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DEUTSCHES ZENTRUM FÜR  
HERZ-KREISLAUF-FORSCHUNG E.V.

Medizinische Fakultät Mannheim  
der Universität Heidelberg

Universitätsklinikum Mannheim



# Supraventricular arrhythmias in Brugada syndrome

**Prof. Dr. Martin Borggrefe**  
Mannheim

**ADVANCES IN CARDIAC  
ARRHYTHMIAS**

*and*

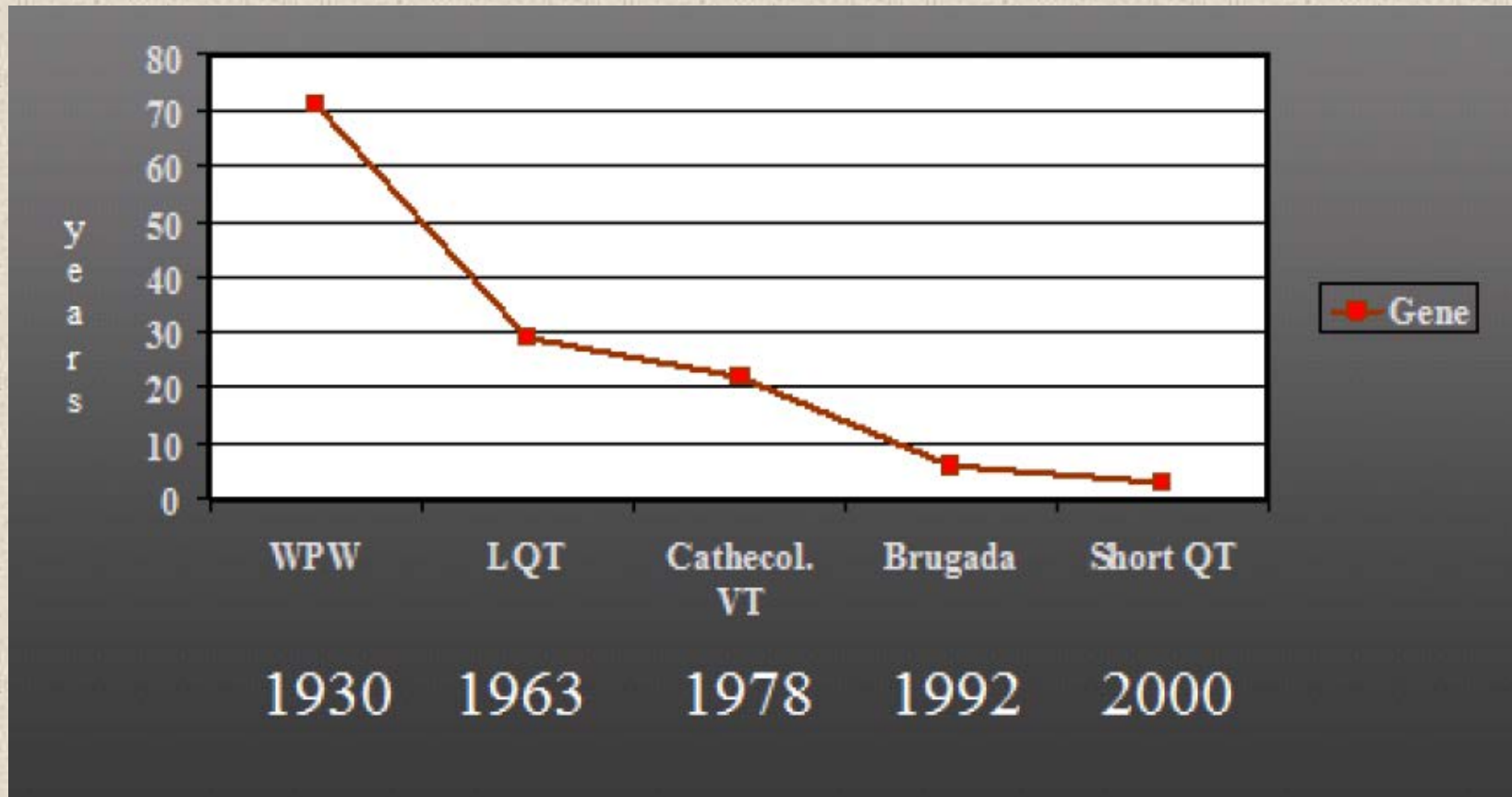
**GREAT INNOVATIONS  
IN CARDIOLOGY**

XXIX GIORNATE CARDIOLOGICHE TORINESI

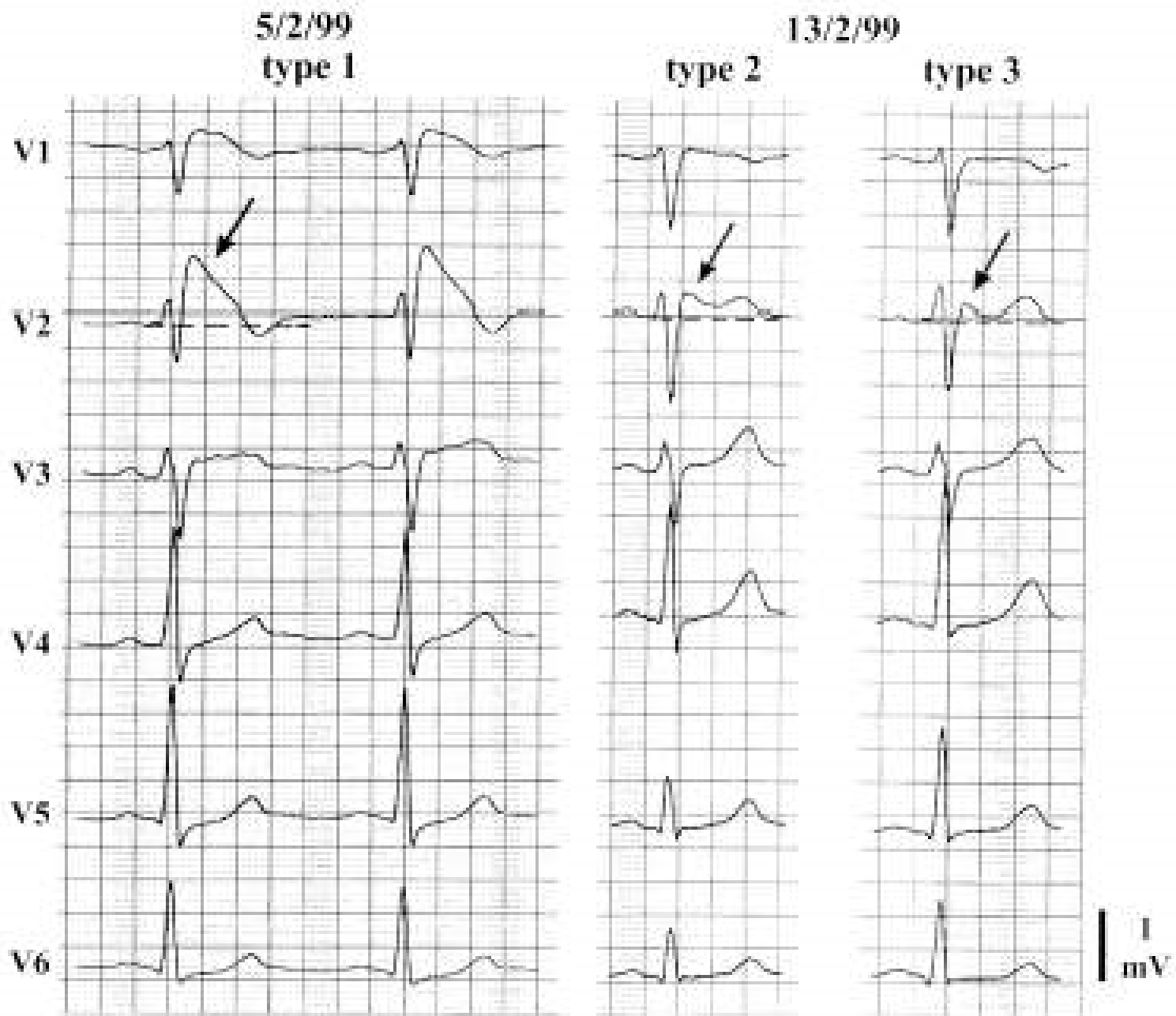
**TURIN**  
**27-28**  
**OCTOBER**  
**2017**

# Brugada syndrome 1992-2012

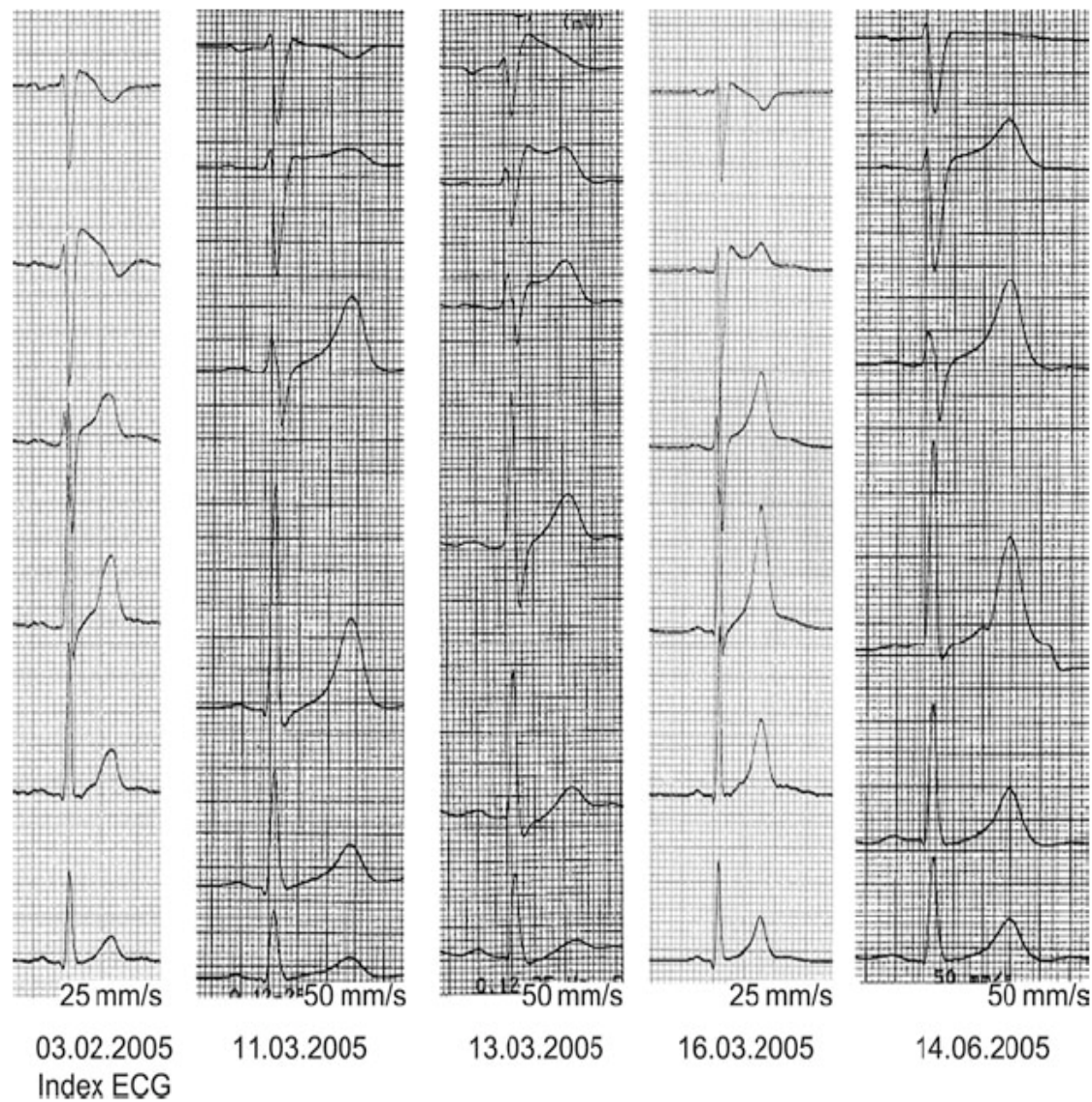
Time interval between description of the disease  
and discovery of first causal gene



Brugada P et al. Eur Heart J 2013;



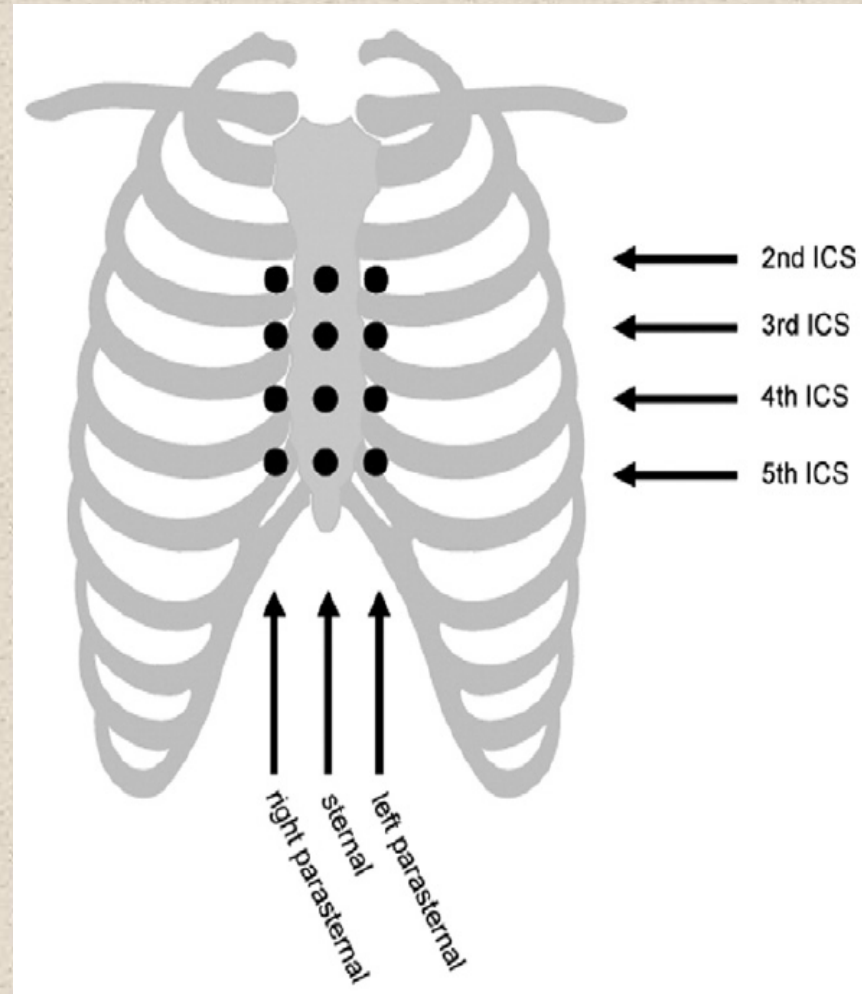
# Fluctuation of Brugada ECG pattern



Veltmann et al. Eur Heart J 2006; 27: 2544-2552

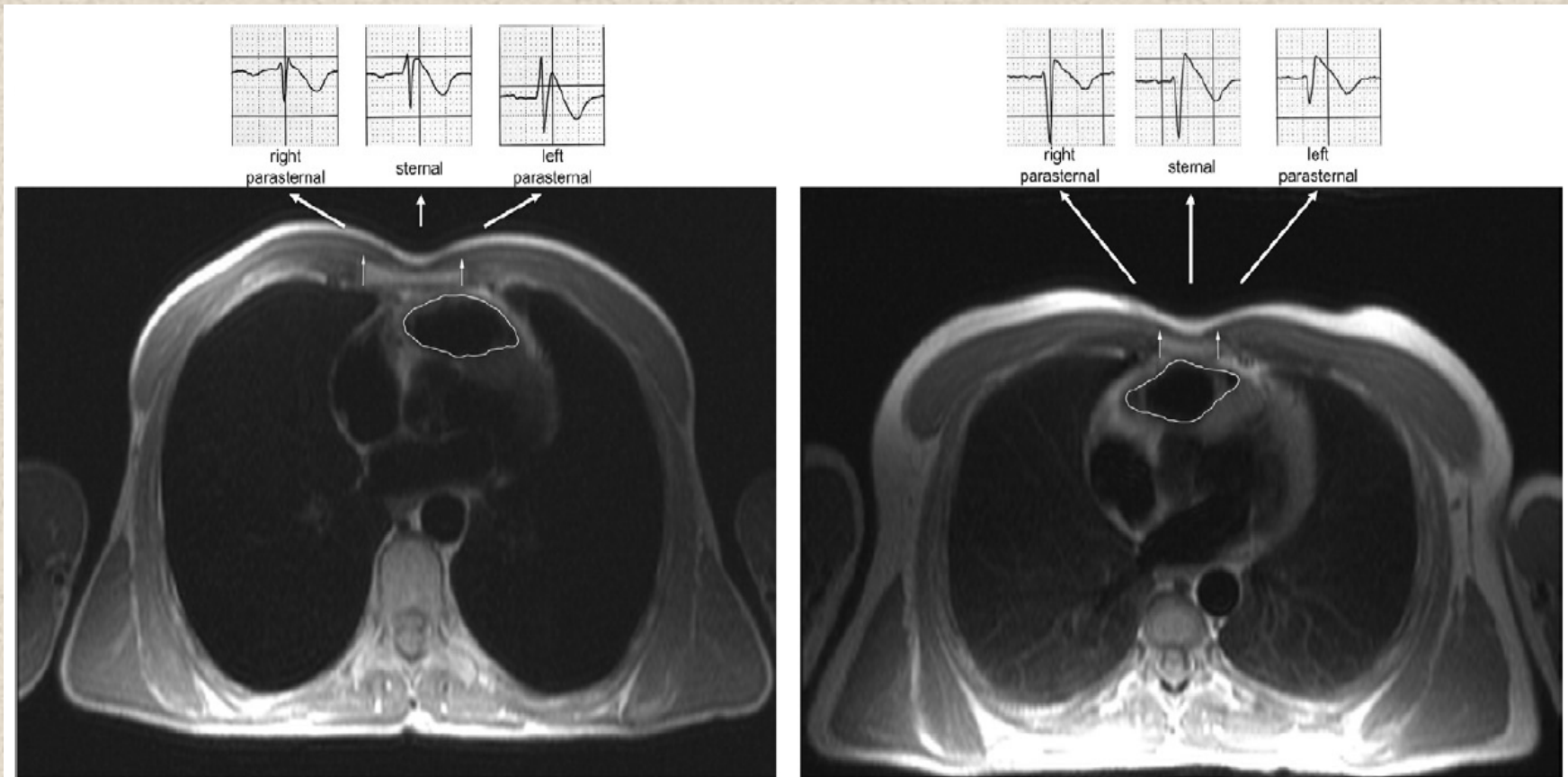
# Brugada Syndrome

## Positions of ECG electrodes



# Brugada Syndrome

## ECG and RVOT



Veltmann et al. Heart Rhythm 2012; 9: 414-421

# Brugada Syndrome

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## Clinical Presentation of Brugada Syndrome

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- **cardiac arrest**
  - **syncope**
  - **palpitations**
  - **family history of sudden death**
  - **asymptomatic**
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# Brugada Syndrome

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## Clinical Presentation of Brugada Syndrome

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- cardiac arrest
- syncope
- palpitations
- family history of sudden death

Brugada  
Syndrome

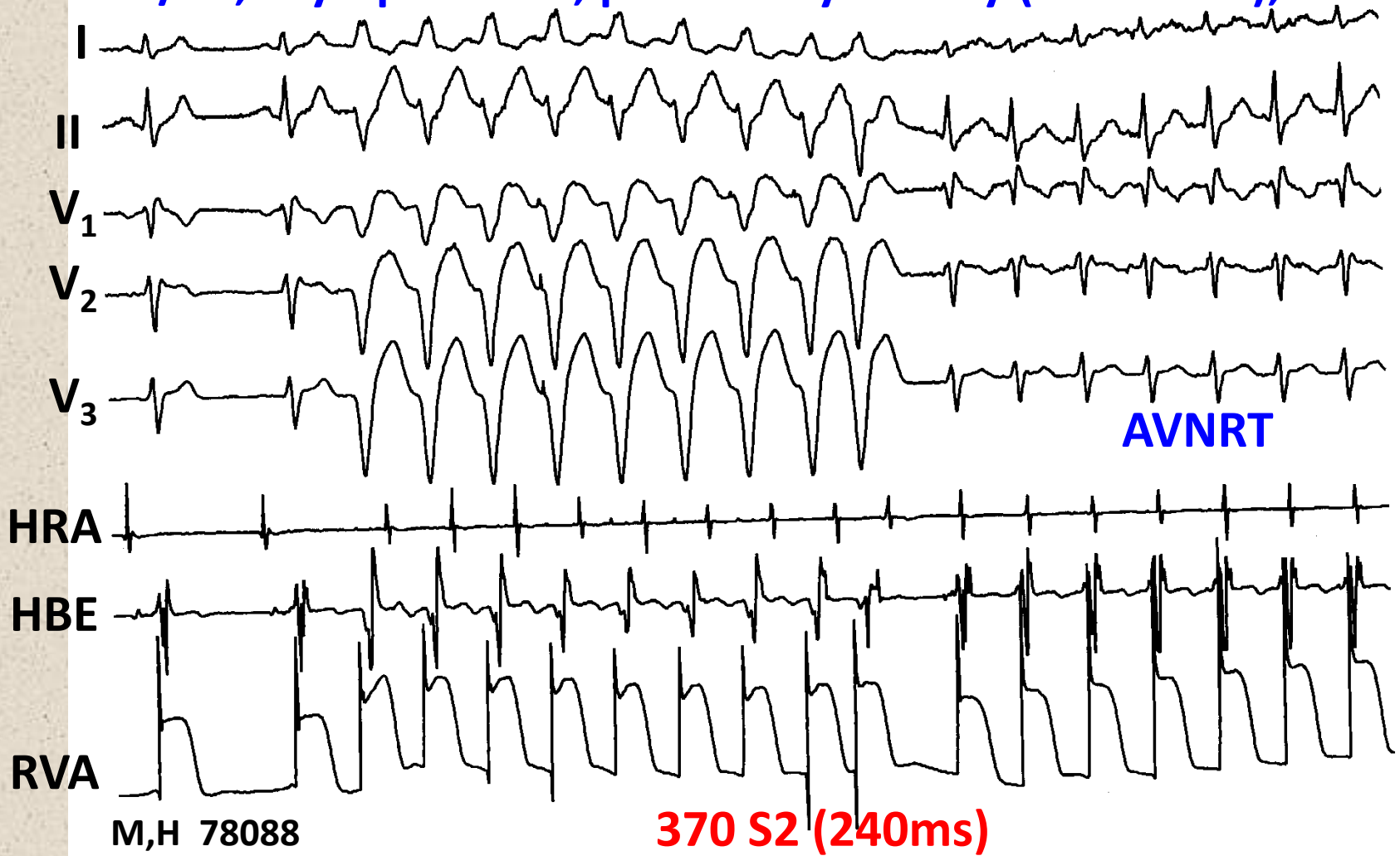
- asymptomatic

Brugada ECG  
pattern



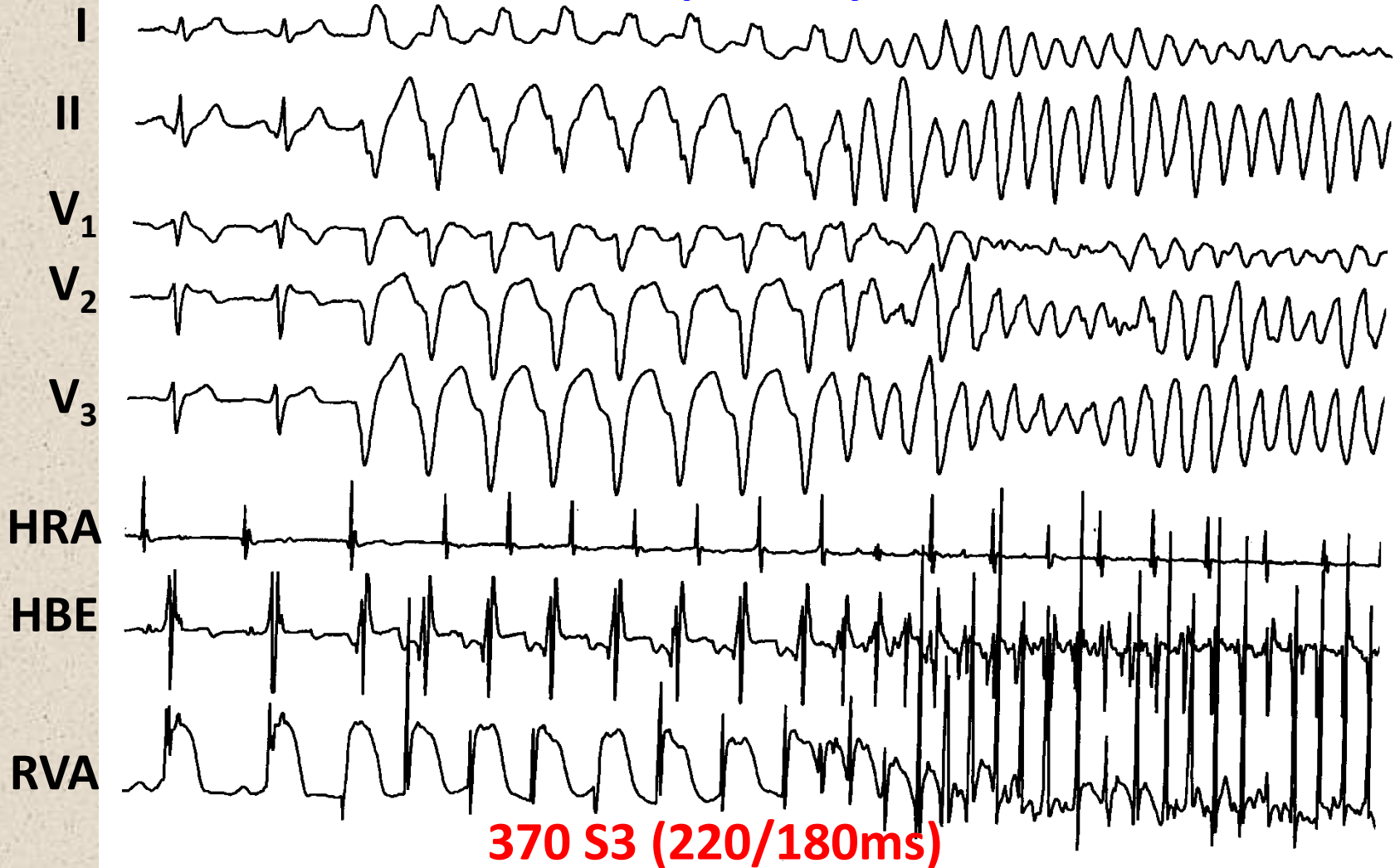
# Brugada syndrome and SVT

Pat. 9: m/57, asymptomatic, pos. family history (SCD uncle), doc. SVT



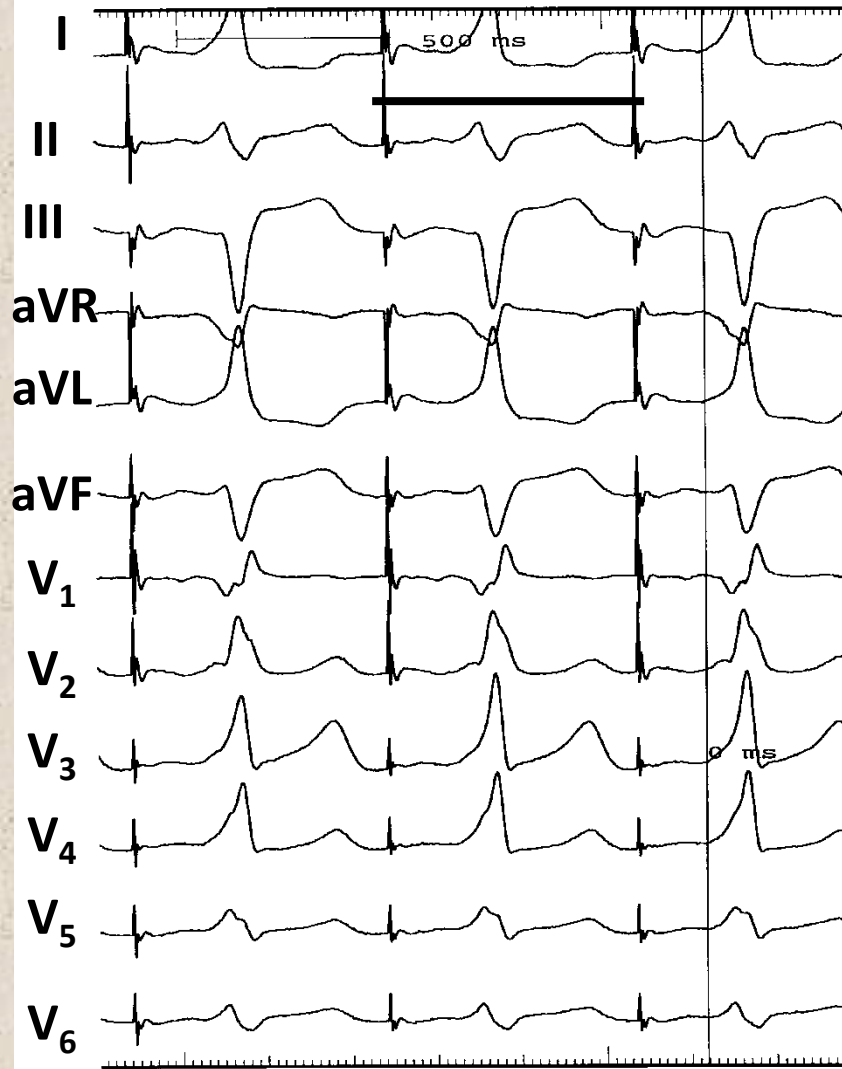
# Brugada syndrome and SVT

Pat. 9 after slow pathway modulation



Eckardt et al., J Cardiovasc Electrophysiol 2001;12:680-685

# Brugada syndrome and SVT

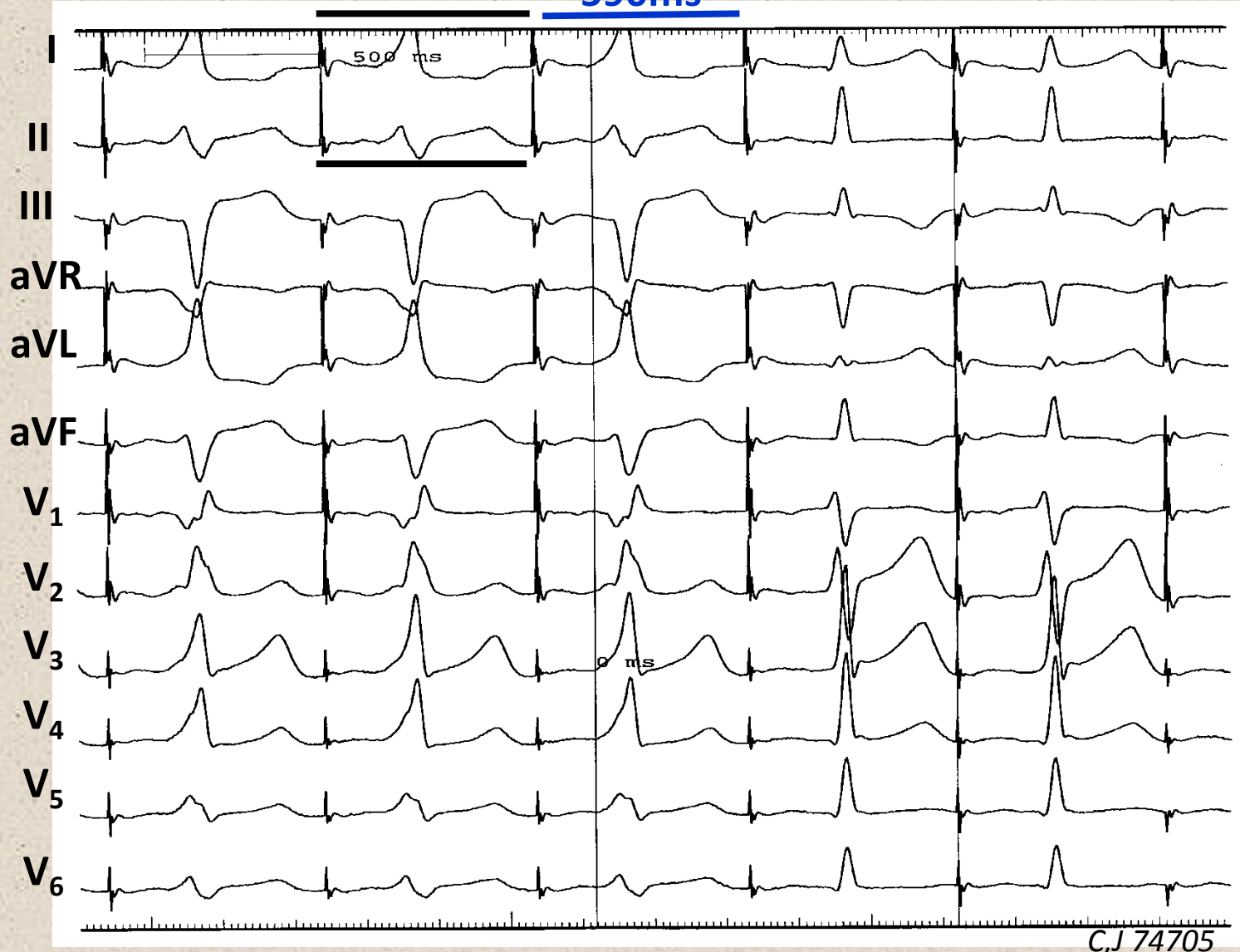


- Patient 5
- M/31
- Aborted SCD
- No FH of syncope/SCD
- WPW syndrome

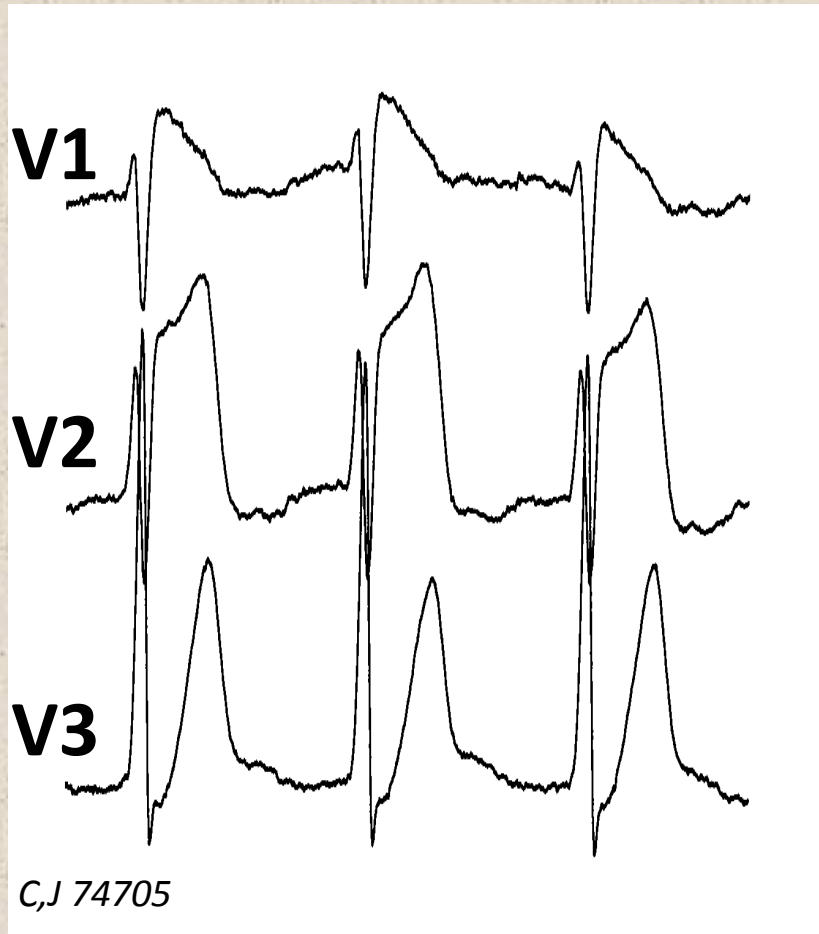
Eckardt et al. Pace 2001;224: 1423ff

# Brugada syndrome and SVT

590ms



# Brugada syndrome and SVT



60mg ajmaline

- Patient 5
- M/31
- Aborted SCD
- No FH of syncope/SCD
- WPW syndrome
- Transient Brug. Sign
- Inducible VF
- ICD

# Wolff-Parkinson-White Syndrome Associated with Brugada Syndrome

LARS ECKARDT, PAULUS KIRCHHOF, ROBERT JOHNA,  
WILHELM HAVERKAMP, GÜNTER BREITTHARDT, and MARTIN BORGGREFE

Pacing Clin Electrophysiol. 2001; 24 : 1423-1424

# **Brugada Syndrome and Supraventricular Tachyarrhythmias: A Novel Association?**

LARS ECKARDT, M.D., PAULUS KIRCHHOF, M.D., PETER LOH, M.D.,  
ERIC SCHULZE-BAHR, M.D., ROBERT JOHNA M.D., THOMAS WICHTER, M.D., FESC,  
GÜNTER BREITHARDT, M.D., FESC, FACC, WILHELM HAVERKAMP, M.D.,  
and MARTIN BORGGREFE, M.D., FESC\*

**J Cardiovasc Electrophysiol. 2001; 12 : 680-685**

### Clinical Characteristics of the Brugada Patients

No. of patients	35
Males	25
History	
Aborted SCD	12
Syncope	14
Asymptomatic	9
Family history	
SCD	7
Syncope	6
Investigation for <i>SCN5A</i>	31
Mutation	3
Supraventricular stimulation	35
HV interval (msec)	49 ± 12
SVT induction (Table 2)	10
Ventricular stimulation	
VT/VF induction	24
2 extrastimuli	15
3 extrastimuli	9
Therapy	
ICD	26
Follow-up (months)	32 ± 12
VF on follow-up	3

Eckardt et al. J Cardiovasc Electrophysiol. 2001; 12 : 680-685





# Prevalence of Supraventricular Tachyarrhythmias in a Cohort of 115 Patients with Brugada Syndrome

Rainer Schimpf M.D., Carla Giustetto M.D., Lars Eckardt M.D., Christian Veltmann M.D., Christian Wolpert M.D., Fiorenzo Gaita M.D., Günter Breithardt M.D., Martin Borggrefe M.D.

**Ann Noninvasive Electrocardiol. 2008; 3: 266-269**

# Mannheim-Münster-Turino

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**n = 115 pts**

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**Age: 45 ± 12 years**

**Sex: male n = 82 female n = 33**

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## Clinical presentation

**VF n = 19 (17%)**

**syncope n = 58 (50%)**

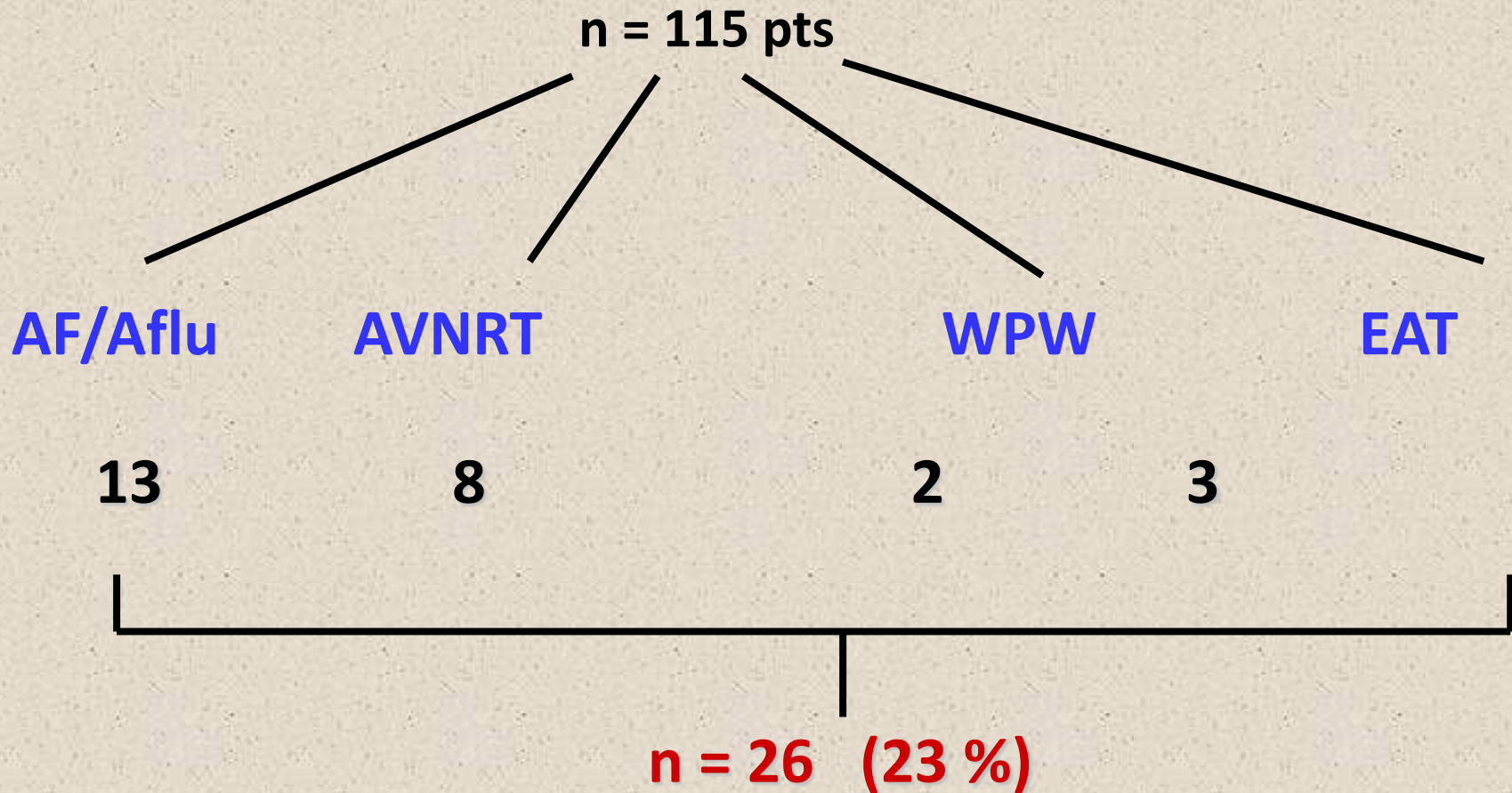
**family history n = 33 (29%)**

**n = 120 pts ???**

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# Mannheim-Münster-Turino

## Supraventricular Tachycardias in BrS



# Mannheim-Münster-Turino

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## Ablation of SVT

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<b>AVNRT</b>	<b>n = 8 / 8 (100%)</b>
<b>WPW</b>	<b>n = 2 / 2 (100%)</b>
<b>EAT</b>	<b>n = 0 / 3 (0%)</b>

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**Success 10/10 (100%)**

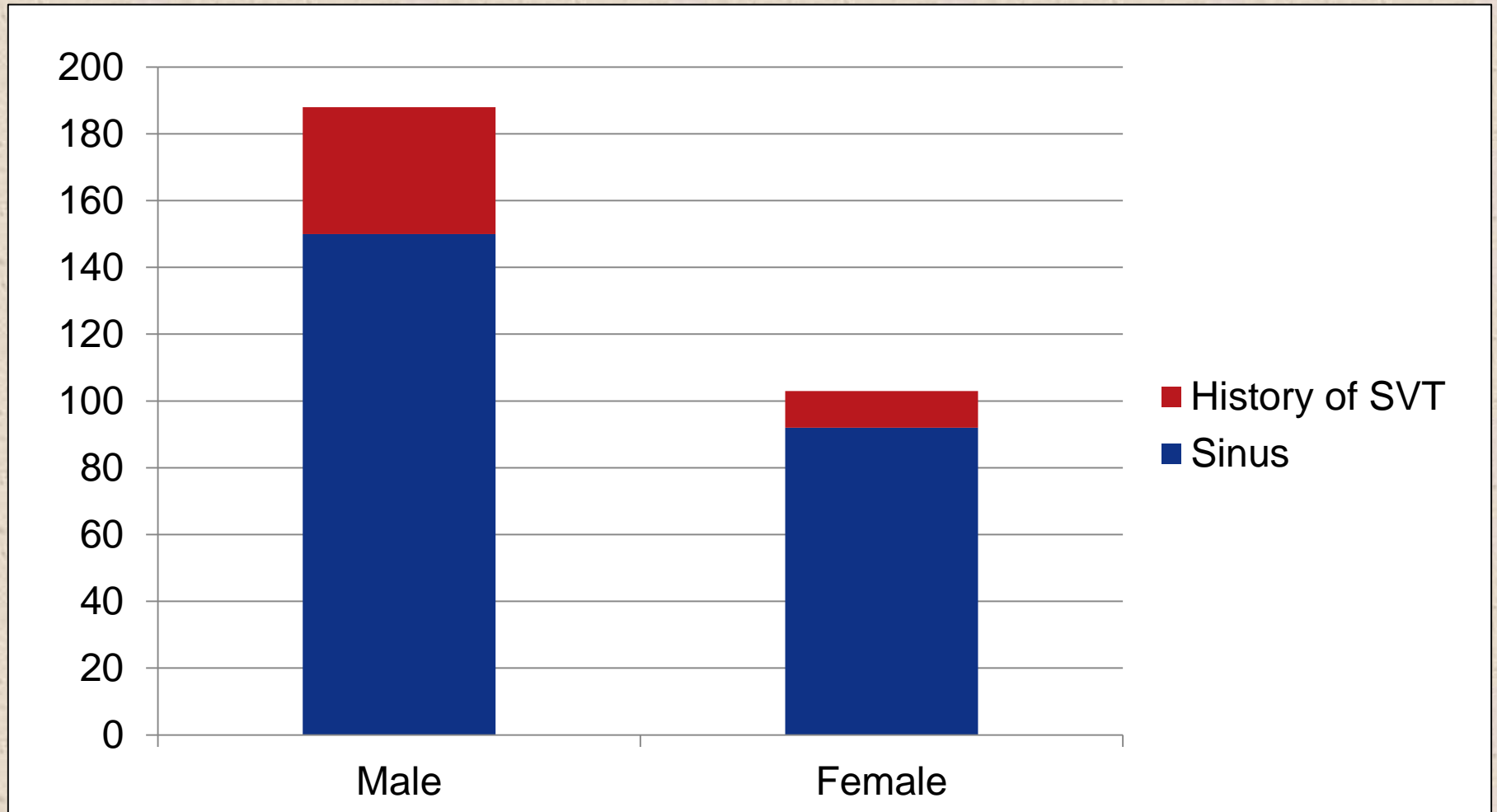
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# Incidence of atrial arrhythmias in Brugada Syndrome

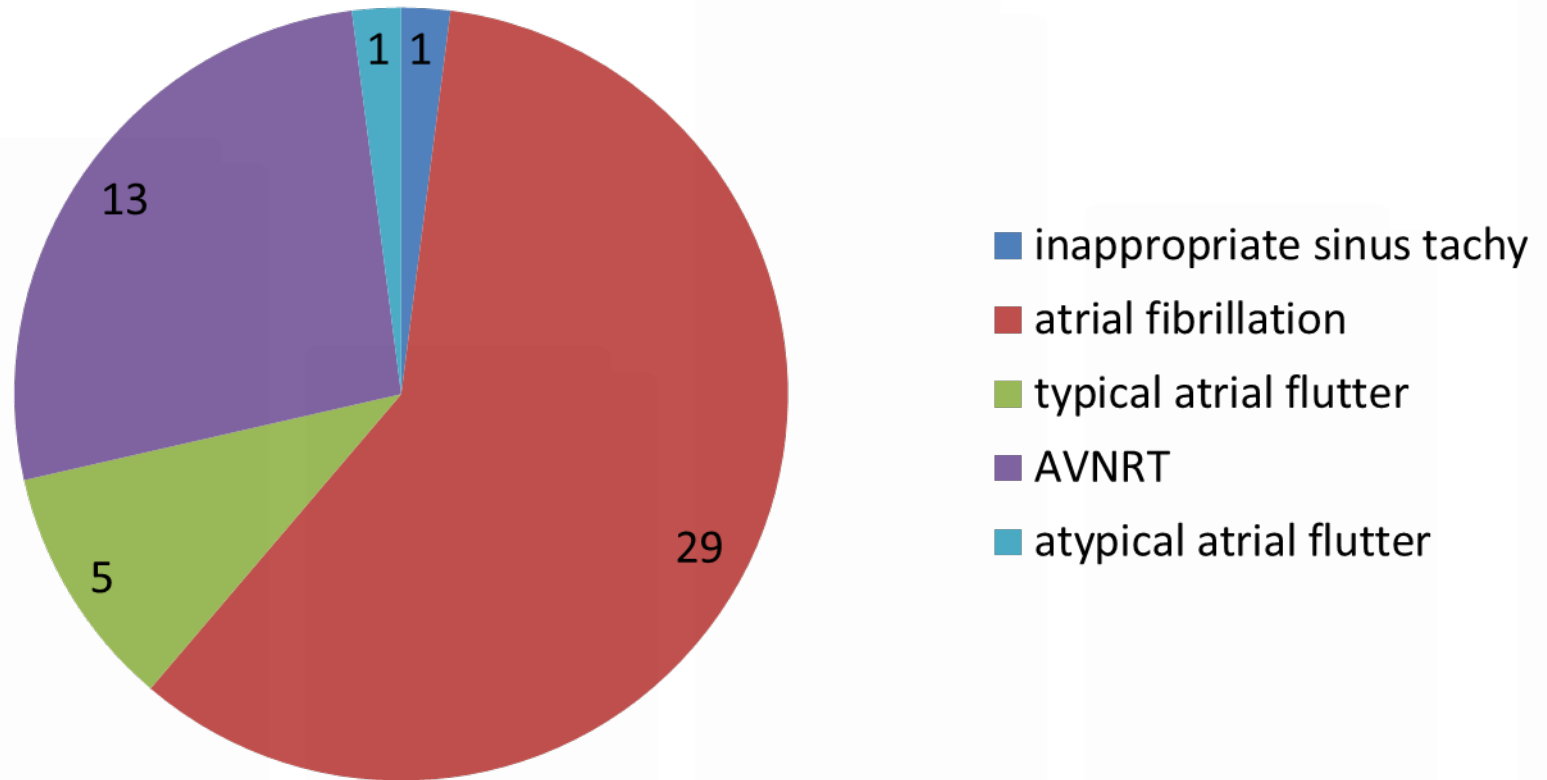
Author	Year	No. of Patients	Incidence of Atrial Arrhythmias		
			Total	Atrial Fibrillation	
				Spontaneous	Inducible
Eckardt et al. (5)	2001	35	29%	—	3% (1/35)
Itoh et al. (6)	2001	30	30%	30% (9/30)	—
Morita et al. (7)	2002	18	—	39% (7/18)	57% (8/14)
Park et al. (8)	2003	15	40%	27% (4/15)	8% (1/13)
Bordachar et al. (9)	2004	59	20%	17% (12/59)	—
Junttila et al. (10)	2004	18	6%	6% (1/18)	—
Sacher et al. (11)	2006	220	15%	10% (23/220)	—
Yamada et al. (12)	2006	11	100%	0	100% (11/11)
Kharazi et al. (13)	2007	12	17%	17% (2/12)	—
Miyamoto et al. (14)	2007	98	20%	20% (20/98)	—
Bigl et al. (15)	2007	28	53%	53% (15/28)	—

Francis and Antzelevitch, JACC 2008; 51: 1149-53

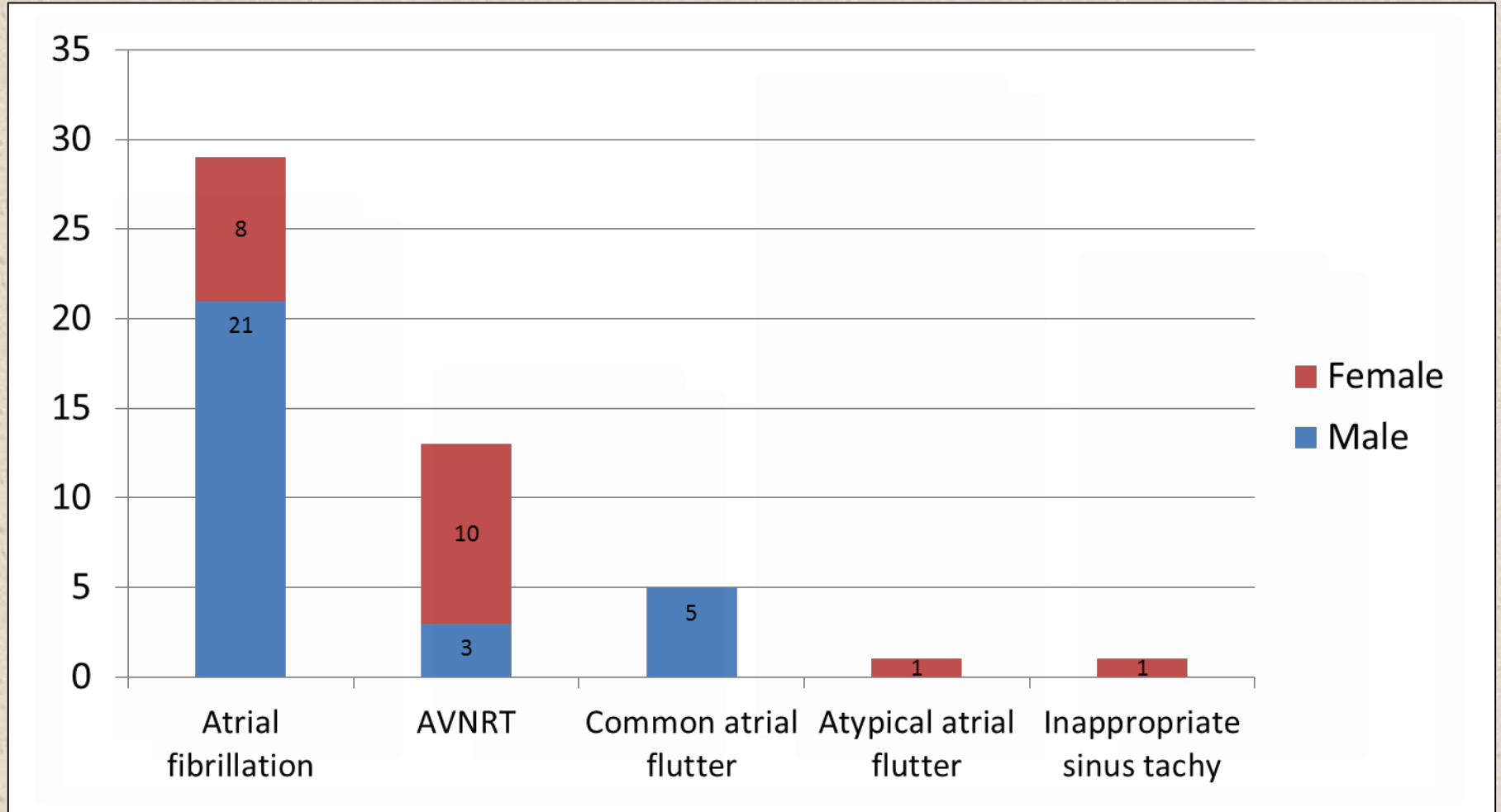
# Brugada cohort (n=291 pts; 1999-2017) Mannheim



# Type of SVT in patients with Brugada Syndrome (n=49) Mannheim

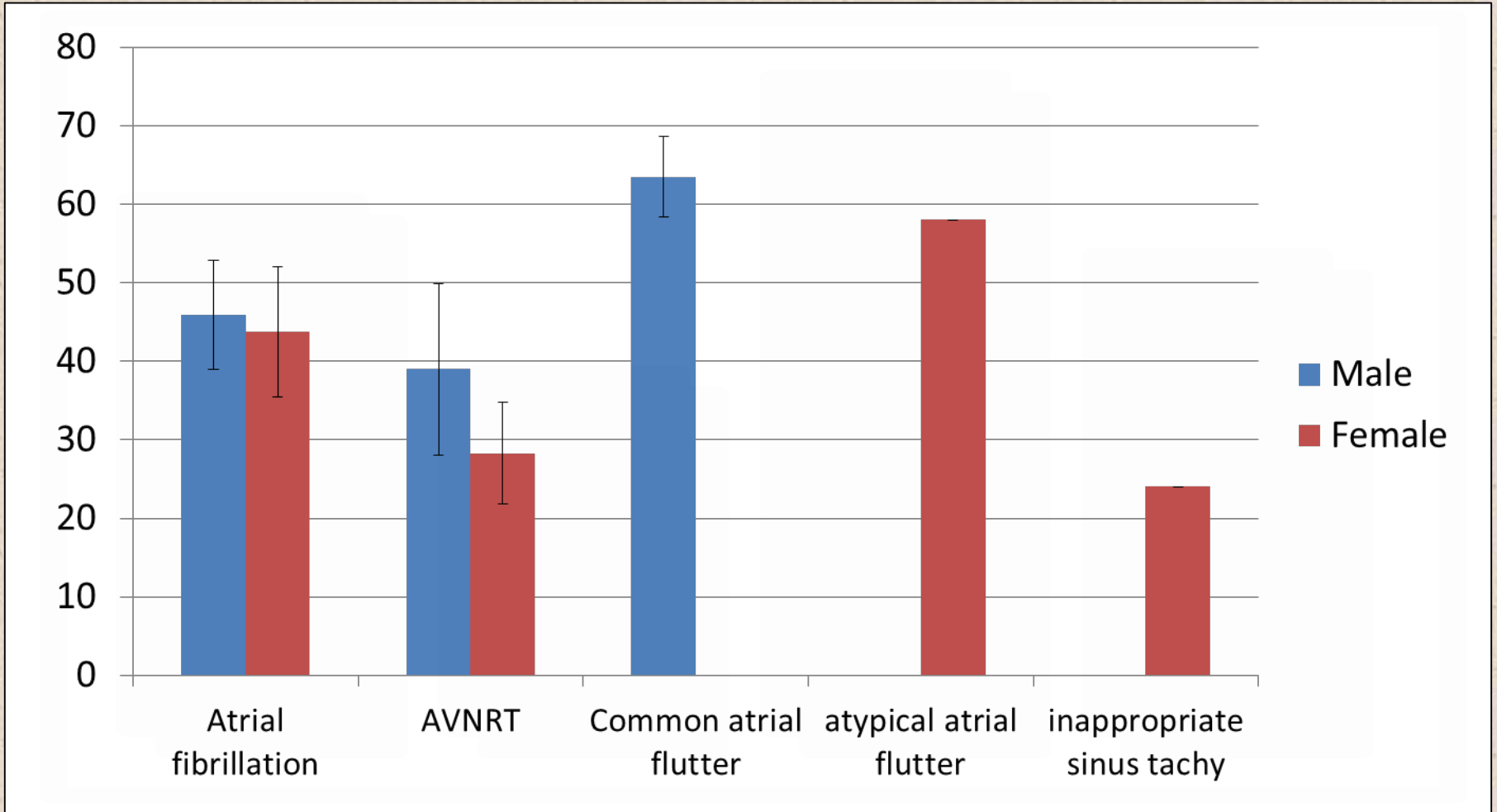


# Gender difference in arrhythmia sub-type Mannheim





# Age distribution of Brugada patients with SVT Mannheim



# Predictors of Atrial Tachyarrhythmias in Subjects with Type 1 ECG Pattern of Brugada Syndrome

KONSTANTINOS P. LETSAS, M.D., REINHOLD WEBER, M.D., KLAUS ASTHEIMER, M.D.,  
CONSTANTINOS C. MIHAS, M.D., JOCHEM STOCKINGER, M.D., THOMAS BLUM, M.D.,  
DIETRICH KALUSCHE, M.D., and THOMAS ARENTZ, M.D.

**PACE 2009; 32: 500-505**

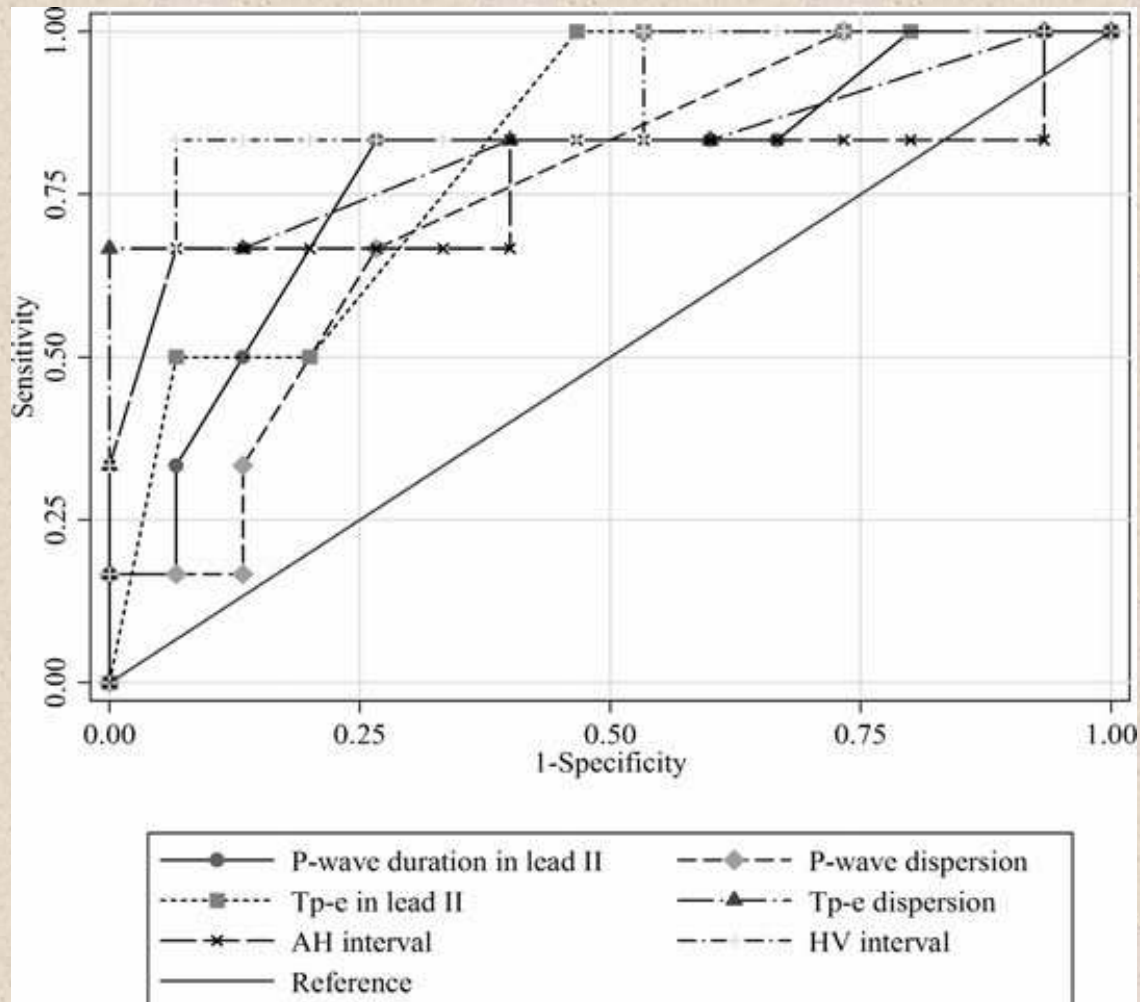
# AF in patients with Brugada Syndrome

## Who is at risk?

- P wave duration (II) ↑
- P wave dispersion ↑
- PR ↑ (II)
- QRS ↑
- HV ↑

Letsas et al. PACE 2009; 32: 500-505

# Plot of ROC curve for AF prediction



Letsas et al. PACE 2009; 32: 500-505

# High prevalence of concealed Brugada Syndrome in patients with atrioventricular nodal reentrant tachycardia

Can Hasdemir, MD, Serdar Payzin, MD, Umut Kocabas, MD, Hatice Sahin, RN, Nihal Yildirim, RN, Alpay Alp, Mehmet Aydin, MD, Ryan Pfeiffer, BSc, Elena Burashnikov, BSc, Yuesheng Wu, MS, Charles Antzelevitch, PhD, FHRS

**Heart Rhythm 2015; 12: 1547-1594**

# AVNRT and Brugada Syndrome

n = 96 AVNRT pts



n = 26 (27%) AVNRT + Brugada ECG

genetic testing 13/17 pts positive

→ high yield (76%)

**Heart Rhythm 2015; 12: 1547-1594**

# Conclusions (I)

**Patients with Brugada syndrome may present with:**

- **AF**
- **EAT**
- **AVNRT**
- **AVRT**
- **WPW Syndrome**

# Conclusions (II)

- **As class Ic agents are contraindicated, serial ECG monitoring is mandatory („unmasking“ Brugada ECG pattern)**
- **Catheter ablation is effective for SVT in Brugada syndrome**



# Conclusions (III)

**If patients present with AF < 40 yrs**

- **take family history (AF, sudden death)**
- **Ask for history of syncope**
- **Ask for fever seizures**

**As AF is present in pts with SQT / LQT / Brugada Syndrome**