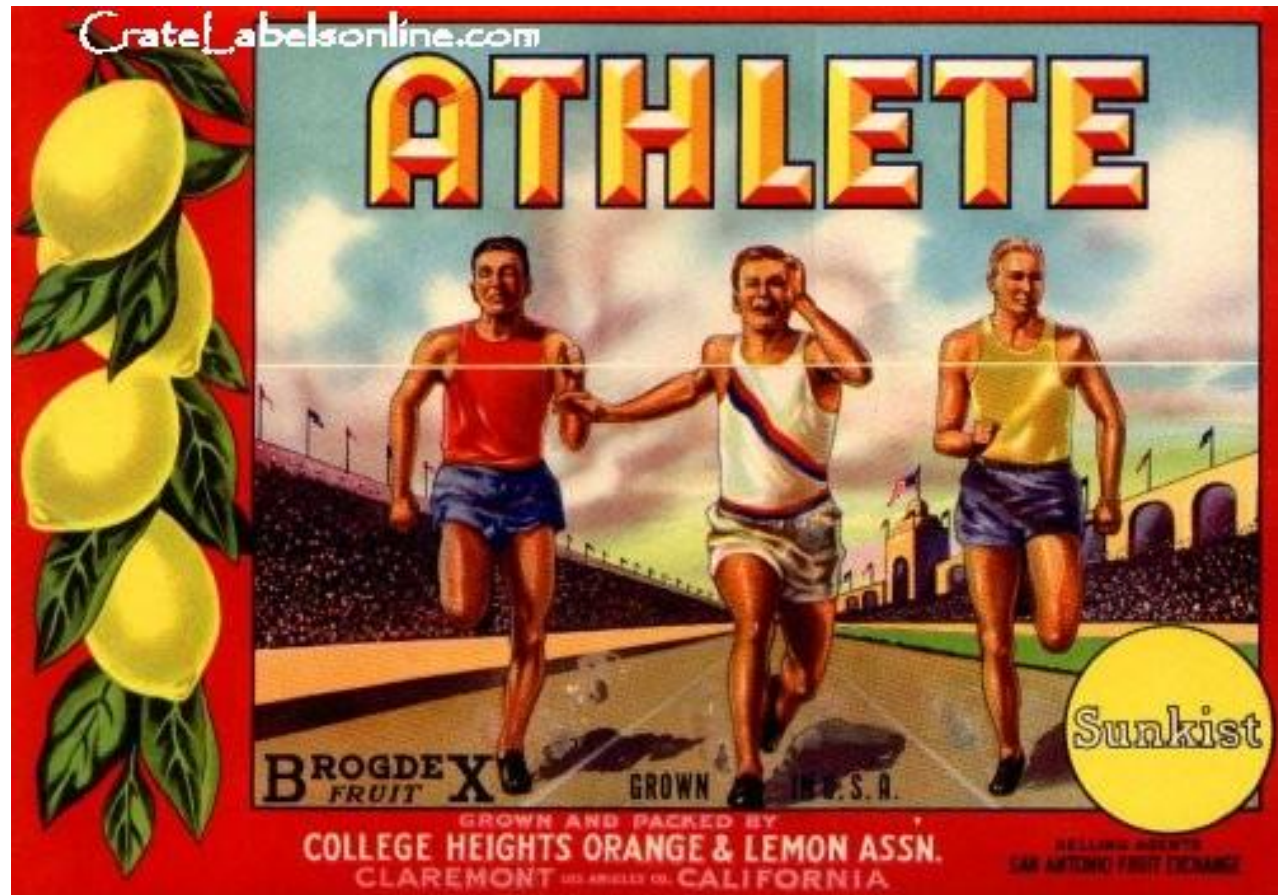


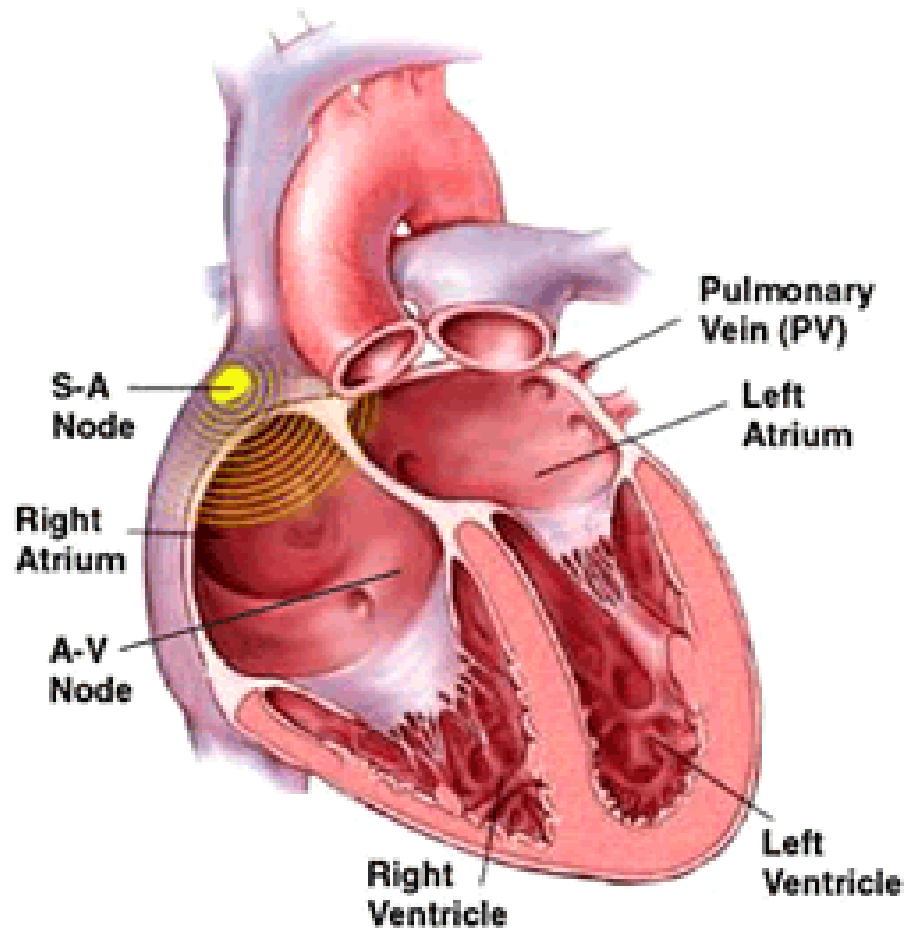
Atrial Fibrillation in Athletes

Chris Milne
Sports Physician
Hamilton

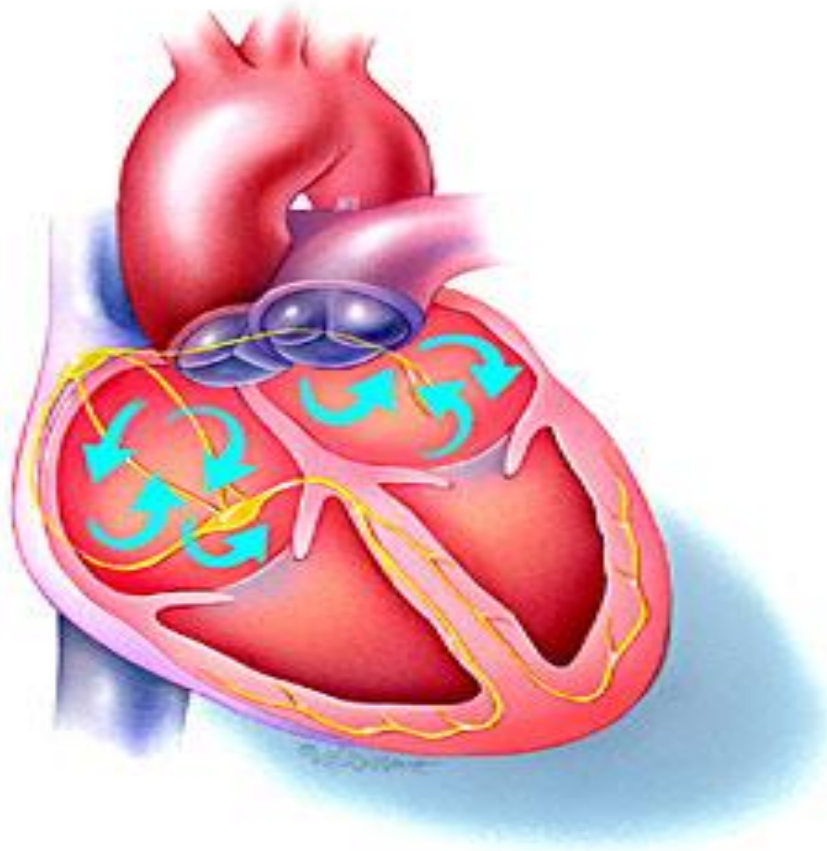
Athlete health- ? a misnomer



Standard propagation of cardiac impulse



Blood circulation in atria in AF





Atrial Fibrillation- description

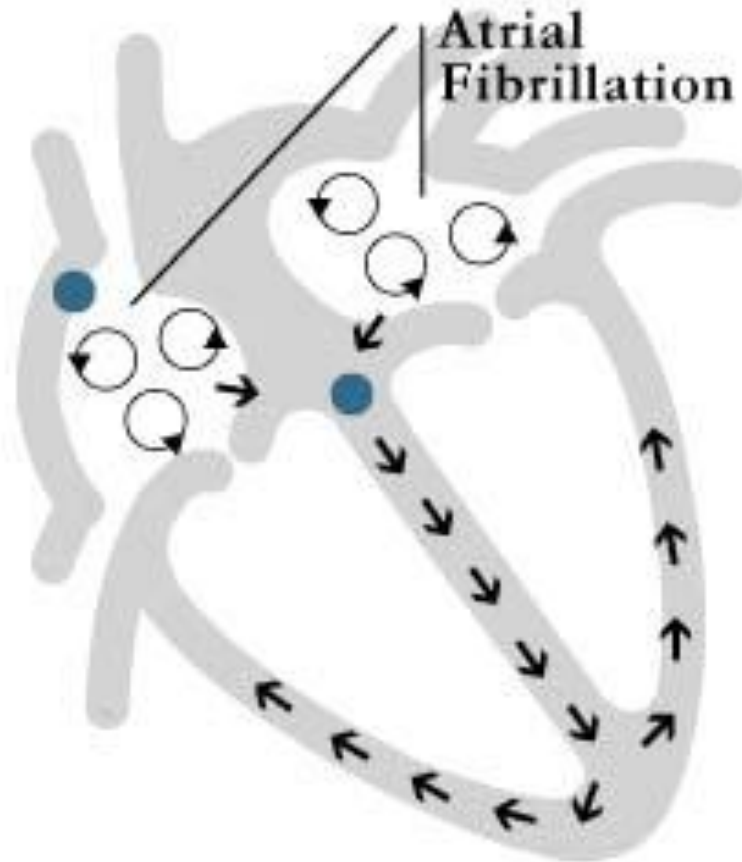
- Commonest arrhythmia in athletes
- Responsible for significant morbidity and rarely mortality
- Early recognition can limit morbidity
- Appropriate management enables sporting participation at the highest level



Atrial fibrillation-characteristics

- Definition- discoordinate contraction of atria [bag of worms]
- Consequences-
- Loss of atrial booster pump
- Reduced cardiac output by 30% [equivalent to removing 1 or 2 spark plugs from the V8]
- After 48 hrs in AF, risk of clot formation in atria, and systemic embolisation

Mechanism of atrial fibrillation





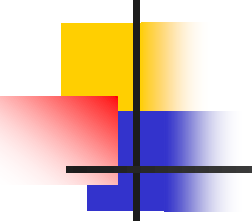
Atrial fibrillation- clinical classification

- Paroxysmal [less than 7 days per episode]
- Chronic - continuous



Classification -Aetiology- Primary [lone AF] or secondary

- Acute
- Sympathomimetics eg energy drinks, caffeine, sinus tablets
- Alcohol
- Thyrotoxicosis
- Myocarditis
- Pericarditis
- Pulmonary embolism
- Chronic
- Hypertension
- Rheumatic HD esp mitral stenosis
- Ischaemic HD
- Cardiomyopathy
- Conduction system defects eg WPW, sick sinus syndrome



Pathophysiology - Why are trained athletes at increased risk of AF?

- Aerobic training causes volume overload
- Volume overload causes 4 chamber enlargement
- Atrial enlargement results in fibrosis/ collagen deposits
- These deposits have heterogeneous conduction properties
- Prolonged training causes enhanced vagal tone and shortening of refractory period
- Shortened atrial refractory period predisposes to development of AF



Symptoms of AF

- Palpitations- thumping in the chest, irregular pulse
- Reduced exercise tolerance- fatigue, shortness of breath
- Continual or paroxysmal
- Rarely- manifestations of embolic phenomena



Signs of AF

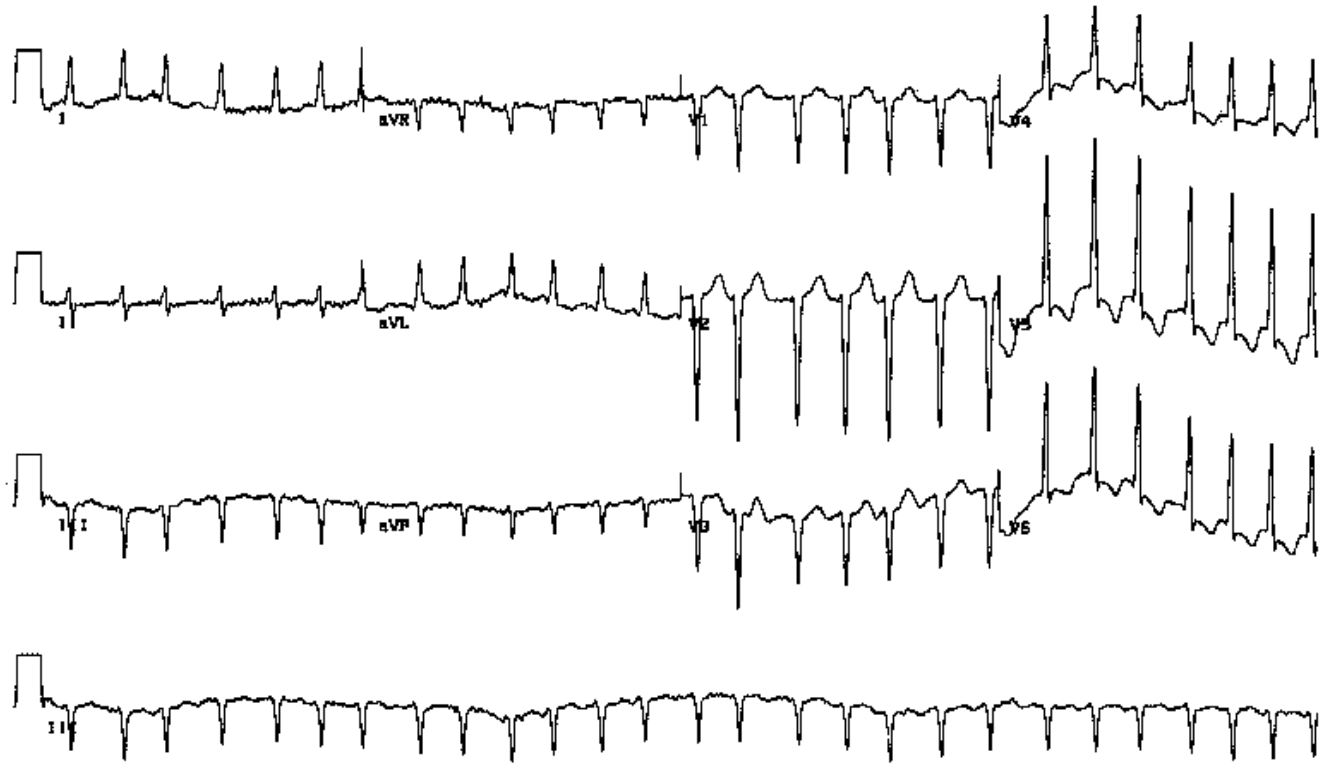
- Pulse- irregularly irregular, variable pulse volume
- BP changes- may have postural hypotension
- Signs of cardiac failure are rare in athletes
- Occasionally, evidence of structural heart disease eg displaced apex beat, heart murmur
- NB- between attacks, should be clinically normal



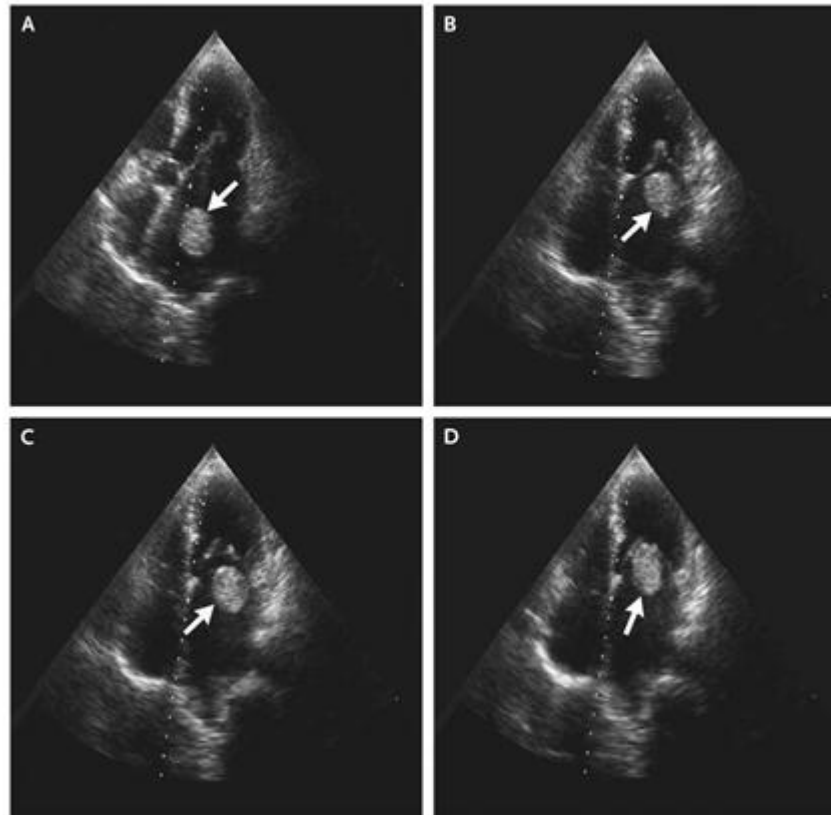
Investigations

- ECG will capture the arrhythmia if in AF at the time
- Holter/ event monitor should capture paroxysmal AF
- Echocardiogram- to look for atrial thrombi, structural heart disease
- Detailed electrophysiology studies can show specific conduction abnormalities

ECG of AF with rapid ventricular response



Echocardiogram of thrombus





Natural history in athletes

[Hoogsteen et al]

- Study of 30 male athletes from 1993-2002
- Mean age 48 yrs [older than most elite performers]
- Of initial 30 athletes-
- 7- No further AF
- 15- Paroxysmal AF
- 5- Continual AF
- 3-Died- 1 sudden death, 1 cerebral bleed [on warfarin], 1 cerebral infarct [not on warfarin]



Management of AF

- Early recognition by patient- prompt presentation for advice
- If in AF for <48 hrs, immediate conversion to sinus rhythm with IV Flecainide. If still in AF- DC cardioversion
- If in AF for over 48 hrs, need anticoagulant for 6 weeks
- Maintenance of sinus rhythm-
- Avoidance of provocateurs
- Anti-arrhythmic drugs- usually flecainide [B blockers banned in athletes]
- Radiofrequency ablation, circling pulmonary veins



Scenario 1

- Elite oarsman, age 33
- Past Hx- AF, on flecainide for years, stopped in late 2000. No AF for 7 years, competing as yachtsman
- Recurrence in highly publicised selection trial for Olympics
- Treated with Flecainide for 5 months
- Trained fully without recurrence
- 4 th in Olympic final



Scenario 2

- Elite rugby player, age 32
- AF in training and games, significantly limiting his effectiveness as a player
- Successful radiofrequency ablation
- Returned to Super 14 level rugby

Elite athlete development- 10 years or 10,000 hours





Scenario 3

- Ex international steeplechaser, age 48
- Now orthopaedic surgeon, running recreationally
- Paroxysmal AF, initially just with fast running, gradually more intrusive
- Not controlled with flecainide
- Successful radiofrequency ablation
- Returned to recreational running



Scenario 4

- Elite oarswoman, age 36
- Irregular pulse at rest, presented after 4 hrs of symptoms- ECG confirmed AF
- Admitted to hospital, IV Flecainide not successful. DC cardioversion- sinus rhythm
- Not a candidate for Flecainide due to rare ECG abnormality
- Remained in sinus rhythm through to Olympics 2 months later, trained fully
- 5 th in Olympic final

DC Cardioversion





Common themes

- Aerobic athletes with many years of high intensity training
- Progressive volume overload of the heart
- Present with symptoms with exertion or at rest
- Aerobically trained athletes are extra sensitive to sympathomimetic drugs

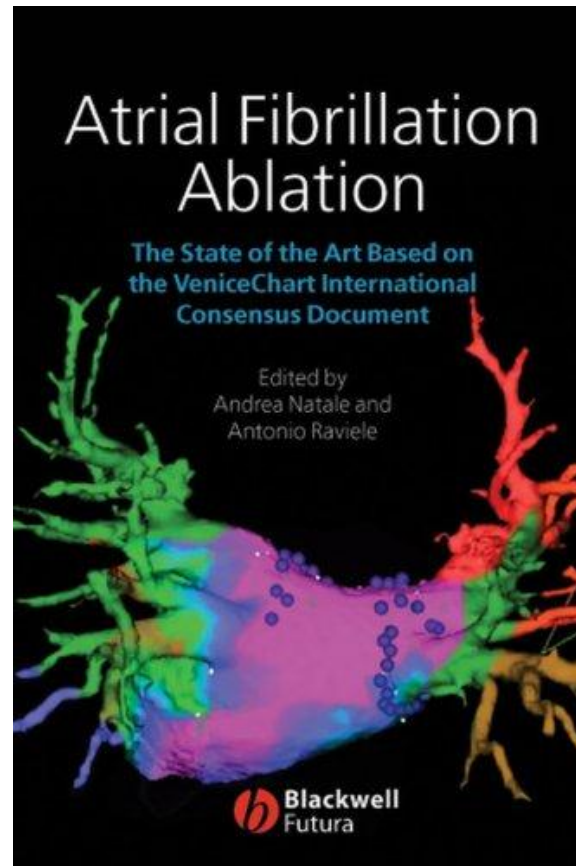


Progressive treatment hierarchy

- Avoid sympathomimetics
- Medications eg flecainide are first choice intervention to maintain sinus rhythm
- Radiofrequency ablation is emerging as a very effective long term treatment



Ablation Consensus Document





Complications of radiofrequency ablation

- First ablation may be ineffective- 50% of patients need a second or third procedure
- Pericardial effusion- transient
- Air embolism
- Rare- Pulmonary vein stenosis- insidiously life threatening
- Rare- Atrial-oesophageal fistula- may bleed to death
- Rare- Sudden death during procedure



Take home messages

- AF is responsible for significant morbidity
- In athletes, only sinus rhythm is acceptable
- Always look for the cause [behave like a physician]
- Appropriate management enables the athlete to compete at the highest level.

Thank you

