Kurs Kardio 35

DIAGNOSTIKA V ARYTMOLOGII

Dan Wichterle

6.4.2013

INSTITUT KLINICKÉ A EXPERIMENTÁLNÍ MEDICÍNY
KLINIKA KARDIOLOGIE
IKEM

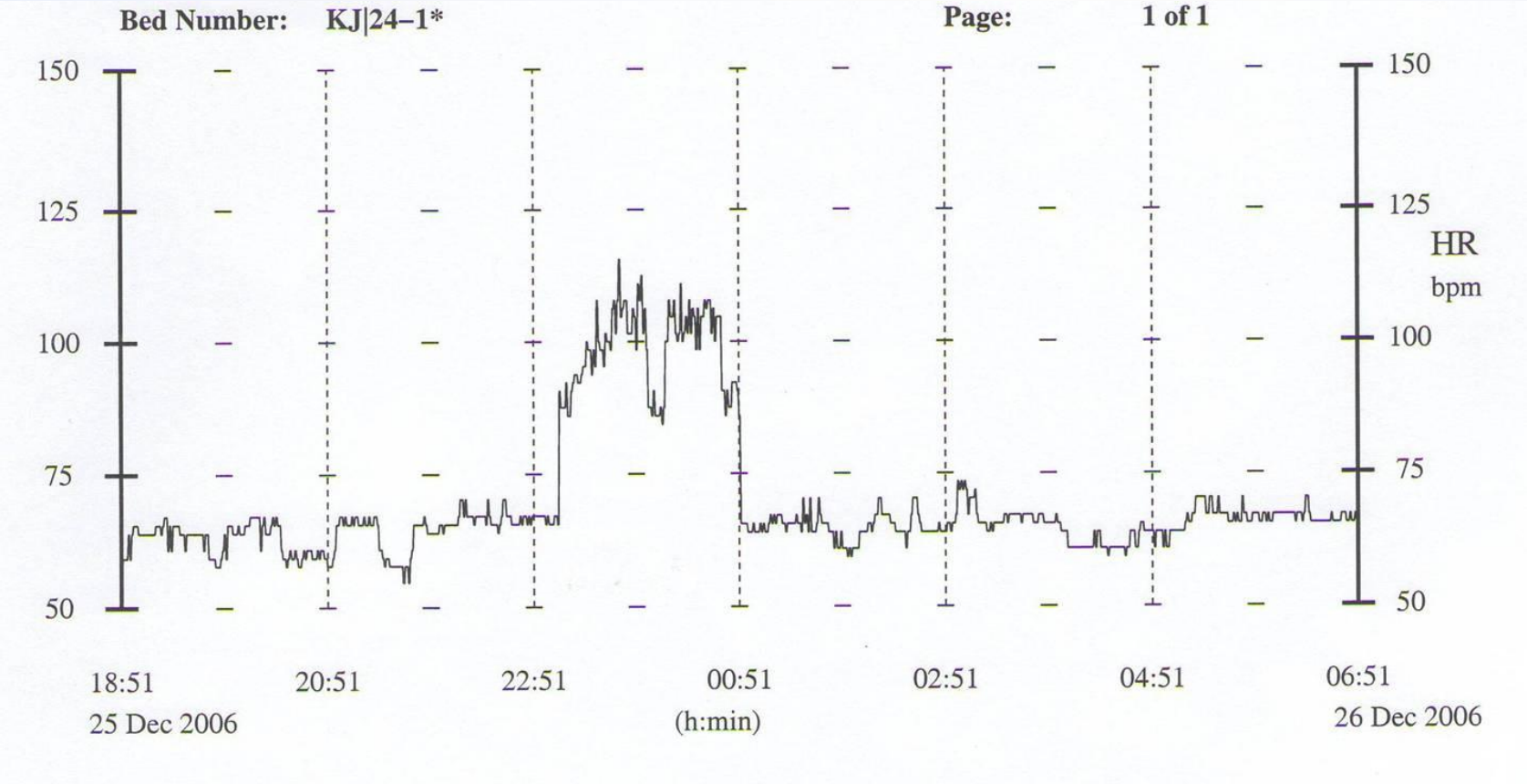
Anamnéza

- Palpitace (charakter, četnost, intenzita, trvání)
- Nespecifické projevy (slabost, únava, nevýkonnost, dušnost, oprese až bolest na hrudi, závratě)
- Synkopa (pokles srdečního výdeje, post-tachykardické pauzy)
- Vyvolávající momenty
- Terminující momenty (vagové manévry)
- Léky (účinnost, nežádoucí účinky)

Vyšetření

- ✓ Fyzikální
- ✓ Laboratorní
- ✓ Zobrazovací
- ✓ EKG
  - Standardní EKG
  - Holter EKG
  - Epizodické záznamníky EKG
  - Zátěžové EKG
- ✓ Adenosin / karotická masáž
- ✓ Ajmalinový test
- ✓ Tilt test
- ✓ Elektrofyziologické vyšetření

Holter


Bed Number: KJ|24–1*
Page: 1 of 1
150
125
100
75
50
HR
bpm
18:51
25 Dec 2006
20:51
22:51
00:51
(h:min)
02:51
04:51
06:51
26 Dec 2006

Telemonitoring EKG

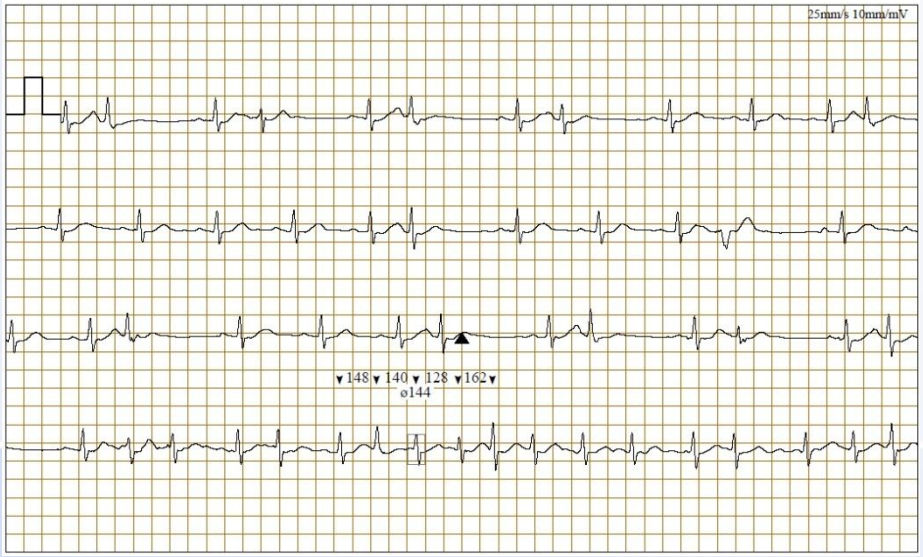
S/N: 102483
Journal: 60101-25
Event: 04
Type / Vers.: 3100 BT / 3.10
REMOS / 1.9
Recording: 2009-10-24 03:26:32 CEST
Transmit: 2009-10-24 03:26:48 CEST

Name:
First Name:
Date of Birth:

Symptoms / Notes

vitaphone

Page 1 of 1

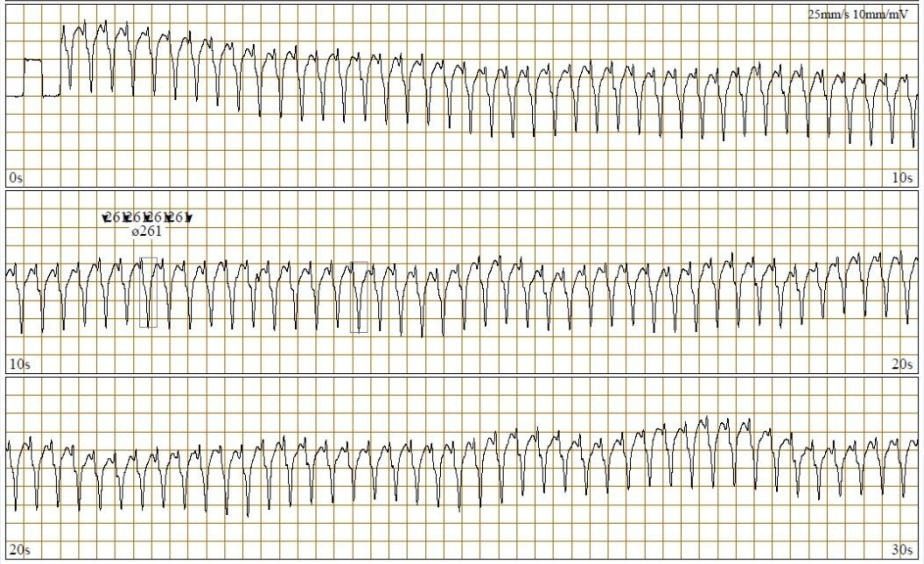


S/N: 096638
Journal: 23716-25
Type / Vers.: 100 IR / 2.11
REMOS / 1.9
Recording: 2009-06-01 07:12:05 CEST
Transmit: 2009-06-01 07:12:52 CEST

Name:
First Name:
Date of Birth:

Symptoms / Notes

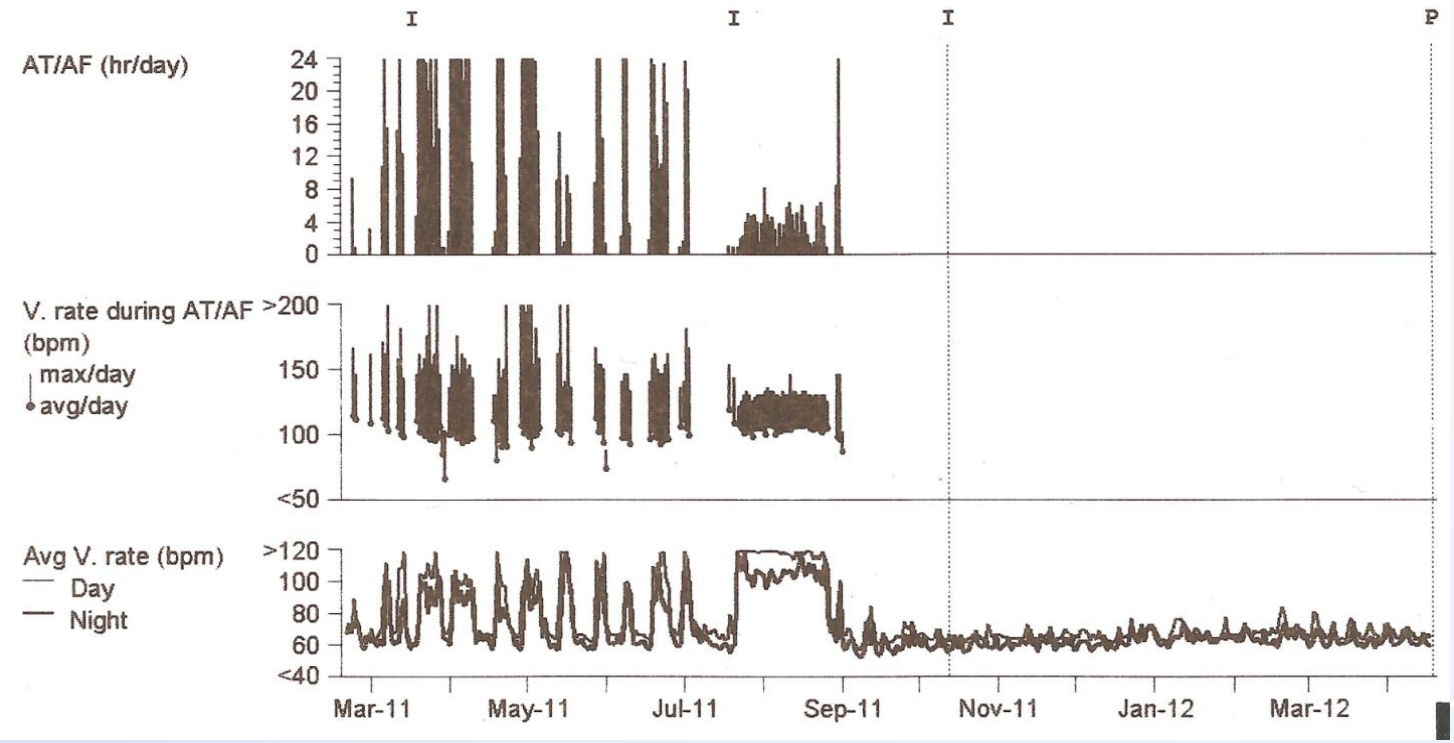
vitaphone



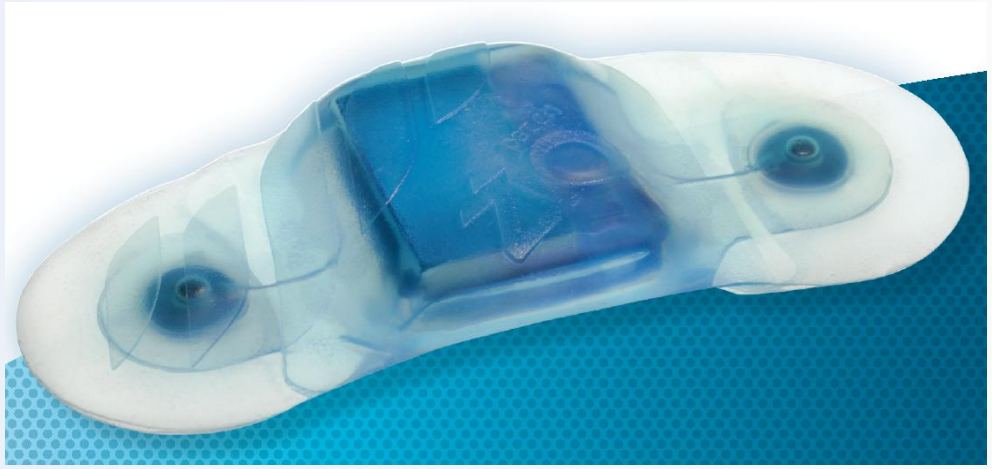
Implantabilní EKG monitor

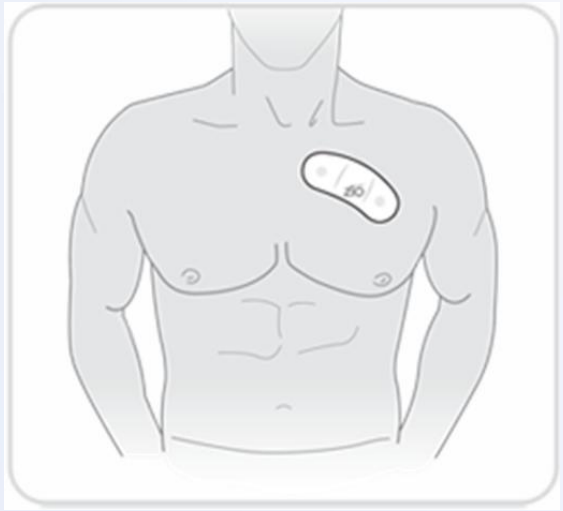
Date of Visit: **19-Apr-2012 10:20:40**
FullView SW007 Software Version 7.1

Cardiac Compass Trends (Feb-2011 to Apr-2012)

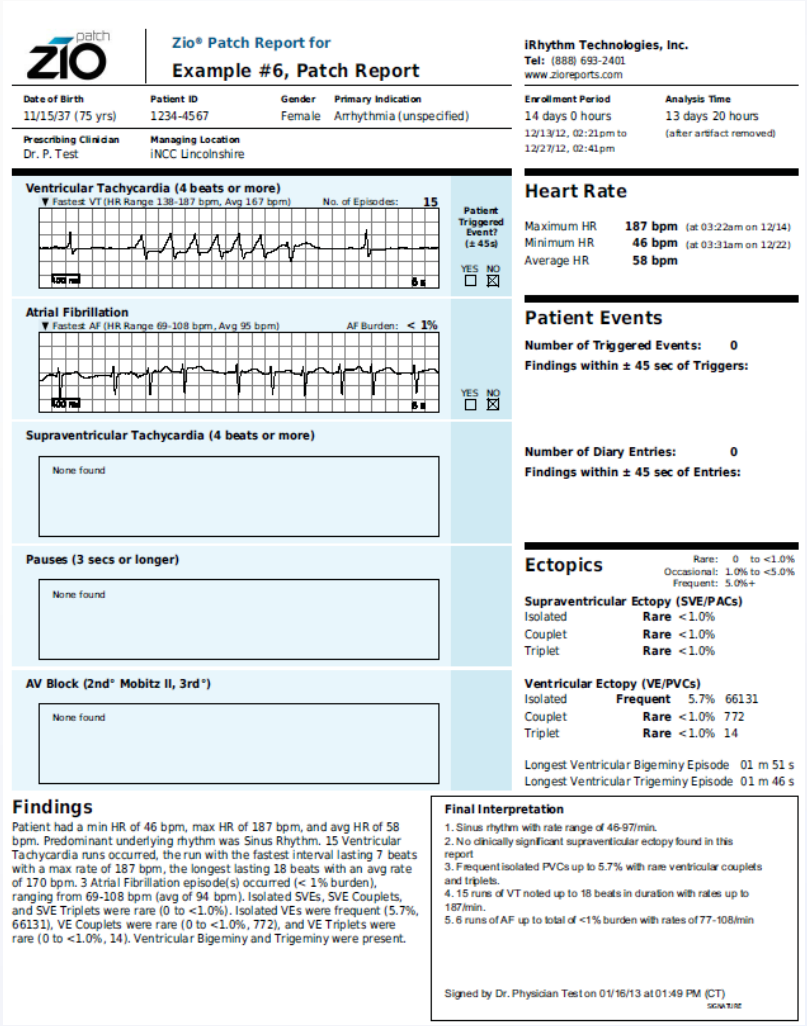


Zio ® Patch





14-denní full-disclosure Holter



ZIO patch

Zio® Patch Report for

Example #6, Patch Report

iRhythm Technologies, Inc.
Tel: (888) 693-2401
www.zioreports.com

Date of Birth	Patient ID	Gender	Primary Indication
11/15/37 (75 yrs)	1234-4567	Female	Arrhythmia (unspecified)

Prescribing Clinician	Managing Location
Dr. P. Test	iNCC Lincolnshire

Enrollment Period	Analysis Time
14 days 0 hours 12/13/12, 02:21pm to 12/27/12, 02:41pm	13 days 20 hours (after artifact removed)

Ventricular Tachycardia (4 beats or more)
Fastest VT (HR Range 138-187 bpm, Avg 167 bpm) — No. of Episodes: 15

Atrial Fibrillation
Fastest AF (HR Range 69-108 bpm, Avg 95 bpm) — AF Burden: < 1%

Patient Triggered Event? (± 45s) YES NO

Supraventricular Tachycardia (4 beats or more)
None found

Pauses (3 secs or longer)
None found

AV Block (2nd° Mobitz II, 3rd°)
None found

Heart Rate

Maximum HR	187 bpm	(at 03:22am on 12/14)
Minimum HR	46 bpm	(at 03:31am on 12/22)
Average HR	58 bpm	

Patient Events

Number of Triggered Events: 0
Findings within ± 45 sec of Triggers:

Number of Diary Entries: 0
Findings within ± 45 sec of Entries:

Ectopics

Rare: 0 to <1.0%
Occasional: 1.0% to <5.0%
Frequent: 5.0%+

Supraventricular Ectopy (SVE/PACs)

Isolated	Rare	<1.0%	
Couplet	Rare	<1.0%	
Triplet	Rare	<1.0%	

Ventricular Ectopy (VE/PVCs)

Isolated	Frequent	5.7%	66131
Couplet	Rare	<1.0%	772
Triplet	Rare	<1.0%	14

Longest Ventricular Bigeminy Episode 01 m 51 s
Longest Ventricular Trigeminy Episode 01 m 46 s

Findings

Patient had a min HR of 46 bpm, max HR of 187 bpm, and avg HR of 58 bpm. Predominant underlying rhythm was Sinus Rhythm. 15 Ventricular Tachycardia runs occurred, the run with the fastest interval lasting 7 beats with a max rate of 187 bpm, the longest lasting 18 beats with an avg rate of 170 bpm. 3 Atrial Fibrillation episode(s) occurred (< 1% burden), ranging from 69-108 bpm (avg of 94 bpm). Isolated SVEs, SVE Couplets, and SVE Triplets were rare (0 to <1.0%). Isolated VEs were frequent (5.7%, 66131), VE Couplets were rare (0 to <1.0%, 772), and VE Triplets were rare (0 to <1.0%, 14). Ventricular Bigeminy and Trigeminy were present.

Final Interpretation

1. Sinus rhythm with rate range of 46-97/min.
2. No clinically significant supraventricular ectopy found in this report
3. Frequent isolated PVCs up to 5.7% with rare ventricular couplets and triplets.
4. 15 runs of VT noted up to 18 beats in duration with rates up to 187/min.
5. 6 runs of AF up to total of <1% burden with rates of 77-108/min

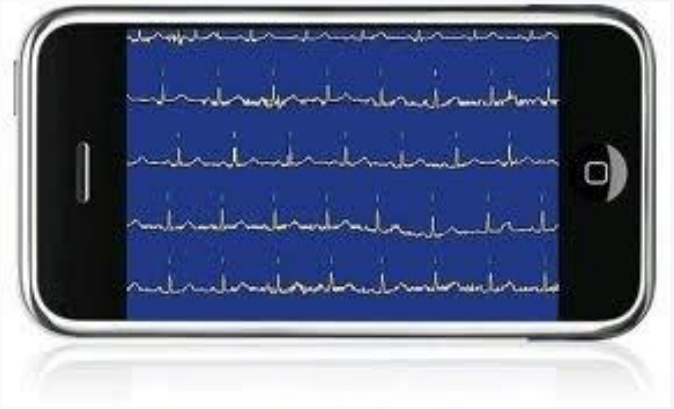
Signed by Dr. Physician Test on 01/16/13 at 01:49 PM (CT)
SIGNATURE

iRhythm

INSTITUT KLINICKÉ A EXPERIMENTÁLNÍ MEDICÍNY
KLINIKA KARDIOLOGIE

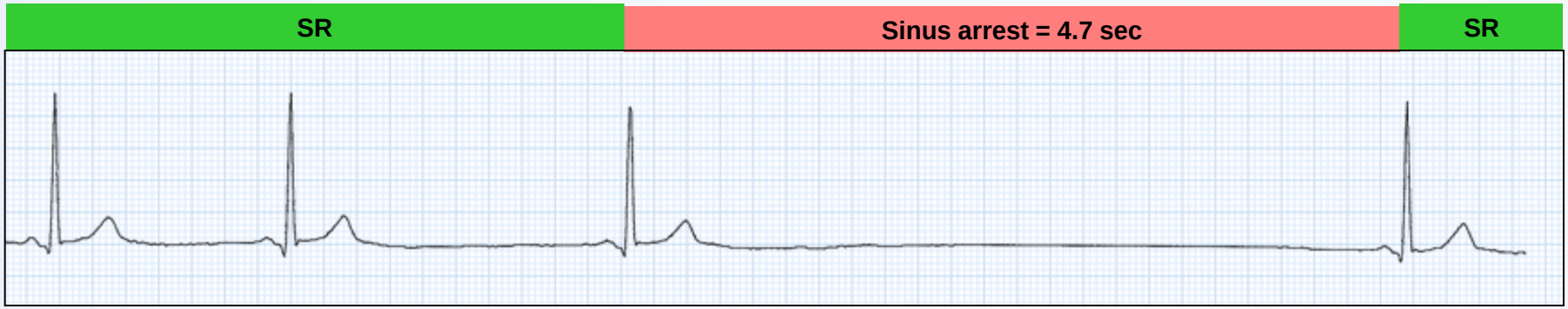
IK+EM

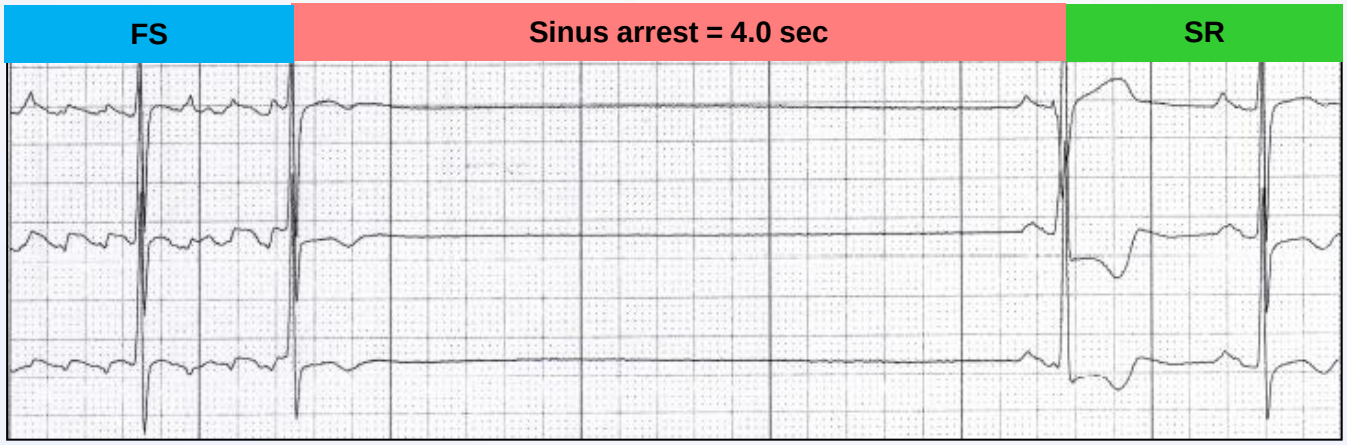
AliveCor iPhone ECG



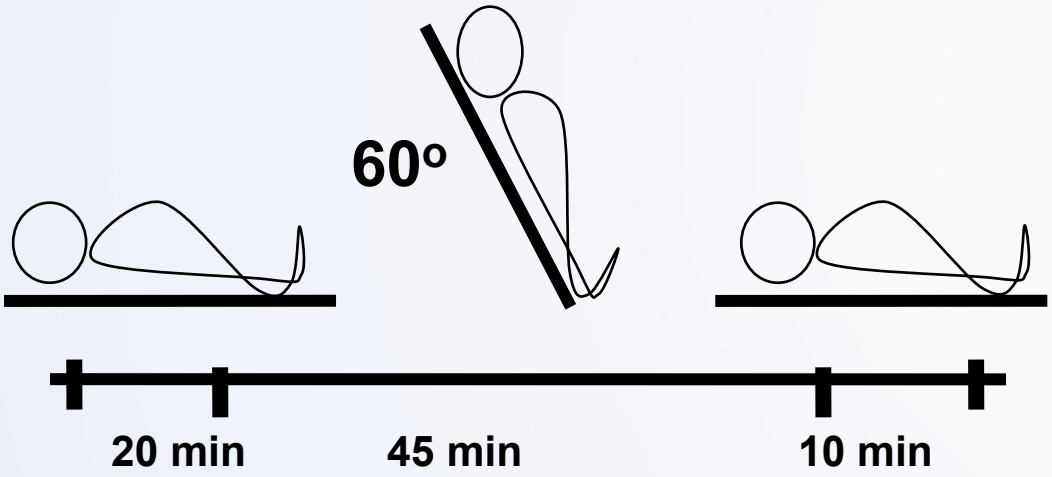
FDA approval and CE mark expected soon.
Anticipated price of $99.

Sinus arrest



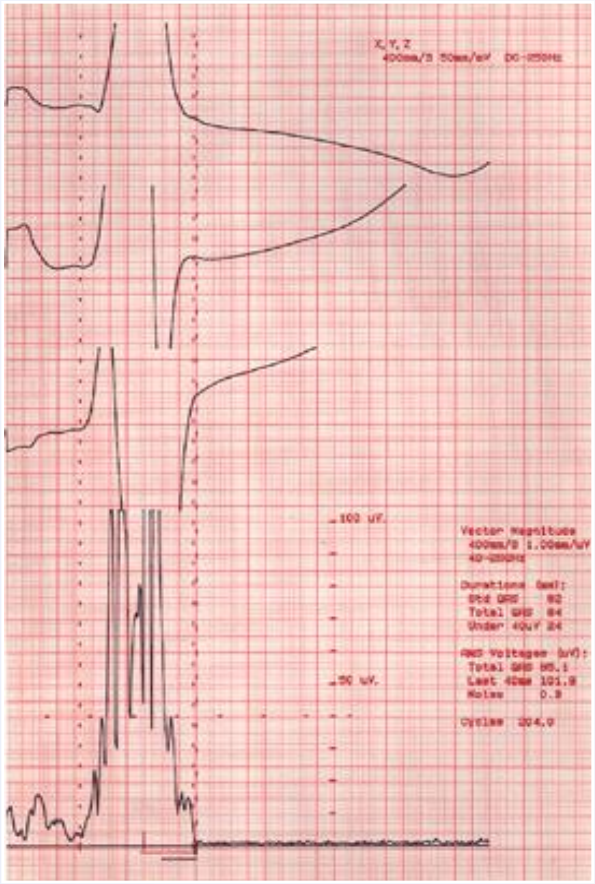


Tilt test

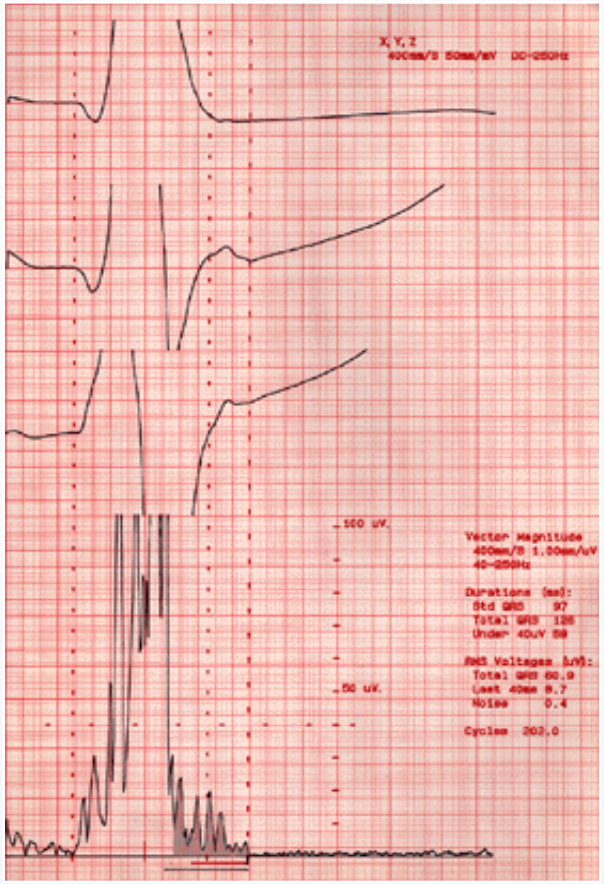

60°
20 min
45 min
10 min


Tlakové trendy
mmHg
160
140
120
100
80
60
40
20
0
0 30 60 90 120 150 180 210 240 270 300 330 360 390 420 450 480 510 540 570 600 630 660 690 720
počet beatů

Pozdní komorové potenciály

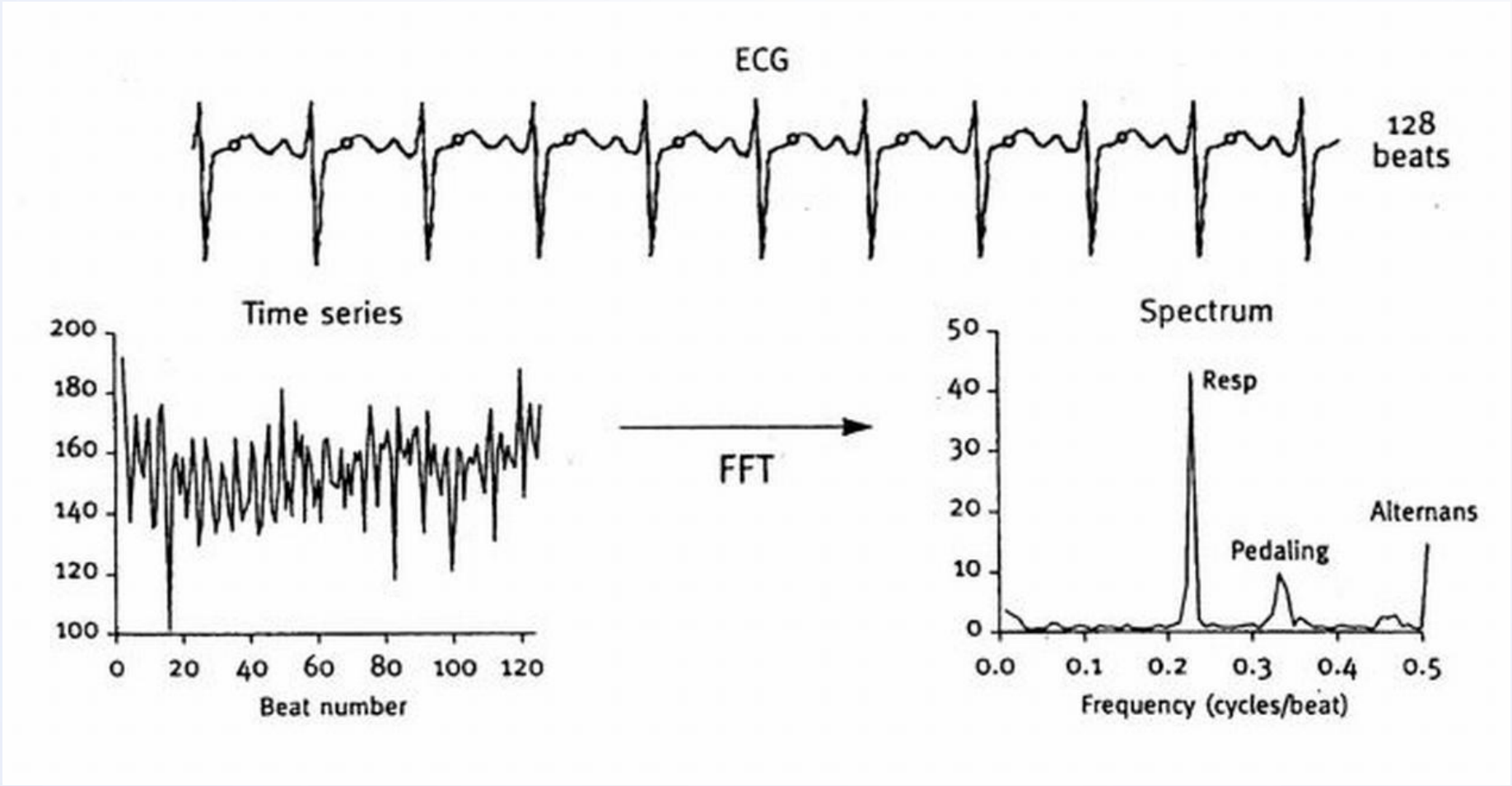


Normální SAECG

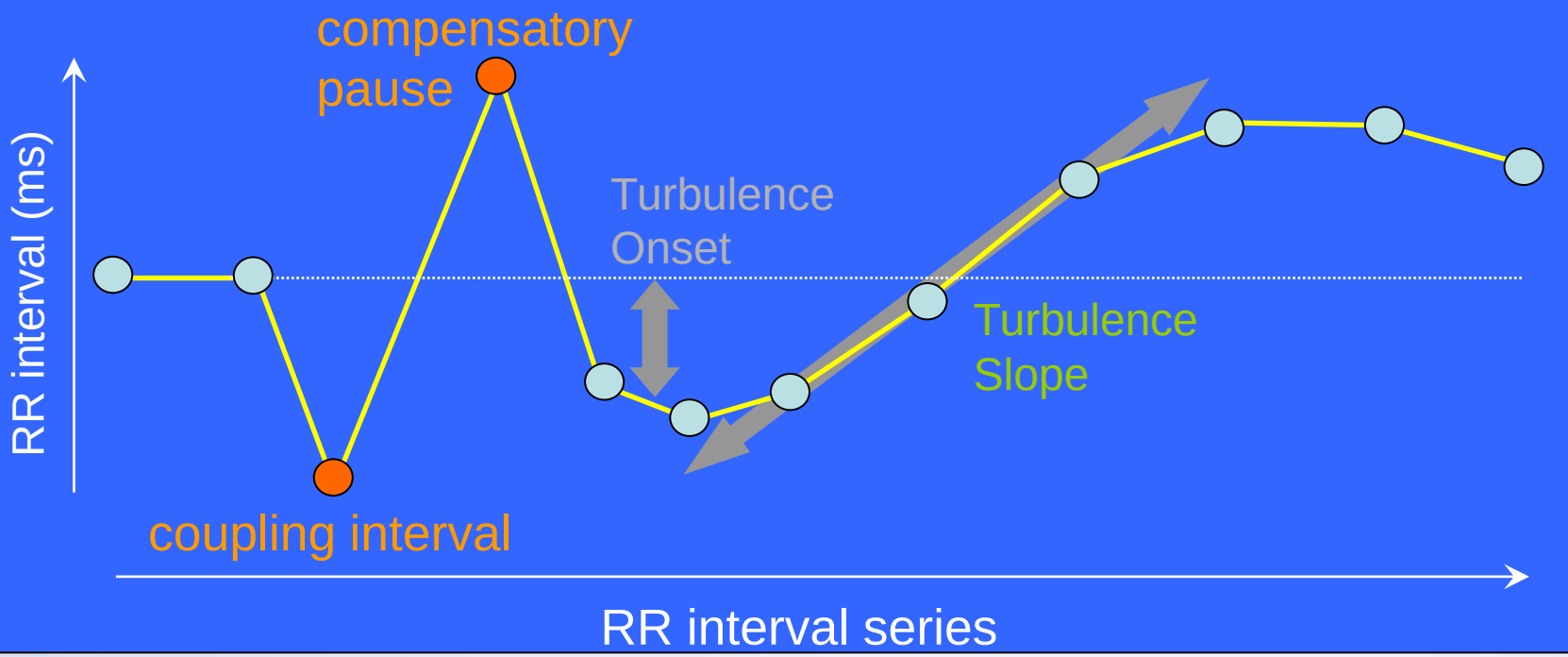


SAECG s pozdními potenciály

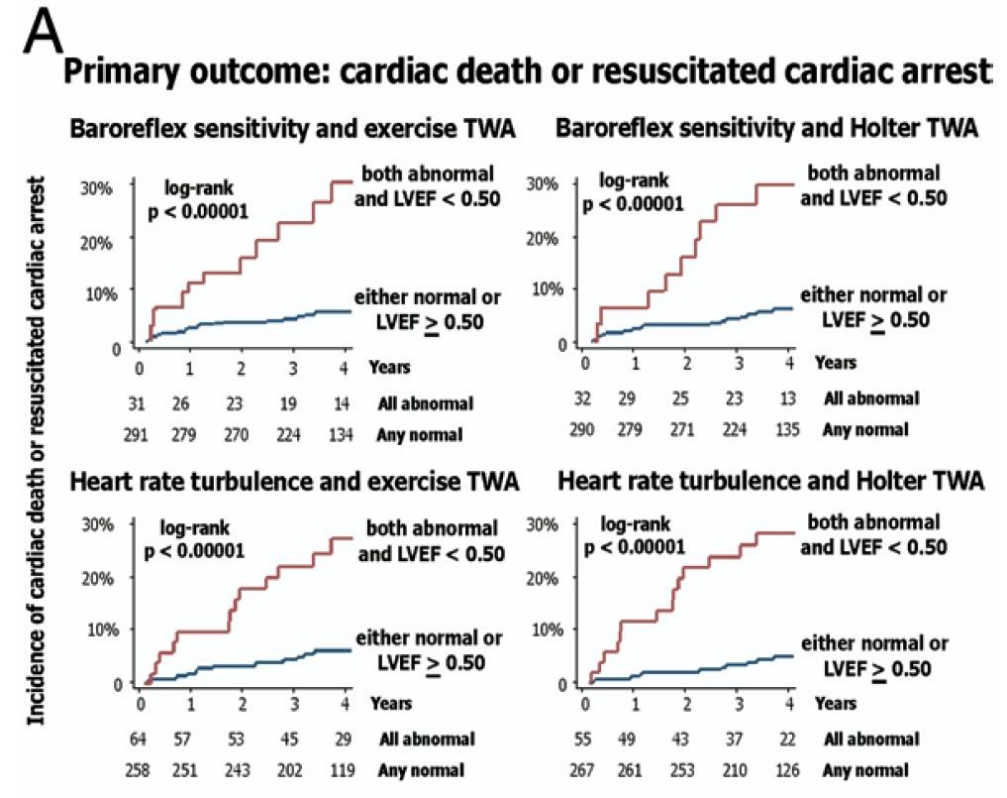
Mikrovoltový alternans T vlny



Turbulence srdeční frekvence



ICD studie – středně snížená funkce LK

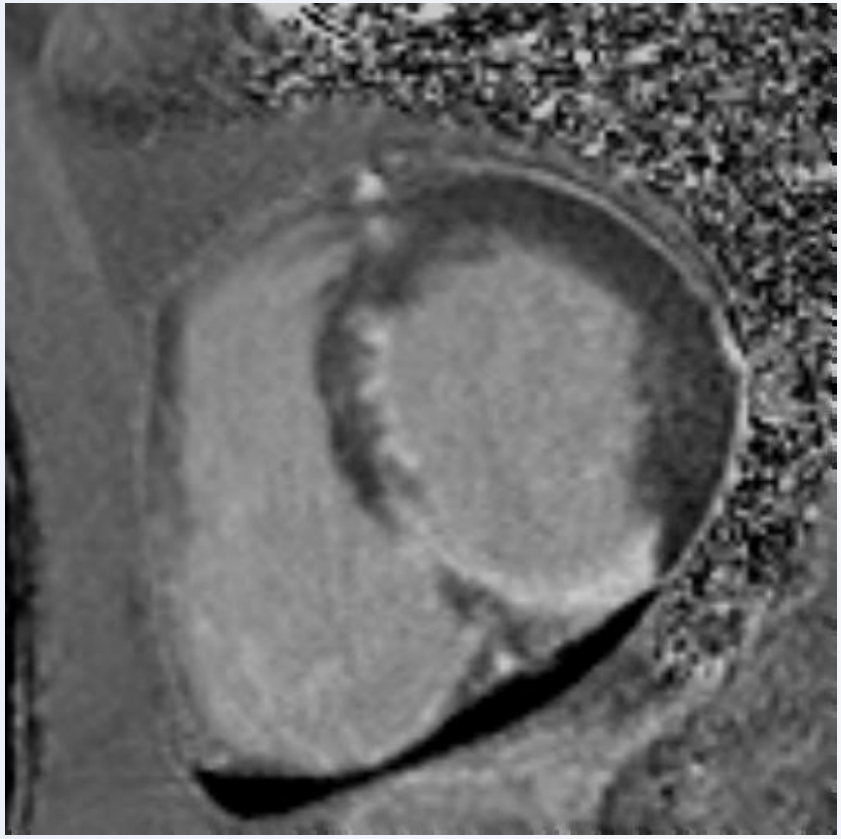


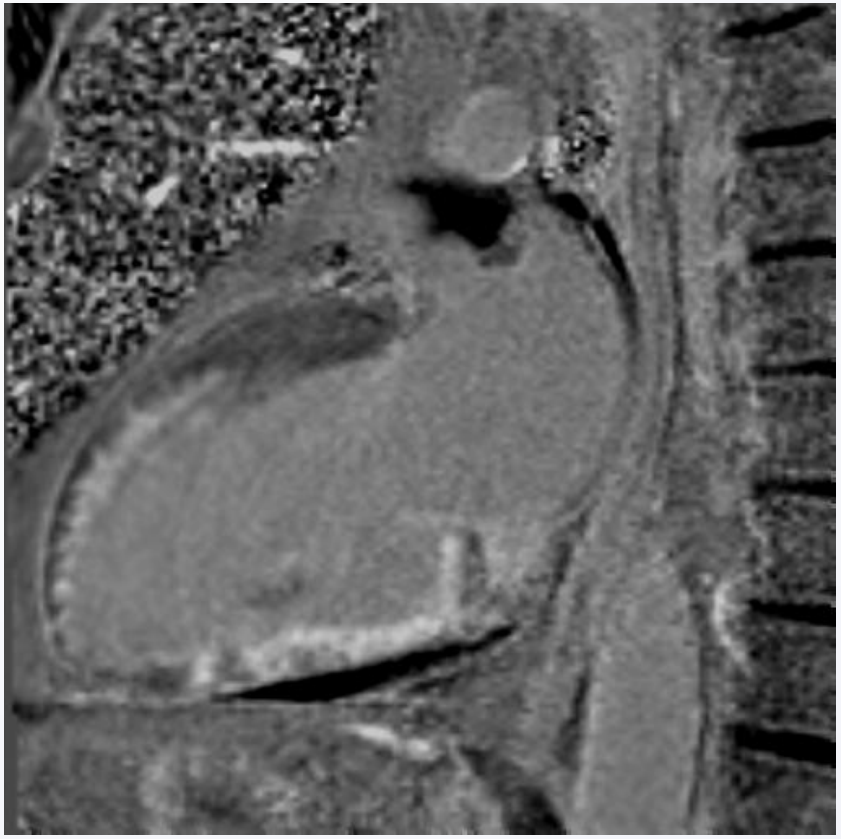
REFINE-ICD

Efficacy of Implantable Defibrillator Therapy After a Myocardial Infarction

Pacienti 2-12 měsíců po IM, EF LK 36 – 50%, abnormální HRT + TWA (Holter); randomizace: ICD x běžná léčba

Magnetická rezonance

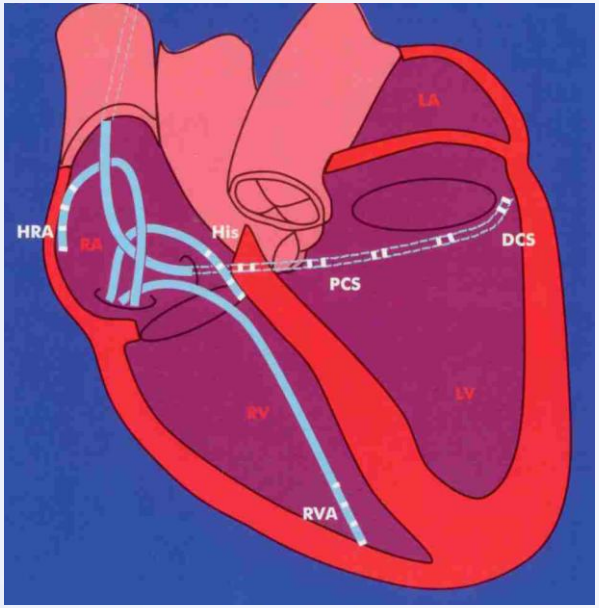


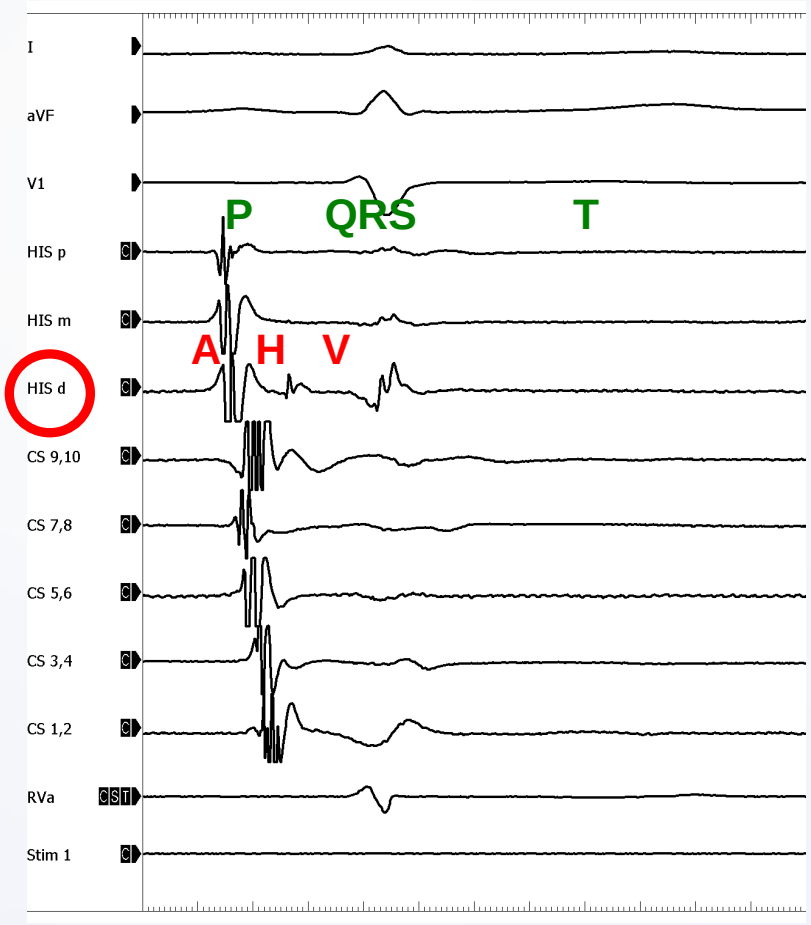


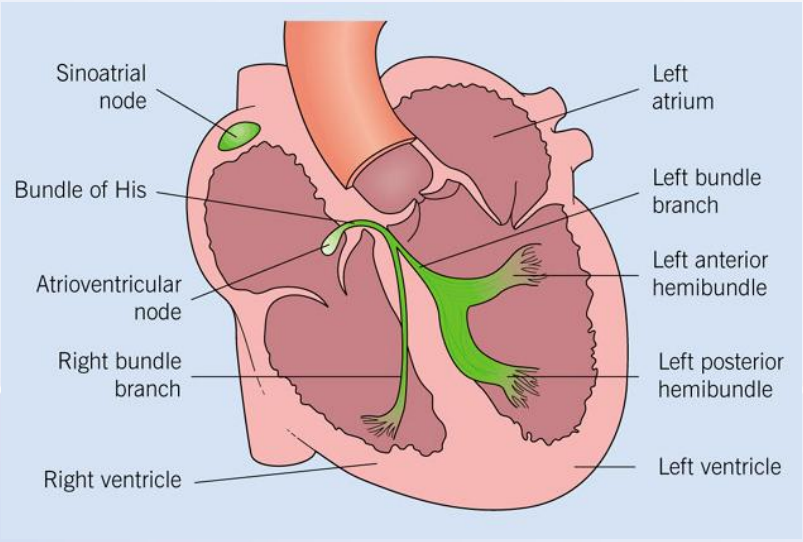
DETERMINE Defibrillators To Reduce Risk by Magnetic Resonance Imaging Evaluation

Pacienti po IM s relativně zachovanou EF LK a velkým rozsahem jizvy podle MRI; randomizace: ICD x konvenční léčba

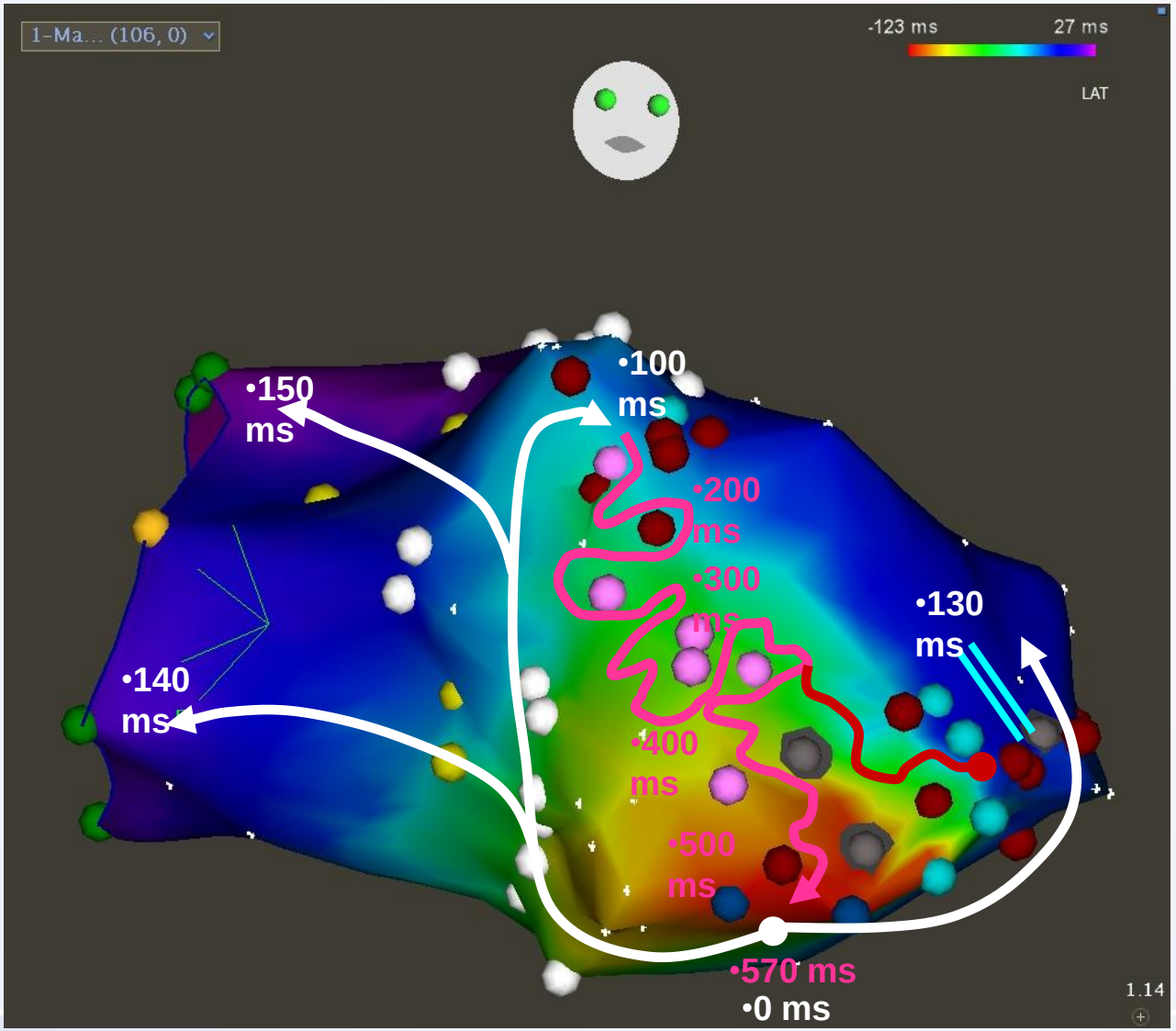
Elektrofyziologická studie

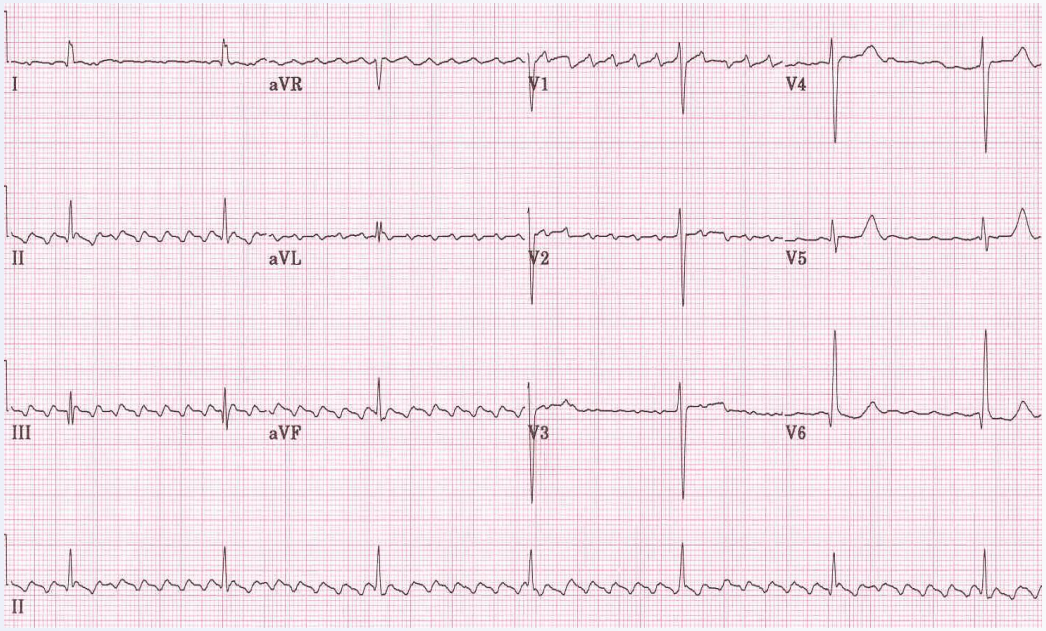




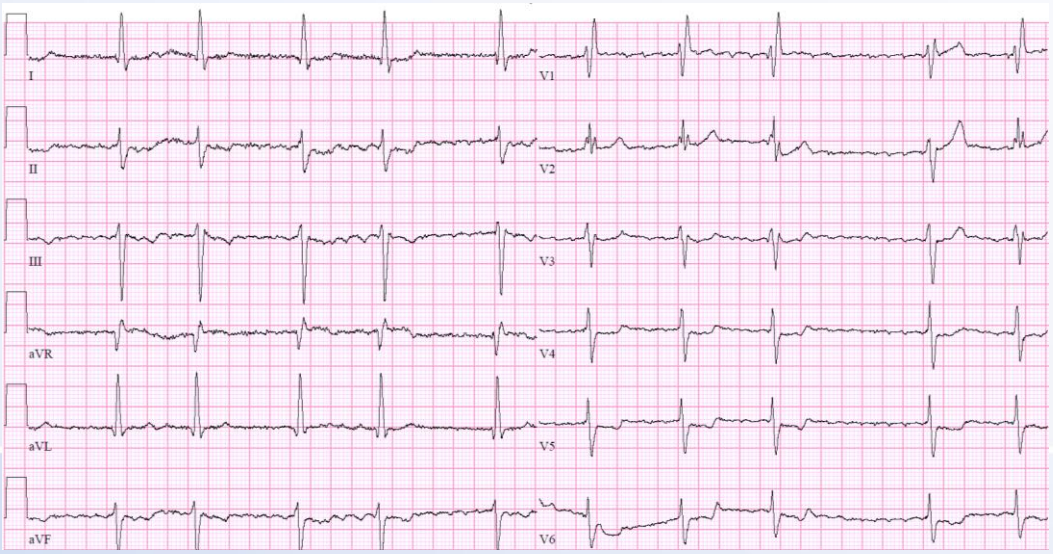


Princip pomalého vedení

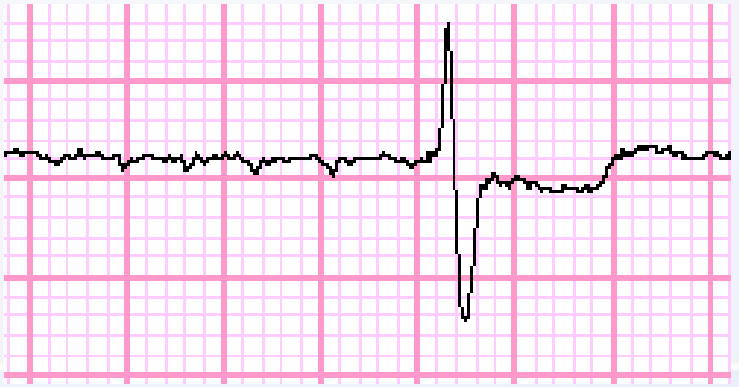




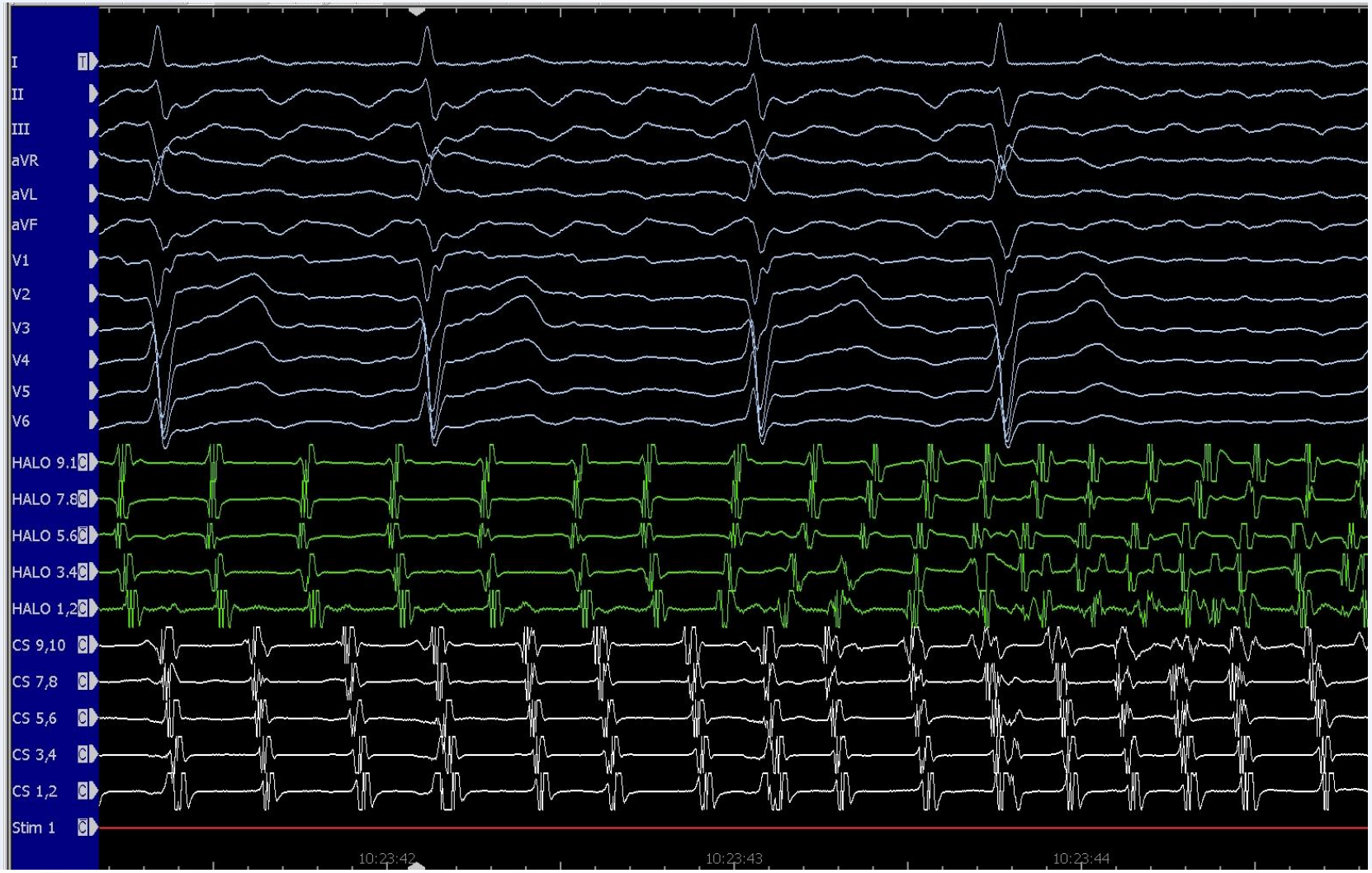
Typický flutter síní



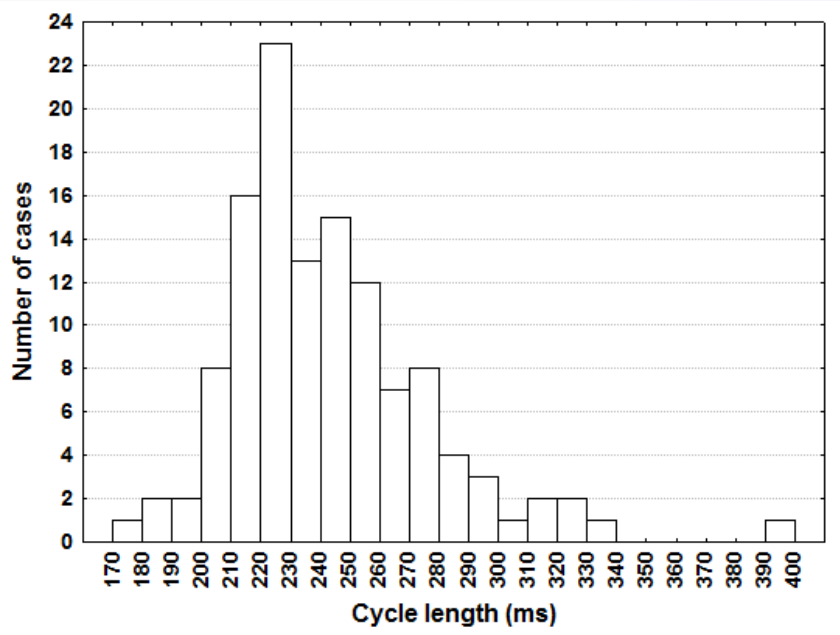
Fibrilace síní



Flutter a fibrilace síní



Přesné měření dominantního cyklu

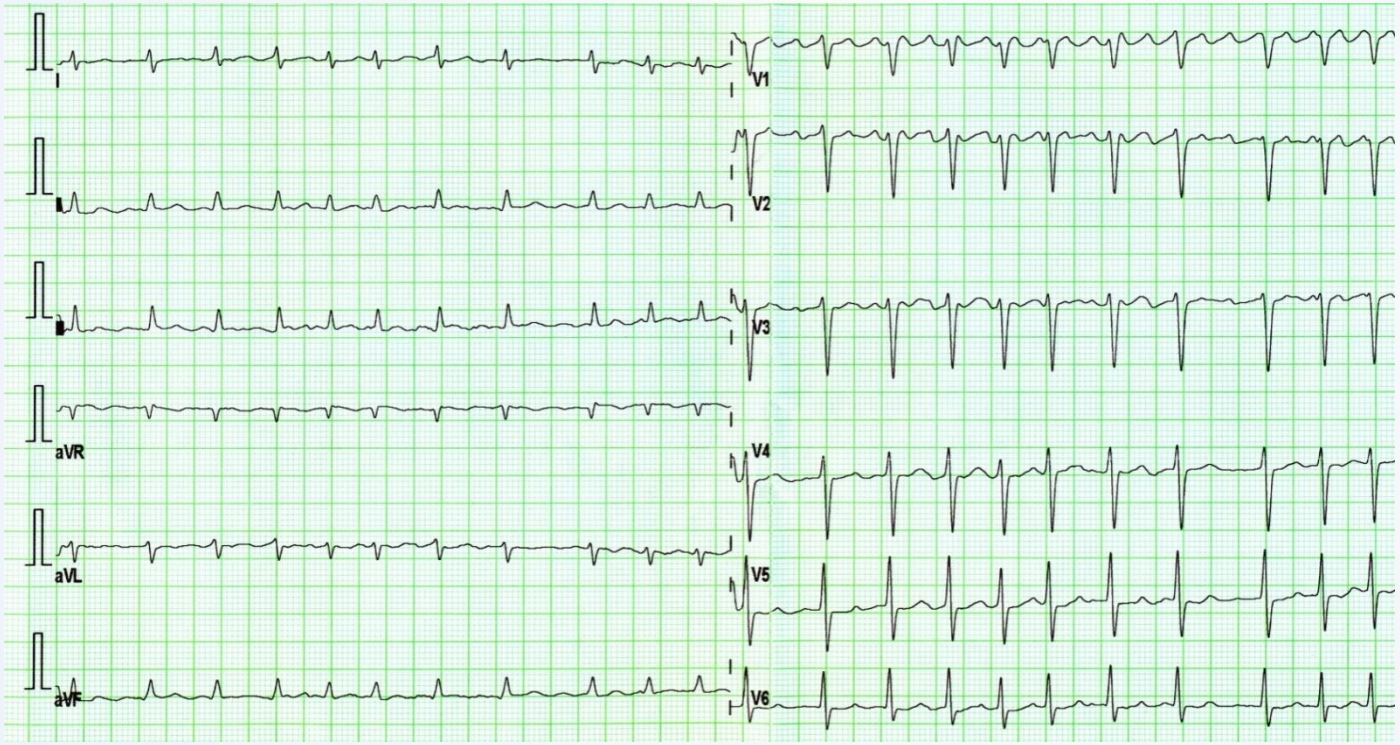


200-220 ms

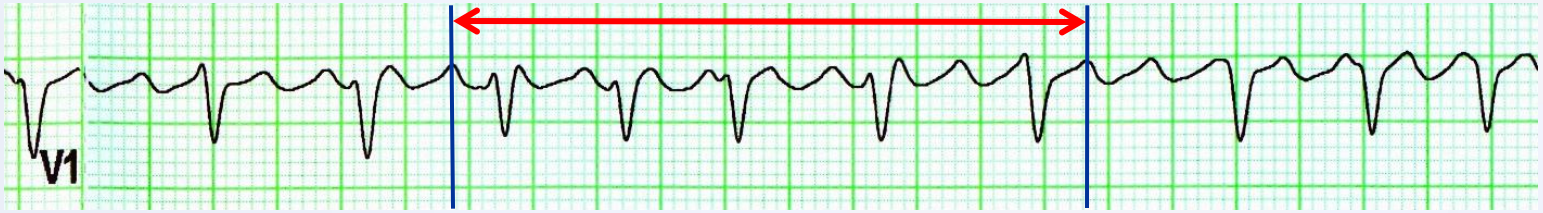
10 cyklů = 2140 ms; **1 cyklus 214 ms**

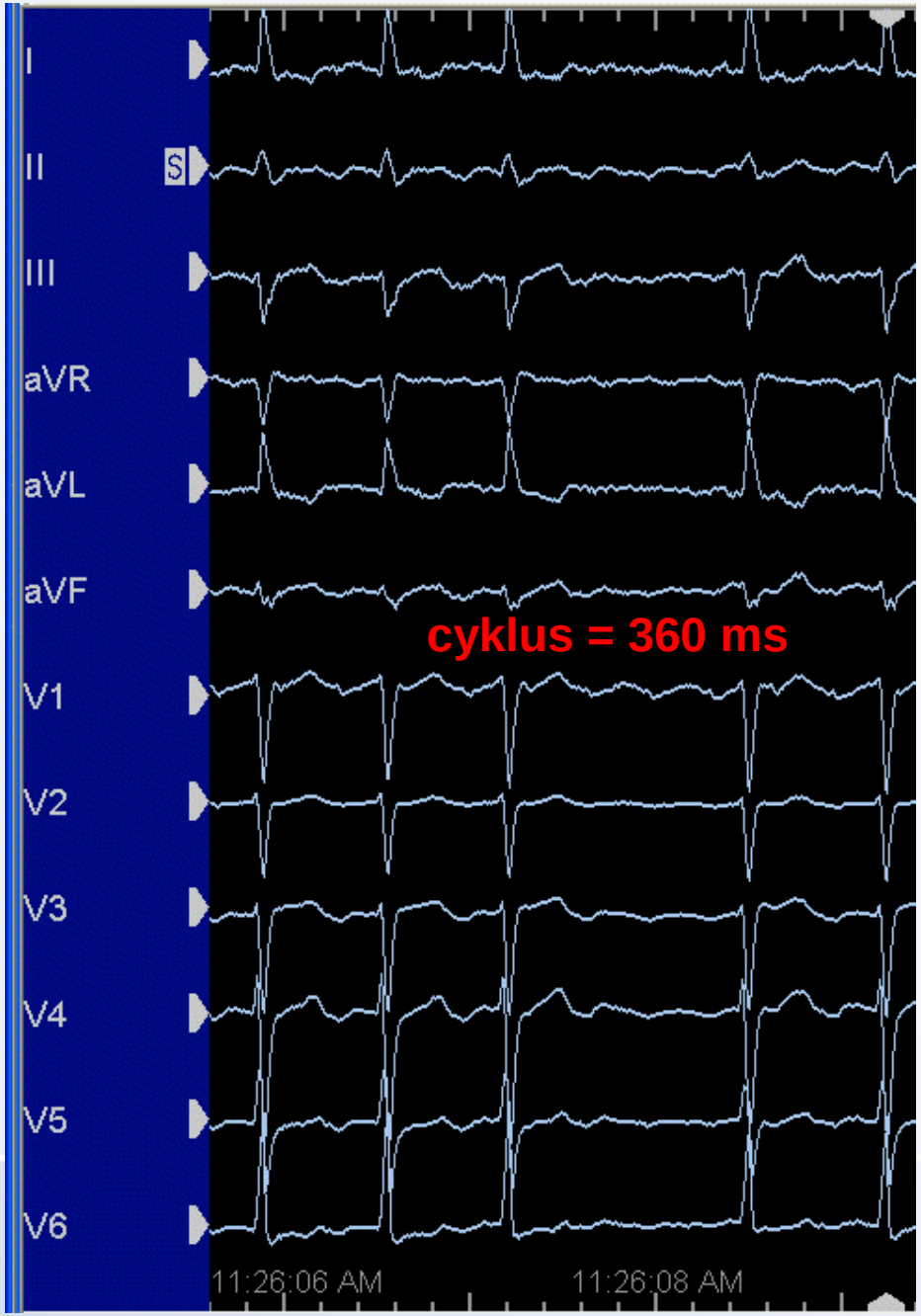
Havránek et al. Physiol Res 2012;61:43-51

Fibrilace síní nebo atypický flutter?



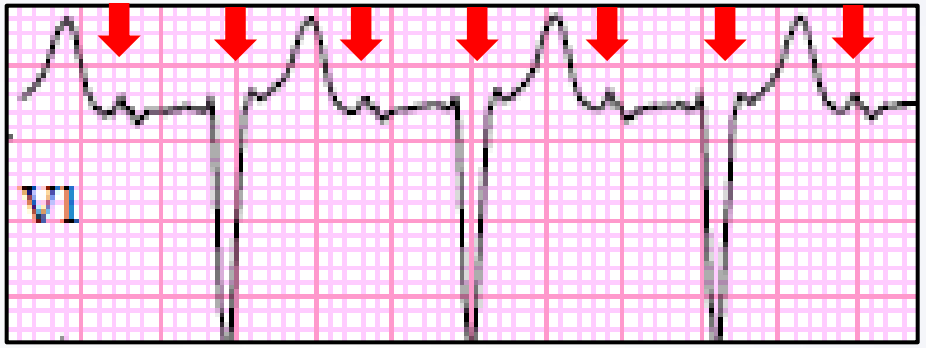
10 cyklů = 1980 ms; **1 cyklus 198 ms**

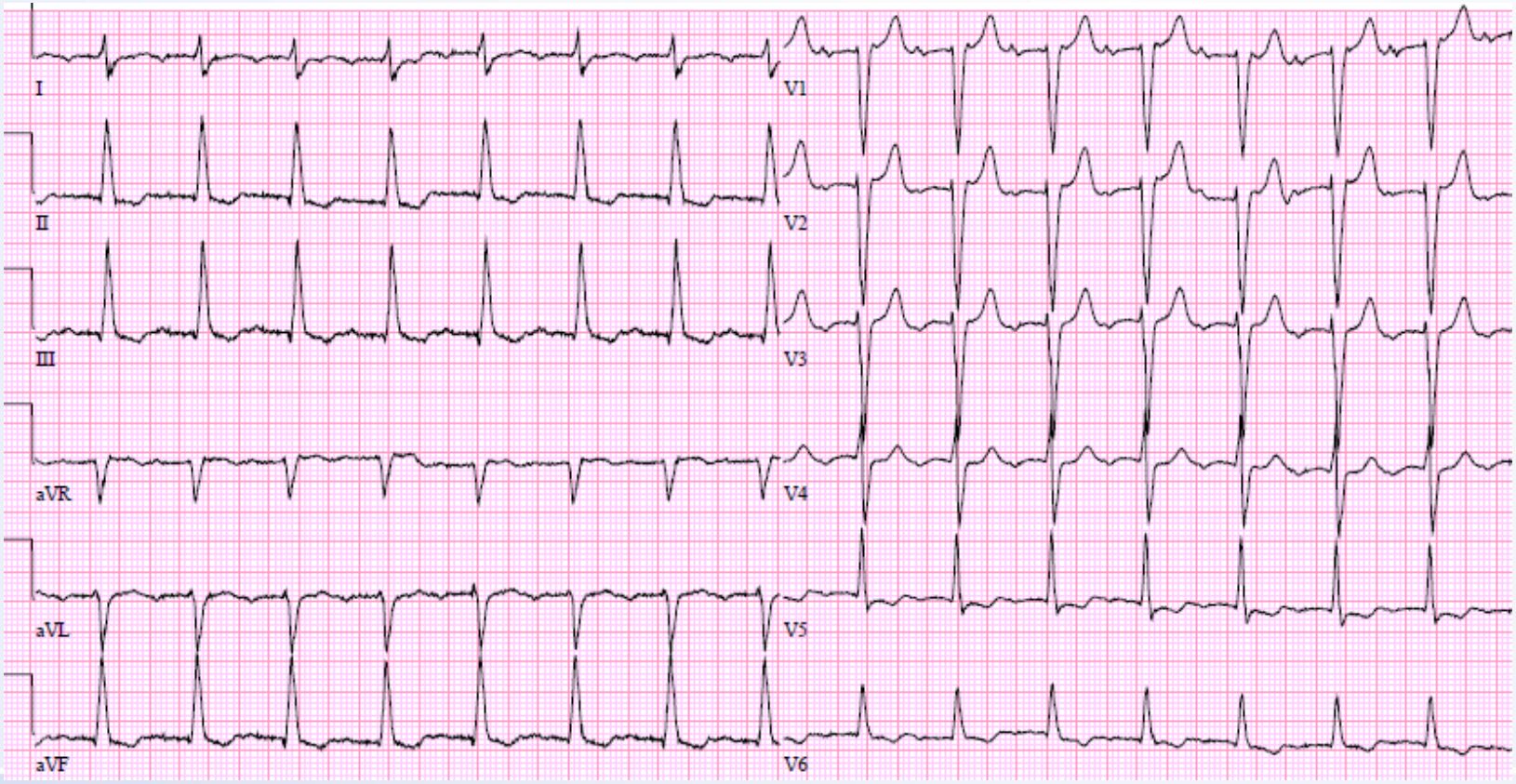




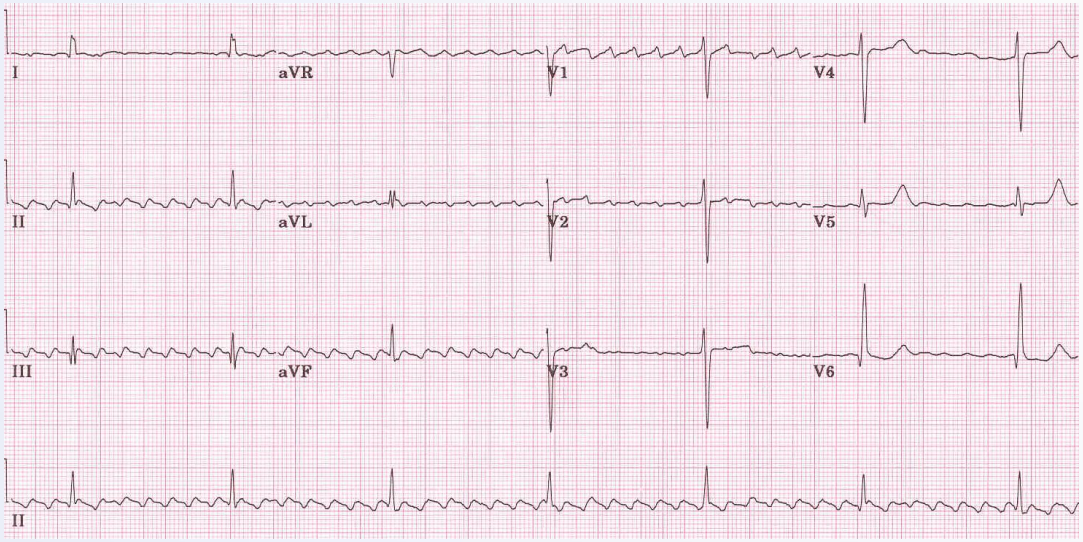
Typický flutter síní u pacienta s významným jizevnatým postižením obou síní (spontánním a postablačním)

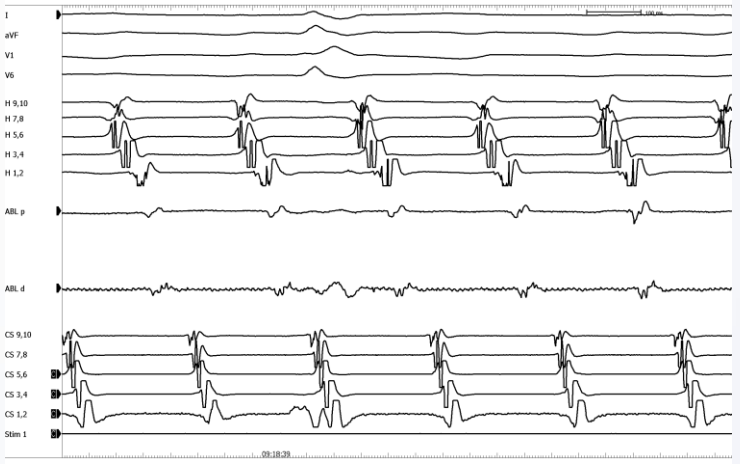
Pomalý atypický flutter síní
CL 300 ms, 2:1

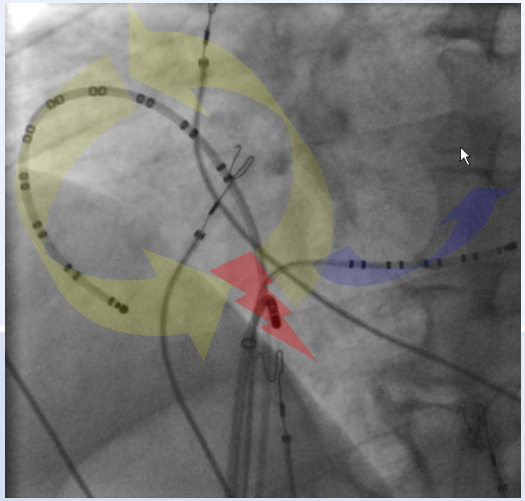


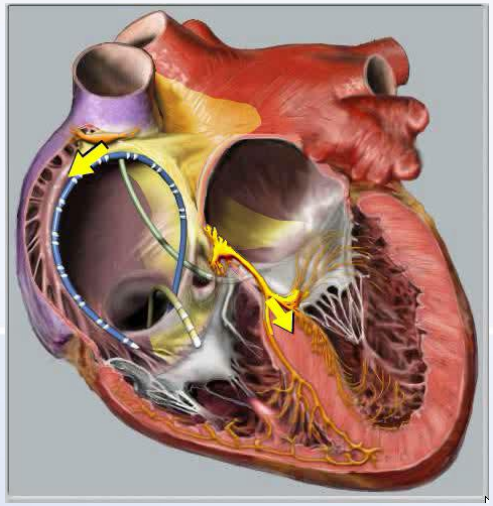


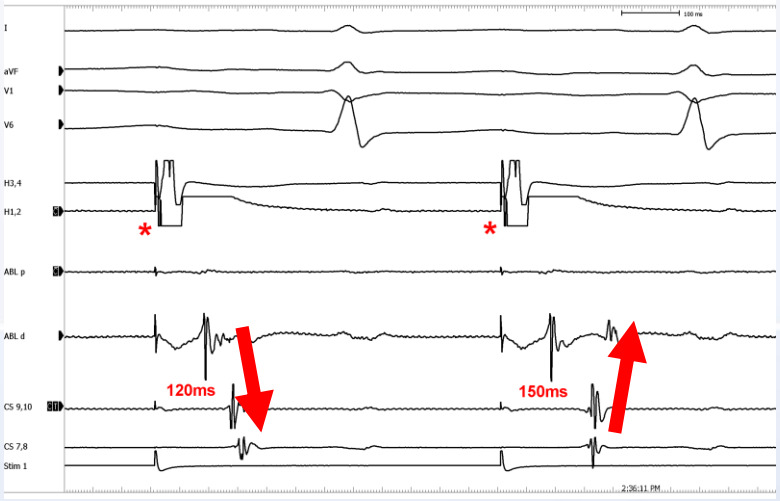
Typický flutter síní



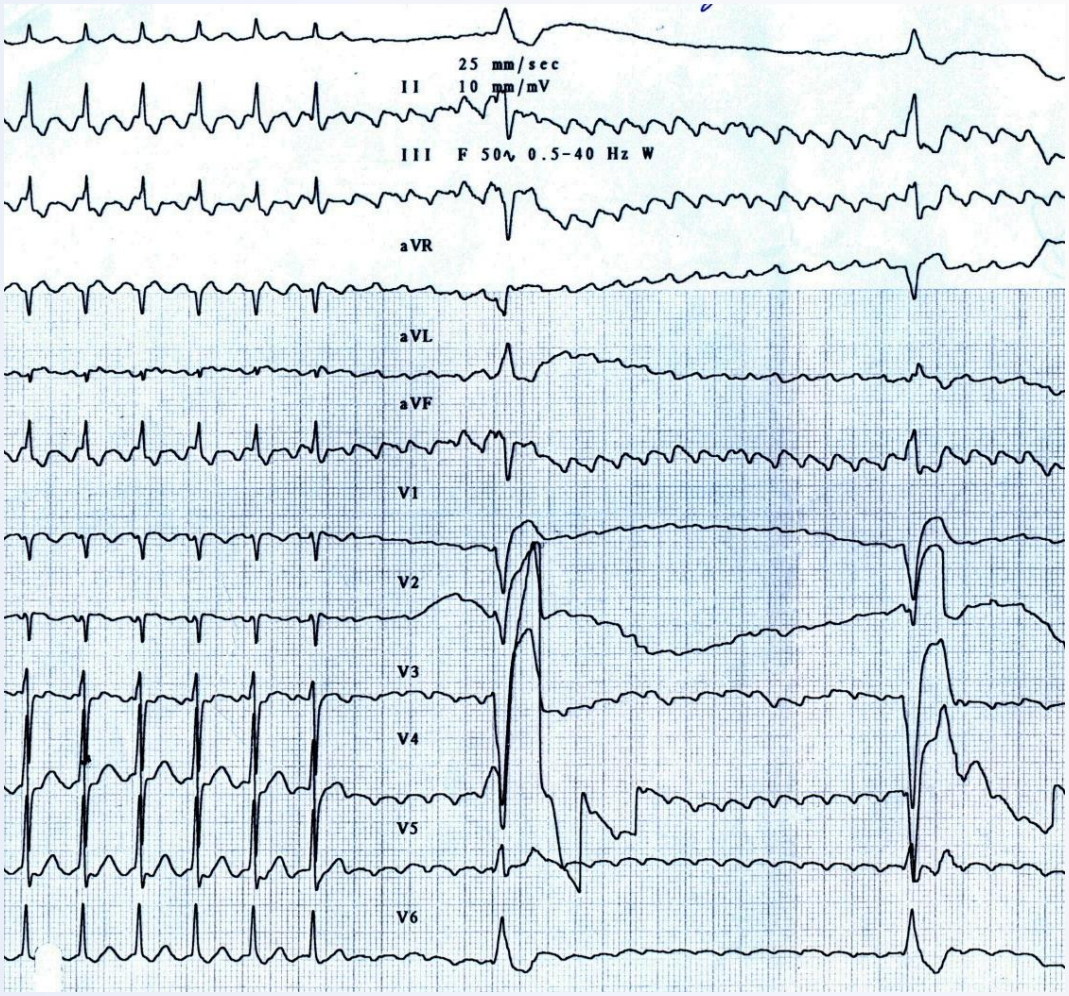


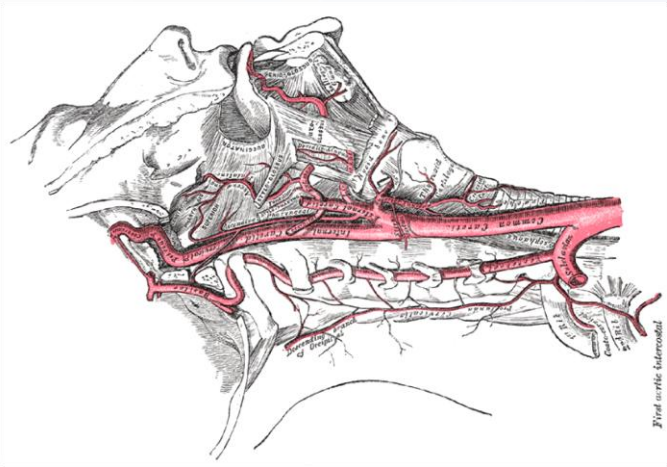




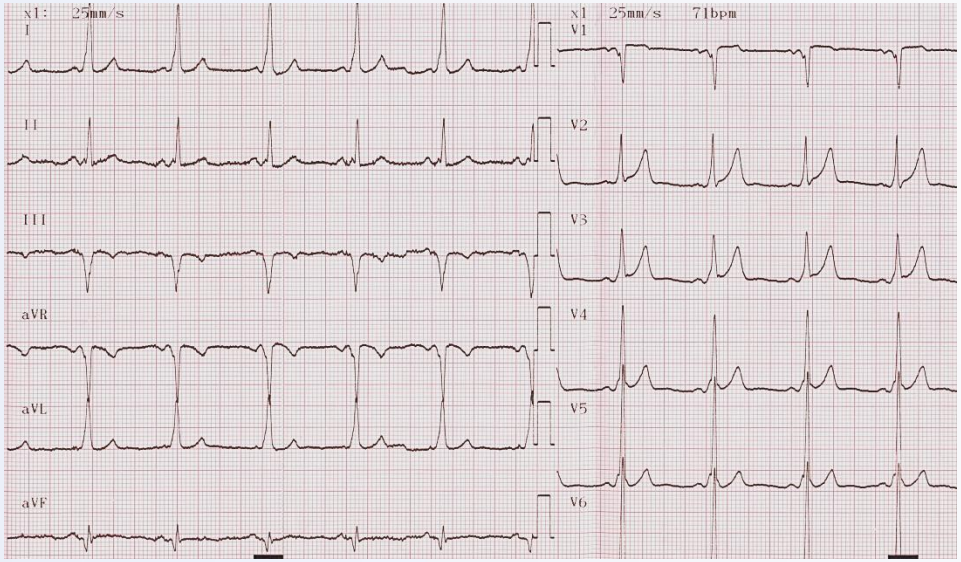


Adenosin nebo masáž karotického sinu



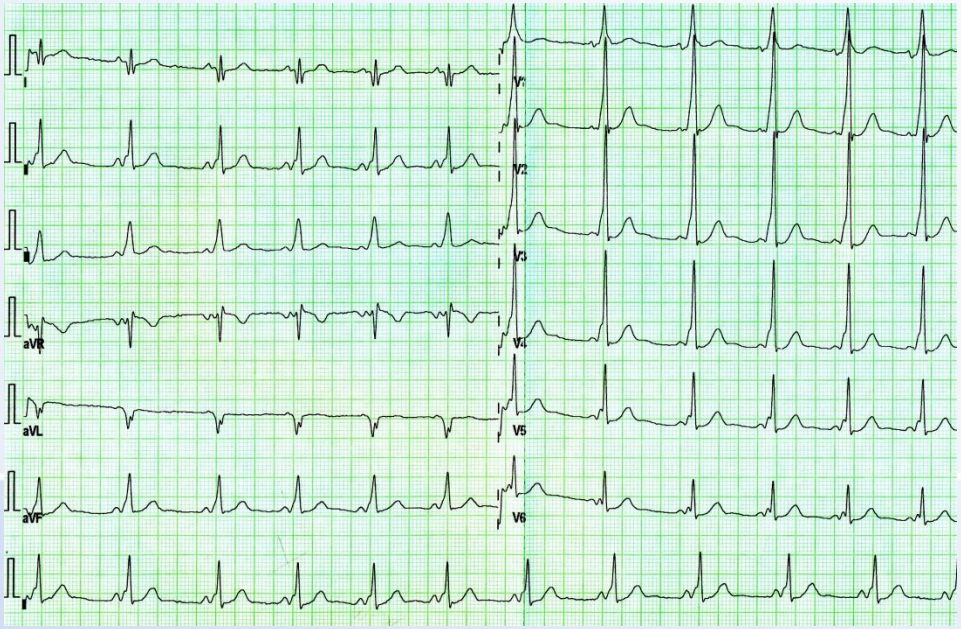


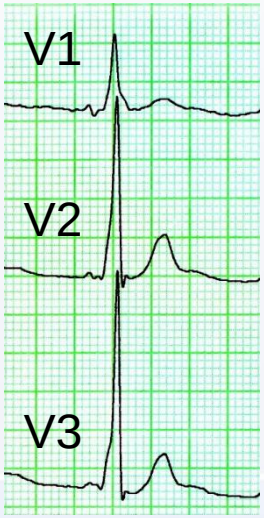
Syndrom preexcitace



Pravostranná

akcesorní dráha



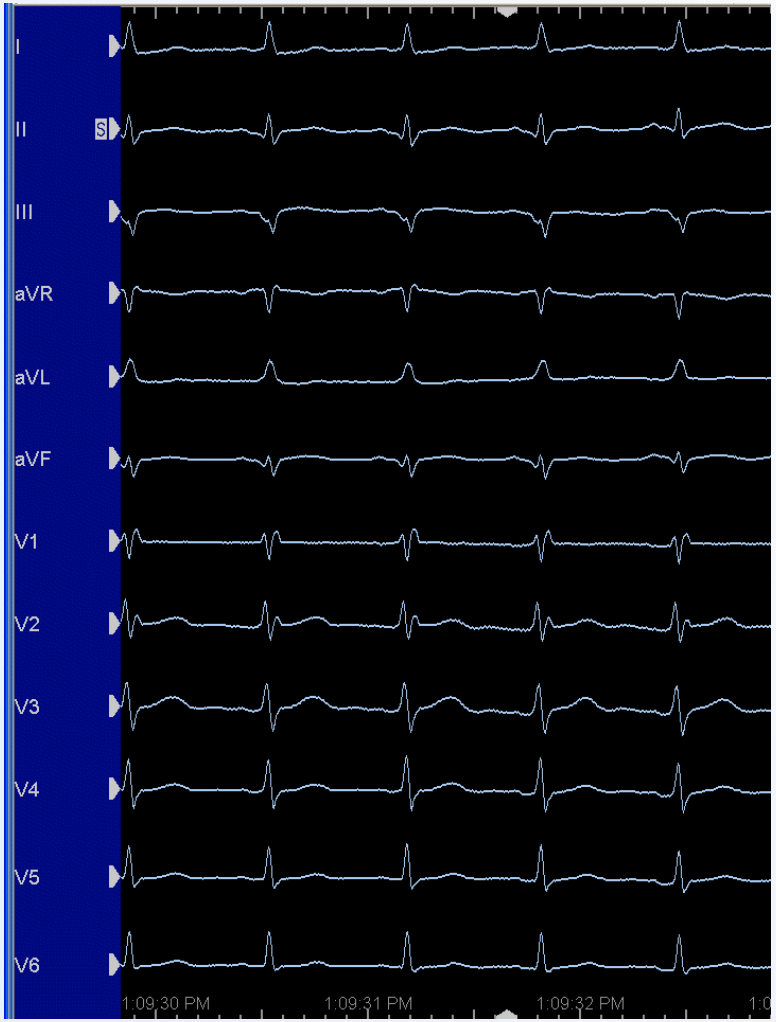


Levostranná

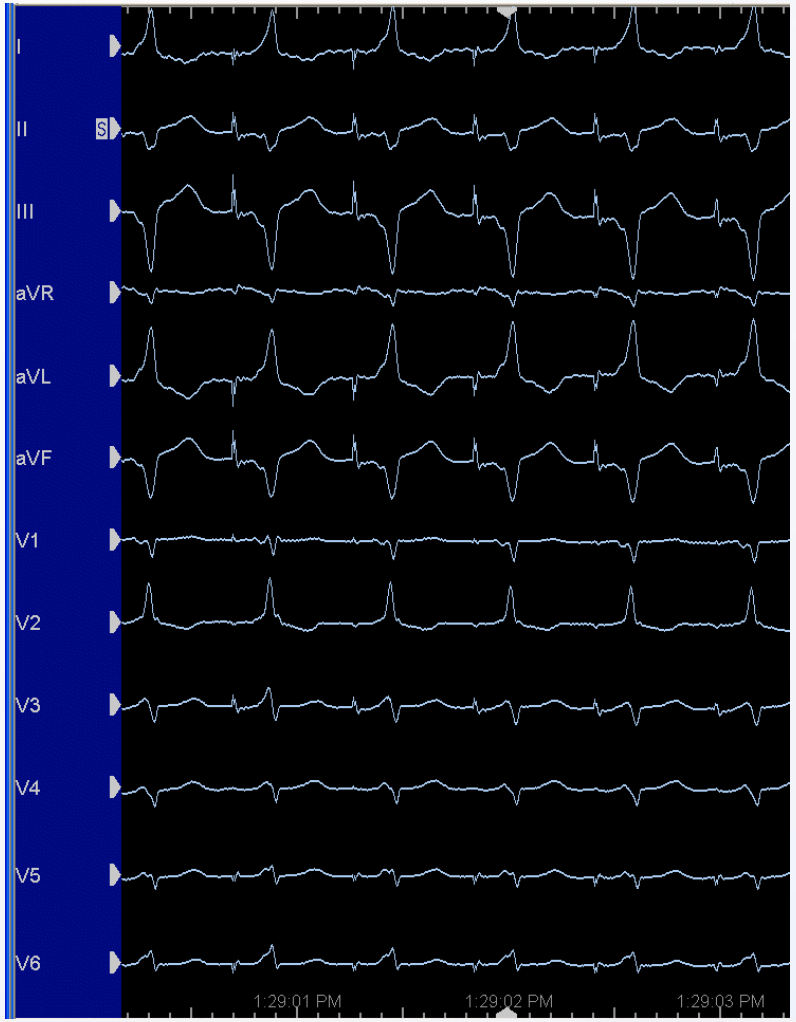
akcesorní dráha

Preexcitace

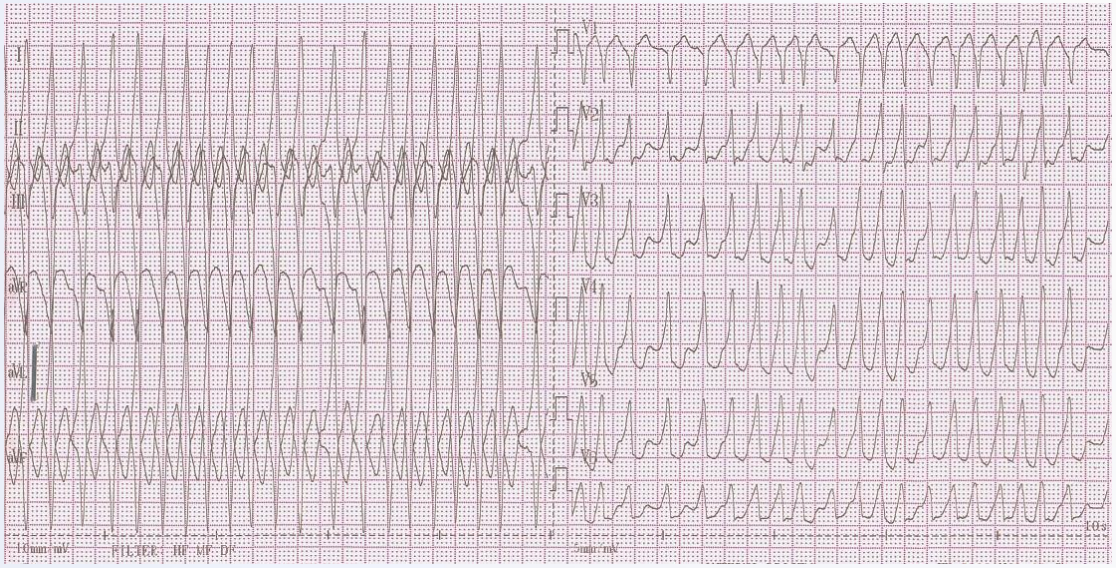
Nevýrazná při SR

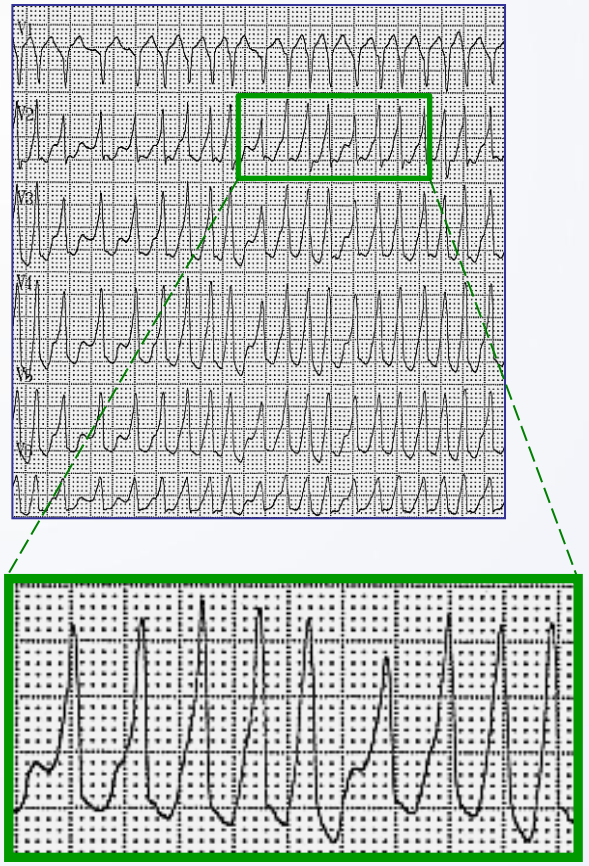


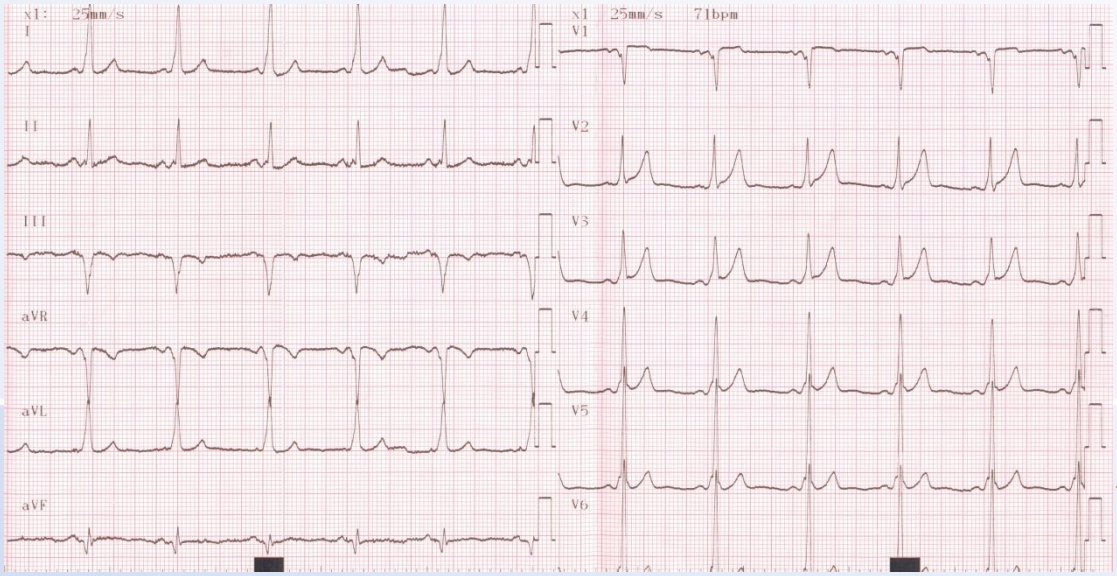
Zjevná při síňové stimulaci



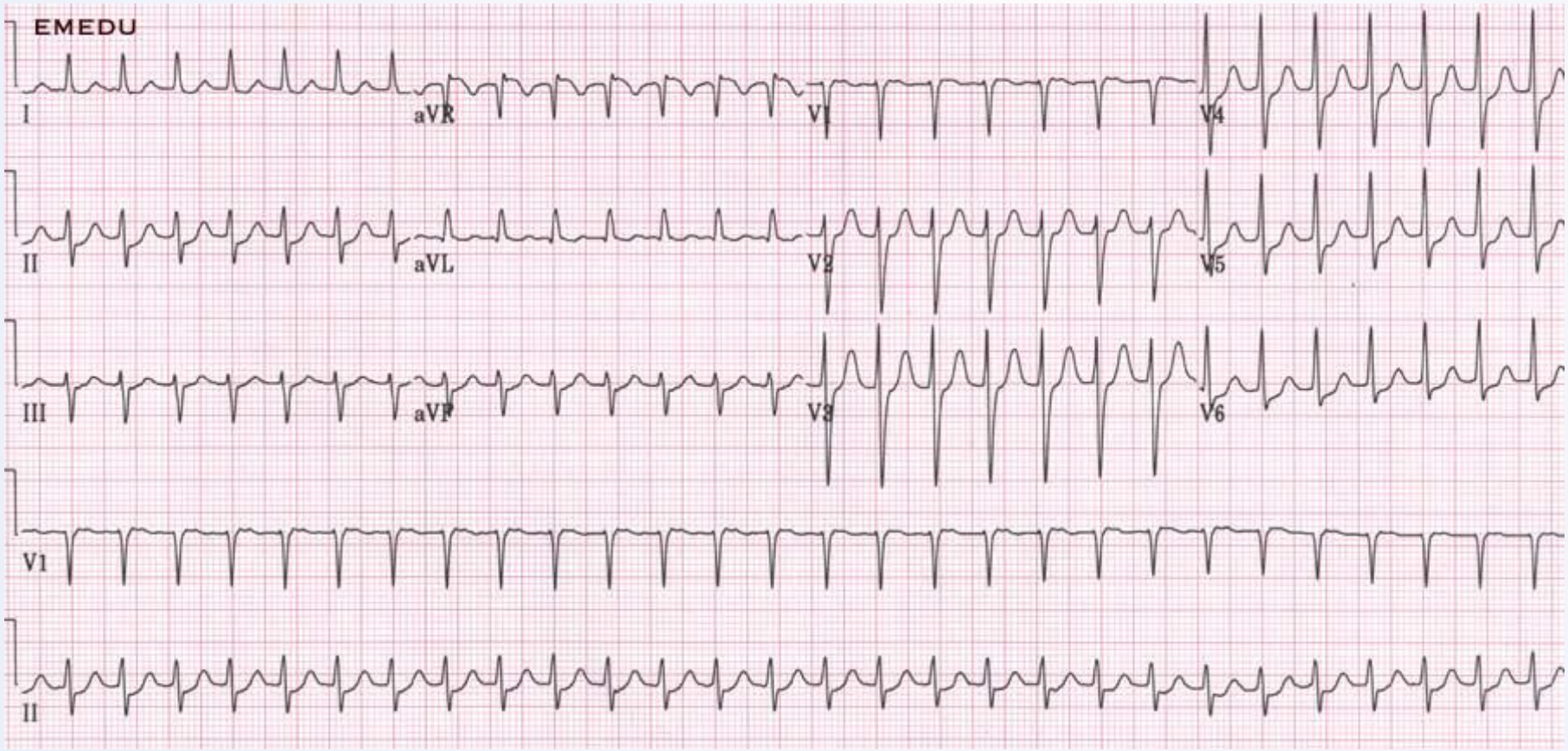
Preexcitovaná fibrilace síní



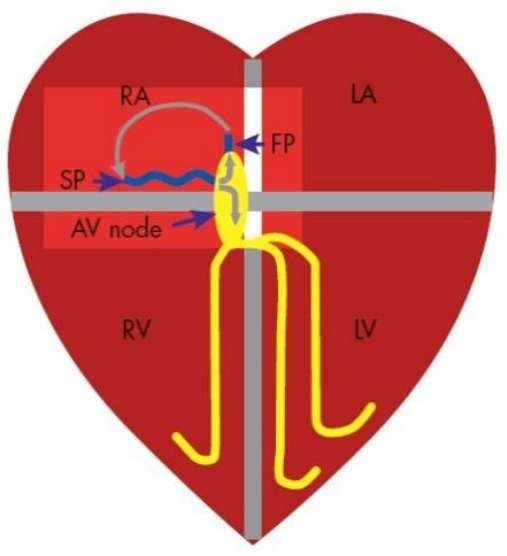


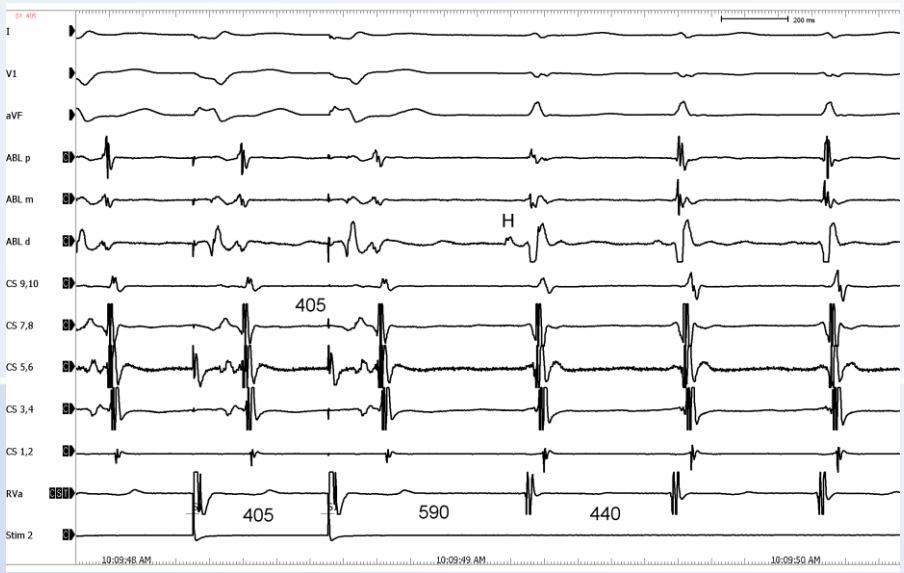


AVNRT x AVRT

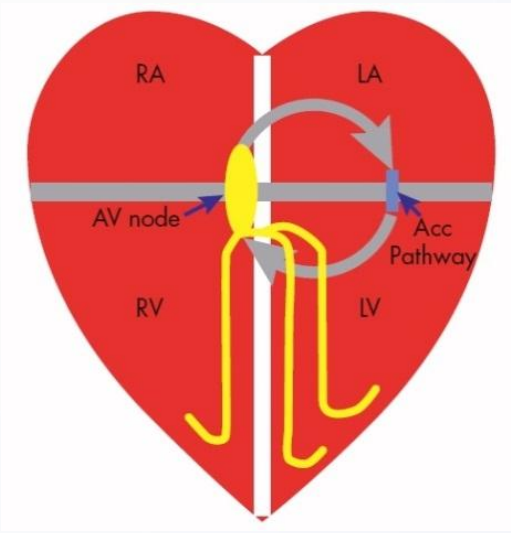


AVNRT


RA
LA
FP
SP
AV node
RV
LV


I
V1
aVF
ABL p
ABL m
ABL d
CS 9,10
CS 7,8
CS 5,6
CS 3,4
CS 1,2
RVa
Stim 2
H
405
405
590
440
10:09:48 AM
10:09:49 AM
10:09:50 AM

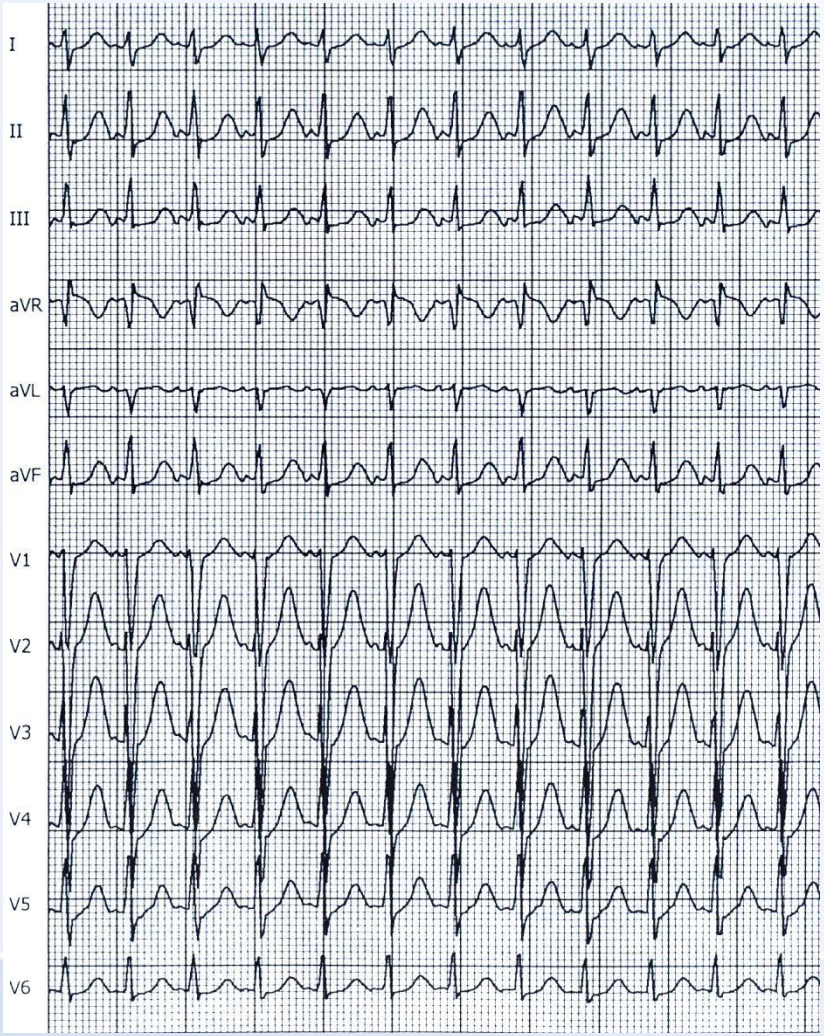
AVRT


RA
LA
AV node
Acc
Pathway
RV
LV

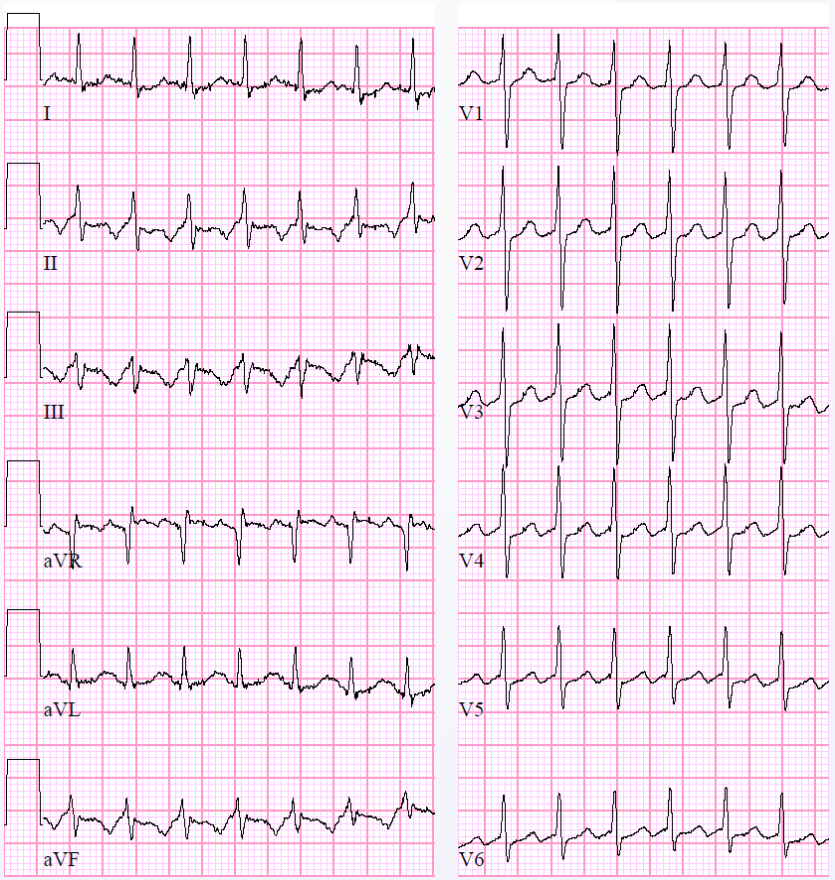

I
aVF
V1
ABL p
ABL m
ABL d
CS 9,10
CS 7,8
CS 3,4
CS 1,2
RVa
Stim 1
8:16:10 AM
8:16:11 AM
8:16:12 AM

Tachykardie s dlouhým RP intervalem

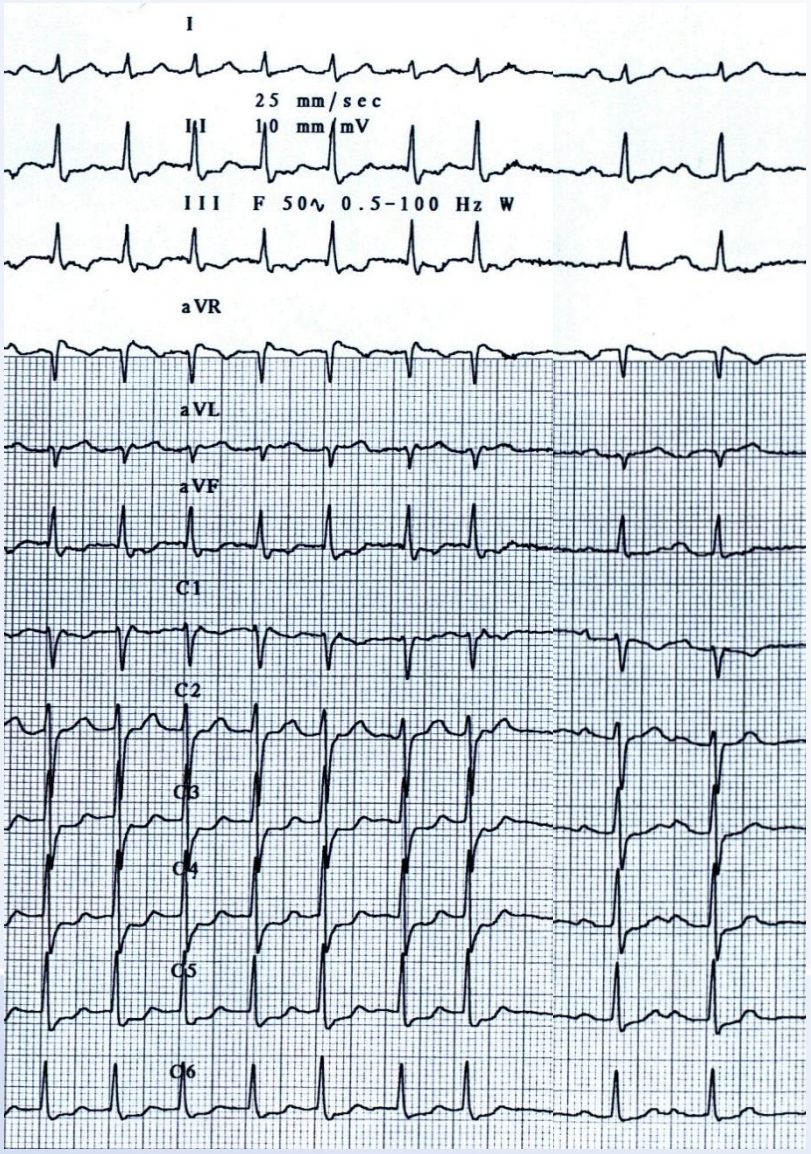
Atypická AVNRT



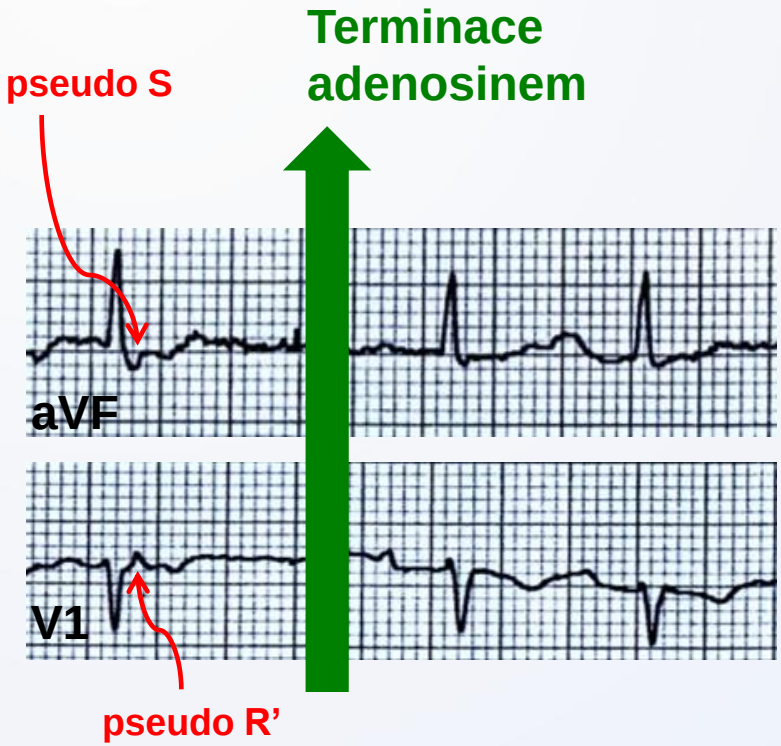
Fokální ST



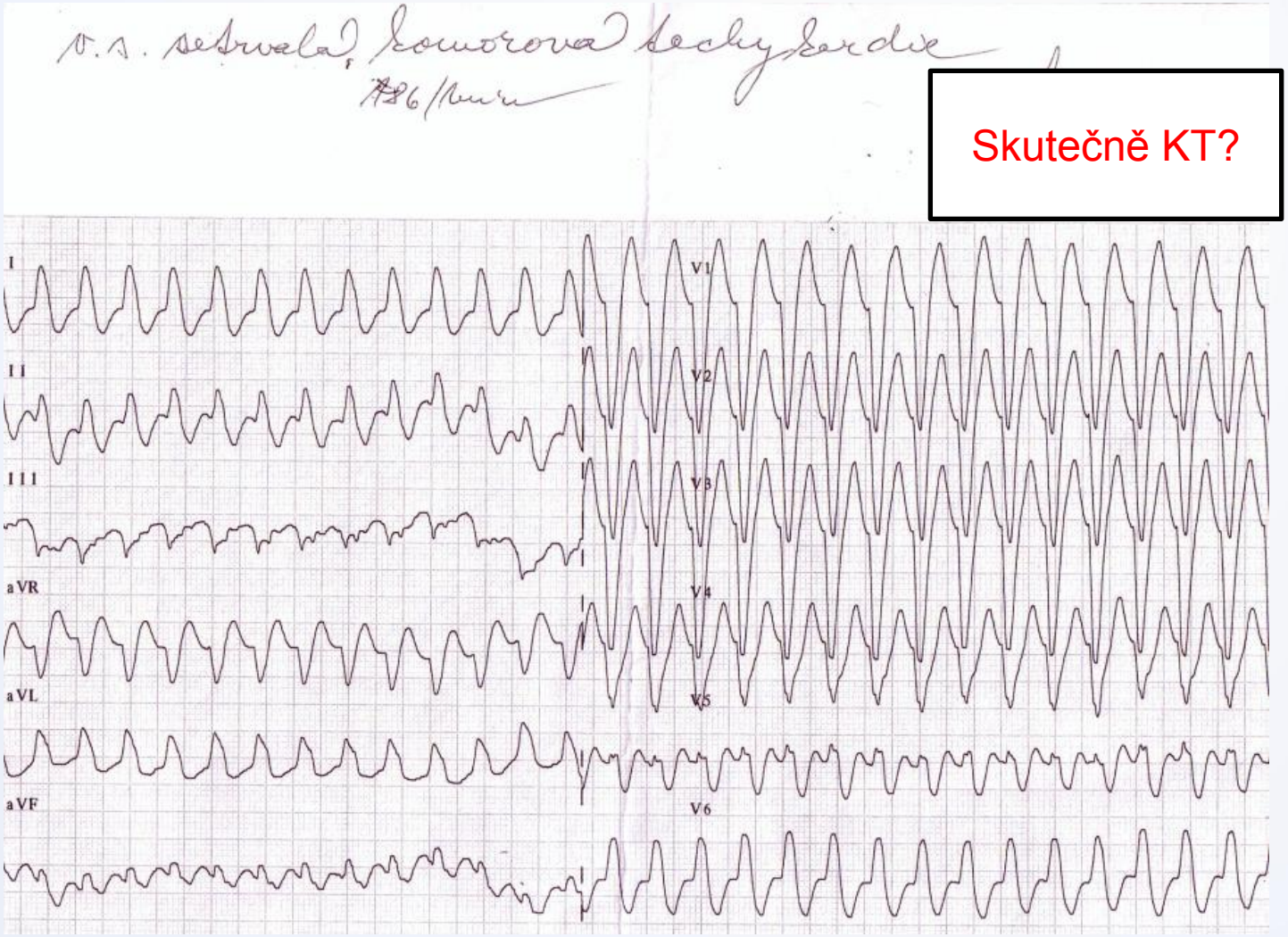
Terminace síňové tachykardie adenosinem



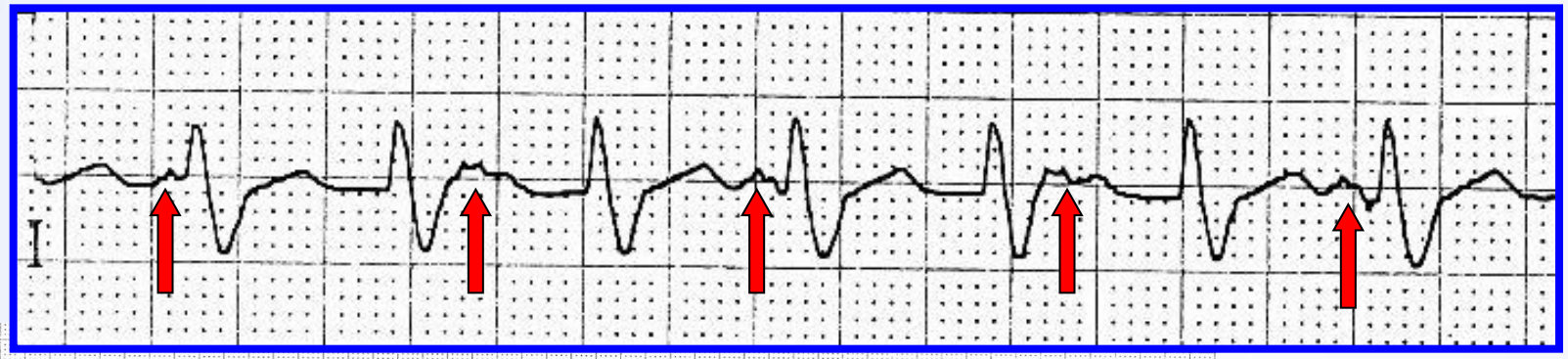
Došlo k bloku antegrádního vedení, což vylučuje fokální mechanismus arytmie.

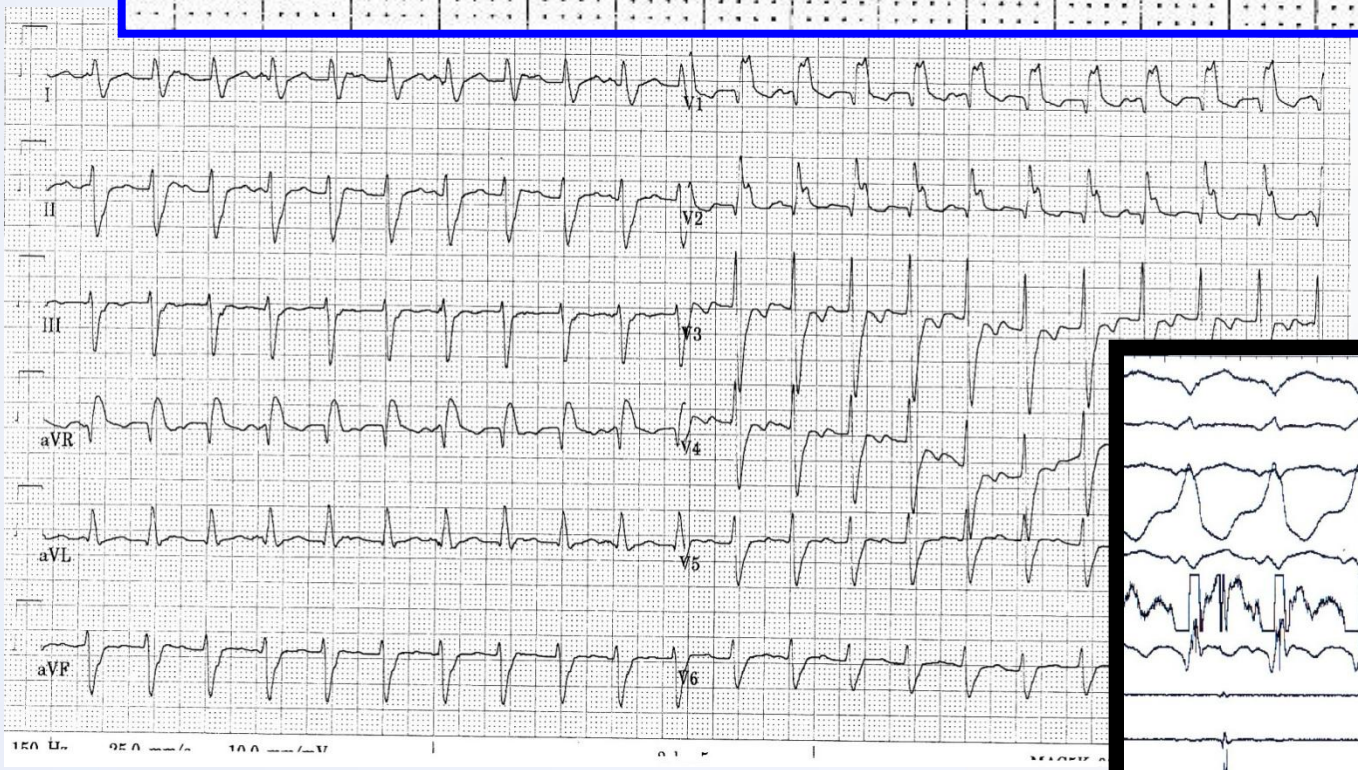


Tachykardie se širokými komplexy LBBB



Komorová tachykardie - AV disociace

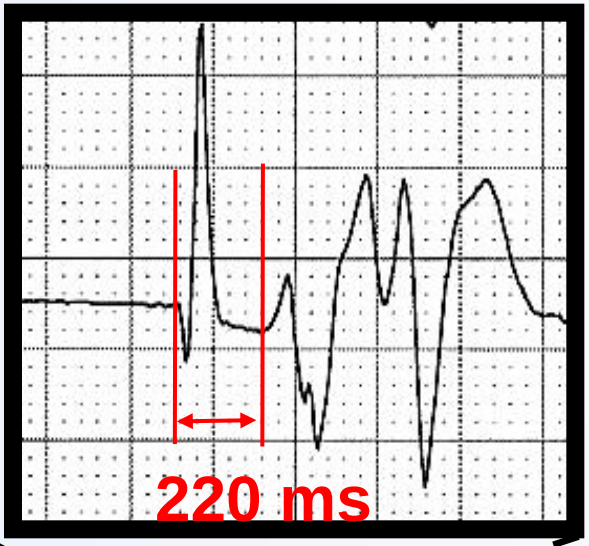


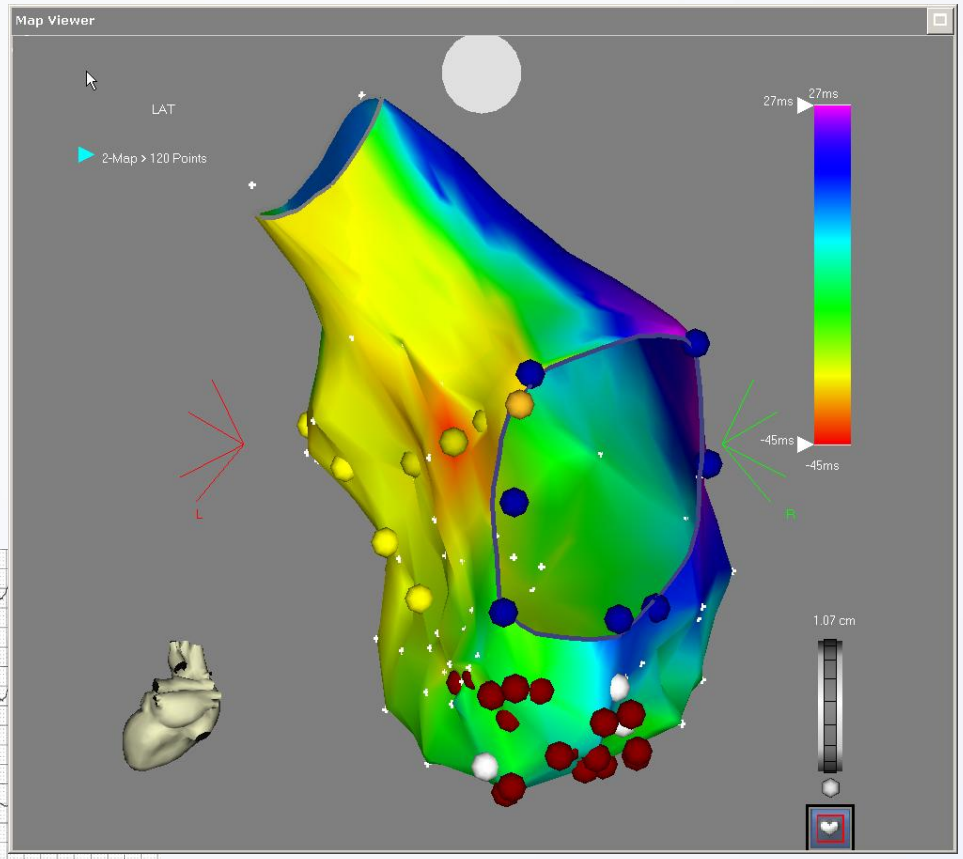


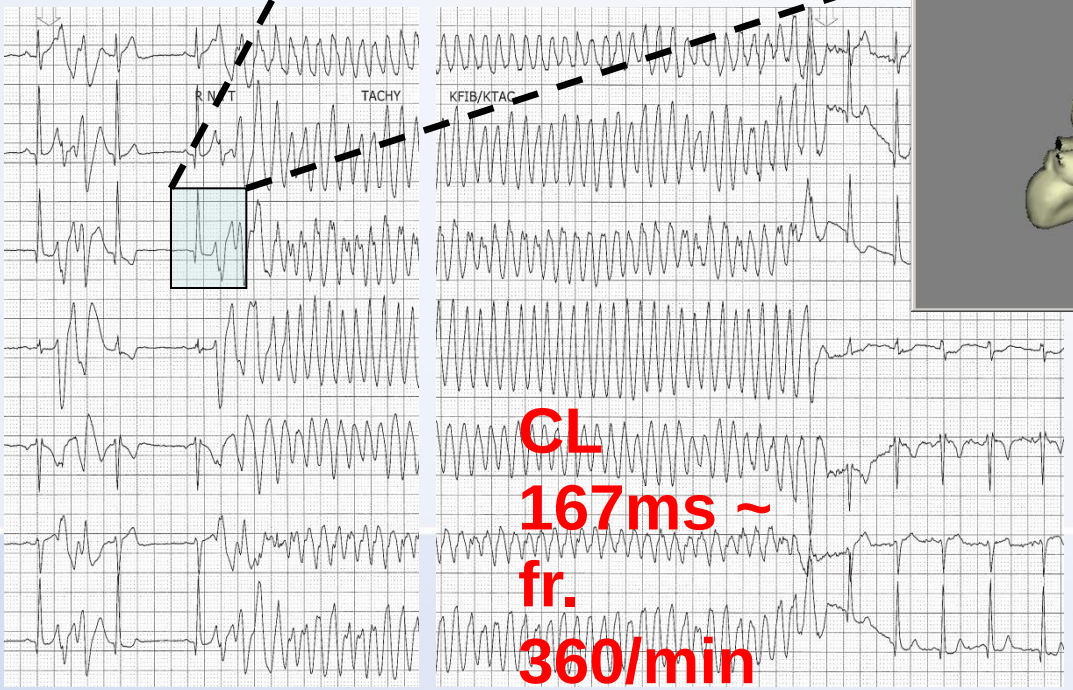
Abnormalita repolarizace

Abnormalita repolarizace a maligní arytmie

Katetrizační ablace pro idiopatickou fibrilaci komor



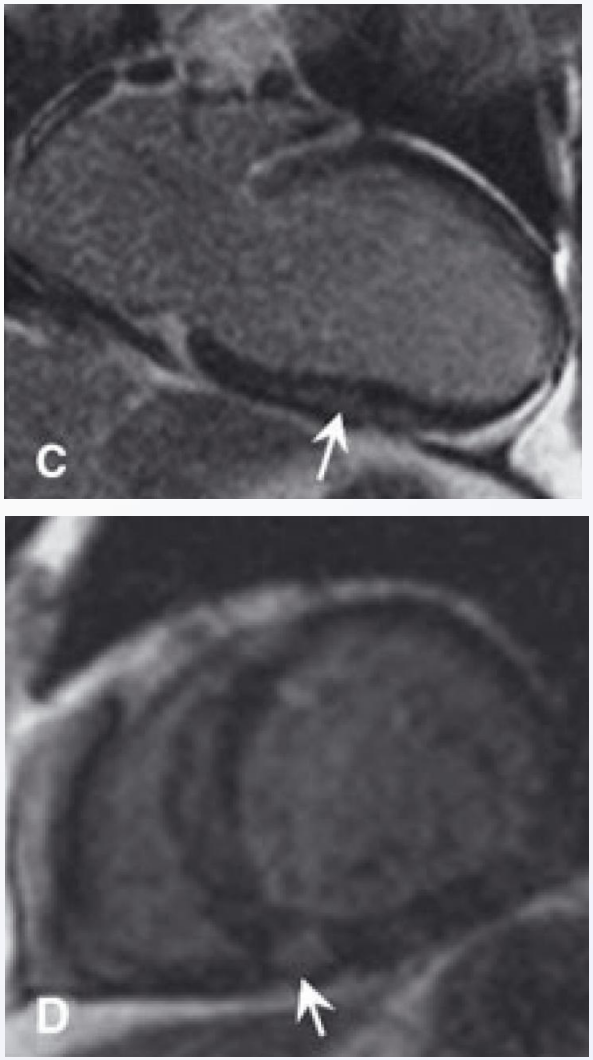




Tachykardická x idiopatická dilatační KMP – dif. dg

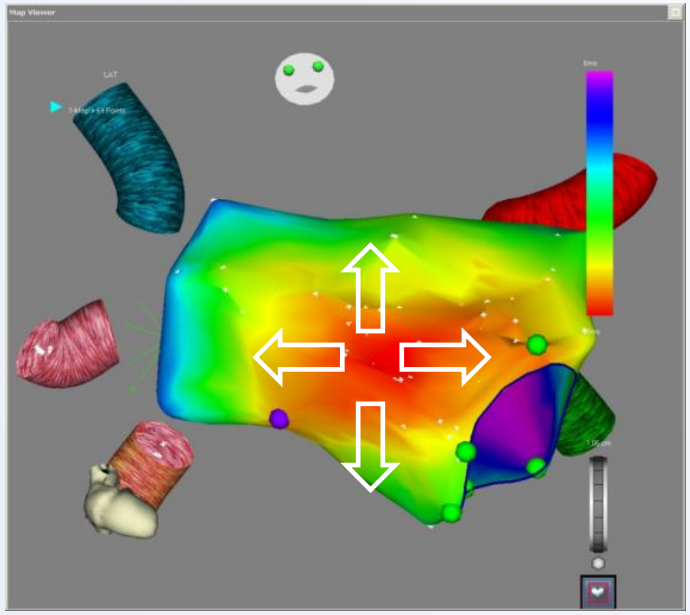
Pro tachykardickou KMP svědčí:

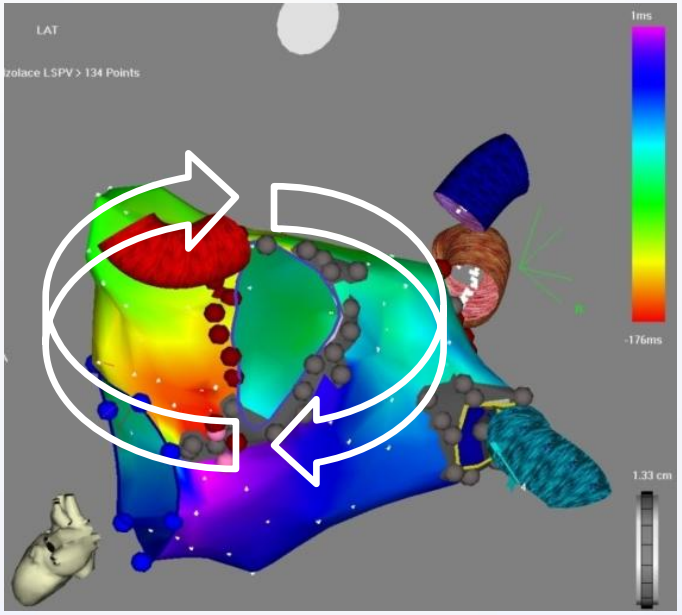
- **Přítomnost signifikantní arytmie**
- **Rychlejší rozvoj poruchy funkce LK a její kolísání v závislosti na arytmické zátěži**
- **Relativně menší dilatace LK**
- **Nepřítomnost CMRI-LGE**



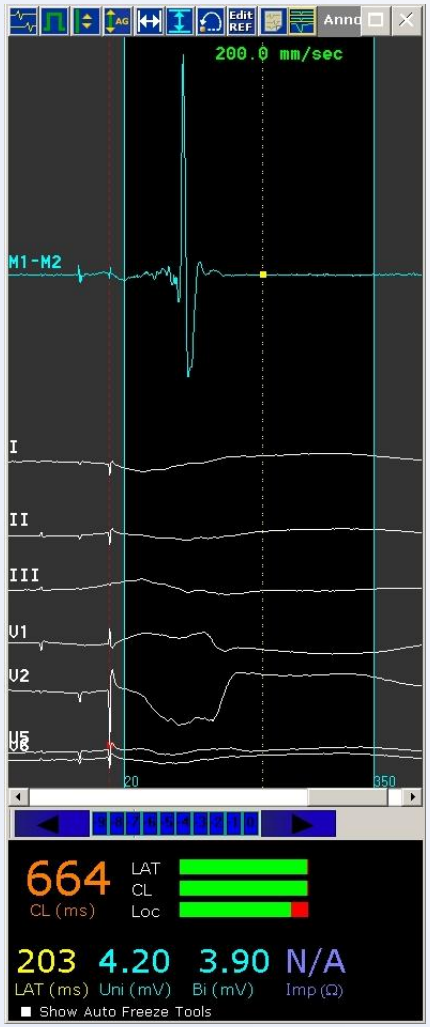
Hasdemir C et al. Late gadolinium enhancement CMR in patients with tachycardia-induced cardiomyopathy caused by idiopathic ventricular arrhythmias. Pacing Clin Electrophysiol 2012; 35:465–470

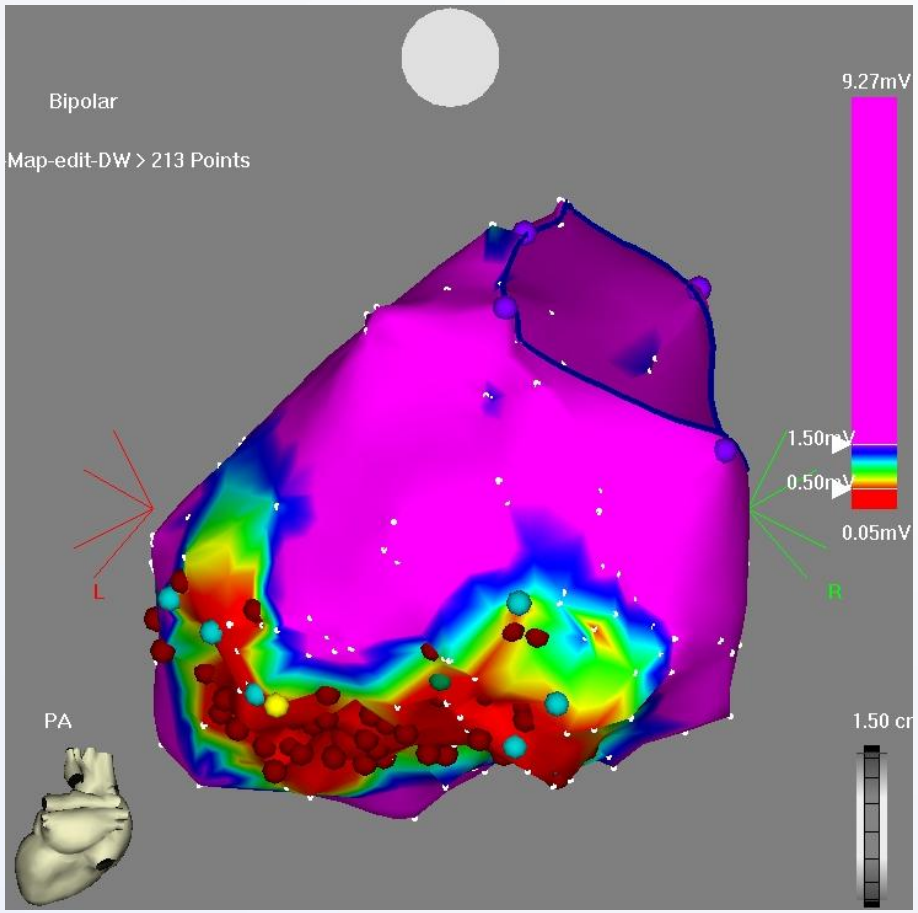
Aktivační mapování

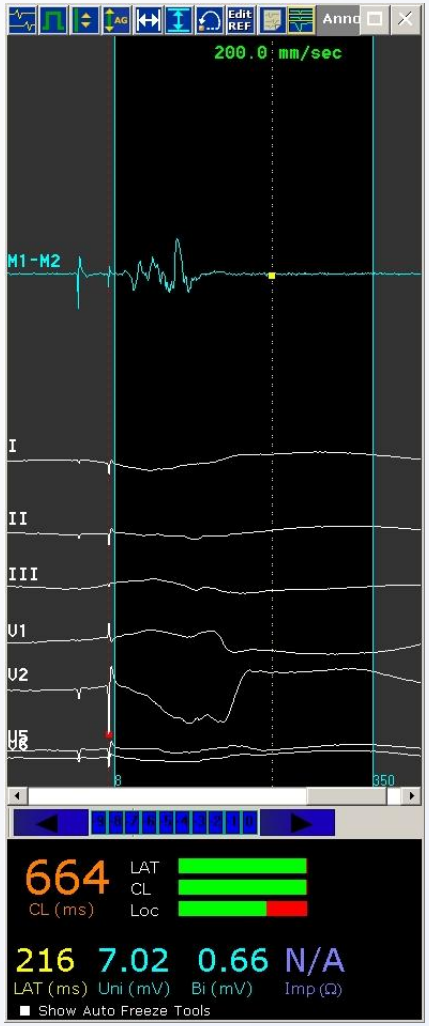




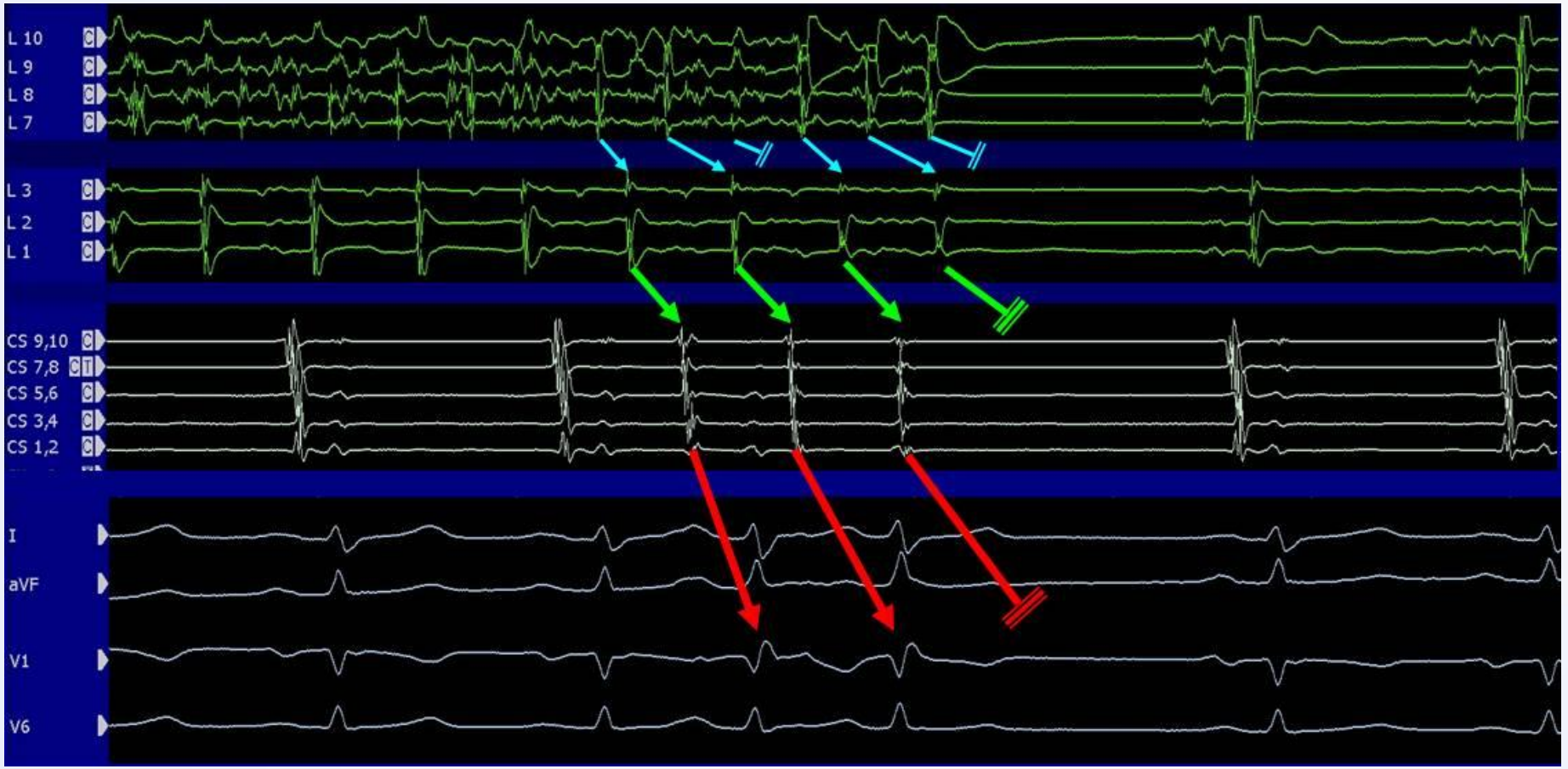
Voltážové mapování



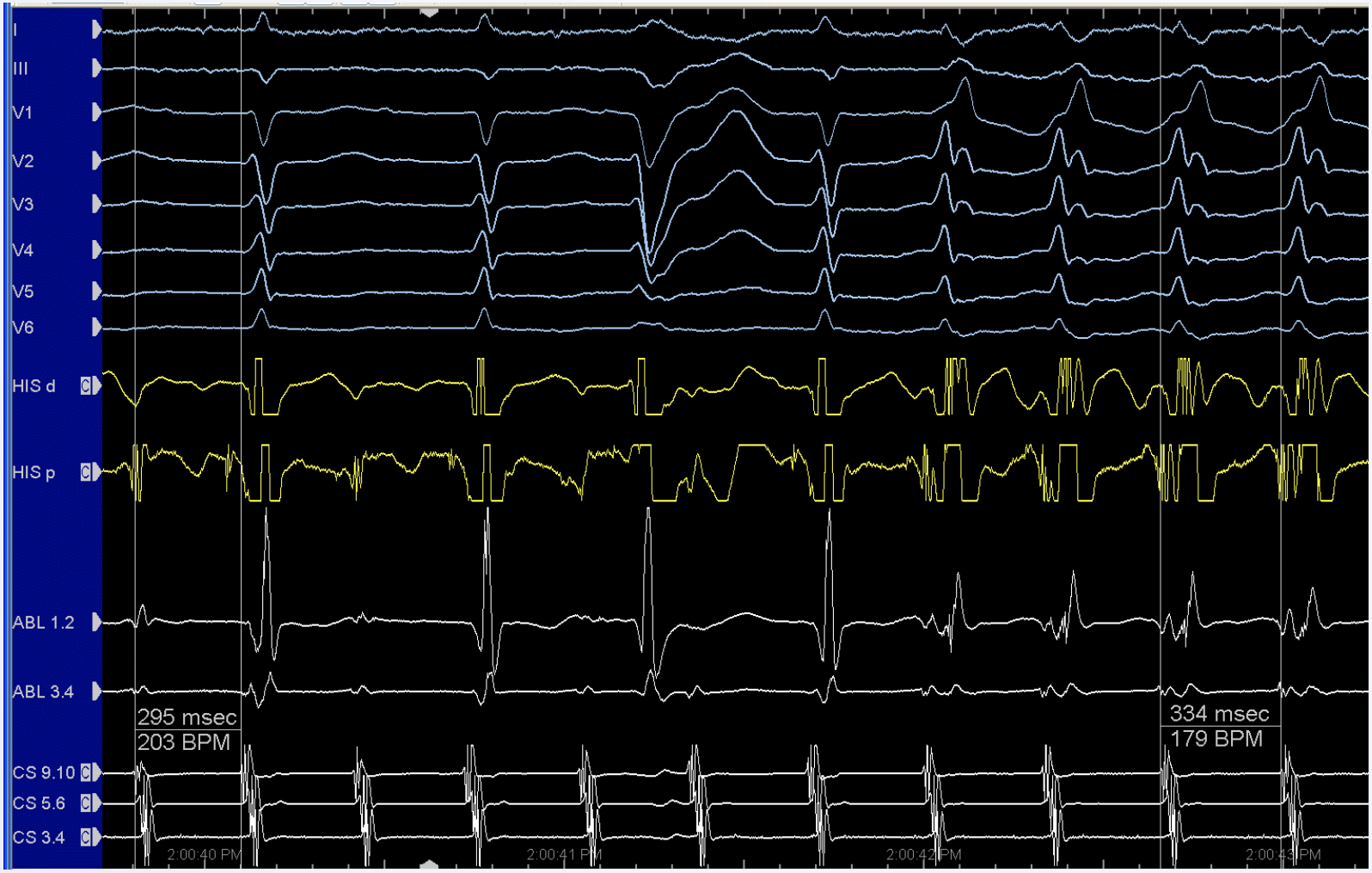




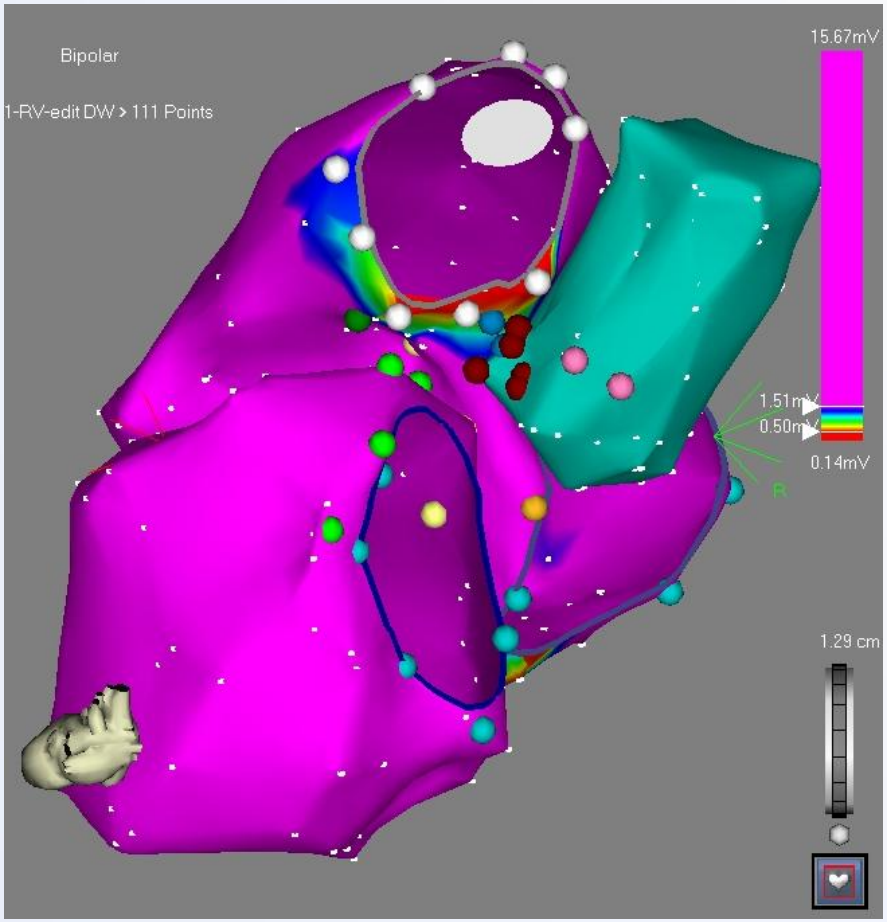
Dekrementální vedení vzruchu

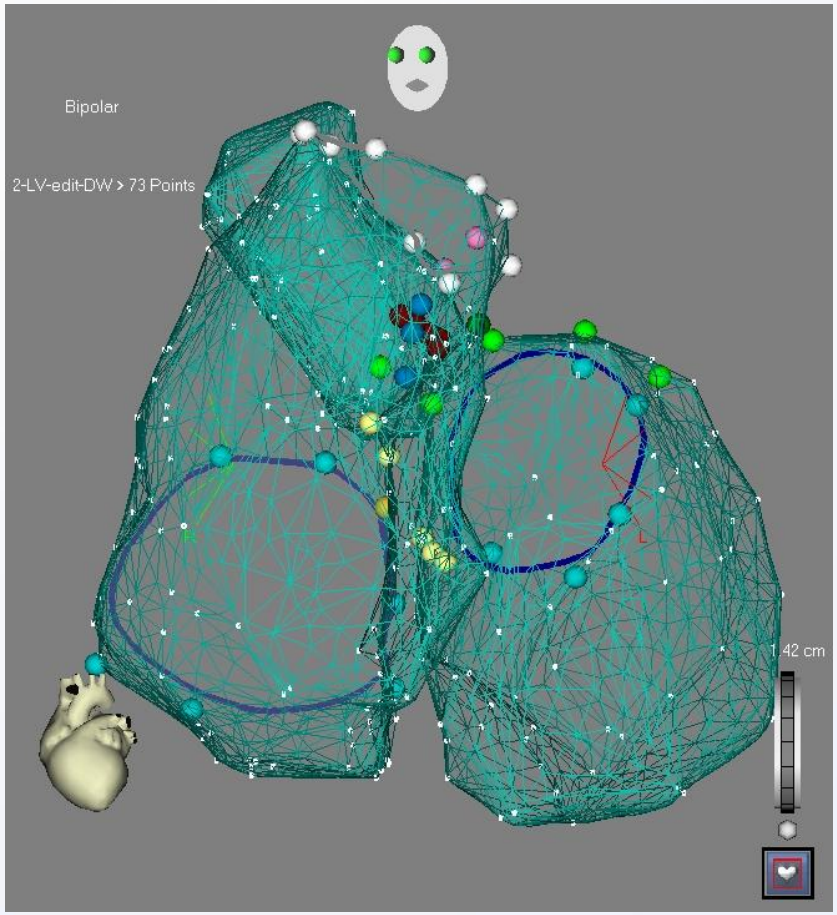


Frekvenčně závislý blok/aberace při AVNRT



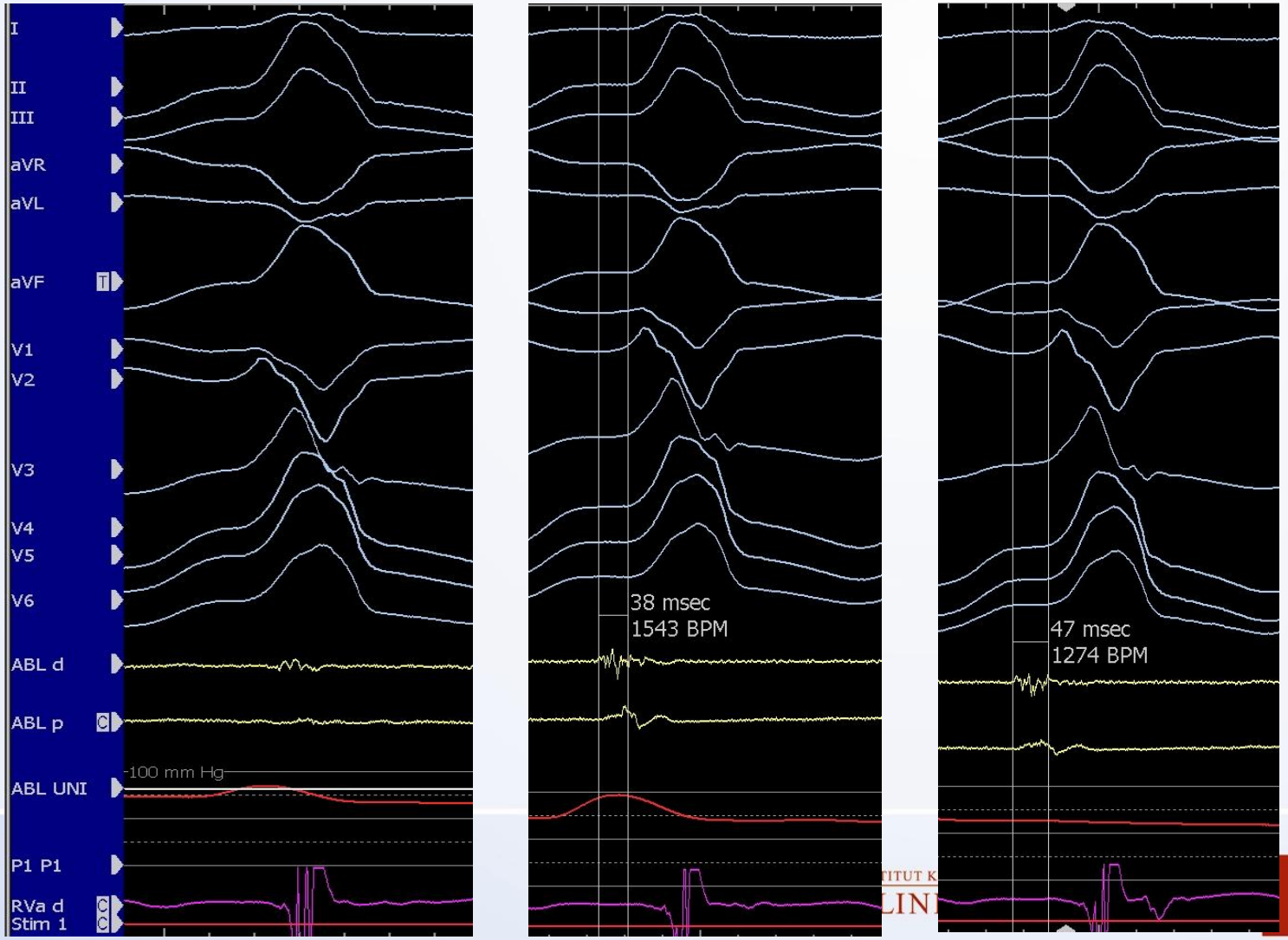
Anatomie výtokových traktů



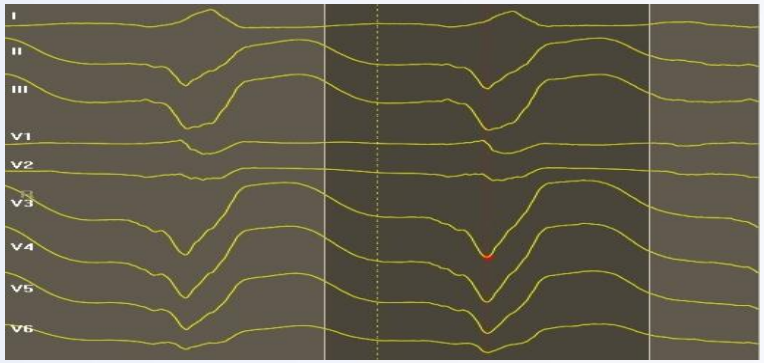


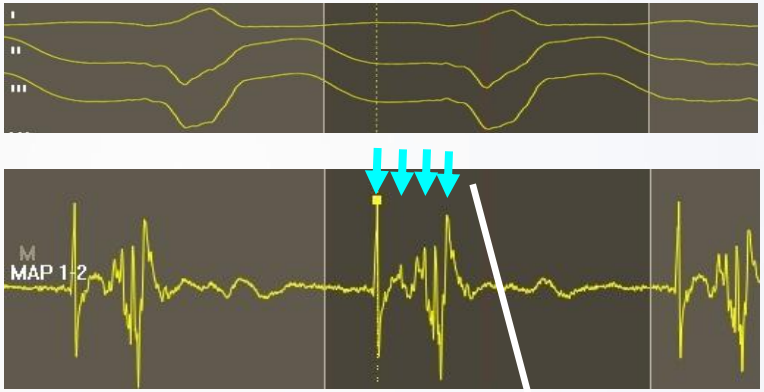
Komorová tachykardie z pravé koronární kapsičky

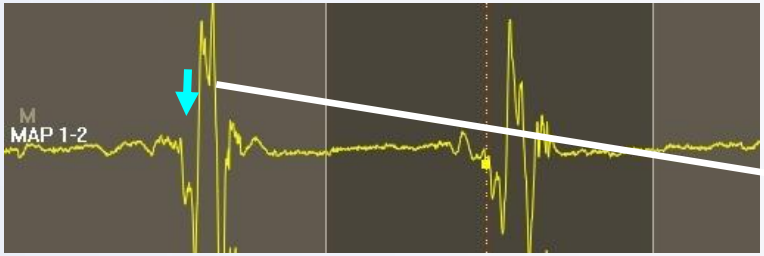
Předčasnost: LCC-špatná RCC-dobrá RCC-nejlepší

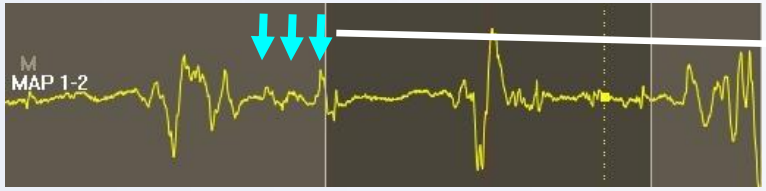


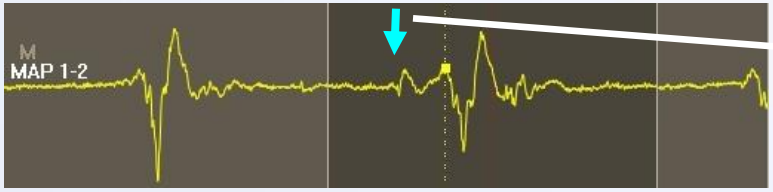
Kritický okruh tachykardie

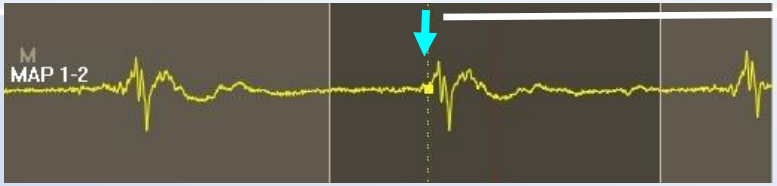


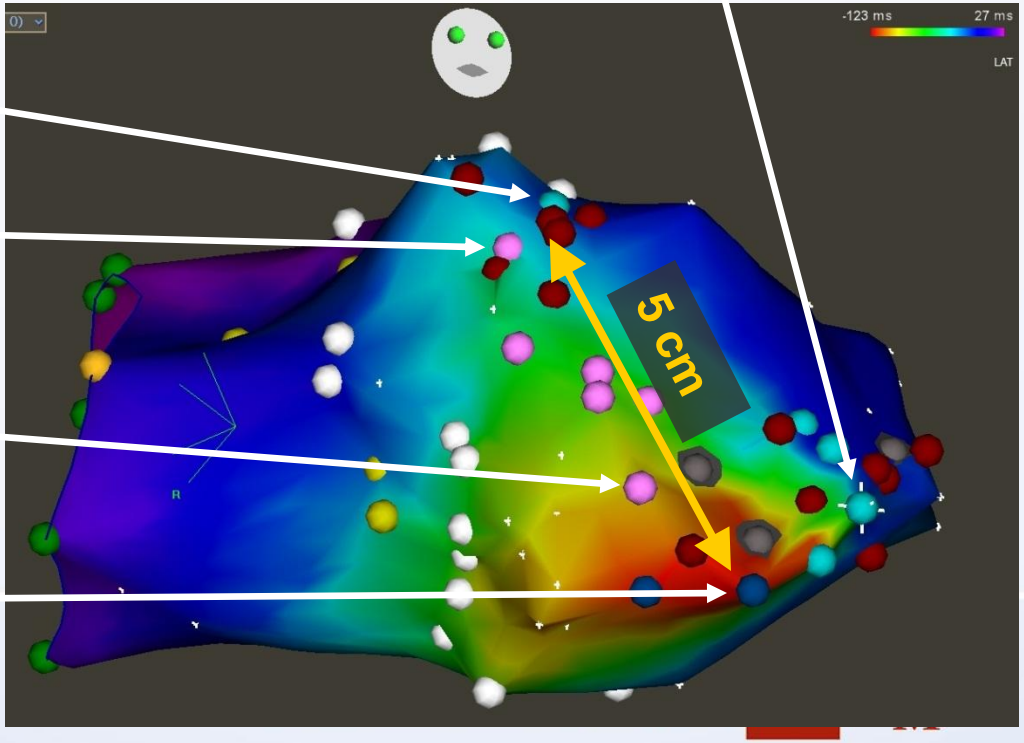




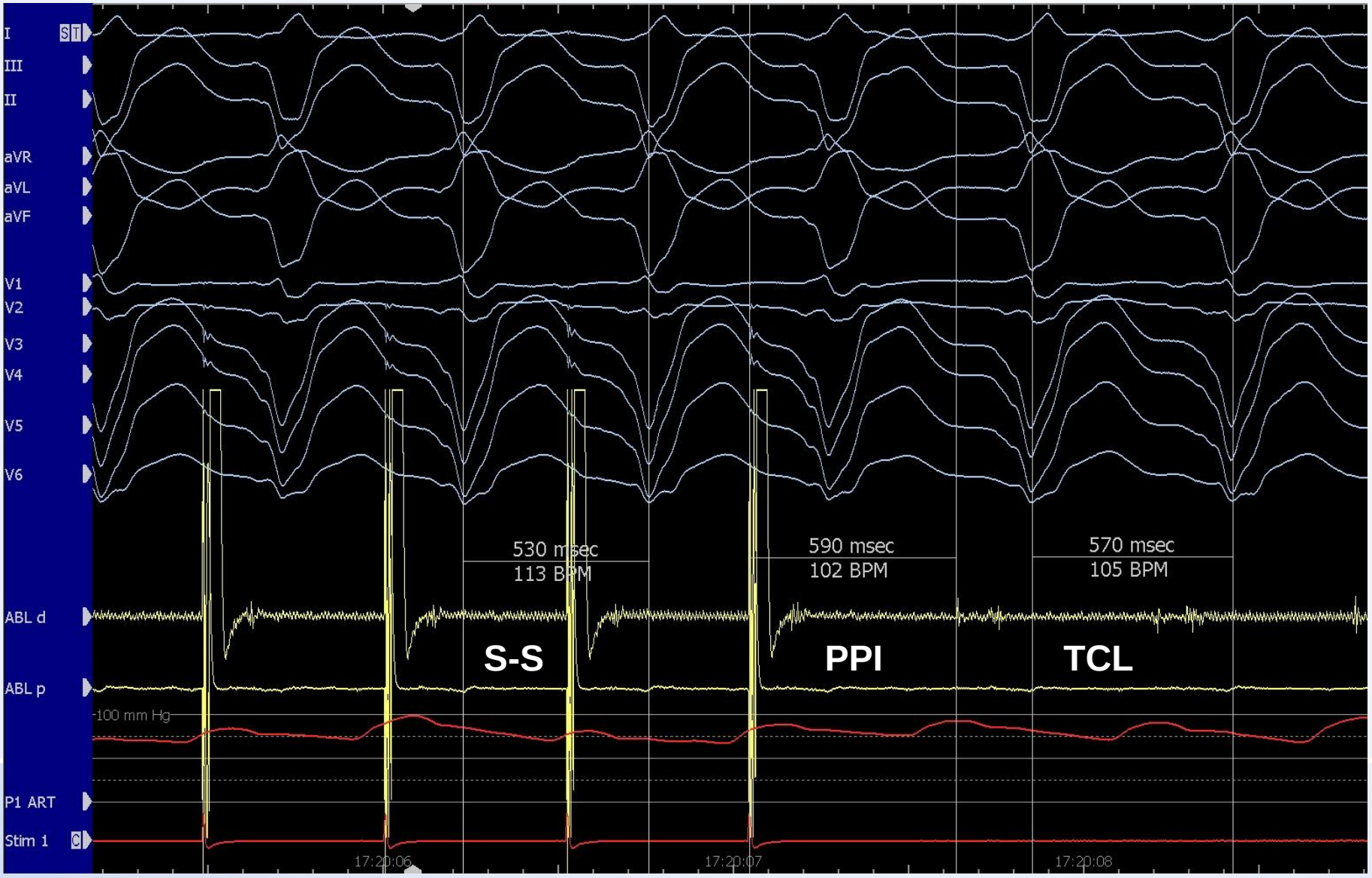








Bystander: skrytý entrainment + dlouhý S-QRS + PPI>TCL



Závěry

Při arytmologické diagnostice se kromě EKG se používá:

- **Široké spektrum vhodně zvolených EKG monitorů**
- **Vagové manévry**
- **Adenosin**
- **Adekvátní znalosti o substrátech a mechanismech arytmií**

Neinvazivní diagnostika má četné limitace, ale při správné aplikaci poskytuje nenahraditelné údaje.

Definitivní diagnóza je často stanovena až při invazivním elektrofyziologickém vyšetření.