SEDE OMCEO
VIA MANZÙ 25
BERGAMO

PROGRAMMA

Saluti e introduzione

h. 8.30 *Dott. Guido Marinoni*
Presidente Omceo Bergamo

I Sessione

h. 9.00
Tachiaritmie sopraventicolari nell'adulto e nel paziente pediatrico

h. 9.40
Indicazioni ed esecuzione di studio elettrofisiologico (Sef) ed ablazione del substrato aritmico

h. 10.20
Fibrillazione atriale ed indicazione all'ablazione di fibrillazione atriale

h. 11.00 domande
h.11.15 pausa

II Sessione

h. 11.30
Aritmie ventricolari e morte cardiaca improvvisa: novità delle linee guida ESC 2022

h. 12.10
Sindromi aritmogene familiari: gestione del paziente adulto. del paziente pediatrico e dei familiari

h. 12.50 domande
h.13.00 test e conclusioni

Relatori:
dottori *Luca Bontempi, Angelica Fundaliotis Andrea Dell'Aquila, Marina Moretti*

Durante l'evento utilizzo dei dispositivi di protezione in base alla normativa antiCovid

RESPONSABILE SCIENTIFICO
DOTT.SSA EUGENIA BELOTTI
vicepresidente Omceo Bergamo

1 APRILE 2023
H. 8.30/13.30

APPROFONDIMENTI IN TEMA DI ARITMIE

5 CREDITI ECM

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Sindromi aritmogene familiari

Gestione del paziente adulto, del paziente pediatrico e dei familiari

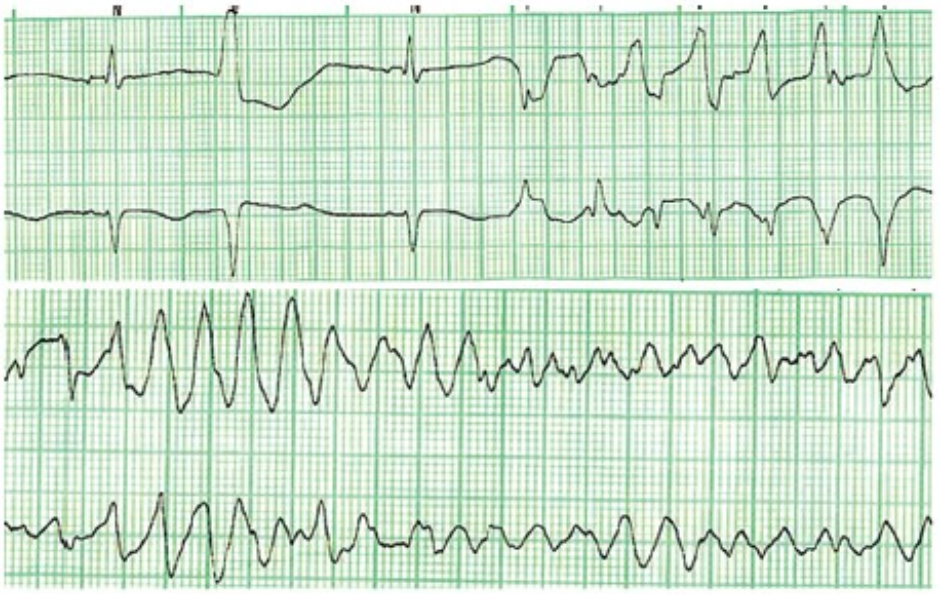
Dr. Andrea Dell'Aquila

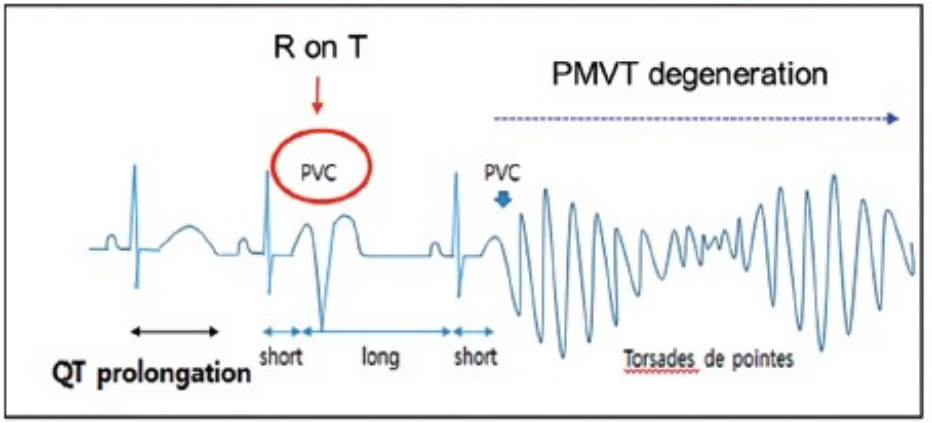
UOS Elettrofisiologia ed Elettrostimolazione
UOC Cardiologia
ASST Bergamo Est
Ospedale "Bolognini" di Seriate

Sistema Socio Sanitario
Regione Lombardia
ASST Bergamo Est

S. aritmogene familiari: introduzione

- Gruppo eterogeneo di **malattie genetiche** (cardiomiopatie + disordini elettrici primari) associate a **rischio** di **morte cardiaca improvvisa** (**SCD**: Sudden Cardiac Death)
- **Morte improvvisa (SUD: Sudden Unexplained Death) ≠ SCD**
- Una delle **cause principali** di **SCD** in **giovani** apparentemente sani
- **NB:** **anamnesi familiare positiva** per **SUD**



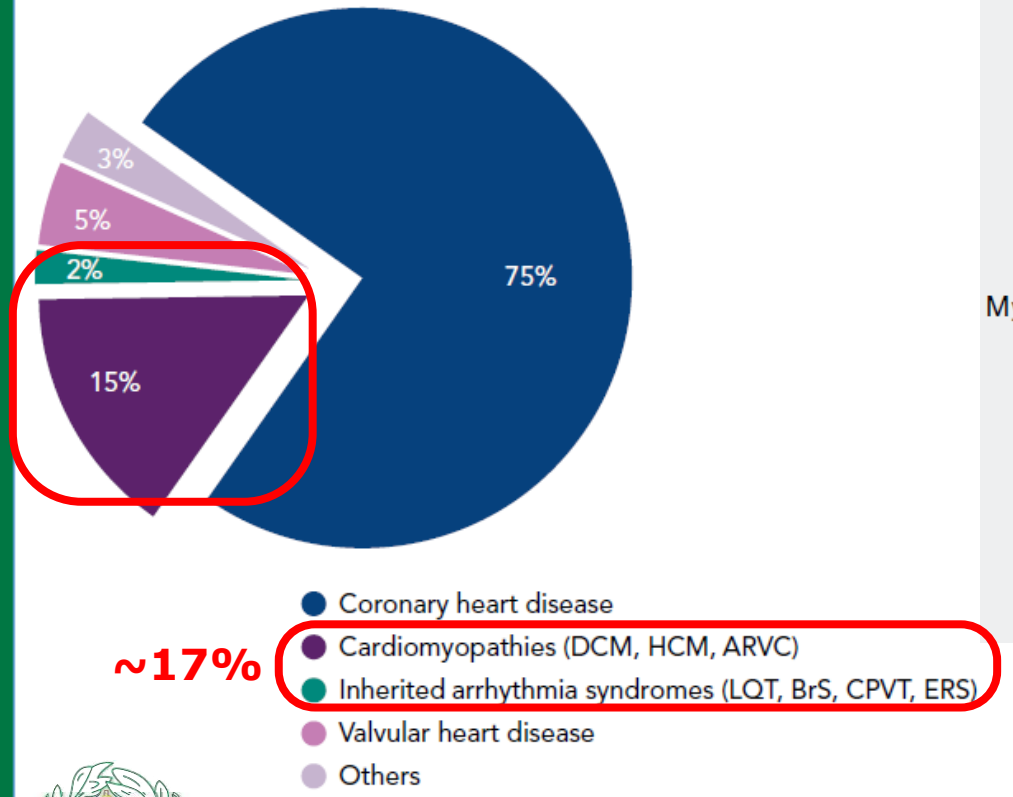


Fᑫ 24enne, LQTS tipo 2

Kim YG, et al. Inherited arrhythmia syndrome predisposing to sudden cardiac death. Korean J Intern Med. 2021;36(3):527-538.

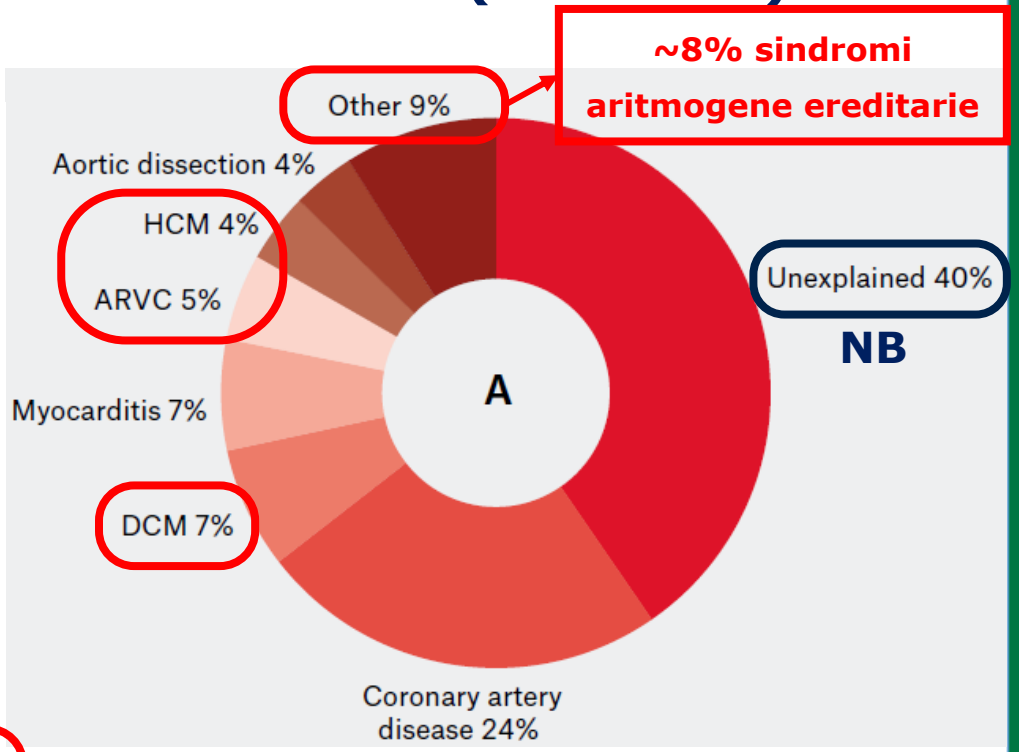
Morte cardiaca improvvisa (SCD): cause

Popolazione generale



~17%

Giovani (≤40 anni)



~8% sindromi aritmogene ereditarie

NB

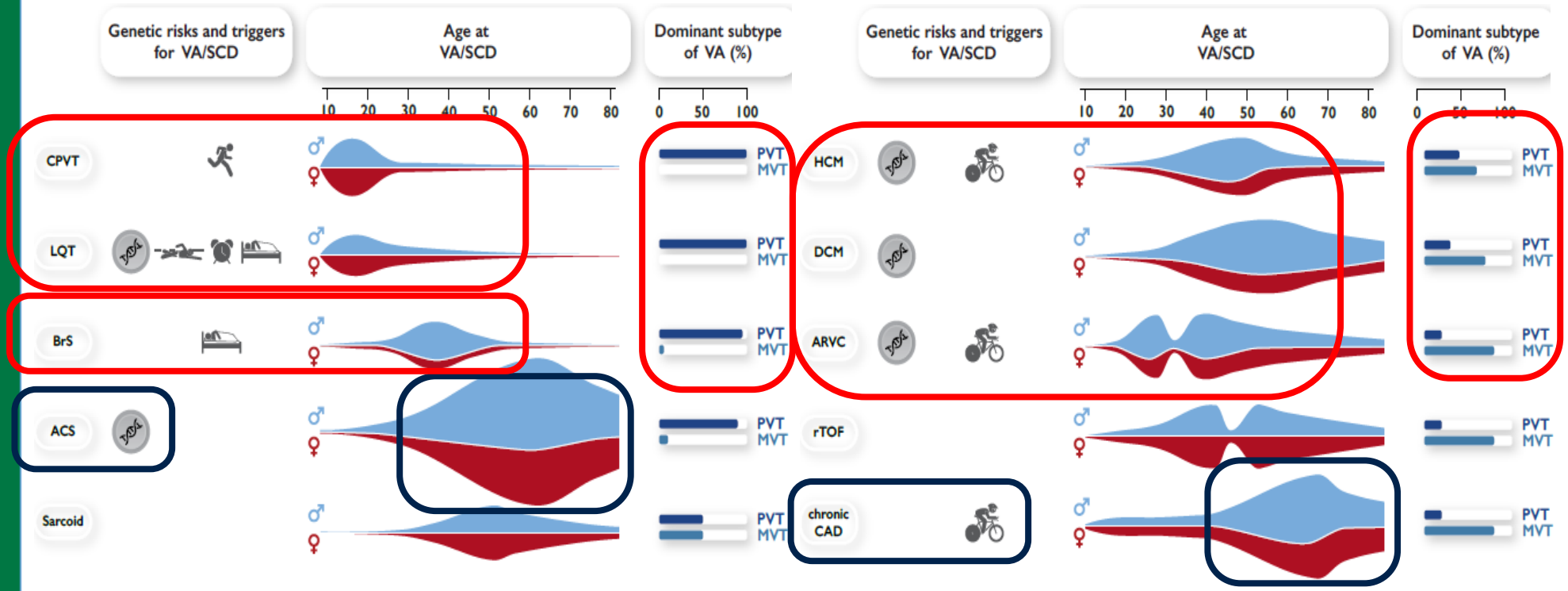
~24%: causa certa → **Potenzialmente >50%**

NB: netta differenza in **malattia coronarica** (**comunque presente** anche nei **giovani**)

Srinivasan NT, Schilling RJ. Sudden cardiac death and arrhythmias. Arrhythmia Electrophysiol Rev. 2018;7(2):111-117.

Isbister J, Semsarian C. Cardiovascular genomics and sudden cardiac death in the young. Aust J Gen Pract. 2019;48(3):90-95.

SCD: età e rischio aritmico



- **LQTS e CPVT:** pz pediatrici e giovani (**<30 anni**), M♂=F♀
- **Cardiomiopatie + S. di Brugada:** giovani adulti e adulti **<50 anni**, **M♂**>F♀
- **Malattia coronarica (acuta o cronica):** adulti **>40 anni**, **M♂ prima** di F♀

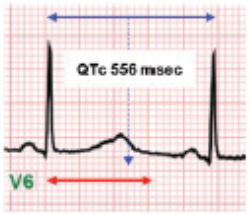
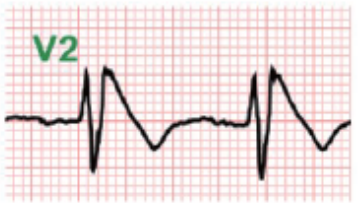
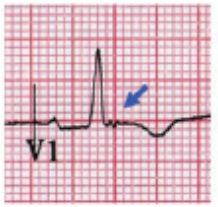
S. aritmogene = PVT vs **CMP = MVT**

ORDINE DEI MEDICI CHIRURGHI E DEGLI ODONTOIATRI DELLA PROVINCIA DI BERGAMO

Sistema Socio Sanitario Regione Lombardia ASST Bergamo Est

Zeppenfeld K, et al. 2022 ESC Guidelines for the management of patients with ventricular arrhythmias and the prevention of sudden cardiac death. Eur Heart J. 2022;43(40):3997-4126.

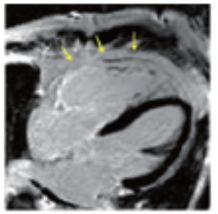
S. aritmogene familiari: diagnosi

	Congenital LQTS	Brugada syndrome	CPVT	SQTS	ARVC
ECG[a]	✓Repeated QTc ≥ 480 ms or ≥ 460 ms with unexplained syncope	✓ ST elevation ≥2 mm, coved ST, T wave inversion in V1-V2	✓Bidirectional VT during exercise	✓Repeated QTc ≤ 340 ms or ≤ 360 ms when accompanied by a confirmed pathogenic mutation, a family history of SQTS or sudden death at age < 40 years, or survival from a VT/VF episodes in the absence of heart disease	✓ Epsilon wave at end of QRS in V1-2
Echocardiogram CAG					
Holter Exercise test SA-ECG					
EP study					
Implantable loop recorder					

Drug provocation test[b]

Cardiac MRI/CT

RV biopsy



DDx) Brugada phenocopy

Genetic testing[c]

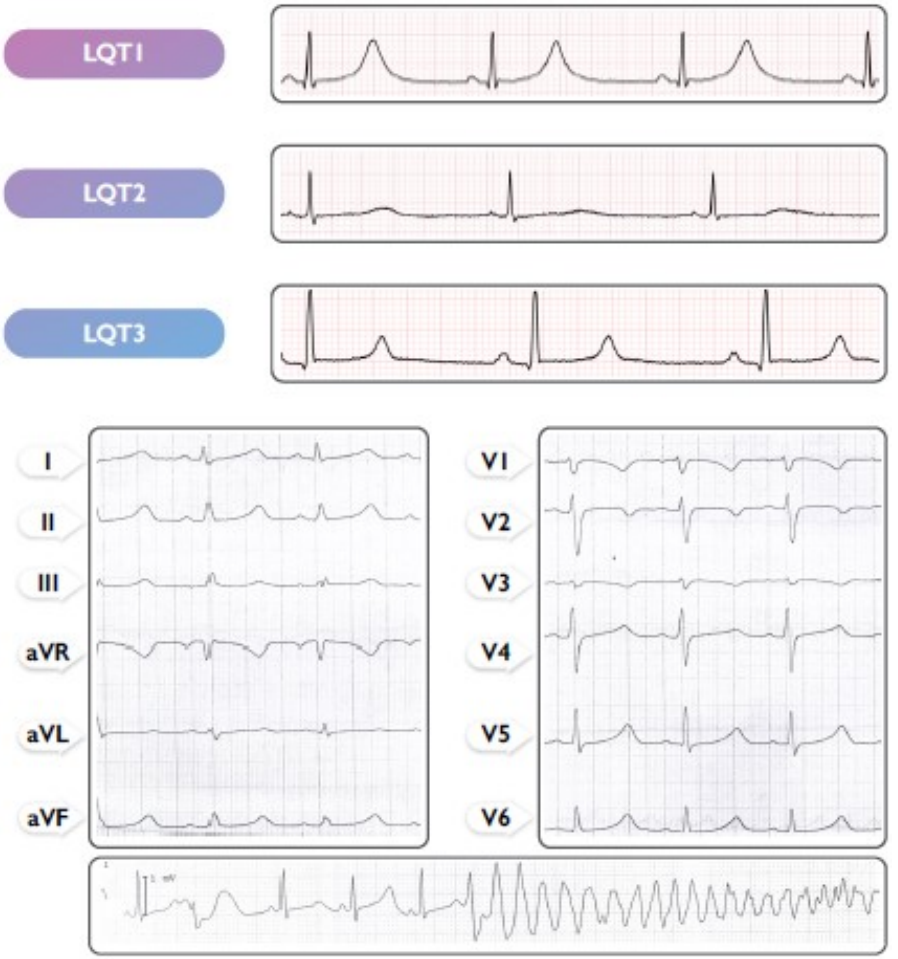
Idiopathic VF

NB: test provocativi, SEF e **Loop Recorder** per **stratificare rischio** e/o confermare **diagnosi**

Kim YG, et al. Inherited arrhythmia syndrome predisposing to sudden cardiac death. Korean J Intern Med. 2021;36(3):527-538.

S. del QT lungo congenito (LQTS)

- **LQTS** = **prolungamento** intervallo **QTc**
- **LQTS congenito ≠ acquisito** (es. iatrogeno da farmaci, disionie, ecc)
- **Trigger** aritmico = attivazione **adrenergica**
- **Età media** di presentazione: **14 anni**
- Tasso **annuo** di **SCD**: **0.5%** in **asintomatici**, **5%** in pz con **sincopi** in anamnesi



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Wilde AAM, et al. Diagnosis, management and therapeutic strategies for congenital long QT syndrome. Heart. 2022;108(5):332-338.

LQTS: forme principali (1)

- **Multiple forme** (**>10**), di cui **molte disputate** da alcuni autori
- Forme **principali**: **LQTS 1-3, >90%** dei **casi di LQTS** confermati geneticamente
- Forme **AD** isolate (senza manifestazioni extracardiache): prevalenza 1:2500
- Forme **AD** con **manifestazioni extracardiache**: Andersen–Tawil Syndrome (LQT7), Timothy Syndrome (LQT8)
- Forme **AR** con **sordità congenita**: Jervell and Lange–Nielsen Syndrome

Table 1 Classification of genetic evidence by the Clinical Genome Resource (ClinGen) for genes previously associated with LQTS

Gene	Protein	Level of evidence	
AKAP9	A kinase anchor protein 9	Disputed	
ANK2	Ankyrin-2	Disputed	
CACNA1C	Calcium voltage-gated channel α1c subunit	Moderate	
CALM1	Calmodulin-1	Definitive	
CALM2	Calmodulin-2	Definitive	
CALM3	Calmodulin-3	Definitive	
CAV3	Caveolin-3	Limited	
KCNE1	Potassium voltage-gated channel subfamily E regulatory subunit 1	Disputed	
KCNE2	Potassium voltage-gated channel subfamily E regulatory subunit 1	Disputed	
KCNH2	Potassium voltage-gated channel subfamily H member 2	Definitive	**LQTS2**
KCNJ2	Potassium voltage-gated channel subfamily J member 2	Limited	
KCNJ5	Potassium voltage-gated channel subfamily J member 5	Disputed	
KCNQ1	Potassium voltage-gated channel subfamily Q member 2	Definitive	**LQTS1**
SCN4B	Sodium voltage-gated channel β subunit 4	Disputed	
SCN5A	Sodium channel voltage-gated α subunit 5	Definitive	**LQTS3**
SNTA1	Syntrophin α1	Disputed	
TRDN	Triadin	Strong	

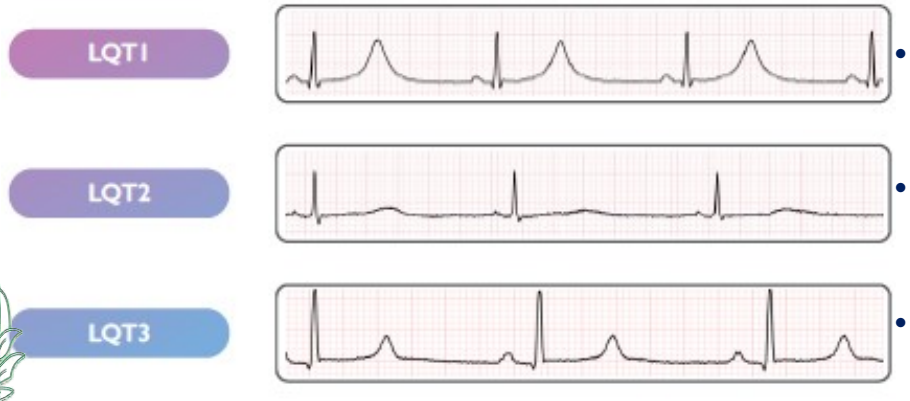
NB: stesso **gene** di **BrS**

Wilde AAM, et al. Diagnosis, management and therapeutic strategies for congenital long QT syndrome. Heart. 2022;108(5):332-338.

LQTS: forme principali (2)

	Type 1	Type 2	Type 3
Gene	*KCNQ1*	*KCNH2*	*SCN5a*
Protein	$K_v7.1$	$K_v11.1$	$Na_v1.5$
Effect on current	$I_{Ks}\downarrow$	$I_{Kr}\downarrow$	$I_{Na,L}\uparrow$
Effect on action potential			
Frequency among LQTS	± 35%	± 30%	≤ 10%
Penetrance	± 65%	± 80%	± 90%
Typical resting ECG (V_5)			

	Type 1	Type 2	Type 3
QT change with exercise	Failure to shorten	Normal	Supranormal
Main trigger of events	Exercise *(swimming)*	Arousal	Rest
Age of onset arrhythmias	Childhood	Puberty	Puberty
Gender most at risk	♂	♀	♀
Onset of arrhythmias	*Not pause-dependent*	*Pause-dependent*	At lower heart rates
Therapy	Beta-blockers (+++) Left stellectomy	Beta-blockers (++) Left stellectomy Potassium suppletion	Beta-blockers (++) Sodium channel blocker Pacemaker



- **LQTS1:** onda T larga ad esordio precoce o normale
- **LQTS2:** onda T piccola e tardiva, spesso indentata o a doppia gibbosità
- **LQTS3:** onda T tardiva con normale morfologia

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LQTS: diagnosi

- **QTc ≥480 ms**

oppure

- **Mutazione patogenica**

oppure

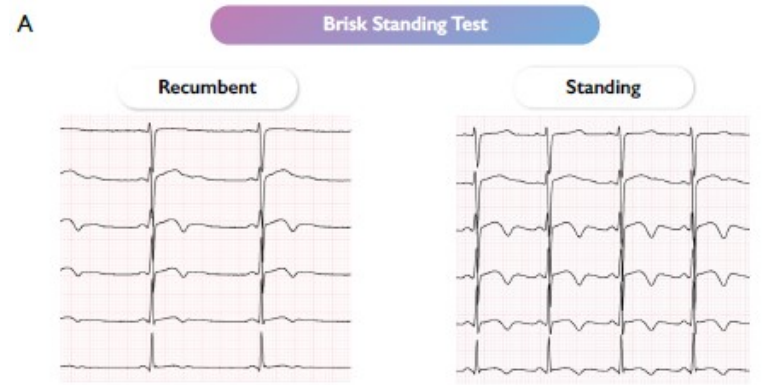
- **LQTS modified risk score >3**

(in assenza di cause secondarie, es. farmaci o ipokaliemia)

Findings			Points
ECG	QTc	≥480 ms	3.5
		=460–479 ms	2
		=450–459 ms (in males)	1
		≥480 ms during 4th minute of recovery from exercise stress test	1
	Torsade de pointes		2
	T wave alternans		1
	Notched T wave in 3 leads		1
	Low heart rate for age		0.5
Clinical history	Syncope	With stress	2
		Without stress	1
Family history	Family member(s) with definite LQTS		1
	Unexplained SCD at age <30 years in first-degree family		0.5
Genetic finding	Pathogenic mutation		3.5

NB: test da sforzo

Brisk standing test (LQTS2)



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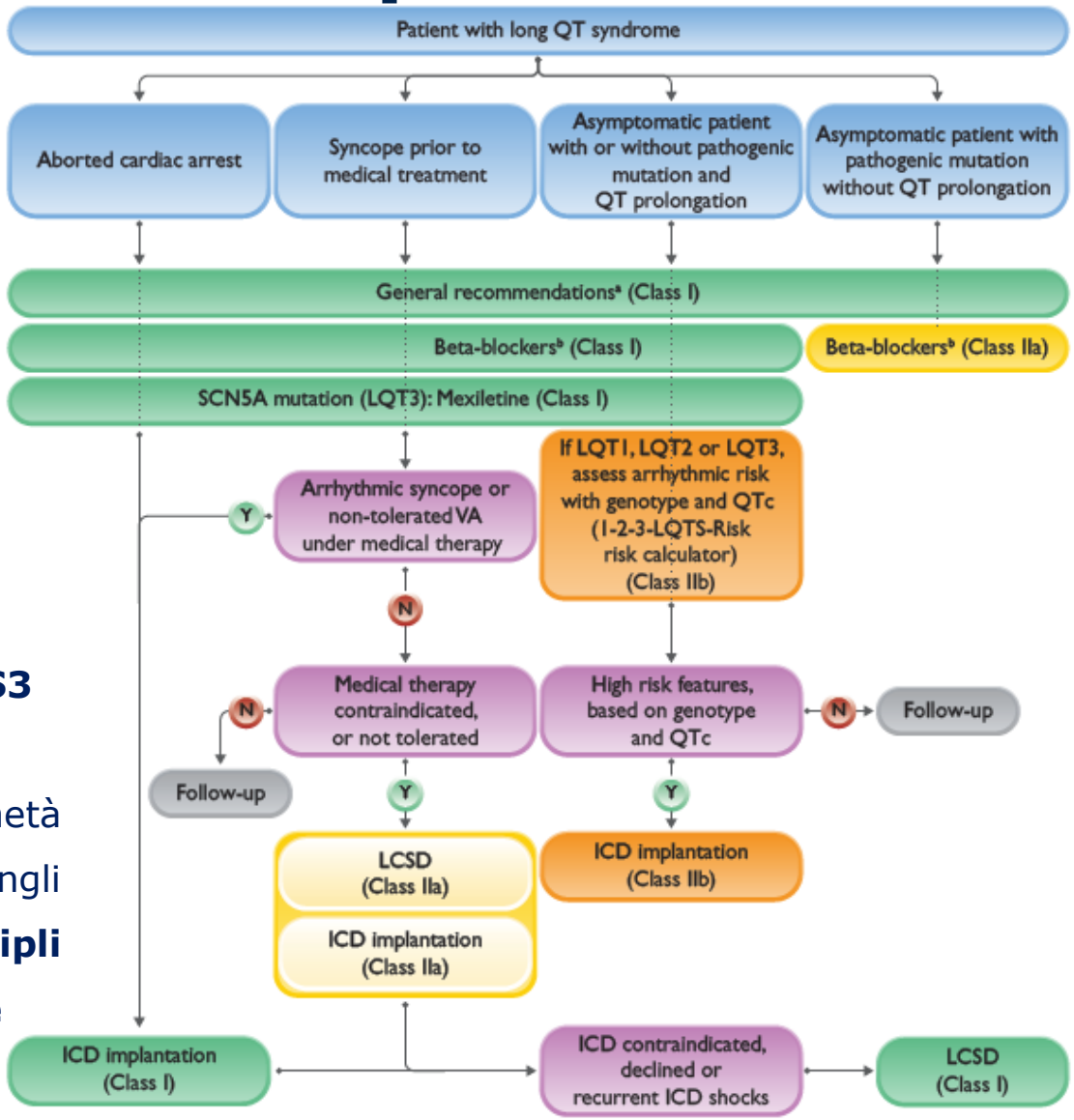
LQTS: gestione del paziente

General recommendations to prevent SCD		
The following is recommended in LQTS: • Avoid QT-prolonging drugs.[c] **(lista: crediblemeds.org)** • Avoid and correct electrolyte abnormalities. • Avoid genotype-specific triggers for arrhythmias.[943]	I	C
Beta-blockers, ideally non-selective beta-blockers (nadolol or propranolol), are recommended in LQTS patients with documented QT interval prolongation, to reduce risk of arrhythmic events.[940,945,946]	I	B
Mexiletine is indicated in LQT3 patients with a prolonged QT interval.[948]	I	C



- **Nadololo** 80-320 mg/die
- **Propranololo** 40-240 mg x2/die)
- **Mexiletina** (200-400 mg x3/die) in **LQTS3**
- **ICD** se **ACC** o **TVS** o **sincope aritmica**
  - **LCSD** (ablazione chirurgica metà inferiore ganglio stellato sx + gangli T2-T4 sx) solo se **multipli shock/sincopi** in **tp massimale**
  - **NB: Screening familiari**

ORDINE DEI MEDICI CHIRURGHI E DEGLI ODONTOIATRI DELLA PROVINCIA DI BERGAMO

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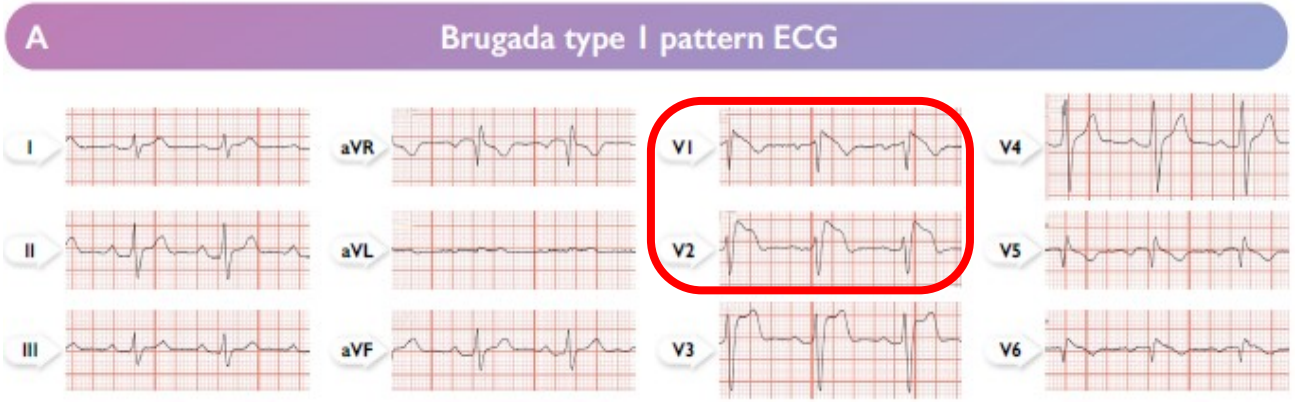
S. di Brugada (BrS)

- Sindrome di **recente identificazione** (1992)
- **Prima descrizione:** associazione fra **BBDx, ↑ST** e **SCD**



- Malattia **genetica** a trasmissione **AD** (se presente mutazione), **M♂**>F♀
- Mutazione **LoF** gene **SCN5A (NB: stesso gene** di **LQTS3,** ma con **GoF**) presente **SOLO** in **~35-50%** dei casi, nei restanti casi coinvolti **altri geni**
- **-> TEST GENETICO FONDAMENTALE** nei **familiari**
- **Prevalenza:** 5/10.000 (~0.05%), **molto sottostimata**

Recommendations	Class[a]	Level[b]
Diagnosis		
Genetic testing for *SCN5A* gene is recommended for probands with BrS.[164,1016]	I	C

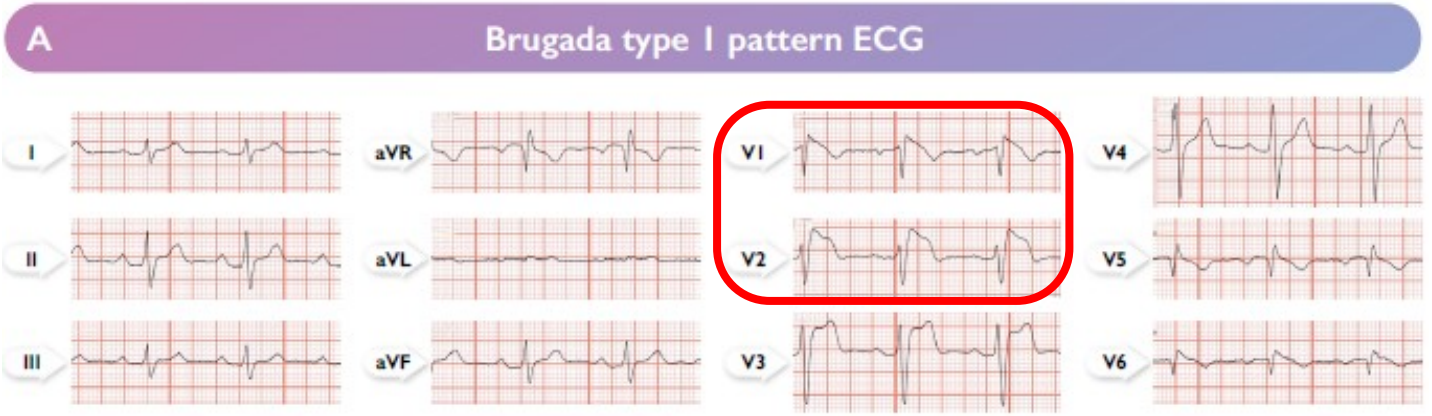
  - **Probabilmente** una delle **principali cause di morte <40 anni,** inoltre verosimile causa di numerose **SIDS (Sudden Infant Death Syndrome)**

Brugada P, Brugada J. Right bundle branch block, persistent ST segment elevation and sudden cardiac death: A distinct clinical and electrocardiographic syndrome. A multicenter report. J Am Coll Cardiol. 1992;20(6):1391-1396.

Zeppenfeld K, et al. 2022 ESC Guidelines for the management of patients with ventricular arrhythmias and the prevention of sudden cardiac death. Eur Heart J. 2022;43(40):3997-4126.

BrS: diagnosi

- **BrS** = pattern ECG di **tipo 1 spontaneo** in **assenza** di **cardiopatia**



Pattern ECG di tipo 1: elevazione del punto J ≥0.2 mV con morfologia "a tenda" e onda T negativa in almeno una derivazione precordiale dx (V1-V2), posizionata al 2°, 3° o 4° spazio intercostale

- Può essere **considerata diagnosi** se pattern **indotto** o (**farmaci** o **febbre**)

Recommendations	Class[a]	Level[b]
Diagnosis		
It is recommended that BrS is diagnosed in patients with no other heart disease and a spontaneous type 1 Brugada ECG pattern.[974–976]	I	C
It is recommended that BrS is diagnosed in patients with no other heart disease who have survived a CA due to VF or PVT and exhibit a type 1 Brugada ECG induced by sodium channel blocker challenge or during fever.[135,136,975,981,982]	I	C

Recommendations	Class[a]	Level[b]
Diagnosis		
BrS should be considered in patients with no other heart disease and induced type 1 Brugada pattern who have at least one of: • Arrhythmic syncope or nocturnal agonal respiration • A family history of BrS • A family history of SD (<45 years old) with a negative autopsy and circumstance suspicious for BrS.	IIa	C

Recommendations	Class[a]	Level[b]
Diagnosis		
BrS may be considered as a diagnosis in patients with no other heart disease who exhibit an induced type 1 Brugada ECG.[136,973,975,978,984,985]	IIb	C

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BrS: gestione del paziente

- Evitare **farmaci** e **sostanze scatenanti** (droghe e alcool), **trattare aggressivamente febbre**
- **ICD** se:
    1. ACC
    2. TV sostenuta (TVS)
    3. Sincope aritmica
    4. SEF di vulnerabilità positivo
- **Loop recorder** se **sincope non spiegata** o per **stratificazione rischio aritmico**
- **NB: Screening familiari**

Recommendations	Class[a]	Level[b]
General recommendations		
The following is recommended in all patients with BrS: (a) Avoidance of drugs that may induce ST-segment elevation in right precordial leads (http://www.brugadadrugs.org). (b) Avoidance of cocaine, cannabis, and excessive alcohol intake. (c) Treatment of fever with antipyretic drugs.	I	C
Risk stratification, prevention of SCD and treatment of VA		
ICD implantation is recommended in patients with BrS who: (a) Are survivors of an aborted CA and/or (b) Have documented spontaneous sustained VT.[980,990–992]	I	C
ICD implantation should be considered in patients with type 1 Brugada pattern and an arrhythmic syncope.[990,992,996]	IIa	C
Implantation of a loop recorder should be considered in BrS patients with an unexplained syncope.[997,999]	IIa	C
PES may be considered in asymptomatic patients with a spontaneous type I BrS ECG.[155]	IIb	B
ICD implantation may be considered in selected asymptomatic BrS patients with inducible VF during PES using up to 2 extra stimuli.[155]	IIb	C

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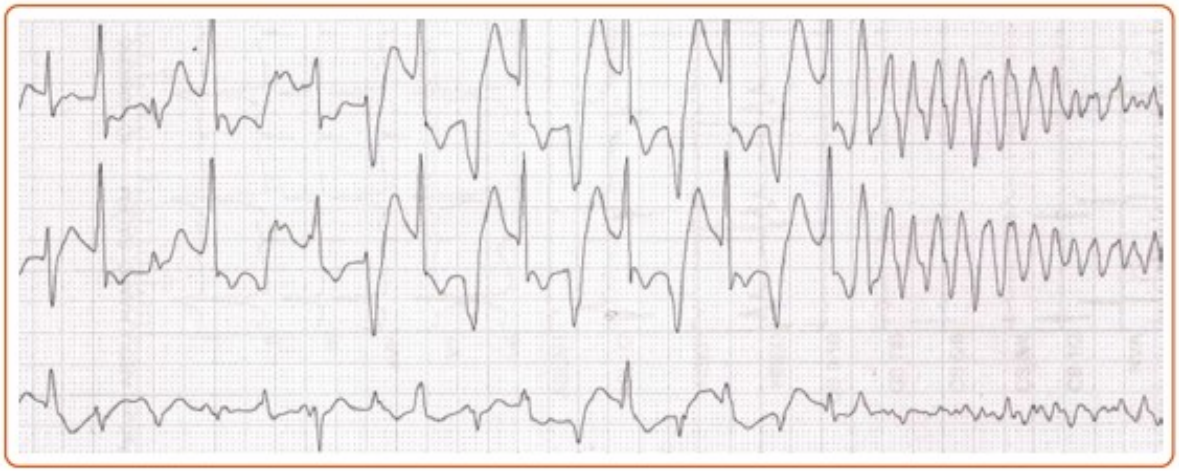
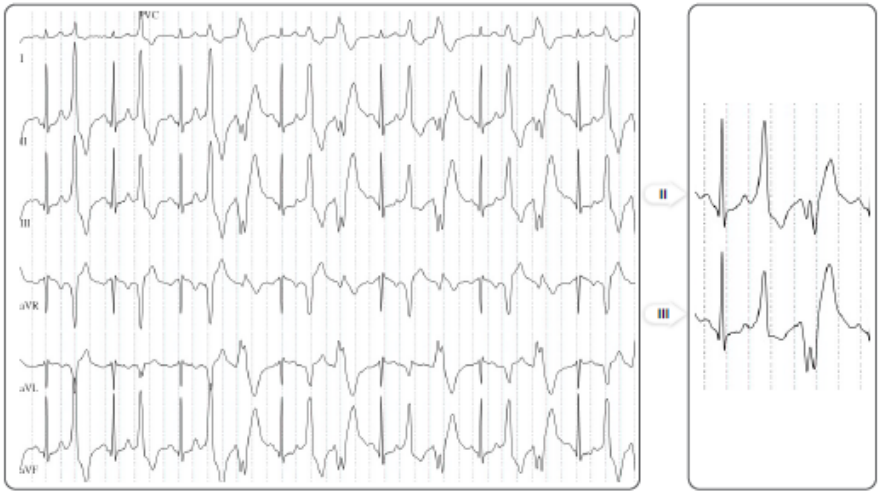
Tachicardia ventricolare polimorfica catecolaminergica (CPVT)

- BEV e TV "**bidirezionale**", indotti da **stimolo adrenergico**, in assenza di cardiopatia o CAD
- Prevalenza: 1/10’000
- Manifestazione nella **prima decade di vita**



- Disordine **ereditario**, 2 tipi:
    1. **AD**: recettore rianodina (RyR2)
    2. **AR**: calsequestrina (CASQ2)
- Entrambi coinvolti nel rientro del Ca^{2+} all’interno del sarcomero



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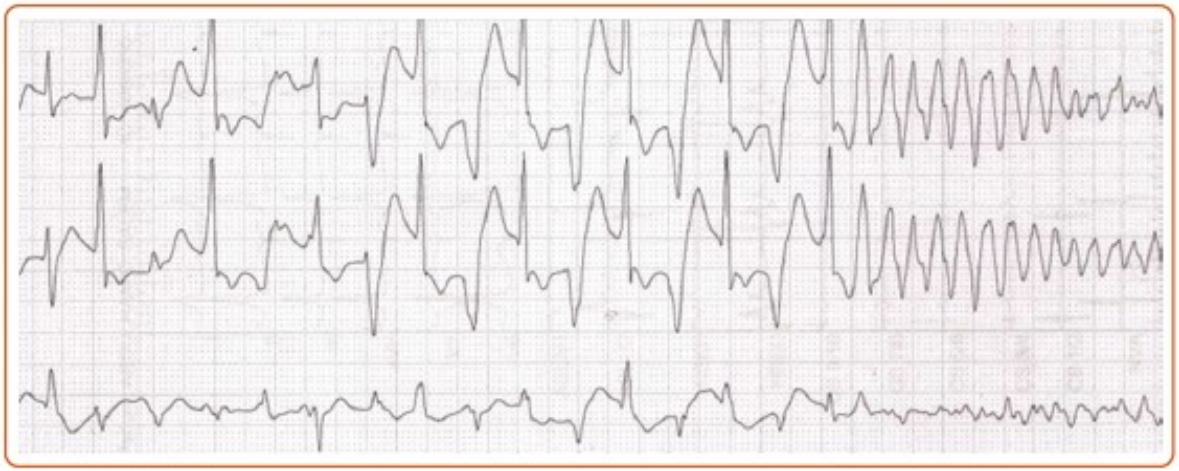
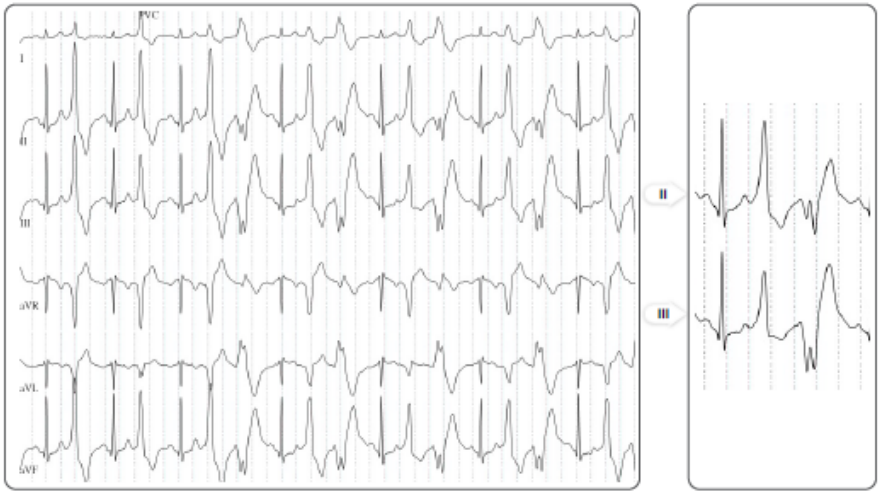
Abbas M, et al. Catecholaminergic Polymorphic Ventricular Tachycardia. In: Arrhythmia and Electrophysiology Review. 2022;(11):e20.

CPVT: diagnosi

- **BEV** o **TV bidirezionali** o **polimorfe** da **sforzo** o dopo **stimolo emotivo** o **farmacologico** (epinefrina o isoprenalina) in **assenza** di **cardiopatia** o **CAD** oppure **mutazione genetica**
  - **NB: ECG a riposo: normale!**
  - **Analisi genetica** in **pazienti**
  - **NB: screening familiari**





Recommendations	Class[a]	Level[b]
Diagnosis		
Genetic testing and genetic counselling are indicated in patients with clinical suspicion or clinical diagnosis of CPVT.	I	C

Zeppenfeld K, et al. 2022 ESC Guidelines for the management of patients with ventricular arrhythmias and the prevention of sudden cardiac death. Eur Heart J. 2022;43(40):3997-4126.

Abbas M, et al. Catecholaminergic Polymorphic Ventricular Tachycardia. In: Arrhythmia and Electrophysiology Review. 2022;(11):e20.

CPVT: gestione del paziente

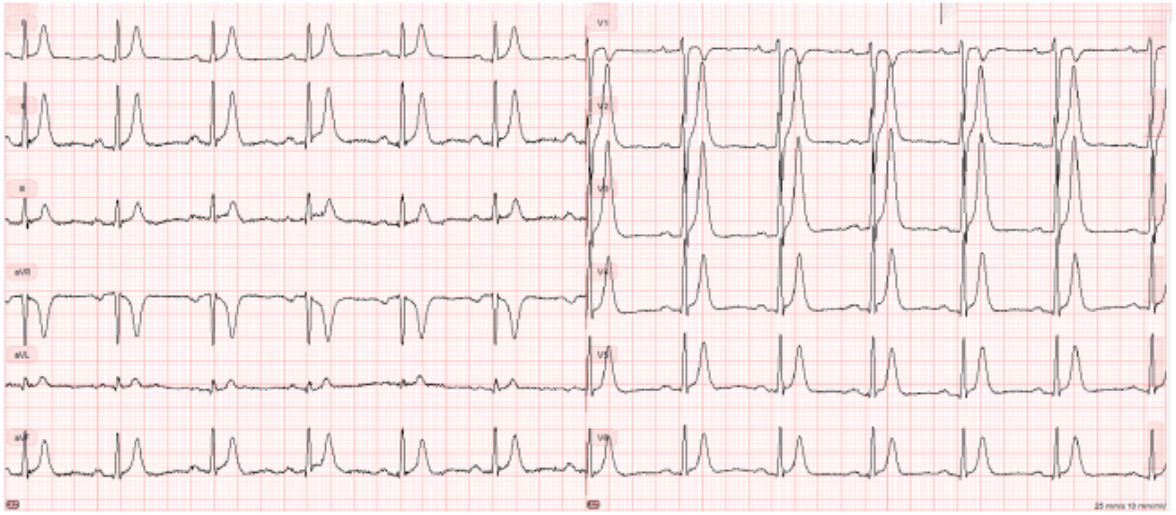
- **NO sport agonistico!**
- **Evitare** eccessivi **sforzi** o **stress**
- **TERAPIA:**
    1. **Beta-bloccanti non selettivi** (nadololo/propranololo)
    2. **Flecainide**
    3. **LCSD** come **ultima linea**
- **ICD** se:
    1. **ACC**
    2. **Sincope** aritmica
    3. Persistenza di **TV o PVC da sforzo** nonostante **terapia**

Recommendations	Class[a]	Level[b]
General recommendations		
Avoidance of competitive sports, strenuous exercise, and exposure to stressful environments is recommended in all patients with CPVT.	I	C
Therapeutic interventions		
Beta-blockers, ideally non-selective (nadolol or propranolol) are recommended in all patients with a clinical diagnosis of CPVT.[1045,1048,1059]	I	C
ICD implantation combined with beta-blockers and flecainide is recommended in CPVT patients after aborted CA.[1045,1047,1060]	I	C
Therapy with beta-blockers should be considered for genetically positive CPVT patients without phenotype.[1047,1050]	IIa	C
LCSD should be considered in patients with diagnosis of CPVT when the combination of beta-blockers and flecainide at therapeutic dosage are either not effective, not tolerated, or contraindicated.[1056]	IIa	C
ICD implantation should be considered in patients with CPVT who experience arrhythmogenic syncope and/or documented bidirectional/PVT while on highest tolerated beta-blocker dose and on flecainide.[1047,1050]	IIa	C
Flecainide should be considered in patients with CPVT who experience recurrent syncope, polymorphic/bidirectional VT, or persistent exertional PVCs, while on beta-blockers at the highest tolerated dose.[1052,1053,1060]	IIa	C

Zeppenfeld K, et al. 2022 ESC Guidelines for the management of patients with ventricular arrhythmias and the prevention of sudden cardiac death. Eur Heart J. 2022;43(40):3997-4126.

S. del QT corto congenito (SQTS)

- **Rara** malattia genetica
- **QT corto**, **FA** prematura, aumentato rischio di **SCD** in assenza di cardiopatia
- **SQTS congenito ≠ acquisito** (es. farmaci come nicorandil, disionie come iperK^{+} o iperCa^{2+}, acidosi)



- Mutazioni **GoF** di **KCNQ1-KCNH2** (geni di LQTS1-2) o **LoF** di SLC4A
- **Altissima letalità** in **tutti i gruppi di età** (40% di probabilità di ACC entro i 40 anni!) -> fondamentale **diagnosi** e **prevenzione primaria**

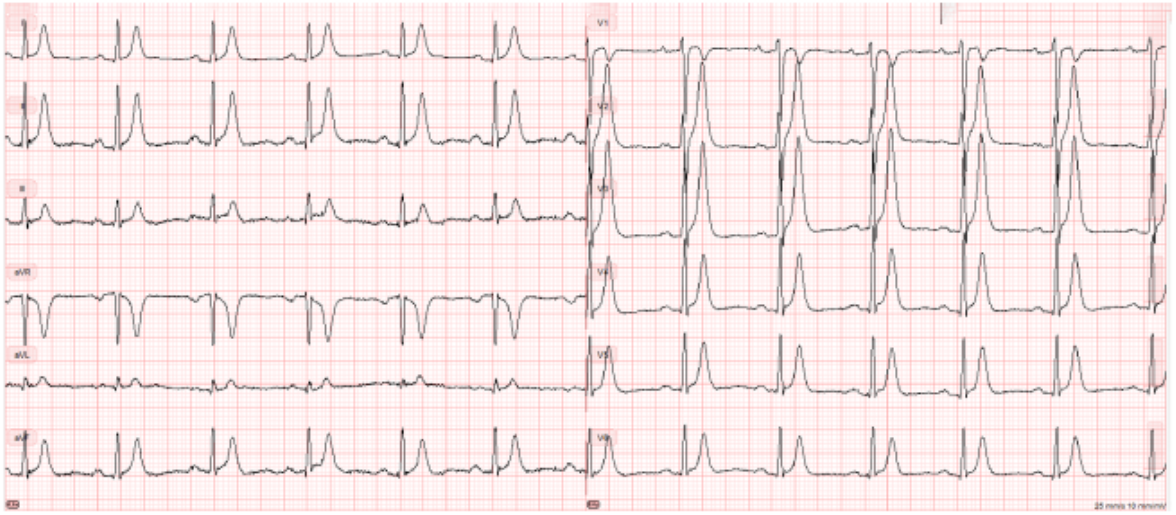
Zeppenfeld K, et al. 2022 ESC Guidelines for the management of patients with ventricular arrhythmias and the prevention of sudden cardiac death. Eur Heart J. 2022;43(40):3997-4126.

SQTS: diagnosi

- **QTc ≤ 320 msec**

oppure

- **QTc 320-360 msec** con **almeno uno** dei seguenti:
    1. **Mutazione** patogenica
    2. **ACC** da TV/FV
    3. **Sincope** aritmica
    4. **Anamnesi familiare** positiva per **SQTS**
    5. **Anamnesi familiare** positiva per **morte improvvisa <40 anni**



NB: screening familiari

Zeppenfeld K, et al. 2022 ESC Guidelines for the management of patients with ventricular arrhythmias and the prevention of sudden cardiac death. Eur Heart J. 2022;43(40):3997-4126.

SQTS: gestione del paziente

- **Evitare** farmaci o condizioni che ↓**QTc**
- **ICD** se:
    1. **ACC**
    2. **TVS** spontanee
    3. **Sincope** aritmica
- **Chinidina** (200-400 mg x 3/die) in pz **asintomatici** con **familiarità** per **morte improvvisa**
- **Chinidina** come **seconda linea** se ICD rifiutato/controindicato

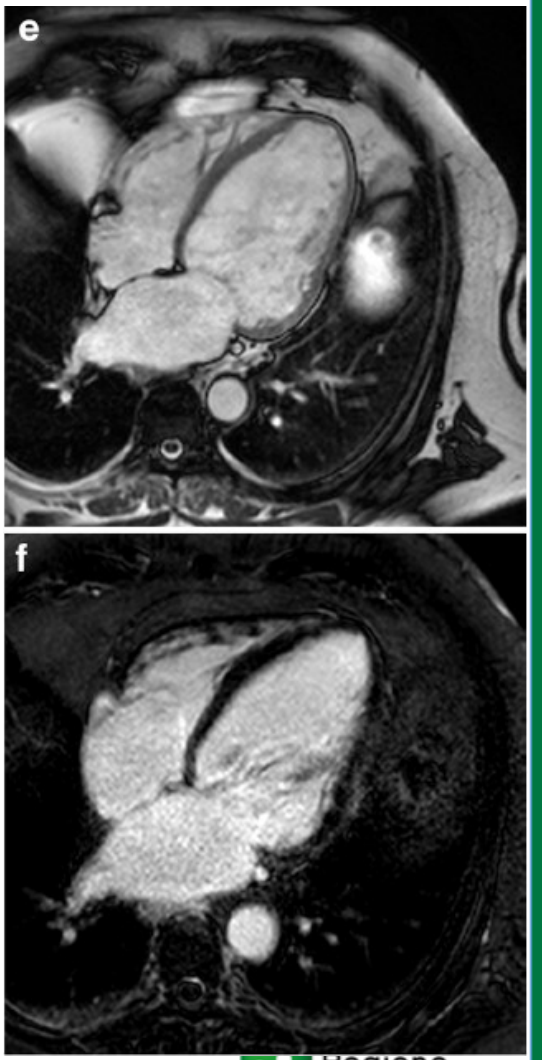
Recommendations	Class[a]	Level[b]
Risk stratification, SCD prevention and treatment of VA		
ICD implantation is recommended in patients with a diagnosis of SQTS who: (a) are survivors of an aborted CA and/or (b) have documented spontaneous sustained VT.[1063]	I	C
ILR should be considered in young SQTS patients.	IIa	C
ICD implantation should be considered in SQTS patients with arrhythmic syncope.	IIa	C
Quinidine may be considered in (a) SQTS patients who qualify for an ICD but present a contraindication to the ICD or refuse it, and (b) asymptomatic SQTS patients and a family history of SCD.[1069–1071]	IIb	C
Isoproterenol may be considered in SQTS patients with an electrical storm.[1075]	IIb	C
PES is not recommended for SCD risk stratification in SQTS patients.	III	C

- **NB: Loop recorder** in pz giovani per **monitoraggio** e **stratificazione del rischio**

Zeppenfeld K, et al. 2022 ESC Guidelines for the management of patients with ventricular arrhythmias and the prevention of sudden cardiac death. Eur Heart J. 2022;43(40):3997-4126.

Cardiomiopatia dilatativa (DCM)

- **Dilatazione** e disfunzione sistolica vsx (**FEVS<50%**), non giustificata da CAD o sovraccarico
- **Prevalenza:** ~1/2700 (stima esatta difficile), **M♂**>F♀
- **Elevata mortalità**: 25% ad 1 anno, 50% a 5 anni
- **SCD**: 12% dei pz, 35% di tutte le morti
- **Pz pediatrici:** più raro, ma maggiore mortalità
- **Eziologia: genetica** (proteine sarcomeriche) o **acquisita** (peri-partum, esotossica da alcool o CHT, ecc)

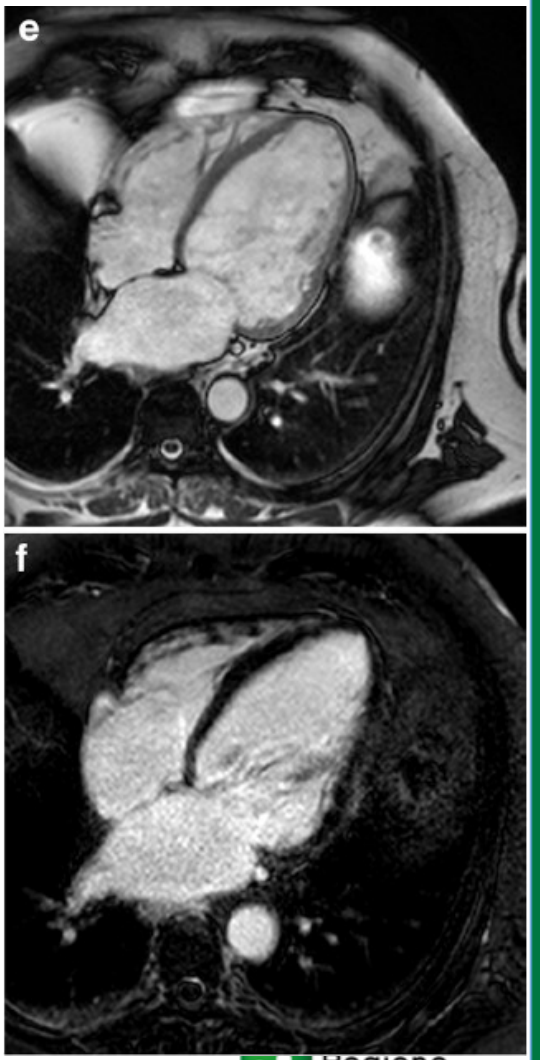


Bietenbeck M, et al. Reduced global myocardial perfusion reserve in DCM and HCM patients assessed by CMR-based velocity-encoded coronary sinus flow measurements and first-pass perfusion imaging. Clin Res Cardiol. 2018;107(11):1062-1070.

Zeppenfeld K, et al. 2022 ESC Guidelines for the management of patients with ventricular arrhythmias and the prevention of sudden cardiac death. Eur Heart J. 2022;43(40):3997-4126.

DCM: diagnosi

- **Ecocardiografia TT**
- -> **coronarografia** o **TC coronarie** (esclusione CAD)
- -> **RM cardiaca** (conferma **diagnosi** e valutazione **scar/LGE**)
- -> **esclusione cause secondarie** (es. sarcoidosi, amiloidosi, m. di Fabry, ecc)
- -> **analisi genetica (NB: LMNA)**
  - **NB: screening familiari**



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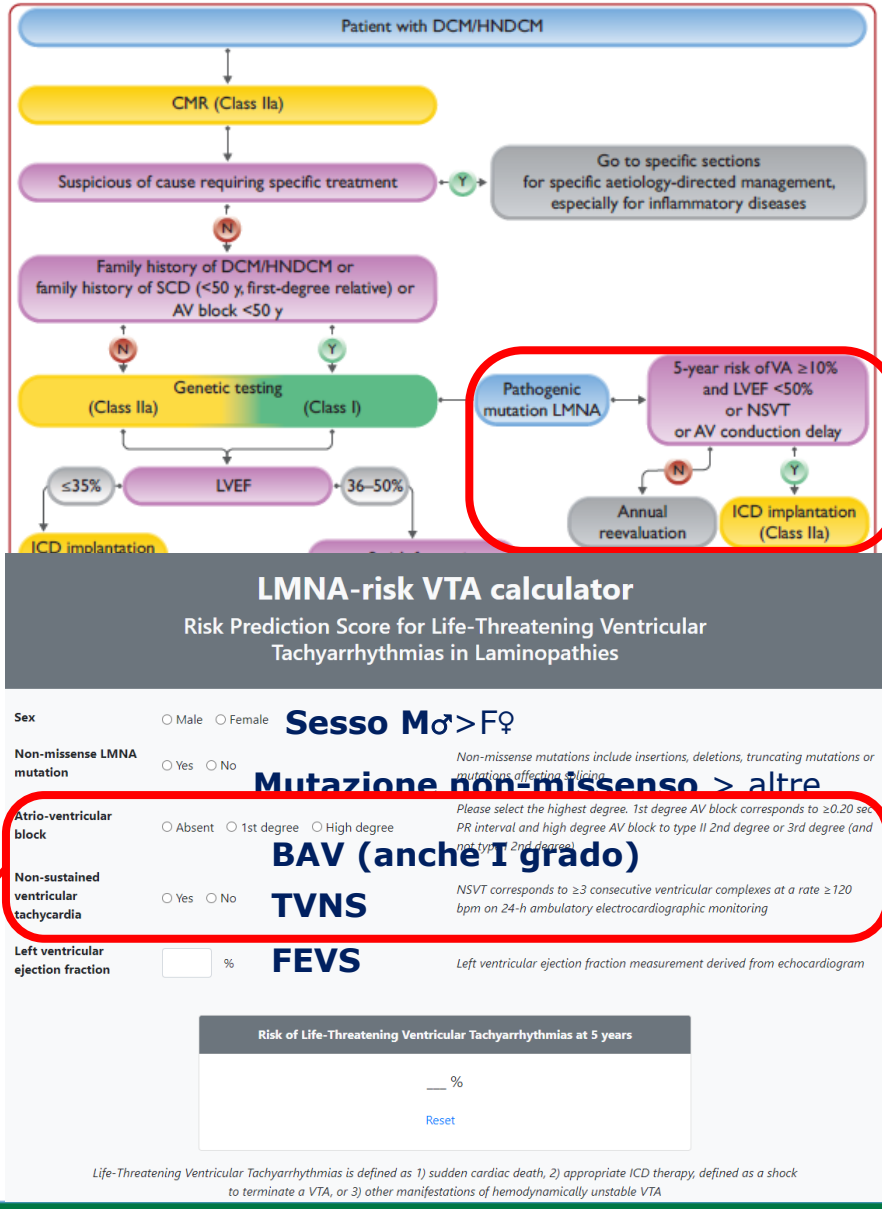
DCM: gestione del paziente LMNA+

- Mutazione **LMNA** (**laminina**) = **maggior rischio aritmico** e di **SCD**
- Calcolo **rischio a 5 anni** (lmna-risk-vta.fr)
- **ICD** se **ACC** o **FE<50% + ≥1 FDR**:
  1. **Rischio** a 5 anni **>10%**
  2. **BAV** (anche di I grado)
  3. **TVNS**

Altrimenti **FU annuale**

Anche da soli ↑rischio >10%

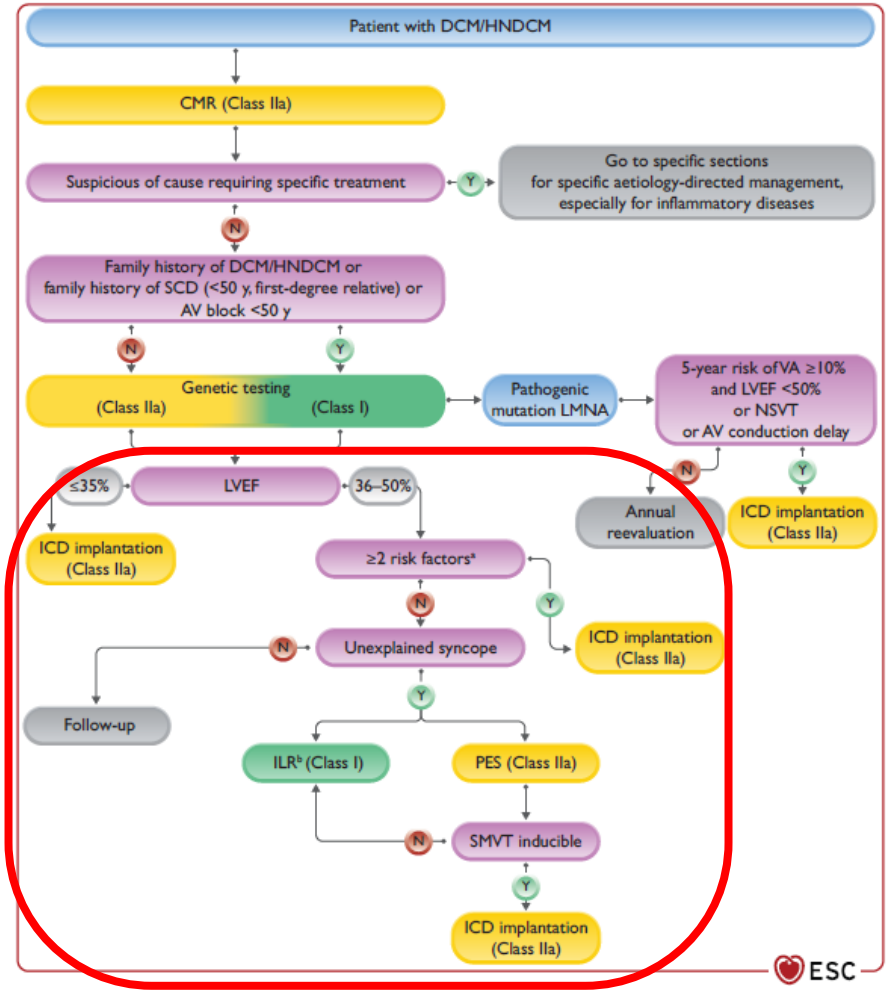


Zeppenfeld K, et al. 2022 ESC Guidelines for the management of patients with ventricular arrhythmias and the prevention of sudden cardiac death. Eur Heart J. 2022;43(40):3997-4126.

DCM: gestione del paziente LMNA-

- **FE<35%** o **ACC/TVS** -> **ICD**
- **FE 35-50% -> ICD** se **≥2 FDR:**

1. **Sincope** inspiegata
2. Mut. **PLN** (fosfolambano, regol. Ca^{2+})
3. Mut. **FLNC** (filamina C,crosslink actina)
4. Mut. **RBM20** (RNA Binding Motif Protein 20, splicing titina/regol. Ca2+)
5. **Scar (LGE)** in **RM cardiaca**
6. **SEF+** per **TVS monomorfa**

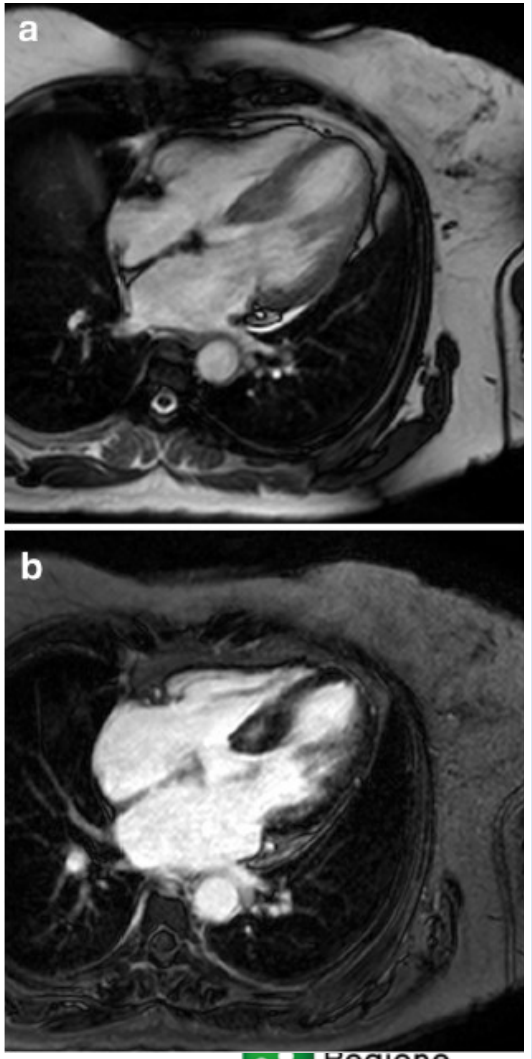


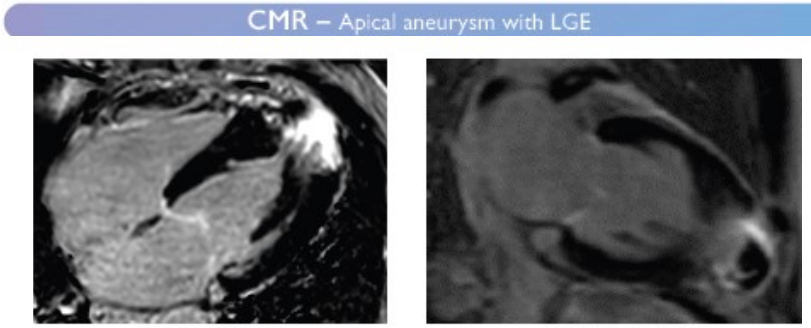
- **NB:** se **sincope** indicati **ILR** e **SEF**

Zeppenfeld K, et al. 2022 ESC Guidelines for the management of patients with ventricular arrhythmias and the prevention of sudden cardiac death. Eur Heart J. 2022;43(40):3997-4126.

Cardiomiopatia ipertrofica (HCM)

- **Ipertrofia vsx** non giustificata da sovraccarico
- **Elevata prevalenza** (~1/500) , **M♂>F♀**
- **Mortalità**: 0.5-2%/anno (**minore** di **DCM**, ma condizione **molto più frequente**); **SCD**: 0.8%/anno
- ↑**SCD** con **esercizio (1ª causa** di **SCD** in **sportivi)**
- ↑**Rischio** di **scompenso cardiaco**, **FA** e **stroke**
- **Eziologia: genetica** (proteine sarcomeriche)
- **NB: DD** con **fenocopie** (amiloidosi, m. di Fabry, tesaurismosi, ecc)





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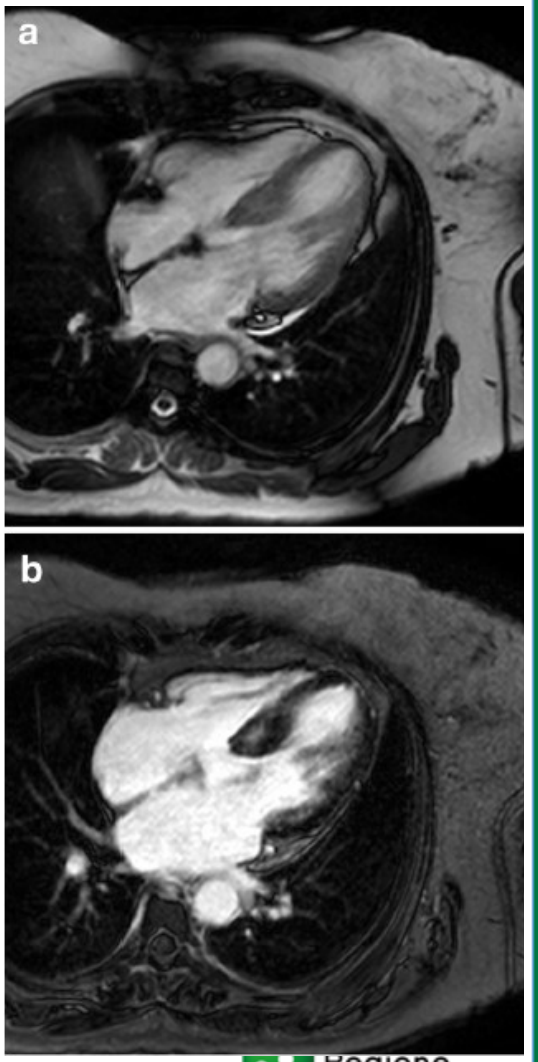
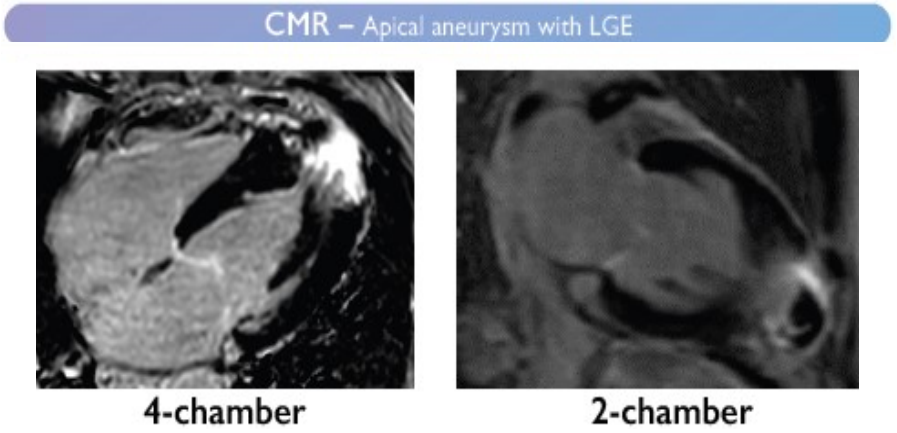
Zeppenfeld K, et al. 2022 ESC Guidelines for the management of patients with ventricular arrhythmias and the prevention of sudden cardiac death. Eur Heart J. 2022;43(40):3997-4126.

HCM: diagnosi

- **Ecocardiografia TT: diagnosi** e valutazione **LVOTO** (terapia farmacologica e chirurgica/ablazione alcolica)
- **RM cardiaca** (conferma **diagnosi** e valutazione **scar/LGE**)
- **Esclusione fenocopie** (amiloidosi, m. di Fabry, ecc)
- **Analisi genetica**
- **NB: screening familiari**





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HCM: gestione del paziente (1)

- **ACC/TVS -> ICD**
- **Prevenzione primaria: stratificazione rischio** a 5 anni di **SCD** iniziale + periodica

NB: evitare sport

Recommendation	Class[a]	Level[b]
Risk stratification and primary prevention of SCD		
It is recommended that the 5-year risk of SCD is assessed at first evaluation and at 1–3-year intervals, or when there is a change in clinical status.	I	C
ICD implantation should be considered in patients aged 16 years or more with an estimated 5-year	IIa	B

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HCM Risk-SCD Calculator

https://doc2do.com/hcm/webHCM.html

Age	Years	**Età** (distribuzione a campana)
Maximum LV wall thickness	mm	**Spessore vsx**
Left atrial size	mm	**Dimensioni atrio sx**
Max LVOT gradient	mmH	**Gradiente LVOTO**
Family History of SCD	No Yes	**Anamnesi familiare di SCD**
Non-sustained VT	No Yes	**TVNS**
Unexplained syncope	No Yes	**Sincope** inspiegata

ardiography in the parasternal long axis plane at time

d with Valsalva provocation (irrespective of concurrent Doppler from the apical three and five chamber views. the modified Bernouilli equation: Gradient= 4V ^{2},

e relatives under 40 years of age or SCD in a first ante-mortem diagnosis).

r minute and <30s in duration on Holter monitoring

Risk of SCD at 5 years (%):	
ESC recommendation:	

Reset

Zeppenfeld K, et al. 2022 ESC Guidelines for the management of patients with ventricular arrhythmias and the prevention of sudden cardiac death. Eur Heart J. 2022;43(40):3997-4126.

HCM: gestione del paziente (2)

- **ACC/TVS -> ICD**

NB: evitare sport

- **Prevenzione primaria: stratificazione rischio** a 5 anni di **SCD** iniziale + periodica

Rischio a 5 anni:

- **≥6%** -> **ICD** (qualsiasi età, anche <16 anni)
- **4-6%**, età**>16 anni** -> **ICD**
- **<4%,** età**>16 anni -> ICD** se **≥1 FDR**
    1. **Scar (LGE)** ≥15% della massa vsx
    2. **FEVS <50%**
    3. **Aneurisma apice vsx**

Recommendation	Class[a]	Level[b]
Risk stratification and primary prevention of SCD		
It is recommended that the 5-year risk of SCD is assessed at first evaluation and at 1–3-year intervals, or when there is a change in clinical status.	I	C
ICD implantation should be considered in patients aged 16 years or more with an estimated 5-year risk of SD >6%.[c,85,728,729]	IIa	B
ICD implantation should be considered in HCM patients aged 16 years or more with an intermediate 5-year risk of SCD (≥4 to <6%)[c] and with (a) significant LGE at CMR (usually ≥15% of LV mass); or (b) LVEF < 50%; or (c) abnormal blood pressure response during exercise test[d]; or (d) LV apical aneurysm; or (e) presence of sarcomeric pathogenic mutation.[716,717,722,736–739]	IIa	B
In children less than 16 years of age with HCM and an estimated 5-year risk of SD >6% (based on HCM Risk-Kids score[e]), ICD implantation should be considered.[84,742]	IIa	B
ICD implantation may be considered in HCM patients aged 16 years or more with an estimated 5-year risk of SCD of ≥4 to <6%.[c,85,728,729]	IIb	B
ICD implantation may be considered in HCM patients aged 16 years or more with a low estimated 5-year risk of SCD (<4%)[c] and with (a) significant LGE at CMR (usually ≥15% of LV mass); or (b) LVEF < 50%; or (c) LV apical aneurysm.[716,717,722,736–739]	IIb	B

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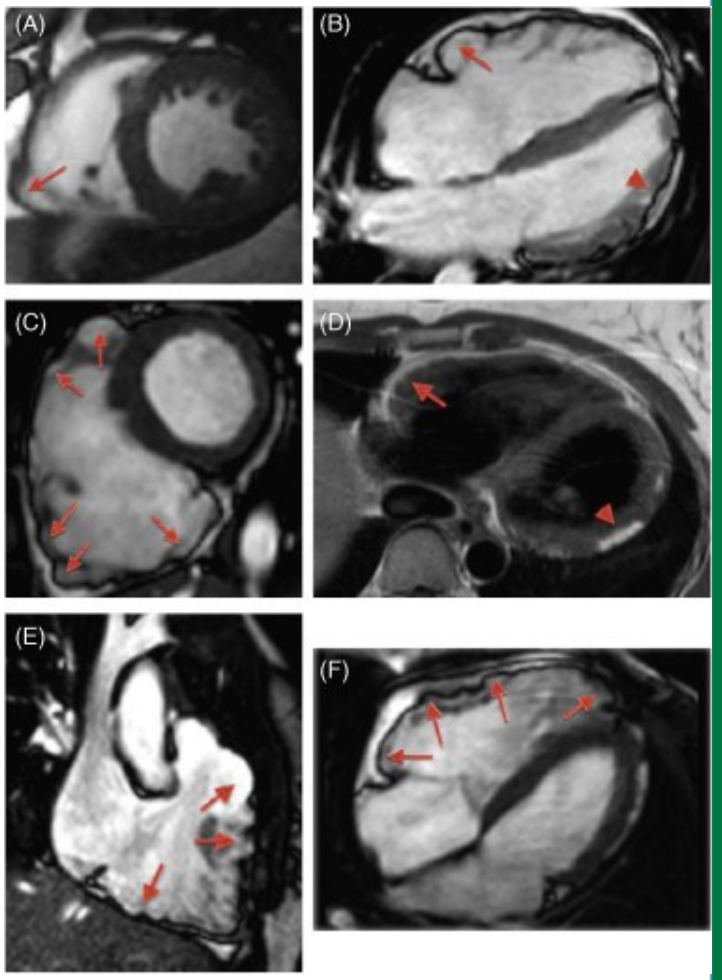
Cardiomiopatia aritmogena (ARVC)

- **Sostituzione fibro-adiposa** del **miocardio, con** Vdx primariamente coinvolto, ma **anche vsx/BiV**
- **Prevalenza**: 1/1’000 – 1/5’000, **M♂**>F♀
- **Mortalità**: ACC in **4.6–6.1%**, 23% TVS non fatali in FU di 8-11 anni in pz senza ICD
- Spesso **SCD** è **1ª presentazione** (età media: 23 aa)
- ↑**SCD** con **esercizio -> evitare sport**
- **Eziologia: genetica** (proteine desmosomiali, più raramente non desmosomiali)
- **RM cardiaca** e **test genetici** fondamentali

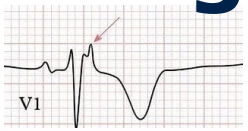


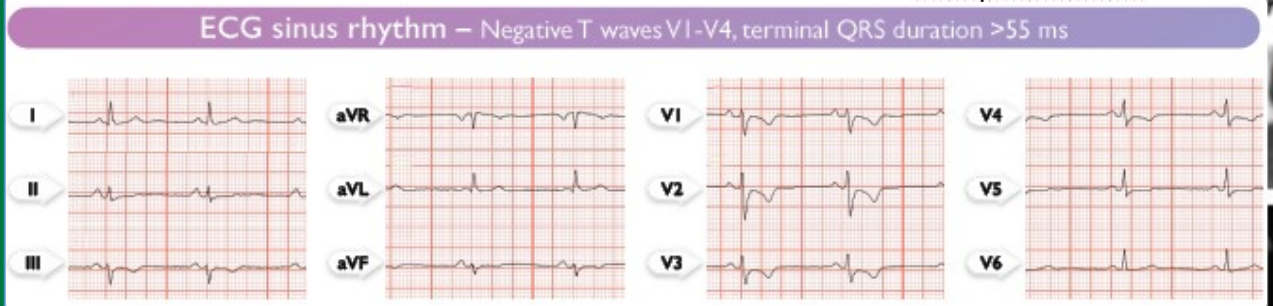
Abidov A, et al. CMR Features of ARVC/D. In: Cardiac MRI in the Diagnosis, Clinical Management, and Prognosis of Arrhythmogenic Right Ventricular Cardiomyopathy/Dysplasia. Academic Press; 2016:53-67.

Zeppenfeld K, et al. 2022 ESC Guidelines for the management of patients with ventricular arrhythmias and the prevention of sudden cardiac death. Eur Heart J. 2022;43(40):3997-4126.

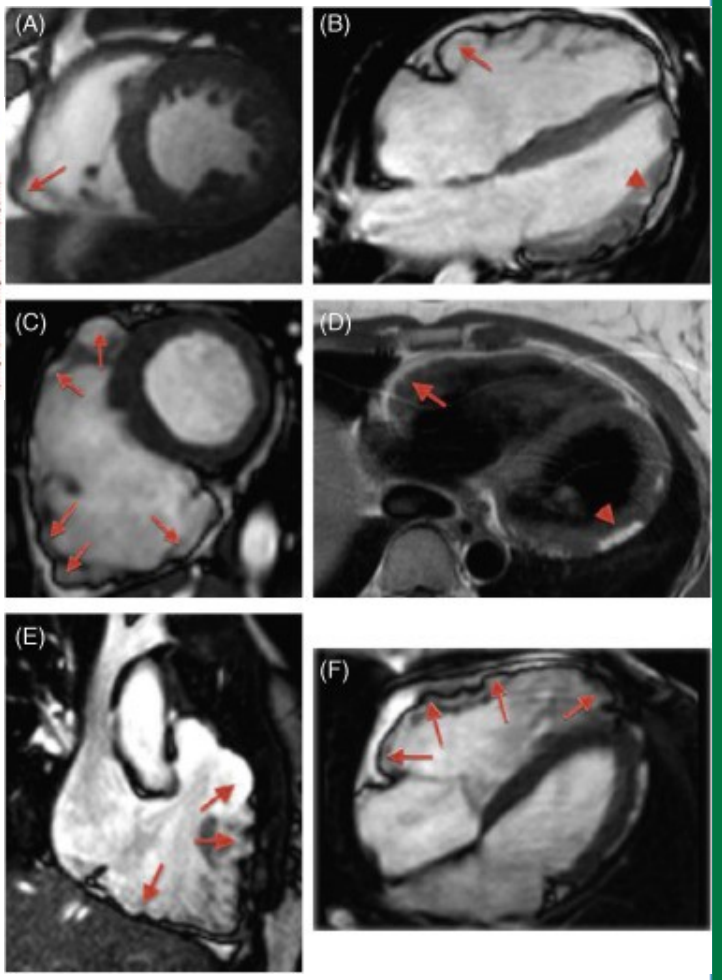
ARVC: diagnosi

- **ECG:** sospetto (es. onde epsilon)





- **Ecocardiografia TT: difficile diagnosi**, principalmente per **esclusione di altre cardiomiopatie** (DCM, HCM)
- **RM cardiaca** (gold standard per **diagnosi**, valutazione **scar/LGE**)
- **Analisi genetica**
- **NB: screening familiari**



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ARVC: gestione del paziente

- **Beta-bloccanti**
- **ICD** in **prevenzione secondaria (ACC/TVS)**
- **ICD** in **prevenzione primaria** se:
    1. **Sincope** aritmica
    2. **Severa disfunzione vdx** e/o **vsx**
    3. **Sintomi** (presincopi e/o cardiopalmo) + **moderata disfunzione vdx o vsx** + **TVNS** oppure **SEF positivo** (TVS monomorfa)

NB: SEF se **sintomi**

NB: screening ai **familiari** con **ECG + ecoTT**

Recommendations	Class[a]	Level[b]
Diagnostic evaluation and general recommendations		
In patients with suspected ARVC, CMR is recommended.[676–678]	I	B
In patients with a suspected or definite diagnosis of ARVC, genetic counselling and testing are recommended.[672,673]	I	B
Avoidance of high-intensity exercise is recommended in patients with a definite diagnosis of ARVC.[683–685]	I	B
Avoidance of high-intensity[c] exercise may be considered in carriers of ARVC-related pathogenic mutations and no phenotype.[683,687]	IIb	C
Beta-blocker therapy may be considered in all patients with a definite diagnosis of ARVC.	IIb	C
Risk stratification and primary prevention of SCD		
ICD implantation should be considered in patients with definite ARVC and an arrhythmic syncope.[696,701,711–713]	IIa	B
ICD implantation should be considered in patients with definite ARVC and severe RV or LV systolic dysfunction.[675,691]	IIa	C
ICD implantation should be considered in symptomatic[d] patients with definite ARVC, moderate right or left ventricular dysfunction, and either NSVT or inducibility of SMVT at PES.[695,696,701,703,705]	IIa	C
In patients with ARVC and symptoms highly suspicious for VA, PES may be considered for risk stratification.[695,705]	IIb	C
Secondary prevention of SCD and treatment of VAs		
ICD implantation is recommended in ARVC patients with haemodynamically not-tolerated VT or VF.[700]	I	C
In patients with ARVC and non-sustained or sustained VAs, beta-blocker therapy is recommended.	I	C
In patients with ARVC and recurrent, symptomatic SMVT or ICD shocks for SMVT despite beta-blockers, catheter ablation in specialized centres should be considered.[482,709,714]	IIa	C
Management of relatives of a patient with ARVC		
In a first-degree relative of a patient with ARVC, ECG and echocardiogram are recommended.[675]	I	C

ORDINE DEI MEDICI CHIRURGHI E DEGLI ODONTOIATRI DELLA PROVINCIA DI BERGAMO

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Conclusioni

- S. aritmogene familiari = gruppo **eterogeneo** di **malattie genetiche** (cardiomiopatie + disordini elettrici primari) associate al rischio di **SCD**
- Spesso correlate a **SCD** nei **giovani** e negli **sportivi** apparentemente sani
- **NB:** spesso **anamnesi familiare positiva** per **morte improvvisa (SUD)**
- Fondamentale il **riferimento dei pazienti** agli **specialisti di aritmie (cardiologi elettrofisiologi)** per **diagnosi e trattamento**
- Fondamentale **l'analisi genetica**
- Ruolo dello **screening** nei **familiari** dei pz affetti

ORDINE DEI MEDICI CHIRURGHI E DEGLI ODONTOIATRI DELLA PROVINCIA DI BERGAMO

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Sistema Socio Sanitario
Regione Lombardia
ASST Bergamo Est

SEDE OMCEO
VIA MANZÙ 25
BERGAMO

PROGRAMMA

Saluti e introduzione

h. 8.30 *Dott. Guido Marinoni*
Presidente Omceo Bergamo

I Sessione

h. 9.00
Tachiaritmie sopraventicolari nell'adulto e nel paziente pediatrico

h. 9.40
Indicazioni ed esecuzione di studio elettrofisiologico (Sef) ed ablazione del substrato aritmico

h. 10.20
Fibrillazione atriale ed indicazione all'ablazione di fibrillazione atriale

h. 11.00 domande
h.11.15 pausa

II Sessione

h. 11.30
Aritmie ventricolari e morte cardiaca improvvisa: novità delle linee guida ESC 2022

h. 12.10
Sindromi aritmogene familiari: gestione del paziente adulto. del paziente pediatrico e dei familiari

h. 12.50 domande
h.13.00 test e conclusioni

Relatori:
dottori *Luca Bontempi, Angelica Fundaliotis Andrea Dell'Aquila, Marina Moretti*

Durante l'evento utilizzo dei dispositivi di protezione in base alla normativa antiCovid

RESPONSABILE SCIENTIFICO
DOTT.SSA EUGENIA BELOTTI
vicepresidente Omceo Bergamo

1 APRILE 2023
H. 8.30/13.30

APPROFONDIMENTI IN TEMA DI ARITMIE

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Sindromi aritmogene familiari

Gestione del paziente adulto, del paziente pediatrico e dei familiari

Dr. Andrea Dell'Aquila

UOS Elettrofisiologia ed Elettrostimolazione
UOC Cardiologia
ASST Bergamo Est
Ospedale "Bolognini" di Seriate

Sistema Socio Sanitario
Regione Lombardia
ASST Bergamo Est

UOS Elettrofisiologia ed Elettrostimolazione

UOC Cardiologia

ASST Bergamo Est

Ospedale “Bolognini” di Seriate

ASST Bergamo Est

Recapiti:

Ambulatorio di aritmologia/ambulatorio PM: 035/3063318

Studio medici Elettrofisiologia: 035/3063607

ORDINE DEI MEDICI CHIRURGHI
E DEGLI ODONTOIATRI
DELLA PROVINCIA DI BERGAMO

Sistema Socio Sanitario
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