

### Atrial Fibrillation Overview – Definition and Symptoms

AF is the most common sustained heart rhythm condition (arrhythmia) Abnormal electrical impulses firing in the atria override heart's natural pacemaker as these ectopic foci come in earlier and faster than intrinsic rhythm

- Atria contract fast and irregularly so the heart muscle cannot relax efficiently between contractions, leading to an inefficient pump, blood stasis & thromboembolism
- If the clot breaks away it becomes a systemic embolism and if it travels to the brain this can cause a stroke

#### Signs and symptoms of AF

- The most obvious symptom of AF is a fast and irregular heartbeat (palpitations) – usually over 100 beats a minute (AF is often asymptomatic. The absence of symptoms (e.g. palpitations) does not imply a lower risk of thromboembolism)
- Other symptoms:
  - Tiredness
  - Breathlessness
  - Dizziness
  - Angina

### Stroke Characteristics

- Strokes due to the embolization of clot from the left atrium or left atrial appendage in patients with atrial fibrillation (AF) present with the characteristics of ischaemic stroke.
- AF is associated with more severe ischemic strokes and "longer" transient ischemic attacks (TIAs) than emboli from carotid disease, due to embolization of larger particles with AF *Stroke*. 2002;33(8):1963
- A report comparing ischaemic brain events in patients with AF and those with carotid disease in two major trials found the ratio of hemispheric events to retinal events was 25:1 with AF compared with 2:1 with carotid disease. *Stroke*. 1984;15(3):441
- The "longer" TIAs typical in AF patients are often associated with abnormal MRI, and would be classified as strokes by the revised American Heart Association definition. *Stroke*. 2009;40(6):2276. Epub 2009 May 7.
- AF is also associated with silent cerebral infarctions and TIAs. The SPINAF trial: One or more silent cerebral infarctions were seen at presentation in 15% of cases. *Circulation*. 1995;92(8):2178.

### Stroke Characteristics

- Anticoagulated AF patients who experience ischemic stroke typically have smaller infarcts with a lower mortality rate compared with AF patients with strokes who are not anticoagulated. Anticoagulation greatly reduced the likelihood of large stroke due to left atrial emboli, so that the remaining strokes are from cerebral small artery disease or other mechanisms

Effect of intensity of oral anticoagulation on stroke severity and mortality in atrial fibrillation-AMVAF. EW, Go AS, Chang Y. *Stroke* 2014;45:100-106

### AF-related stroke is associated with significant morbidity and mortality

**Morbidity**

AF increases risk of stroke by approximately **5-fold** compared to risk of stroke in patients without NVAF<sup>1</sup>

NVAF-related stroke is associated with **increased severity and disability** compared with non-NVAF-related stroke<sup>2</sup>

**Mortality**

Strokes due to AF are associated with an **increased risk of death**

- 30-day mortality rate of **33%** (vs. 1.6% for non-AF strokes)<sup>2</sup>
- 1-year mortality rate of **~50%** (vs. 27% for patients without AF)<sup>2</sup>

**20% (1 in 5) of all strokes in the general population are due to AF<sup>2</sup>**

1. Wolf et al. *Stroke* 1991;22:999-1003  
2. *Stroke* 2002;33(8):1963

### Atrial Fibrillation Prevalence

- 1-2%** Prevalence in general population<sup>1</sup> (generally accepted this is grossly underestimated; asymptomatic cases in up to 20% of patients)<sup>2</sup>
- 1.4 x** Greater risk in men than women<sup>3,4</sup>
- ~25%** Lifetime risk in those who reach 40 years of age<sup>1</sup> (1 in 4) and prevalence is 10% in patients ≥80

**Incidence is projected to grow significantly<sup>5</sup>**

1. Camm et al. *EU Heart J* 2012;33:2369-2372. 2. Wolf et al. *Stroke* 1991;22:999-1003  
3. Wolf et al. *Stroke* 1991;22:999-1003. 4. Wolf et al. *Stroke* 1991;22:999-1003. 5. *Stroke* 2014;45:100-106

### Median age: 75 yrs

Patient age range	Prevalence of AF (%)
Above 40 yrs	2.3%
Above 65 yrs	5.9%
Above 75 yrs	11-14%

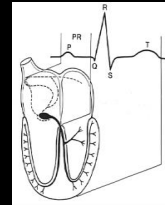
1. *Stroke* 2014;45:100-106

Data based on estimates derived from a review of four population-based studies of AF (n=14 000 over 35 years)

## Classification

Terminology	Features
1. Paroxysmal AF	Spontaneous termination <7 days
2. Persistent AF	Not self-terminating lasting >7 days
3. Long standing AF	Persistent AF for >1 year
4. Permanent AF	Long standing AF refractory to cardioversion
5. Lone AF	Occurs in age group <60 years with no H/o HTN/Heart disease
6. Nonvalvular AF	Absence of rheumatic mitral stenosis, a mechanical or bioprosthetic heart valve, or mitral valve repair

## The "PQRST"



P wave - Atrial depolarization

• QRS - Ventricular depolarization

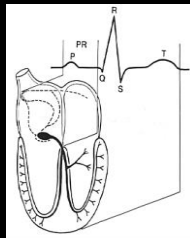
T wave - Ventricular repolarization

## The PR Interval

Atrial depolarization  
+  
delay in AV junction  
(AV node/Bundle of His)

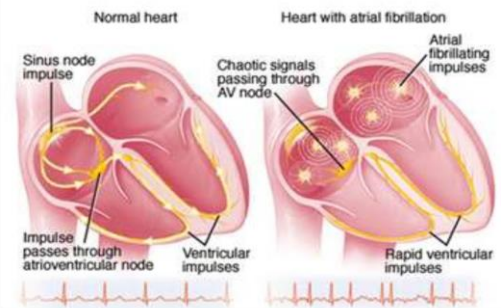
(delay allows time for the atria to contract before the ventricles contract)

NB - No PR interval in AFib



## Atrial fibrillation

### Atrial fibrillation



## Causes & risk factor a/w Afib

- Mnemonic **"PIRATES"**:
- **P**ulmonary embolus, **P**ulmonary disease, **P**ost-operative, **P**ericarditis
- **I**schemic heart disease, **I**diopathic ("lone atrial fibrillation"), **I**ntravenous central line (in right atrium)
- **R**heumatic valvular disease (specifically mitral stenosis or mitral regurgitation)
- **A**nemia, **A**lcohol ("holiday heart"), **A**dvanced age, **A**utonomic tone (vagally mediated Atrial fibrillation)
- **T**h thyroid disease (hyperthyroidism)
- **E**levated blood pressure (hypertension), **E**lectrocution
- **S**leep apnea, **S**epsis.

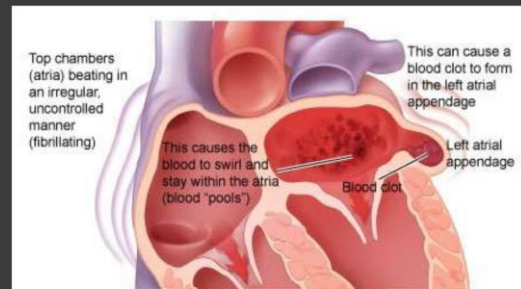
## Causes & risk factor a/w Afib

- **Hypertension with LVH, IHD, MVD, Cardiomyopathies, Constrictive pericarditis, Cardiac tumours, Pulmonary hypertension and Diabetes.**
- **Obesity and Obstructive sleep apnea.**
- **Temporary causes: Alcohol, Open heart or thoracic surgery, Myocardial infarction, Pericarditis, Myocarditis and Pulmonary embolism.**
- **Reversible causes: Hyperthyroidism**

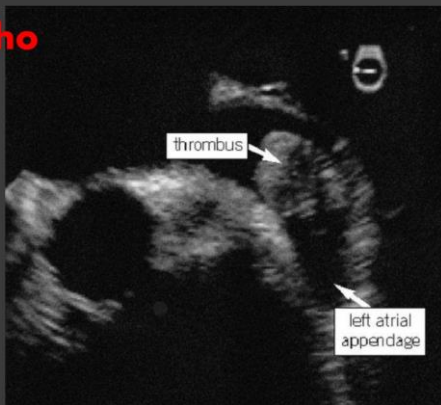
## Complications

- Stroke
- Heart failure

## Stroke with A Fib



## Echo



## Diagnostic evaluation

- Clinical history and Physical examination
- ECG
- Holter monitoring
- Stress test
- ECHO
- Chest radiograph
- Blood tests

## Carotid stenosis and AF

- About 10% of AF patients with ischemic stroke or TIA have a cervical carotid stenosis of above 50% stenosis, slightly more than half of which are ipsilateral to the neurological symptoms.
- Based on estimates of attributable risk, ipsilateral stenosis of at least 70% stenosis is equally likely to be the cause of cerebral ischemia as is cardiogenic embolism.
- Consequently, carotid endarterectomy or stenting seems reasonable for AF patients with high-grade ipsilateral stenosis, followed by anticoagulation and antiplatelet therapy

Kothwani(2005) Practical Neurology, 15(6): 83

## RISK OF RECURRENT EMBOLISM

- Patients who have had a prior embolic event already have the most potent high-risk factor for subsequent stroke. The risk of recurrent stroke in the first few weeks after the initial event is 3 to 5% based upon large numbers of randomized trials [Lancet.1997;349\(9065\):1569](#) [
- In addition, a risk of up to 12% per year has been reported in untreated patients in the first two to three years after a stroke [Lancet. 1993;342\(8882\):1255](#).

## Valvular AF versus non-valvular AF

### Valvular AF

Rheumatic valvular disease (mitral stenosis) or prosthetic heart valves<sup>1</sup>

### Non-valvular AF

In the absence of rheumatic mitral stenosis or a mechanical heart valve, or mitral valve repair<sup>2</sup>

<sup>1</sup> Connolly et al. *Br Heart J* 2012;114(1):1-7  
<sup>2</sup> January et al. *J Am Coll Cardiol* 2014; pii S0735-1097(14)01749-9

## Strategies for treating Atrial fibrillation

- □ Rhythm control (including cardioversion)
- OR**
- □ Rate control
- PLUS**
- **Thromboembolic risk prevention:**  
based on CHA<sub>2</sub>DS<sub>2</sub>-VASc score

## Thrombo-embolic Risk and Treatment Risk Based Antithrombotic Therapy

- CHA<sub>2</sub>DS<sub>2</sub>-VASc score recommended to assess stroke risk (Class I)

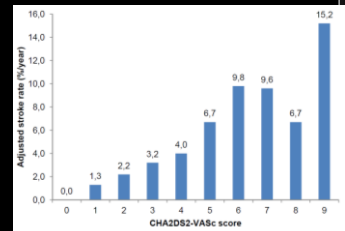
**Table 2—The 2009 Birmingham Schema Expressed as a Point-Based Scoring System, With the Acronym CHA<sub>2</sub>DS<sub>2</sub>-VASc**

Risk Factor	Score
Congestive heart failure/LV dysfunction	1
Hypertension	1
Age ≥ 75 y	2
Diabetes mellitus	1
Stroke/TIA/TE	2
Vascular disease (prior myocardial infarction, peripheral artery disease, or aortic plaque)	1
Age 65-74 y	1
Sex category (ie female gender)	1

## Stroke Risk Assessment-CHADSVASC Score

CHA<sub>2</sub>DS<sub>2</sub>-VASc – a comprehensive score to assess stroke risk and guide use of anticoagulant treatment (≥1) – recommended in the 2012 ESC guidelines<sup>1</sup>  
 Adapted from Lip et al. *Stroke* 2010;41:2731-36

CHA <sub>2</sub> DS <sub>2</sub> -VASc Score	*Adjusted Stroke Rate (%/year)
0	0
1	1.3
2	2.2
3	3.2
4	4.0
5	6.7
6	9.8
7	9.6
8	6.7
9	15.2



<sup>1</sup> ESC 2012 Guidelines: Connolly et al. 2012;114(1):1-7  
<sup>2</sup> Hartzel, Heon et al. *Stroke* 2010;41:2731-36  
<sup>3</sup> Connolly et al. *Br Heart J* 2012;114(1):1-7  
<sup>4</sup> Connolly et al. *Br Heart J* 2012;114(1):1-7  
<sup>5</sup> Connolly et al. *Br Heart J* 2012;114(1):1-7  
<sup>6</sup> Connolly et al. *Br Heart J* 2012;114(1):1-7  
<sup>7</sup> Connolly et al. *Br Heart J* 2012;114(1):1-7  
<sup>8</sup> Connolly et al. *Br Heart J* 2012;114(1):1-7  
<sup>9</sup> Connolly et al. *Br Heart J* 2012;114(1):1-7

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## Aspirin +/- Clopidogrel

- Aspirin monotherapy not supported by evidence
- No benefit in preventing CVA except in one study (SPAF-1 trial)
- Aspirin plus clopidogrel may be a reasonable alternative in the patient who cannot be treated with anticoagulation
- Small non-significant benefit to combo therapy as opposed to aspirin monotherapy\*
- Aspirin + clopidogrel inferior to warfarin (ACTIVE-W trial)

\*Connolly SJ et al. *Ann Intern Med* 2011

## Estimating bleeding risk in NVAF

HAS-BLED score: 2012 ESC guidelines<sup>1</sup> recommend a formal bleeding assessment for all patients with AF to assess the risk of bleeding in people (≥3 regular monitoring)

HAS-BLED Bleeding points*	Points
Hypertension (SBP>160 mmHg)	1
Abnormal renal and liver function (1 point each)	1 or 2
Stroke	1
Bleeding	1
Labile INRs	1
Elderly (e.g. Age >65 years)	1
Drugs or alcohol	1 or 2
<b>Maximum score</b>	<b>9</b>

HAS-BLED ≥3 indicates "high risk", and some caution and regular review of the patient is needed following the initiation of antithrombotic therapy

Connolly et al. *Br Heart J* 2010;102(12):1558-64; Connolly et al. *Br Heart J* 2012;114(1):1-7; Connolly et al. *Br Heart J* 2012;114(1):1-7; Connolly et al. *Br Heart J* 2012;114(1):1-7; Connolly et al. *Br Heart J* 2012;114(1):1-7

## Novel oral anticoagulants

### Dabigatran

- ⦿ Oral direct thrombin inhibitor
- ⦿ Twice daily dosing
- ⦿ Renal clearance

### Rivaroxaban

- ⦿ Direct factor Xainhibitor
- ⦿ Once daily (maintenance), twice daily (loading)
- ⦿ Renal clearance

### Apixaban

- ⦿ Direct factor Xainhibitor
- ⦿ Twice daily dosing
- ⦿ Hepatic clearance

### Edoxaban

- ⦿ Direct factor Xainhibitor
- ⦿ Once daily dosing
- ⦿ Hepatic clearance

## How Can Atrial Fibrillation be Prevented?

- ⦿ Following a healthy lifestyle and taking steps to lower your risk for heart disease may help you prevent atrial fibrillation (AF). These steps include:
  - ⦿ Following a heart healthy diet that's low in saturated fat, *trans* fat, and cholesterol. A healthy diet includes a variety of whole grains, fruits, and vegetables daily.
  - ⦿ Not smoking.
  - ⦿ Being physically active.
  - ⦿ Maintaining a healthy weight.

- ⦿ If already having heart disease or other AF risk factors, regular checkup and followup. In addition to adopting the healthy habits above:
  - ⦿ Advise DASH eating plan to help lower blood pressure.
  - ⦿ Keep cholesterol and triglycerides at healthy levels with dietary changes and medicines (if prescribed).
  - ⦿ Limit or avoid alcohol.
  - ⦿ Control of blood sugar level if diabetic.
  - ⦿ Medical care and medicines as prescribed.

## Summary

- ⦿ Most common cardiac arrhythmia
- ⦿ High prevalence
- ⦿ Stroke and Heart failure – Risk
- ⦿ Treatable disease with early and proper interventions.