

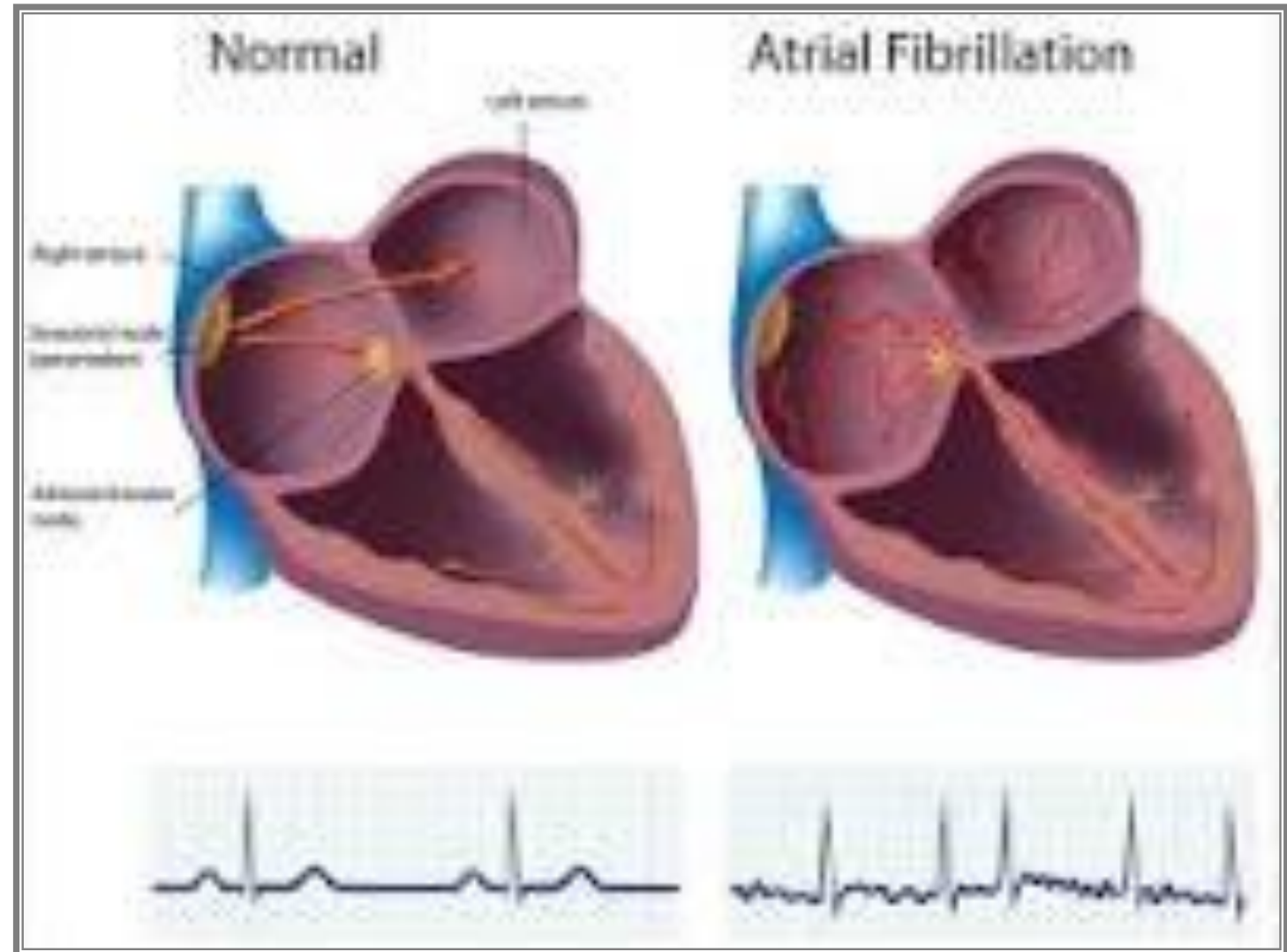
Advances in AFib Treatment: Pulsed Field Ablation

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- What is atrial fibrillation?
- Concerns with atrial fibrillation
- Treatments for atrial fibrillation
- Atrial fibrillation ablation
- Pulsed field ablation

What is Atrial Fibrillation

- Chaotic rhythm
- Upper chambers (atria) shake rapidly
- Lower chambers (ventricles) beat erratically and often rapidly



Concerns with Atrial Fibrillation



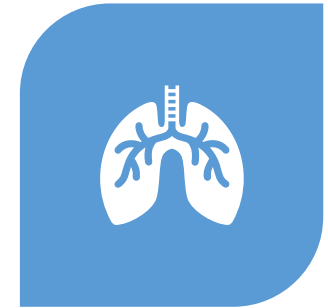
SYMPTOMS



FATIGUE IS MOST COMMON



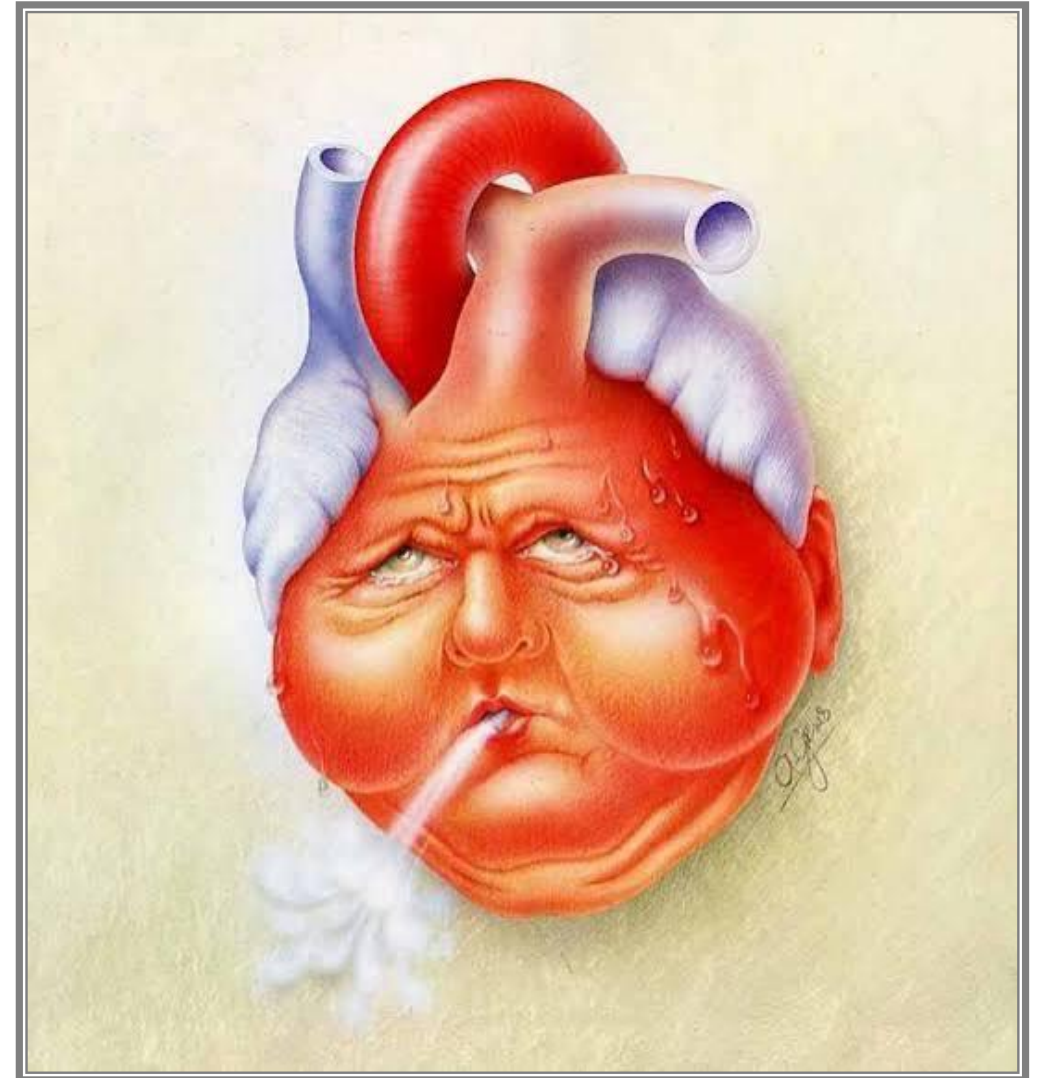
PALPITATIONS ERRATIC
HEARTBEAT



SHORTNESS OF BREATH WITH
EXERTION

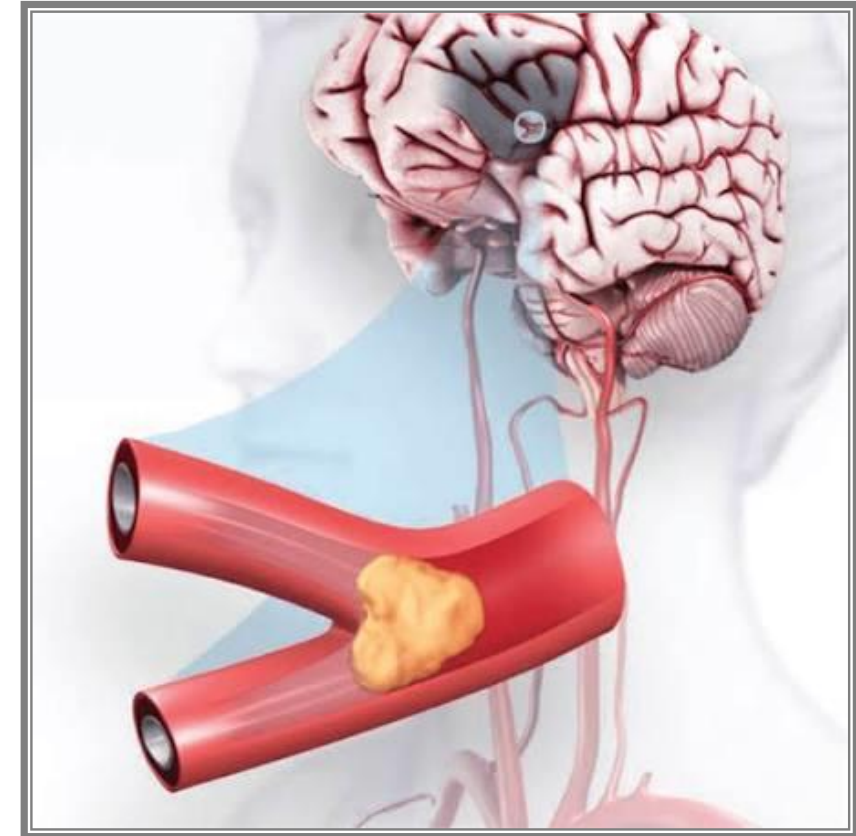
Concerns with Atrial Fibrillation

- Rapid pulse over 120bpm for several weeks
- Can weaken the heart pump
- Causes heart failure
- Most common in those who cannot feel the palpitations



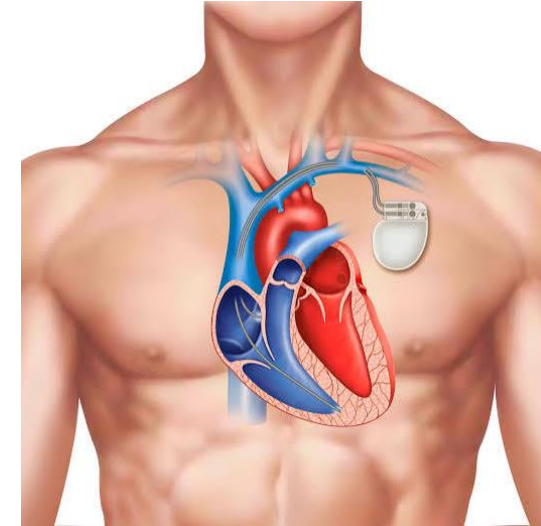
Stroke Risk

- When upper chambers (atria) shake rather than beating
- Blood can pool and form clots
- Clot formed in heart can be pumped out to brain
- Clot from heart to brain is a stroke
- Prevent strokes with blood thinner like Eliquis



Treatments for Atrial Fibrillation

- Rate control with medications
- Rate control with pacemaker and AV node ablation
- Rhythm control with medications
- Rhythm control with atrial fibrillation ablation
 - This is the most direct, effective treatment for atrial fibrillation
- Sadly, though, there is no cure for atrial fibrillation



Rate Control with Medications

- Earliest treatment for atrial fibrillation
- Doesn't prevent atrial fibrillation from happening, but slows the pulse
- Used the plant foxglove as early as the 1700s to slow atrial fibrillation
- Now, meds diltiazem and metoprolol are most common for rate control



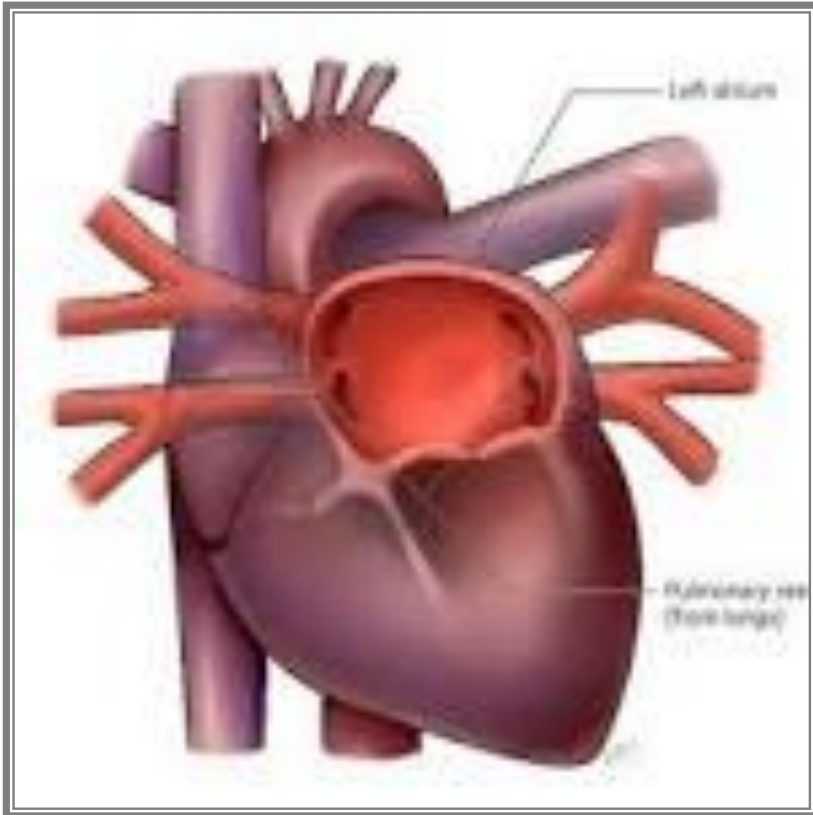
Rate Control with Pacemaker and AV Node Ablation

- This is used when medications and atrial fibrillation ablation have failed or are not options for one of many reasons
- Does not stop the upper chambers (atria) from fibrillating
- Prevents the atrial fibrillation from getting out of the top of the heart
- Pulse/heart rate are no longer affected by the fibrillation in the atria



- This keeps the heart out of atrial fibrillation
- There are a few medications that can be used for rhythm control
- Flecainide (plus diltiazem or metoprolol)
- Propafenone
- Sotalol: start in hospital
- Tikosyn: start in hospital
- Amiodarone: possible side effects especially at higher doses

Atrial Fibrillation Ablation



- Putting catheters into the heart to target the origin of the chaotic signals
- Doctors in Bordeaux, France discovered that pulmonary veins created abnormal electrical signals that started atrial fibrillation
- 1998 First ablation for atrial fibrillation

Steps of Atrial Fibrillation Ablation:

General Anesthesia



Steps of Atrial Fibrillation:

Transesophageal Echo



Left Atrial Appendage

A



B

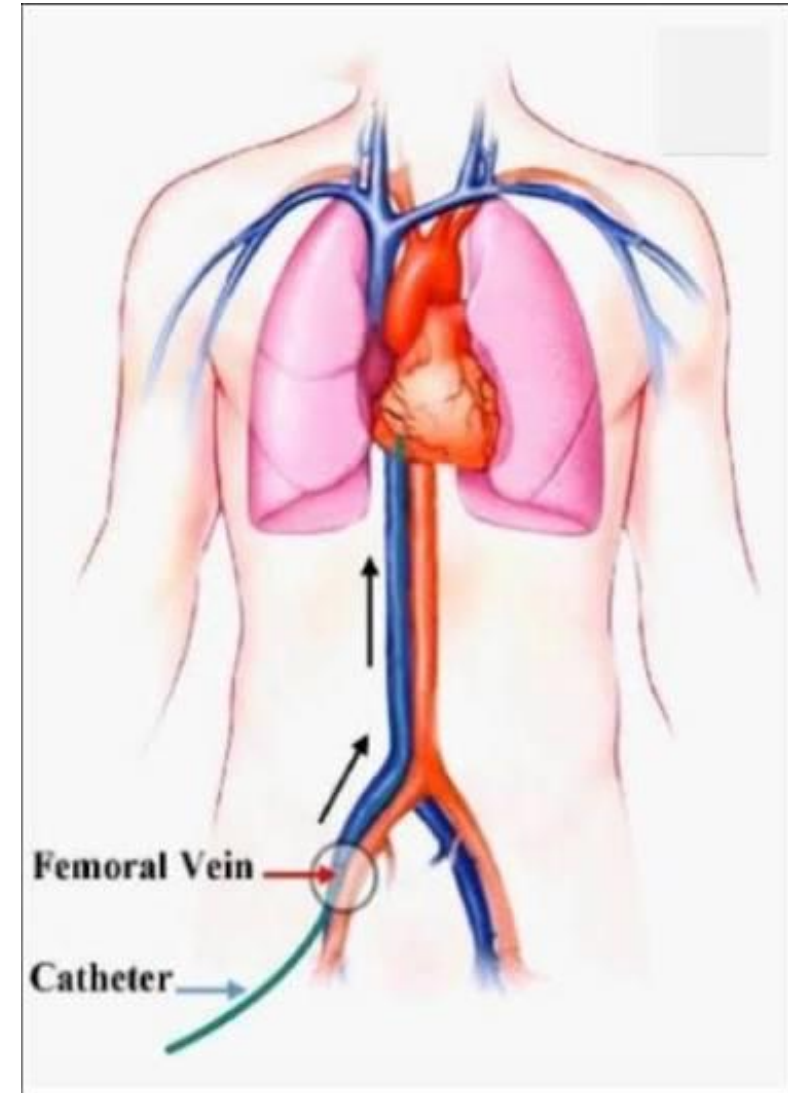


Thrombus (Clot) in Left Atrial Appendage



Access into Femoral (Leg) Vein

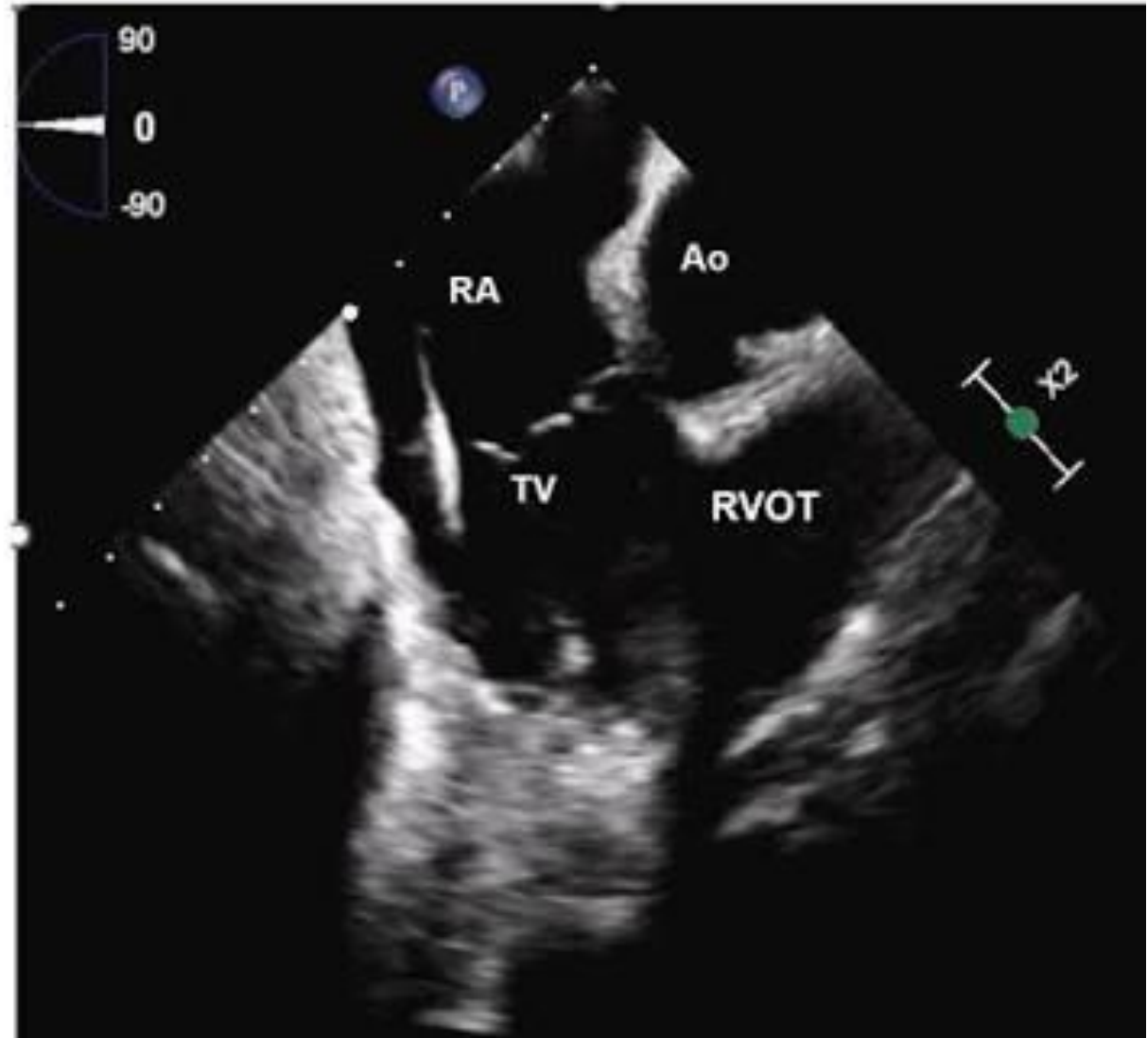
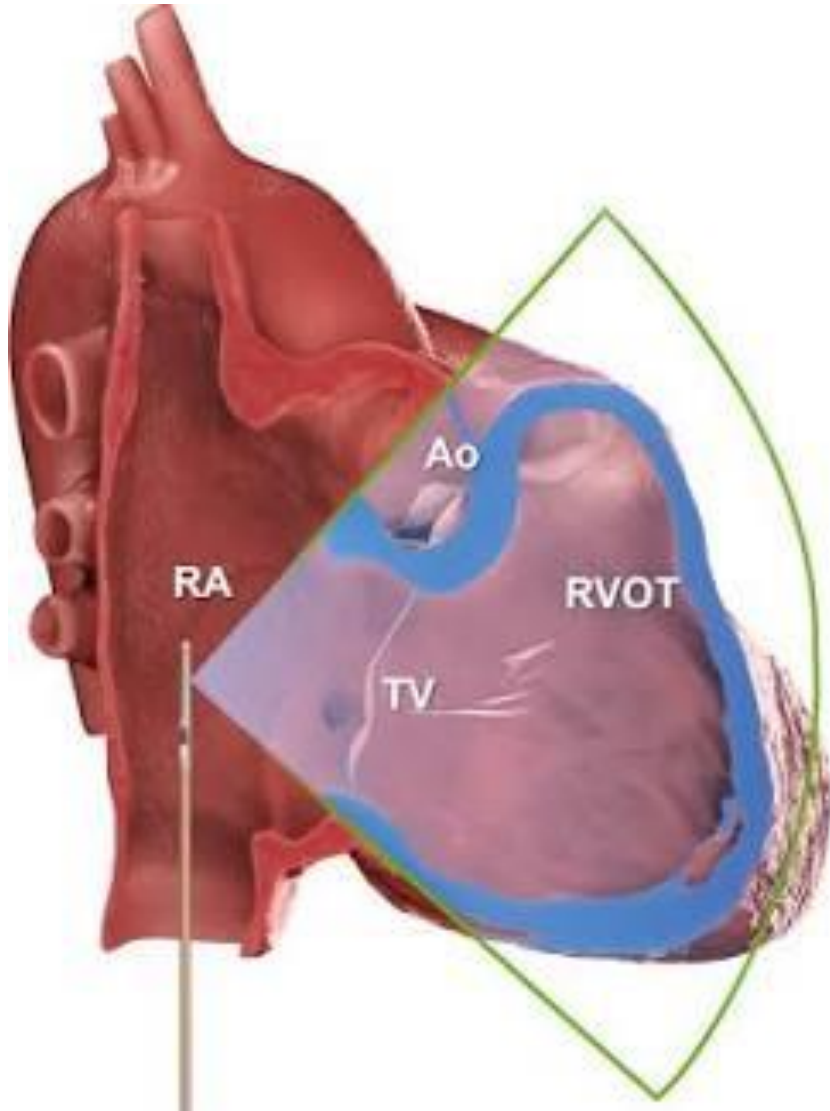
- Ultrasound to find the vein
- Micropuncture needle
- Catheters (tubes) into the vein



Intracardiac Echocardiography

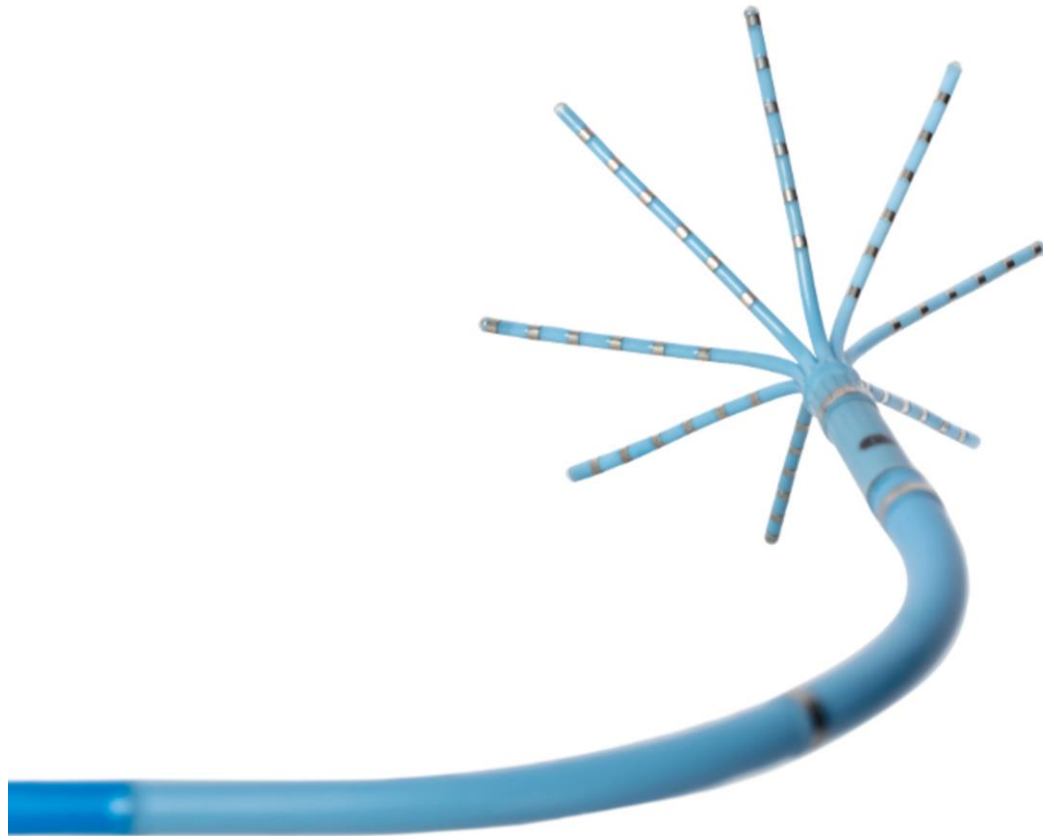


Intracardiac Echocardiography



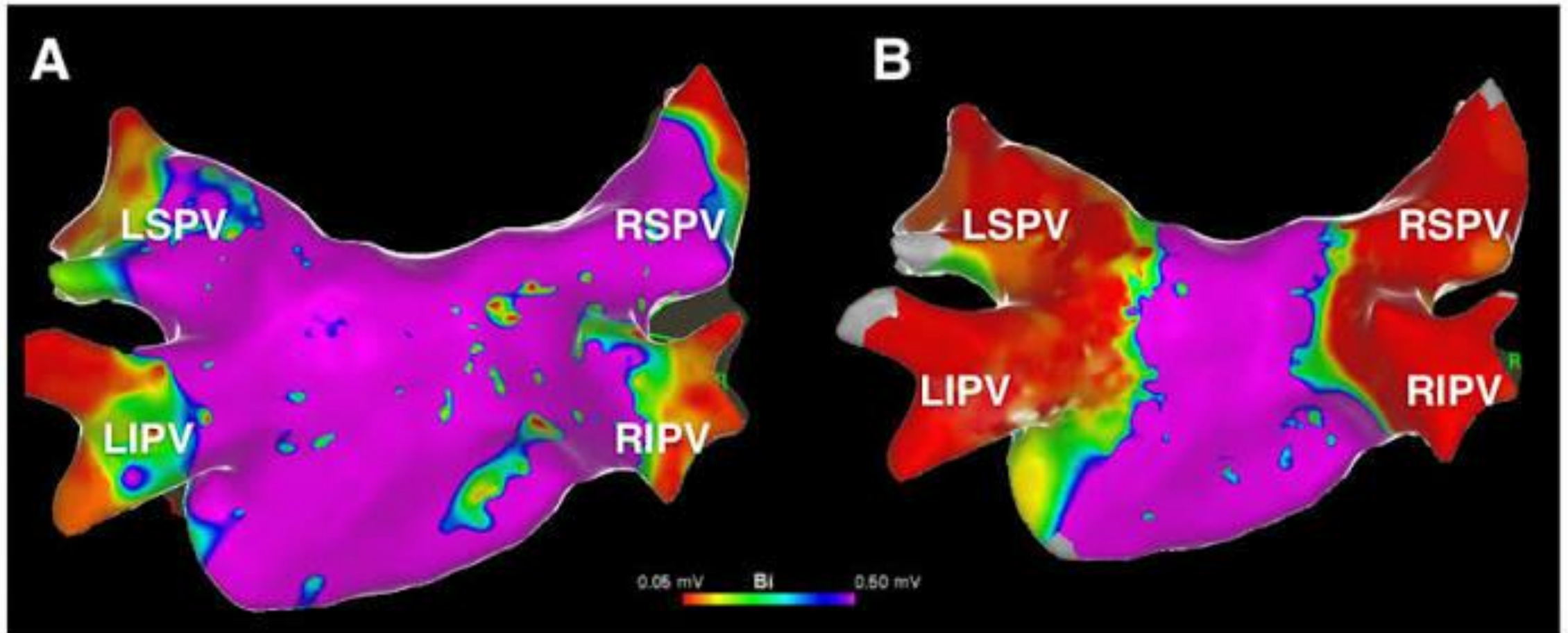
Transeptal Puncture



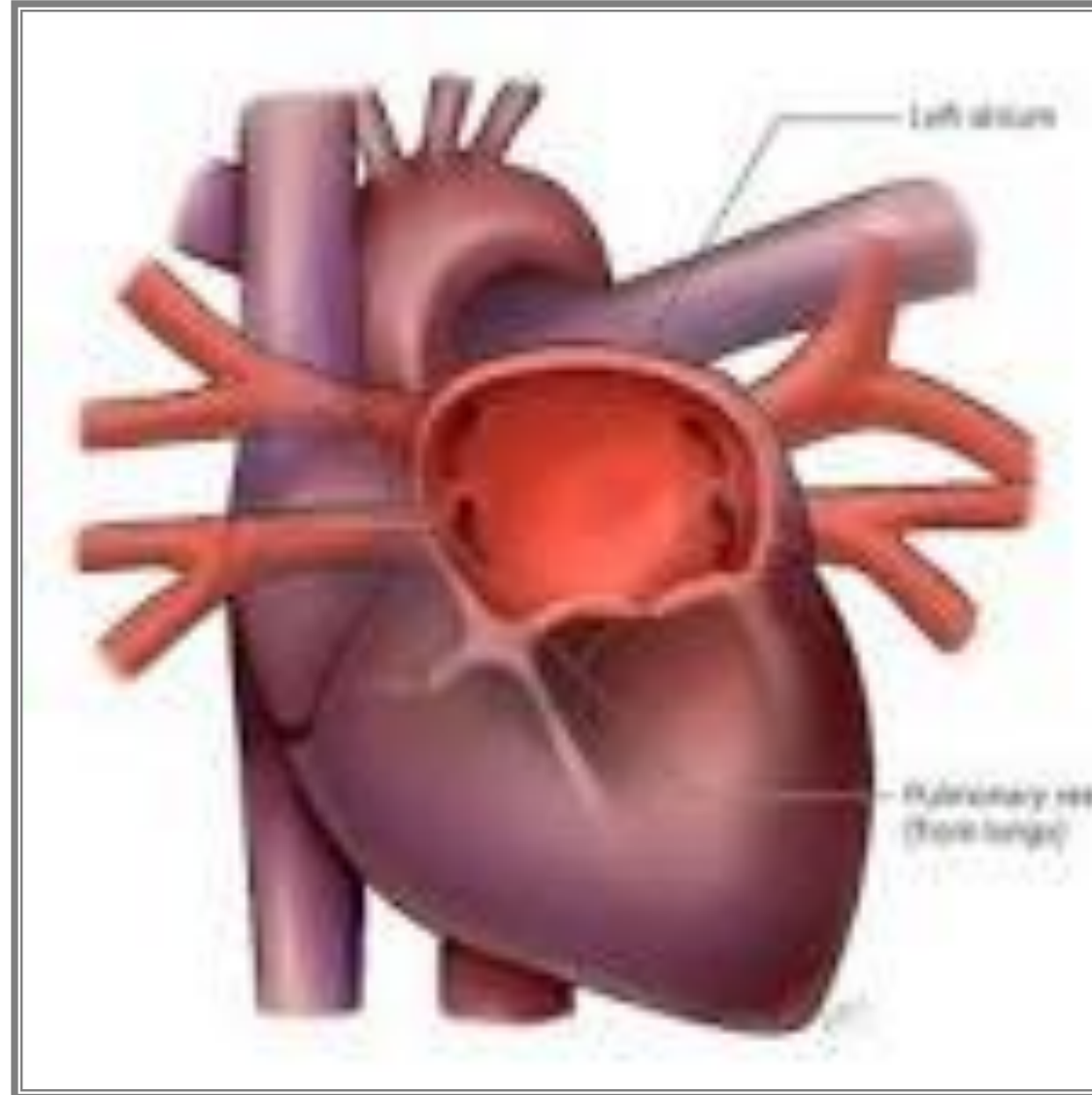


- Octaray catheter
- 8 Splines
- Multielectrode
- Gathers more data for map

CARTO 3D Map



Ready for Ablation!

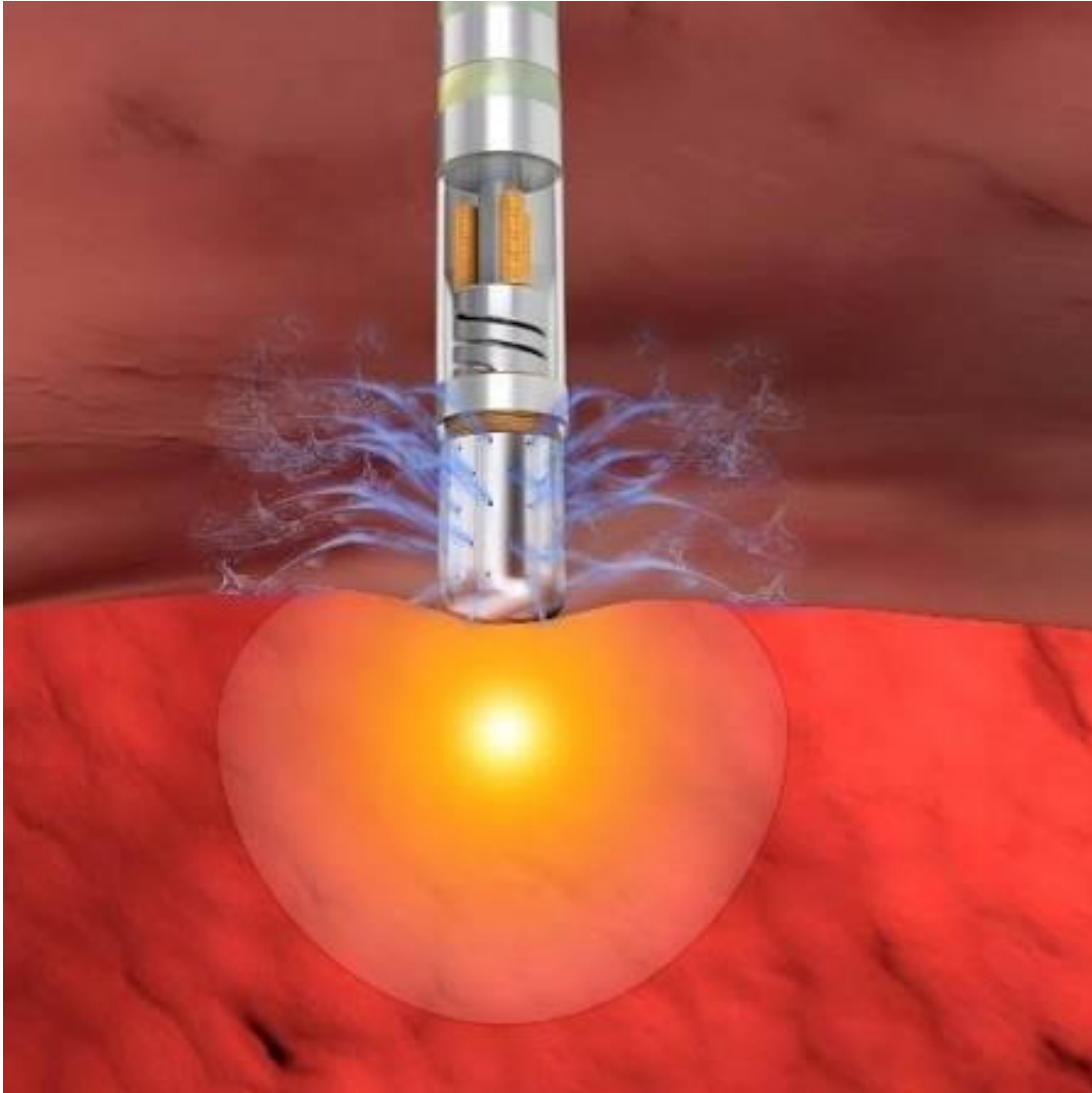


Energy for Atrial Fibrillation Ablation



- Radiofrequency (heat)
- Cryo (cold)
- Pulsed Field

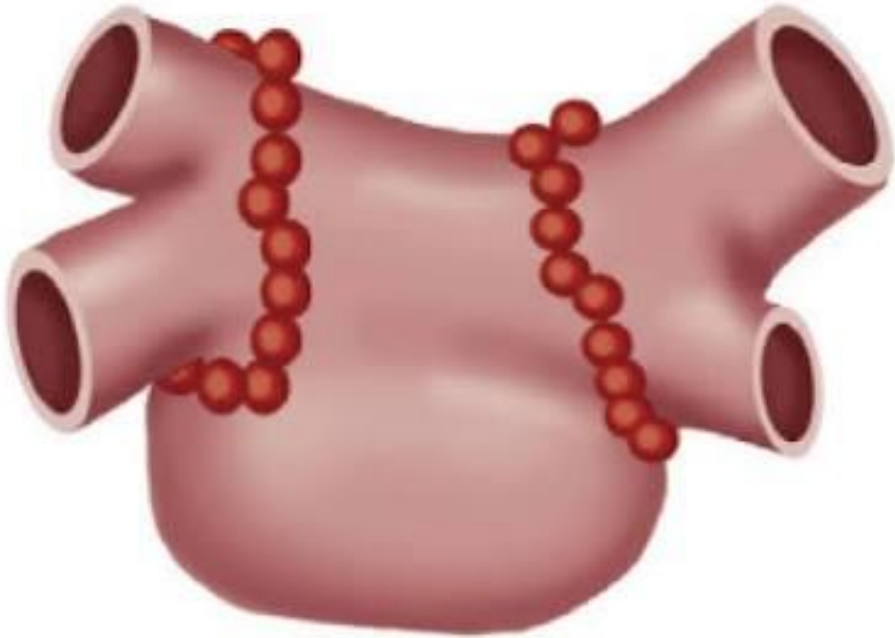
Radiofrequency Ablation



- Point-by-point
- Generates heat
- Kills off the abnormal signals

Radiofrequency Ablation

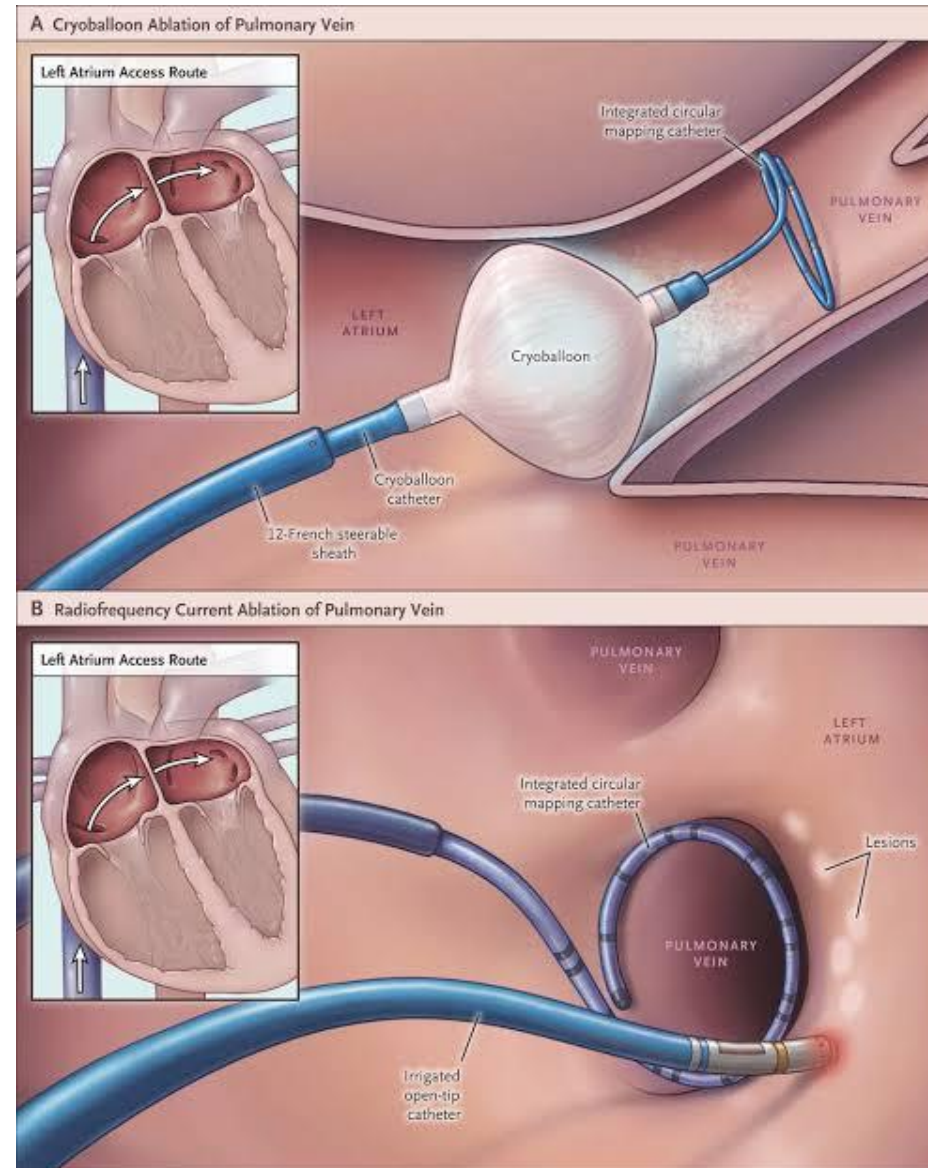
Figure 1 Pulmonary Vein Isolation in AFib Ablation

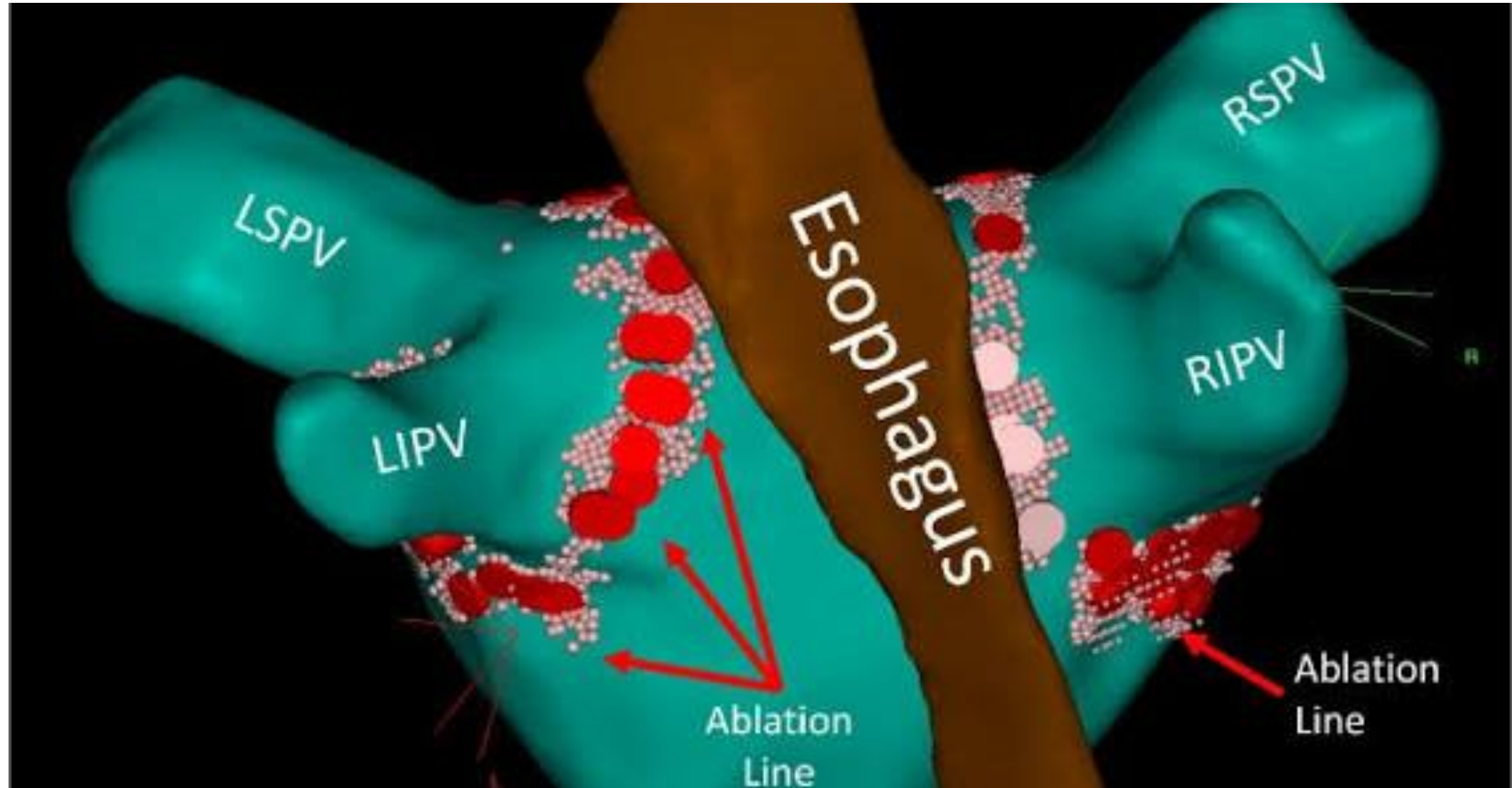


Cheng EP, Liu CF, Yeo I, et al. J Am Coll Cardiol 2019;74:2254-64.

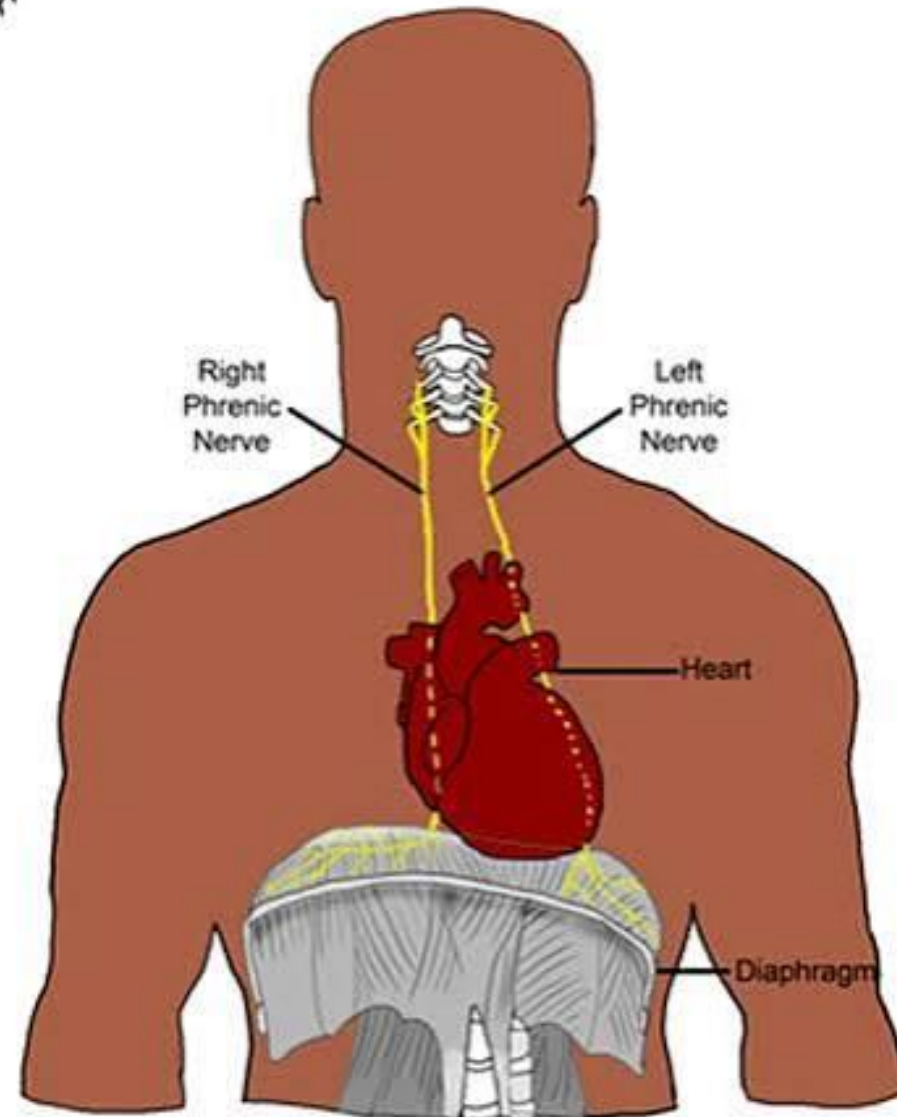
- Heat around opening of each of the four veins
- Pace inside each vein to make sure no electrical signal can escape

Cryoablation





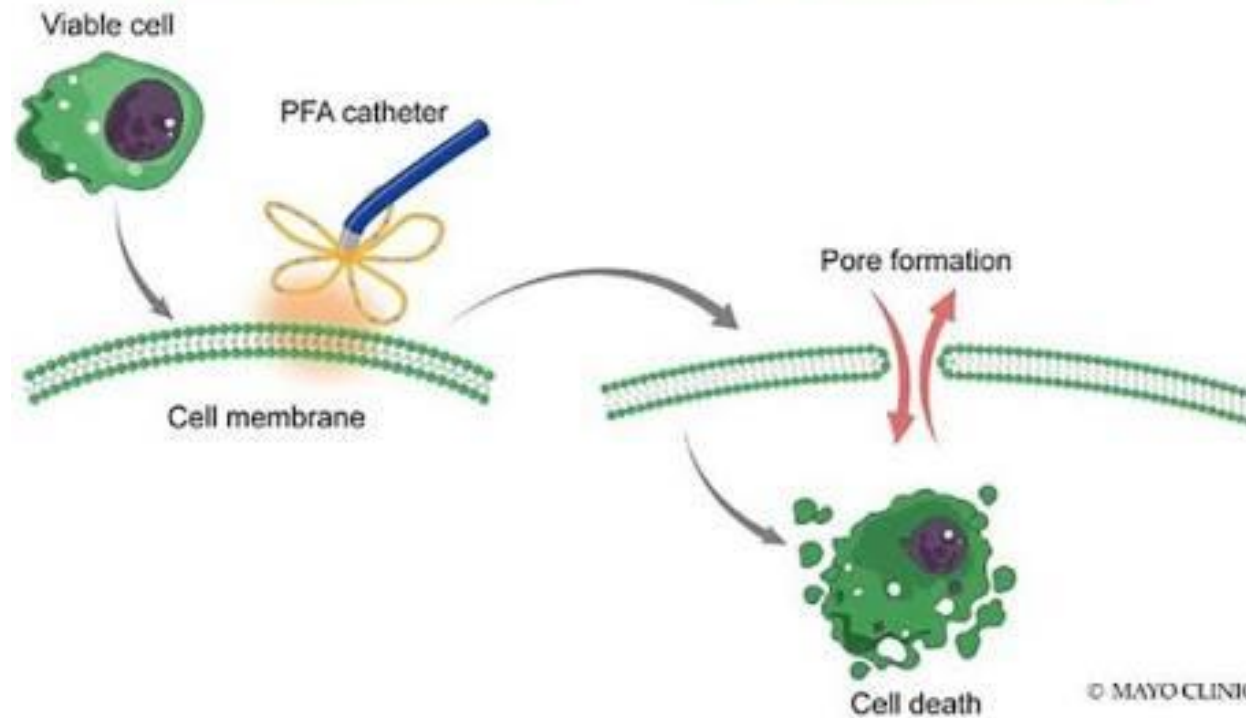
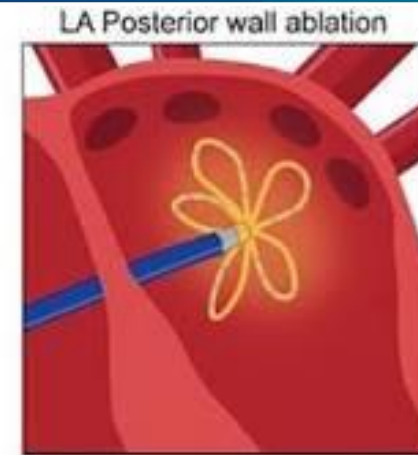
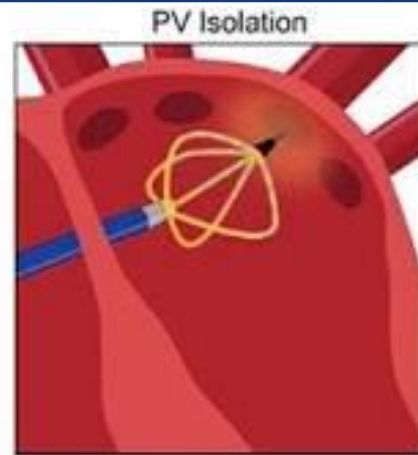
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Pulsed Field Ablation

- Minimal temperature change (heat)
- Prevents damage to esophagus and phrenic nerve







VARIPULSE™



FARAPULSE™



PulseSelect™



Sphere-9™



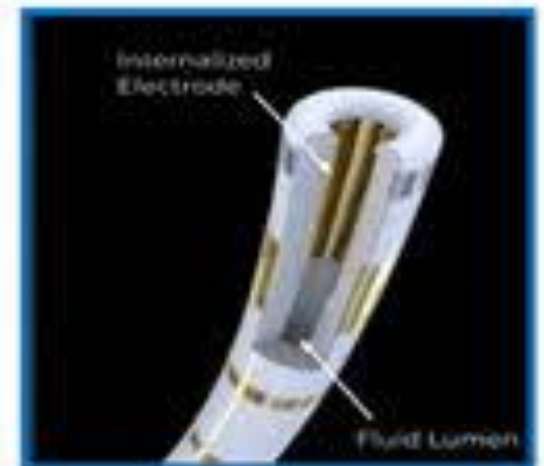
Volt™



X4 PFA™

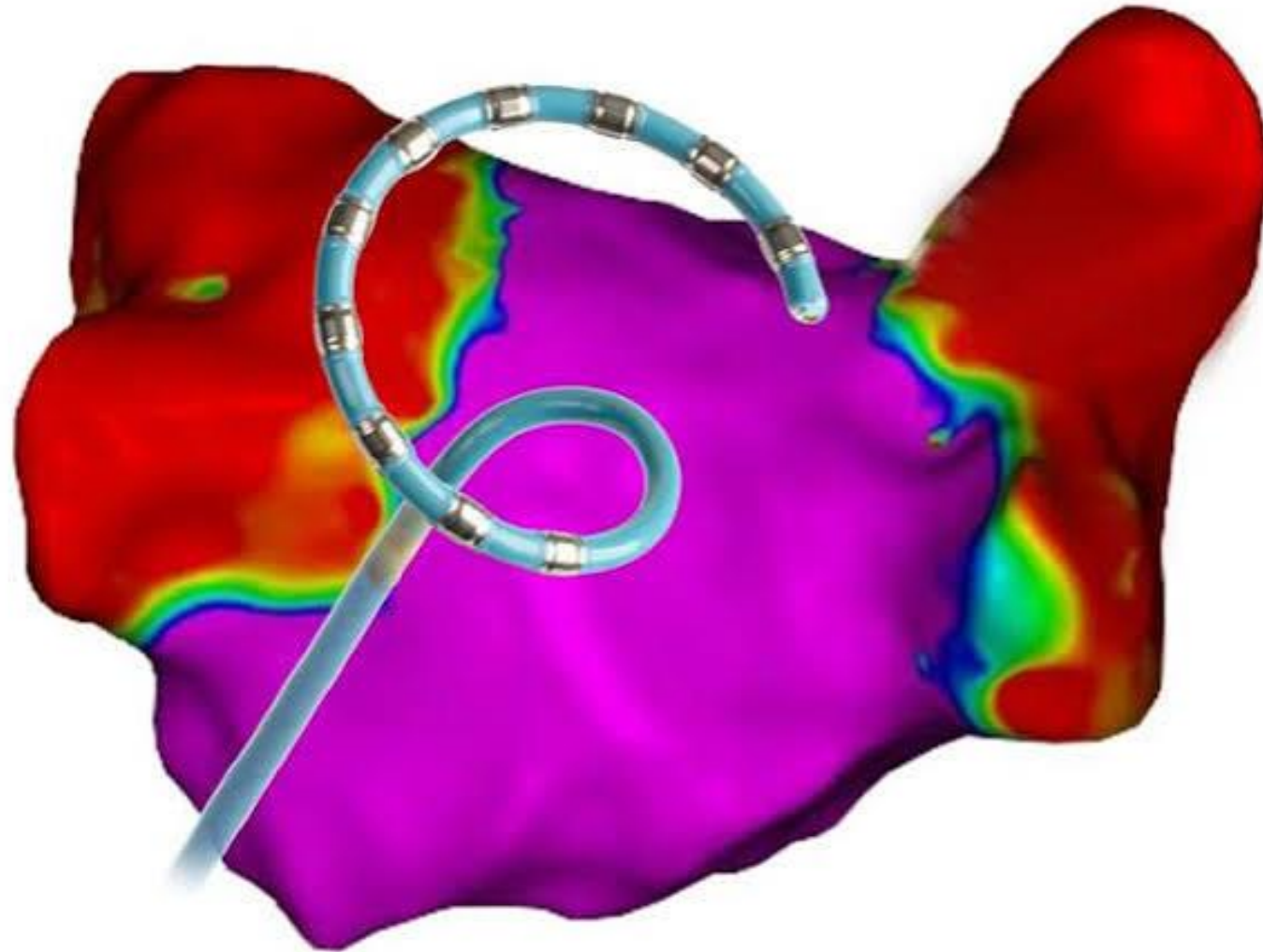


Sphere-360™

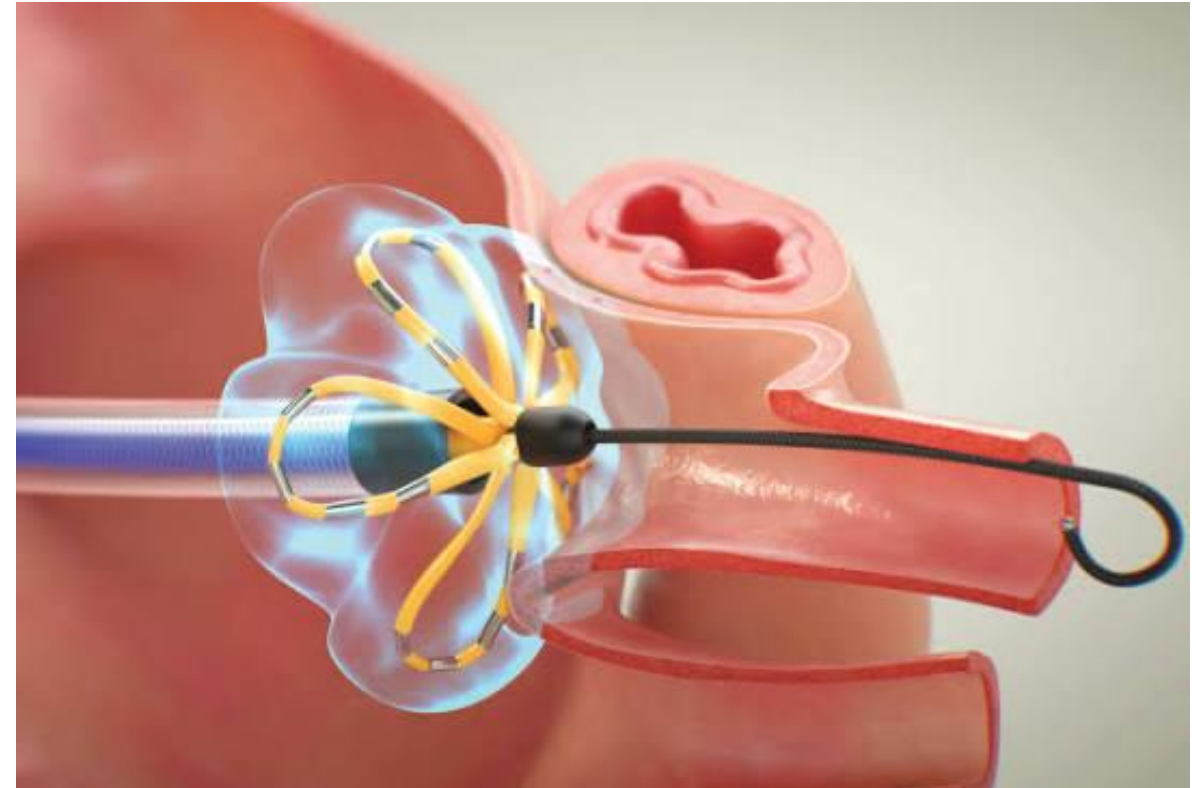


FieldForce™

Varipulse PFA Catheter



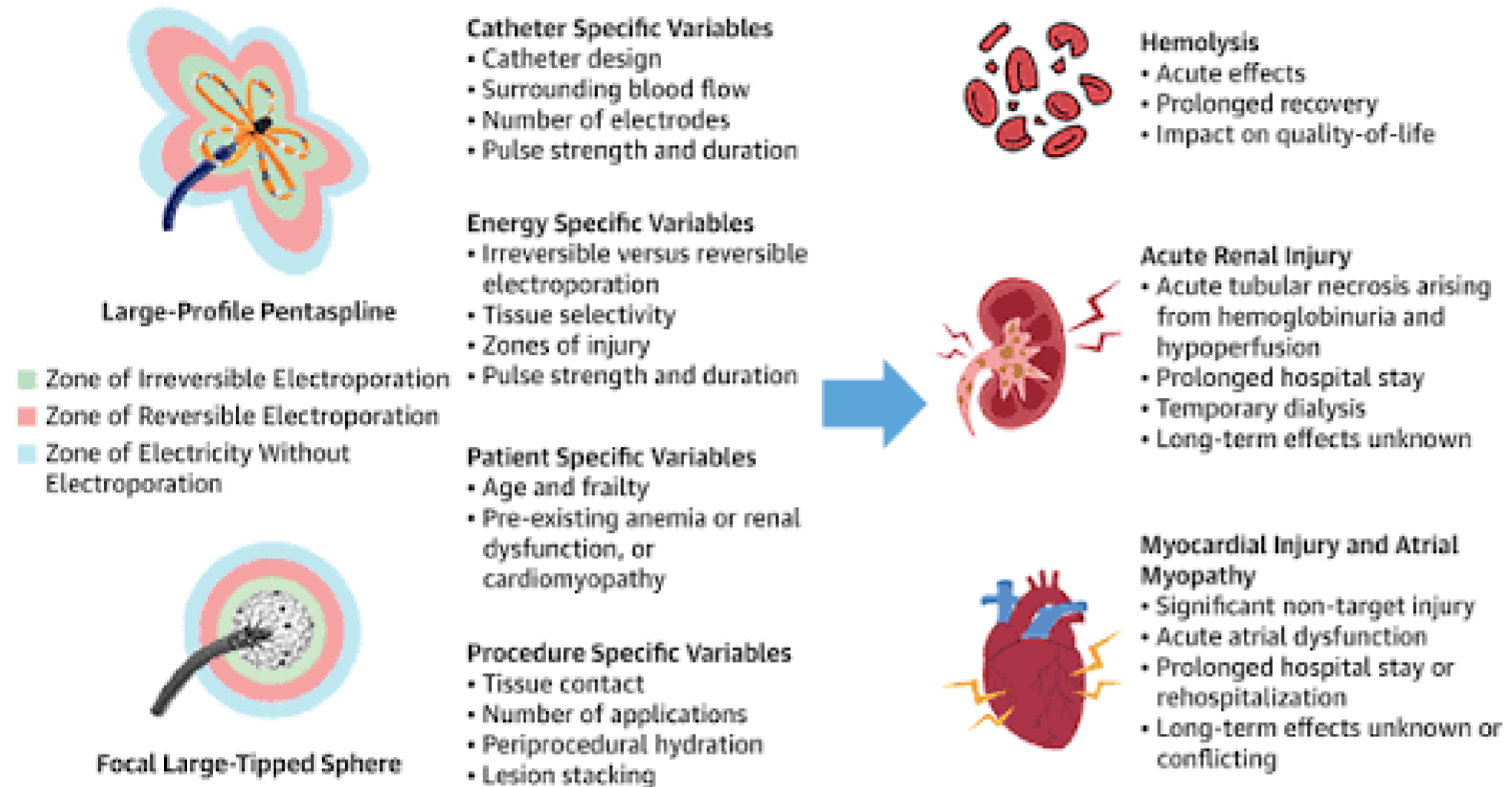
Farapulse PFA Catheter



Pulsed Field Ablation Concerns

- Coronary artery spasm
- Coronary artery stenosis
- Hemolysis (damage to blood cells)
- Kidney failure (from damaged blood cells circulating through kidneys)

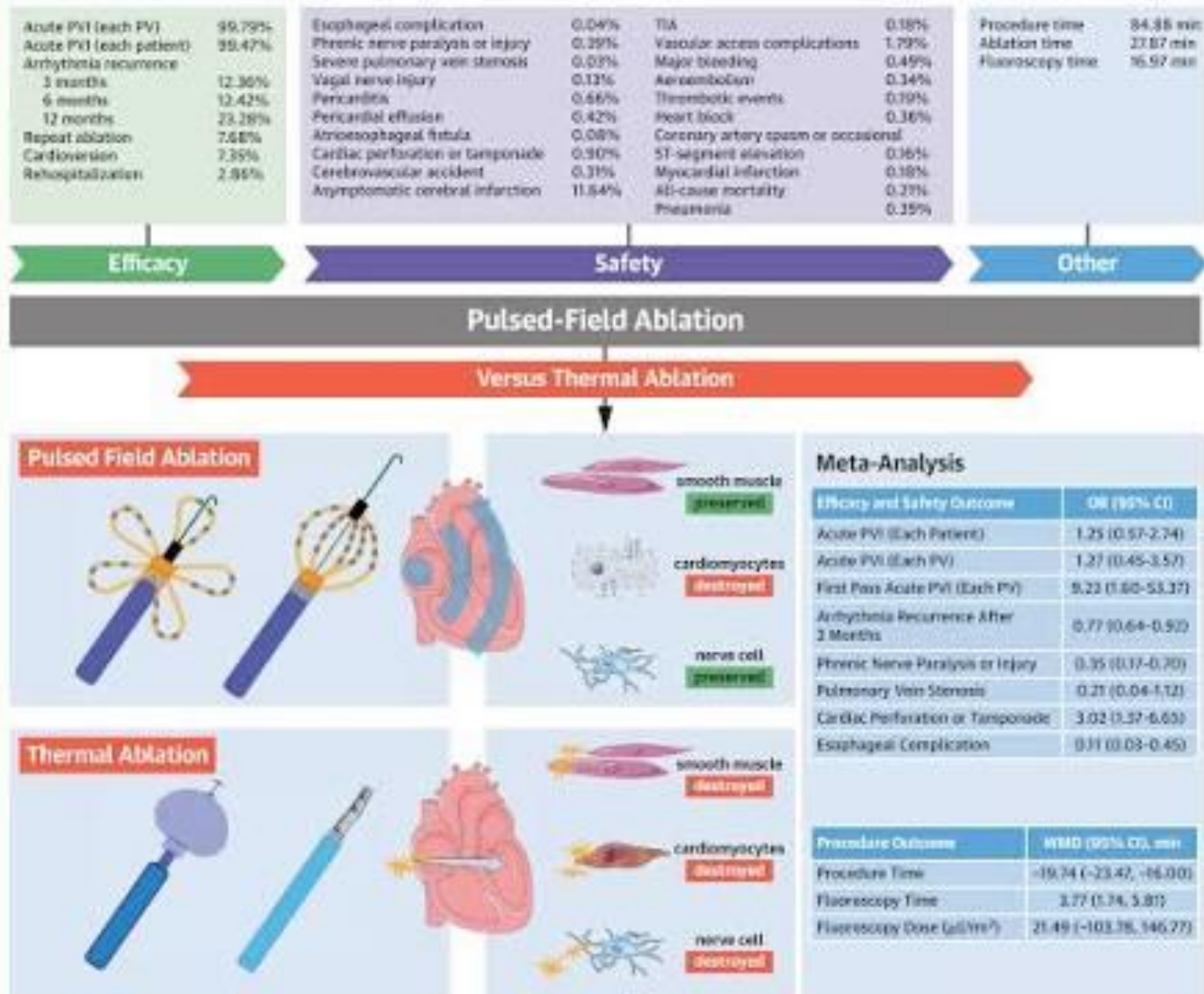
CENTRAL ILLUSTRATION: Resultant Collateral Injury Depends on a Variety of Factors

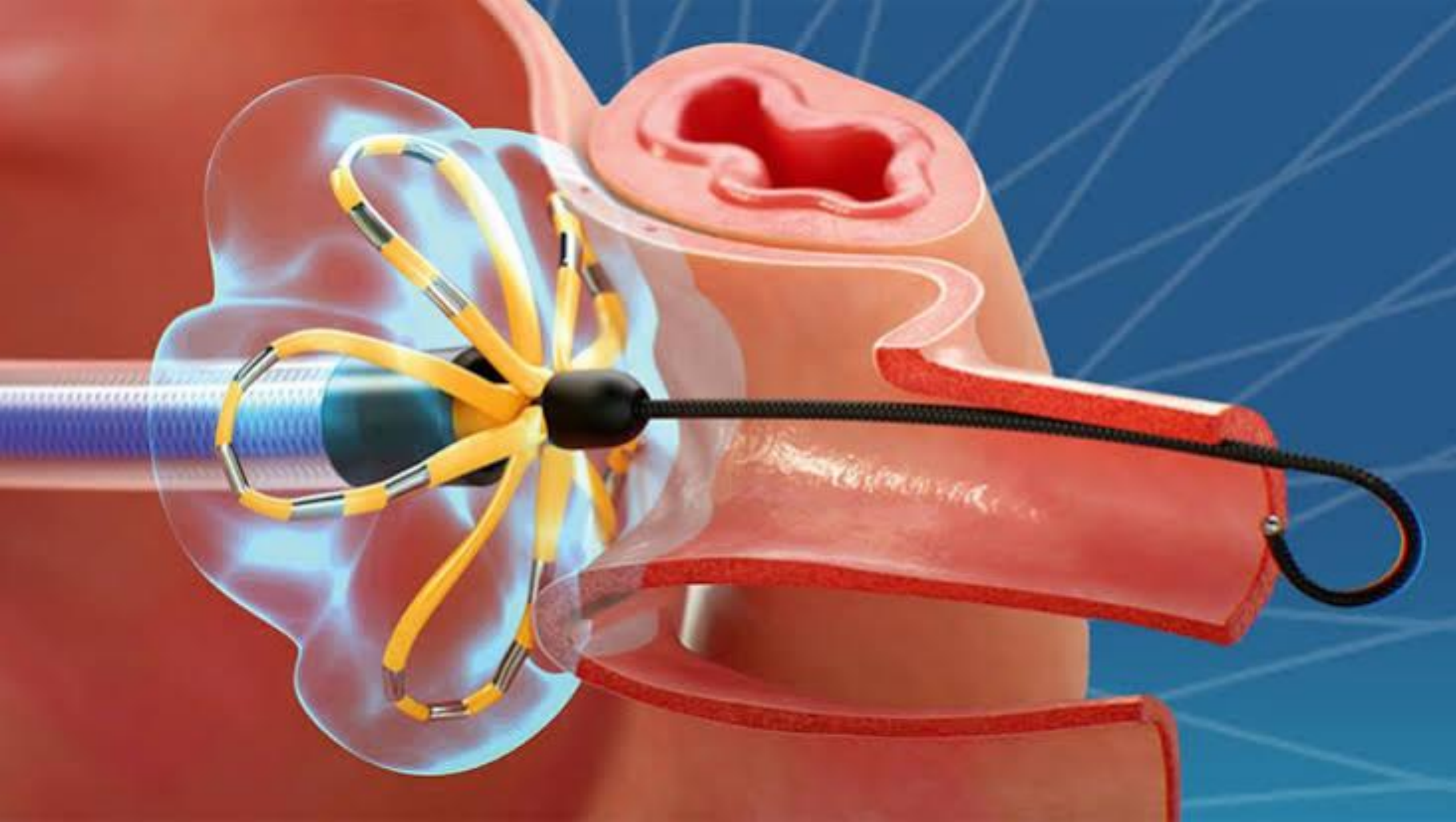


Avoiding PFA Complications

- We waited to use PFA until registry released listing types and incidence of complications
- Keep PFA deliveries below 75 applications to prevent hemolysis and kidney damage
- Avoid use within 5mm of coronary arteries
- Use nitroglycerin before application within 2cm of coronary artery

CENTRAL ILLUSTRATION: Meta-Analysis of PFA Effectiveness and Safety in AF Patients





Thank you!

Questions?



Boulder Community Health Foundation

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**Enhancing the quality and availability
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COMMUNITY

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PATIENTS

We believe providing the community with the highest value in health care requires an innovative, patient-centered environment.

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