

Atrial Fibrillation

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Introduction

- Mechanism / predisposing conditions
- Treatment options / Guidelines
- Ablation techniques
- Risks / benefits of ablation

A Brief History



Classic of Internal Medicine
(Huang Ti Nei Ching Su Wen)

Yellow emperor

"When the pulse is irregular and tremulous and the beats occur at intervals, then the impulse of life fades; when the pulse is slender (smaller than feeble, but still perceptible, thin like a silk thread), then the impulse of life is small."

2000 BC

History Of AF



"De Motu Cordis"

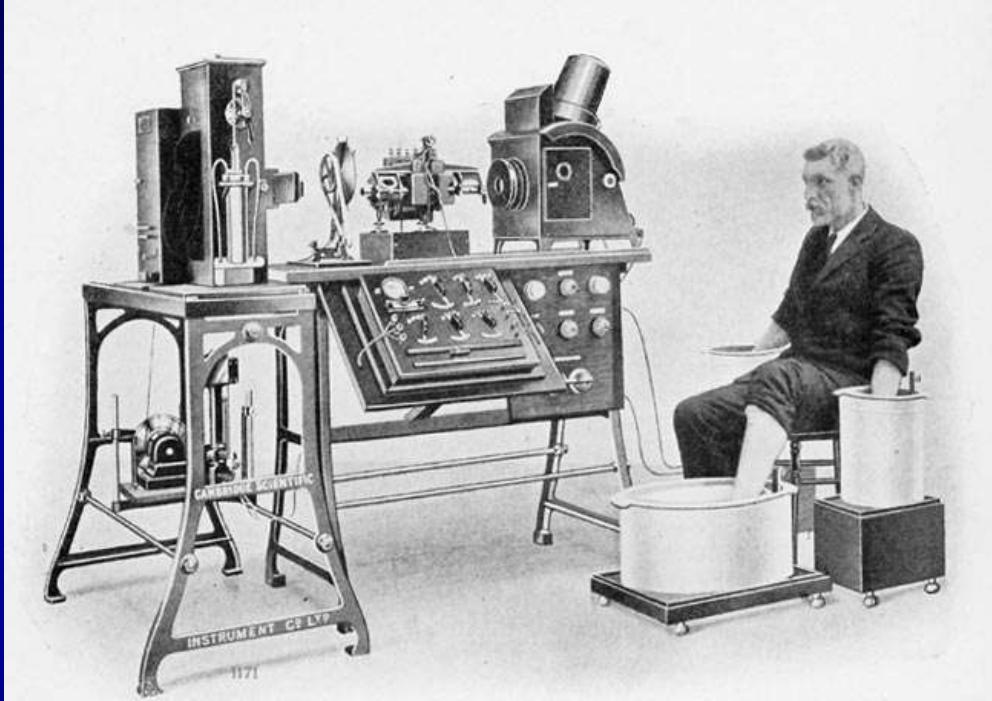
William Harvey Physician
to King Charles I

"Fibrillation of the
auricles" in animals

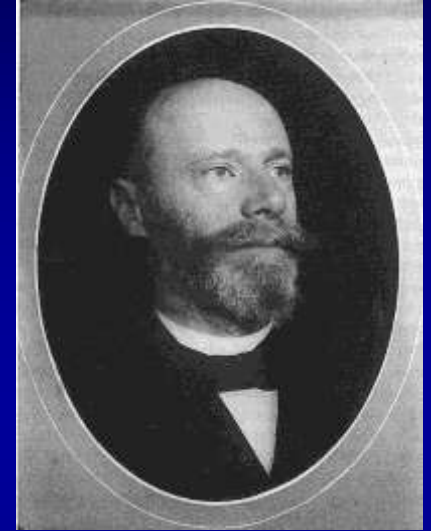
2000 BC

1628

History Of AF



Electrocardiograph



Einthoven and Lewis

1900



2000 BC

1628

1900

History Of AF

Reentrant Wavelet theory of AF

Moe GK: Atrial fibrillation as a self-sustaining arrhythmia independent of focal discharge. Am Heart J 1959;58:59-70

“Irregular ventricle response due to randomly spaced atrial impulses reaching AV node from random directions”

Bootsma 1970



History Of AF

Framingham Data
Impact of AF on morbidity and mortality
Kannel 1982

Stroke
Heart failure
Death

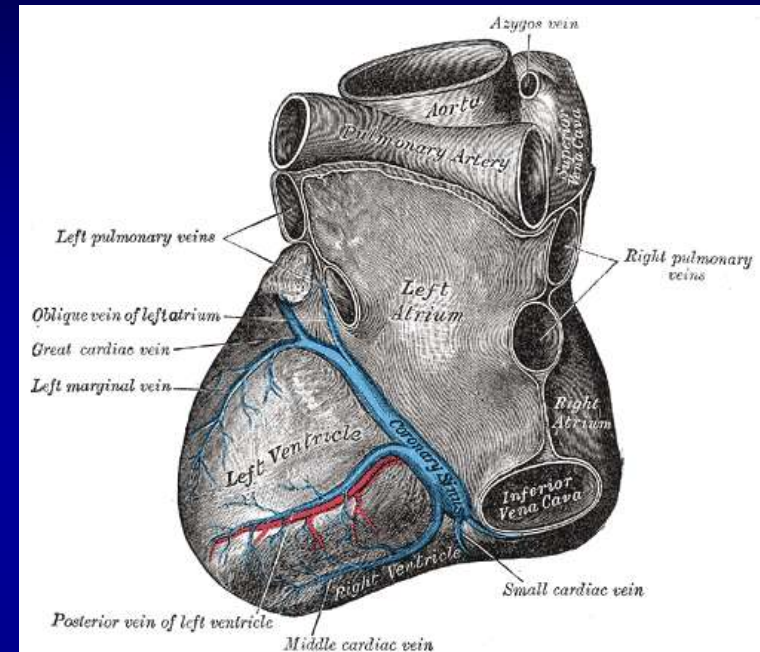
“Atrial fibrillation begets atrial fibrillation”

Allessie MA. Circulation 1995;92:1954-1968.



AF: underlying causes

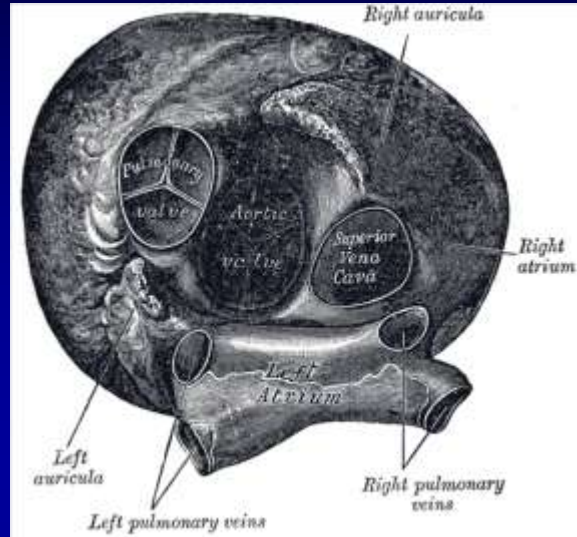
- None – “lone AF”
- Hypertension
- Valve disease
- Thyroid disease



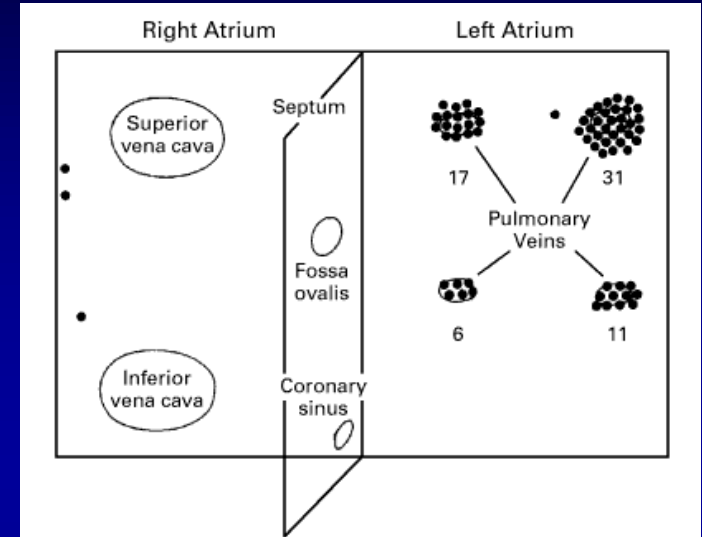
- Pressure or volume overload of the left atrium
- Scarring of the left atrium

The Mechanism

- Triggers



- Substrate



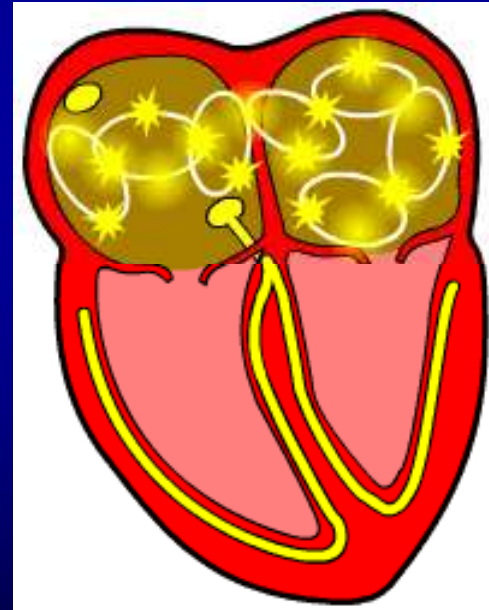
Haisseguerre 1998

The Mechanism

- Triggers

- Substrate

- Re-entrant
- “7 wavelets”
- Slow conduction
- Shorter refractory period
- More space



Treatment for AF

- Anticoagulation
 - stroke
- Rate control
- Rhythm control

Anticoagulation

- Warfarin
 - Dabigatran
 - Other novel anticoagulants
 - LA appendage occlusion
- Prevents strokes
- Saves lives
- Everything else for symptoms



1920 Karl Link

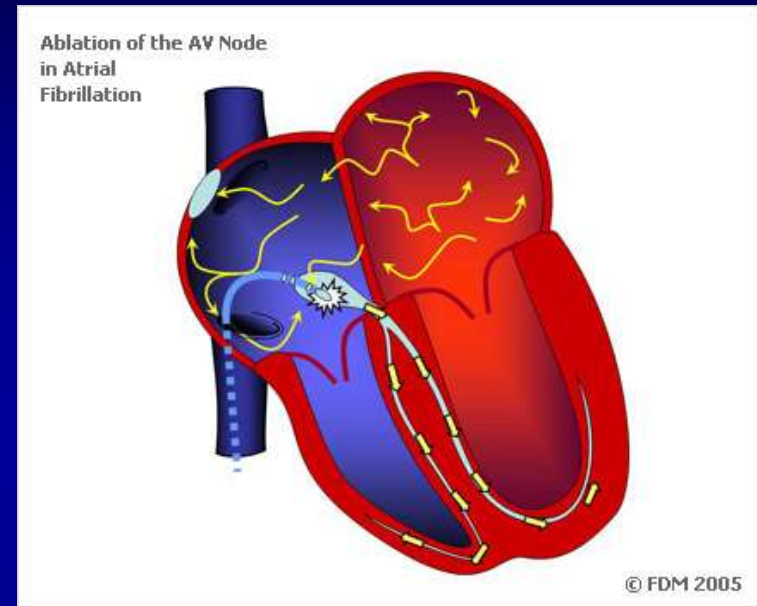


Rate or Rhythm Control

- Complex decision process
- Risk / benefit
 - Symptoms
 - Feasibility / Success rates
 - Comorbidities

Rate Control / AV node Blockade

- Beta-blocker
 - +/- Digoxin
- Verapamil
 - +/- Digoxin
- Amiodarone
- Dronedarone



Ablate and pace

Rhythm Control

- Cardioversion
 - Electrical
 - Drug
- Drugs
- Ablation
 - Surgical / thoracoscopic
 - Catheter

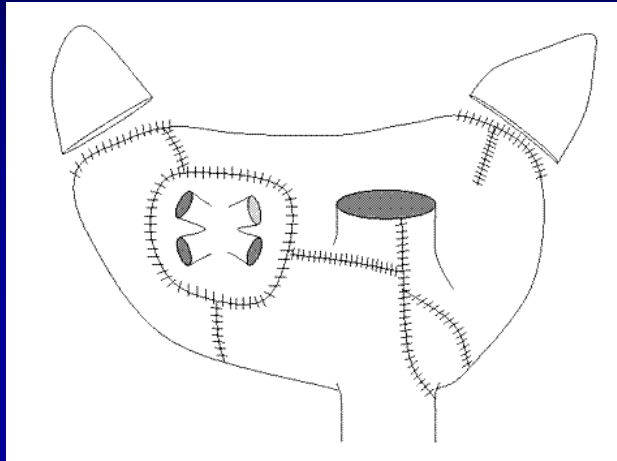
Drugs for Rhythm Control

- (beta-blockers / calcium blockers)
- Class 1 drugs
 - Flecainide
 - Propafenone
- Class 3 drugs
 - Amiodarone
 - Sotalol
 - Dronedarone

Who should undergo catheter Ablation ?

- NICE guidelines
- Symptomatic
- Paroxysmal or persistent
- Intolerant or refractory to a class 1 or class 3 drug

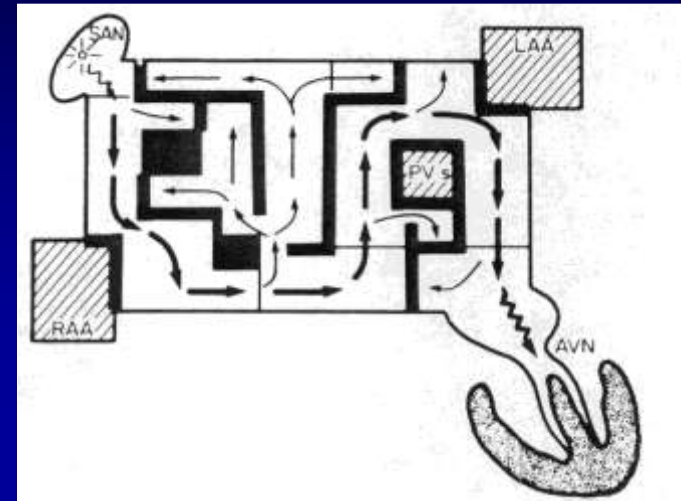
How to ablate? AF Surgery



75 – 99% Success

2% mortality , 2% on meds

15% pacemaker implant rate



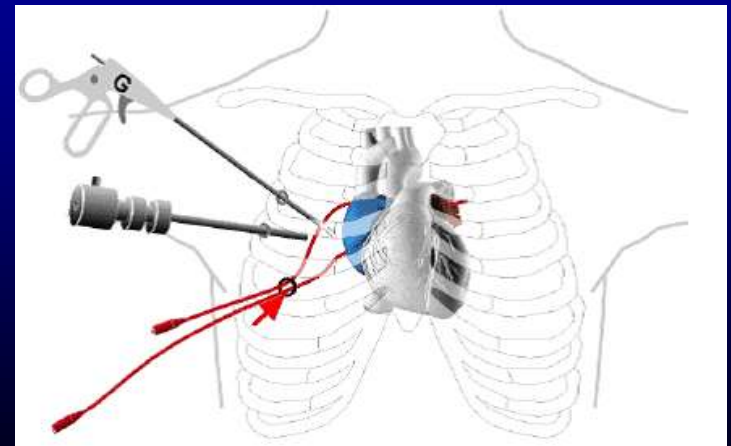
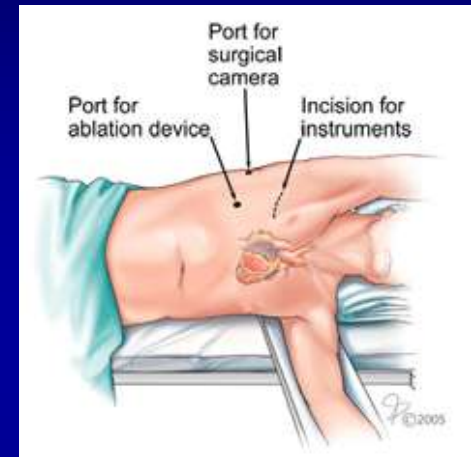
Mass reduction

Substrate modification

Trigger elimination

Ablation for AF

- Surgical epicardial ablation
- Minimal invasive / thoracoscopic
- Chronic AF
- Persistent AF
 - patient choice
 - avoid anticoagulation



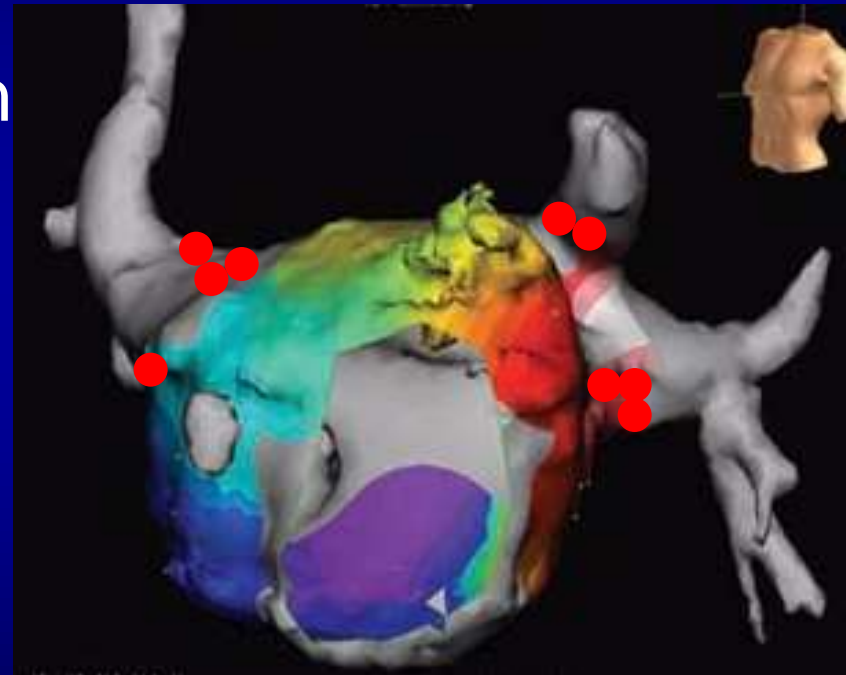
Catheter Ablation

- Catheter Maze
 - 7 hour procedure
 - Difficulty achieving complete lines
 - High recurrence rates
- Unattractive
- Procedure “streamlined”
- Treat key sites / Not carve up entire atria

AF RFA: Theories and Approaches

- Haissageurre
 - PV driven
 - segmental ostial ablation

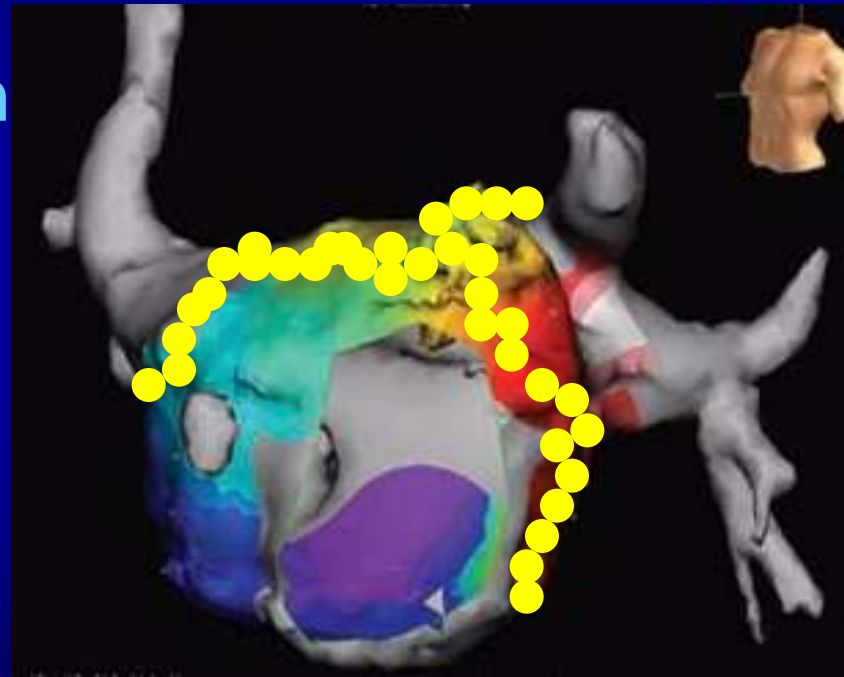
Paroxysmal AF



Triggers

AF RFA: Theories and Approaches

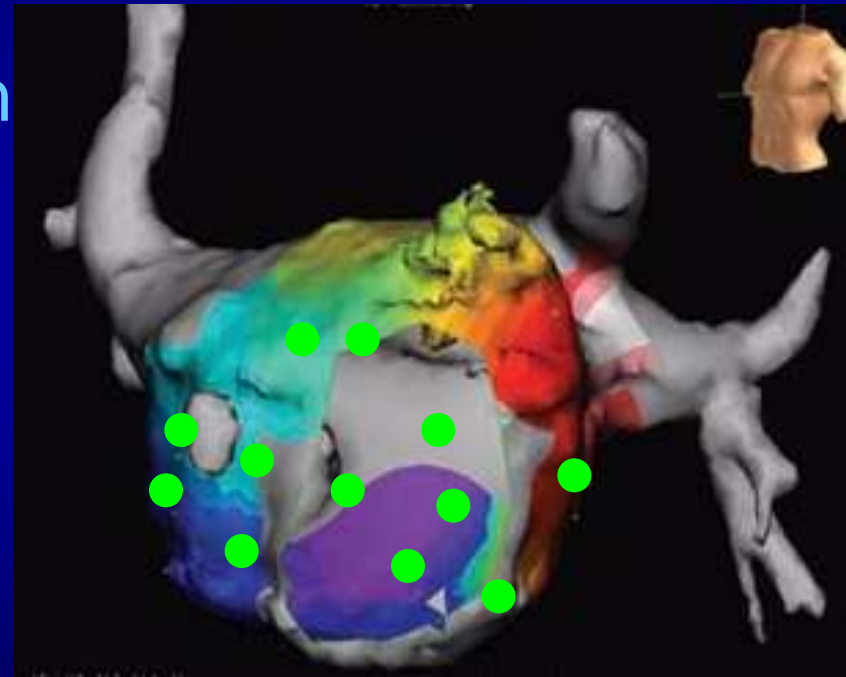
- Haissageurre
 - PV driven
 - segmental ostial ablation
- Pappone
 - Vein antra
 - WACA
 - Lines



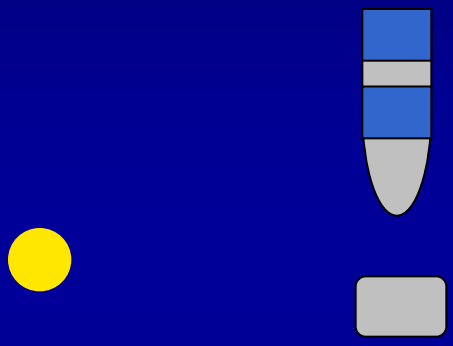
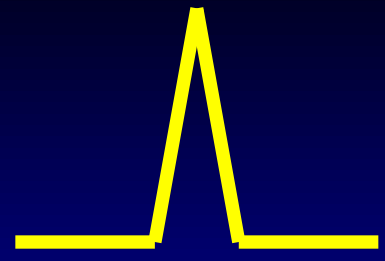
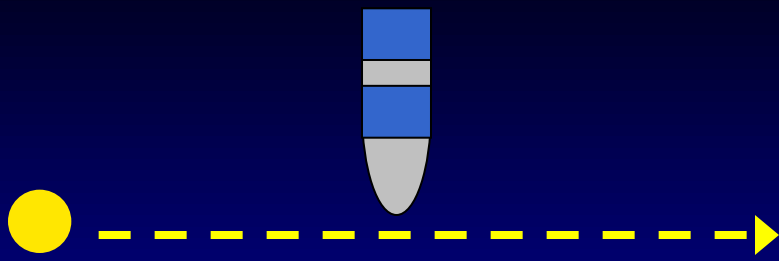
Triggers and substrate

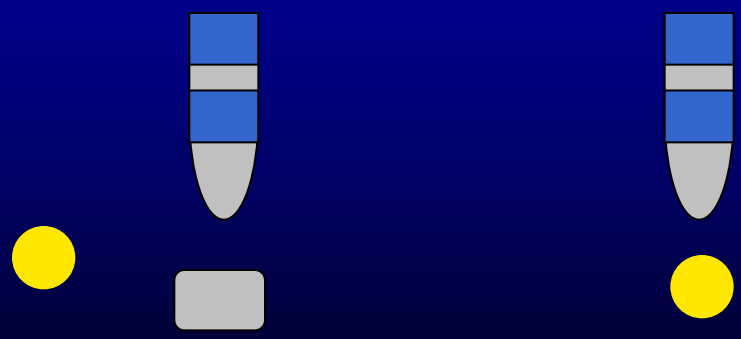
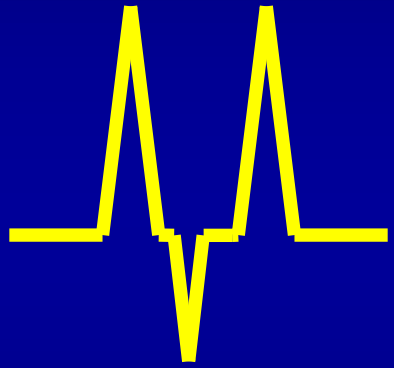
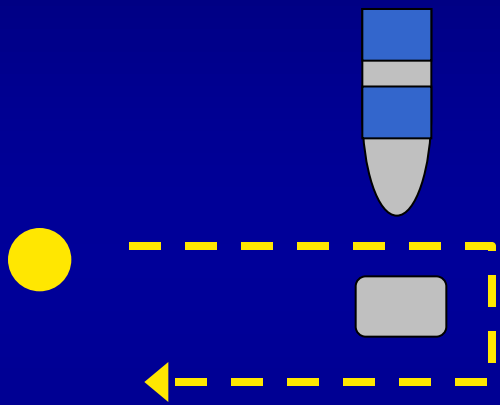
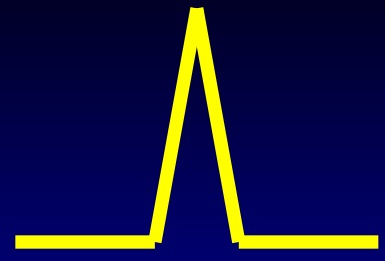
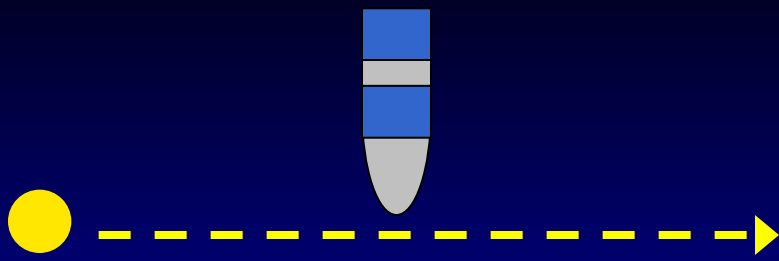
AF RFA: Theories and Approaches

- Haissageurre
 - PV driven
 - segmental ostial ablation
- Pappone
 - Vein antra
 - WACA
 - Lines
- Nadamaneer
 - Sites of fractionation



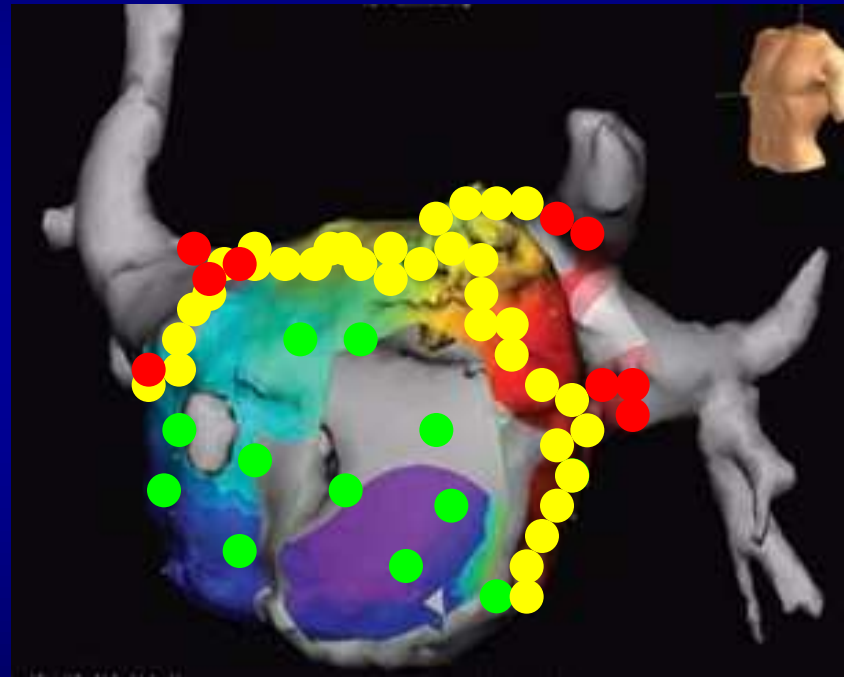






AF RFA: Theories and Approaches

- Combination of approaches for persistent AF patients
- Remove trigger
- Modify Substrate

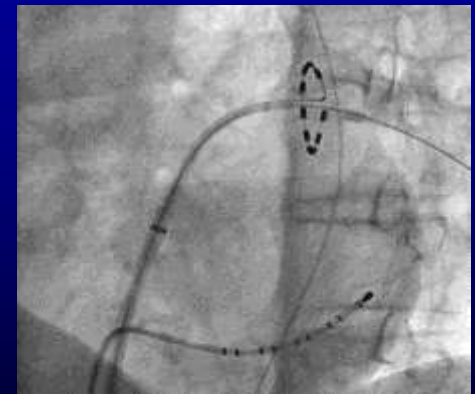
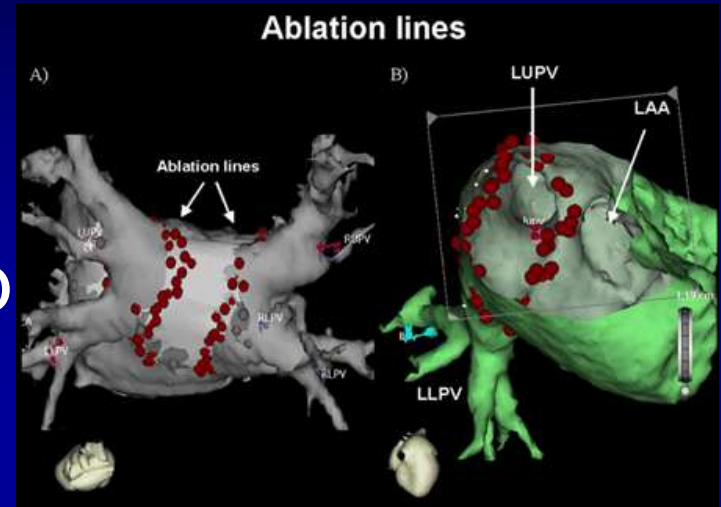


So, how does it work?

- Elimination of triggers and perpetuators
 - pulmonary veins
- Substrate modification
 - reduction of critical mass of atrial tissue
 - Ablation of ganglionic plexi
 - Elimination of rotor sites that maintain reentry

Ablation Procedure

- Anticoagulation (TOE)
- 3D mapping / irrigated tip
- Novel catheters
 - Radiofrequency
 - Cryoablation



Ablation success

- Definition
 - ? Freedom from symptoms or freedom from AF
 - On or off drug RX?
- Paroxysmal
 - 70 to 88 % success rate
 - 20 % need 2 procedures (PV reconnection)
- Persistent
 - 50 to 70 % success rate
 - Most cases 2 or more procedures

Risks / Benefits

	Incidence *
• Stroke	0.2 %
• Tamponade	1 %
• Pulmonary vein stenosis	0.2 %
• Death	< 1/5000
• Atrio-oesophageal fistula	< 1/5000
• Iatrogenic left atrial flutter	1 %

* Meta-analysis of 6 most recent trials of AF ablation ablating in antrum / avoiding tubular vein segment

Summary

- Mechanism / predisposing conditions
- Treatment options / Guidelines
- Ablation techniques
- Risks / benefits of ablation

End



Yellow emperor
2000BC



William Harvey
1628



William Withering
1785



Einthoven
1900



Karl Link
1920