

**CardioVascular
Institute**



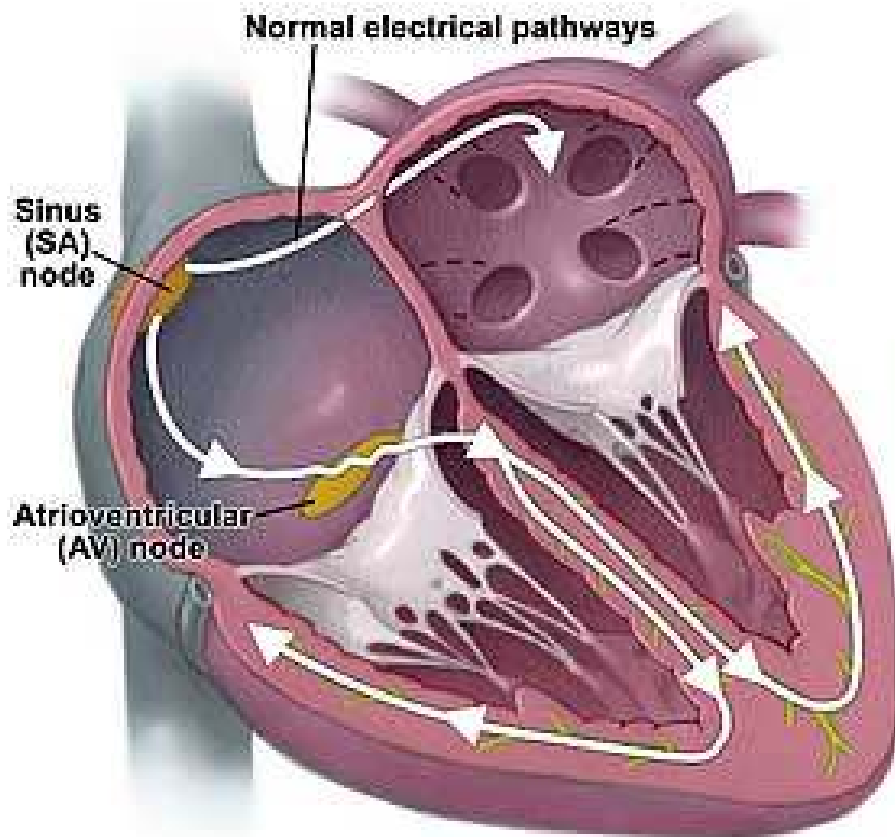
**Beth Israel Deaconess
Medical Center**



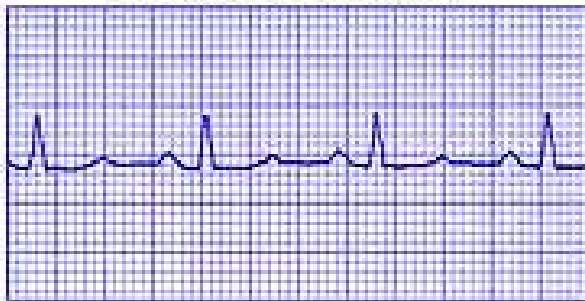
A teaching hospital of
Harvard Medical School

The Atrial Fibrillation Consultation: ABC's of AF Medical Management

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Associate Professor of Medicine, Harvard
Medical School



Normal sinus rhythm



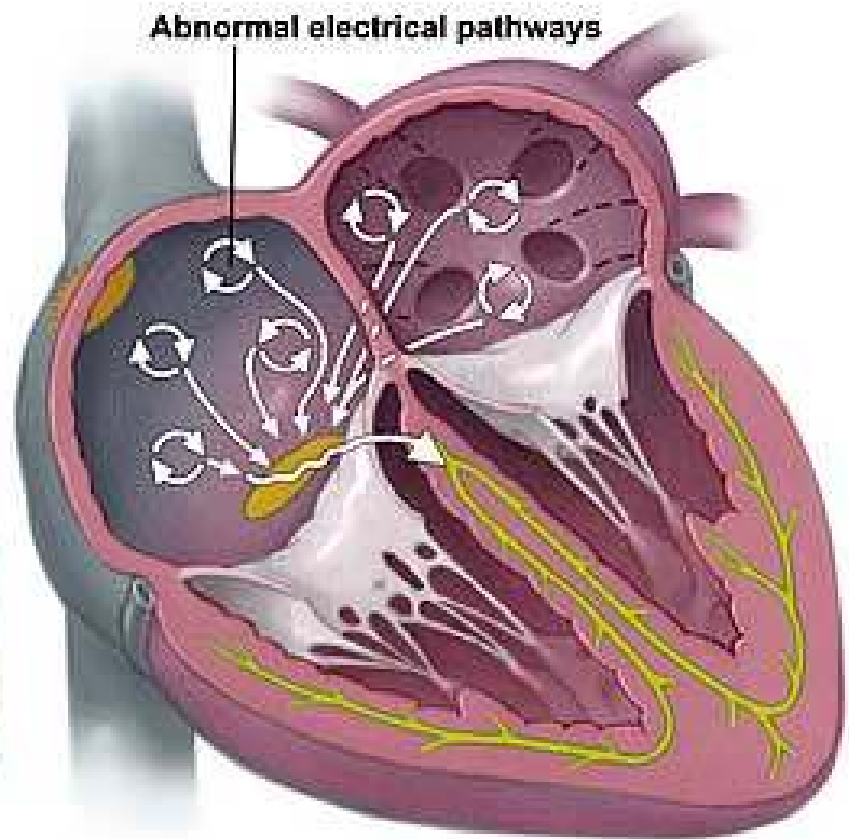
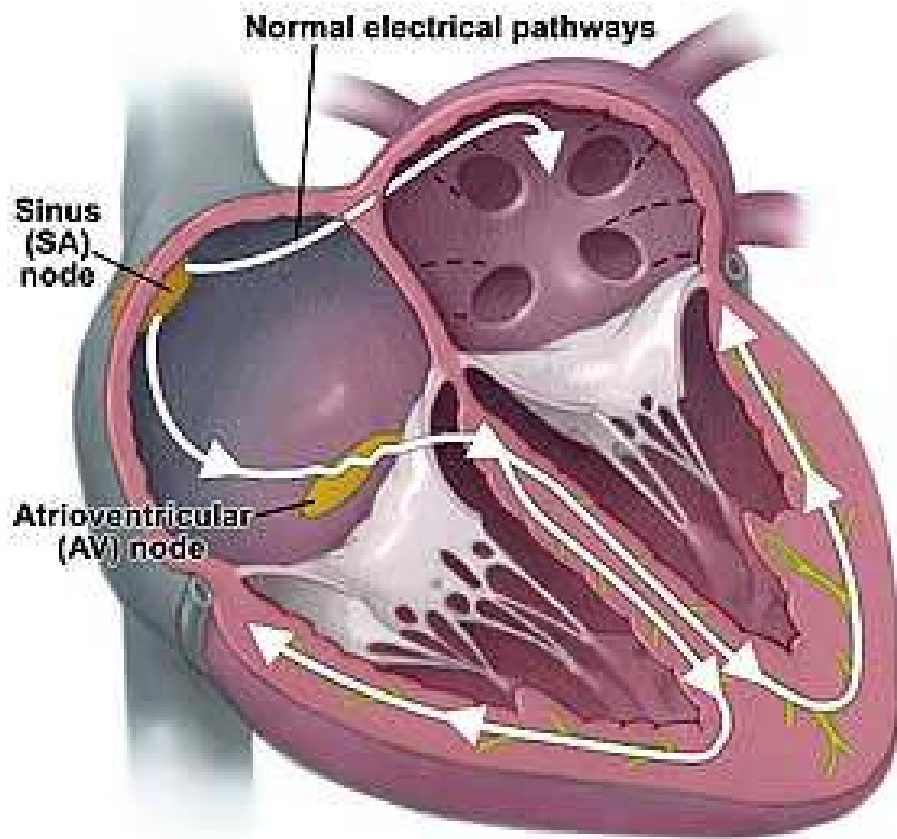
Normal sinus rhythm – normal Heart beat

50-80 beats a minute at rest

Up to 180 beats a minute when exercising

What is atrial fibrillation?

- Atrial fibrillation is an electrical abnormality in the top chambers of the heart (atria)
- During atrial fibrillation electrical signals fire at a rate of approximately 400 beats per minute
- Only a fraction of these signals are able to travel to the bottom of the heart (ventricles)



Normal sinus rhythm

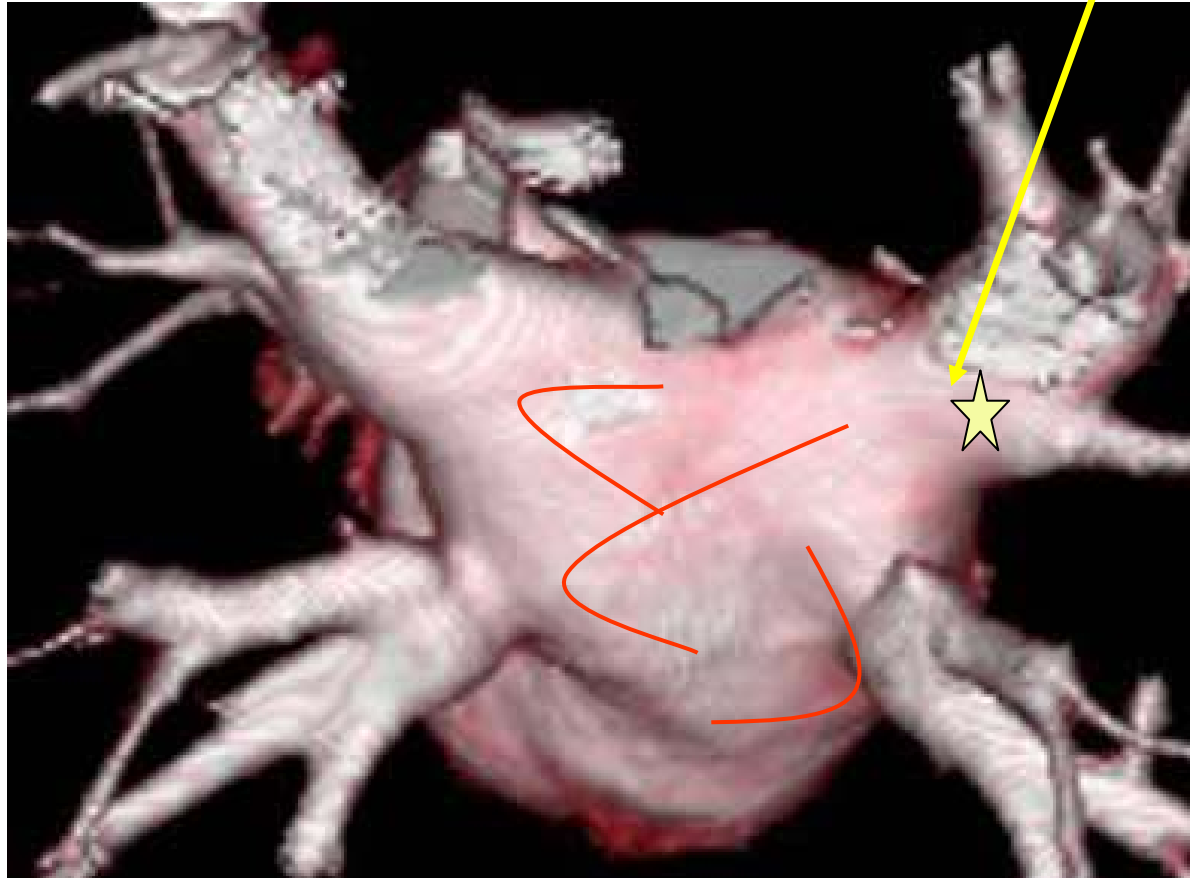
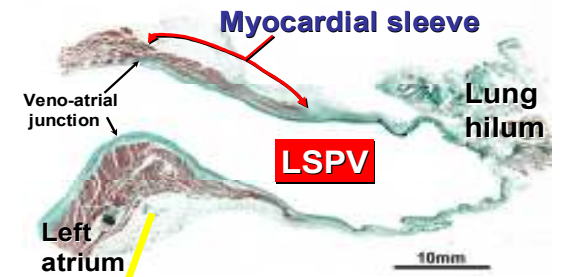


Atrial fibrillation



Heart MRI

Showing the pulmonary (lung) veins connecting into the back wall of the atrium



What is atrial flutter and how does it differ from atrial fibrillation?

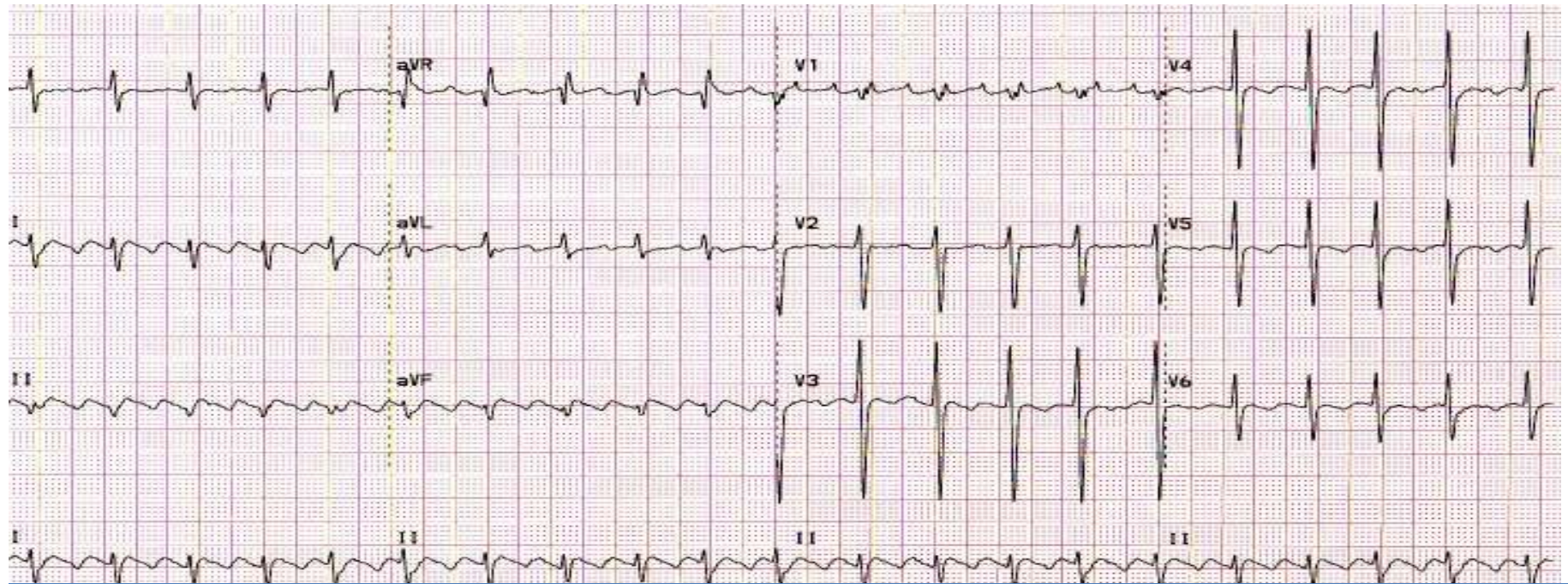
- Atrial flutter is a “cousin” of atrial fibrillation. Instead of beating at 400 + beats per minute in the atrium – it beats at 300 beats per minute
- It begins in the right atrium rather than the left atrium

Atrial fibrillation and atrial flutter frequently coexist in the same patient

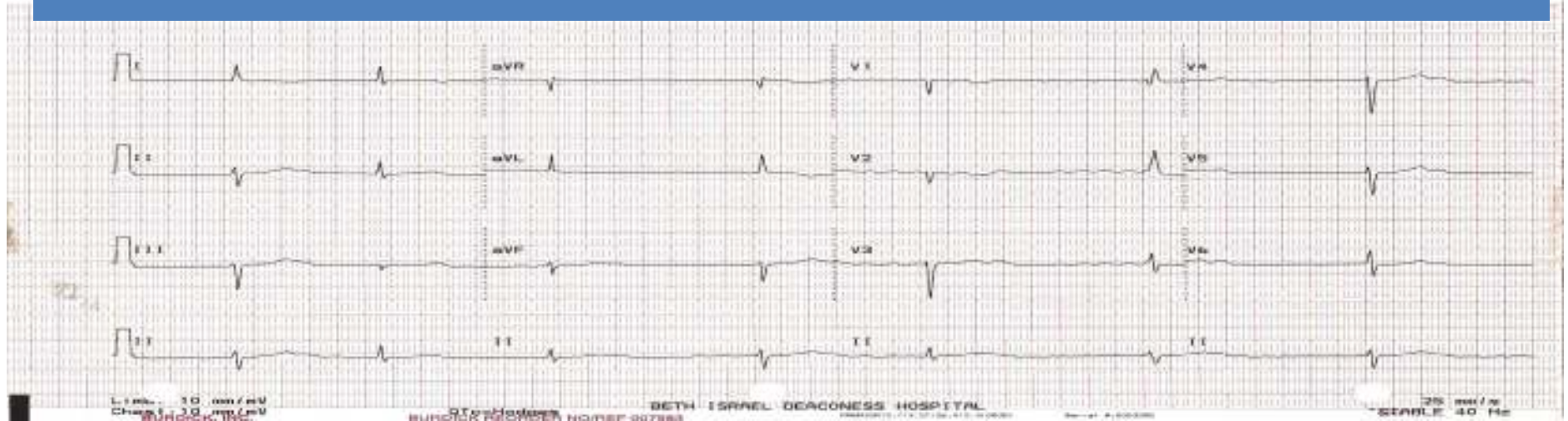
Atrial Flutter



**How do we tell the difference
between atrial fibrillation
and atrial flutter?**



Atrial Flutter ↑ Atrial Fibrillation ↓



Who gets atrial fibrillation?

- Aging (particularly > 60)
- 70% of patients with AF have a history of high blood pressure
- Associated heart or lung disease
- Coronary artery disease
- Weakened heart (cardiomyopathy)
- Overly thickened heart
- COPD
- Obstructive sleep apnea
- Diabetes mellitus

Age and Atrial Fibrillation

- As we age heart cells in the atria degenerate and increase the likelihood of developing atrial fibrillation

Atrial Fibrillation without Heart or Lung Disease

- Lone AF

Associated with vagal tone

Associated with adrenalin

Alcohol excess

Inherited or genetic

OTHER

Rarely associated with caffeine

How common is AF?

- 4.5 million in European Union
- 2.2 million Americans
- 1% of the general population

- Probably underestimates!!

Can AF be a one time problem or is it always recurrent?

- In general AF is always a recurrent problem.
- There may be some instances when AF is a one time event
 - In the setting of an over active thyroid gland
 - After surgery

How do doctors characterize AF?

- Paroxysmal – recurrent episodes that terminate on their own (spontaneously)
- Persistent – recurrent episodes that do not terminate on their own (need to be cardioverted)
- Chronic or permanent – persistent AF lasting > 6 months

What are the main problems to be concerned with if you have AF?

- Symptoms
- Inefficient or impaired heart function – congestive heart failure (shortness of breath and fatigue when the heart doesn't pump properly)
- Stroke

Can atrial fibrillation cause a heart attack or cardiac arrest?

- Heart attack occurs when a blockage occurs in a coronary artery (coronary artery disease) = Chest pain
- Cardiac arrest occurs when a lethal *ventricular* arrhythmia causes the heart to stop
- ***Atrial fibrillation doesn't cause either of these***

Symptoms Associated with AF

- Most patients (85%) will have symptoms when AF first develops
- Palpitations
- Chest pain
- Shortness of breath
- Fatigue

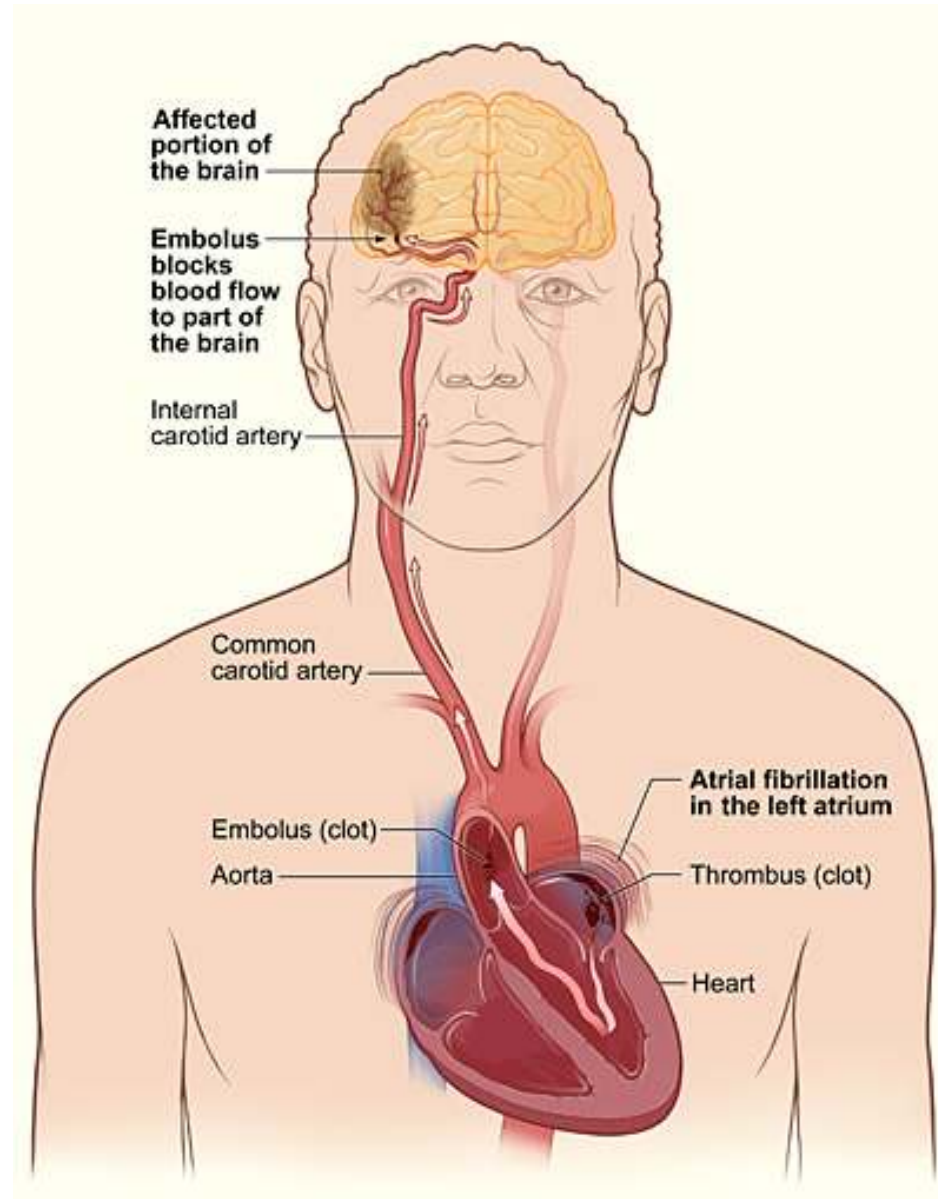
Symptoms and AF

- After one year many will become asymptomatic
- The vast majority of patients have both symptomatic and asymptomatic episodes

Atrial Fibrillation and Decreased Heart Function

- In some patients with stiff heart muscle – require the coordinated contraction of the atria and ventricles – in these patients the heart pumps inefficiently and pressure builds – resulting in fluid accumulation in the lungs = CONGESTIVE HEART FAILURE
- Atrial fibrillation – if not treated can result in a prolonged heart rate – weakens the heart pumping capacity (cardiomyopathy) – CONGESTIVE HEART FAILURE

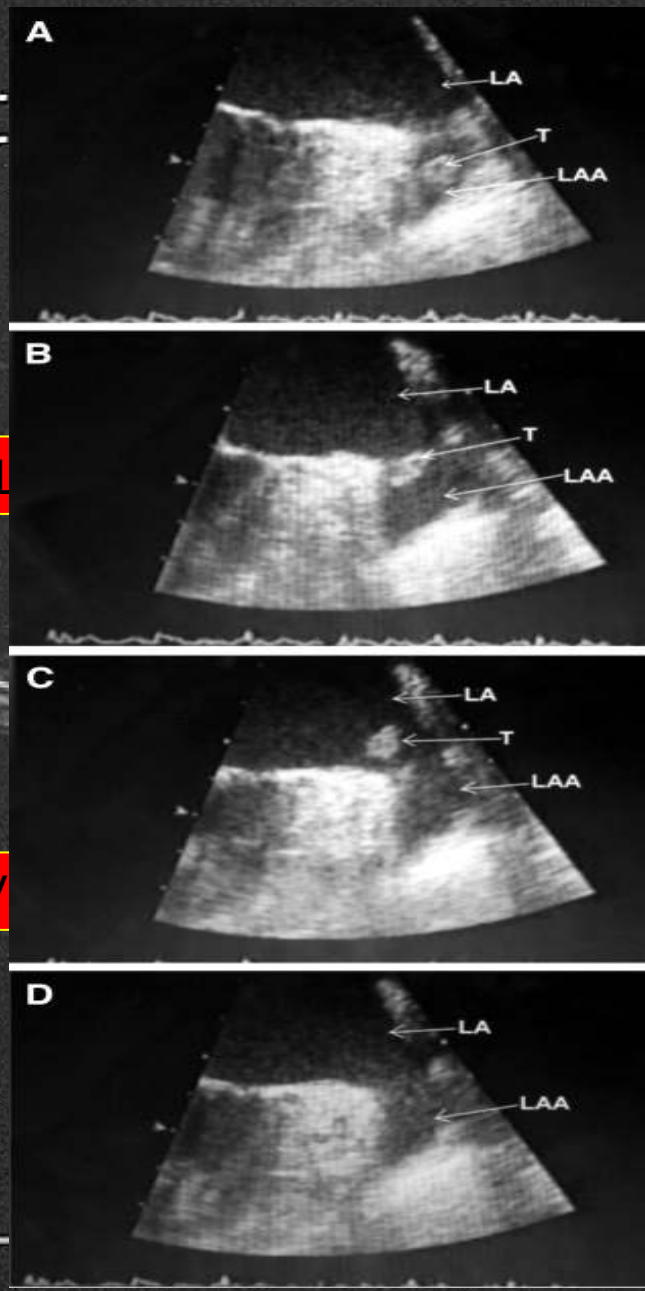
Stroke and Atrial Fibrillation



PAT T: 37.
TEE T: 38.

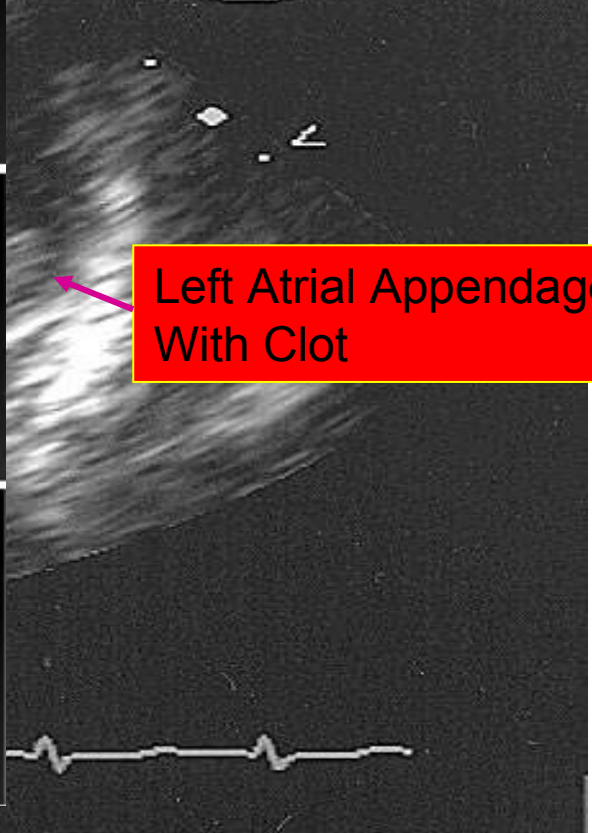
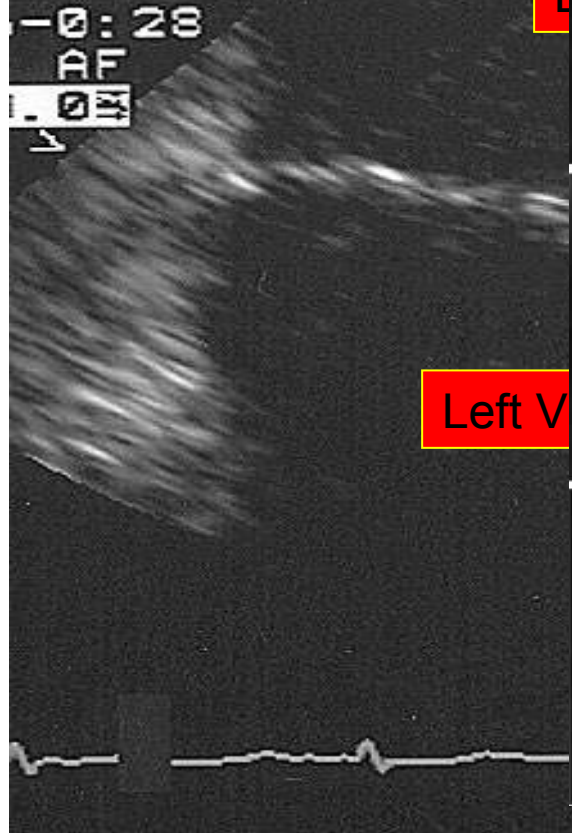
SS
ENTER

-0:28
AF
OK



Left V

Left Atrial Appendage
With Clot



How do we treat AF?

- Relieve symptoms through rhythm control or rate control – improve quality of life in terms of functional and emotional health
- Prevent excessively rapid heart rates which can result in cardiomyopathy
- Determine the risk of stroke and prescribe the best therapy to reduce that risk of stroke

What should you do if you have a recurrence of AF?

- 50% will convert back to normal rhythm in 48 hours
- You do not need to go to the emergency department unless symptoms are severe such as shortness of breath or lightheadedness

How do we manage the symptoms associated with atrial fibrillation?

- Slow down the heart rate by diminishing the number of electrical signals from AF which reach the bottom = RATE CONTROL
- Restore the heart rhythm to normal (sinus rhythm) = RHYTHM CONTROL

Is there an advantage to a strategy of rhythm compared with rate control?

- 5 major research trials compared a strategy of maintenance of sinus rhythm compared with rate control in patients with atrial fibrillation
- Average patient in these trials was 70 years old with hypertension

Regardless of strategy randomized to – mortality was less if in sinus rhythm at the end of the study

Major reasons for the lack of benefit for rhythm control Included:

1. Strokes in patients who had their warfarin stopped
2. Toxicity of some of the anti-arrhythmic drugs

What was the result of these trials?

We don't stop anticoagulation in patients even if we try to maintain sinus rhythm

We need new therapies which are safer and more effective than the old ones

Heart rate control “rate control”

- Can be a temporary strategy or a permanent strategy for AF management

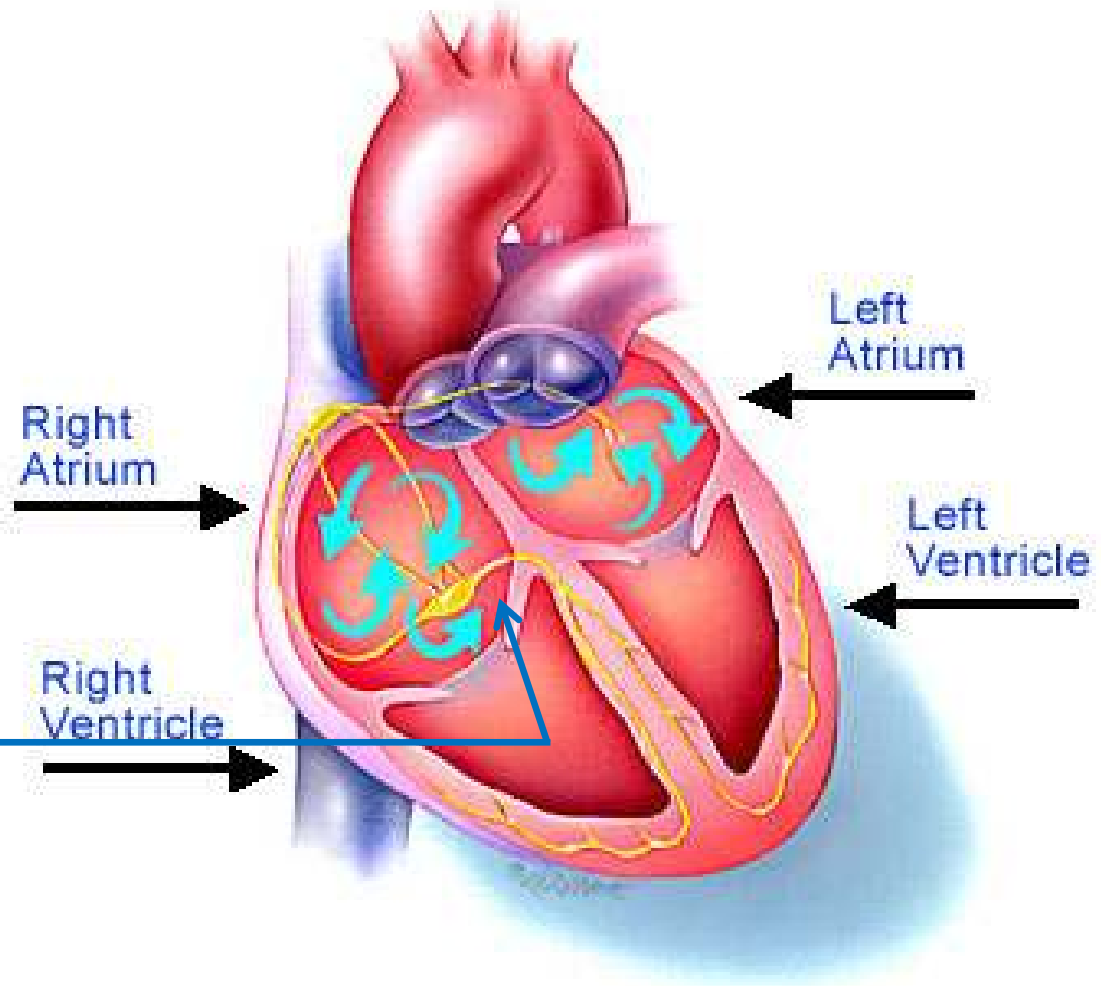
Rate Control

- Heart rate or pulse is < 80 beats a minute at rest and $< 140-160$ beats a minute with exercise
 - Medications:
 - Beta blockers (Metoprolol, Atenolol)*
 - Calcium Channel Blockers (Diltiazem, Verapamil)*
 - Digoxin*
- Often need a combination of these medications*
- *AVN Ablation and pacemaker implantation*

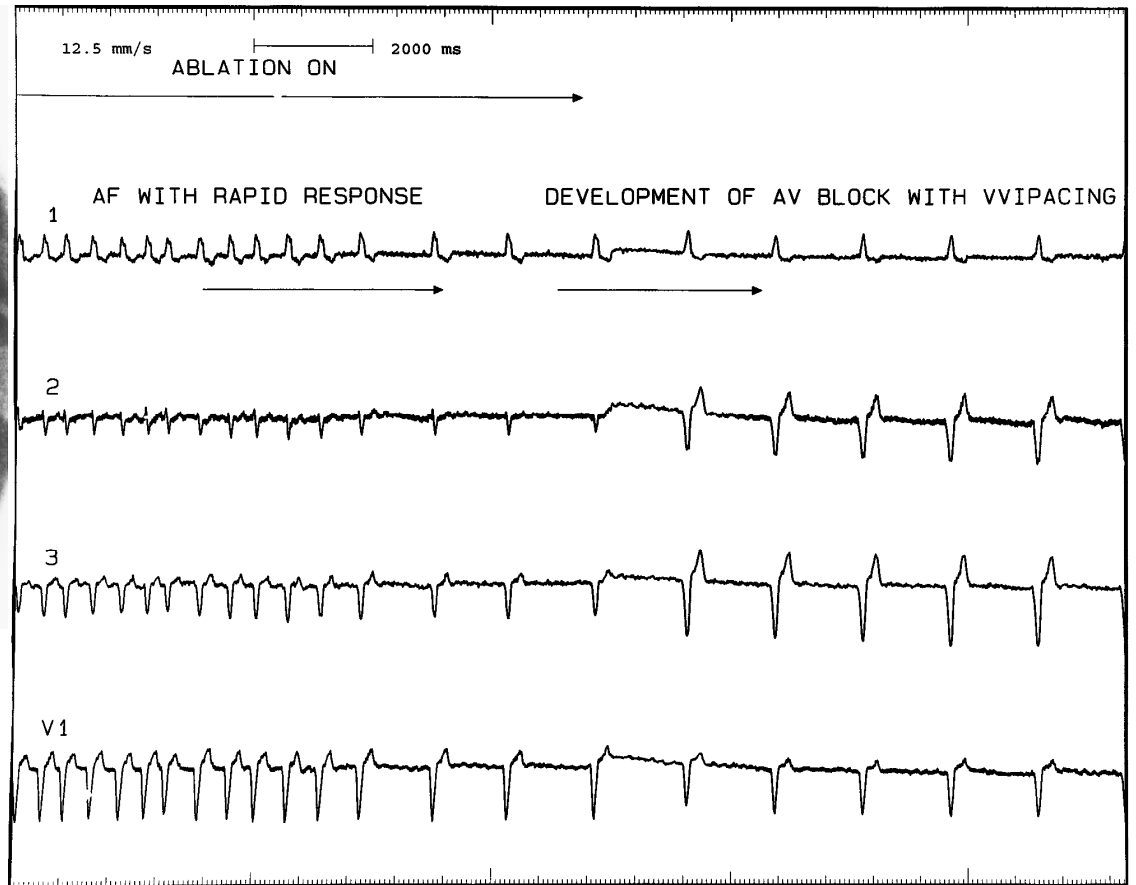
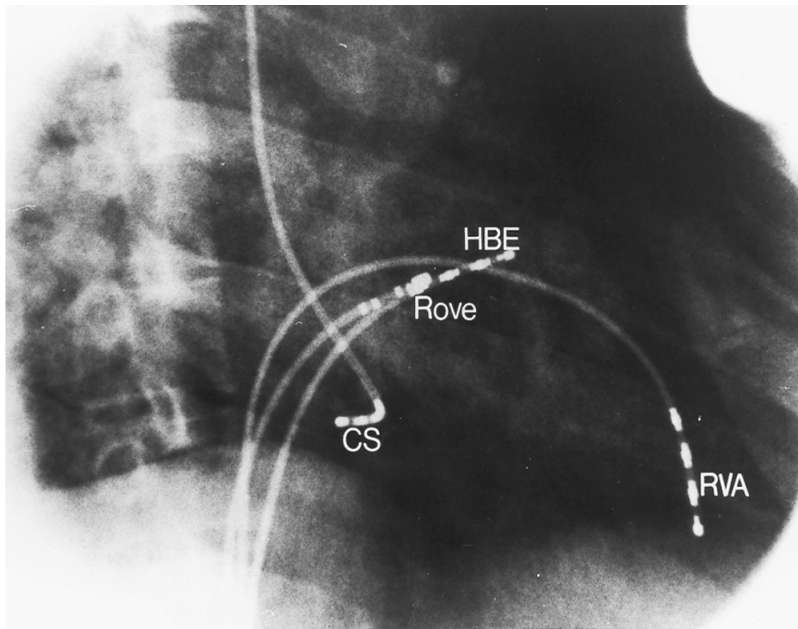
Ablation (Destruction) of the AV Node

Atrial fibrillation travels over an electrical cable in the center of heart (AV node)

Catheter can be placed on this cable and heated up to destroy the ability of the cable to conduct electricity



AVJ Ablation for Rate Control of Atrial Fibrillation



Rhythm Control

- Restore sinus rhythm = convert from atrial fibrillation or atrial flutter to normal rhythm

= CARDIOVERSION

- Maintain sinus rhythm

Types of Cardioversion

Type	Success
Spontaneous (usually within first 48 hrs)	50%
Medication (intravenous or oral)	30%
Electrical - Direct current	
External (monophasic, biphasic)	90%
Internal	95%

Cardioversion = Converting Atrial Fibrillation to Sinus Rhythm

- 50% of the time the rhythm will convert on its own = usually within a few days
- Before undergoing cardioversion - It is critical to make sure a clot has not formed in the heart
- If a clot has formed it may become dislodged after the cardioversion and cause a stroke

Protocol to Reduce the Risk of Stroke after Cardioversion

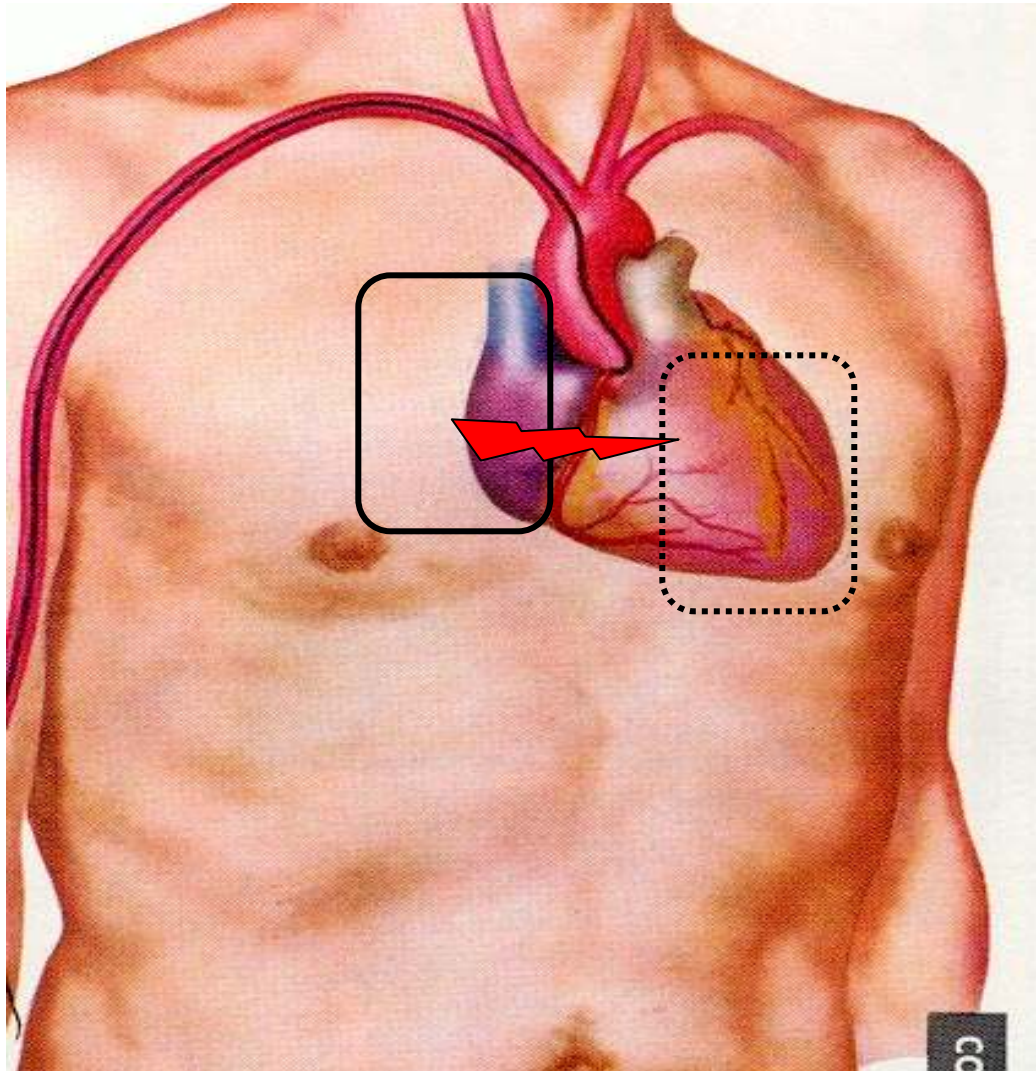
Anticoagulation for
3-4 weeks before
(INR >2)

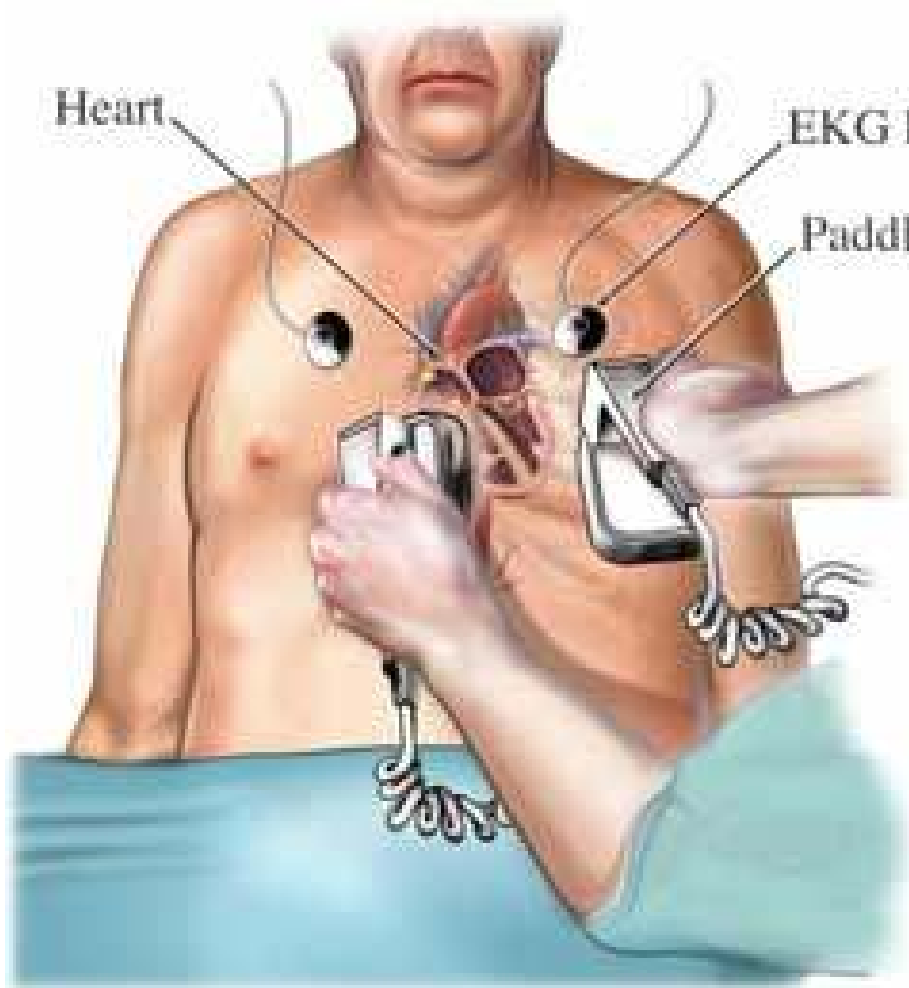
Transesophageal
echocardiogram which
demonstrates no clot

Cardioversion → Warfarin
1 month

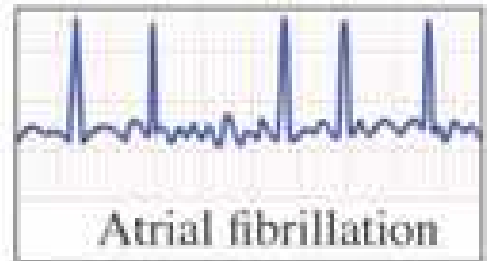
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graph LR; A[Anticoagulation for 3-4 weeks before (INR >2)] --> C[Cardioversion]; B[Transesophageal echocardiogram which demonstrates no clot] --> C; C --> D[Warfarin 1 month]
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Cardioversion: External

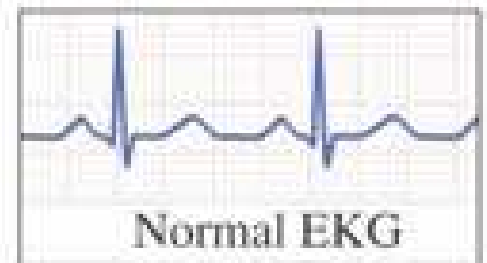




Before Cardioversion



After Cardioversion



Antiarrhythmic Drugs

Quinidine (quinaglute)

Disopyramide (norpace)

Flecainide (tambocor)

Propafenone (rhythmol)

Dofetilide (tikosyn)

Sotalol (betapace)

Amiodarone (cordarone, pacerone)

Dronedarone (multaq)

How do we select drugs for individual patients?

- These drugs can have dangerous side effects in patients – usually dependent upon the patient's prior heart history
- Choose the drug which is most likely to be safe for an individual patient

Amiodarone: Side Effects and Monitoring

Slow heart rate

Thyroid → check thyroid function tests twice a year

Thyroid disease

Liver failure

Pulmonary → pulmonary function tests x 1 and chest x ray every 1yr

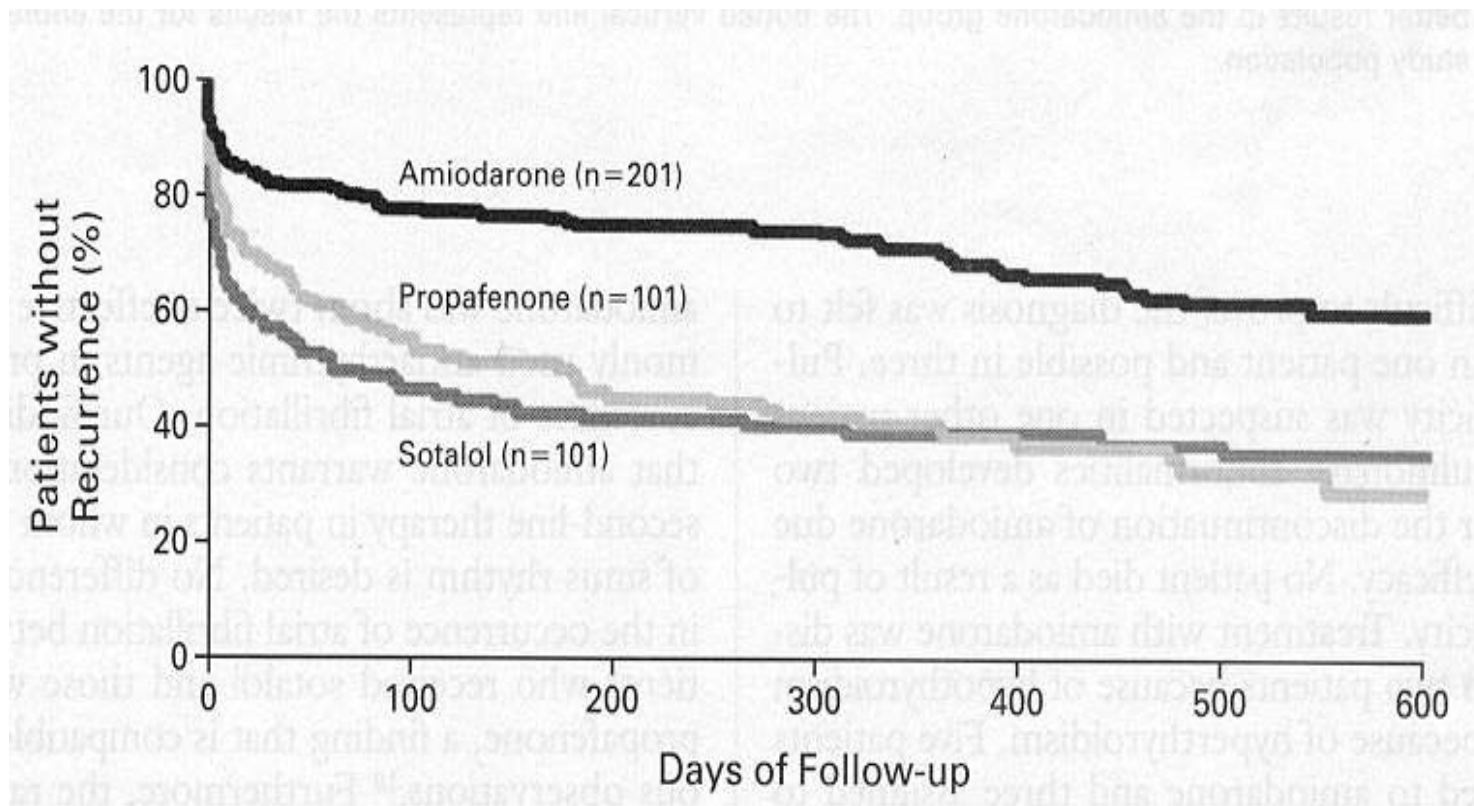
Lung disease

Sun burn

Gait unsteadiness

Liver → Liver function tests every 6 mos

Canadian Trial of Atrial Fibrillation: Amiodarone v. Propafenone or Sotalol for Maintenance of Sinus Rhythm. Roy H. NEJM 2000; 342:913.



Likelihood of being in sinus rhythm on drug at one year

Newest Antiarrhythmic Drug: Dronedarone

- Chemically similar to amiodarone but modified to prevent many of the side effects
- In major clinical trials – it turned out to be very safe in the majority of patients with AF
- Unfortunately it is not as effective as amiodarone at maintaining normal sinus rhythm

Are there new antiarrhythmic drugs to look forward to?

- Yes!!
- Vernakalant
- Other derivatives of amiodarone

Can you stop anticoagulation once you have started an antiarrhythmic drug or had an ablation procedure?

- Treatments to prevent atrial fibrillation
- Don't always work (may have asymptomatic recurrences)
- Cannot stop anticoagulation if you have a risk for stroke associated with atrial fibrillation

What is the yearly stroke risk in patients with AF?

- No stroke risk factors 0.5% / year
- 1-2 stroke risk factors 1.5-2.5% / year
- 3 or more risk factors 5.3-6.9% / year

Risk factors: Congestive heart failure

Age >75

Diabetes

Hypertension

Prior stroke or TIA

Stroke Prevention in AF

Current recommendations for stroke prevention are dependent upon the patients: AGE, history of high blood pressure, heart failure, diabetes mellitus, prior stroke, weakened heart muscle

No risk

Aspirin (81 to 325 mg daily) or nothing

One moderate risk factor
(age \geq 75, Hypertension, Heart failure
LVEF \leq 35%, Diabetes Mellitus)

Aspirin (81 or 325 mg) or
Warfarin (INR 2-3)

\geq 2 moderate risk factors or one
High risk factor (Prior stroke/TIA,
Mitral stenosis, Prosthetic valve)

Warfarin (INR 2-3, or
2.5-3.5 w prosthetic valve)

Cases where patients with one moderate risk factor should probably receive warfarin instead of only aspirin :

Age 65-74 with DM or CAD

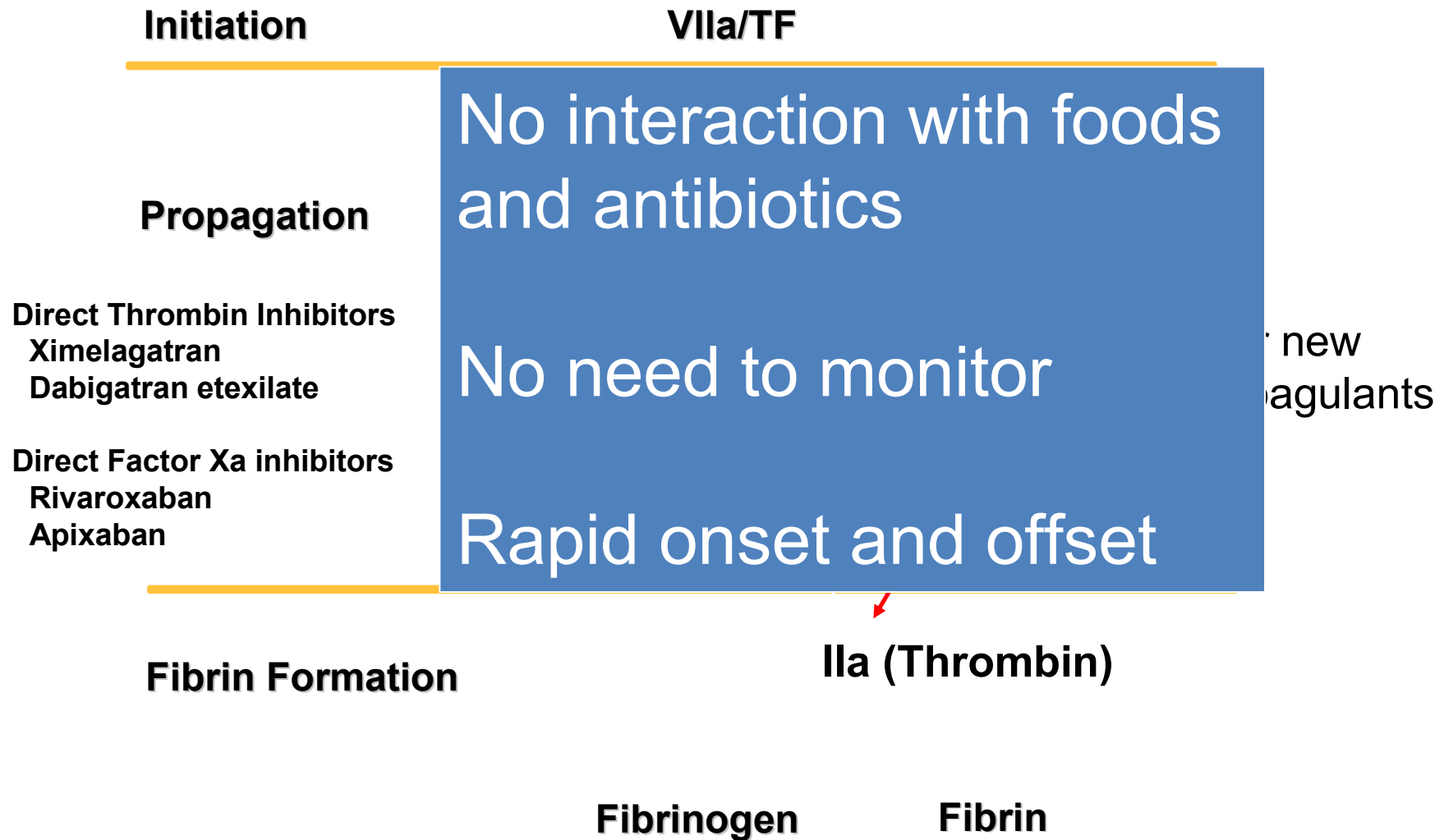
Age \geq 65 with CHF

Warfarin

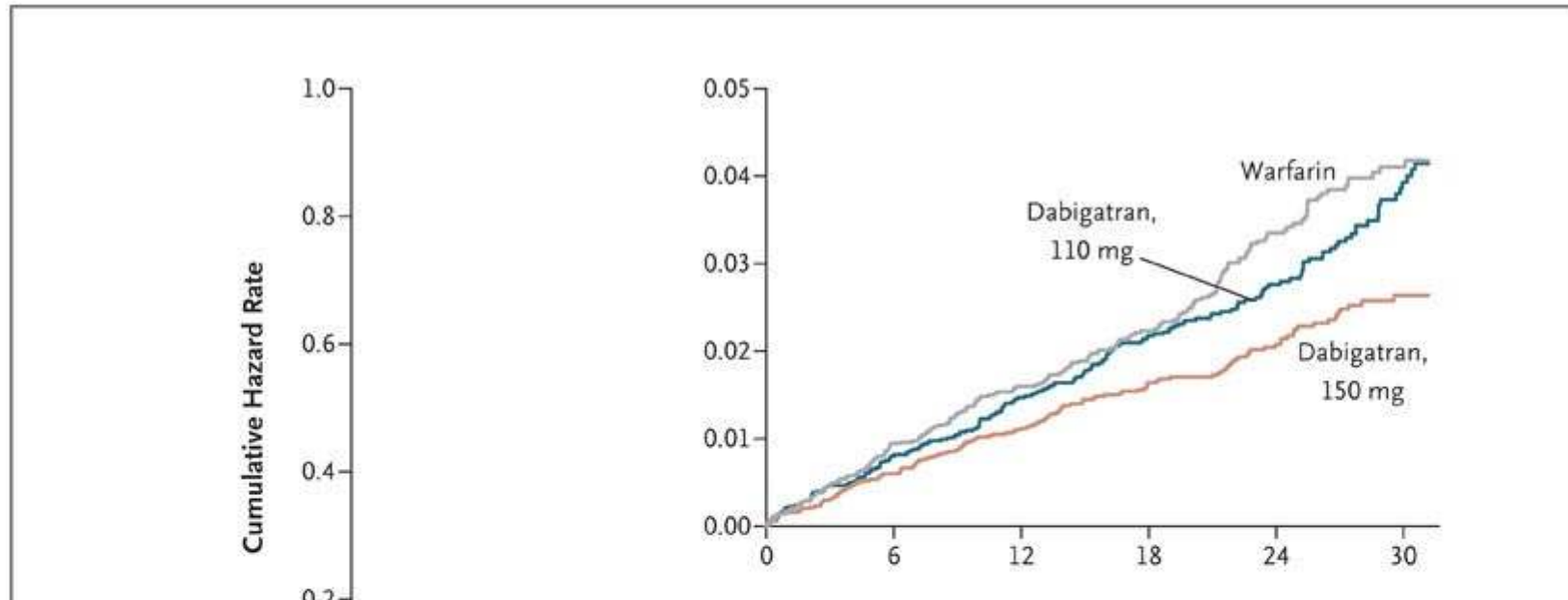
- Very effective at reducing the risk of stroke – however:
- Interacts with many foods and medications
- Variable response resulting from individual genetic differences in metabolism

50% of patients discontinue warfarin due to difficulty taking it

Coagulation Cascade



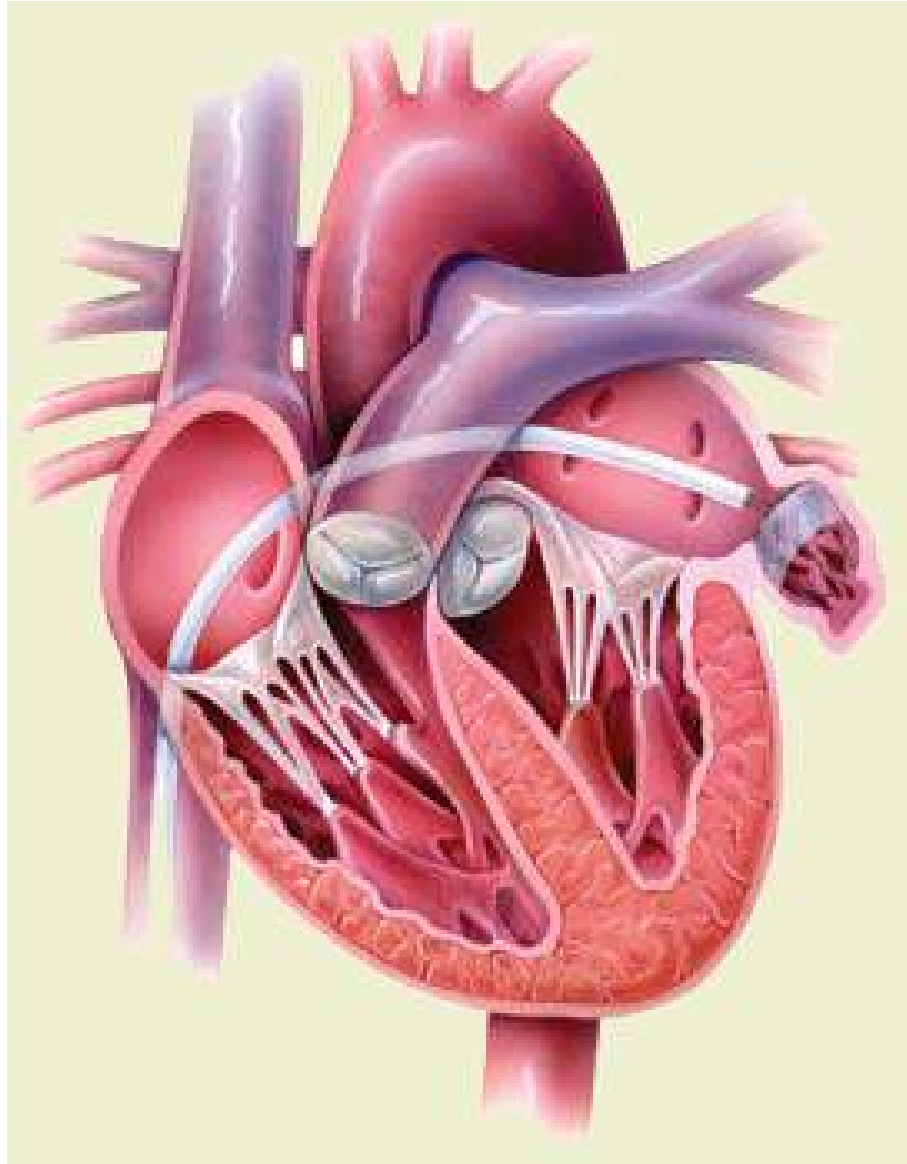
Rely - Cumulative Hazard Rates for the Primary Outcome of Stroke or Systemic Embolism, According to Treatment Group



Low dose of Dabigatran: as effective as warfarin with a lower bleeding risk

Higher dose of Dabigatran: more effective than warfarin but with a higher bleeding risk

Left Atrial Appendage Closure Devices



PLAATO

