

# Indications for, and Results of Ablation in Small Kids < 15kg

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# SCORE: 0

# **Radiofrequency Catheter Ablation for Supraventricular Tachycardia Should It Be Used in Infants and Small Children?**

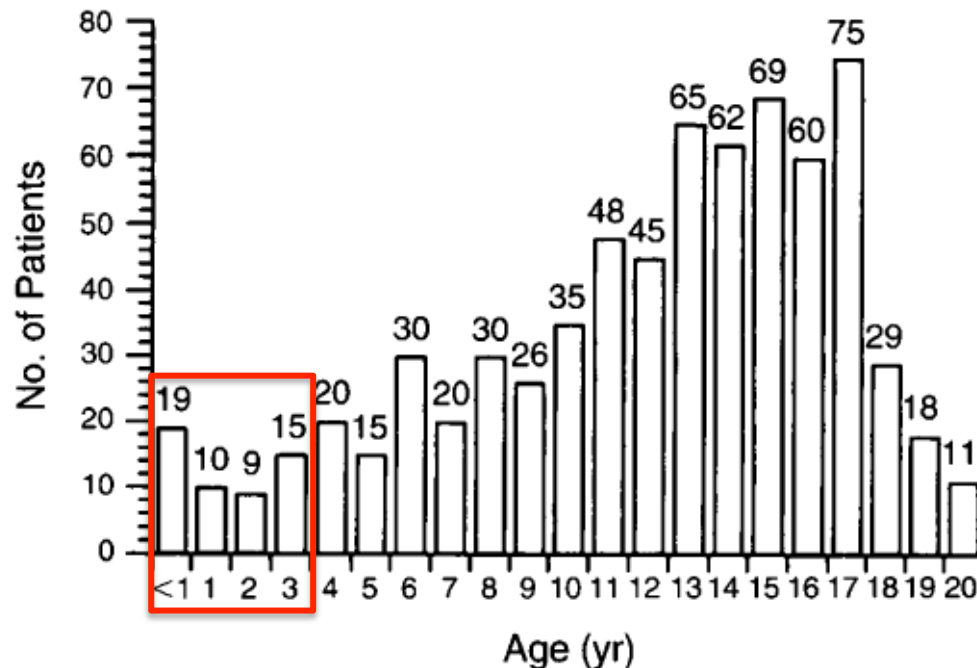
John D. Kugler, MD

Until agreement is reached on operating definitions and more data put speculation to rest, the sobering animal and clinical studies should be considered before performing radiofrequency catheter ablation in infants and small children. Rare situations may warrant recommending the procedure. Infants and small children with congenital heart disease who need intracardiac surgery but who also have an accessory AV pathway may be candidates for preoperative catheter ablation because the risk of additional surgery at the time of operation may be greater than the risk of the catheter ablation. Aside from such unusual extenuating circumstances, the current information does not appear to warrant radiofrequency ablation in infants with drug-refractory supraventricular tachycardia at this time.

# The context . . .

## RADIOFREQUENCY CATHETER ABLATION FOR TACHYARRHYTHMIAS IN CHILDREN AND ADOLESCENTS

JOHN D. KUGLER, M.D., DAVID A. DANFORD, M.D., BARBARA J. DEAL, M.D., PAUL C. GILLETTE, M.D., JAMES C. PERRY, M.D., MICHAEL J. SILKA, M.D., GEORGE F. VAN HARE, M.D., AND EDWARD P. WALSH, M.D., FOR THE PEDIATRIC ELECTROPHYSIOLOGY SOCIETY\*



53 of 652  
were infants  
or toddlers

3 of 4 deaths



# Old Guidelines

Friedman et al, PACE 2002;25:1000-1017

- Ablate:
  - WPW with SCD, syncope or high-risk AP(s)
  - Tachycardia-induced cardiomyopathy
  - SVT over the age of 5 years
  - Medically refractory SVT under the age of 5 years
- Medicate:
  - SVT under the age of 5 years

# New Guidelines

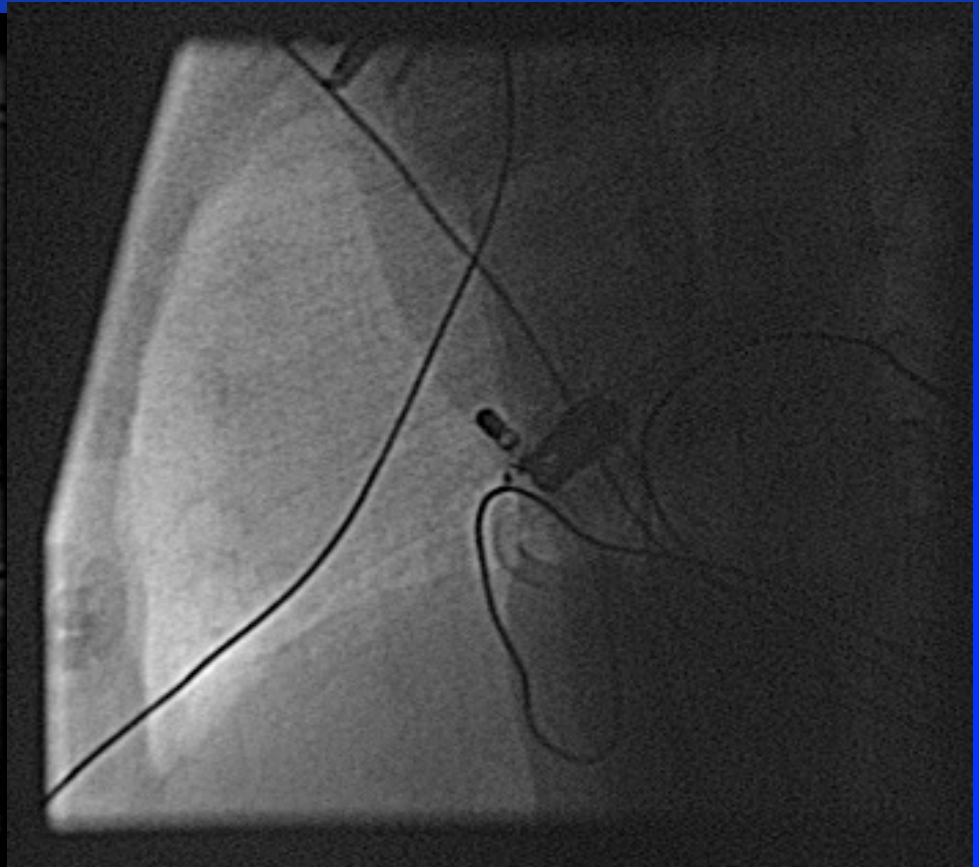
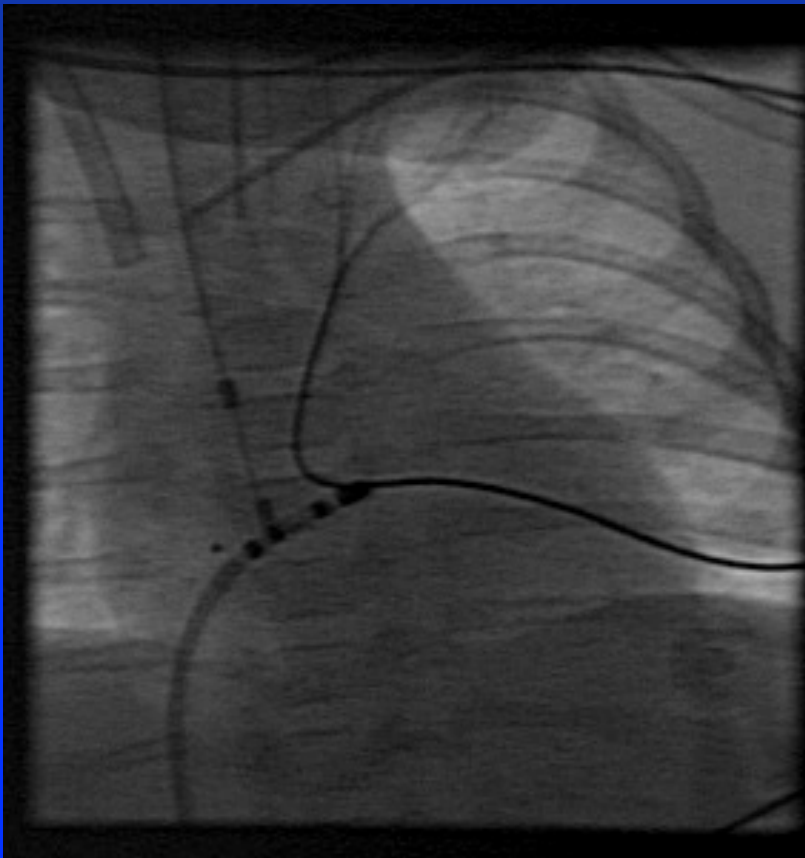
Brugada et al, Europace 2013;15:1337-1382

- Ablate:
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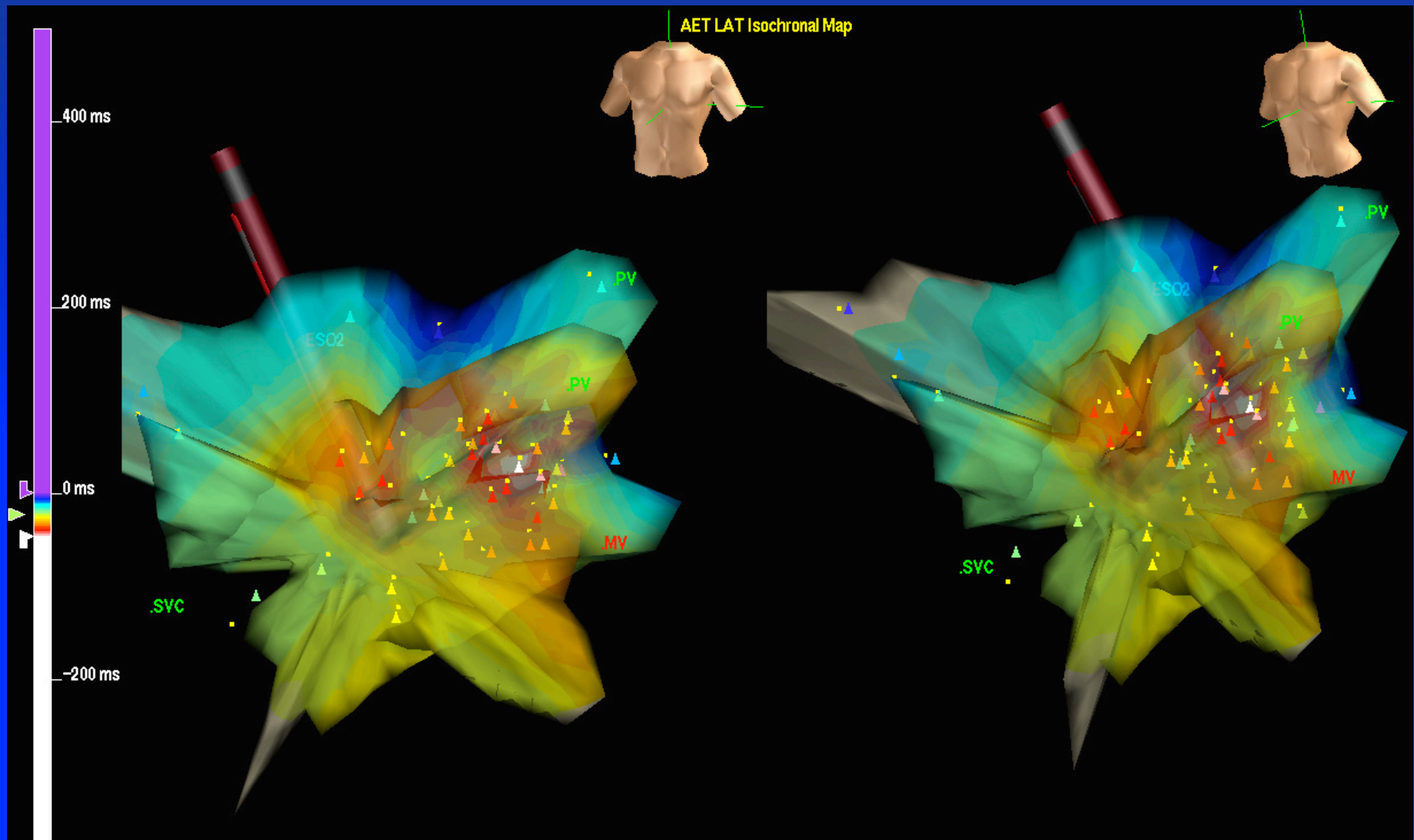
# Weighing the reasons

- Reasons to wait:
  - Risk of ablation procedure
  - Potential for spontaneous remission
- Reasons to proceed:
  - Medically-refractory arrhythmia
  - Tachycardia-induced cardiomyopathy
  - Loss of access after surgery (eg Fontan)
  - Mechanical support (ECMO, VAD)

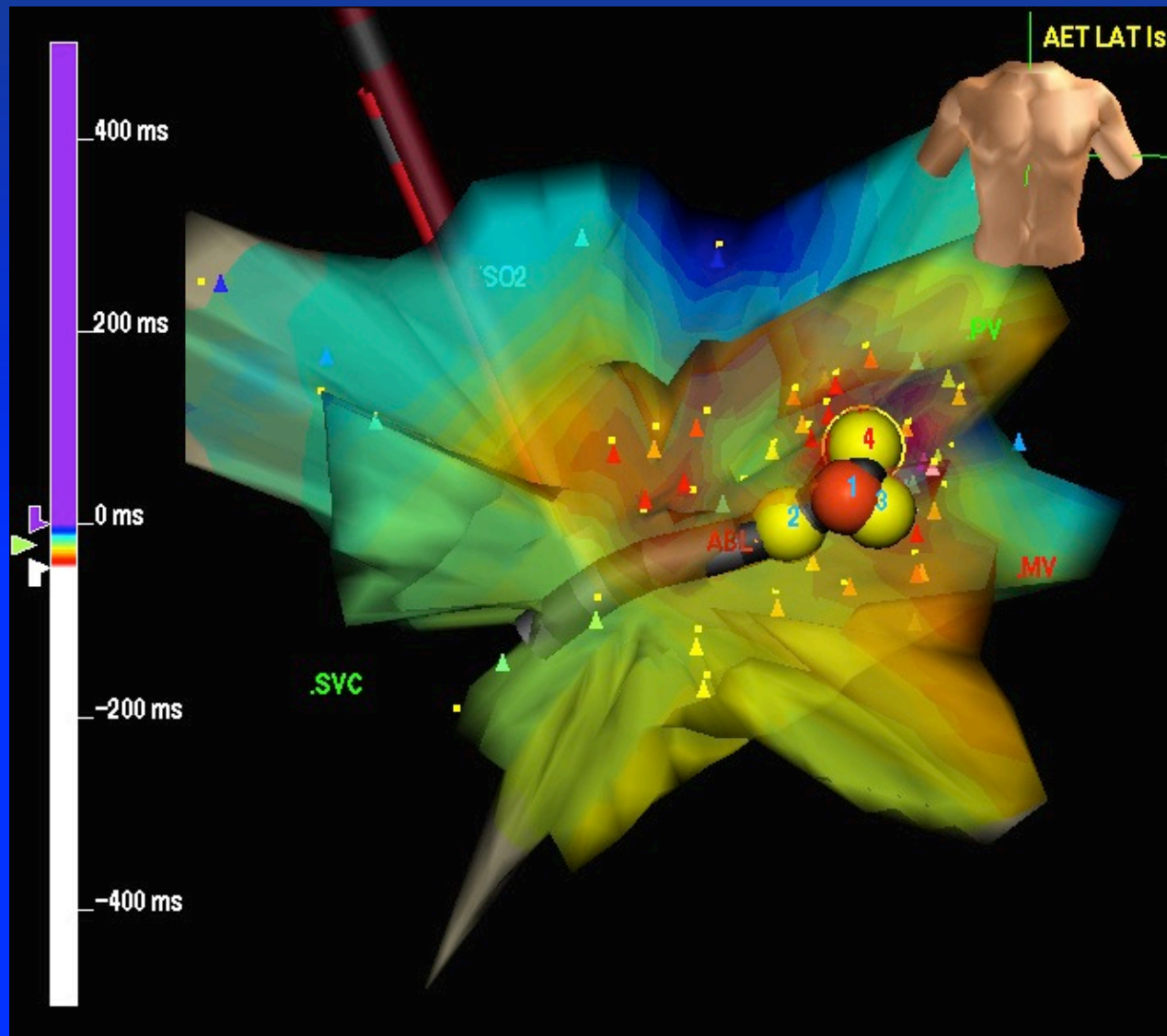
# AET on ECMO



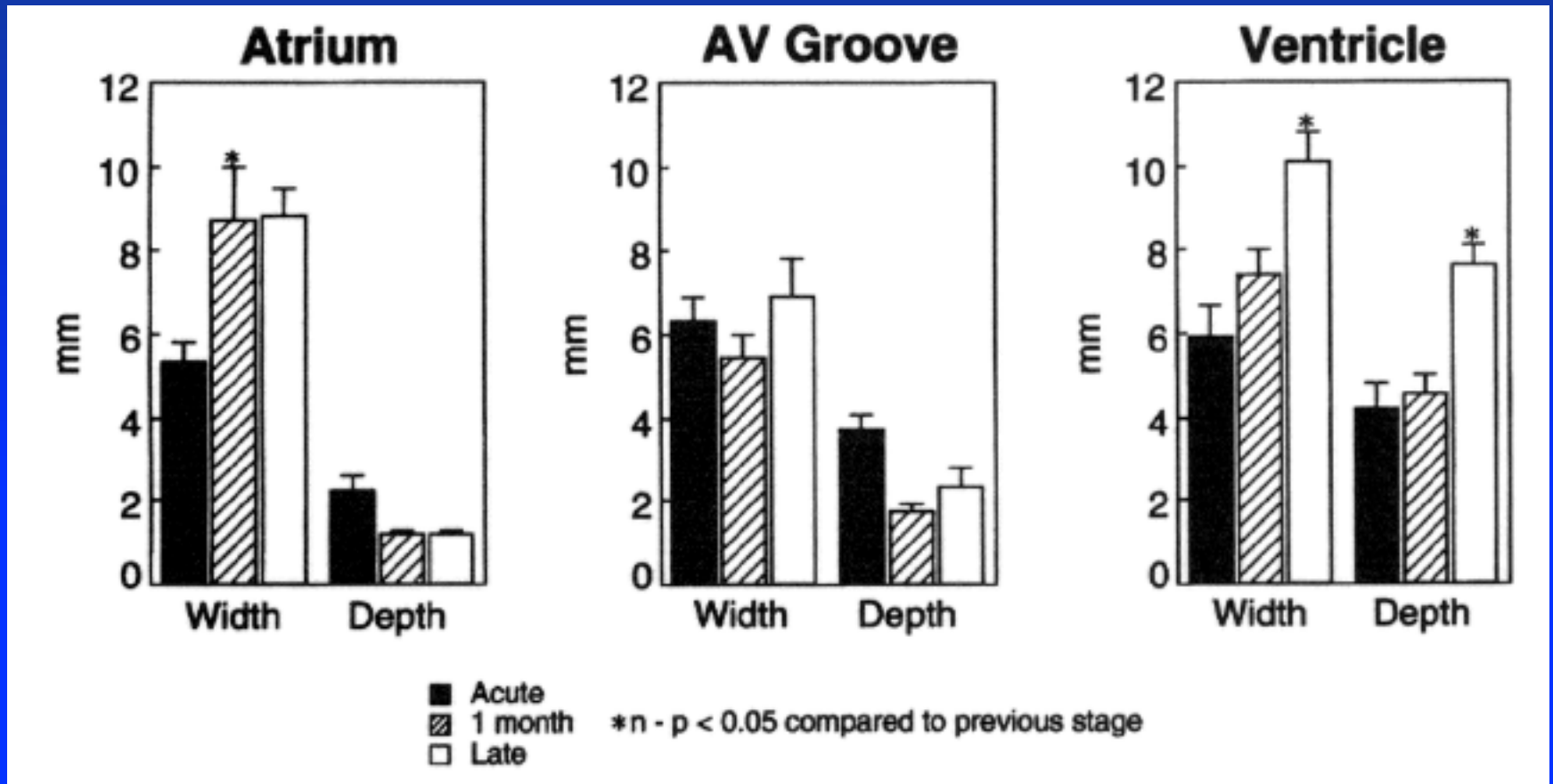
# AET on ECMO



# AET on ECMO



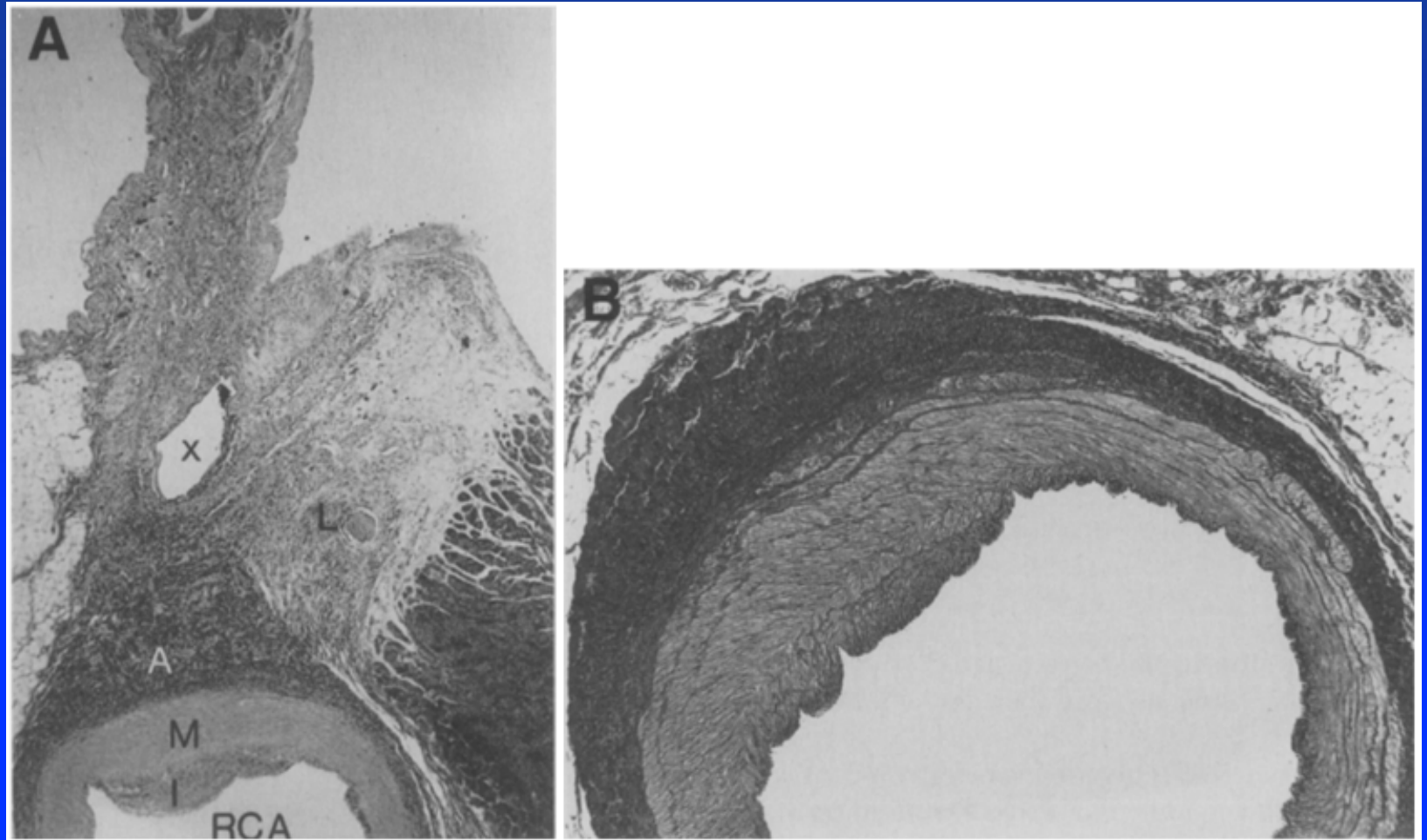
# Reasons for Caution



Saul et al, Circulation 1994;90:492-499

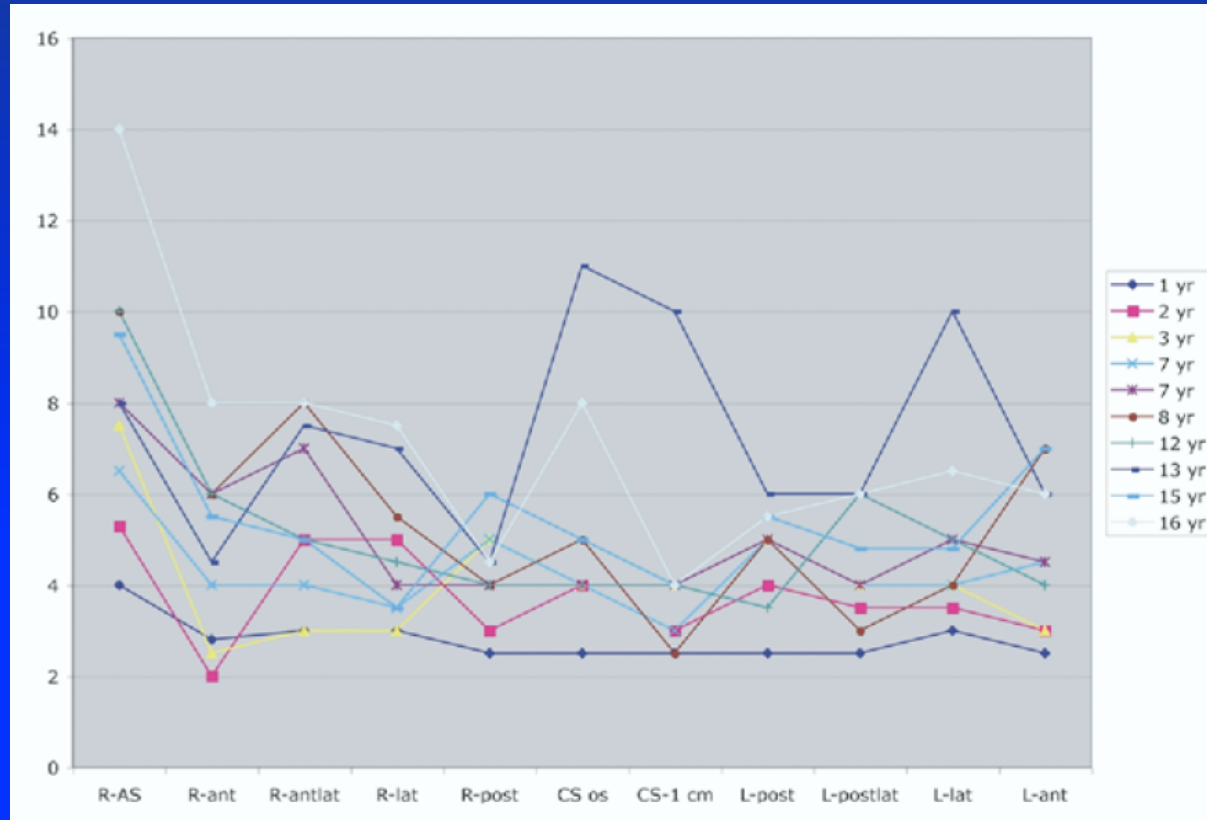


# Reasons for Caution



Paul et al, Am Heart J 1997; 133:436-40

# Reasons for Caution

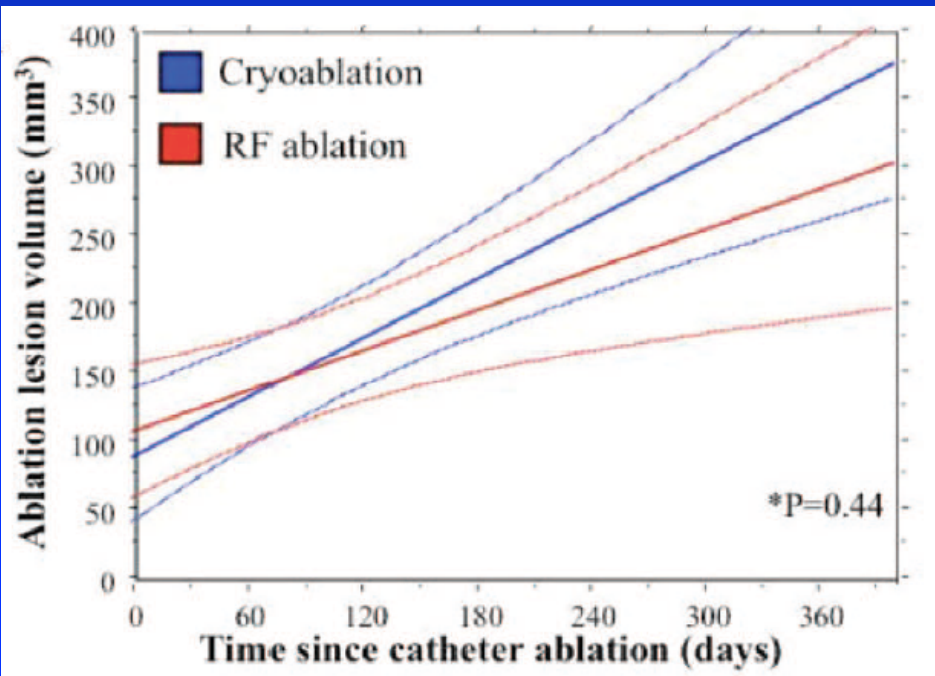


Al-Ammouri et al, Am J Cardiol 2006;97:1752–1755

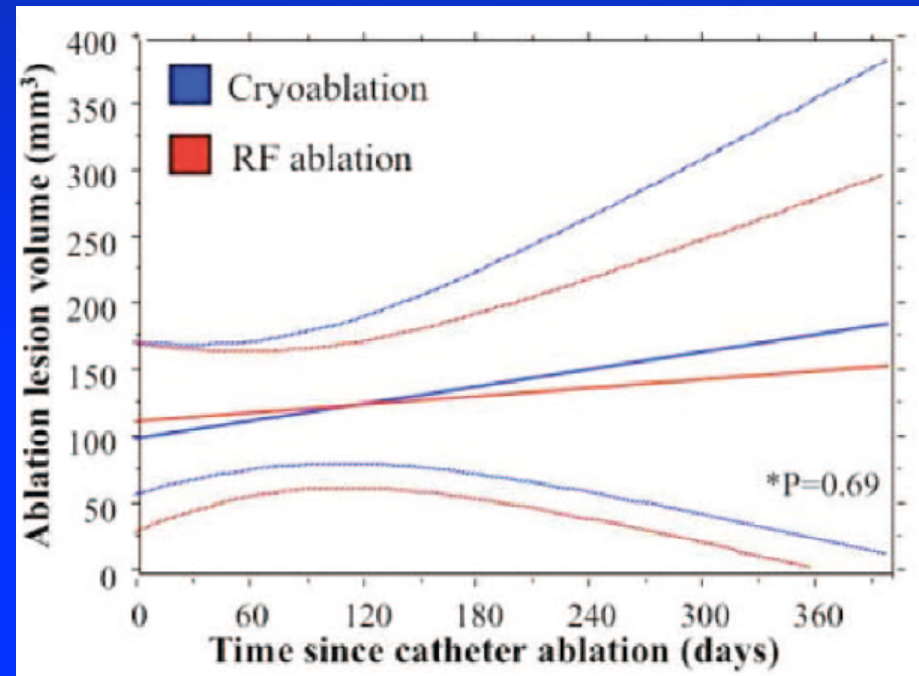
# Cryoablation is not innocent

Khairy et al, Circ Arrhythm Electrophysiol. 2011;4:211-217

## Atrial lesions



## AV groove



# Risks of catheter intervention

Vitiello et al, J Am Coll Cardiol 1998;32:1433

- Single center retrospective review 4952 cases
- Diagnostic, EP and interventional procedures
- Complications (overall 8.8% of cases)
  - Major: 102 (7 deaths all in CHD, none during EP)
  - Minor: 458
- Risk factors for complications:
  - Age 0-2 years
  - Interventional procedure

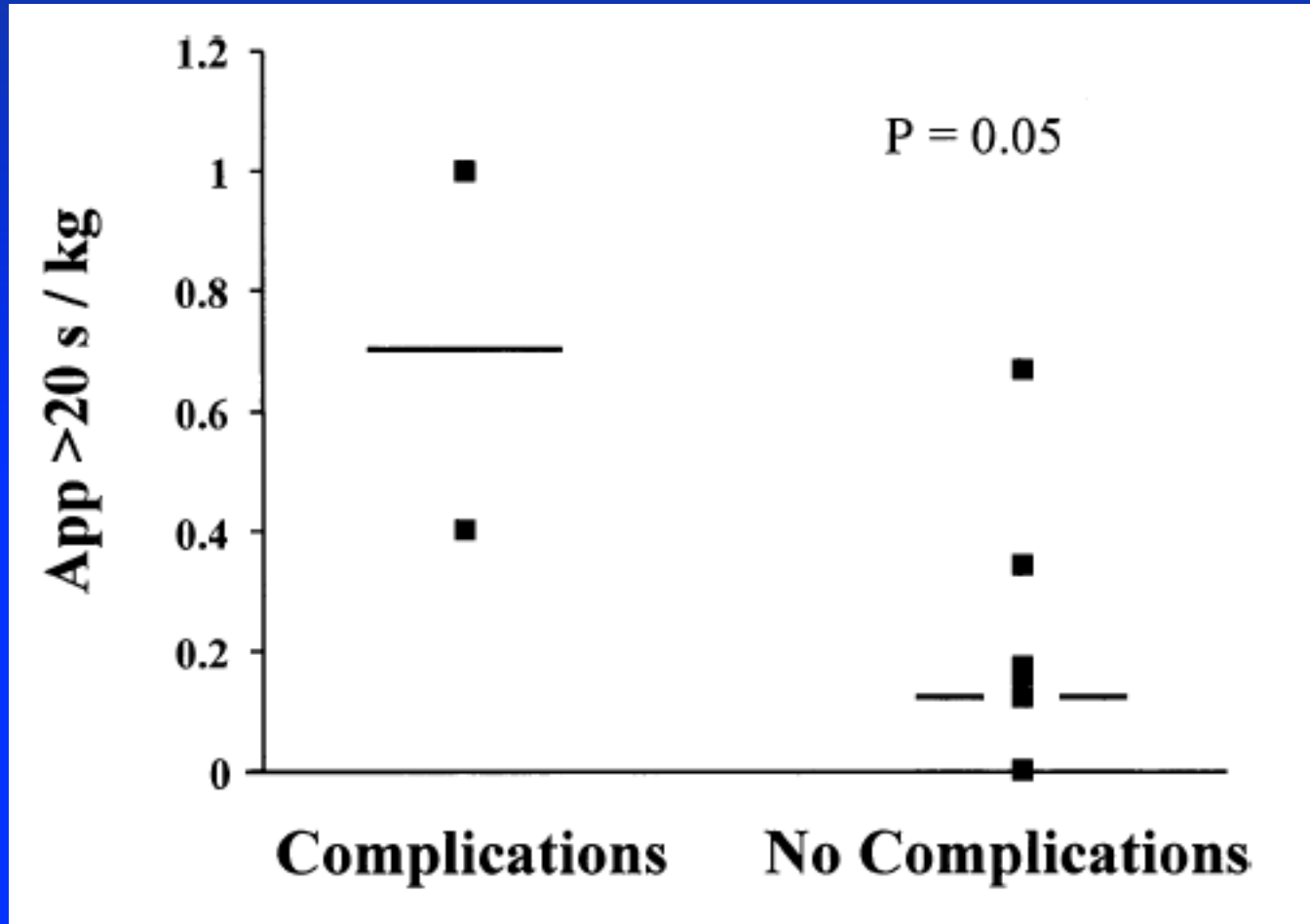
# Mortality after catheter ablation

Schaffer et al, Am J Cardiol 2000;86:639-643

- Pediatric RF registry – 4,651 procedures
- 10 deaths – 0.22%
- 5 in normal hearts, 5 with CHD
- Risk factors for mortality:
  - CHD
  - Lower weight
  - Left-sided procedures
  - Increased number of energy applications

# RF dose-response in ablation risk

Blaufox et al, Am J Cardiol 2006;97:1752–1755



# HRS/PACES/AEPC/AHA/AAP Guidelines

Saul et al, HeartRhythm 2016;13:e251-289

- NCT/UCT (normal heart)
  - Failed medication (class I)
  - Recurrent (>1) and clear target (class IIb)
- Pre-excitation (“WPW pattern”)
  - Cardiac arrest / syncope w high-risk (class I)
  - LV dysfunction, failed meds (class IIb)
- JET (idiopathic): Persistent/recurrent, failed meds (class IIb)
- CHD
  - Persistent/recurrent AVRT, failed meds (class I)
  - Sustained mVT (& adverse PVCs), failed meds (class IIa)
  - Hemodynamically embarrassing SVT (class IIb)



# Selected experience

Year	Author	Age or Wt	N	Success	Recurred	Major Comps
1994	Erickson	<2y	11	82%	18%	1
1997	Benito	<1y	5	100%	0%	3
2000	Case	<4y	33	94%	12%	1
2001	Blaufox	<2y	137	88%	N/A	7
2005	Aiyagari	<15kg	25	96%	5%	2
2011	Kantoch	<2y	34	74%	0%	4
2013	Svintsova	<1y	15	86%	7%	0
2016	Backhoff	<15kg	22	82%	N/A	2
2016	Jiang	<3y	123	94%	7%	0

# Hospital for Sick Children Experience

- Total of 1335 ablations
- 53 (4%) under the age of 5 years
- AET, PJRT over-represented
- 49/53 (92%) acute success rate (c/w 97%)
- 4/49 (8%) recurrence rate
- Complications:
  - 2<sup>nd</sup> degree AV block (recovered)
  - Femoral vein thrombosis, medically treated



# Summary – decision making

- Indication for the procedure
  - Morbidity or mortality without definitive Rx
  - Medical suppression failing or not tolerable
- Success/complication rates for ablation
- Consideration of dose-response effects
- Minimize basic procedural risks
  - Reduce catheter size and numbers
  - Non-fluoroscopic mapping methods









Thank you!