ARVC

A – som i Arrhythmogenic

RV – Right Ventricular: Höger kammare ”angripen” i de flesta fall. Dock förekommer biventrikulärt eller isolerat LV-engagemang.

C – Cardiomyopathy- klassificeras bland primära kardiomyopatier numera. (D - Tidigare begrepp ARVD – Dysplasi. Men **ej** embryonal anläggningsrubbning!)

AVC - Arrhythmogenic Ventricular Cardiomyopathy?
ACM - Arrhythmogenic Cardiomyopathy. Förekommer även supraventrikulära arytmier.

Sven Lagerberg

ARVC

Incidens ca 1/2000 (1/1000-1/5000?)
Vanligare i vissa regioner (Norra Italien, Naxos)
Vanlig orsak till SCD hos unga vuxna.

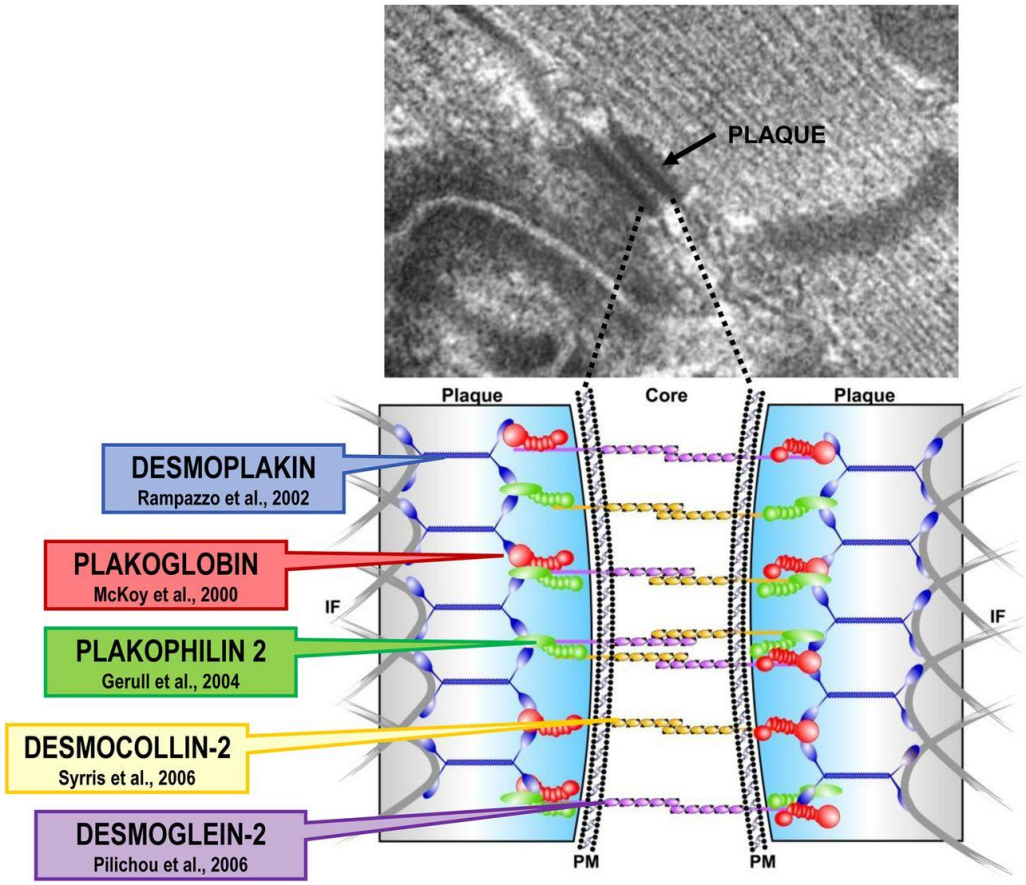
Debutsymtom ofta VT eller plötslig död:

- Plötslig död (SCD), VF – vid debut i yngre ålder.
- VT – något äldre patienter.

Mål: förebygga SCD!

Årlig mortalitet <1% (?)

ARVC - En desmosomsjuka



ARVC

Hur kommer patienter till oss?

- 50% av index pat – SCD!
- Släktutredning efter indexpt

- Avvikande EKG/UKG vid undersökning för annat
- Hjärtklappning – VT
- Svikt

Hur går vi vidare vi klinisk misstanke?

ARVC

Utredning vid klinisk misstanke:

- Anamnes (inkl hereditet)
- Vilo-EKG
- Arb-EKG
- HOLTER
- UKG
- ----------
- SAECG – sena potentialer
- MR-hjärta
- ARVC-UKG
- (Biopsi)

ARVC - Diagnoskriterier-1

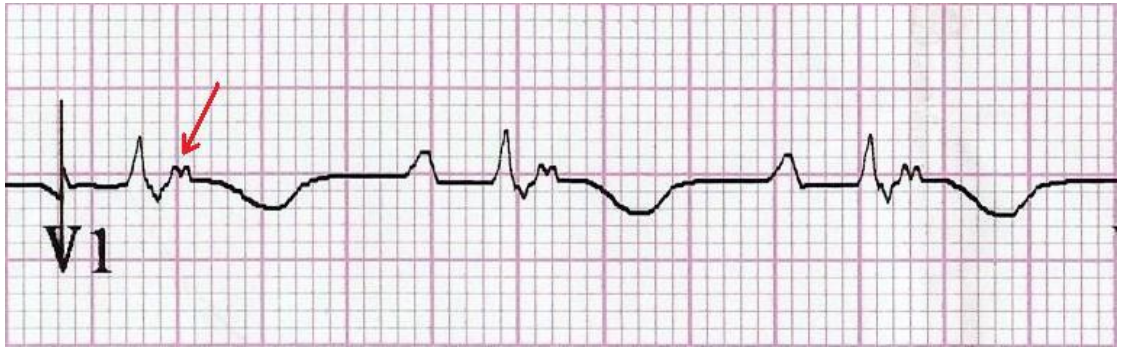
DEPOLARIZATION/CONDUCTION ABNORMALITIES	
Major	Epsilon wave (V1, V2, or V3)
Minor	Signal averaged ECG in the absence of QRSD >110 ms
	fQRS duration >114 ms or
	Duration of terminal QRS <40 μV ≥38 ms or
	Root-mean-square voltage of terminal 40 ms ≤20 μV
	Terminal activation delay ≥55 ms
REPOLARIZATION ABNORMALITIES (IN PATIENTS >14 YEARS OF AGE)	
Major	Negative T-wave in V1, V2, and V3 (without complete RBBB)
Minor	Negative T-wave in V1 and V2 or in V4, V5, or V6 (without complete RBBB)
	Negative T-wave in V1, V2, V3, and V4 with complete RBBB
VENTRICULAR ARRHYTHMIAS	
Major	Non-sustained or sustained VT with LBBB pattern with superior axis
Minor	Non-sustained or sustained VT with LBBB pattern with inferior or unknown axis
	>500 Premature ventricular complexes/24 h

ARVC - Diagnoskriterier -2

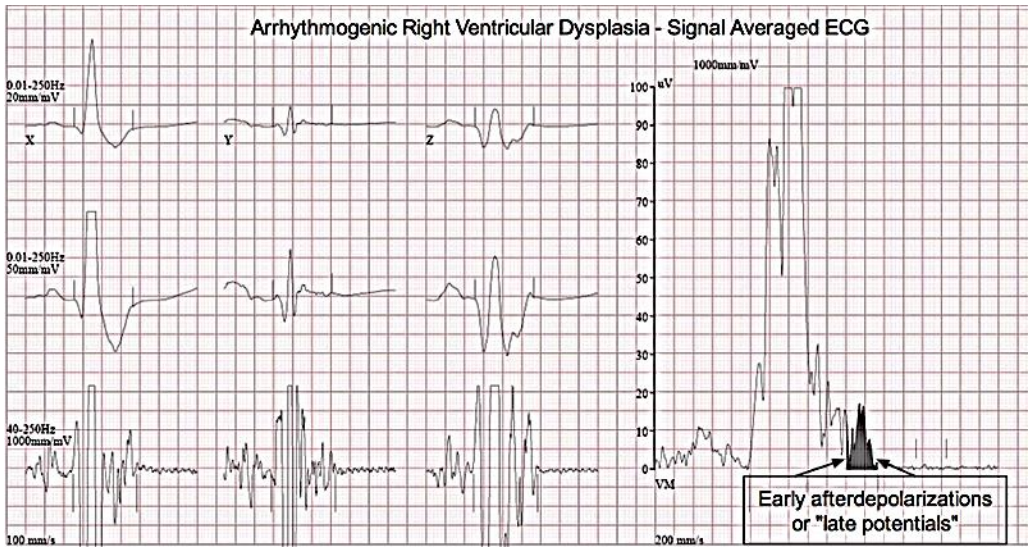
IMAGING TECHNIQUES	
Major	2D Echocardiography Regional RV akinesia, dyskinesia, or aneurysm and PLAX RVOT >32 mm (or PLAX RVOT >19 mm/m^2) or PSAX RVOT >36 mm (or PSAX RVOT >21 mm/m^2) or Fractional area change <33% MRI Regional RV akinesia, dyskinesia, or dyssynchronous RV contraction and Ratio of RVEDV to BSA >110 ml/m^2 (male) or >100 ml/m^2 (female) or RV ejection faction <40% RV angiography Regional RV akinesia, dyskinesia, or aneurysm
Minor	2D Echocardiography Regional RV akinesia or dyskinesia and PLAX RVOT ≥29 to <32 mm (or PLAX RVOT ≥16 to <19 mm/m^2) or PLAX RVOT ≥32 to <36 mm (or PLAX RVOT ≥18 to <21 mm/m^2) or Fractional area change ≥33 to <40% MRI Regional RV akinesia, dyskinesia, or dyssynchronous RV contraction and Ratio of RVEDV to BSA ≥100 to <110 ml/m^2 (male) or ≥90 to >100 ml/m^2 (female) or RV ejection faction ≥40 to <45%
HISTOLOGY (ENDOMYOCARDIAL BIOPSY FROM RVFW WITH FIBROUS REPLACEMENT)	
Major	Residual myocytes <60% on morphometric analysis (or <50% estimated)
Minor	Residual myocytes 60–75% on morphometric analysis (or 50–65% estimated)
FAMILY HISTORY	
Major	First degree relative with ARVC according to current task force criteria First degree relative with pathologically confirmed ARVC (surgery or atopsy) Pathogenic mutation categorized as associated or probably associated with ARVC
Minor	First degree relative with ARVC undetermined whether diagnosis meets current task force criteria First degree relative with sudden death <35 years of age suspected to be related to ARVC Second degree relative with ARVC according to current task force criteria

ARVC - Depolarisation

Epsilonvågor - Major

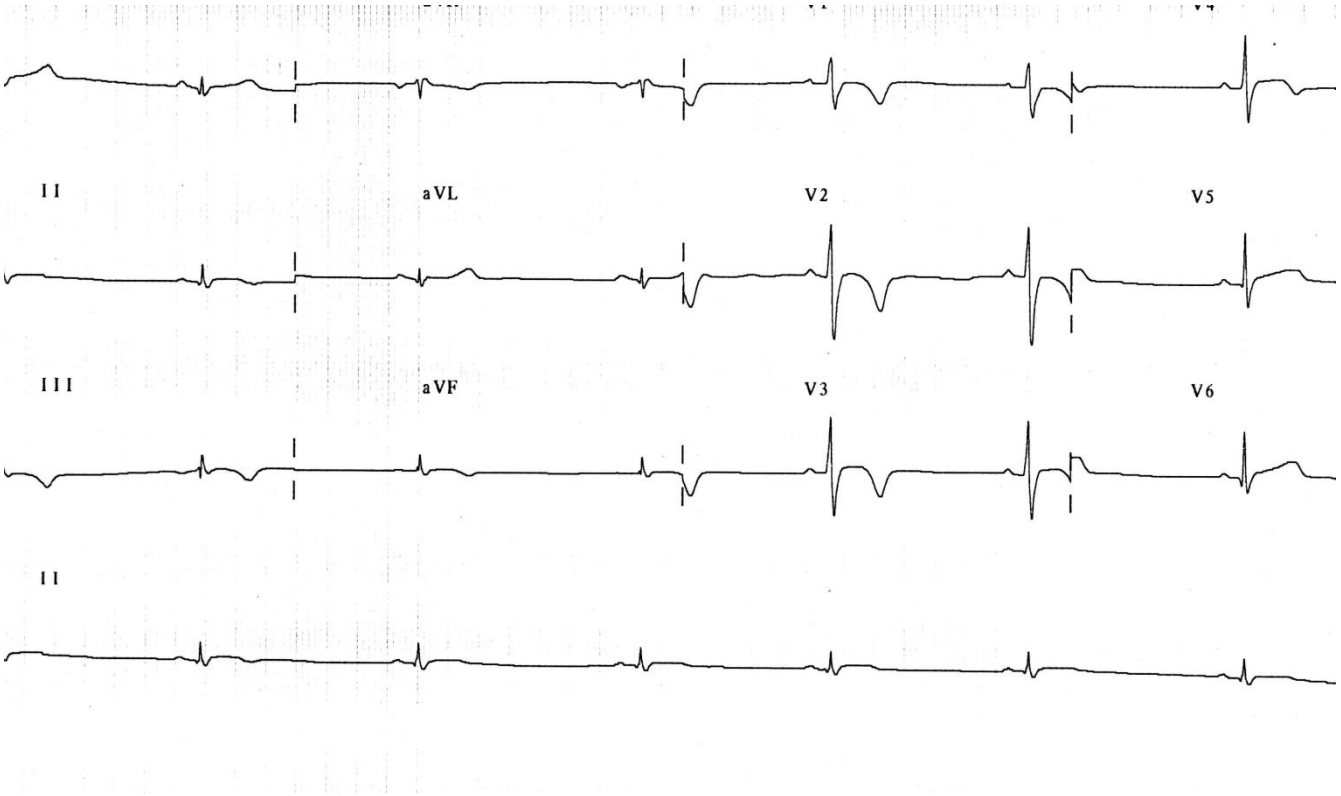


SAECG – sena potentialer - Minor



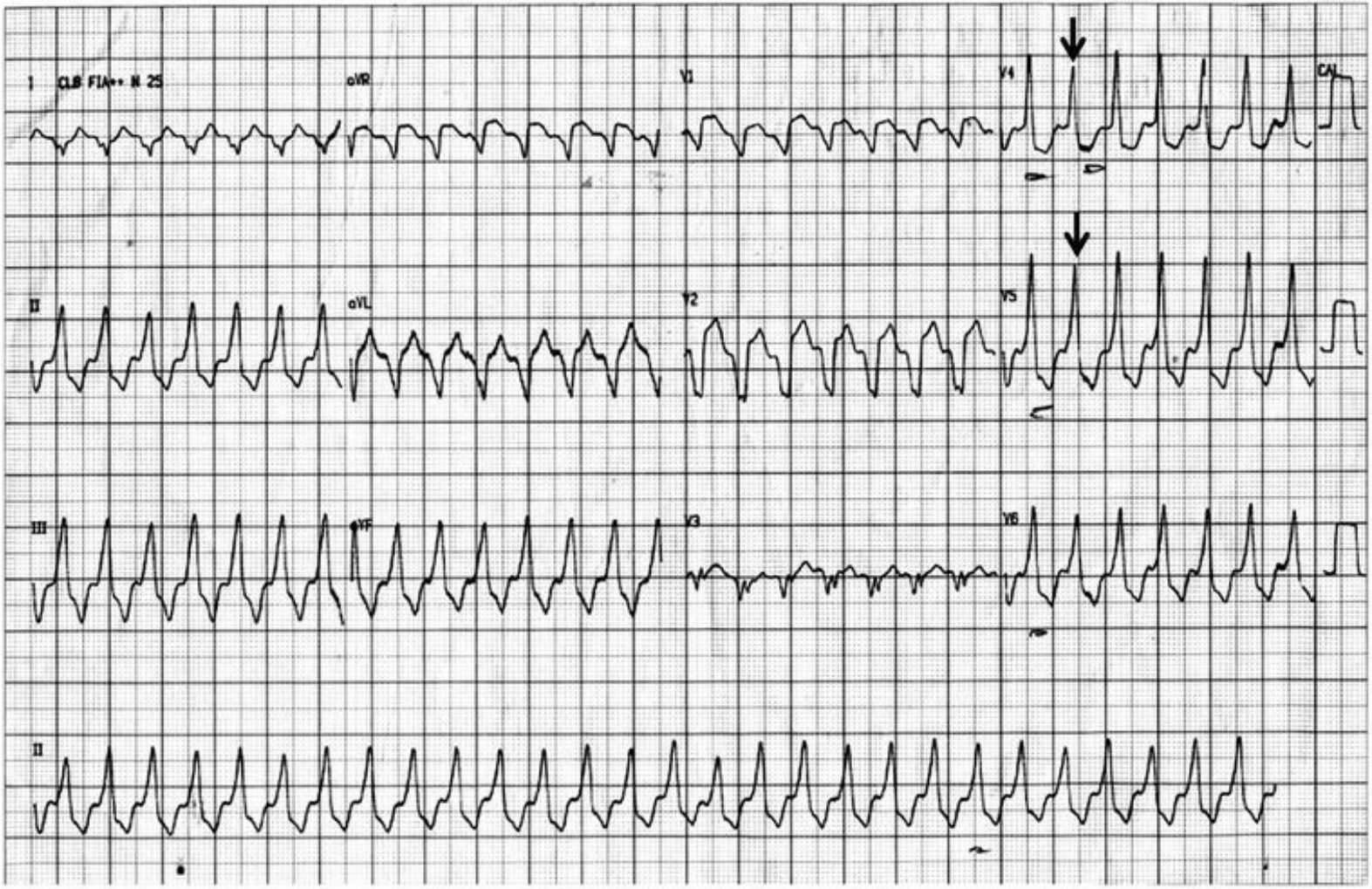
ARVC - Repolarisation

T-vågsinvertering: Tre avledningar – Major
T-vågsinvertering: Två avledningar - Minor

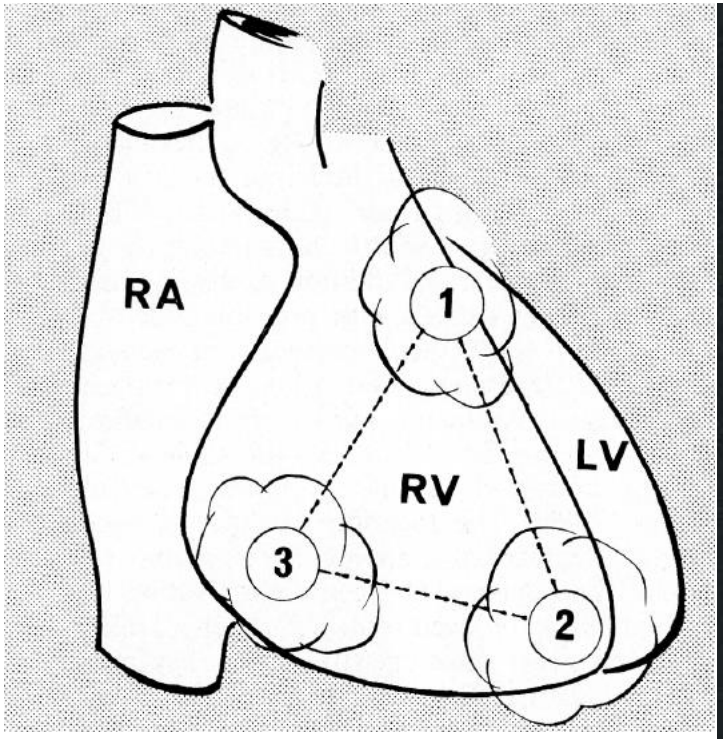


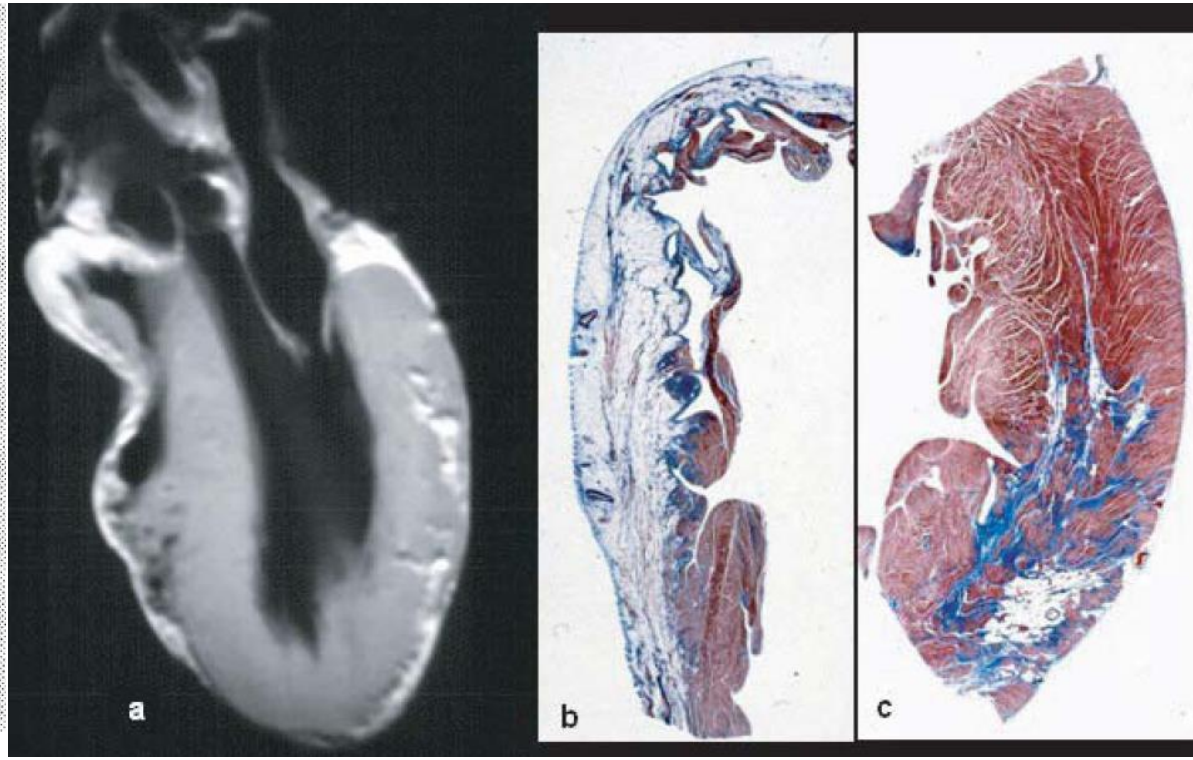
ARVC - Ventrikulära arytmier

VT: Ursprung höger kammare

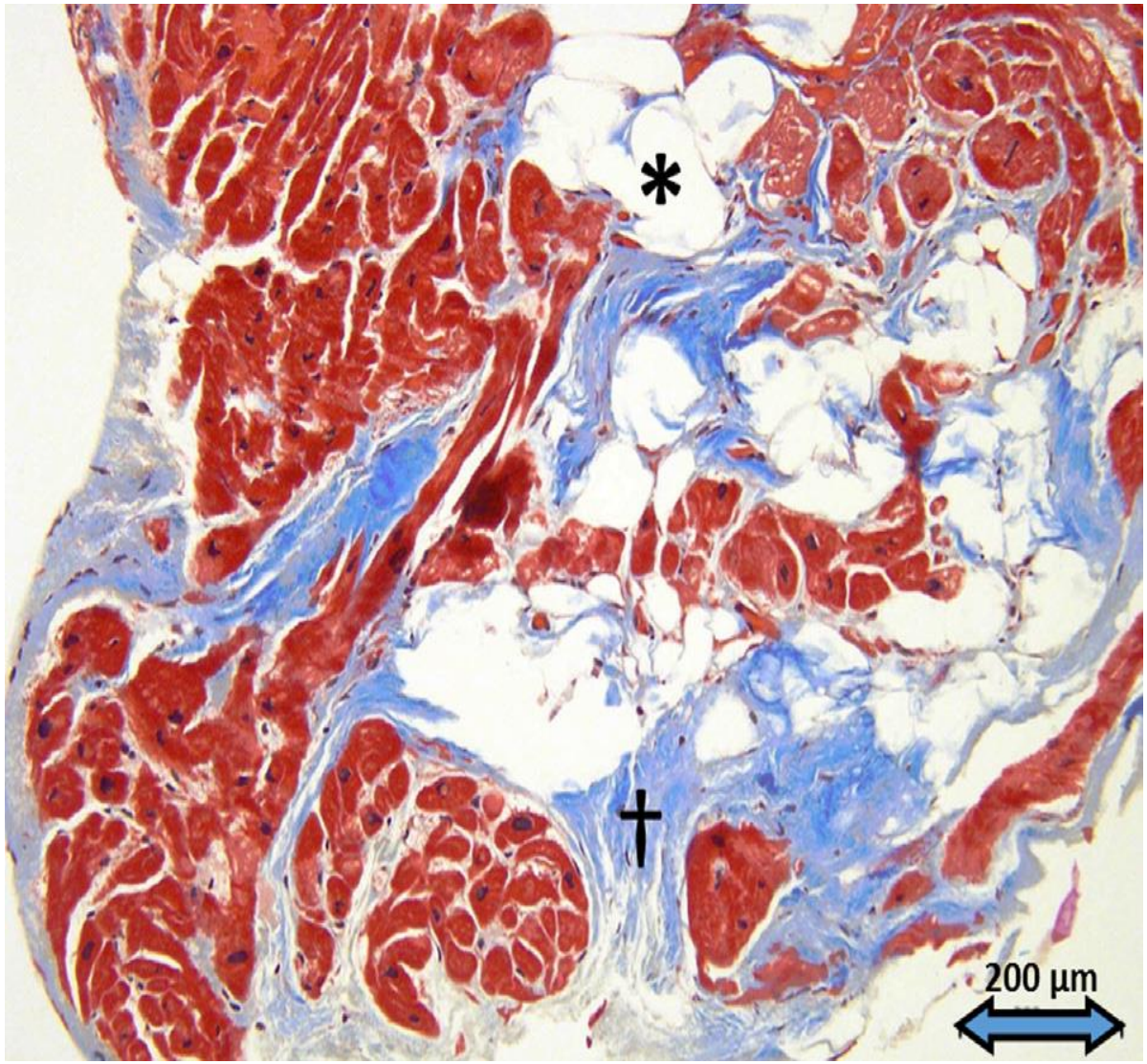


ARVC - Strukturella avvikelser





ARVC - Vävnadskaraktäristika



Fibro-Fatty Replacement

ARVC - Genetik

Hos ca 40-50% av ARVC-pat kan man identifiera genetisk avvikelse.

- Minst 12 olika mutationer kända, fler på gång.
- Vissa individer kan ha mer än en patologisk gen.
- Mkt varierande penetrans ger svårförutsägbar fenotyp.

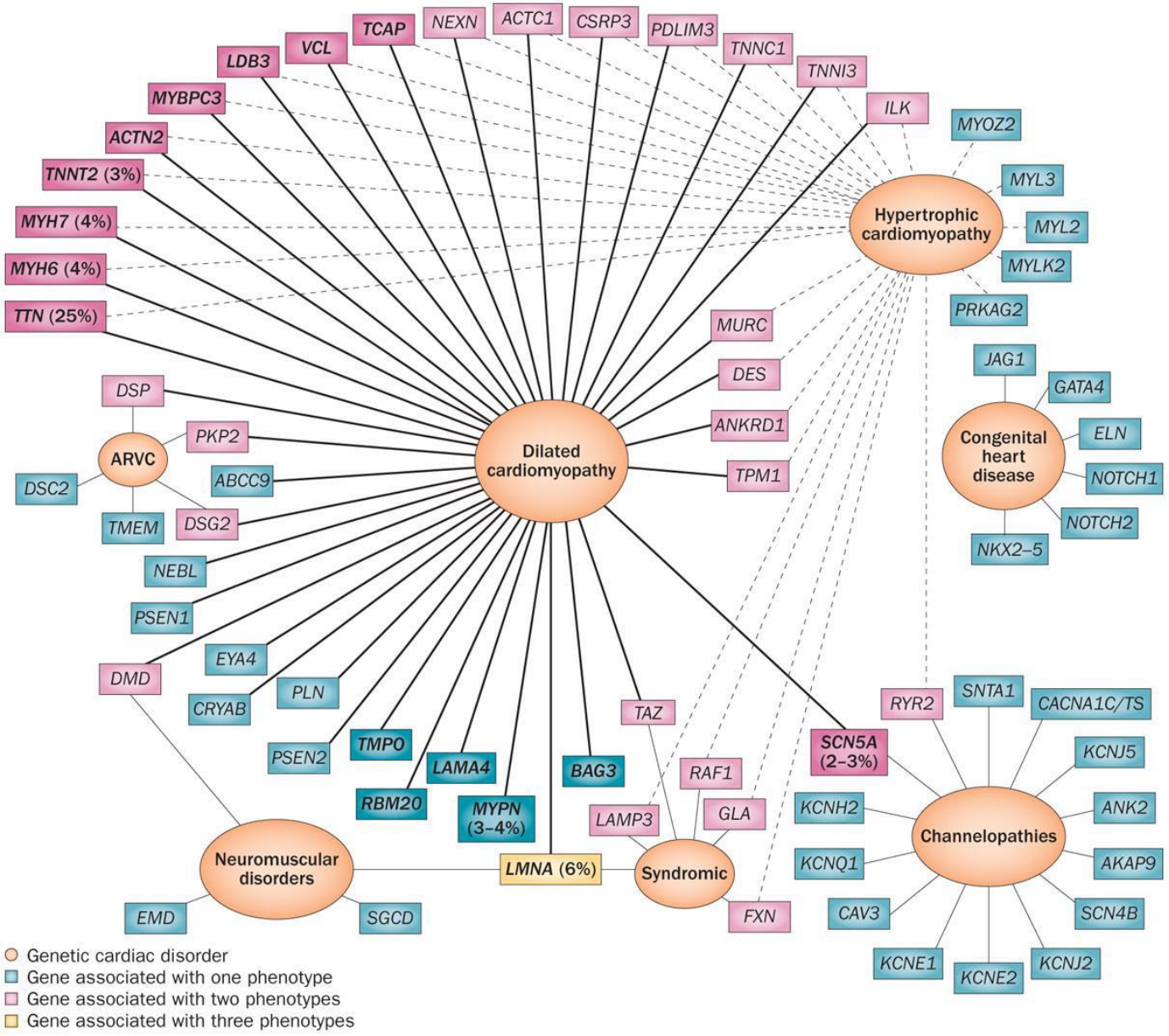
Genetisk screening betydelsefullt för att:

- Konfirmera diagnos hos pat som ej helt uppfyller övriga kriterier.
- Tidigt hitta asymtomatiska bärare.
- *Utesluta* sjukan hos förstagradssläktingar om redan känd mutation.
- Riskstratifiering – sannolikt ökad arytmirisk om mer än en mutation.
- OBS – enbart mutationsbärarskap räcker inte för diagnos!

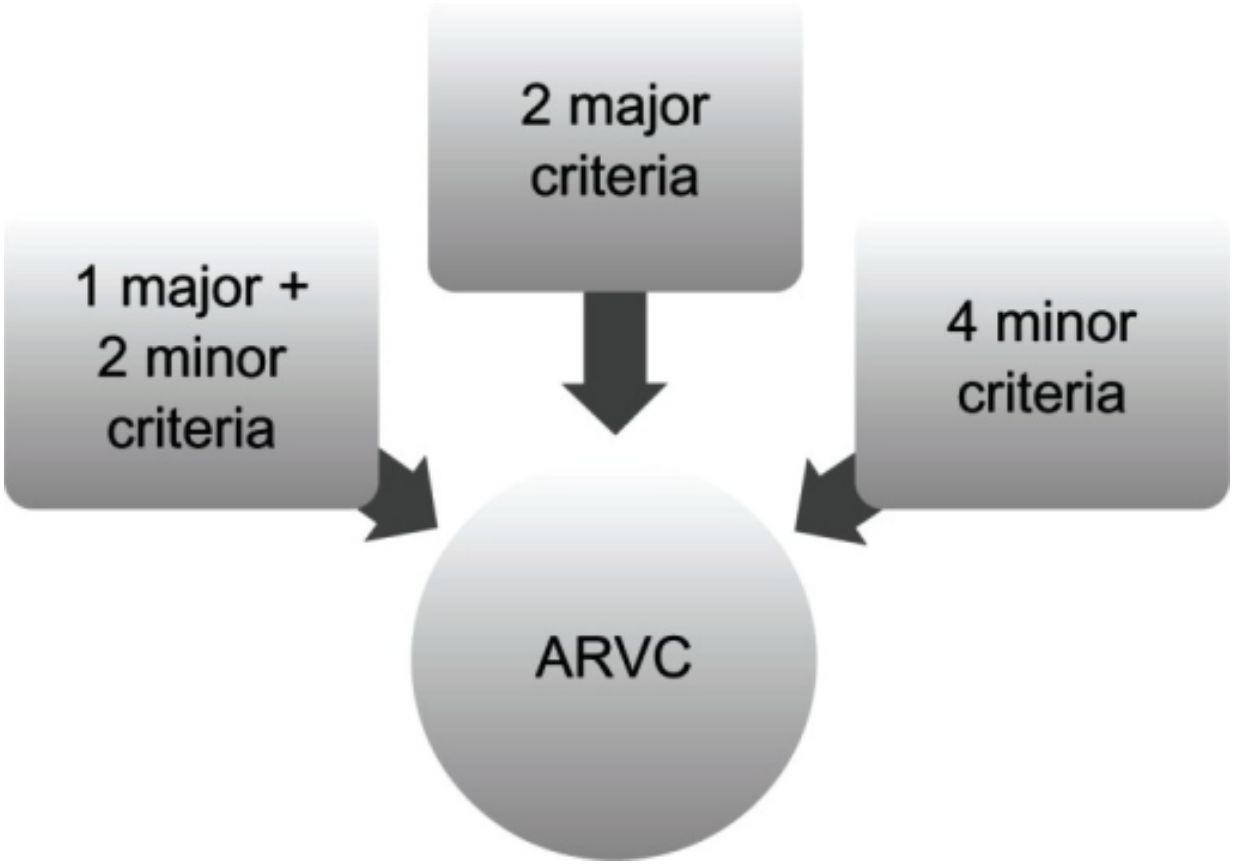
ARVC - Genetik

Om sjukdomsorsakande genvariant *inte identifieras* bör förstagradssläktingar erbjudas klinisk screening (EKG, aEKG, UKG, MR, HOLTER, SAECG)

Genotyp vs Fenotyp



ARVC - Diagnoskriterier - 3



OBS: kriterier skall vara från olika kategorier!

ARVC - Behandling

European Heart Journal (2015) **36**, 3227–3237
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CURRENT OPINION

Treatment of arrhythmogenic right ventricular cardiomyopathy/dysplasia: an international task force consensus statement

Domenico Corrado[1*], Thomas Wichter[2], Mark S. Link[3], Richard Hauer[4], Frank Marchlinski[5], Aris Anastasakis[6], Barbara Bauce[1], Cristina Basso[1], Corinna Brunckhorst[7], Adalena Tsatsopoulou[8], Harikrishna Tandri[9], Matthias Paul[10], Christian Schmied[7], Antonio Pelliccia[11], Firat Duru[7], Nikos Protonotarios[8], NA Mark Estes III[3], William J. McKenna[12], Gaetano Thiene[1], Frank I. Marcus[13], and Hugh Calkins[9]

ARVC - Behandling

Livsstilsförändringar
Farmakologisk behandling
Ablation
ICD
Hjärttransplantation

Recommendations	Class[a]	Level[b]	Ref.[c]
Avoidance of competitive sports[d] is recommended in patients with ARVC.	I	C	388
Beta-blockers titrated to the maximally tolerated dose are recommended as the first-line therapy to improve symptoms in patients with frequent PVC and NSVT.	I	C	This panel of experts
ICD implantation is recommended in patients with a history of aborted SCD and haemodynamically poorly tolerated VT.	I	C	389
Amiodarone should be considered to improve symptoms in patients with frequent PVC or NSVT who are intolerant of or have contraindications to beta-blockers.	IIa	C	390, 391
Catheter ablation, performed in experienced centres, should be considered in patients with frequent symptomatic PVC or VT unresponsive to medical therapy to improve symptoms and prevent ICD shocks, respectively.	IIa	B	183, 202, 207, 392, 393
ICD implantation should be considered in ARVC patients who have haemodynamically well-tolerated sustained VT, balancing the risk of ICD therapy, including long-term complications, and the benefit for the patient.	IIa	B	387, 394, 395
ICD implantation may be considered in patients with one or more recognized risk factors for VA in adult patients with a life expectancy >1 year following detailed clinical assessment that takes into account the lifelong risk of complications and the impact of an ICD on lifestyle, socioeconomic status and psychological health.	IIb	C	This panel of experts
Invasive EPS with PVS may be considered for stratification of SCD risk.	IIb	C	113, 114

ARVC - Behandling

Livsstilsförändringar:

- Samband mellan SCD och ansträngning, femfaldig riskökning vid ARVC!
- Träning kan påskynda progress av fenotypen!

Rekommendation vid diagnos ARVC:

- Ej tävling eller uthållighetsträning
- Lågintensiv träning på komfortnivå kan vara OK.

Rekommendation under utredning för ARVC?

- ”Kan överväga att undvika tävlingsidrott”

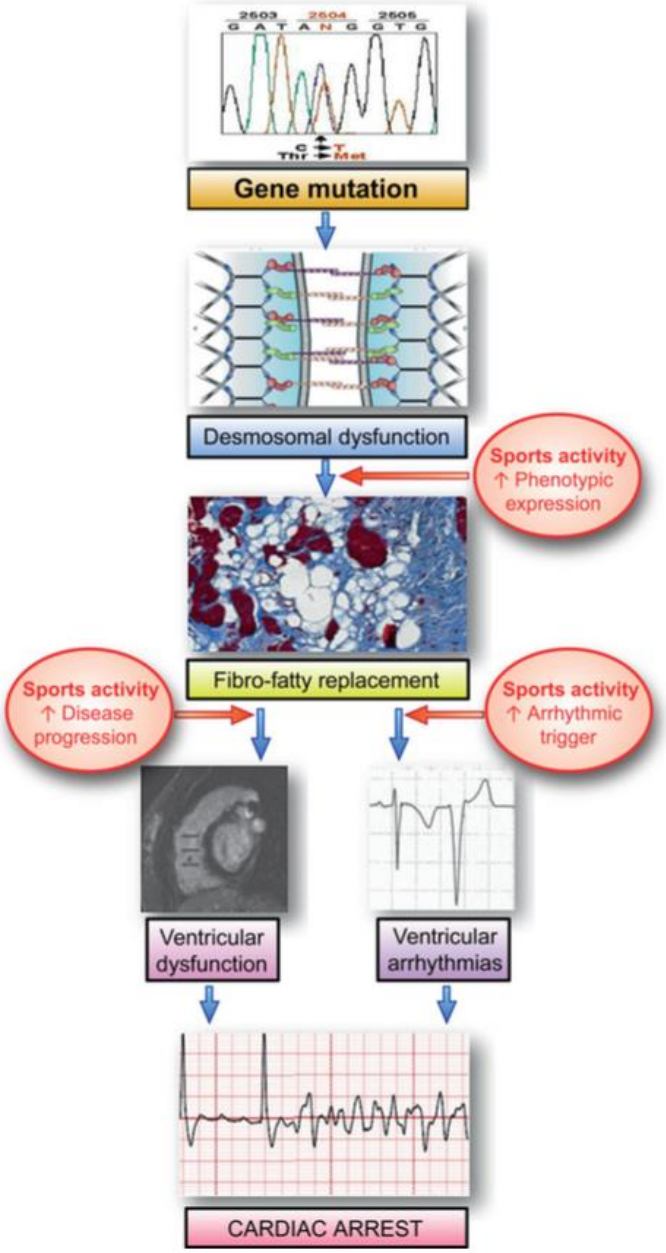


Figure 1 Schematic representation of the course of arrhythmogenic right ventricular cardiomyopathy from desmosomal gene mutation to phenotypic expression and cardiac arrest due to ventricular fibrillation. Sports activity may promote development of phenotypic expression, accelerate disease progression, and trigger life-threatening ventricular arrhythmias (see text for more details).

ARVC - Behandling

Farmakologisk behandling:

Cordarone: Som komplement till ICD om mkt arytmier.
(Sotalol??)
Betablockad: Kanske till alla med ARVC
Hjärtsviktsbehandling: om LV/RV-dysfunktion
Antikoagulantia: Om intrakavitära tromboser

OBS: Friska genbärare skall inte ha behandling!

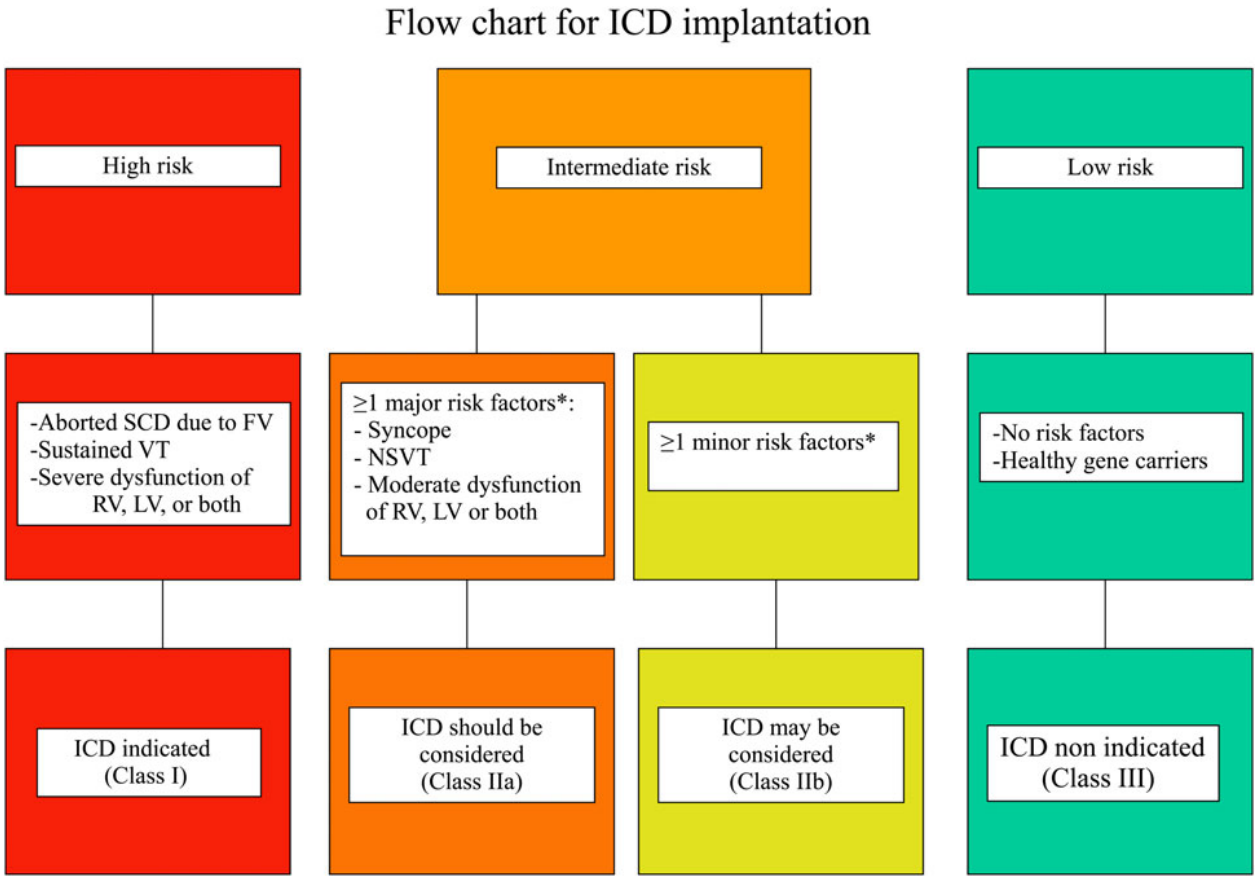
ARVC - Behandling

VT-ablation: endo-, epicardiell

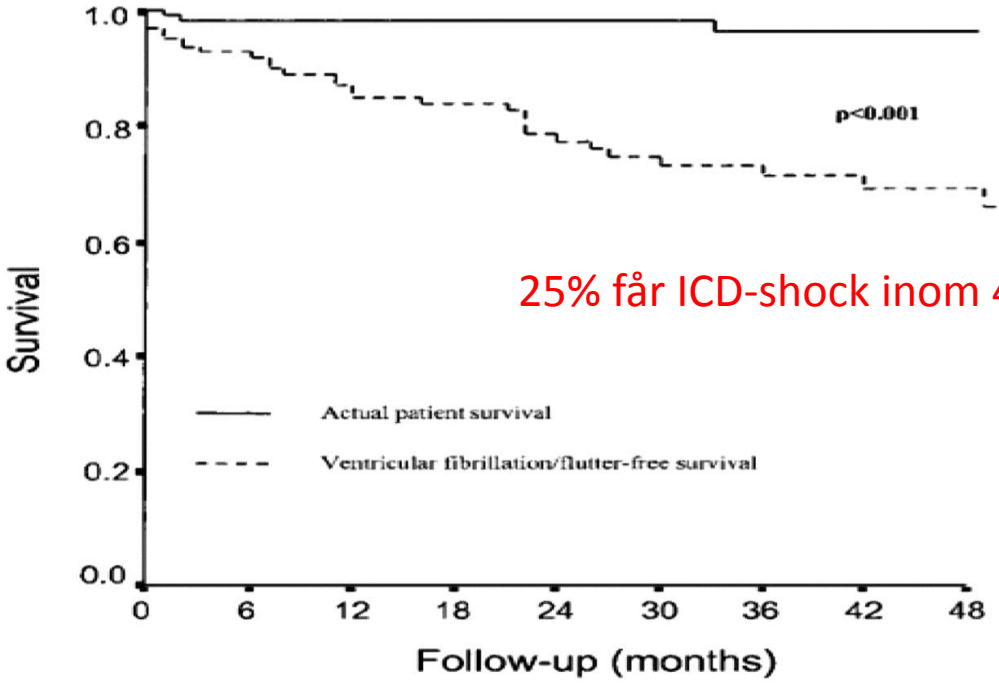
- Om mkt VT trots antiarytmika
- Om elektrisk storm vid ICD
- Ej bot, bara symtomlindring
- Förhindrar ej SCD

ARVC - Behandling

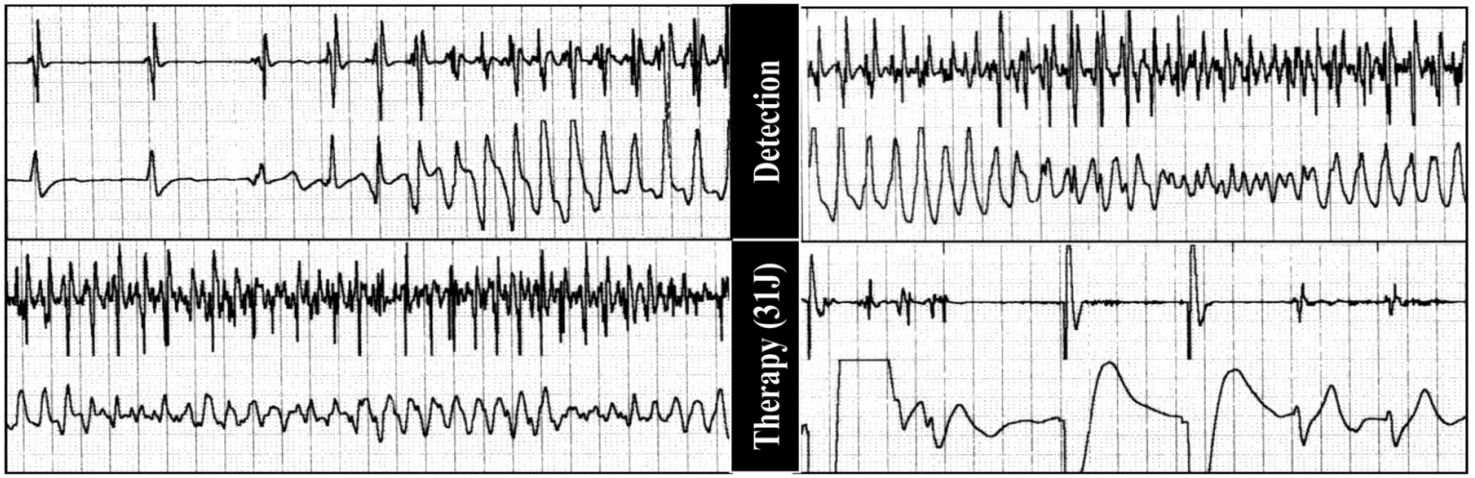
ICD?



ARVC - ICD



25% får ICD-shock inom 4 år!



ARVC - Behandling

Hjärttransplantation?

Vid refraktär hjärtsvikt och/eller refraktära arytmier.

Utredning vid klinisk misstanke:

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- Vilo-EKG
- Arb-EKG
- HOLTER
- UKG
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TACK!