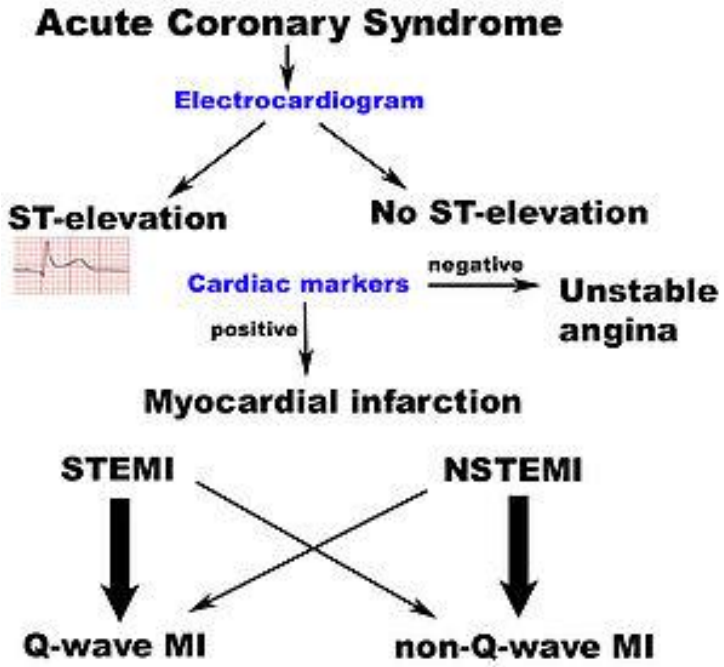
Clinical picture

Sweating.

http://images.medicinenet.com/images/slideshow/15-heart-symptoms-s13-businessman-in-cold-sweat.jpg

Diagnosis

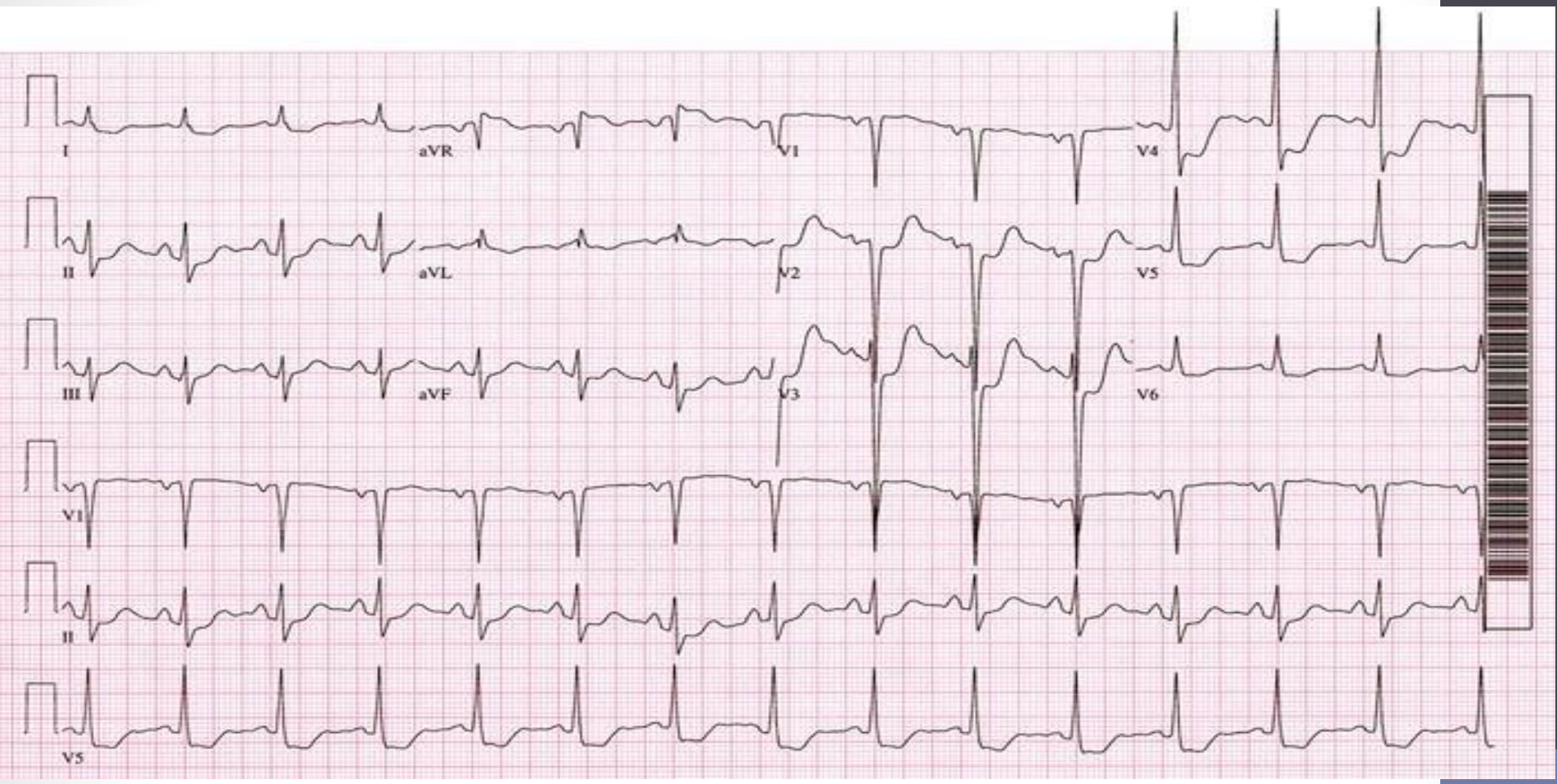
- Electrocardiography
- Stress test
- Echocardiography (including stress echocardiography and intravascular ultrasound)
- Coronary angiography
- Radioisotopes
- Visualization
- Blood Test



Diagnostics algorythm:
STEMI ST-elevation Myocardial Infarction,
NCTEMI – No ST-elevation Myocardial Infarction

https://upload.wikimedia.org/wikipedia/commons/thumb/e/e5/ACS_scheme.jpg/300px-ACS_scheme.jpg https://en.wikipedia.org/wiki/Coronary_artery_disease

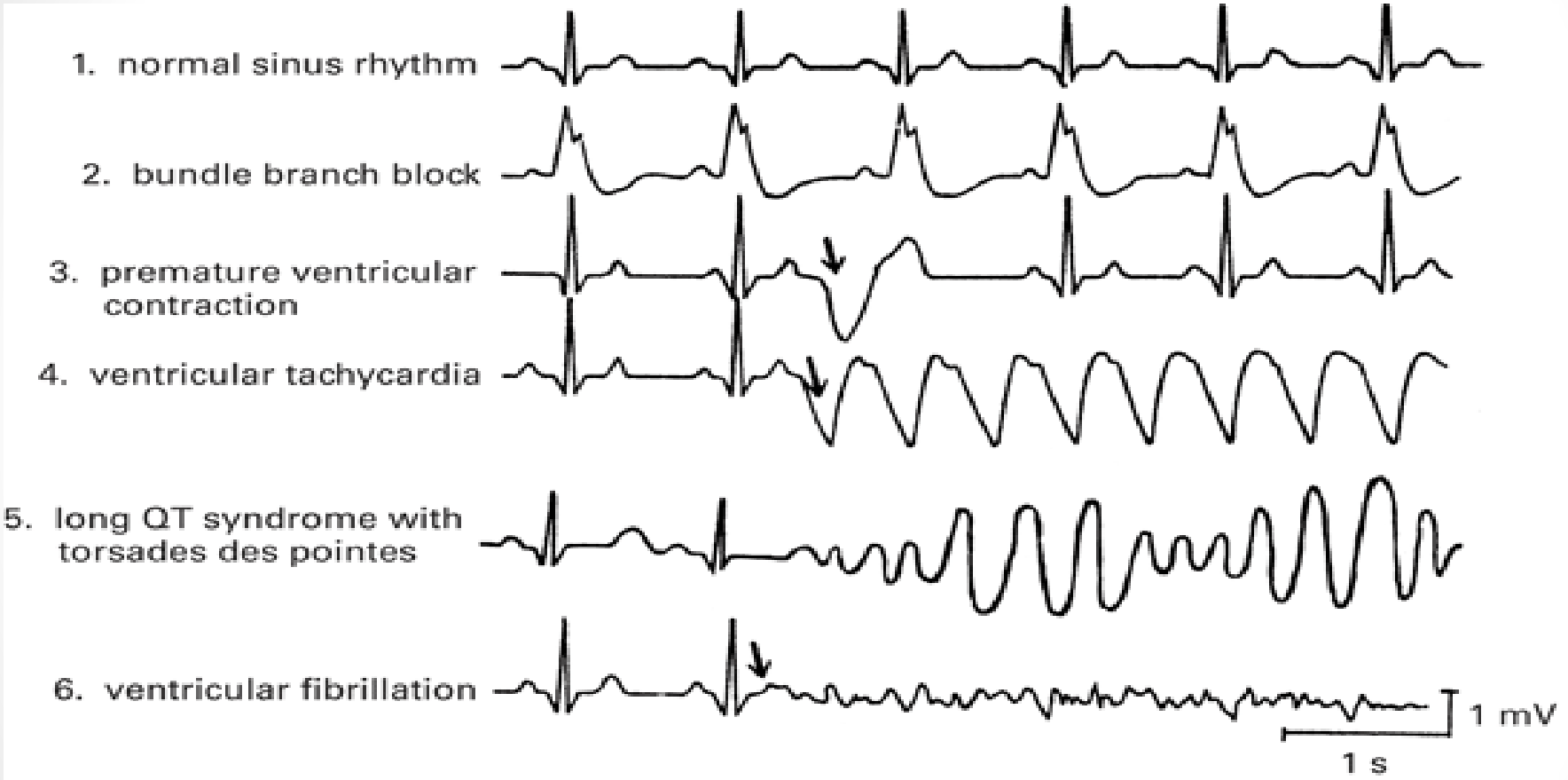
Diagnosis: electrocardiography 1



A 12-lead ECG of ischemic anterolateral ST-segment depression in a patient with coronary artery disease.

http://emedicine.medscape.com/article/153647-overview

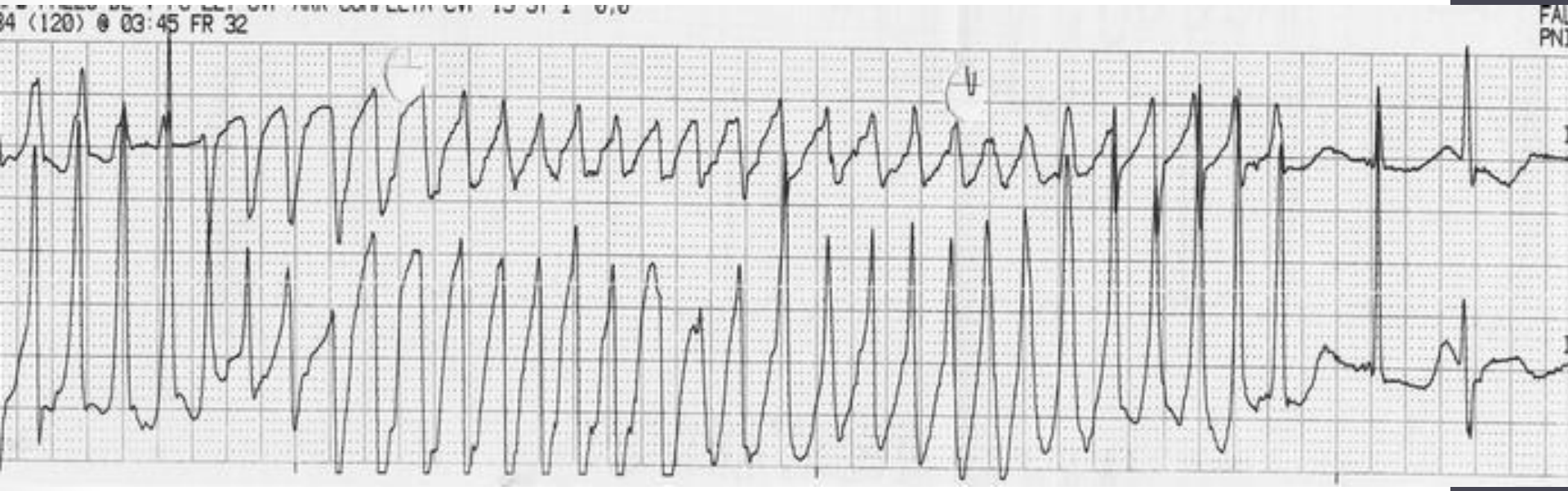
Diagnosis: electrocardiography 2



Ventricular arrhythmias.

http://flylib.com/books/4/5/1/html/2/05.%20print%20chapter%205_%20cardiac%20abnormalities_files/loadbinarycaprnv89.gif

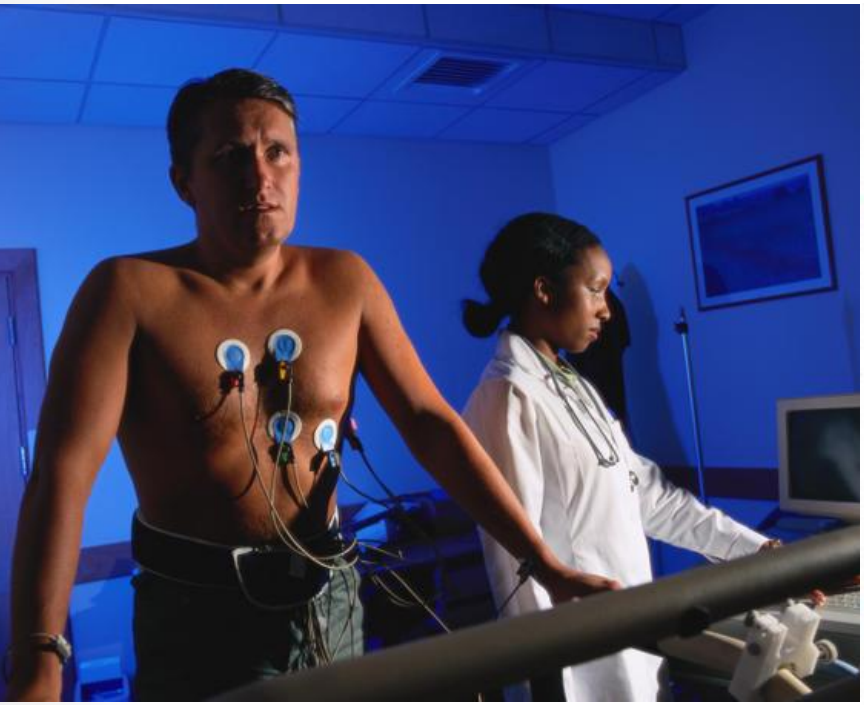
Diagnosis: electrocardiography 3

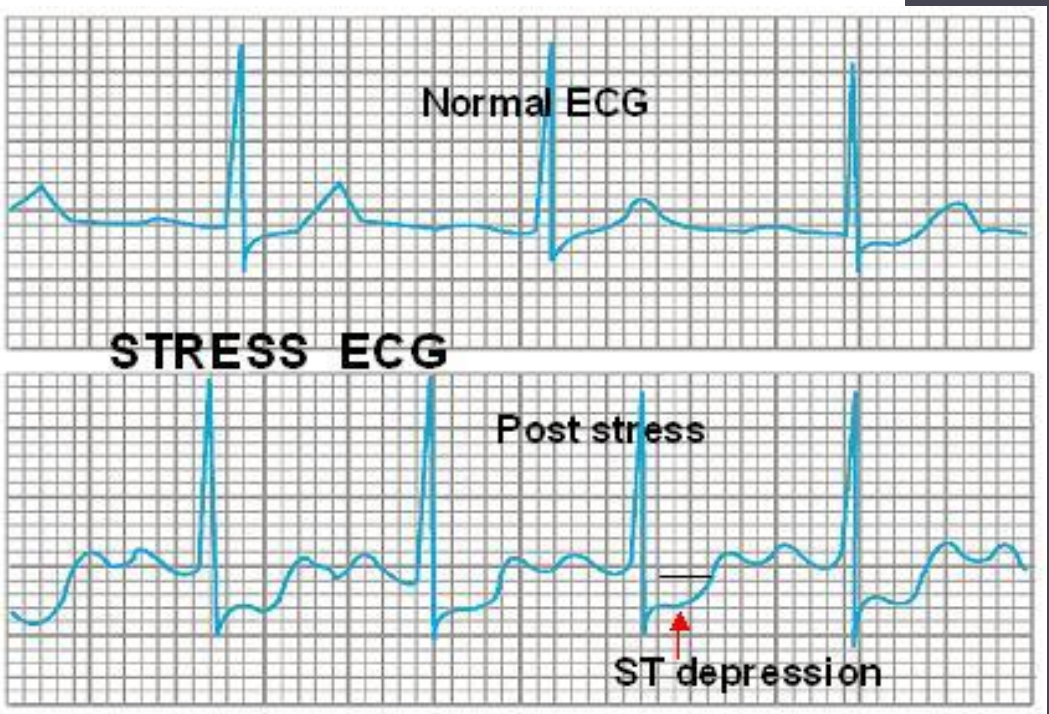


Polymorphic ventricular tachycardia
in torsade de pointes.

http://www.revespcardiol.org/imatges/255/255v60n04/grande/255v60n04-13106381fig01.jpg

Diagnosis: stress test



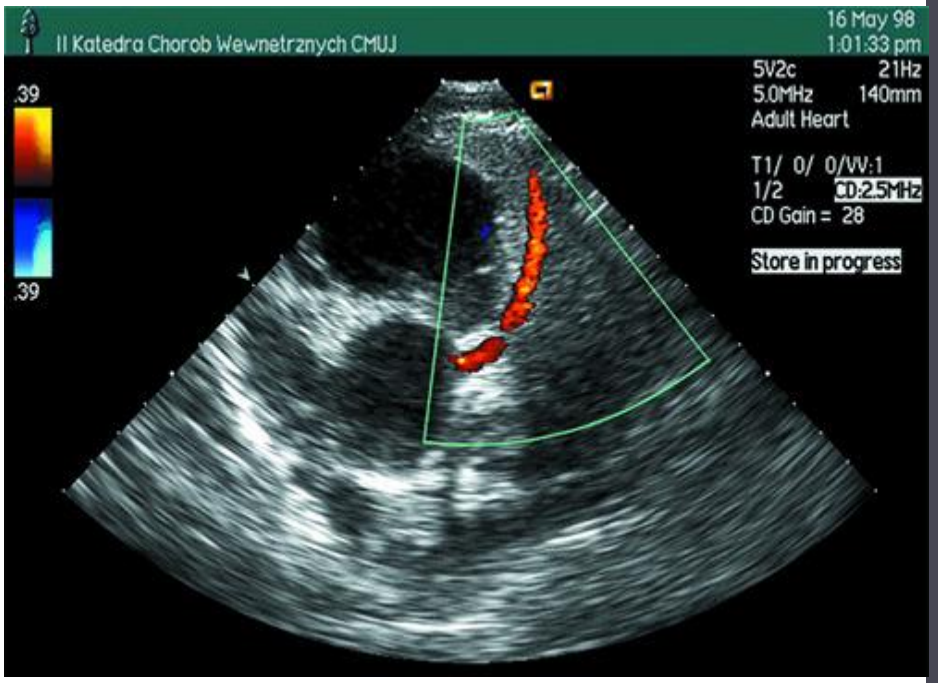


ST-segment depression confirms ischemia and positive stress test

https://edc2.healthtap.com/ht-staging/user_answer/reference_image/12066/large/stress_test.jpeg?1386670054
http://photos1.blogger.com/blogger/2473/2137/1600/stress.jpg http://www.revespcardiol.org/imatges/255/255v60n04/grande/255v60n04-13106381fig01.jpg

Diagnosis: echocardiography 1

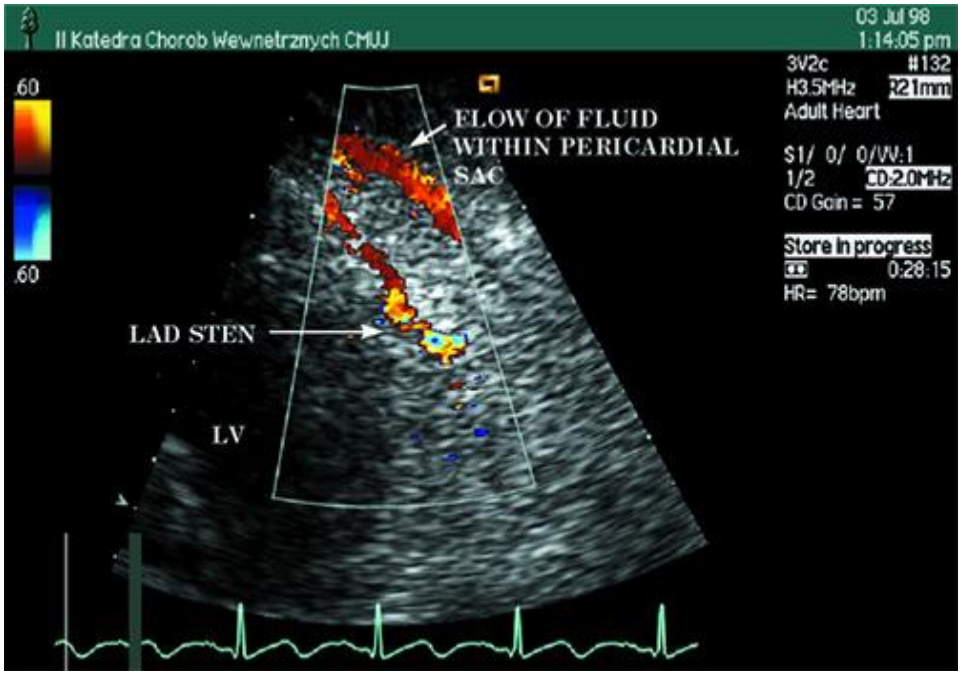
Left main stem coronary artery and proximal segment of left anterior descending coronary artery (LAD) in color-coded transthoracic Doppler echocardiography



http://www.fac.org.ar/tcvc/llave/c307/dimitrow.htm

Diagnosis: echocardiography 2

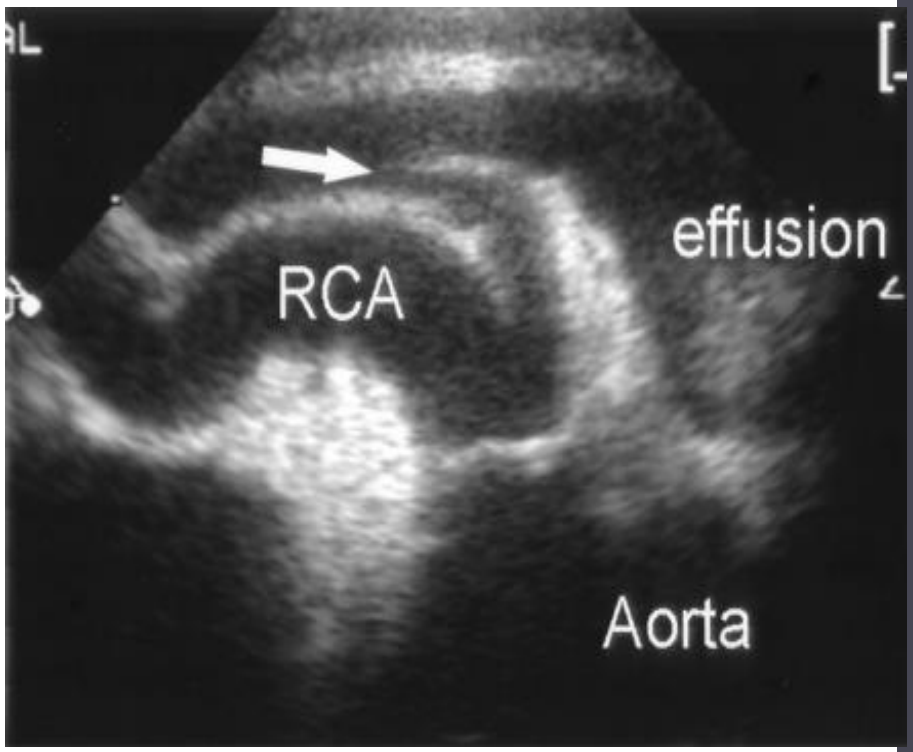
- Direct visualization of coronary artery stenosis
- The portion of mid segment of left anterior descending coronary artery (LAD) with color mosaic (a sign of high-velocity, turbulent flow) at stenotic site



http://www.fac.org.ar/tcvc/llave/c307/dimitrow.htm

Diagnosis: echocardiography 3

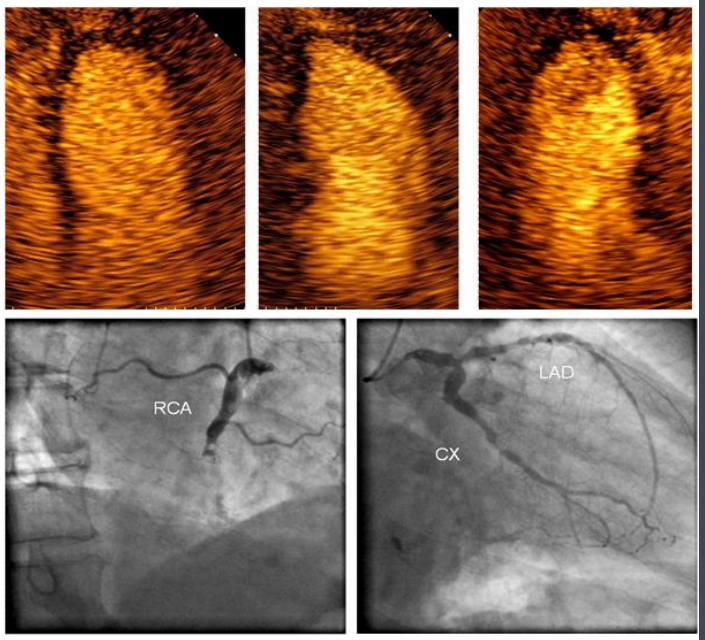
- Echocardiography, parasternal short-axis view
- In presence of pericardial effusion, proximal part of right coronary artery (RCA) is suspicious for dissection (arrow). Imaging plane is off axis of nondilated RCA ostium



http://circ.ahajournals.org/content/111/24/e440/F2.expansion.html

Diagnosis: echocardiography 4

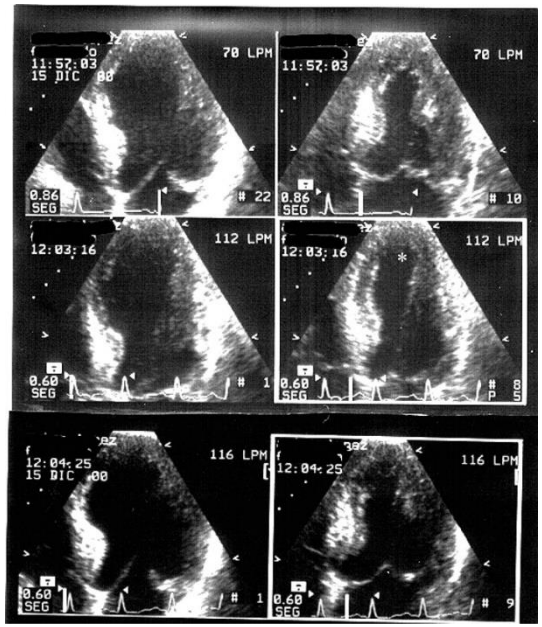
Contrast echocardiography in apical 4-chamber, 2-chamber and 3-chamber views (upper panels) demonstrating the extensive reduction of myocardial perfusion in a non ST-elevation myocardial infarction (NSTEMI) patient with angiographic trippel-vessel disease including acute occlusion of the right coronary artery and left main stem stenosis (lower panels)



http://www.intechopen.com/source/html/18294/media/image8.png

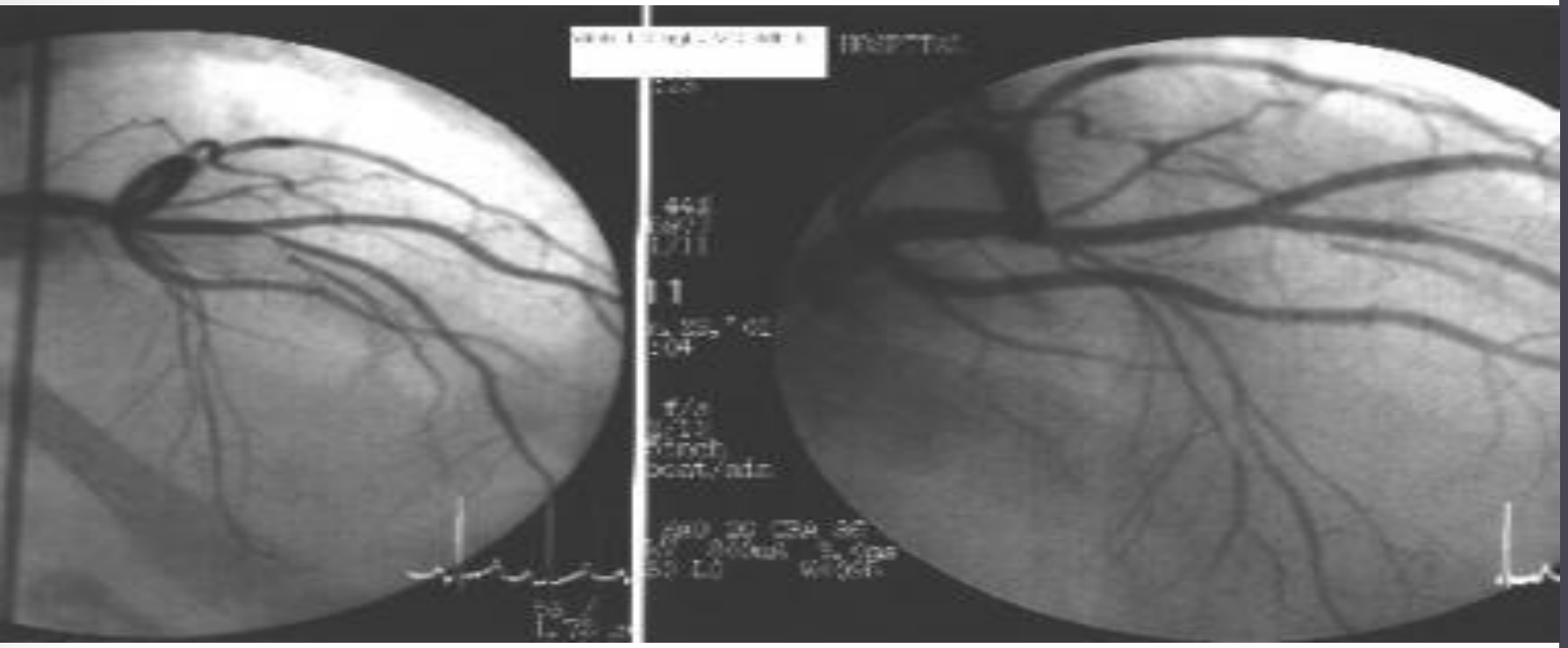
Diagnosis: echocardiography 5

- Four-chamber diastolic (left) and systolic (right) apical frames at rest (top), peak (middle) and post-exercise (bottom) imaging in a patient with a previous inferior infarction
- Rest regional wall motion was normal, whereas apical hypokinesia developed at peak exercise (asterisk) and had been resolved by the time post-exercise imaging was performed



http://ehjcimaging.oxfordjournals.org/content/4/3/182

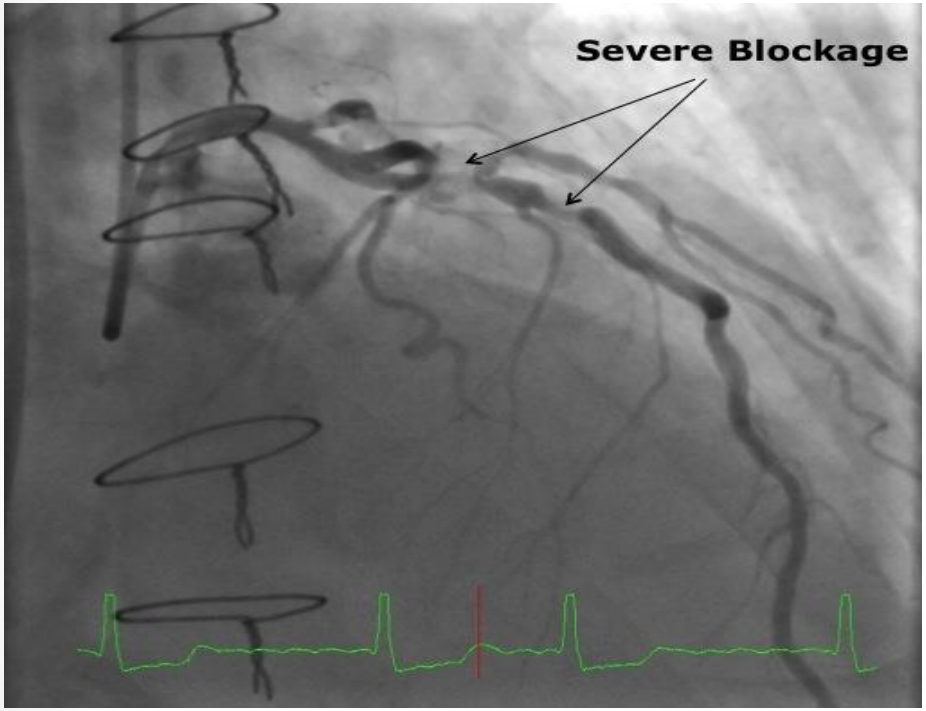
Diagnosis: coronary angiography 1

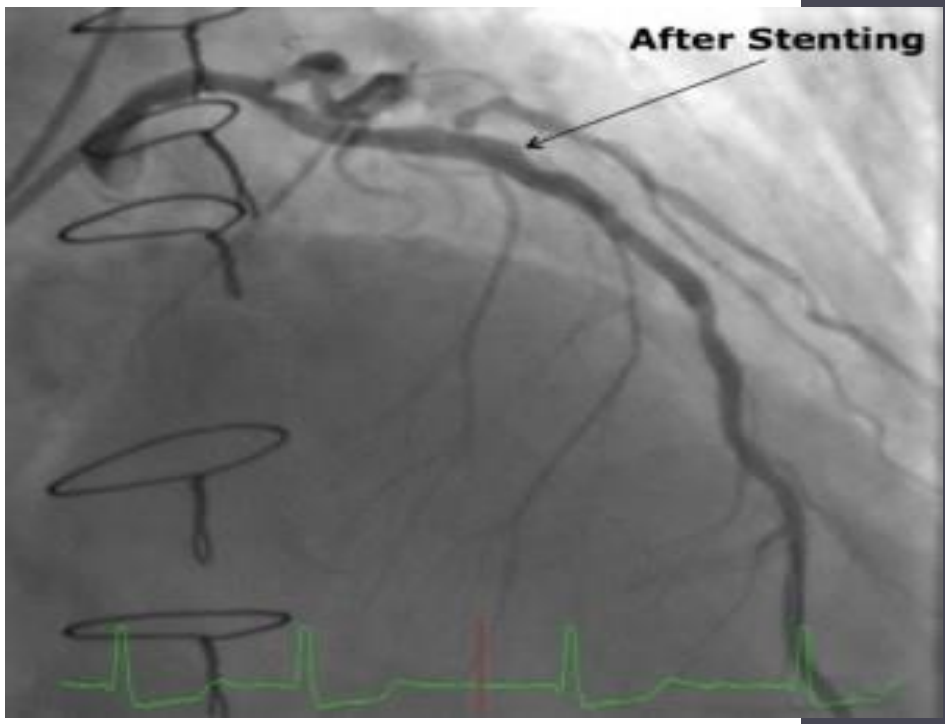


Cardiac catheterization and coronary angiography shows severe left anterior descending coronary artery stenosis (left panel) with stent placement in the left anterior descending coronary artery(right panel).

http://emedicine.medscape.com/article/153647-overview

Diagnosis: coronary angiography 2

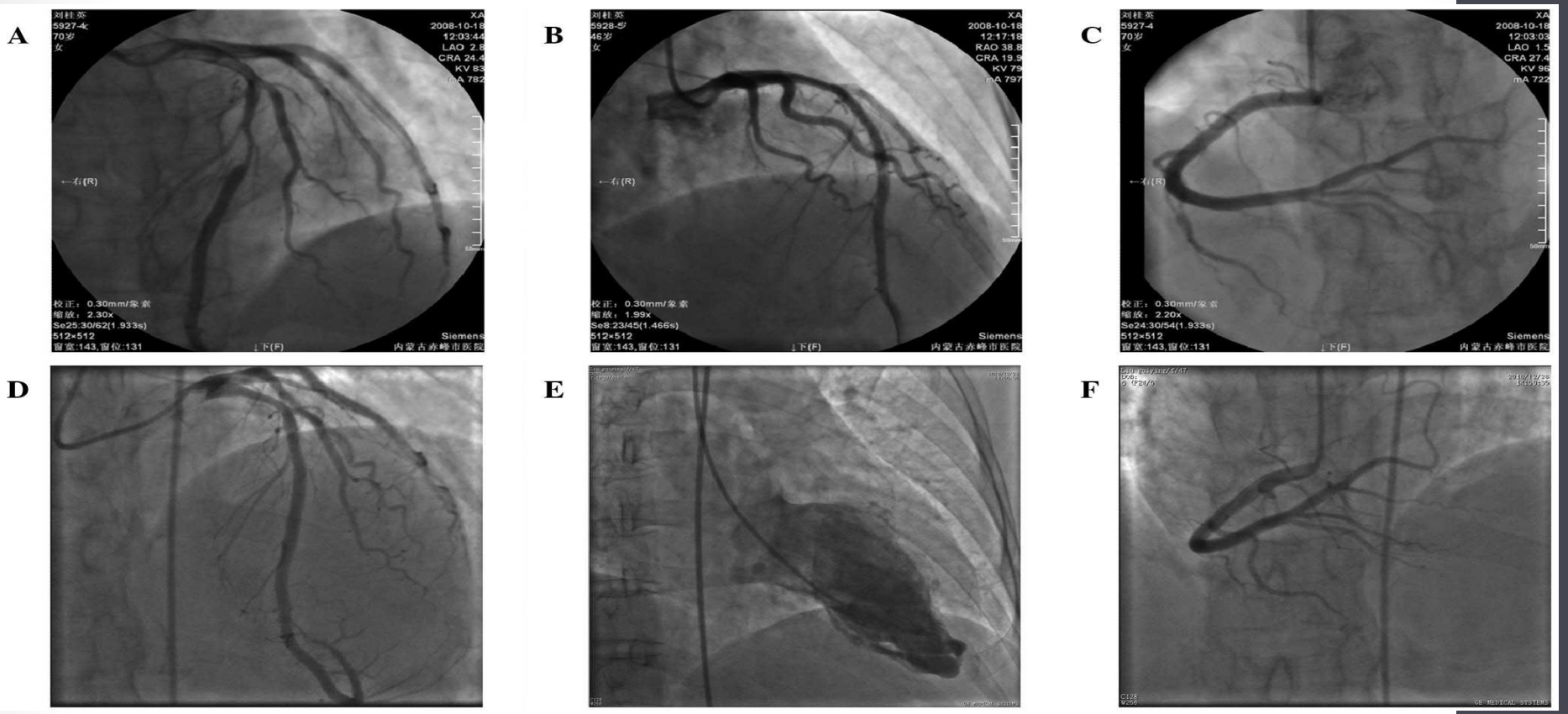




Single-vessel coronary artery disease

http://www.uvaphysicianresource.com/reoperative-cardiac-surgery/

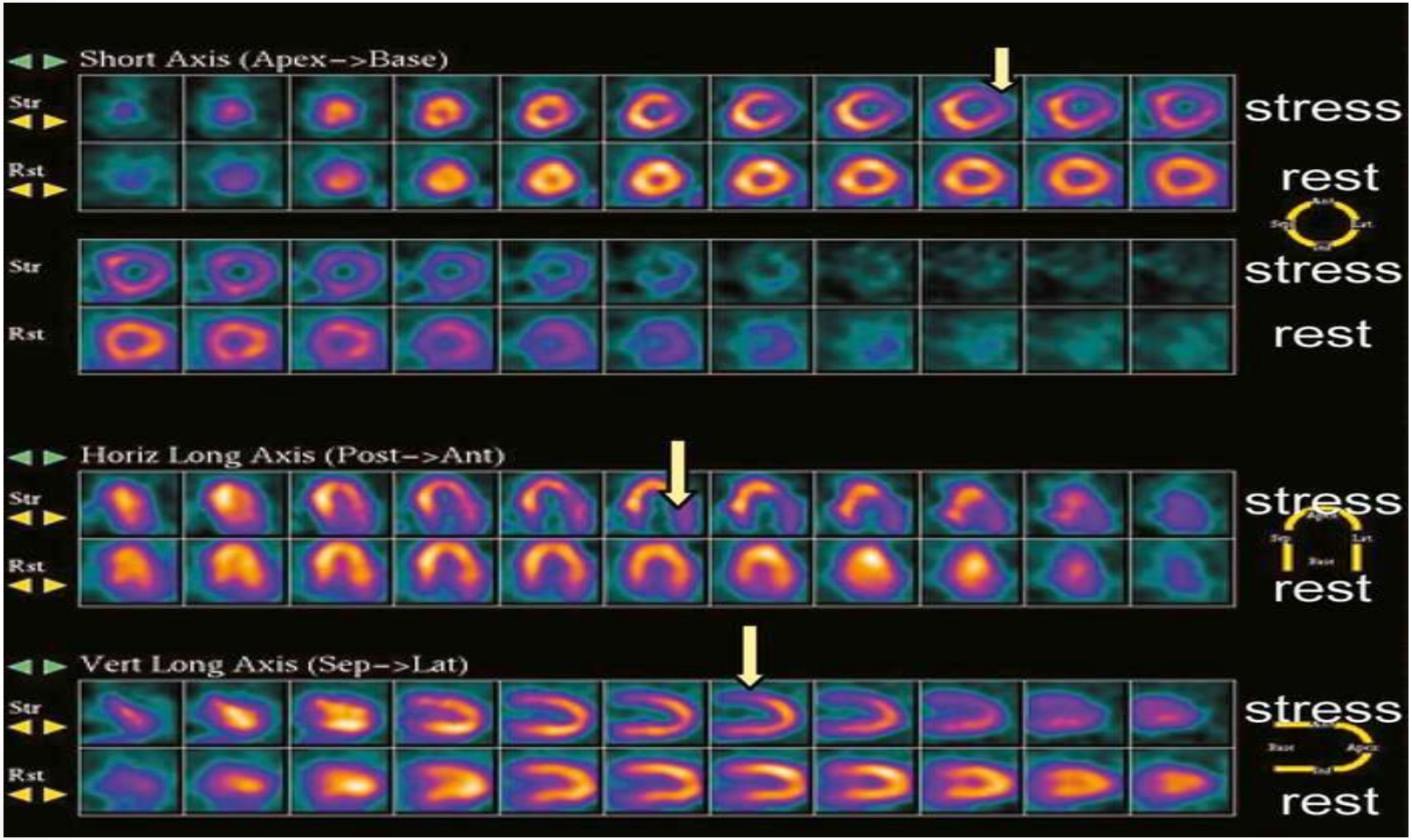
Diagnosis: coronary angiography 3



Coronary angiography of a case with acute myocardial infarction in the (A–C) first and (D–F) second time admissions.

http://www.spandidos-publications.com/etm/7/1/267

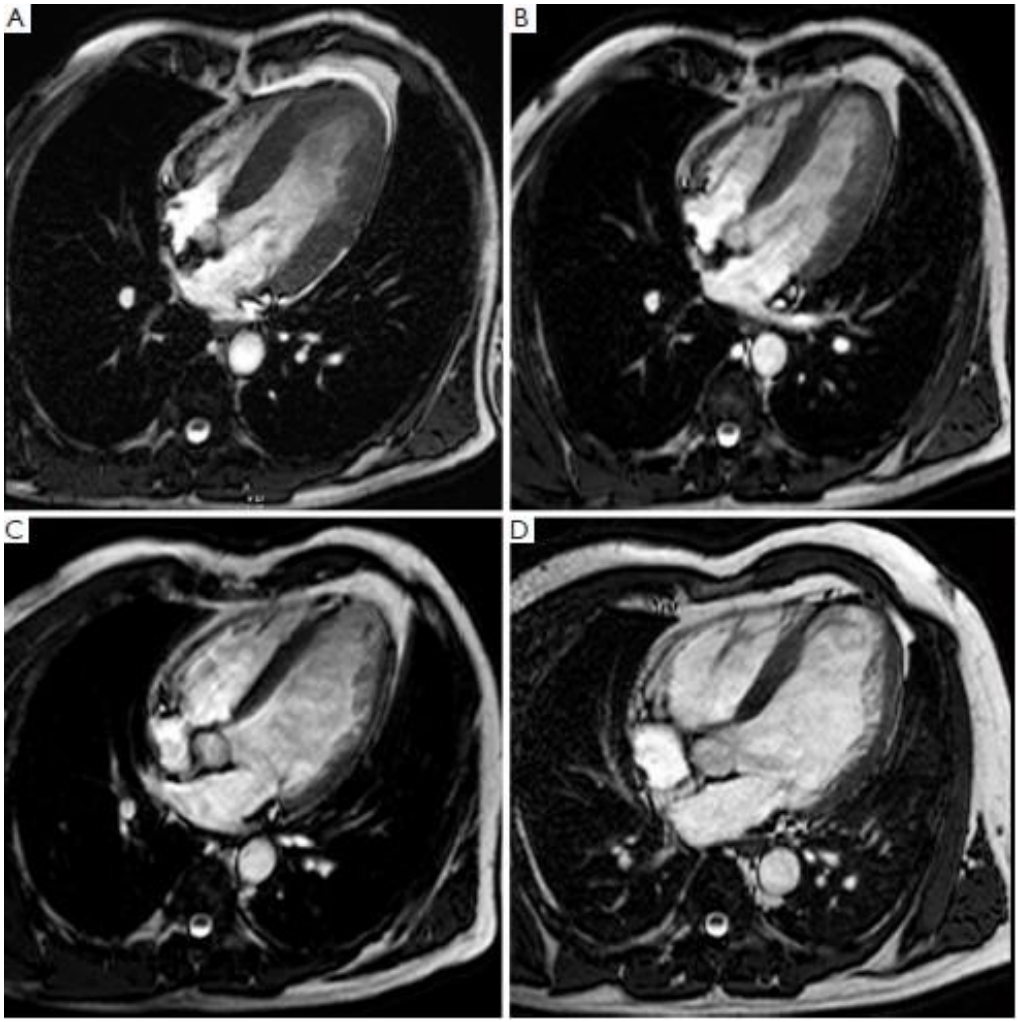
Diagnosis: radioisotopes



Stress images (arrows) demonstrate inferolateral and anterolateral (left circumflex) ischemia.

http://www.clevelandclinicmeded.com/medicalpubs/diseasemanagement/cardiology/coronary-artery-disease/

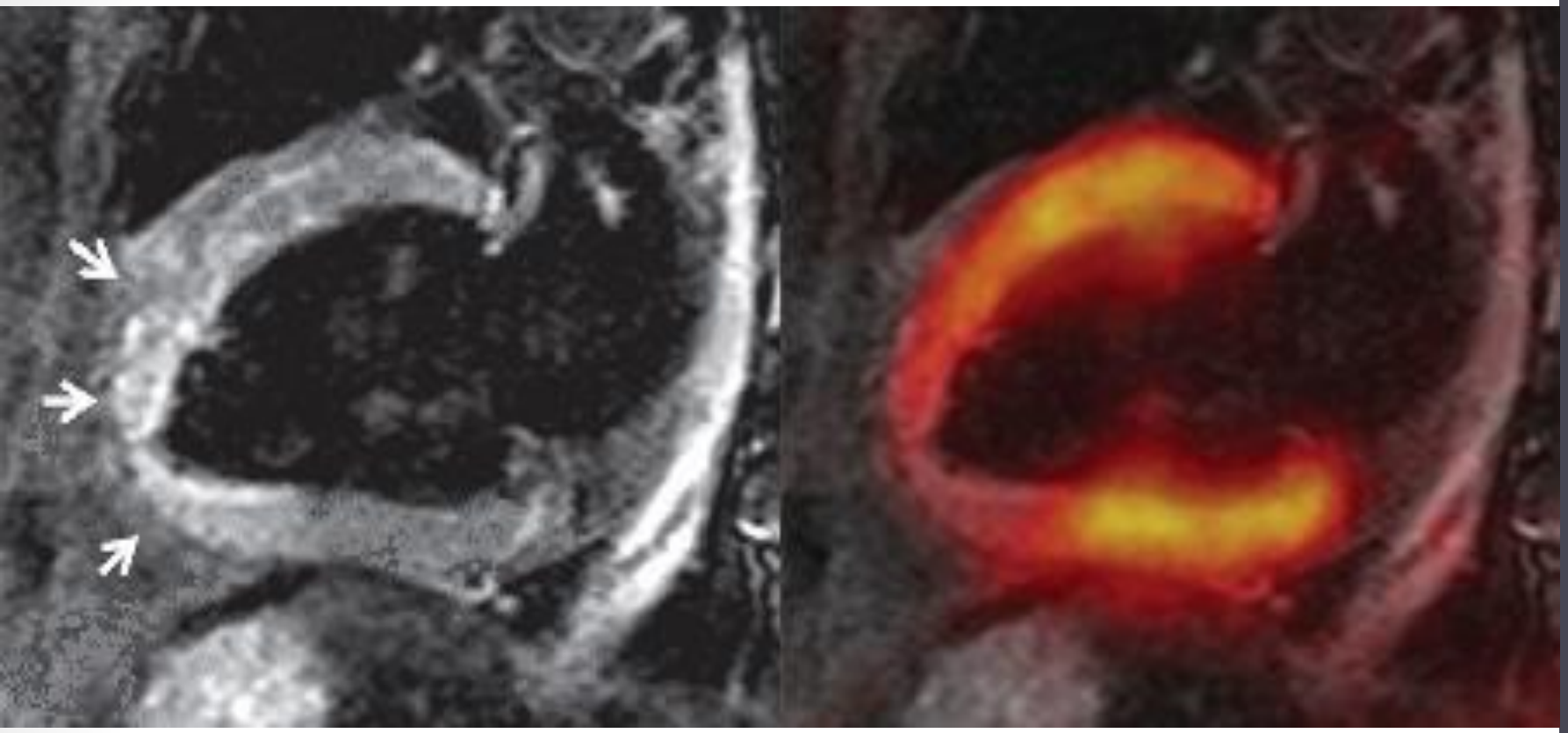
Diagnosis: magnetic resonance imaging



Ventricular remodeling post myocardial infarction.

http://www.thecdt.org/article/view/682/751

Diagnosis: positron emission tomography



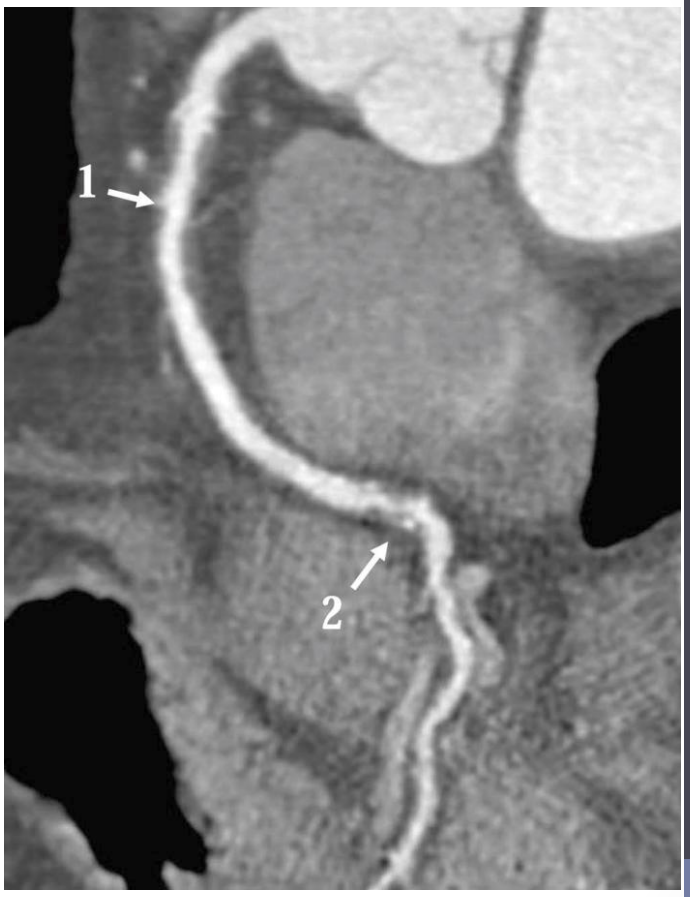
The infarct zone of the entire left ventricular myocardium.

http://pharmaceuticalintelligence.com/tag/magnetic-resonance-imaging/

Diagnosis: computed tomography

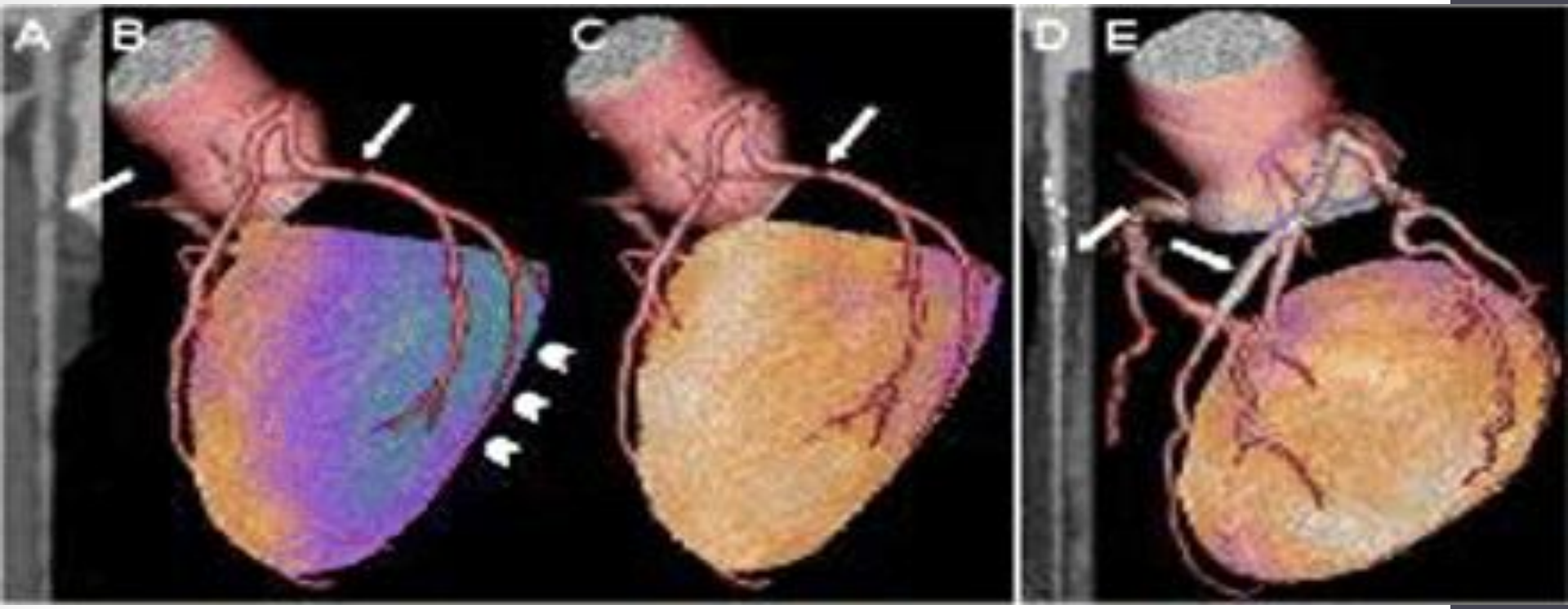
1. Mild proximal stenosis with expansive remodelling and predominantly nonexpansive plaque

2. Partially calcified advanced mid to distal stenosis



http://www.clevelandclinicmeded.com/medicalpubs/diseasemanagement/cardiology/coronary-artery-disease/

Diagnosis: hybrid imaging



Patient with silent ischemia. Cardiac hybrid imaging integrating single-photon emission computed tomography with computed tomography coronary angiography.

http://eurheartjsupp.oxfordjournals.org/content/13/suppl_A/A1 http://

Diagnosis: blood test 1

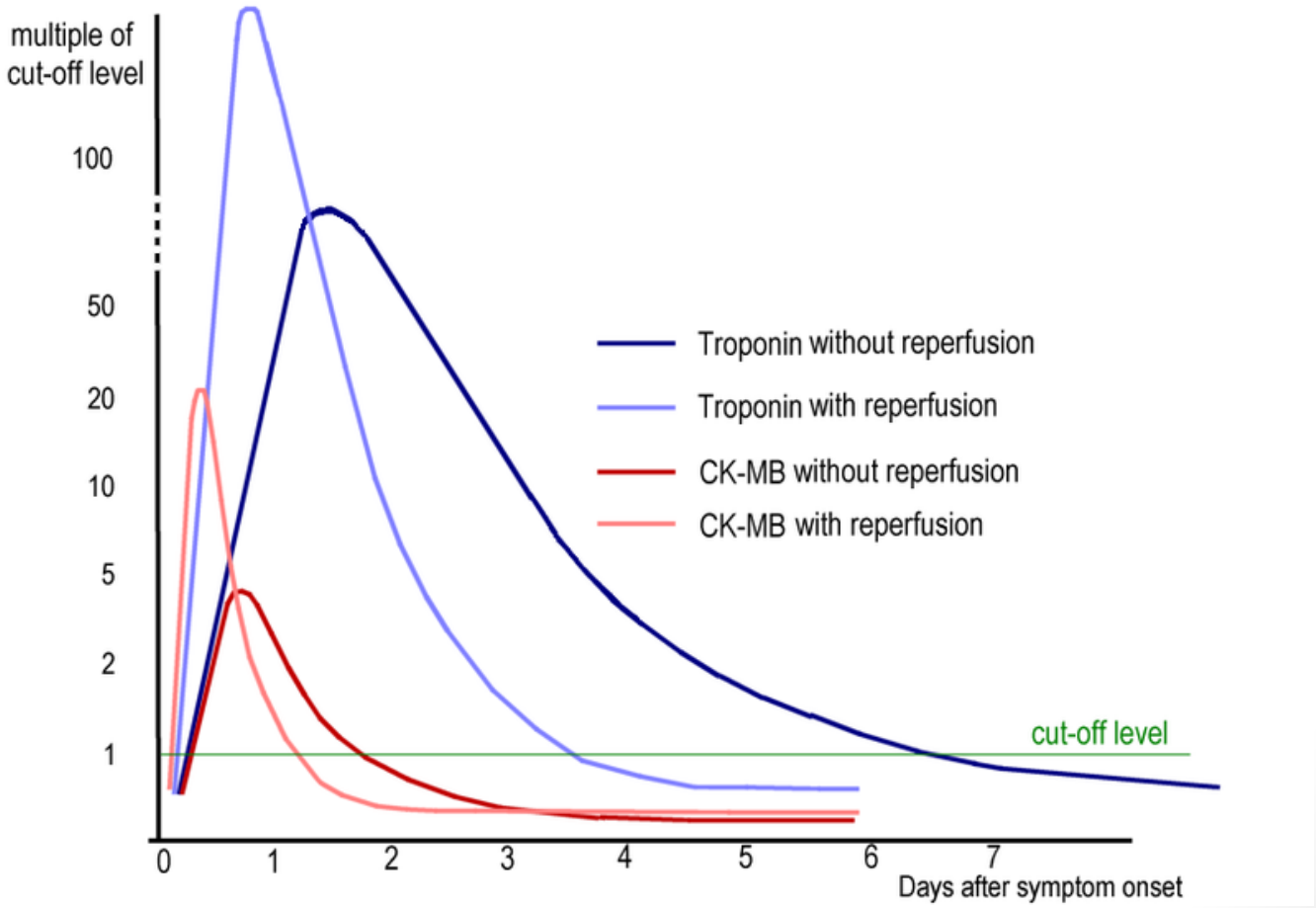
- Lipid profile (LDL-C,HDL-C, cholesterol, triglycerides)
- CRP—C-reactive protein, a marker of inflammation that is associated with atherosclerosis, among other conditions
- Lp(a)—an additional lipid test that may be used to identify an elevated level of lipoprotein (a), a modification to LDL-C that increases risk of atherosclerosis; the test may be used in conjunction with a routine lipid profile to provide additional information

http://www.clevelandclinicmeded.com/medicalpubs/diseasemanagement/cardiology/heart-disease-risk-reduction/images/figure-1-ldl-c.jpg

Diagnosis: blood test 2

Heart attacks tests:

- Troponin
- Myoglobin
- CK-MB
- Etc.



http://old.sinobiological.com/Elevated-Creatine-Kinase-a-5892.html http://old.sinobiological.com/Elevated-Creatine-Kinase-a-5892.html

Syndrome of heart failure

Definition

- Heart failure (HF) can be defined as an abnormality of cardiac structure or function leading to failure of the heart to deliver oxygen at a rate commensurate with the requirements of the metabolizing tissues, despite normal filling pressures (or only at the expense of increased filling pressures)
- HF is defined, clinically, as a syndrome in which patients have typical symptoms (e.g. breathlessness, ankle swelling, and fatigue) and signs (e.g. elevated jugular venous pressure, pulmonary crackles, and displaced apex beat) resulting from an abnormality of cardiac structure or function

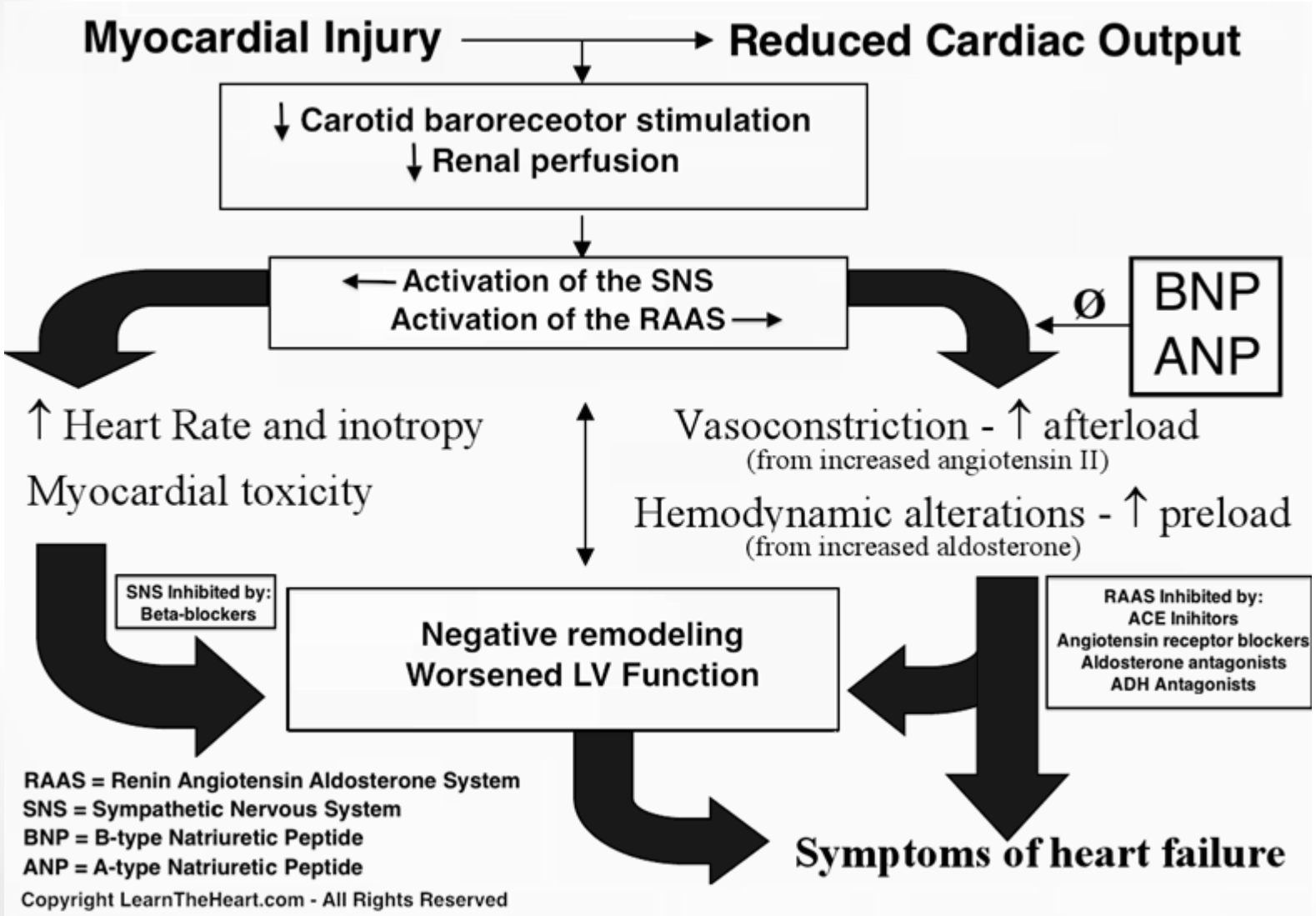
http://kehatlab.net.technion.ac.il/files/2012/12/heart-failure-icon.jpg http://eurheartj.oxfordjournals.org/content/ehj/33/14/1787.full.pdf

Pathophysiology 1

- In HF, the heart may not provide tissues with adequate blood for metabolic needs, and cardiac-related elevation of pulmonary or systemic venous pressures may result in organ congestion
- This condition can result from abnormalities of systolic or diastolic function or, commonly, both
- Although a primary abnormality can be a change in myocyte function, there are also changes in collagen turnover of the extracellular matrix

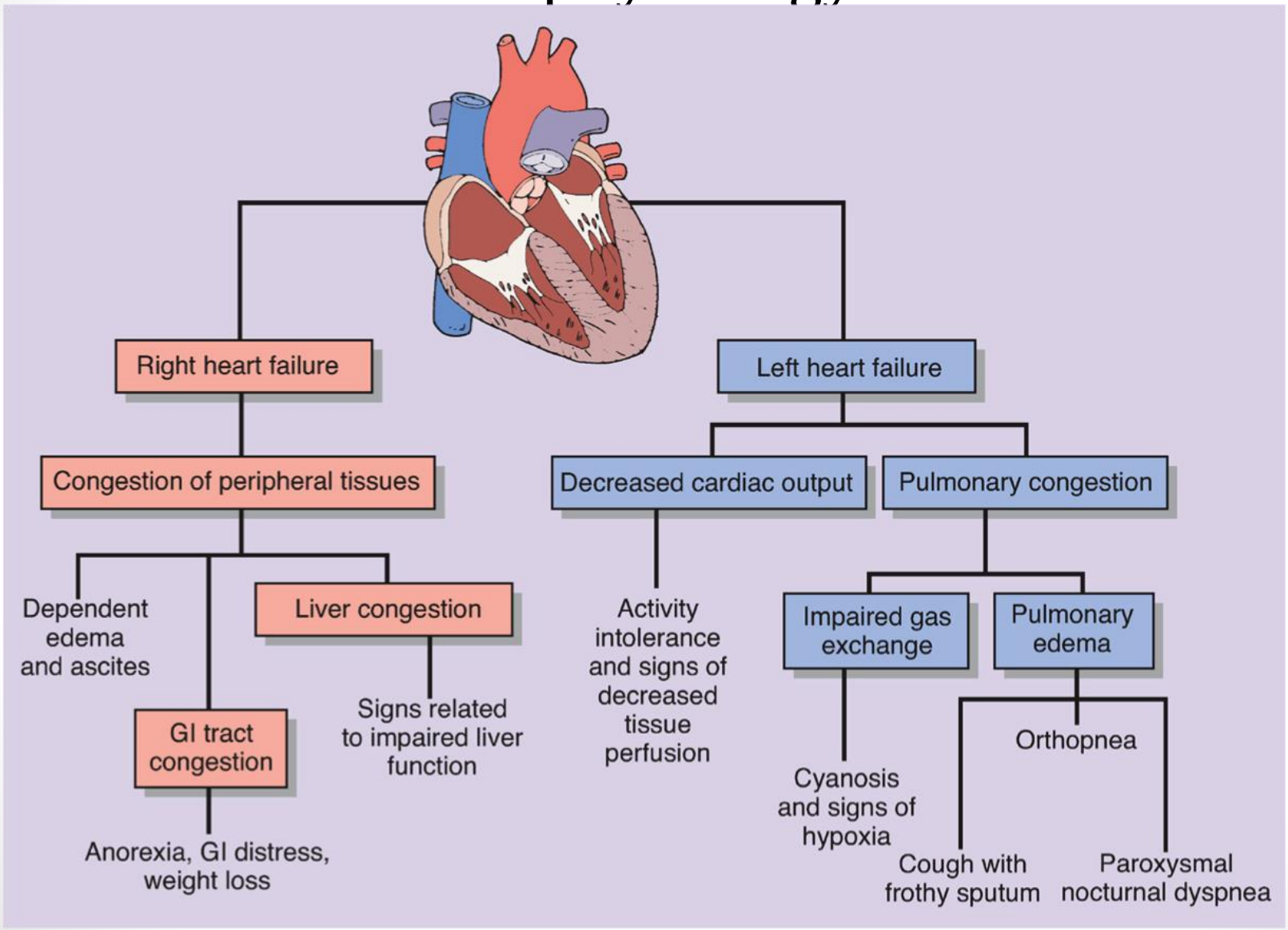
http://www.pedcard.rush.edu/MP/physiology/CHF%20physiology.gif http://www.merckmanuals.com/professional/cardiovascular-disorders/heart-failure/heart-failure-hf

Pathophysiology 2



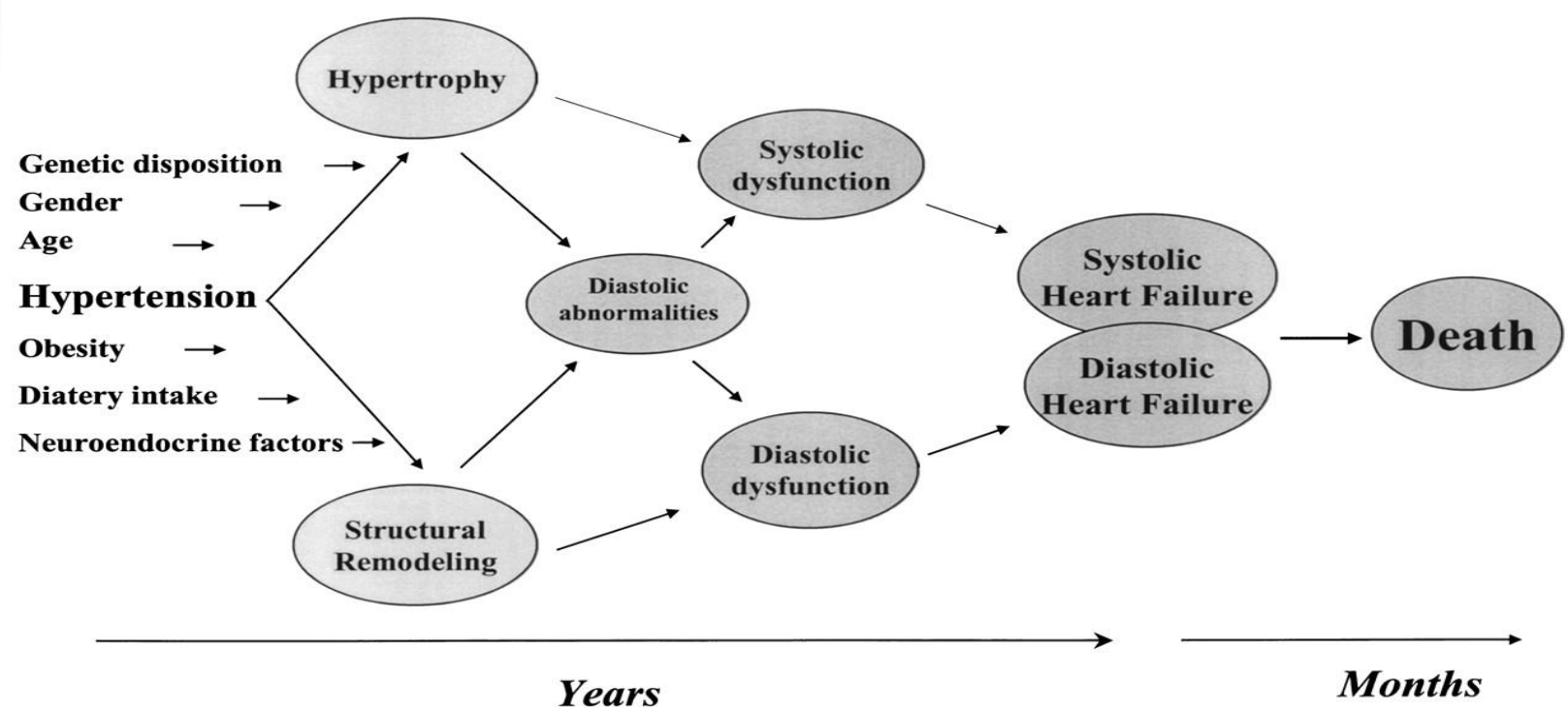
http://www.pedcard.rush.edu/MP/physiology/CHF%20physiology.gif http://www.merckmanuals.com/professional/cardiovascular-disorders/heart-failure/heart-failure-hf

Pathophysiology 3



https://www.pinterest.com/explore/congestive-heart-failure-pathophysiology/

Pathophysiology 4



Progression from hypertrophy to diastolic HF. In the presence of congestive symptoms the time course of HF may become progressive and may end with sudden cardiac death or intractable end-stage failure.

http://cardiovascres.oxfordjournals.org/content/45/4/813

Systolic dysfunction 1

- In systolic dysfunction with reduced ejection fraction (EF)), the ventricle contracts poorly and empties inadequately, leading initially to increased diastolic volume and pressure and decreased EF
- Many defects in energy utilization, energy supply, electrophysiologic functions, and contractile element interaction occur, with abnormalities in intracellular Ca modulation and cAMP production

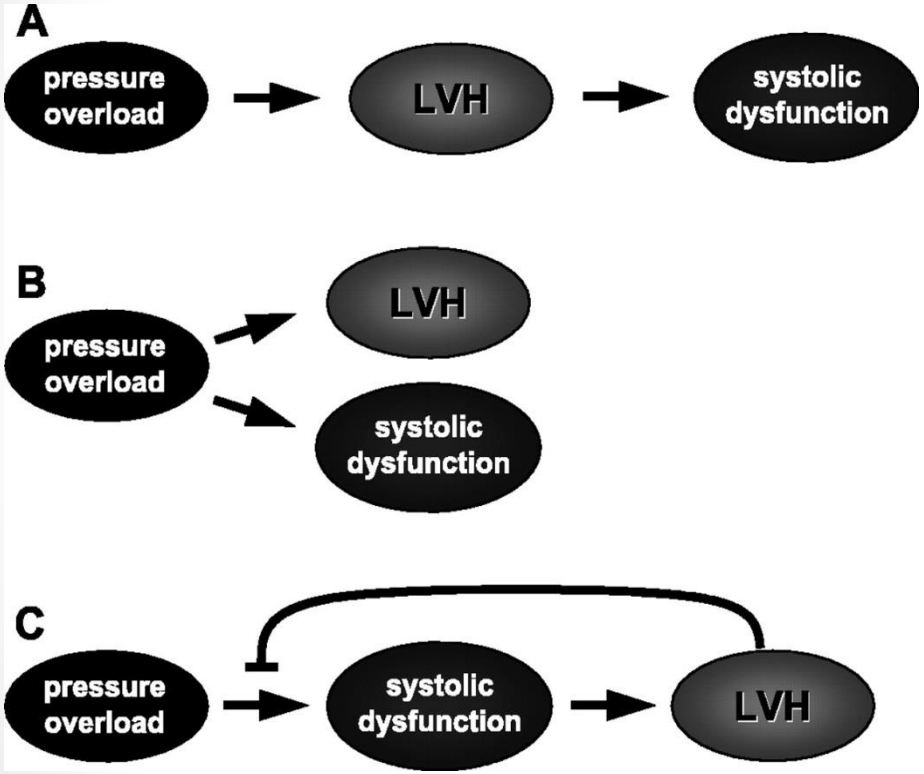
http://www.merckmanuals.com/professional/cardiovascular-disorders/heart-failure/heart-failure-hf

Systolic dysfunction 2

- Predominant systolic dysfunction is common in HF due to MI, myocarditis, and dilated cardiomyopathy
- Systolic dysfunction may affect primarily the left ventricle (LV) or the right ventricle (RV)
- LV failure often leads to RV failure

http://www.merckmanuals.com/professional/cardiovascular-disorders/heart-failure/heart-failure-hf

Systolic dysfunction 3



A, B: Left ventricular hypertrophy (LVH) and systolic dysfunction
C: LVH is a compensatory response to stress-mediated systolic dysfunction.

http://ajpheart.physiology.org/content/289/1/H8 http://www.merckmanuals.com/professional/cardiovascular-disorders/heart-failure/heart-failure-hf

Diastolic dysfunction 1

- In diastolic dysfunction (heart failure (HF) with preserved ejection fraction (EF), ventricular filling is impaired, resulting in reduced ventricular end-diastolic volume, increased end-diastolic pressure, or both
- Contractility and hence EF remain normal
- EF may even increase as the poorly filled LV empties more completely to maintain cardiac output (CO)

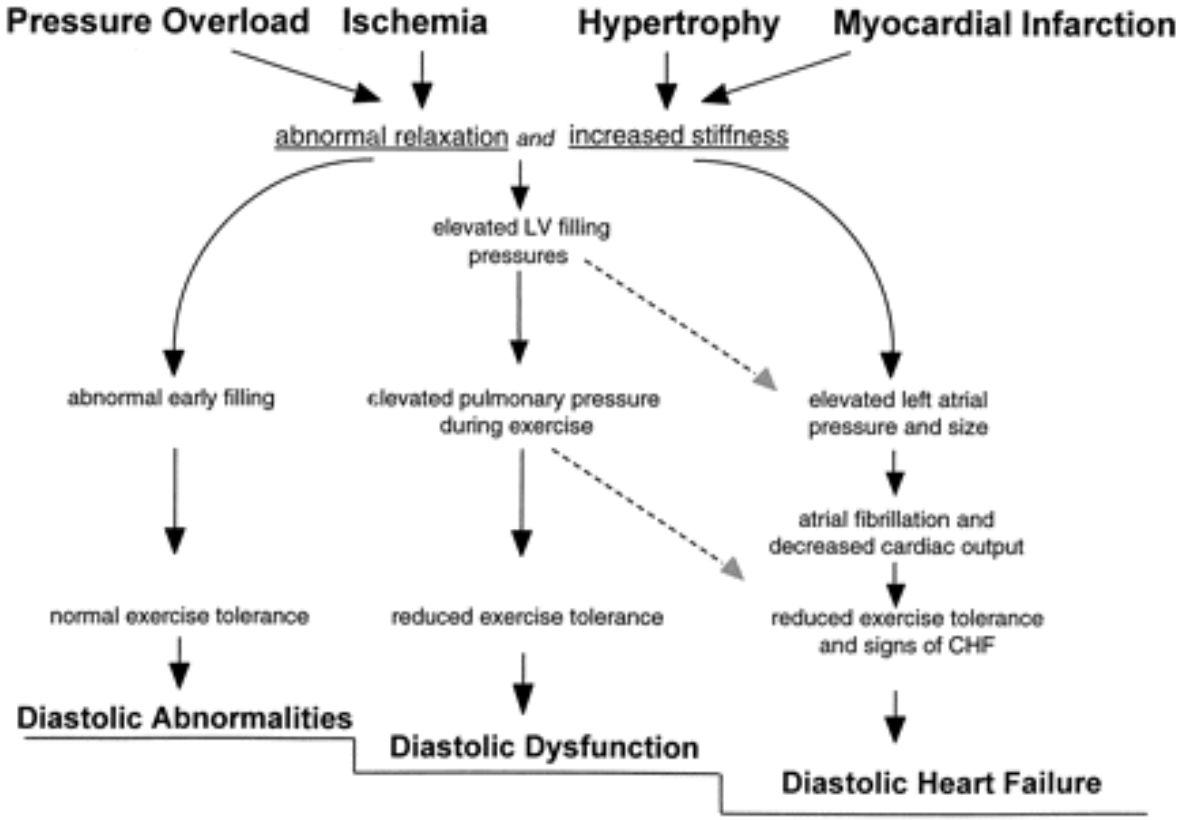
http://www.merckmanuals.com/professional/cardiovascular-disorders/heart-failure/heart-failure-hf

Diastolic dysfunction 2

- Markedly reduced LV filling can cause low CO and systemic symptoms Elevated left atrial pressures can cause pulmonary hypertension and pulmonary congestion
- Diastolic dysfunction usually results from impaired ventricular relaxation, increased ventricular stiffness due to valvular disease, constrictive pericarditis, acute myocardial ischemia, hypertrophic cardiomyopathy, disorders with ventricular hypertrophy, and amyloid infiltration of the myocardium

http://www.merckmanuals.com/professional/cardiovascular-disorders/heart-failure/heart-failure-hf

Diastolic dysfunction 3



Abnormal relaxation and increased stiffness are associated with diastolic filling abnormalities and normal exercise tolerance in the early phase of diastolic dysfunction

http://cardiovascres.oxfordjournals.org/content/45/4/813

Left ventricle failure 1

- Cardiac output (CO) decreases and pulmonary venous pressure increases
- When pulmonary capillary pressure exceeds the oncotic pressure of plasma proteins (about 24 mm Hg), fluid extravasates from the capillaries into the interstitial space and alveoli, reducing pulmonary compliance and increasing the work of breathing
- Lymphatic drainage increases but cannot compensate for the increase in pulmonary fluid

http://www.merckmanuals.com/professional/cardiovascular-disorders/heart-failure/heart-failure-hf

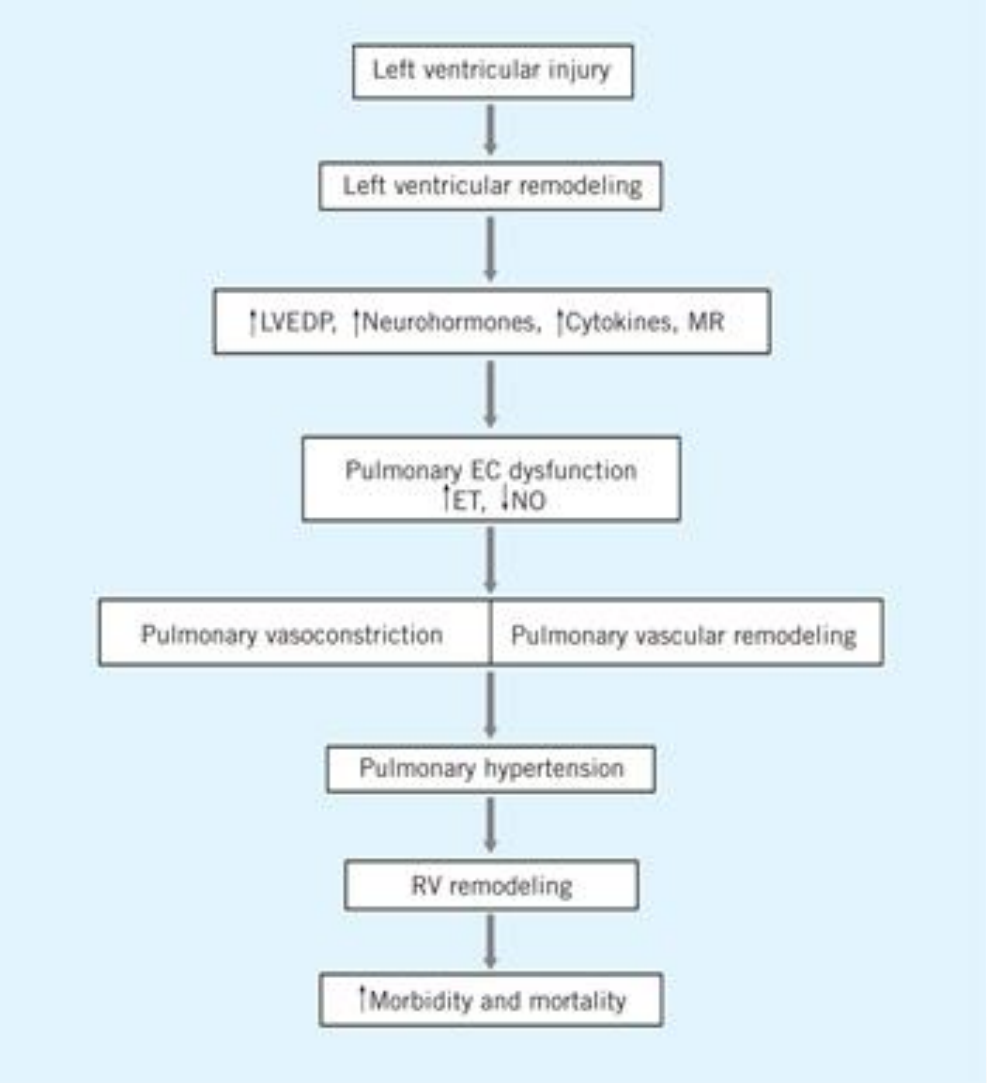
Left ventricle failure 2

- Marked fluid accumulation in alveoli (pulmonary edema) significantly alters ventilation/perfusion relationships
- In severe or chronic LV failure, pleural effusions characteristically develop in the right hemithorax and later bilaterally, further aggravating dyspnea

http://www.merckmanuals.com/professional/cardiovascular-disorders/heart-failure/heart-failure-hf

Left ventricle failure 3

Left ventricular injury leading to structural remodeling and dysfunction is the seminal event in the progression of heart failure



http://www.phaonlineuniv.org/Journal/Article.cfm?ItemNumber=657

Right ventricle failure 1

- Systemic venous pressure increases, causing fluid extravasation and consequent edema, primarily in dependent tissues (feet and ankles of ambulatory patients) and abdominal viscera
- The liver is most severely affected, but the stomach and intestine also become congested
- Fluid accumulation in the peritoneal cavity (ascites) can occur

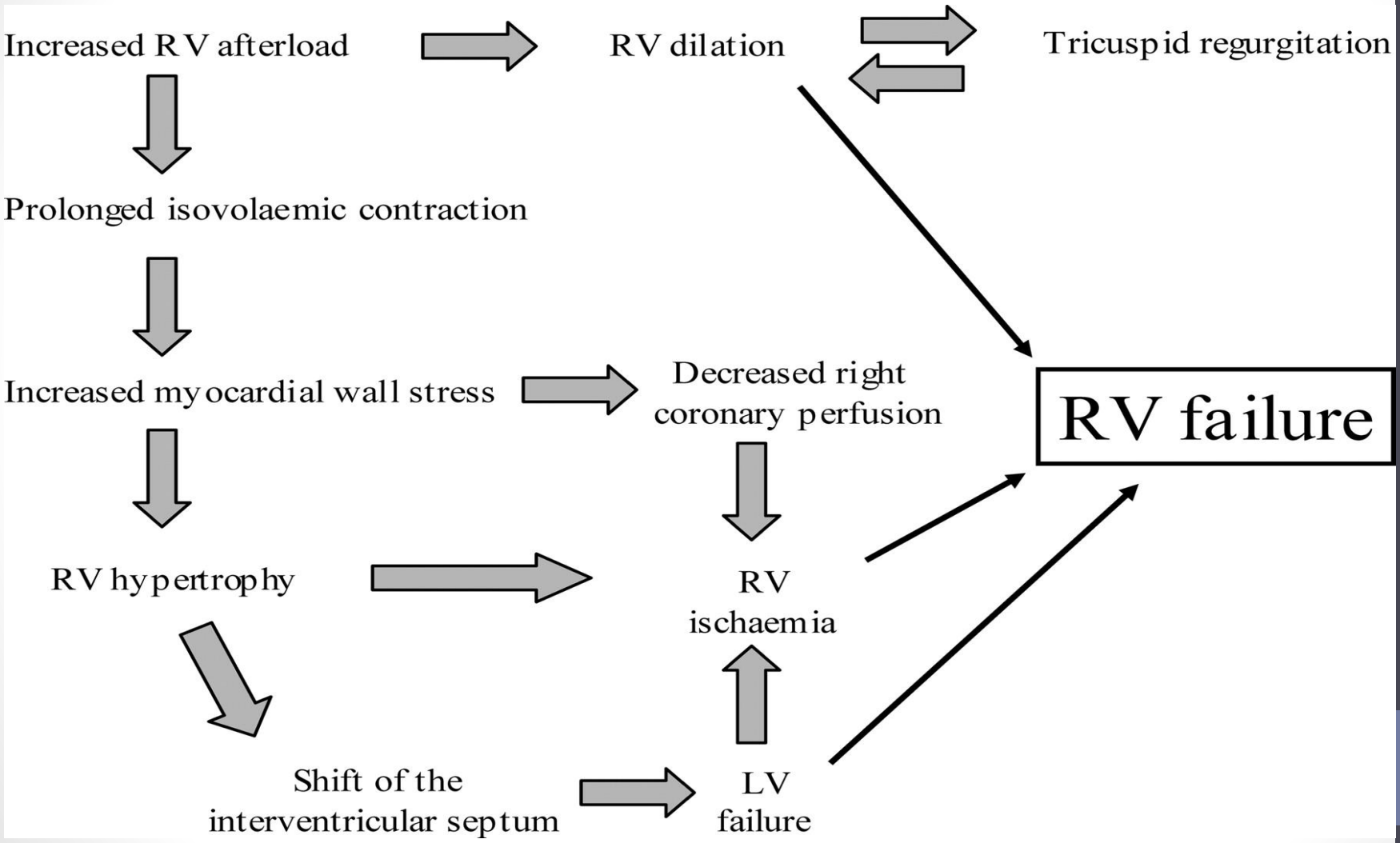
http://www.merckmanuals.com/professional/cardiovascular-disorders/heart-failure/heart-failure-hf

Right ventricle failure 2

- Right ventricle failure causes moderate hepatic dysfunction, with modest increases in conjugated and unconjugated bilirubin, hepatic enzymes, etc.
- The impaired liver breaks down less aldosterone, further contributing to fluid accumulation
- Chronic venous congestion in the viscera can cause anorexia, malabsorption of nutrients and drugs, protein-losing enteropathy (characterized by diarrhea and marked hypoalbuminemia), chronic GI blood loss, and rarely ischemic bowel infarction

http://www.merckmanuals.com/professional/cardiovascular-disorders/heart-failure/heart-failure-hf

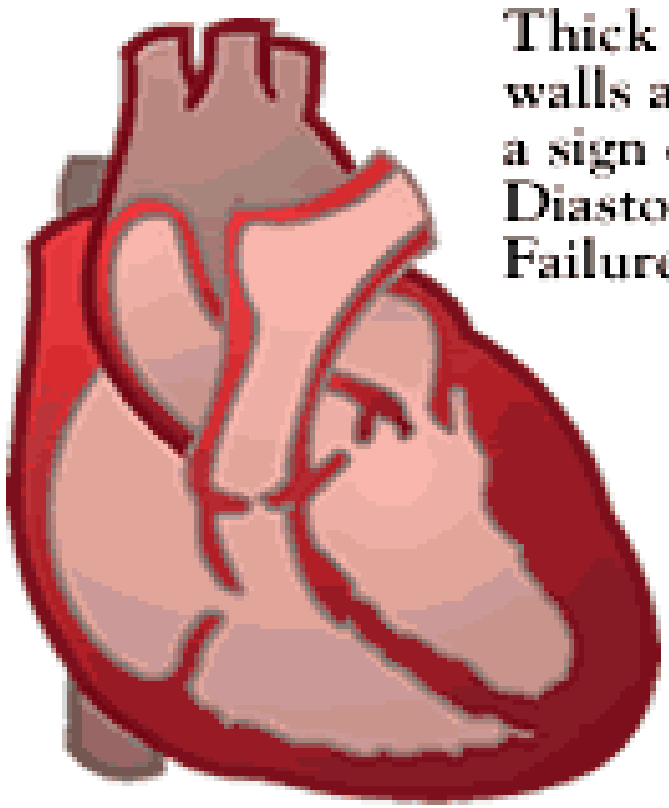
Right ventricle failure 3



http://ceaccp.oxfordjournals.org/content/7/3/89/F2.large.jpg

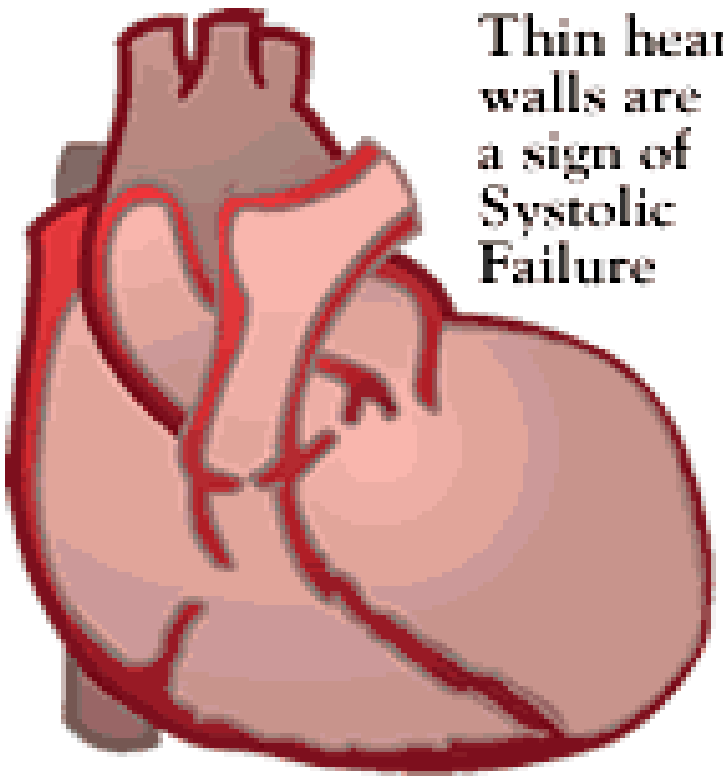
Cardiovascular response 3

Diastolic Failure



Thick heart walls are a sign of Diastolic Failure

Systolic Failure



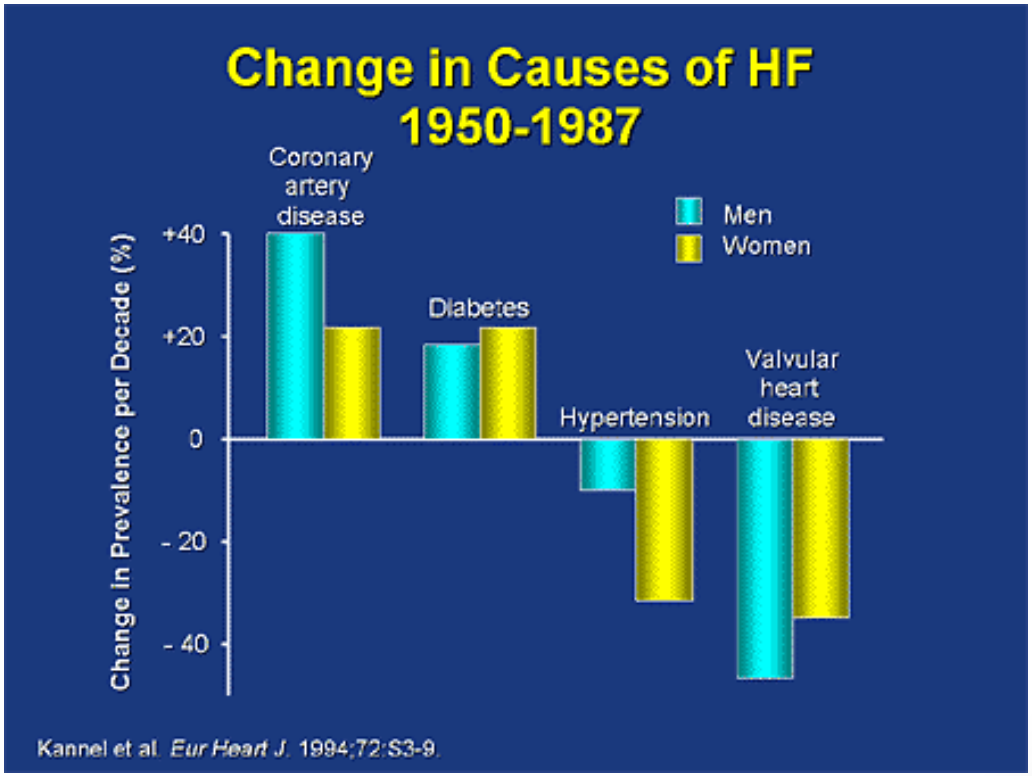
Thin heart walls are a sign of Systolic Failure

http://3.bp.blogspot.com/_m7f1iV3WaEI/TN5VdR38VNI/AAAAAAAAFP8/uPqLj-VEhtM/s400/dia_systolicheart.gif

Causes 1

Heart failure can complicate any cardiovascular disease sooner or later

- Coronary artery disease
- High blood pressure
- Atrial fibrillation
- Valvular heart disease
- Excess alcohol use
- Infection
- Cardiomyopathy

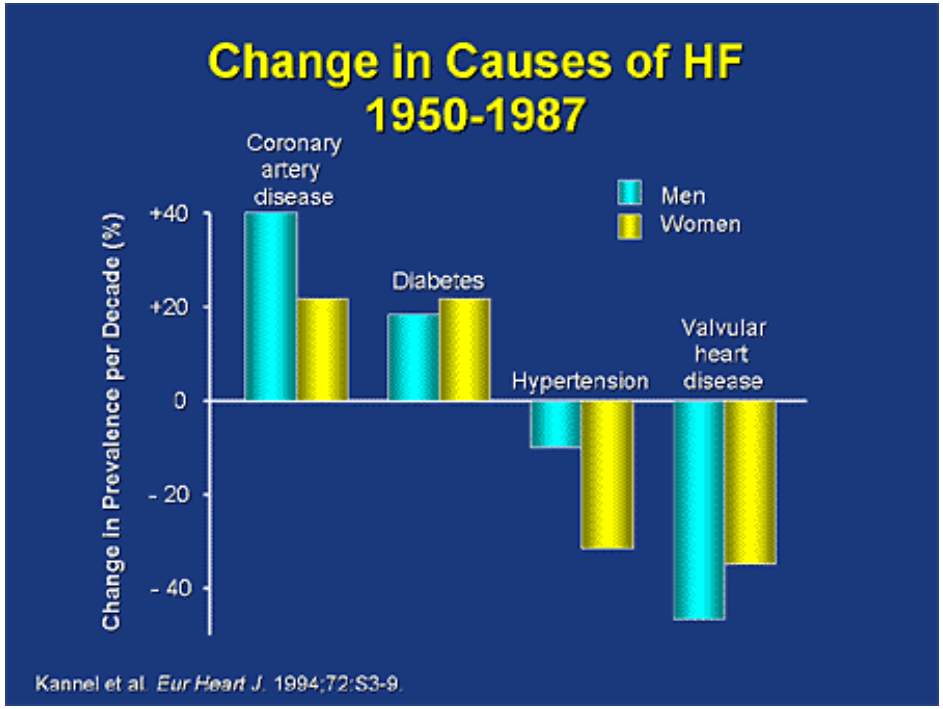


http://img.medscape.com/slide/migrated/editorial/cmecircle/2003/2850/images/braunwald/slide05.gif
http://www.webmd.com/heart-disease/guide-heart-failure#2 https://en.wikipedia.org/wiki/Heart_failure

Causes 2

Heart failure can complicate any cardiovascular disease sooner or later

- Thyroid disease
- Kidney disease
- Diabetes
- Heart defects present at birth

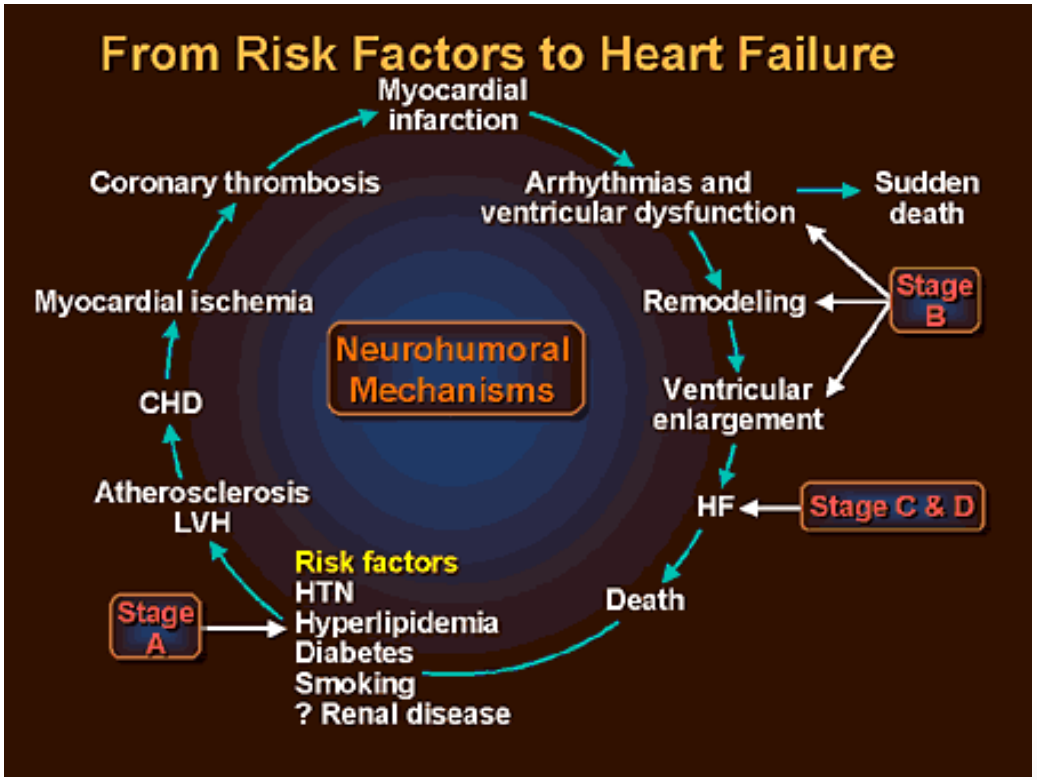


http://img.medscape.com/slide/migrated/editorial/cmecircle/2003/2850/images/braunwald/slide05.gif
http://www.webmd.com/heart-disease/guide-heart-failure#2 https://en.wikipedia.org/wiki/Heart_failure

Risk factors 1

Risk factors for cardiovascular diseases = risk factors for heart failure

- High blood pressure
- Coronary artery disease
- Heart attack
- Diabetes
- Some diabetes
- Sleep apnea
- Congenital heart defects

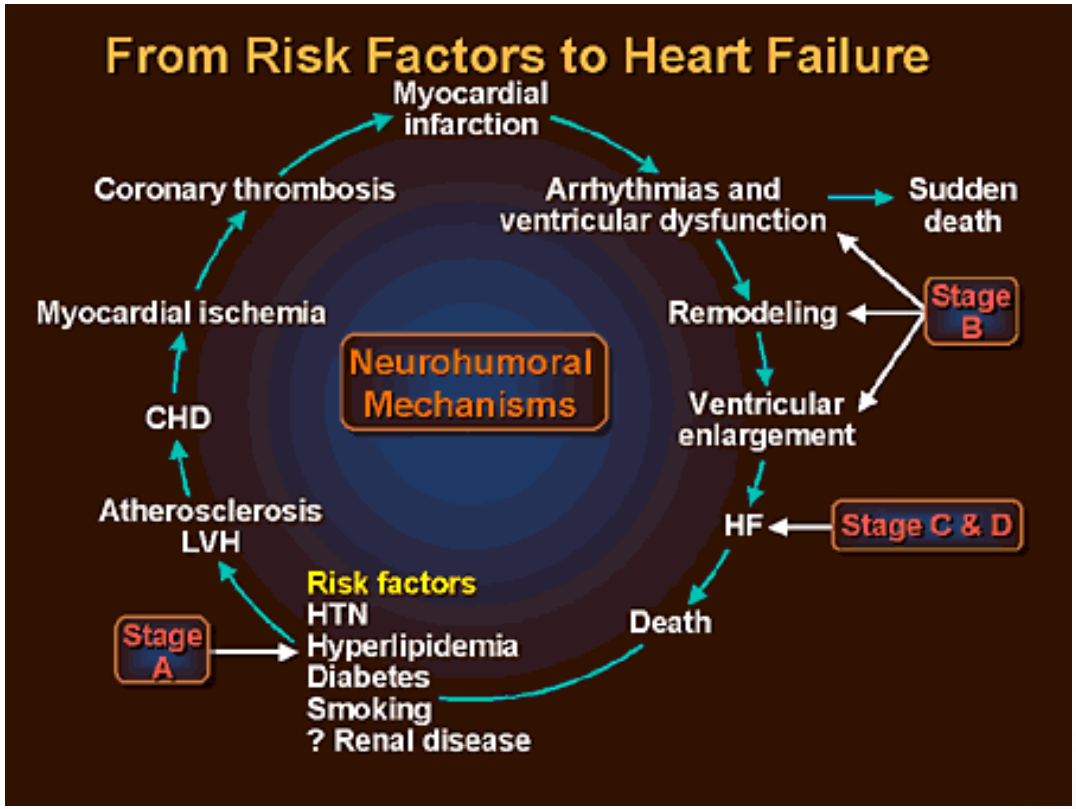


http://img.medscape.com/slide/migrated/editorial/cmecircle/2004/3530/images/burnett/slide031.gif
http://www.mayoclinic.org/diseases-conditions/heart-failure/basics/risk-factors/con-20029801
http://www.webmd.com/heart-disease/guide-heart-failure#2 https://en.wikipedia.org/wiki/Heart_failure

Risk factors 2

Risk factors for cardiovascular diseases = risk factors for heart failure

- Valvular heart disease
- Viruses
- Alcohol use
- Tobacco use
- Obesity
- Irregular heartbeats



http://img.medscape.com/slide/migrated/editorial/cmecircle/2004/3530/images/burnett/slide031.gif
http://www.mayoclinic.org/diseases-conditions/heart-failure/basics/risk-factors/con-20029801
http://www.webmd.com/heart-disease/guide-heart-failure#2 https://en.wikipedia.org/wiki/Heart_failure

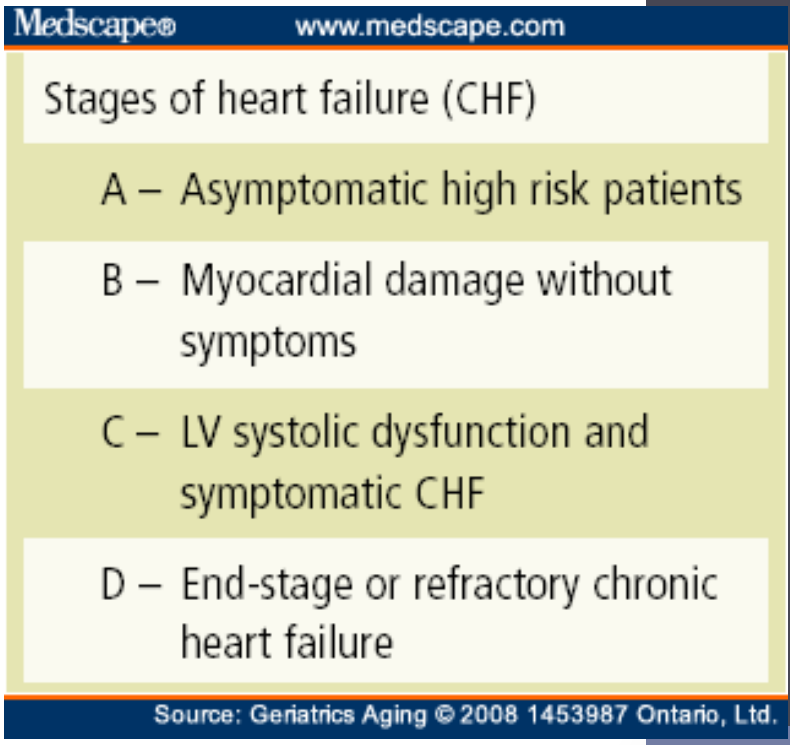
Classification 1

- Acute or chronic (congestive)
- High output or low output
- Systolic or diastolic
- Left heart or right heart or biventricular
- Dilated or nondilated
- Cause: ischemic, hypertensive, idiopathic dilated cardiomyopathy, etc.

http://www.onmedica.com/getresource.aspx?resourceid=d8c24110-e9ad-4e79-8628-09359cf36637
http://www.webmd.com/heart-disease/guide-heart-failure#2 https://en.wikipedia.org/wiki/Heart_failure

Classification 2
Heart failure stage (the American College of Cardiology classification)

Stage	Definition of Stage
A	High risk of heart failure (HF) but no structural heart disease or symptoms
B	Structural heart disease but no symptoms of HF
C	Structural heart disease with symptoms of HF
D	Refractory HF requiring specialized interventions



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Classification 2
heart failure class (New York Heart Association (NYHA) Classification)

NYHA Class	Definition	Limitation
I	Ordinary physical activity does not cause undue fatigue, dyspnea, or palpitations.	None
II	Ordinary physical activity causes fatigue, dyspnea, palpitations, or angina.	Mild
III	Comfortable at rest; less than ordinary physical activity causes fatigue, dyspnea, palpitations, or angina.	Moderate
IV	Symptoms occur at rest; any physical activity increases discomfort.	Severe

http://www.merckmanuals.com/professional/cardiovascular-disorders/heart-failure/heart-failure-hf

Clinical picture 1

- Shortness of breath (dyspnea)
- Fatigue and weakness
- Swelling (edema) in legs, ankles and feet
- Rapid or irregular heartbeat
- Reduced ability to exercise
- Persistent cough or wheezing with white or pink blood-tinged phlegm
- Increased need to urinate at night

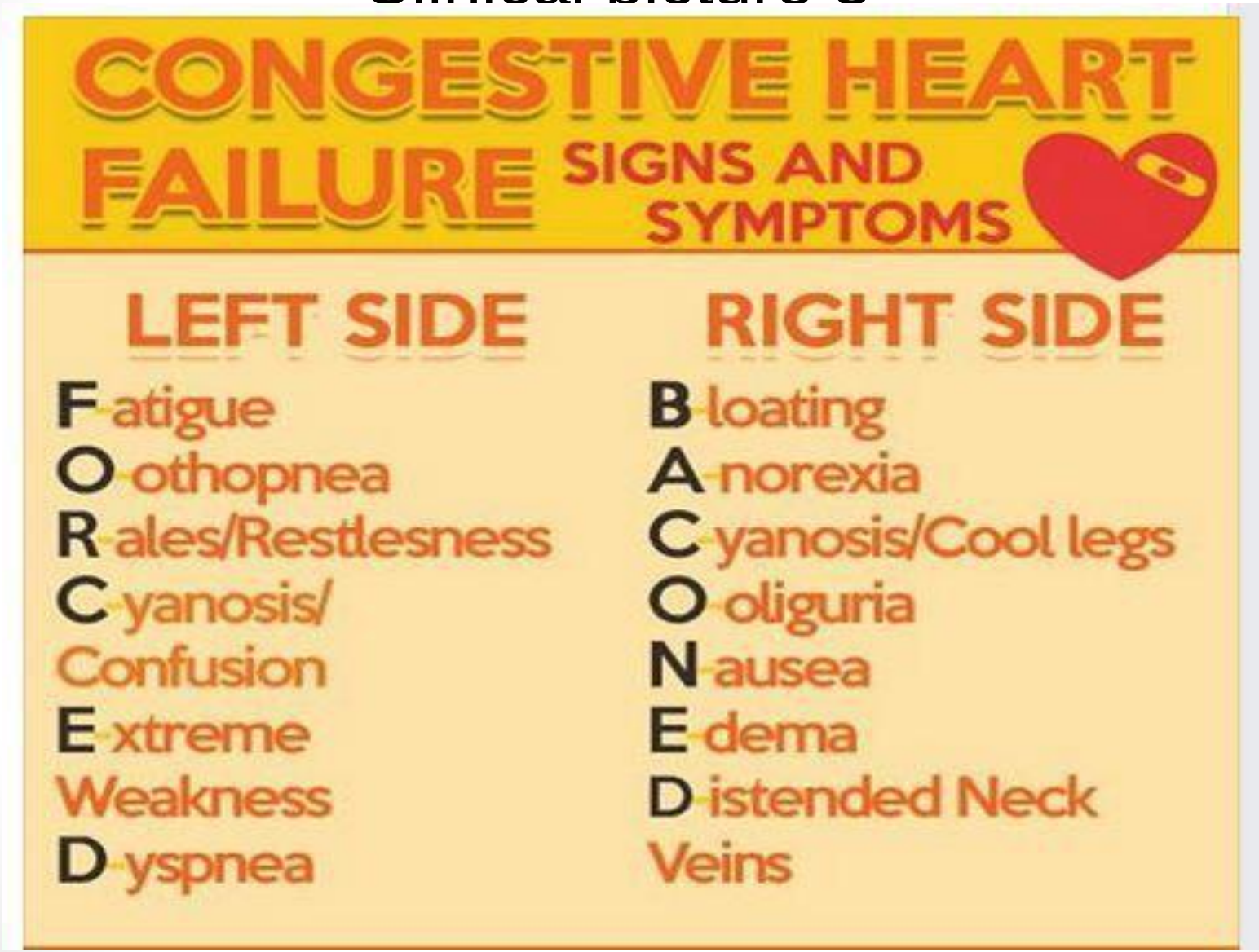
http://www.mayoclinic.org/diseases-conditions/heart-failure/basics/symptoms/con-20029801

Clinical picture 2

- Swelling of abdomen (ascites)
- Sudden weight gain from fluid retention
- Lack of appetite and nausea
- Difficulty concentrating or decreased alertness
- Sudden, severe shortness of breath and coughing up pink, foamy mucus
- Chest pain if heart failure is caused by a heart attack

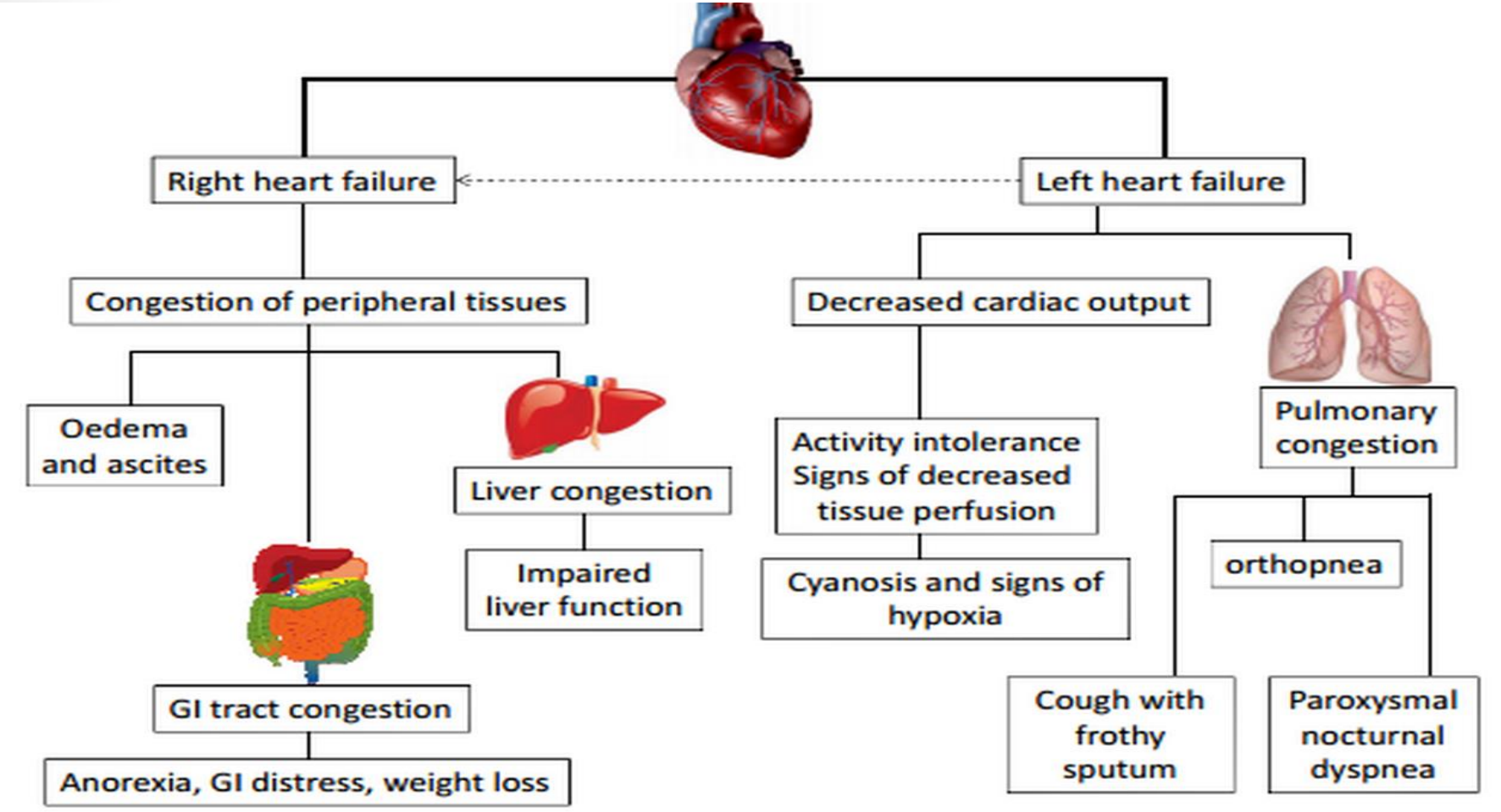
http://www.mayoclinic.org/diseases-conditions/heart-failure/basics/symptoms/con-20029801

Clinical picture 3



https://www.pinterest.com/pin/306667055863242166/

Clinical picture: left and right heart failure



https://classconnection.s3.amazonaws.com/930/flashcards/3853930/png/screen_shot_2013-10-16_at_92756_am-141C06124857054B85A.png

Diagnosis 1

- In left heart (left ventricle - LV) failure, tachycardia and tachypnea, hypotension, and confusion because of hypoxia and poor cerebral perfusion may occur
- Central cyanosis reflects severe hypoxemia; peripheral cyanosis of the lips, fingers, and toes reflects low blood flow with increased O_2 extraction

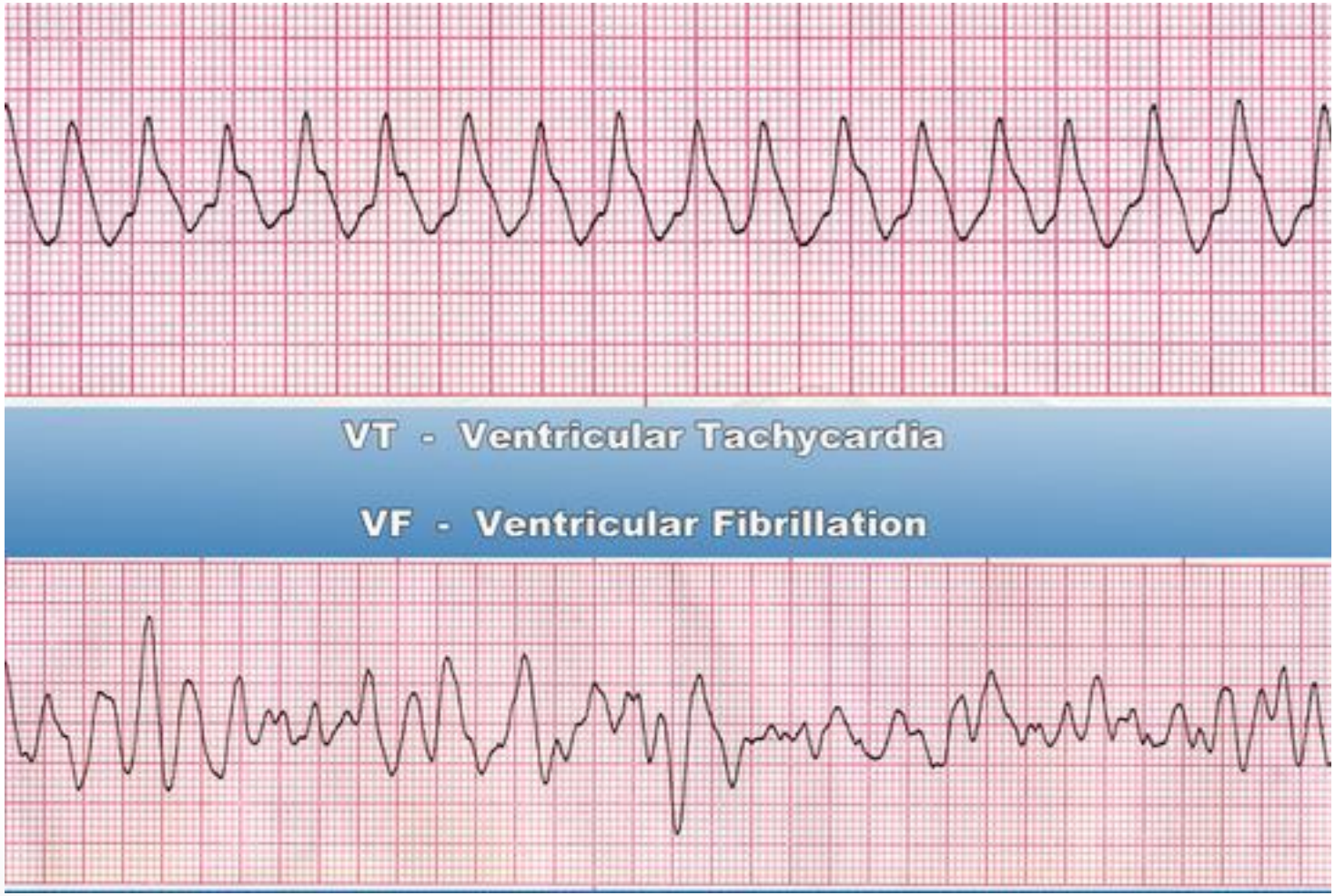
http://www.mayoclinic.org/diseases-conditions/heart-failure/basics/symptoms/con-20029801

Diagnosis 2

- LV systolic dysfunction include a diffuse, sustained, and laterally displaced apical impulse; audible and occasionally palpable 3rd (S_3) and 4th (S_4) heart sounds, and an accentuated pulmonic component (P_2) of the 2nd heart sound (S_2); a pansystolic murmur of mitral regurgitation at the apex may occur
- Pulmonary findings include early inspiratory basilar crackles that do not clear with coughing and, if pleural effusion is present, dullness to percussion and diminished breath sounds at the lung base(s)

http://www.mayoclinic.org/diseases-conditions/heart-failure/basics/symptoms/con-20029801

Diagnosis: tachycardia



http://www.mayoclinic.org/diseases-conditions/heart-failure/basics/symptoms/con-20029801

Diagnosis: central cyanosis

Central cyanosis is caused by abnormal composition of hemoglobin such as sulphaemoglobinaemia and methaemoglobinaemia or decreased in the saturation of the oxygen because of cyanotic congenital heart disease, pulmonary embolism, pulmonary edema (required urgent treatment) and severe respiratory disease

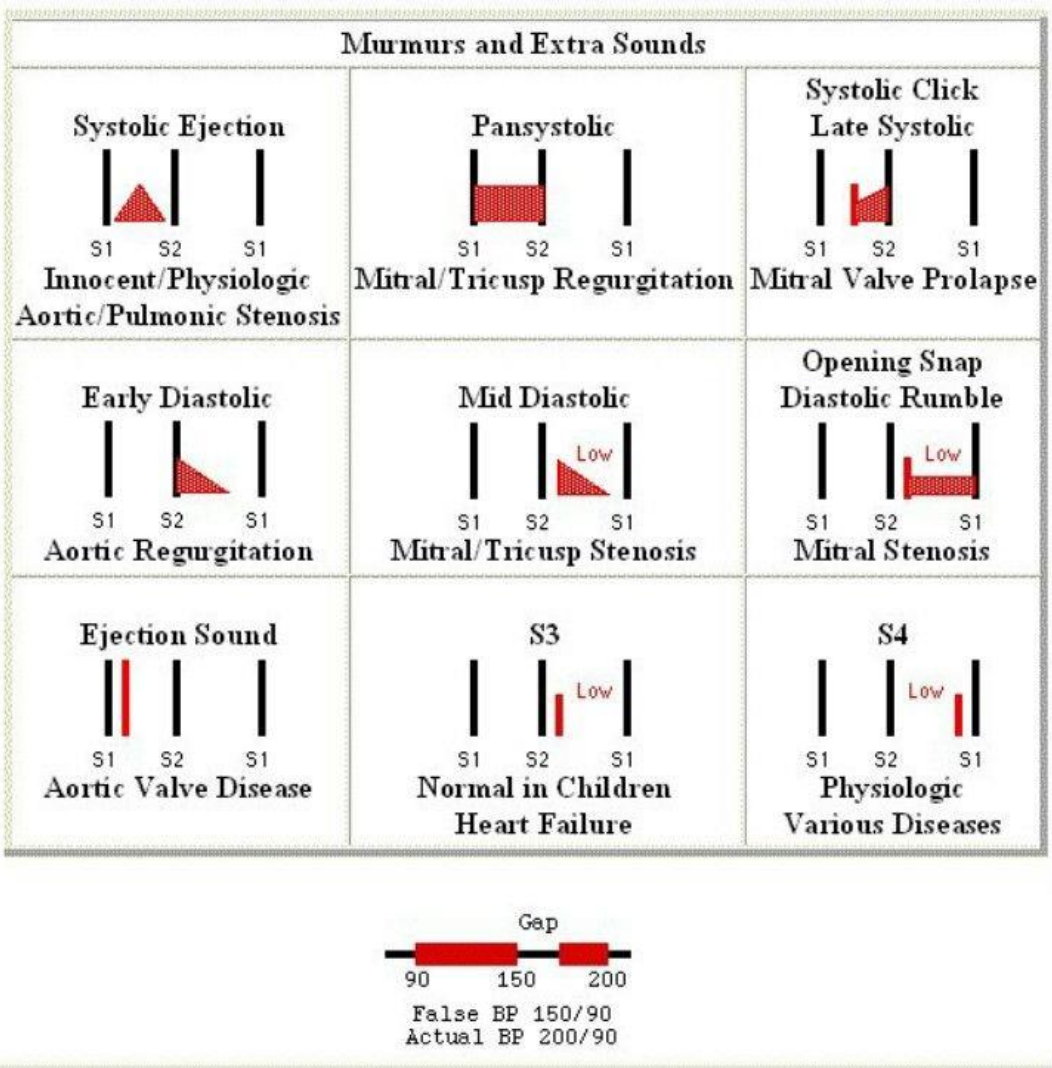
http://www.medicalzone.net/symptom-finder---the-causes-of-cyanosis.html

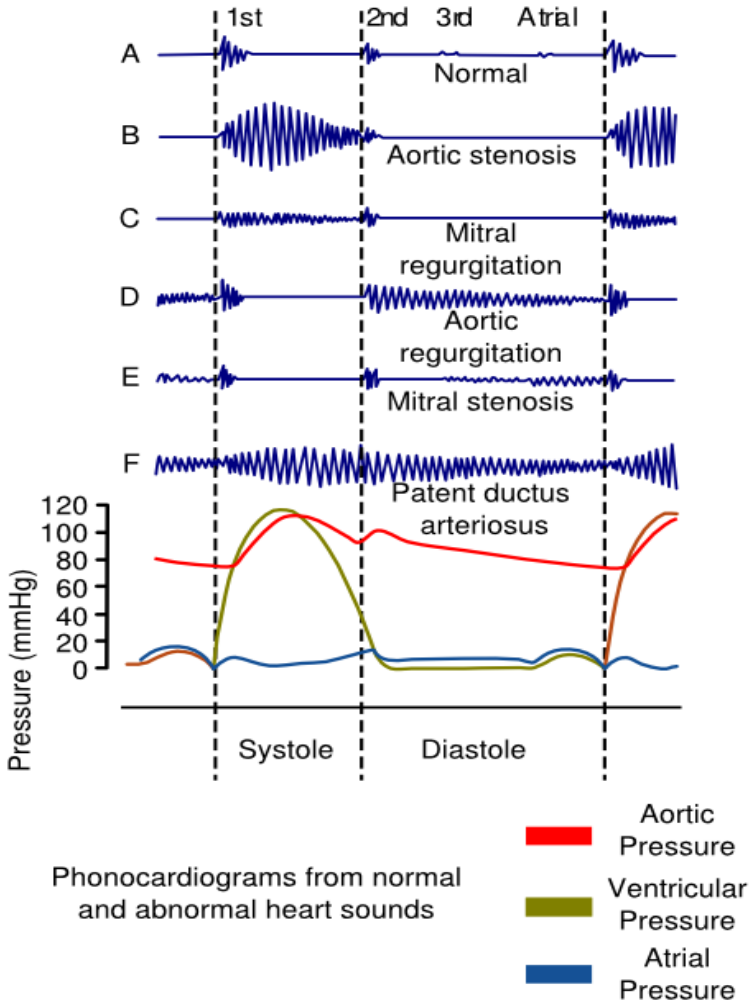
Diagnosis: peripheral cyanosis

- Peripheral cyanosis can be a result of the causes of central cyanosis or can occur in isolation
- Common causes of peripheral cyanosis without central cyanosis are:
  - Peripheral vasoconstriction due to cold, Raynaud's phenomenon or beta blocker drugs;
  - Reduced cardiac output due to cardiac failure or hypovolemia;
  - Peripheral vascular disease;
  - Venous obstruction (deep vein thrombosis, etc.).

http://www.fastbleep.com/medical-notes/heart-lungs-blood/14/30/448

Diagnosis: heart sounds





Phonocardiograms from normal and abnormal heart sounds

http://ktthebest4u.blogspot.com/2015_01_01_archive.html http://www.textbookofcardiology.org/

Diagnosis: right heart failure 1

- Nontender peripheral pitting edema (digital pressure leaves visible and palpable imprints, sometimes quite deep) in the feet and ankles; an enlarged and sometimes pulsatile liver palpable below the right costal margin; abdominal swelling and ascites; and visible elevation of the jugular venous pressure, sometimes with large *a* or *v* waves that are visible even when the patient is seated or standing

http://www.mayoclinic.org/diseases-conditions/heart-failure/basics/symptoms/con-20029801

Diagnosis: right heart failure 2

- In severe cases, peripheral edema can extend to the thighs or even the sacrum, scrotum, lower abdominal wall, and occasionally even higher (anasarca); edema may be asymmetric if patients lie predominantly on one side
- With hepatic congestion, the liver may be palpably enlarged or tender, and hepato jugular or abdominal-jugular reflux may be detected

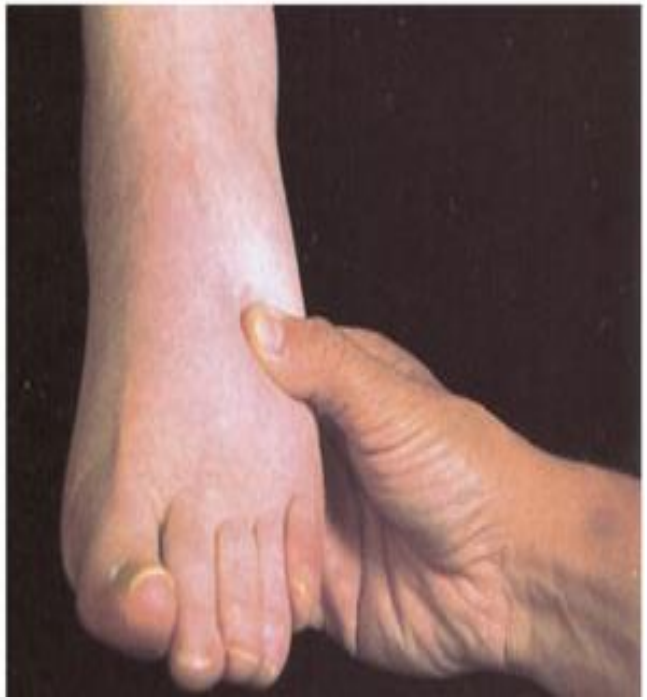
http://www.mayoclinic.org/diseases-conditions/heart-failure/basics/symptoms/con-20029801

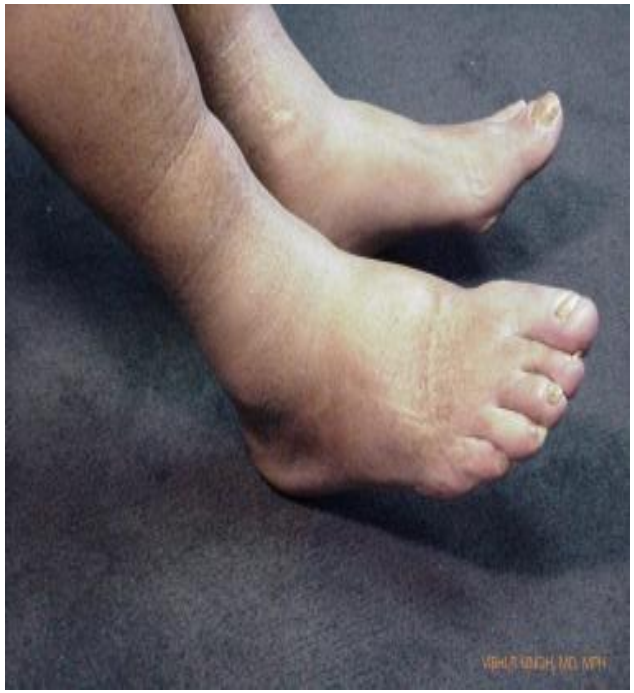
Diagnosis: right heart failure 3

- Precordial palpation may detect the left parasternal lift of RV enlargement, and auscultation may detect the murmur of tricuspid regurgitation or the RV S_3 along the left sternal border; both findings are augmented upon inspiration

http://www.mayoclinic.org/diseases-conditions/heart-failure/basics/symptoms/con-20029801

Diagnosis: peripheral edema





http://img.medscapestatic.com/pi/meds/ckb/84/6284tn.jpg
https:// https://classconnection.s3.amazonaws.com http://www.cormedicalgroup.com/wp-content/uploads/2014/01/pitting-edema-300x231.png

Diagnosis: anasarca)

Anasarka is whole body edema

https://classconnection.s3.amazonaws.com/683/flashcards/4419683/png/screen_shot_2014-01-25_at_125401_pm-143CB2C3EC22D2BA818.png

Diagnosis: chest x-ray

- Chest x-ray findings include an enlarged cardiac silhouette, pleural effusion, fluid in the major fissure, and horizontal lines in the periphery of lower posterior lung fields (Kerley B lines)
- The x-ray may also suggest alternative diagnoses (e.g., chronic obstructive pulmonary disease (COPD), pneumonia, interstitial pulmonary fibrosis, lung cancer)

https://www.med-ed.virginia.edu/courses/rad/chest/images/x-rays/chf.jpg http://www.mayoclinic.org/diseases-conditions/heart-failure/basics/symptoms/con-20029801

Diagnosis: electrocardiography

- Electrocardiography (ECG) findings are not diagnostic, but an abnormal ECG, especially showing previous myocardial infarction (MI), left ventricle (LV) hypertrophy, left bundle branch block, or tachyarrhythmia (e.g., rapid atrial fibrillation), increases suspicion for heart failure (HF) and may help identify the cause
- An entirely normal ECG is uncommon in chronic HF

http://www.mayoclinic.org/diseases-conditions/heart-failure/basics/symptoms/con-20029801

Diagnosis: echocardiography 1

- Echocardiography can help evaluate chamber dimensions, valve function, ejection fraction (EF), wall motion abnormalities, left ventricle (LV) hypertrophy, and pericardial effusion
- Measuring LV EF can distinguish between predominant diastolic dysfunction (EF > 0.50) and systolic dysfunction (EF < 0.40)
- Intracardiac thrombi, tumors, and calcifications within the heart valves, mitral annulus, and aortic wall abnormalities can be detected

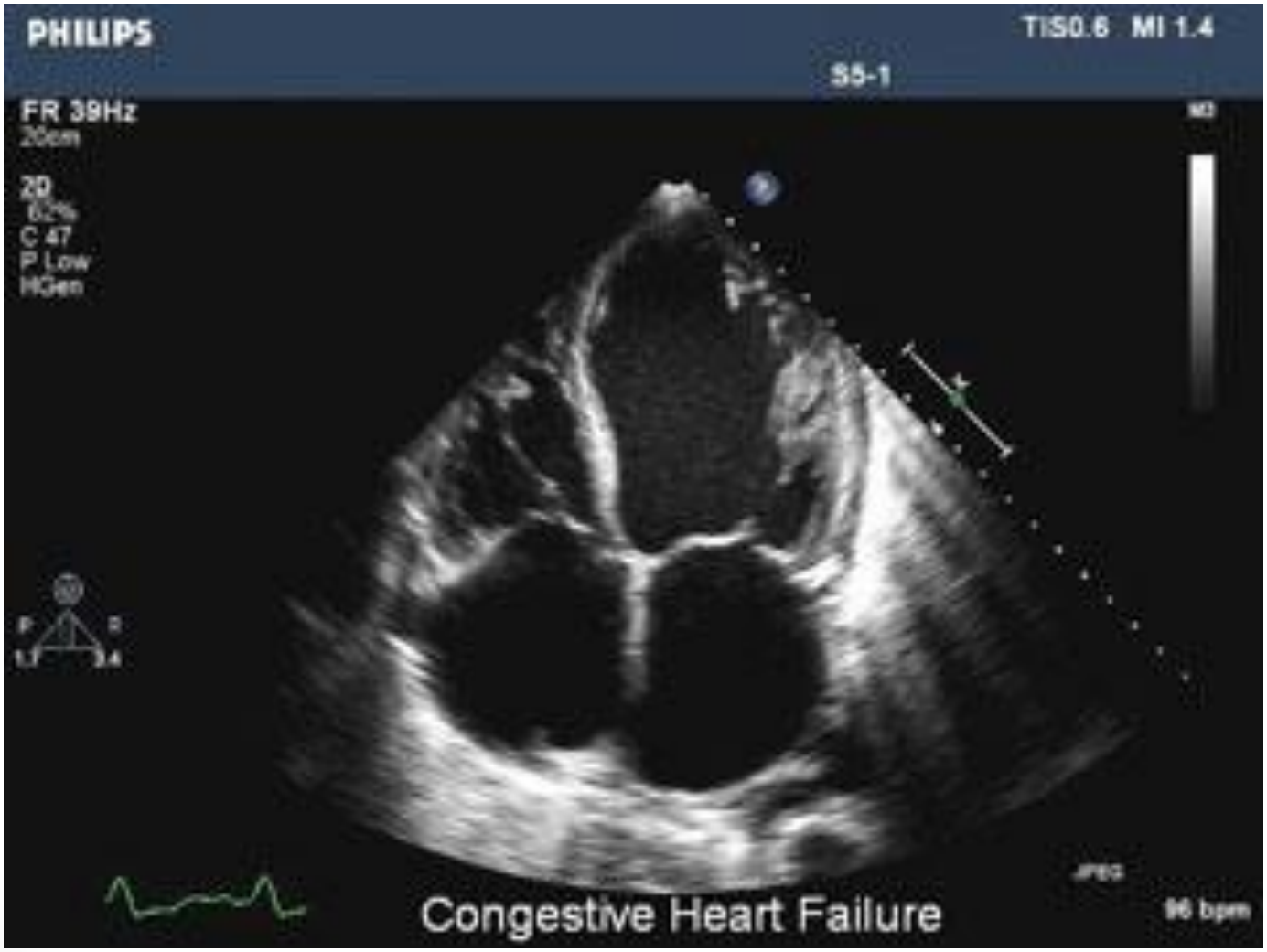
http://www.mayoclinic.org/diseases-conditions/heart-failure/basics/symptoms/con-20029801

Diagnosis: echocardiography 2

- Localized or segmental wall motion abnormalities strongly suggest underlying coronary artery disease (CAD) but can also be present with patchy myocarditis
- Doppler echocardiography accurately detects valvular disorders and shunts, can help identify and quantify LV diastolic dysfunction

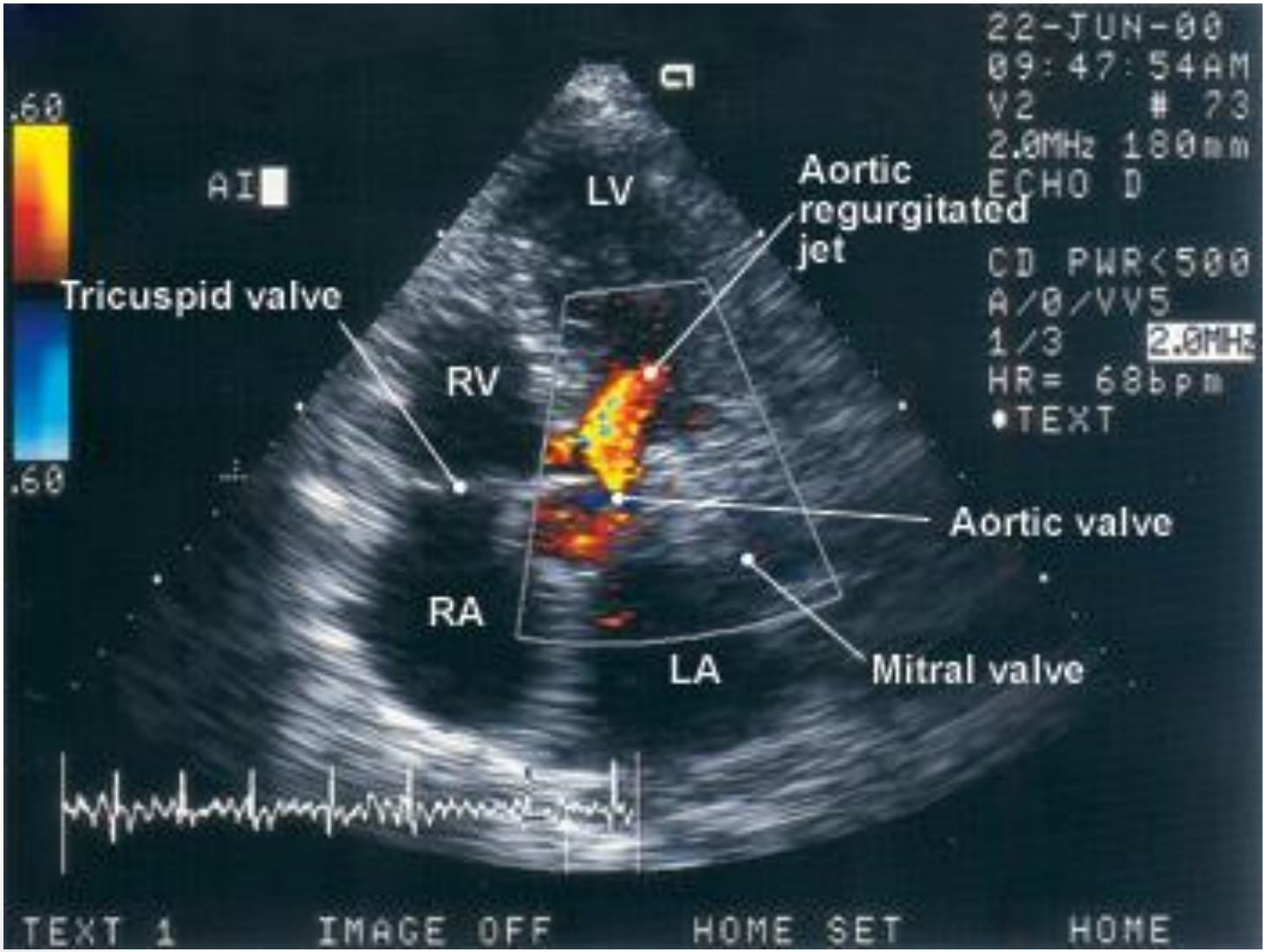
http://www.mayoclinic.org/diseases-conditions/heart-failure/basics/symptoms/con-20029801

Diagnosis: echocardiography 3



http://tursweet.com/e/echocardiogram-of-heart-failure.html

Diagnosis: echocardiography 4

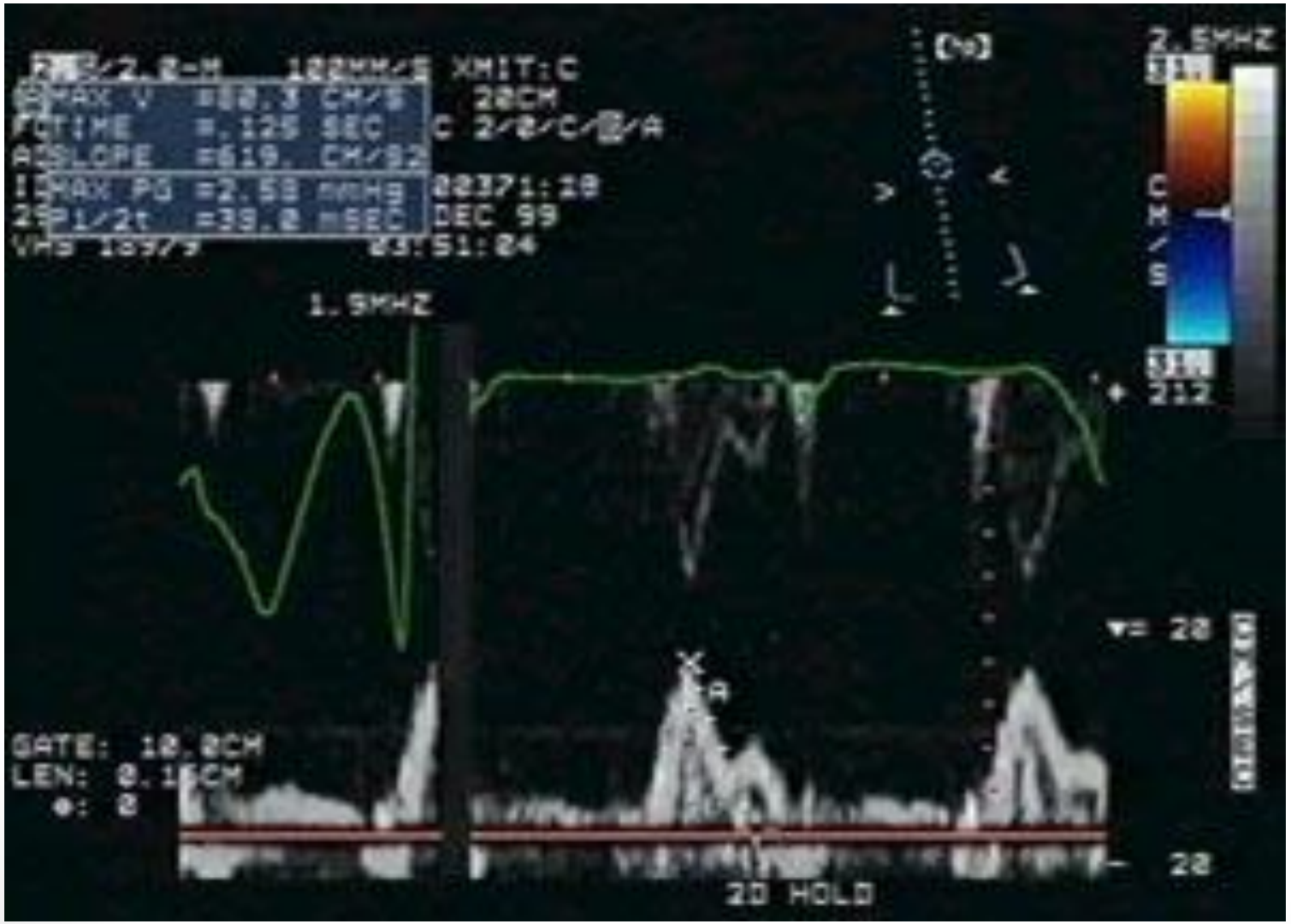


http://www.aafp.org/afp/2001/0601/afp20010601p2201-f1.jpg

Diagnosis: echocardiography 5

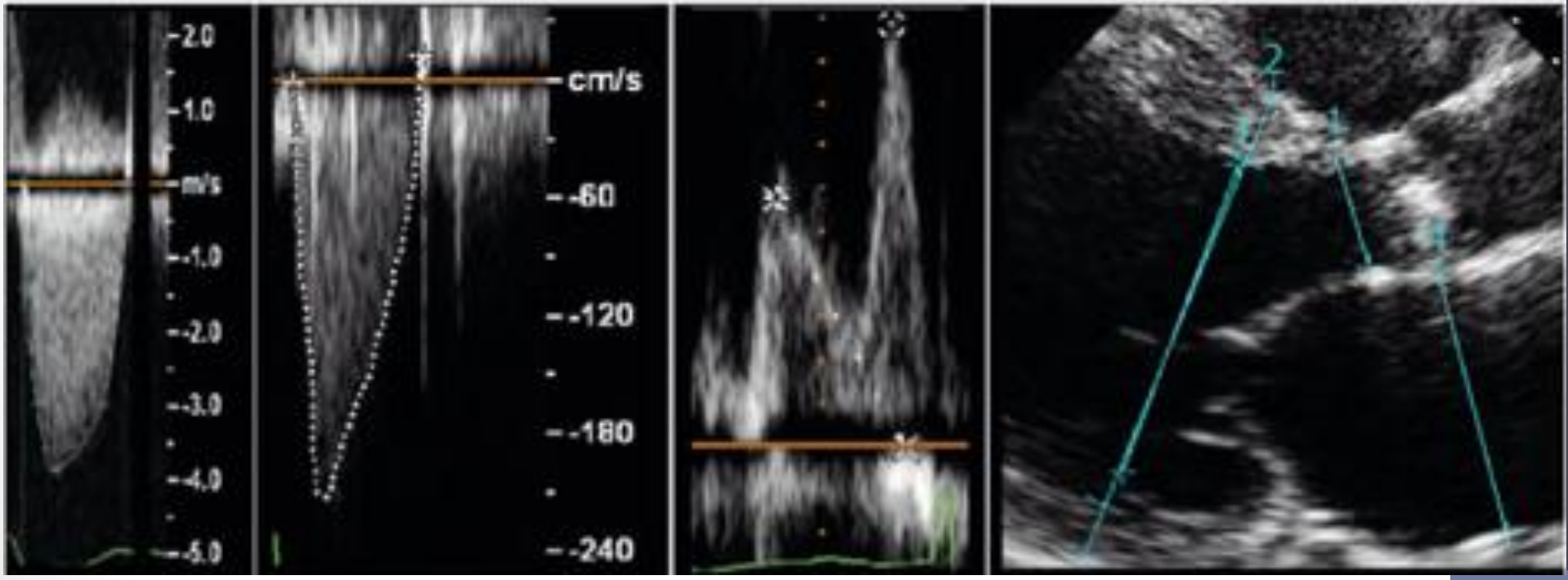
http://www.escardio.org/static_file/Escardio/Medias/working-groups/myocardial-pericardial/case-dec12-fig2.jpg

Diagnosis: echocardiography 6



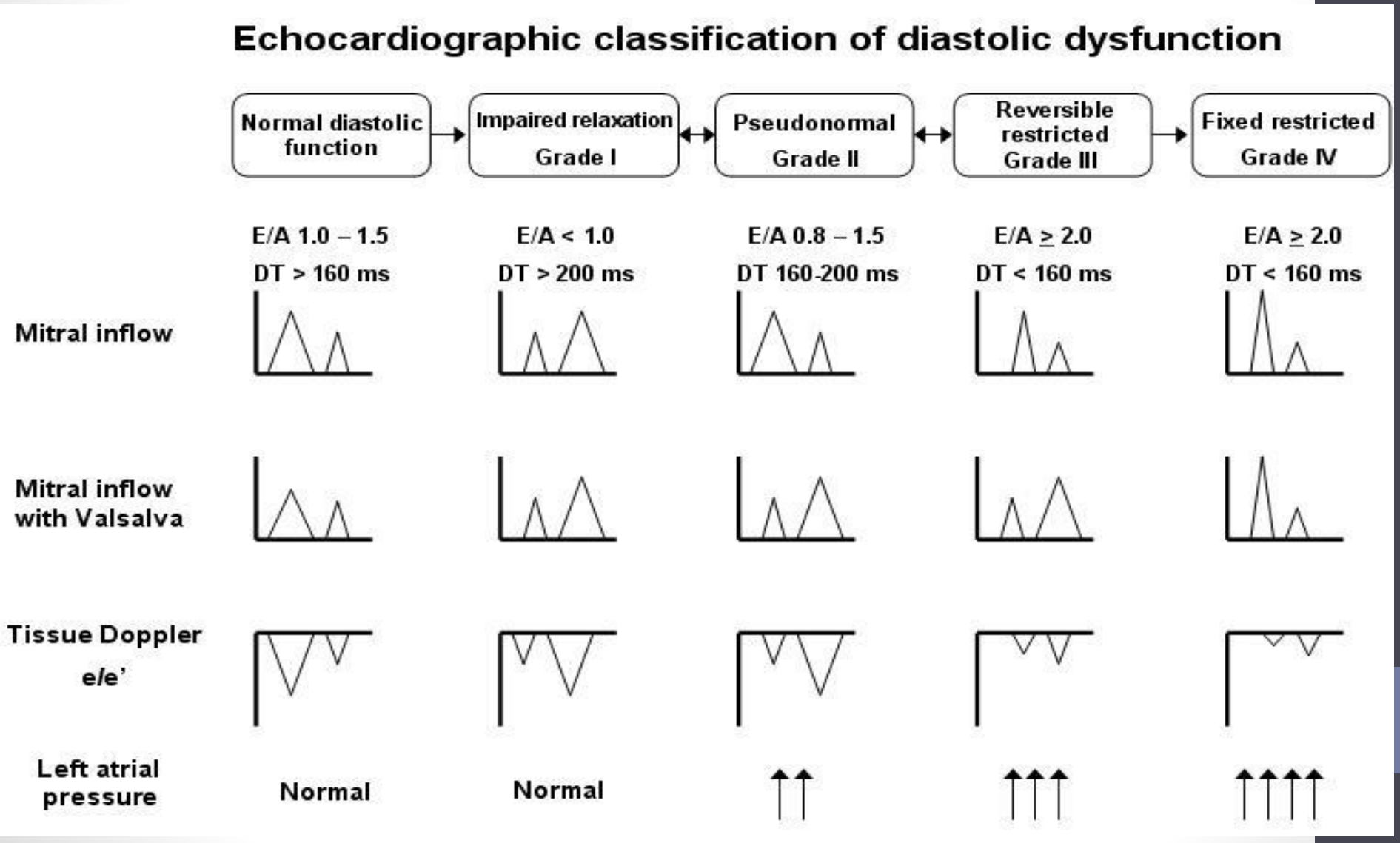
http://my.clevelandclinic.org/ccf/media/Images/heart/echo2.JPG

Diagnosis: echocardiography 7



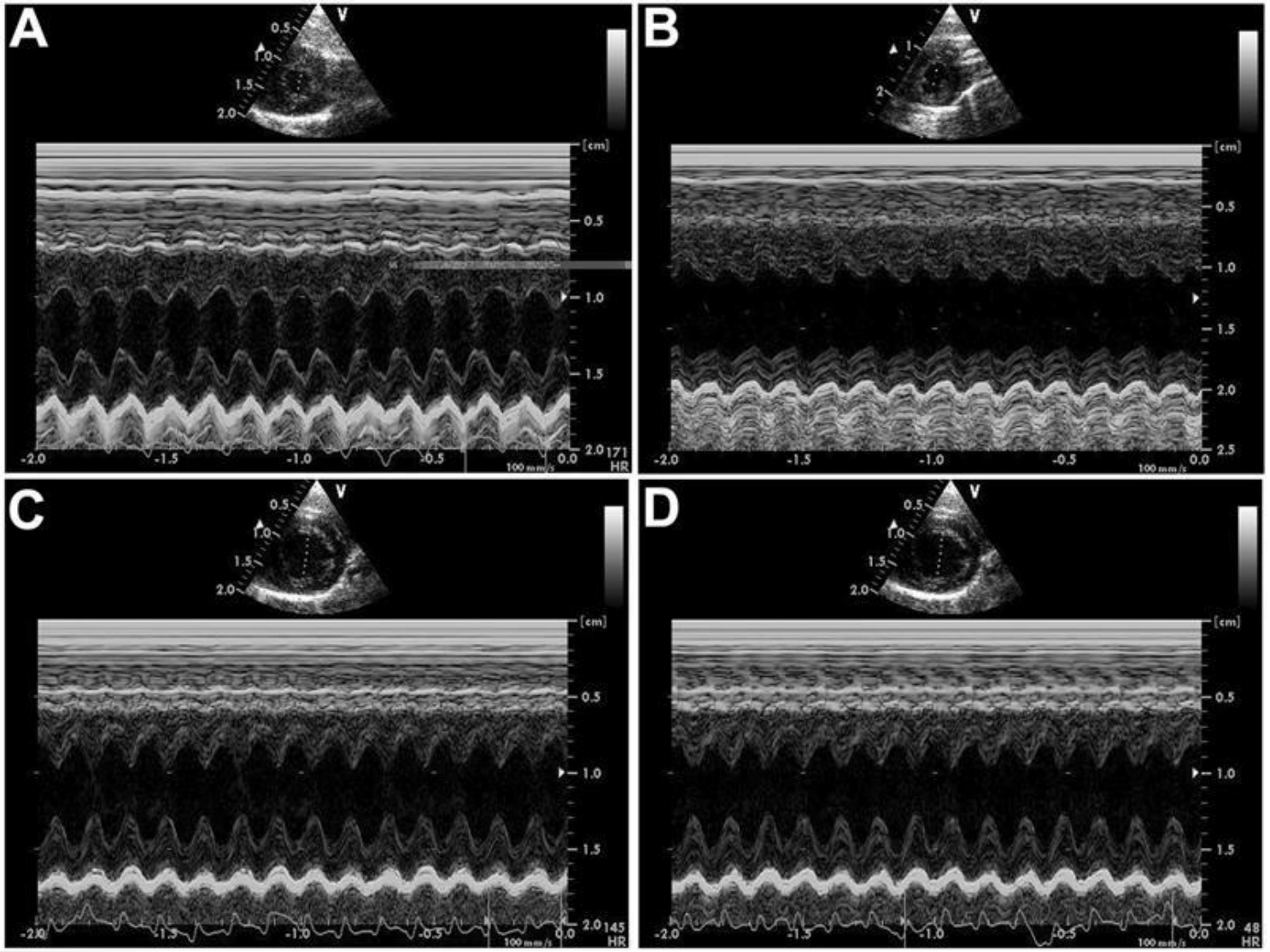
http://www.cardialysis.com/files/echo-2904-1.jpg

Diagnosis: echocardiography 8



http://www.learntheheart.com/assets/1/7/DD-echoClassification.JPG

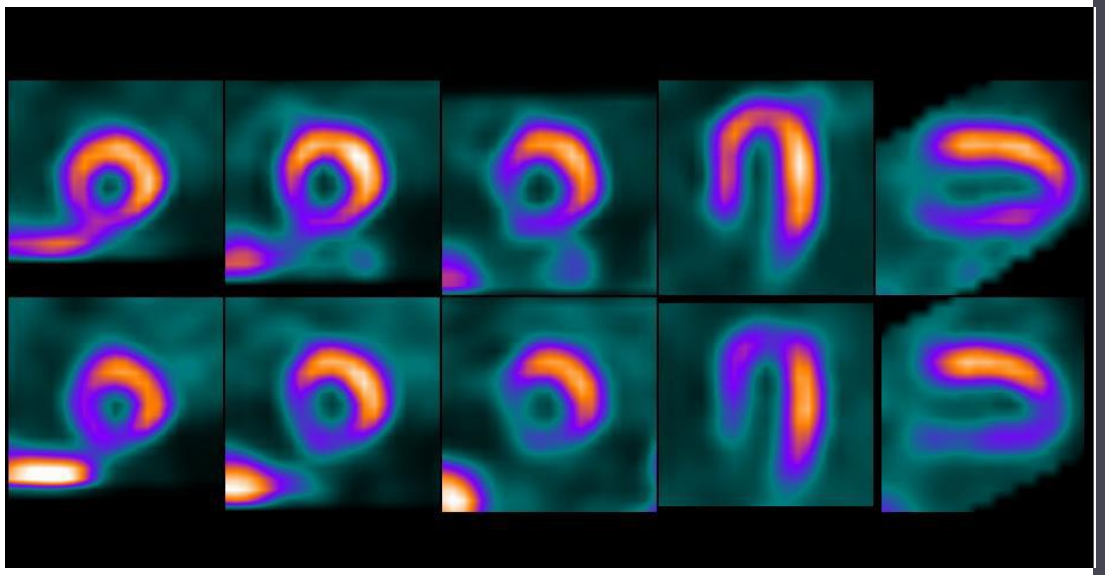
Diagnosis: echocardiography 9



http://www.scielo.br/img/revistas/bjmbr/v47n8//1414-431X-bjmbr-1414-431X20143474-gf001.jpg

Diagnosis: cardiac radionuclide scan

Radionuclide imaging can help assess systolic and diastolic function, previous myocardial infarction (MI), and inducible ischemia or myocardial hibernation

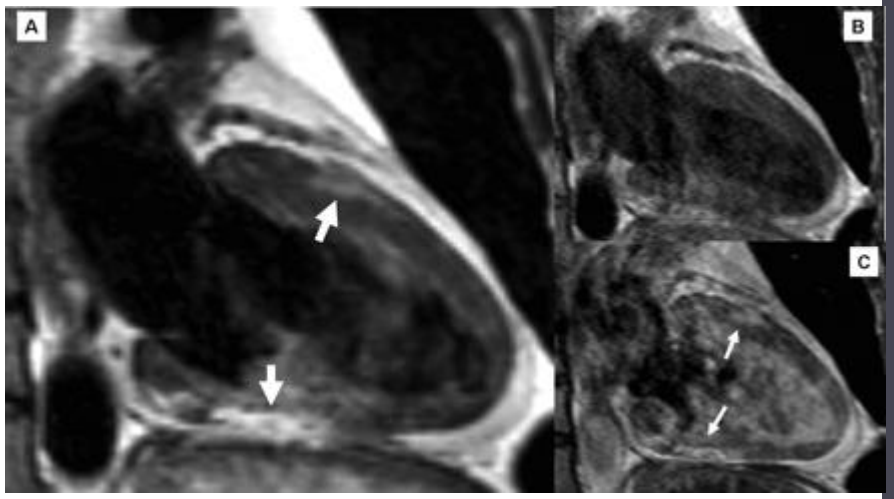


A myocardial perfusion SPECT (Single Photon Emission Computed Tomography) study, also called a cardiac stress-rest test, is used to evaluate the heart's blood supply. Two sets of images showing blood flow are obtained: the first following a period of rest, and the second following a period of stress, which involves exercise on a treadmill.

http://cedars-sinai.edu/Patients/Programs-and-Services/Imaging-Center/For-Physicians/Cardiac-Imaging/Cardiac-SPECT/SPECT.JPG
http://www.mayoclinic.org/diseases-conditions/heart-failure/basics/symptoms/con-20029801

Diagnosis: magnetic resonance imaging

Cardiac magnetic resonance imaging (MRI) provides accurate images of cardiac structures and is becoming more widely available

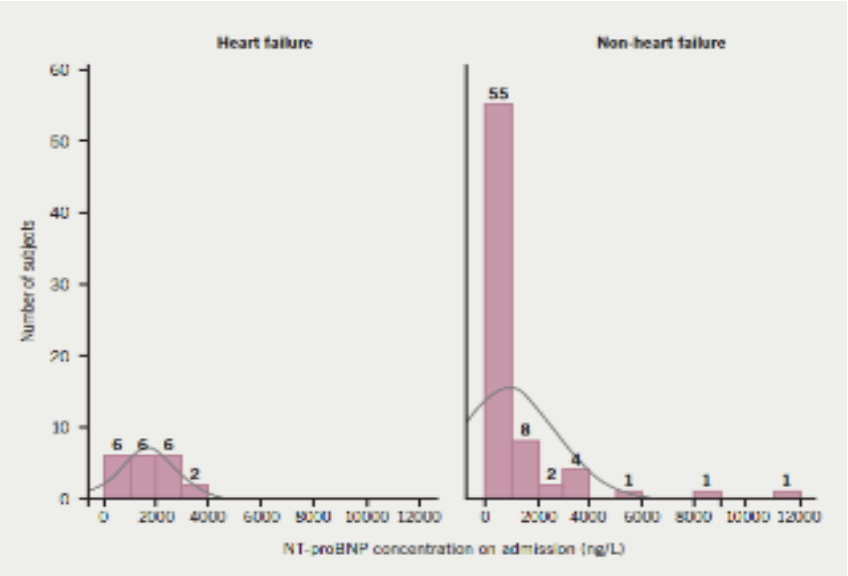


T2-weighted dark-blood imaging of the left ventricular long axis showing high signal intensity in the left ventricular anterior and inferior wall, a sign of myocardial edema. A, T1-weighted dark-blood imaging (early enhancement) shows high signal intensity directly after gadolinium administration in the corresponding area of the anterior left ventricular wall. Arrows indicate myocardial edema. B, T1-weighted imaging before gadolinium administration. C, Arrows indicate myocardial early enhancement.

http://circ.ahajournals.org/content/123/13/1451/F3.medium.gif http://www.mayoclinic.org/diseases-conditions/heart-failure/basics/symptoms/con-20029801

Diagnosis:
NP/BNP or N-terminal-pro-BNP levels

- Serum NP/BNP levels are high in heart failure (HF); this finding may help when clinical findings are unclear or other diagnoses (e.g., chronic obstructive pulmonary disease (COPD)) need to be excluded
- It may be particularly useful for patients with a history of both pulmonary and cardiac disorders
- NT-pro-BNP, an inactive moiety created when pro BNP is cleaved, can be used similarly to NP/BNP



http://bjcardio.co.uk/files/uploads/2014/12/Figure-1.png http://www.mayoclinic.org/diseases-conditions/heart-failure/basics/symptoms/con-20029801

Diagnosis: the Framingham criteria 1

- Diagnosis requires the simultaneous presence of at least 2 of the major criteria or 1 major criterion in conjunction with 2 of the minor criteria
- Major criteria include an enlarged heart, an S3 gallop, acute pulmonary edema, episodes of waking up from sleep gasping for air, crackles on lung auscultation, central venous pressure of more than 16 cm H_2O at the right atrium, jugular vein distension, positive abdomino jugular test, and weight loss of more than 4.5 kg in 5 days in response to treatment

https://en.wikipedia.org/wiki/Heart_failure

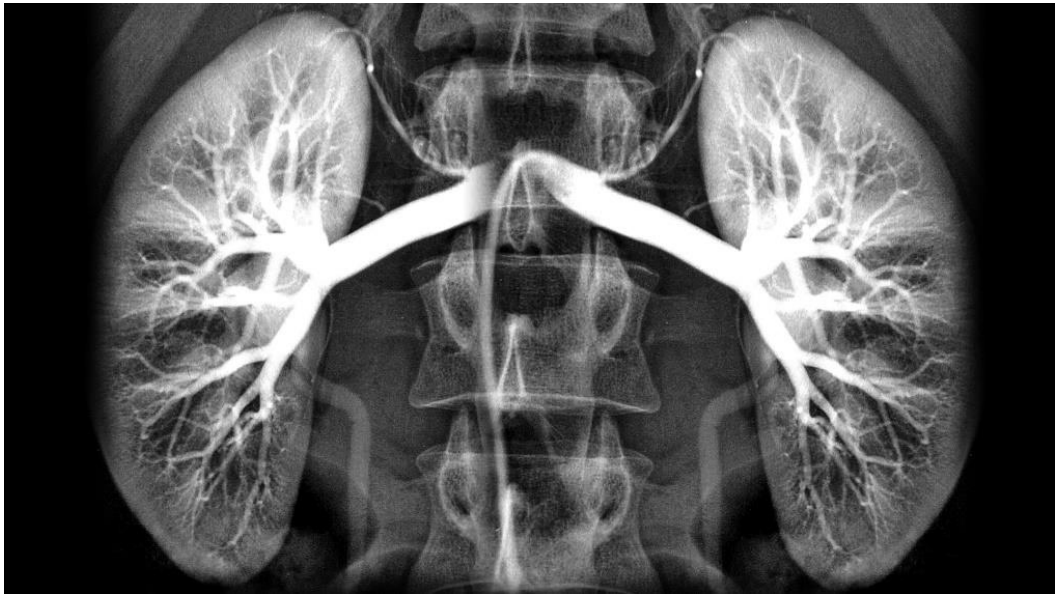
Diagnosis: the Framingham criteria 2

- Minor criteria include an abnormally fast heart rate of more than 120 beats per minute, nocturnal cough, difficulty breathing with physical activity, pleural effusion, a decrease in the vital capacity by one third from maximum recorded, liver enlargement, and bilateral ankle swelling

https://en.wikipedia.org/wiki/Heart_failure

Complications

- Kidney damage or failure
- Heart valve problems
- Heart rhythm problems
- Liver damage



http://nutritionfacts.org/wp-content/uploads/2012/10/Preventing-and-Treating-Kidney-Failure-with-Diet.jpg
http://www.mayoclinic.org/diseases-conditions/heart-failure/basics/symptoms/con-20029801

Thank you for attention