Atrial Fibrillation
(A-Fib)

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Outline

• **Definition** - What is Atrial Fibrillation?
• **Epidemiology**
• **Treatment**: Anticoagulation
  Rate vs. Rhythm
• **Drugs**
• **Afib ablation** – success, complications, costs
• **What’s Next**
Cardiac Conduction System

Normal

Atrial Fibrillation

What is A-Fib?

- Atrial fibrillation is chaotic electrical rhythm from the Left upper chamber (300 beats per min)

- The atrium quiver, instead of organized contraction

- The electrical impulses travel to the ventricles \( \rightarrow \) irregular and usually rapid heart rate.
Symptoms of A-fib

- **Heart palpitations** - Sudden pounding, fluttering or racing sensation in the chest.
- **Lack of energy** or feeling over-tired.
- **Dizziness** - Feeling lightheaded or faint.
- **Chest discomfort** - Pain, pressure, or discomfort in the chest.
- **Shortness of breath** - Having difficulty breathing during normal activities or even at rest
- **No Symptoms**

What Causes Afib?

- **Unknown**
  - Heart failure
  - Thyroid Abnormality
- **Hypertension (high blood pressure)**
  - Congenital heart disease
  - Chronic lung disease
  - Coronary artery disease
  - Heart valve disease
  - After heart surgery
- **Cardiomyopathy (Heart Failure)**
  - Pulmonary embolism
EPIDEMIOLOGY

Projected Number of US Adults with AF (in millions)

- Increased age-adjusted AF incidence
- Current age-adjusted AF incidence
- 95% Confidence Interval (CI) for current age-adjusted AF incidence


2000: 5.1, 5.2, 5.1
2005: 5.6, 5.6, 5.6
2010: 6.7, 6.8, 6.8
2015: 7.7, 8.6, 8.6
2020: 8.9, 9.4, 9.4
2025: 10.5, 16.3, 16.3
2030: 11.9, 11.1, 11.1
2035: 14.3, 14.3, 14.3
2040: 15.7, 15.7, 15.7
2045: 17.0, 17.0, 17.0
2050: 19.5, 19.5, 19.5


EPIDEMIOLOGY

Framingham analysis

Men and women have a 1 in 4 lifetime risk of developing AF

Lloyd-Jones et al., Circ. 110:1042-6, 2004
Why is A-Fib Dangerous?

- Usually progressive gets worse over time
- Decrease the heart's pumping ability by as much as 20 to 25 percent.
- Atrial fibrillation, combined with a fast heart rate over a long period of time, can result in heart failure.
Stroke

- Blood clots form because blood doesn’t move well
- Clot can travel to brain → Stroke
- 5-7x more likely to have a **stroke** than the general population.

Mortality

![](Mortality.png)

Tests for Afib

1. A review of your medical history
2. Echocardiogram (echo)
3. Complete physical examination
4. Holter monitor test
5. Electrocardiogram (ECG)
6. Other tests, as needed
Treatment

- Anticoagulation (Blood Thinning)
- Rate Control
- Rhythm Control

Anticoagulation with non-valvular A-Fib = CHADS$_2$

C  CHF =1
H  Hypertension =1
A  Age > 75 =1
D  Diabetes =1
S$_2$ Stroke/embolic = 2

=0 $\rightarrow$ Aspirin 325mg
=1 $\rightarrow$ Aspirin 325mg or warfarin
=2 $\rightarrow$ warfarin/ New direct Thrombin Inhibitors

ACC/AHA Atrial Fibrillation Anticoagulation Guidelines, JACC 2012.
Old vs. New Blood Thinners

**OLD**
Warfarin (Coumadin)

+ Well known
+ Easy to reverse
+ Cheap
+ Once a day
- Need frequent monitor
- Vit K dependant

**New**
Dabigitran (Pradaxa)
Rivaroxaban (Xarleto)
Abixiban (Eliquis)

+ Not Vit K
+ No monitoring
+ 34% better at preventing stroke
- $
- Stomach upset
- Can be twice a day

Approaches

**Symptoms**

- No
  - Rate Control
    - Avoid fast or slow rates
    - Feel bad when heart rates not controlled

- Yes
  - Rhythm Control
    - Keep normal rhythm
    - Much harder to do
### Approaches

<table>
<thead>
<tr>
<th>Rate Control</th>
<th>Rhythm Control</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Asymptomatic</strong></td>
<td><strong>Symptomatic</strong></td>
</tr>
<tr>
<td>- Old</td>
<td>- Young</td>
</tr>
<tr>
<td>- Other medical problems</td>
<td>- Healthy hearts</td>
</tr>
<tr>
<td>- Failed Rhythm Control Approach</td>
<td></td>
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</tbody>
</table>

### Treatment

<table>
<thead>
<tr>
<th>Rate Control</th>
<th>Rhythm Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ Drugs safe  (beta blockers, Calcium channel blockers, Digoxin)</td>
<td>+ Cure for Atrial Fibrillation</td>
</tr>
<tr>
<td>+ Procedures low risk (Pacer)</td>
<td>- Drugs with more side effects</td>
</tr>
<tr>
<td>- Still in afib</td>
<td>- Procedures with more risks</td>
</tr>
<tr>
<td>- Does not change CHADS2 score</td>
<td>- Does not change CHADS2 score</td>
</tr>
</tbody>
</table>
**Cardioversion (Electrical Shock)**

- 3 days → 86% in Normal Rhythm
- 1 year → 23% in Normal Rhythm
- 2 Years → 16% in Normal Rhythm

- Temporary measure only
- **Main Purpose** → Determine symptoms (which approach?)

ACC/AHA/ESC Atrial Fibrillation Guidelines 2006

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**Rhythm Control Drugs**

ACC/AHA/ESC Atrial Fibrillation Guidelines 2012
## Traditional Results of Antiarrhythmic Drugs at One Year

- Beta Blockers - 0-10%
- Dronedarone – 30%
- Propafenone, Flecainide, Sotalol – 50% → 30%
- Dofetilide – 60%
- Amiodarone – 65%

- Ablation – 70% → 80%
- Surgical Maze – 80%

## Side Effects of Amiodarone
Side Effects of Amiodarone

Table 1. Adverse Effects of Oral Amiodarone

<table>
<thead>
<tr>
<th>Adverse Effect</th>
<th>Incidence</th>
<th>Recommended Monitoring</th>
<th>Special Considerations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cardiac</td>
<td>15%</td>
<td>Baseline electrocardiogram at least once during loading period, especially if conduction delay is present.</td>
<td>Consider reduction of loading dose in older patients and those with atrioventricular conduction disease; reduce dose if baseline QT interval exceeds 550 ms.</td>
</tr>
<tr>
<td>Thyroid</td>
<td></td>
<td>Thyroid function tests at baseline and then every 3 months or as needed.</td>
<td>Avoid in presence of hyperthyroidism. In patients with no evidence of thyroid effects, continue amiodarone and repeat tests monthly. Discontinue if hyperthyroidism suspected.</td>
</tr>
<tr>
<td>Pulmonary</td>
<td>&lt;10%</td>
<td>Pulmonary function tests at baseline and every 6 months.</td>
<td>Consider close monitoring.</td>
</tr>
<tr>
<td>Dermatologic</td>
<td>25-75%</td>
<td>Routine</td>
<td>Recommended use of sunscreen with a high sun protection factor.</td>
</tr>
<tr>
<td>Neurologic</td>
<td>&gt;10%</td>
<td>Routine</td>
<td></td>
</tr>
<tr>
<td>Ophthalmologic</td>
<td></td>
<td>Examination at baseline, follow-up examinations as needed.</td>
<td></td>
</tr>
</tbody>
</table>


Side Effects: 75%
Side Effects → discontinue drug: 33%
Ablation

The catheter tip delivers bursts of high-energy waves that destroy the abnormal areas.

Ablation Lesion

© Tufts Medical Center

Source: Ann J Rheum Dis. © 2009 American Rheumatism Association
Pulmonary Veins

Mechanisms of A-fib
Atrial Fibrillation

Wide Area Circumferential Ablation (WACA)
Ablation

Who is candidate for A-fib ablation?

**Optimal**
- Highly symptomatic
- Paroxysmal afib
- Age < 75
- LA < 50 ml
- No Sleep Apnea

**Less Optimal**
- Minimally symptomatic
- Persistant/Permanent
- Age > 75
- LA > 50 ml
- Sleep Apnea
Atrial Fib Ablation Results

**Paroxysmal**
(Comes and goes):
- 1 ablation → 70%
- 2 ablations → 80%

**Persistant:**
(in all the time)
- 1 ablation → 60%
- 2 ablations → 70%

Complications

1000 Atrial Fibrillation Ablation Procedures:
5-6% Total Procedure Complications

- 1 death (4 weeks later)
- 1.3% Tamponade – hole in heart
- 1.1% Vascular Complications (Groin)
- 0.4% Stroke
- 1 Atrioesophageal Fistula
- 1 Endocarditis – heart infection

Cost of Drugs vs. Ablation

Figure 1. Comparison of medical versus ablative cost of therapy in atrial fibrillation (AF). Estimates in the Figure are based on 3% discounting.

Dementia and Atrial Fibrillation

Ablation vs. Drugs


Reduction in Mortality

Reduction in Stroke


Reduction in Stroke, Heart Failure and Dementia

LA Appendage Occlusion

Reduces Risk of stroke
(Same reduction as warfarin/coumadin)

Hybrid Approach – EP and Surgery

ablation device instruments
More Information

www.HRSonline.org

www.stopafib.org

www.A-fib.com

Conclusion