Common Drugs used in CV Ward

Yang Teng-Yao

Common Drugs used in CV WARD

- ***Anti-hypertensive drugs***
- ***Anti-anginal agents***
- ***Anti-heart failure agents***
- ***Anti-arrythmia drug***
- ***Anti-thrombotic agents, platelet inhibitors, anticoagulants and fibrinolytics***
- ***Lipid lowering and anti-atherosclerotic drugs***

Table 1. Classification and management of blood pressure for adults*

BP Classification	SBP* mmHg	DBP* mmHg	Lifestyle Modification	Initial drug therapy	
				Without Compelling Indication	With Compelling Indications (See Table 8)
Normal	<120	and <80	Encourage		
Prehypertension	120–139	or 80–89	Yes	No antihypertensive drug indicated.	Drug(s) for compelling indications.‡
Stage 1 Hypertension	140–159	or 90–99	Yes	Thiazide-type diuretics for most. May consider ACEI, ARB, BB, CCB, or combination.	Drug(s) for the compelling indications.‡ Other antihypertensive drugs (diuretics, ACEI, ARB, BB, CCB) as needed.
Stage 2 Hypertension	≥160	or ≥100	Yes	Two-drug combination for most† (usually thiazide-type diuretic and ACEI or ARB or BB or CCB).	

DBP, diastolic blood pressure; SBP, systolic blood pressure.
Drug abbreviations: ACEI, angiotensin converting enzyme inhibitor; ARB, angiotensin receptor blocker; BB, beta-blocker; CCB, calcium channel blocker.

* Treatment determined by highest BP category.

† Initial combined therapy should be used cautiously in those at risk for orthostatic hypotension.

‡ Treat patients with chronic kidney disease or diabetes to BP goal of <130/80 mmHg.

Table 4. Identifiable causes of hypertension

- Sleep apnea
- Drug-induced or related causes (see table 9)
- Chronic kidney disease
- Primary aldosteronism
- Renovascular disease
- Chronic steroid therapy and Cushing's syndrome
- Pheochromocytoma
- Coarctation of the aorta
- Thyroid or parathyroid disease

Target Organ Damage

Heart

- Left ventricular hypertrophy
- Angina or prior myocardial infarction
- Prior coronary revascularization
- Heart failure

Brain

- Stroke or transient ischemic attack

Chronic kidney disease

Peripheral arterial disease

Retinopathy

GFR, glomerular filtration rate.

- Components of the metabolic syndrome.

Table 5. Lifestyle modifications to manage hypertension*†

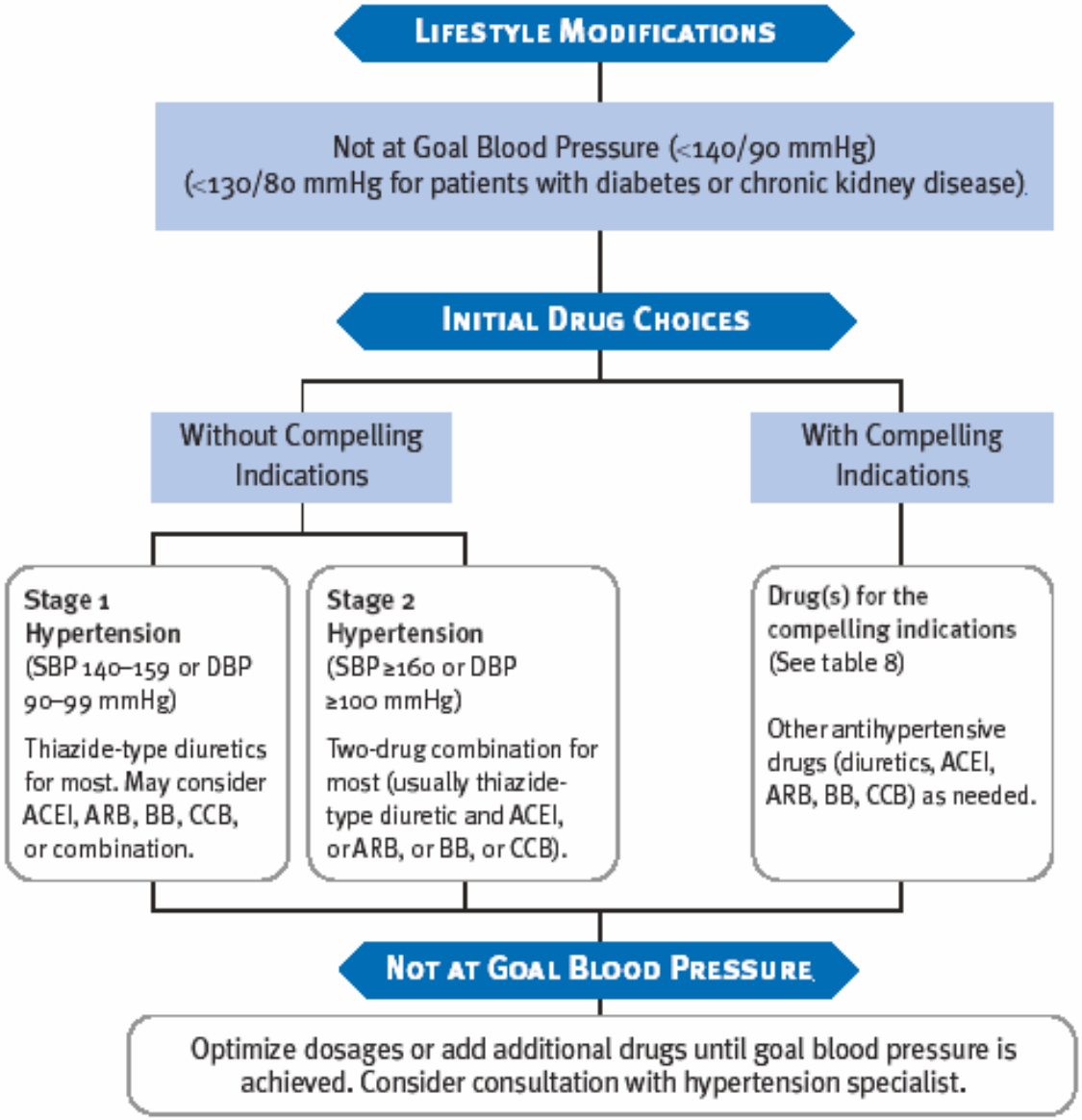
Modification	Recommendation	Approximate SBP Reduction (Range)
Weight reduction	Maintain normal body weight (body mass index 18.5–24.9 kg/m^2).	5–20 mmHg/10 kg weight loss[23,24]
Adopt DASH eating plan	Consume a diet rich in fruits, vegetables, and lowfat dairy products with a reduced content of saturated and total fat.	8–14 mmHg[25,26]
Dietary sodium reduction	Reduce dietary sodium intake to no more than 100 mmol per day (2.4 g sodium or 6 g sodium chloride).	2–8 mmHg[25–27]
Physical activity	Engage in regular aerobic physical activity such as brisk walking (at least 30 min per day, most days of the week).	4–9 mmHg[28,29]
Moderation of alcohol consumption	Limit consumption to no more than 2 drinks (1 oz or 30 mL ethanol; e.g., 24 oz beer, 10 oz wine, or 3 oz 80-proof whiskey) per day in most men and to no more than 1 drink per day in women and lighter weight persons.	2–4 mmHg[30]

DASH, Dietary Approaches to Stop Hypertension.

* For overall cardiovascular risk reduction, stop smoking.

† The effects of implementing these modifications are dose and time dependent, and could be greater for some individuals.

Figure 1. Algorithm for treatment of hypertension



DBP, diastolic blood pressure; SBP, systolic blood pressure.
Drug abbreviations: ACEI, angiotensin converting enzyme inhibitor; ARB, angiotensin receptor blocker; BB, beta-blocker; CCB, calcium channel blocker.

Table 8. Clinical trial and guideline basis for compelling indications for individual drug classes

Compelling Indication*	Recommended Drugs†						Clinical Trial Basis‡
	Diuretic	BB	ACEI	ARB	CCB	Aldo ANT	
Heart failure	•	•	•	•		•	ACC/AHA Heart Failure Guideline,[40] MERIT-HF,[41] COPERNICUS,[42] CIBIS,[43] SOLVD,[44] AIRE,[45] TRACE,[46] ValHEFT,[47] RALES[48]
Postmyocardial infarction		•	•			•	ACC/AHA Post-MI Guideline,[49] BHAT,[50] SAVE,[51] Capricorn,[52] EPHESUS[53]
High coronary disease risk	•	•	•		•		ALLHAT,[33] HOPE,[54] ANBP2,[55] LIFE,[32] CONVINCE[31]
Diabetes	•	•	•	•	•		NKF-ADA Guideline,[33,222] UKPDS,[56] ALLHAT[33]
Chronic kidney disease			•	•			NKF Guideline,[33] Captopril Trial,[55] RENAAL,[58] IDNT,[57] REIN,[58] AASK[59]
Recurrent stroke prevention	•		•				PROGRESS[35]

* Compelling indications for antihypertensive drugs are based on benefits from outcome studies or existing clinical guidelines; the compelling indication is managed in parallel with the BP.

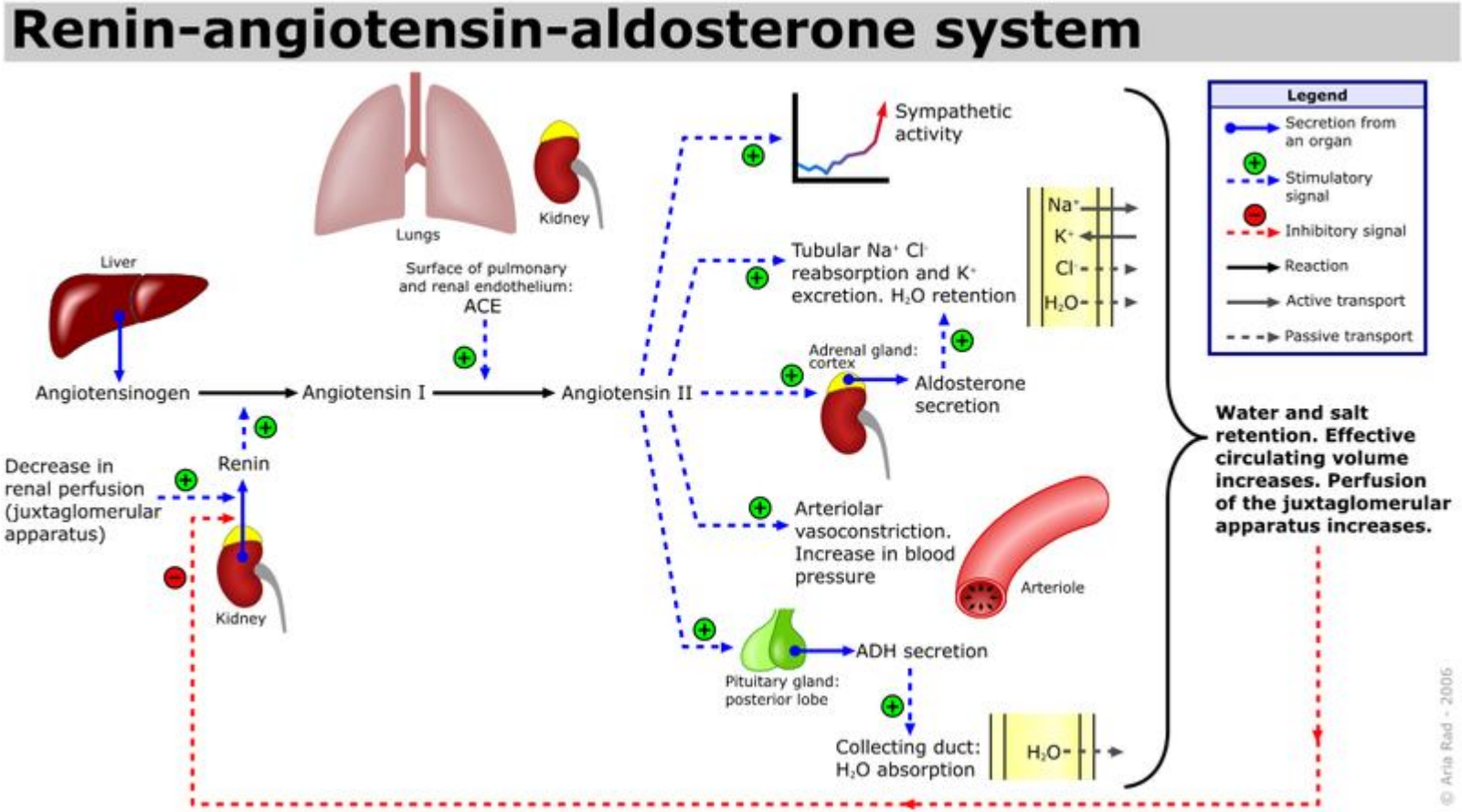
† Drug abbreviations: ACEI, angiotensin converting enzyme inhibitor; ARB, angiotensin receptor blocker; Aldo ANT, aldosterone antagonist; BB, beta-blocker; CCB, calcium channel blocker.

‡ Conditions for which clinical trials demonstrate benefit of specific classes of antihypertensive drugs.

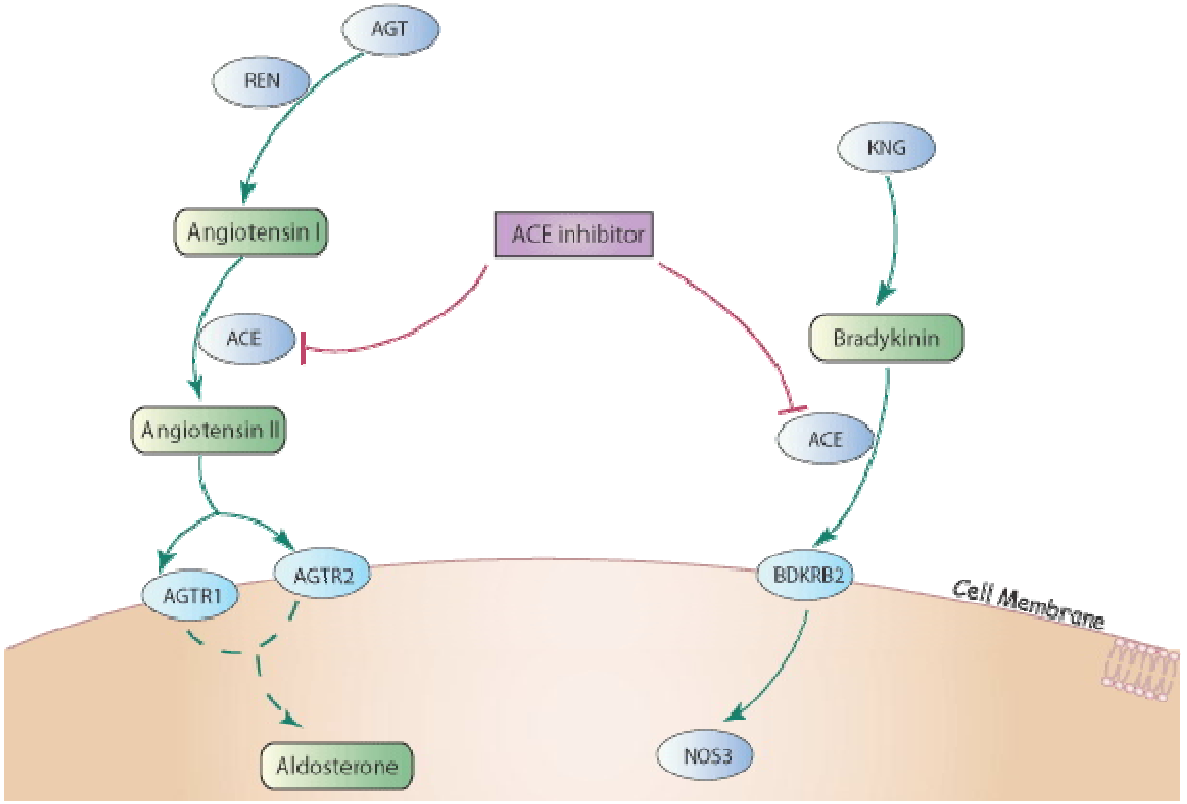
Anti-hypertensive drugs

- (1) ACEI/ A2 blocker
- (2) β blocker
- (3) calcium channel blocker
- (4) diuretics:
- (5) α 1 blocker
- (6) sympathetic blocker
- (7) α 2 antagonist
- (8) direct vasodilator

ACEI/ A2 blocker



ACEI/ A2 blocker



ACEI/ A2 blocker

- ACEI: captopril (25 mg), enalpril (5,20), fosinopril
- ARB: losartan, valsartan, irbesartan, candesartan, telmisartan

ACEI/ A2 blocker

- Especially suitable for DM,CHF, CAD.
- Contraindicated: allergy, bilateral renal artery stenosis, hypovolemia
- Captopril with other ACEIs
- Salt
- Losartan and uric acid

Beta blockers

- (1) effect of β receptor :
- as a part of adenyl cyclase ,it promote formation of
- cAMP via G protein(Gs), increased cAMP increase
- Ca influx which increase hear rate ,conduction , and
- contractility ; however muscarinic receptor activate Gi
- and inhibit formation of cAMP
- (2) ***withdrawl syndrome***
- (3) contra-indicated in bradycardia, heart blocker
- (4) lipid, sugar

	Cardioselective	Lipid solubility	ISA	α 1(+)	Anti-oxidant(+)	Oral	IV
atenolol	+	0	-	-	-	+	-
carvedilol	-	+	-	+	+	+	-
esmolol	+	?	-	-	-	-	+
nadolol	-	0	-	-	-	+	-
propranolol	-	+++	-	-	-	+	-
bisoprolol	+	?	-	-	-	+	-
labetalol	-	+++	-	+	-	+	+

Calcium channel blockers

- (1) mechanism : reduce intracellular Ca
- (2) classification:
- (a) dihydropyridine: bind the “N “ site of Ca channel
- e.g. Nifedipine(10) (adalat), felodipine(5),
- nicardipine(20), amlodipine, adalat OROS , lercanidipine
- (b) verapmil(40,120,240) : bind to the V site
- © diltiazem (30,90): bind the D site
- (3) metabolically neutral
- (4) ***dihydropyridine and ischemic heart disease***
- contraindication of verapamil and diltiazem

Diuretics

- usually cause metabolic alkalosis except
- carbonic anhydrase , usually cause
- hypokalemia except potasium sparing diuretics;
- usually cause hyperlipidemia , hyperglycemia , hyperuricemia

Diuretics

- (a) lasix (furosemide), burinax
- (b) thizide: e.g. behyd
- © potasium sparing : spironolactone
- (d) osmotic:
- (e) carbonic anhydase inhibitor
- (f) combination: moduretic
- (g) indapamide

Hypertensive Urgencies and Emergencies

Patients with marked BP elevations and acute target-organ damage (e.g., encephalopathy, myocardial infarction, unstable angina, pulmonary edema, eclampsia, stroke, head trauma, life-threatening arterial bleeding, or aortic dissection) require hospitalization and parenteral drug therapy.

- Patients with markedly elevated BP but without acute target organ damage usually do not require hospitalization, but they should receive immediate combination oral antihypertensive therapy. They should be carefully evaluated and monitored for hypertension-induced heart and kidney damage and for identifiable causes of hypertension.

Potential Favorable Effects

- Thiazide-type diuretics are useful in slowing demineralization in osteoporosis.
- BBs can be useful in the treatment of atrial tachyarrhythmias/fibrillation, migraine, thyrotoxicosis (short term), essential tremor, or perioperative hypertension.
- CCBs may be useful in Raynaud's syndrome and certain arrhythmias
- alpha-blockers may be useful in prostatism.

Potential unfavorable effects

Thiazide diuretics should be used cautiously in patients who have gout or who have a history of significant hyponatremia.

BBs should generally be avoided in individuals who have asthma, reactive airways disease, or second or third degree heart block.

ACEIs and ARBs should not be given to women likely to become pregnant and are contraindicated in those who are. ACEIs should not be used in individuals with a history of angioedema.

Aldosterone antagonists and potassium-sparing diuretics can cause hyperkalemia and should generally be avoided in patients who have serum potassium values more than 5.0 mEq/L while not taking medications.

Hypertension in women
(1)

Oral contraceptives may increase BP, and the risk of hypertension increases with duration of use.

Development of hypertension is a reason to consider other forms of contraception.

In contrast, menopausal hormone therapy does not raise BP.

Hypertension in women (2)

Women with hypertension who become pregnant should be followed carefully because of increased risks to mother and fetus.

Methyldopa, BBs, and vasodilators are preferred medications for the safety of the fetus.

ACEI and ARBs should not be used during pregnancy because of the potential for fetal defects and should be avoided in women who are likely to become pregnant

Hypertension in women (3)

Preeclampsia, which occurs after the 20th week of pregnancy, is characterized by new-onset or worsening hypertension, albuminuria, and hyperuricemia, sometimes with coagulation abnormalities.

In some patients, preeclampsia may develop into a hypertensive urgency or emergency and may require hospitalization, intensive monitoring, early fetal delivery, and parenteral antihypertensiveand anticonvulsant therapy

Resistant Hypertension

- Resistant hypertension is the failure to reach goal BP in patients who are adhering to full doses of an appropriate three-drug regimen that includes a diuretic.

- After excluding potential identifiable hypertension, clinicians should carefully explore reasons why the patient is not at goal BP. Particular attention should be paid to diuretic type and dose in relation to renal function.

- Consultation with a hypertension specialist should be considered if goal BP cannot be achieved.

Table 9. Causes of resisitant hypertension

Improper BP Measurement
Volume Overload and Pseudotolerance • Excess sodium intake • Volume retention from kidney disease • Inadequate diuretic therapy
Drug-Induced or Other Causes • Nonadherence • Inadequate doses • Inappropriate combinations • Nonsteroidal anti-inflammatory drugs; cyclooxygenase 2 inhibitors • Cocaine, amphetamines, other illicit drugs • Sympathomimetics (decongestants, anorectics) • Oral contraceptives • Adrenal steroids • Cyclosporine and tacrolimus • Erythropoietin • Licorice (including some chewing tobacco) • Selected over-the-counter dietary supplements and medicines (e.g., ephedra, ma haung, bitter orange)
Associated Conditions • Obesity • Excess alcohol intake
Identifiable Causes of Hypertension. (See table 4.)

Anti-anginal agents

- ***Beta blockers***
- ***Nitrates***
- ***Calcium channel blockers***
- ***Anti-platelet***

- ***Selection between beta blocker and ca antagonist***

Coronary artery disease

- ＊ please describe the
- ● **risk factors**(male, age more than 45 or post-
- menopasaul women without hormone replacement
- therapy, hypertension, DM, hyperlipidemia,
- smoking, obesity, no exercise, past history,
- family history)
- ● **coronary vessel(s) involved**
- **current status**(chronic stable angina, unstable
- angina or myocardial infarction)

chronic stable angina

- ● Recognized from history taking 、 comparing attack EKG
- (horizontal or downward ST segment depression) and resting
- EKG 、 from exercise EKG or Thallium scan
- <1> **aspirin** (75-324 mg per day is available)
- <2> β **receptor antagonist** (favored if vessel obstruction dominant)

or <3> **calcium channel blocker** (favored if vessel spasm dominant

- ● of the three kinds of calcium channel blockers, short acting nifedipine(adalat) is avoided unless the heart rate is slow or in combination with β receptor antagonist (which can reduce the heart rate)
- heart rate, AV conduction(PR interval) and heart failure sign should be monitored carefully if β receptor antagonist is combined with calcium channel blocker
- <4> **nitrate** : isordil, Imdur, nicorandil, NTG(sublingual, spray, dermal patch

Syndrome X
and
Silent myocardial ischemia

- Syndrome X: angina with normal coronary angiogram which may be due to micro-vascular dysfunction
- ＊ Silent myocardial ischemia : no angina symptom although objective evidence of ischemia
- <1> two types: type I (totally no angina symptom) and type II (mixture of symptomatic and silent)
- <2> Possible mechanism
- (1) autonomic neuropathy
- (2) high pain threshold for pain(cardiac or non-cardiac)
- (3) patients produce excessive amount of endogenous opioid
- (4) less sever ischemia episode(for type II)

unstable angina

- ＊ one or more of the following
- <1> **crescendo angina**
- <2> **new onset**(less than 1 month)
- <3> **angina at rest or mild exertion**
- * secondary unstable angina : coronary ischemia secondary to anemia,
- infection, hyperthyroidism, arryhtmia, systemic hypotension
- ＊ Prinzmetal's variant angina : angina from coronary artery spasm
- with EKG ST elevation which responds to nitrate and calcium
- channel antagonists well

Table 4. Three Principal Presentations of UA

Class	Presentation
Rest angina*	Angina occurring at rest and prolonged, usually greater than 20 min
New-onset angina	New-onset angina of at least CCS class III severity
Increasing angina	Previously diagnosed angina that has become distinctly more frequent, longer in duration, or lower in threshold (i.e., increased by 1 or more CCS class to at least CCS class III severity)

*Patients with non–ST-elevated myocardial infarction usually present with angina at rest. Adapted with permission from Braunwald E. Unstable angina: a classification. Circulation 1989;80:410–4 (14).

CCS = Canadian Cardiovascular Society classification; UA = unstable angina.

Table 3. Causes of UA/NSTEMI*

Thrombus or thromboembolism, usually arising on disrupted or eroded plaque
• Occlusive thrombus, usually with collateral vessels†
• Subtotally occlusive thrombus on pre-existing plaque
• Distal microvascular thromboembolism from plaque-associated thrombus
Thromboembolism from plaque erosion
• Non–plaque-associated coronary thromboembolism
Dynamic obstruction (coronary spasm‡ or vasoconstriction) of epicardial and/or microvascular vessels
Progressive mechanical obstruction to coronary flow
Coronary arterial inflammation
Secondary UA
Coronary artery dissection§

*These causes are not mutually exclusive; some patients have 2 or more causes. †DeWood MA, Stifter WF, Simpson CS, et al. Coronary arteriographic findings soon after non–Q-wave myocardial infarction. N Engl J Med 1986;315:417–23 (13). ‡May occur on top of an atherosclerotic plaque, producing missed-etiology angina or UA/NSTEMI. §Rare. Modified with permission from Braunwald E. Unstable angina: an etiologic approach to management. Circulation 1998;98:2219–22 (12).

UA = unstable angina; UA/NSTEMI = unstable angina/non–ST-elevation myocardial infarction.

Nitrates

- (1) mechanism : as a NO supplier , it promote formation of
- cGMP ,accumulation of cGMP lowers intracellular Ca then
- cause vasodilatation
- (2) preparation
- (1) nitroglycerin (sublingual)
- (2) nitroglycerin (spray)
- (3) nitroglycerin (IV)
- (4) isosorbide dinitrate
- (5) isosobide mononitrate
- (6) nicorandil
- (3) **nitrate tolerance**
- **interaction with sidenafil citrate**

platelet inhibitors

- (1) aspirin: 100,.324; by blocking COX1 (cyclooxegenase 1)
- (2) Clopidogrel (75): by blocking ADP receptors on platelet: 4 pills before stenting

(3) Dipyridamole: (25,75)

(1) coronary vasodilator by blocking adenosine transport

(2) inhibit platelet adhesion to damaged vessel

(3) potentiate the anti-aggregatory effect of prostacyclin

(4) increase C-AMP and decrease intracellular calcium

Acute Coronary Syndrome

When the “vulnerable plaque” rupture , it will

- lead a cascade of reaction causing occlusion of the lumen of the coronary artery and ischemic injury or necrosis of the myocardium .
- This is called “ *acute coronary syndrome* “, the spectrum of which includes
- ***unstable angina, non-ST elevation myocardial infarction and ST elevation infarction***

ST elevation MI

- ＊ if the ruptured plaque leads to completely occlusion of the coronary lumen , it typically produces EKG ST elevation and causes necrosis of full or nearly full thickness of the ventricular wall supplied by the obstructed artery.

Unstable angina

- ＊ less obstructive thrombi or less fibrin formation produce a syndrome of unstable
- angina and non- ST elevation MI ,typically presenting as ST depression and/or T inversion.
- If the occlusion is less then 20 minutes, then there will be no persistent EKG change or ***release of biochemical marker of necrosis. It is unstable angina.***

Non-ST elevation MI

- ＊ if the occlusion is more severe than that of unstable angina and cause release of biochemical marker of necrosis but no pathological Q wave , then it is termed non-Q wave AMI , a condition midway between unstable angina and Q wave AMI. Often the necrosis observed in non-Q AMI is less confluent and usually concentrated in ***inner third of the ventricular wall.***

unstable angina or NSTE MI

- <1>-<4> as chronic stable angina
- <5> heparin or low molecular weight heparin
- <6> IV NTG
- <7> morphine
- <8> glycoprotein IIbIIIa antagonist
- <9> PTCA if medical failure

UA/NSTEMI 2007 ACC/AHA Guideline

- CLASS I
- 1. Bed/chair rest with continuous ECG monitoring is recommended for all UA/NSTEMI patients during the early hospital phase. *(Level of Evidence: C)*
- 2. Supplemental oxygen should be administered to patients with UA/NSTEMI with an arterial saturation less than 90%, respiratory distress, or other high-risk features for hypoxemia. (Pulse oximetry is useful for continuous measurement of SaO2.) *(Level of Evidence: B)*
- 3. Patients with UA/NSTEMI with ongoing ischemic discomfort should receive sublingual NTG (0. 4 mg) every 5 min for a total of 3 doses, after which assessment should be made about the need for intravenous NTG, if not contraindicated. *(Level of Evidence: C)*

UA/NSTEMI 2007 ACC/AHA Guideline

- CLASS I
- 4. Intravenous NTG is indicated in the first 48 h after UA/NSTEMI for treatment of persistent ischemia, heart failure (HF), or hypertension.
- The decision to administer intravenous NTG and the dose used should not preclude therapy with other proven mortality-reducing interventions such as beta blockers or angiotensin-converting enzyme (ACE) inhibitors. *(Level of Evidence: B)*
- 5. Oral beta-blocker therapy should be initiated within the first 24 h for patients who do not have 1 or more of the following: 1) signs of HF, 2) evidence of a low-output state, 3) increased risk* for cardiogenic shock, or 4) other relative contraindications to beta blockade (PR interval greater than 0.24 s, second or third degree heart block, active asthma, or reactive airway disease). *(Level of Evidence: B)*

UA/NSTEMI 2007 ACC/AHA Guideline

- CLASS I
- 6. In UA/NSTEMI patients with continuing or frequently recurring ischemia and in whom beta blockers are contraindicated, a nondihydropyridinecalcium channel blocker (e.g., verapamil or diltiazem) should be given as initial therapy in the absence of clinically significant left ventricular (LV) dysfunction or other contraindications. *(Level of Evidence: B)*
- 7. An ACE inhibitor should be administered orally within the first 24 h to UA/NSTEMI patients with pulmonary congestion or LV ejection fraction (LVEF) less than or equal to 0.40, in the absence of hypotension (systolic blood pressure less than 100 mm Hg or less than 30 mm Hg below baseline) or known contraindications to that class of medications. *(Level of Evidence: A)*
- 8. An angiotensin receptor blocker should be administered to UA/NSTEMI patients who are intolerant of ACE inhibitors and haveeither clinical or radiological signs of HF or LVEF less than or equal to 0.40. *(Level of Evidence: A)*
- 9. Because of the increased risks of mortality, reinfarction, hypertension, HF, and myocardial rupture associated with their use, nonsteroidal anti-inflammatory drugs (NSAIDs), except for ASA, whether nonselective or cyclooxygenase (COX)-2–selective agents, should be discontinued at the time a patient presents with UA/NSTEMI. *(Level of Evidence: C)*

UA/NSTEMI 2007 ACC/AHA Guideline

- CLASS IIa
- 1. It is reasonable to administer supplemental oxygen to all patients with UA/NSTEMI during the first 6 h after presentation. *(Level of Evidence: C)*
- 2. In the absence of contradictions to its use, it is reasonable to administer morphine sulfate intravenously to UA/NSTEMI patients if there is uncontrolled ischemic chest discomfort despite NTG, provided that additional therapy is used to manage the underlying ischemia. *(Level of Evidence: B)*
- 3. It is reasonable to administer intravenous (IV) beta blockers at the time of presentation for hypertension to UA/NSTEMI patients who do not have 1 or more of the following: 1) signs of HF, 2) evidence of a low-output state, 3) increased risk* for cardiogenic shock, or 4) other relative contraindications to beta blockade (PR interval greater than 0.24 s, second or third degree heart block, active asthma, or reactive airway disease). *(Level of Evidence: B)*

UA/NSTEMI 2007 ACC/AHA Guideline

- CLASS IIa
- 4. Oral long-acting nondihydropyridine calcium antagonists are reasonable for use in UA/NSTEMI patients for recurrent ischemia in the absence of contraindications after beta blockers and nitrates have been fully used. *(Level of Evidence: C)*
- 5. An ACE inhibitor administered orally within the first 24 h of UA/NSTEMI can be useful in patients without pulmonary congestion or LVEF less than or equal to 0.40 in the absence of hypotension (systolic blood pressure less than 100 mm Hg or less than 30 mm Hg below baseline) or known contraindications to that class of medications. *(Level of Evidence: B)*
- 6. Intra-aortic balloon pump counterpulsation is reasonable in UA/NSTEMI patients for severe ischemia that is continuing or recurs frequently despite intensive medical therapy, for hemodynamic instability in patients before or after coronary angiography, and for mechanical complications of MI. *(Level of Evidence: C)*

STE MI

※ Please recognize the **wall segment(s) involved**, the **Killip classification**, if **t-PA** was used, **which day** the infarct happened, if **mechanical or electrical complication**(free wall rupture? Septal rupture? Pseudoaneurysm? Acute Mitral regurgitation? VT/Vf? Af? Sinus bradycardia? A-V block?)

<1>-<7> as unstable angina or non-Q MI

<8> t-PA or primary PTCA (within 12 hours of symptom or persist ischemia or

pulmonary congestion or cardiogenic shock even after 12 hours)

* ***more than 2 continuous leads with ST elevation more than 0.1mV(limb leads) or 0.2mV (precordial leads) or new onset LBBB with ischemic symptom***

& recognize by **(1) clinical symptom(2) evolutional EKG change(3) evolutional cardiac enzyme change**

-

EKG change	Myocardium segment involved	Infarct related artery
LII, LIII, AVF leads ST elevation	inferior wall	Usually RCA
LI, AVL, V5,V6 leads ST elevation	lateral wall	LCX
V1-V4 leads ST elevation	anterior wall	LAD
RV lead ST elevation	RV infarct	RCA
V1-V2 R/S>1 with ST depression	posterior wall infarct	RCA

NTG and Nipride

- NTG (5mg/10ml/ amp or 50ml/vial)

  (1) *glass bottle only*

  (2) 10-400 ug/min

  Nipride (50 mg/amp)

  (1) 10-400 ug/min

  (2) *photoprotection*

  (3) *in D5W only*

Heart failure

please describe

the functional status(1-4),

the etiology,

the structure(s) involved,

rhythm(siuns or Af; if there is RBBB or LBBB) ,

possible precipitating factor?

Predominant systolic	(1) CAD (2) HCVD (3) DCM
Predominant diastolic	(1) HCVD (2) HCM (3) Restrictive cardiomyopathy (4) Constrictive cardiomyopahty (5) High out-put failure

Precipitating factors
(1) ischemia or infarction (1) hypertension (2) arrhythmia (3) infection (4) anemia (5) pregnancy (6) thyroid disease (7) volume overload (8) toxin (9) drugs (10) pulmonary embolism (11) diet or drug non-compliance

Heart failure

- <1> find the possible etiology and precipitating factors
- <2> let patient keep bed rest with head up posture and O2 supply prn
- <3> record body weight and/or I/O (depends on the clinical condition)
- <4> ACEI/AII blocker
- <5> Diuretics
- <6> Positive inotropic agent(digoxin, dopamine, dobutamine,
- mirilone)
- **Digoxin : excreted mainly by kidney, half life about 36- 48 hours; serum level should not be checked within 6-8 hours after a oral dose and 4 hours after an IV dose (the time for adequate distribution), therapeutic level is about 0.8-2 ng/mL(hypokalemia increase the risk of digitalis intoxication)**

Sympathemimetic amine

- *Dopamine*: 200mg/5 ml/ample

  1-3ug/kg/min (dopaminergic), 2-8 (beta), 7-20 (alfa)

- *Dobutamine*: 250 mg/5/ml/ample

  2-20 ug/kg/min

  levophed: 4mg/4ml/ample

  1-30 ug/min; (in D5W only)

Heart failure

- <7> Nitrate and other vasodilator
- **<8>** β receptor antagonist(Carvedilol) in selected patients
- adjust drugs according to symptom and sign(BP,HR, rales, S3, edema) and renal function and drug level and electrolyte and body weight(I/O) change(usually 0.5-1 Kg BW decrease per-day initially)

ACEI/ARB/ β blockers in Heart Failure

- (Hydralazine + nitrate) to ACEI/ARB to β blockers
- Captopril 10mg tid, enalpril 20mg bid,
- Carvedilol, bisoprolol and metoprolol

IV anti-arrythmia drug (1)

- (1) isopreterenol (isuprel, 0.2mg/1 ml/amp)
- 1-10 ug/min (5 amp in 500ml run 30 ml/hr= 1 ug/min)
- (2) Lidocaine (2%/5ml/100 mg or 10%/10/1g)
- loading: 1-1.5 mg/kg Q 3-5 min up to 3 mg/Kg
- maintenance: 2-4 mg/min (10% 2 amp in 500 run 30 ml/hr= 2mg/min)
- (3) Procainamide (1gm/10cc/amp)
- lodaing: 10 mg/kg with rate < 50mg/min
- maintenance: 2-5 mg/min
-

IV anti-arrythmia drug (2)

- (4) **Amiodarone** (150 mg/3ml/amp, 200 mg/tab)
- loading: 150 mg in ***D5W (only)*** for 10 min
- maintenance: 6 amp/D5W 500 run 33 ml/hr for 6 hr then 16.6
- ml/hr for 18 hr
- oral: 800-1200 mg/D for 1-3 weeks then 400-1200mg/D for 2-4
- weeks then 200-400 mg/D
- (5) MgSO4 (2g/20ml/amp)
- loading:2g IVF for 15 min, maintenance: 2-20 mg/min

Anti-arrythmia drug

- (1) Class I: Na channel blocker
- I a: QT prolongation (Qunidine, procainamide,
- disopyramide)
- I b: QT shortening (lidocaine,mexiletine, phenytoine)
- I c: no effect on QT but prolong QT when
- heart rate increase (prapafenone, flecanide)
- (2) Class II: β blocker
- (3) Class III: K channel blocker: amiodarone, sotalol
- (4) Class IV: calcium channel blocker
- Others: adenosine

Anti-thrombotic agents, platelet inhibitors, anticoagulants and fibrinolytic

- (1) t-PA, urokinase, streptokinase:
- (2) unfractionized heparin, LMWH, coumardin
- (3) aspirin; clopidegrol; dipirydamole
- (4) glycoprotein IIbIIIa antagonist

T-PA

- t-PA for AMI: 15ml stat; 50 ml in 30 min, 35 ml in 1 hour (< 6-12 hours after symptom)
- T-PA for pulmonary embolism: 100 mg over 2 hours

1.Hyper-coagulability: (1) factor V mutation
(2) protein C
(3) protein S
(4) antithrombin III deficiency
(5) plasminogen deficiency
(6) antiphopholipid antibody
(7) elevated factor VIII

2 .surgery/ immobilization/trauma

3. obesity

4. increasing age

5. oral contraceptive/pregnancy/postpartum

6. cancer

7. stroke /spinal cord injury

8. indwelling central venous catheter

- of note, heparin may depress antithrombin III level and coumardin may cause mild deficiency of protein C, protein S

anticoagulants

- (a) heparin: keep APTT 1.5x2;
- antidote: protamine (1mg=100u heparin)
- (b) fraxiparine: 0.4ml,0.6ml SC bid
- (c) enoxaparine: 0.6ml(60mg) bid
- protamine 1mg= enoxaparine 1mg
- (d) coumardin (1 mg/5 mg):
- monitored with INR 2-3;
- antidote: Vit K, FFP

What is glycoprotein IIbIIIa?

- (1) Glycoprotein IIbIIIa belongs to a family of
- adhesion receptors known as “integrins”
- (2) All integrins are non-covalently linked α / β
- heterodimers

What is the function of glycoprotein IIbIIIa?

- (1) glycoprotein IIbIIIa serves as the receptor on platelets that binds plasma-
- borne adhesive proteins, such as fibrinogen and von Willebrand
- factor(vWF) to permit platelet aggregation . Aggregation is mediated
- by this pathway, no matter what agonist (agonists including
- immobilized adhesive protein like collage, vWF and fibrinogen or
- soluble proteins like thrombin, ADP and other agents that are
- liberated at the sites of vessel injury which function to further activate
- adhering platelet)stimulate platelet and irrespective of what stimulus-
- coupling pathway that is used to activate glycoprotein IIbIIIa to
- aggregate platelet
- (2) another function of glycoprotein IIbIIIa is to bind prothrombin which
- increase conversion of prothrombin to thrombin

附表十二　全民健康保險使用 tirofiban (Aggrastat)申報表

醫院代號		醫院名稱		申請日期	
病人姓名		性別	年齡	出生日期	
身分證號		病歷號碼		體重	
藥品代碼		申請數量		用法用量	
使用期間	自　年　月　日　時　分至　年　月　日　時　分				

	適應症範圍	診斷根據
診斷	□ 不穩定型心絞痛：(缺血性心絞痛合併心電圖兩個導程 ST 節段改變 1mm（0.1mv）以上，及血循力學【hemodynamics】有變化者) □ 非Q波之心肌梗塞	□ 臨床症狀 □ 心電圖變化 □ Troponin 升高 □ CK-MB 升高 □ 冠狀動脈照影 □ 其他
	□ 急性Q波心肌梗塞症狀發作十二小時內且準備進行冠狀動脈氣球擴張術(ＰＴＣＡ) 發作時刻＿＿＿年＿＿＿月＿＿＿日 ＿＿＿時＿＿＿分 來診時刻＿＿＿年＿＿＿月＿＿＿日 ＿＿＿時＿＿＿分 執行ＰＴＣＡ時間＿＿年＿＿月＿＿日 ＿＿時＿＿分 注射起始時間：執行ＰＴＣＡ前＿＿小時 注射結束時間：執行ＰＴＣＡ後＿＿小時(≦48 小時)	

用量　□1 瓶(12.5mg)　□2 瓶(25mg)　□3 瓶(37.5mg)

心肌梗塞部位
□ 前壁
□ 側壁
□ 中隔部
□ 下壁

申報醫師：　　本表請併醫療費用申報

Tirofiban

- Tirofiban is **containdicated** in patients with:

- known hypersensitivity to any component of the product
- active (internal) bleeding or a history of abnormal bleeding tendencies
- a history of intracranial hemorrhage or neoplasm, arteriovenous malformation, or aneurysm
- patients who developed thrombocytopenia following prior exposure to tirofiban
- known coagulopathy, platelet disorder or history of thrombocytopenia
- stroke within 30 days prior to hospitalization or any history of hemorrhagic stroke
- major surgical procedure or severe physical trauma within the previous month
- history, symptoms or findings suggestive of aortic dissection
- severe uncontrolled hypertension
- acute pericarditis
- cirrhosis or other clinically significant liver disease
- angina caused by obvious provoking factors (arrhythmia, severe anemia, hyperthyroidism or hypotension)

Tirofiban

- Tirofiban should be used with caution in the following clinical situations:

- recent (<1 year) bleeding, including a history of gastrointestinal bleeding, or genitouritary bleeding of clinical significance (e.g. macrohematuria)
- platelet count < 150,000/μl
- history of cerebrovascular disease in the past year
- hemorrhagic retinopathy
- chronic hemodialysis
- Tirofiban is initially given as rapid intravenous infusion at a rate of 0.4 μg/kg and minute for 30 minutes. Upon completion of the initial infusion, the rate is decreased to 0.1 μg/kg and minute delivered as continuous infusion.

Lipid lowering and anti-atherosclerotic drugs

- (1) Statins: atorvastatin, simvastatin, fluvastatin. rosuvastatin
- (2) Fibrate: gemfibrozil(lopid 2# bid); fenofibrate (1 # QD)

(3) Ezetimibe

* Stain and warfarin, renal transplant, clopidegrol

Lack of Evidence of a Clopidogrel–Statin Interaction in the CHARISMA Trial

- Objectives: The purpose of this study was to evaluate the potential impact of clopidogrel and statin interaction in a randomized, placebo-controlled trial with long-term follow-up.
- Background: **There are conflicting data regarding whether statins predominantly metabolized by CYP3A4 reduce the metabolism of clopidogrel to its active metabolite and diminish its clinical efficacy.**
- Methods: The CHARISMA trial was a randomized trial comparing long-term 75 mg/day clopidogrel versus placebo in patients with cardiovascular disease or multiple risk factors on aspirin. The primary end point was a composite of myocardial infarction, stroke, or cardiovascular death at median follow-up of 28 months. We performed a secondary analysis evaluating the interaction of clopidogrel versus placebo with statin administration, categorizing baseline statin use to those predominantly CYP3A4 metabolized (atorvastatin, lovastatin, simvastatin; CYP3A4-MET) or others (pravastatin, fluvastatin; non–CYP3A4-MET).
- Results: Of 15,603 patients enrolled, 10,078 received a statin at baseline (8,245 CYP3A4-MET, 1,748 non–CYP3A4-MET) and 5,496 did not. For the overall population, the primary end point was 6.8% with clopidogrel and 7.3% with placebo (hazard ratio [HR] 0.93; p = 0.22). This was similar among patients on CYP3A4-MET (5.9% clopidogrel, 6.6% placebo, HR 0.89; p = 0.18) or non–CYP3A4-MET statin (5.7% clopidogrel, 7.2% placebo, HR 0.78; p = 0.19). There was no interaction between statin types and randomized treatment (p = 0.69). Patients on atorvastatin (n = 4,127) (5.7% clopidogrel, 7.1% placebo, HR 0.80; p = 0.06) or pravastatin (n = 1,440) (5.1% clopidogrel, 7.0% placebo, HR 0.72; p = 0.13) had similar event rates.
- Conclusions: **Despite theoretic concerns and ex vivo testing suggesting a potential negative interaction with concomitant clopidogrel and CYP3A4-MET statin administration, there was no evidence of an interaction clinically in a large placebo-controlled trial with long-term follow-up.**

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Lipid lowering and anti-atherosclerotic drugs

- CLASS I
- **1. The following lipid recommendations are beneficial**:
- a. Lipid management should include *assessment of a fasting lipid profile for all patients, within 24 h of hospitalization.* (Level of Evidence: C)
- b. Hydroxymethyl glutaryl-coenzyme A reductase inhibitors *(statins), in the absence of contraindications, **regardless of baseline LDL-C and diet modification**, should be given to post-UA/ NSTEMI patients, including postrevascularization patients.(**Level of Evidence: A**)*
- c. For hospitalized patients, lipid-lowering medications should be initiated before discharge. (Level of Evidence: A)
- d. For UA/NSTEMI patients with elevated LDL-C (greater than or equal to 100 mg per dL), cholesterol-lowering therapy should be initiated or intensified to *achieve an LDL-C of less than **100** mg per dL. (Level of Evidence: A) Further titration to less than **70** mg per dL is reasonable. (Class IIa, Level of Evidence: A)*

Lipid lowering and anti-atherosclerotic drugs

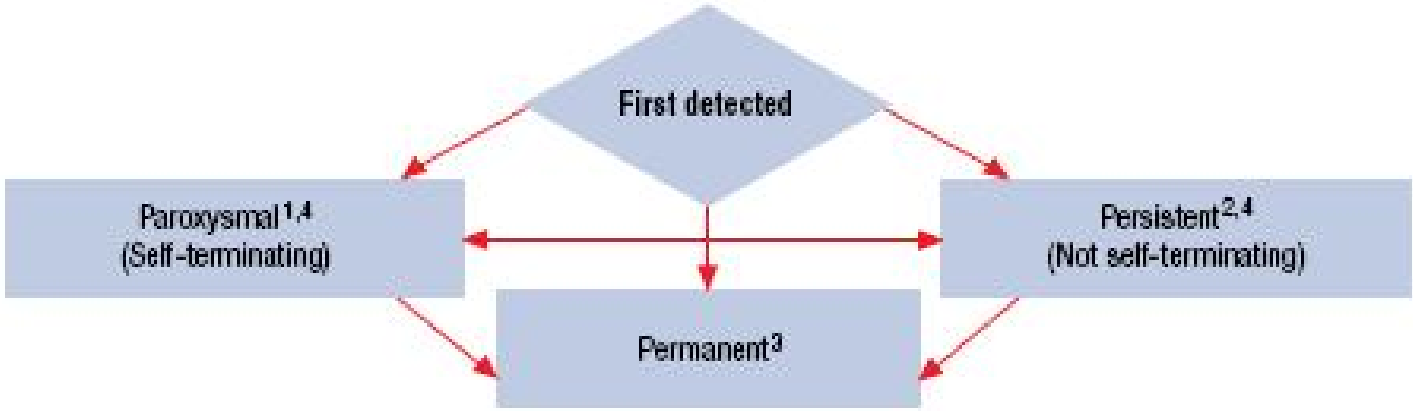
- CLASS I
- e. Therapeutic options to reduce non–HDL-C are recommended, including more intense LDL-C–lowering therapy. *(Level of Evidence: B)*
- f. Dietary therapy for all patients should include reduced intake of saturated fats (to less than 7% of total calories), cholesterol (to less than 200 mg per d), and trans fat (to less than 1% of energy). *(Level of Evidence: B)*
- g. Promoting daily physical activity and weight management are recommended. *(Level of Evidence: B)*
- **2. Treatment of triglycerides and non–HDL-C is useful, including the following:**
- a. If triglycerides are 200 to 499 mg per dL, non–HDL-C* should beless than 130 mg per dL. *(Level of Evidence: B)*
- b. If triglycerides are greater than or equal to 500 mg per dL†, therapeutic options to prevent pancreatitis are fibrate‡ or niacin‡ before LDL-lowering therapy is recommended. It is also recommended that LDL-C be treated to goal after triglyceridelowering therapy. Achievement of a non–HDL-C* less than 130 mg per dL (i.e., 30 mg per dL greater than LDL-C target) if possible is recommended. *(Level of Evidence: C)*

CLASS III

1. Antioxidant vitamin supplements (e.g., vitamins E, C, or beta carotene) should not be used for secondary prevention in UA/NSTEMI patients. *(Level of Evidence: A)*
2. Folic acid, with or without B6 and B12, should not be used for secondary prevention in UA/NSTEMI patients. *(Level of Evidence: A)*

Atrial Fibrillation

Figure 1. Patterns of Atrial Fibrillation

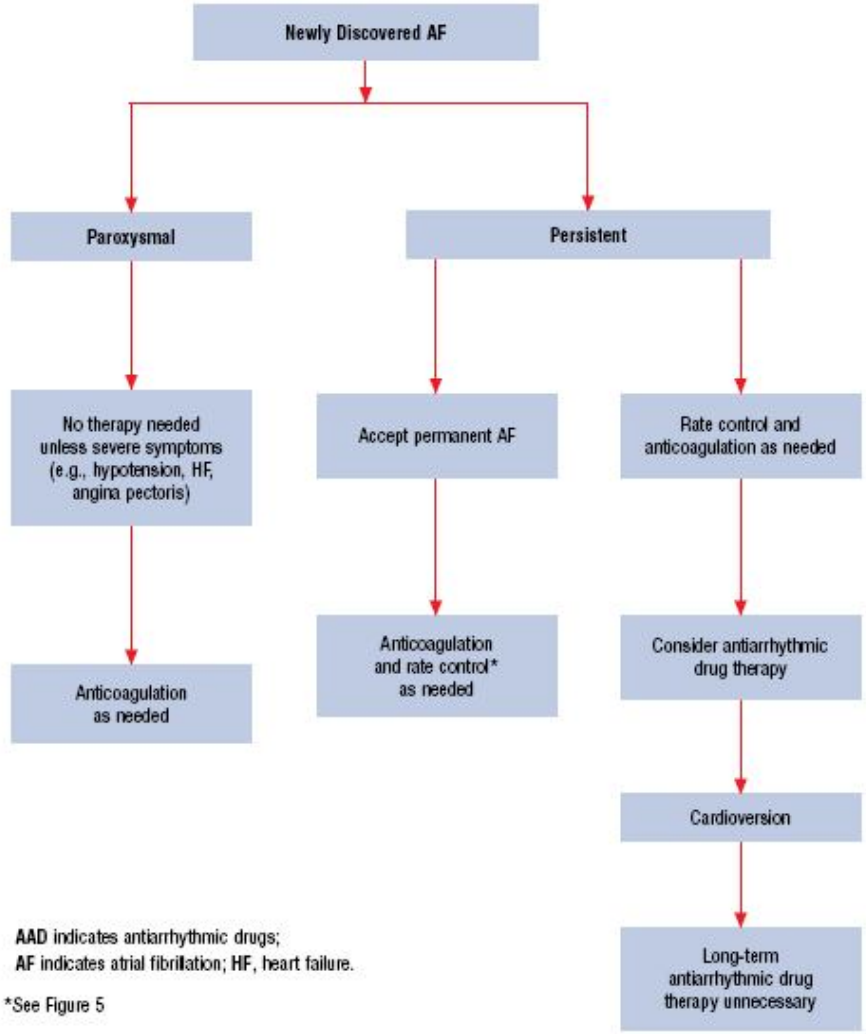


[1] Episodes that generally last less than or equal to 7 days (most less than 24 h);
[2] usually more than 7 days;
[3] cardioversion failed or not attempted; and
[4] both paroxysmal and persistent AF may be recurrent.

- paroxysmal Af(pAf): recurrent Af spontaneously converted to sinus rhythm without chemical or electrical conversion
- persistent Af: Af persists unless chemical or electrical conversion applied

  permanent Af: Af persist even after chemical and electrical conversion applied

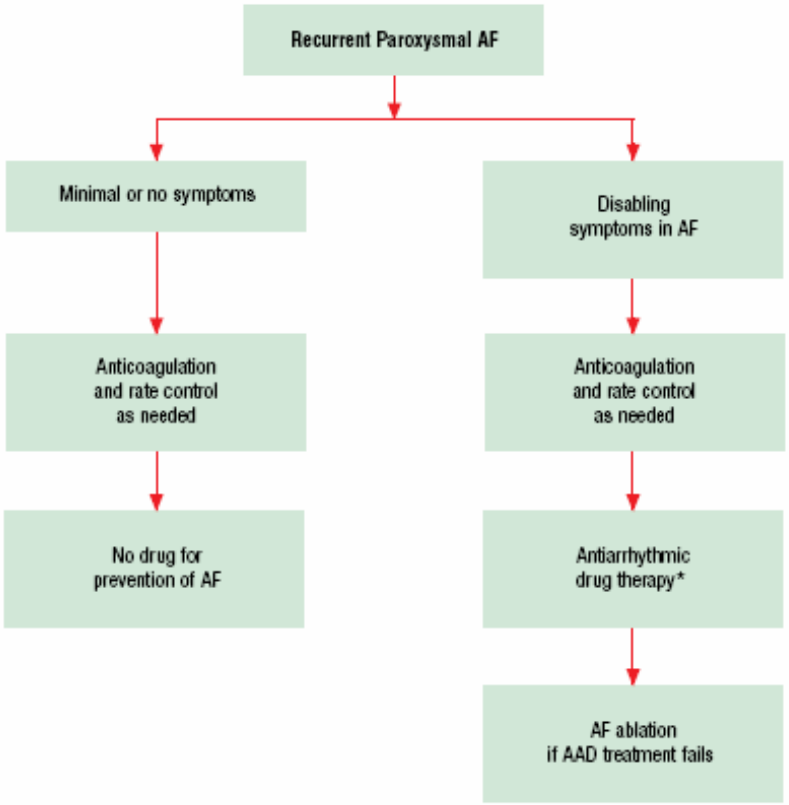
Figure 2. Pharmacological Management of Patients With Newly Discovered Atrial Fibrillation



AAD indicates antiarrhythmic drugs;
AF indicates atrial fibrillation; **HF**, heart failure.

*See Figure 5

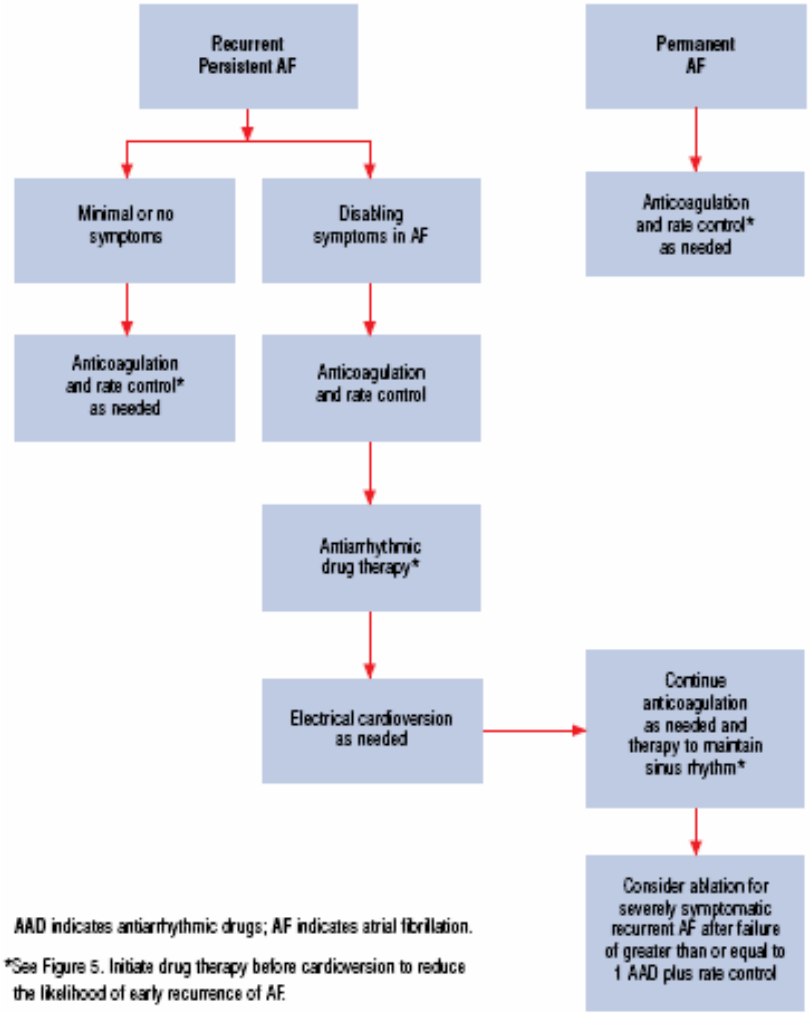
Figure 3. Pharmacological Management of Patients With Recurrent Paroxysmal Atrial Fibrillation



AAD indicates antiarrhythmic drugs; **AF** indicates atrial fibrillation.

*See Figure 5

Figure 4. Pharmacological Management of Patients With Recurrent Persistent or Permanent Atrial Fibrillation



AAD indicates antiarrhythmic drugs; AF indicates atrial fibrillation.

*See Figure 5. Initiate drug therapy before cardioversion to reduce the likelihood of early recurrence of AF.

Atrial fibrillation

- 1 prevent thromboembolism
- 2 rate control
- 3 rhythm control

Table 10. Antithrombotic Therapy for Patients With Atrial Fibrillation

Risk Category	Recommended Therapy
No risk factors	Aspirin, 81-325 mg daily
One moderate risk factor	Aspirin, 81-325 mg daily or Warfarin (INR 2.0 to 3.0, target 2.5)
Any high risk factor or more than 1 moderate risk factor	Warfarin (INR 2.0 to 3.0, target 2.5)*

Less validated or weaker risk factors	Moderate risk factors	High risk factors
■ Female gender	■ Age ≥75 years	■ Previous stroke, TIA or embolism
■ Age 65-74 years	■ Hypertension	■ Mitral stenosis
■ Coronary artery disease	■ Heart failure	■ Prosthetic heart valve*
■ Thyrotoxicosis	■ LV ejection fraction ≤35%	
	■ Diabetes mellitus	

* indicates if mechanical valve, target INR greater than 2.5.

INR indicates international normalized ratio; LV, left ventricular; TIA, transient ischemic attack.

Racial/Ethnic Differences in the Risk of Intracranial Hemorrhage Among Patients With Atrial Fibrillation

- Objectives: This study was designed to study racial/ethnic differences in the risk for intracranial hemorrhage (ICH) and the effect of warfarin on ICH risk among patients with atrial fibrillation (AF).
- Background: Nonwhites are at greater risk for ICH than whites in the general population. Whether this applies to patients with AF and whether warfarin therapy is associated with comparable risk of ICH in nonwhites are unknown.
- Methods: We retrospectively identified a multiethnic stroke-free cohort hospitalized with nonrheumatic AF. Warfarin use and anticoagulation intensity were assessed by searching pharmacy and laboratory records. Crude ICH event rates were calculated by Poisson regression. Cox proportional hazard models were constructed to assess the independent effect of race/ethnicity on ICH after adjusting for age, gender, hypertension, diabetes, heart failure, and warfarin exposure.
- Results: Between 1995 and 2000, we identified 18,867 qualifying AF hospitalizations (78.5% white, 8% black, 9.5% Hispanic, and 3.9% Asian) and 173 qualifying ICH events over 3.3 years follow-up. Achieved anticoagulation intensity was lower among blacks but not different between the other groups. Warfarin was associated with increased ICH risk in all races, but the magnitude of risk was greater among nonwhites. There were no gender differences. **The hazard ratio for ICH with whites as referent was 4.06 for Asians (95% confidence interval [CI] 2.47 to 6.65), 2.06 for Hispanics (95% CI 1.31 to 3.24), and 2.04 (95% CI 1.25 to 3.35) for blacks.**
- Conclusions: Nonwhites with AF were at greater risk for warfarin-related ICH. Blacks, Hispanics, and Asians were at successively greater ICH risk than whites.

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Rate control

- digoxin
- calcium channel antagonist
- β receptor antagonist

Table 8. Intravenous and Orally Administered Pharmacological Agents for Heart Rate Control in Patients With Atrial Fibrillation

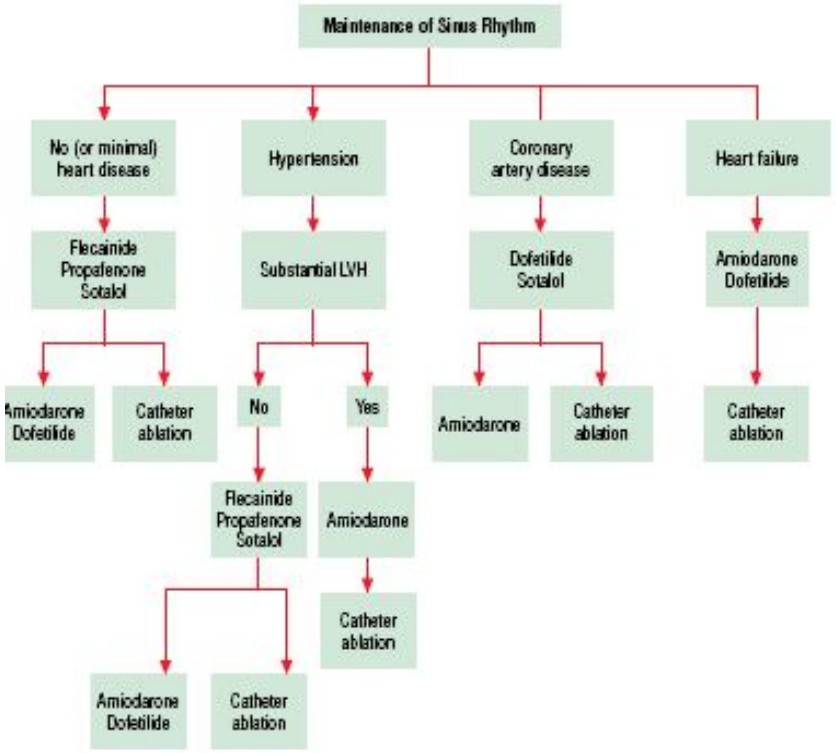
Drug	Class/LOE Recommendation	Loading Dose	Onset
Acute Setting			
Heart Rate Control in patients without accessory pathway			
Esmolol[†]	Class I, LOE C	500 mcg/kg IV over 1 min	5 min
Metoprolol[†]	Class I, LOE C	2.5 to 5 mg IV bolus over 2 min; up to 3 doses	5 min
Propranolol[†]	Class I, LOE C	0.15 mg/kg IV	5 min
Diltiazem	Class I, LOE B	0.25 mg/kg IV over 2 min	2 to 7 min
Verapamil	Class I, LOE B	0.075 to 0.15 mg/kg IV over 2 min	3 to 5 min
Heart Rate Control in patients with accessory pathway[¶]			
Amiodarone[‡ ||]	Class IIa, LOE C	150 mg over 10 min	Days
Heart Rate Control in patients with heart failure and without accessory pathway			
Digoxin	Class I, LOE B	0.25 mg IV each 2 h, up to 1.5 mg	60 min or more[#]
Amiodarone[‡]	Class IIa, LOE C	150 mg over 10 min	Days

Non-Acute Setting and Chronic Maintenance Therapy[1]			
Heart Rate Control			
Metoprolol†	Class I, LOE C	Same as maintenance dose	4 to 6 h
Propranolol†	Class I, LOE C	Same as maintenance dose	60 to 90 min
Diltiazem	Class I, LOE B	Same as maintenance dose	2 to 4 h
Verapamil	Class I, LOE B	Same as maintenance dose	1 to 2 h
Heart Rate Control in patients with heart failure and without accessory pathway			
Digoxin	Class I, LOE C	0.5 mg by mouth daily	2 days
Amiodarone‡	Class IIb, LOE C	800 mg daily for 1 wk, orally 600 mg daily for 1 wk, orally 400 mg daily for 4 to 6 wk, orally	1 to 3 wk

Rhythm control

- <A> electrical convert :
- * cardioversion with or without accompanying
- anti- arrhythmia agent
- anticoagulation : 3 weeks before and 4 weeks after
- cardioversion if AF persist longer than 2 days or
- immediately if TEE shows no LA thrombus with anti-
- coagulant followed for weeks
- <B> chemical convert

Figure 5. Antiarrhythmic Drug Therapy to Maintain Sinus Rhythm in Patients With Recurrent Paroxysmal or Persistent Atrial Fibrillation



Within each box, drugs are listed alphabetically and not in order of suggested use. The vertical flow indicates order of preference under each condition. The seriousness of heart disease proceeds from left to right, and selection of therapy in patients with multiple conditions depends on the most serious condition present. See Section 8.3.3 in the full-text guidelines for details.

LVH indicates left ventricular hypertrophy.

Table 7. Typical Doses of Drugs Used to Maintain Sinus Rhythm in Patients With Atrial Fibrillation*

Drug**	Daily Dosage	Potential Adverse Effects
Amiodarone†	100 to 400 mg	Photosensitivity, pulmonary toxicity, polyneuropathy, GI upset, bradycardia, torsades de pointes (rare), hepatic toxicity, thyroid dysfunction, eye complications
Disopyramide	400 to 750 mg	Torsades de pointes, HF, glaucoma, urinary retention, dry mouth
Dofetilide‡	500 to 1000 mcg	Torsades de pointes
Flecainide	200 to 300 mg	Ventricular tachycardia, HF, conversion to atrial flutter with rapid conduction through the AV node
Procainamide	1000 to 4000 mg	Torsades de pointes, lupus-like syndrome, GI symptoms
Propafenone	450 to 900 mg	Ventricular tachycardia, HF, conversion to atrial flutter with rapid conduction through the AV node
Quinidine	600 to 1500 mg	Torsades de pointes, GI upset, enhanced AV nodal conduction
Sotalol‡	160 to 320 mg	Torsades de pointes, HF, bradycardia, exacerbation of chronic obstructive or bronchospastic lung disease

GI indicates gastrointestinal; AV, atrioventricular; HF, heart failure.

*The drugs and doses given here have been determined by consensus based on published studies.

**Drugs are listed alphabetically.

†A loading dose of 600 mg per day is usually given for one month or 1000 mg per day for 1 week.

‡Dose should be adjusted for renal function and QT-interval response during in-hospital initiation phase.