

14TH NATIONAL EMERGENCY MEDICINE CONGRESS

5TH 19-22 April 2018 Kaya Palazzo Golf Resort Hotel
INTERCONTINENTAL EMERGENCY MEDICINE CONGRESS
INTERNATIONAL CRITICAL CARE AND EMERGENCY MEDICINE CONGRESS



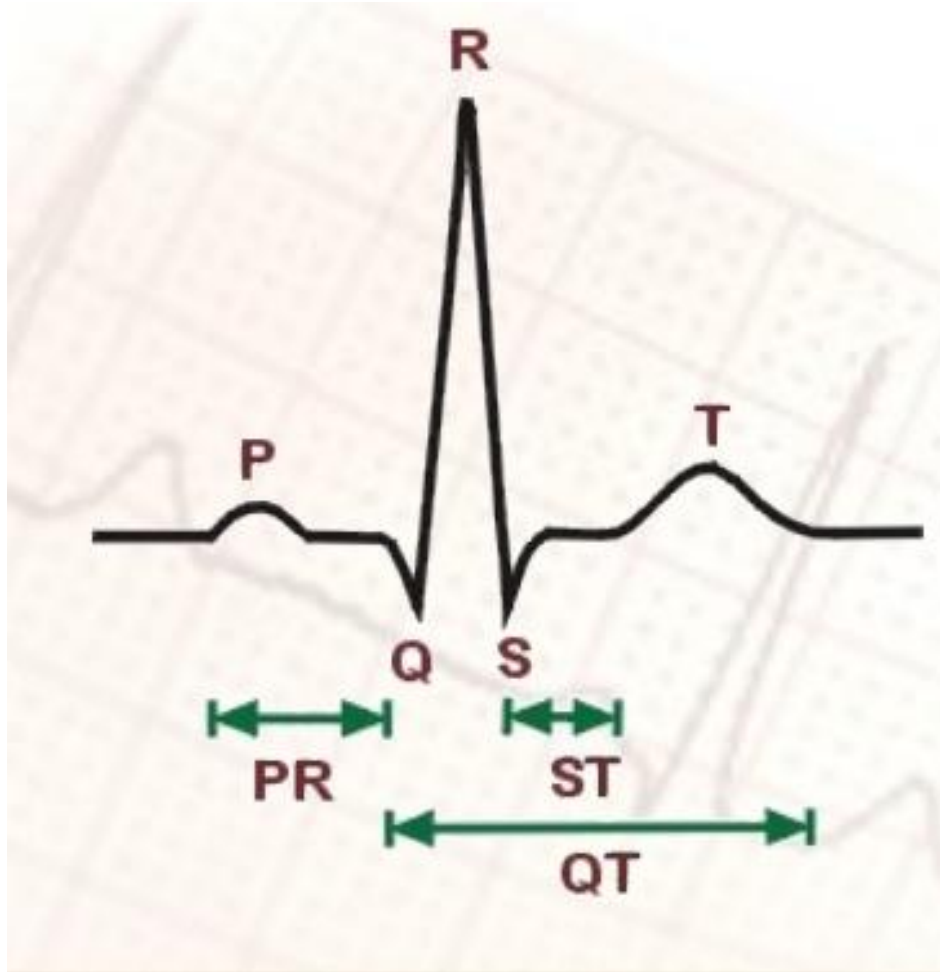
ECG in Drug Poisoning

Roberta Petrino

EUSEM president

Director Emergency Department S. Andrea Hospital, Vercelli, Italy

ECG



P wave = atrial depolarisation

PR interval = impulse from atria to ventricles

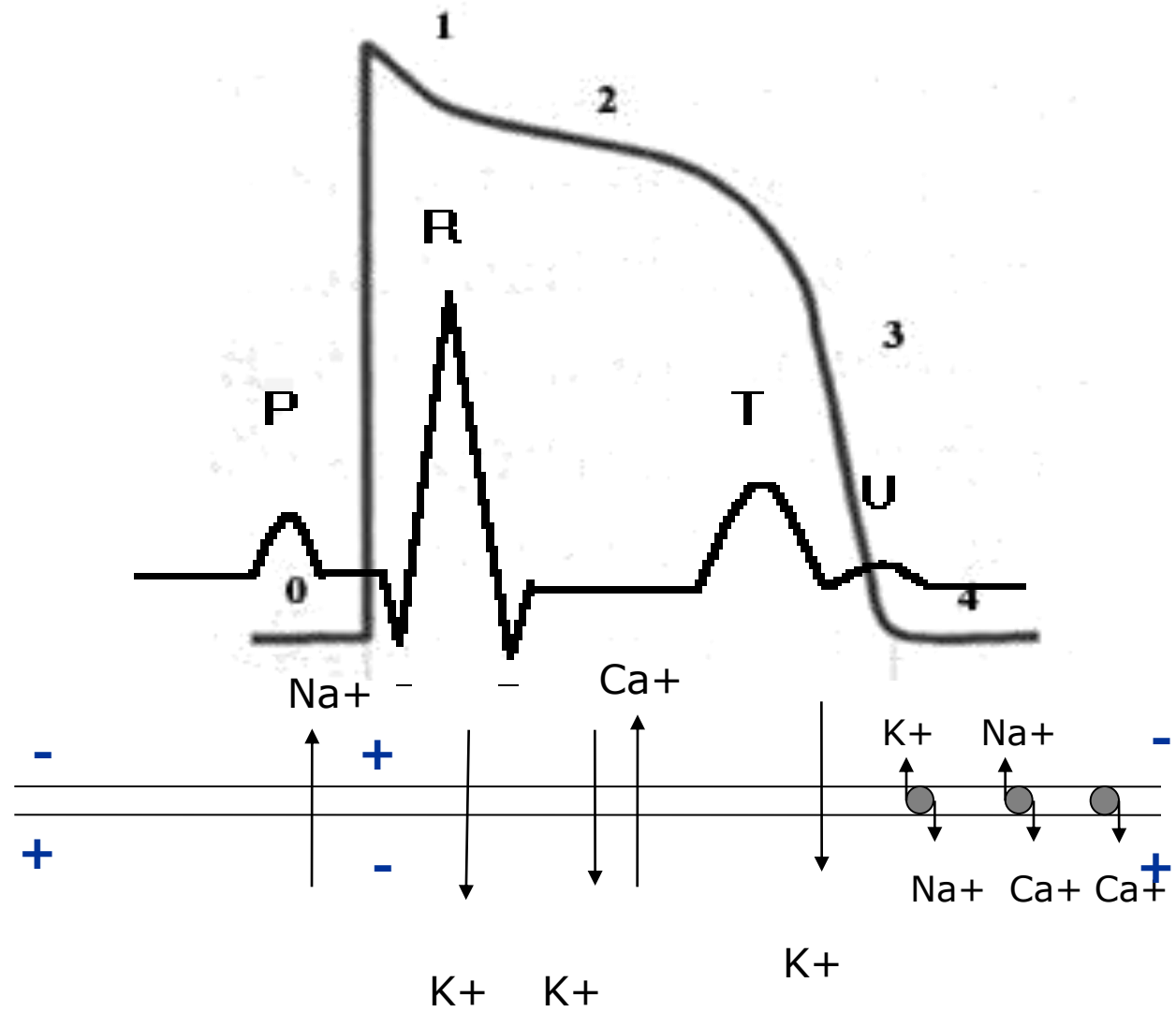
QRS complex = ventricular depolarisation

ST segment = isoelectric part, AV conduction

T wave = ventricular repolarisation

QT interval = onset of depolarisation to end of repolarisation of ventricles





Approach to ECG in Drug poisoning

- rate and rhythm
- PR interval, heart block
- Determine QRS duration in lead II
- Check for right axis deviation of the terminal QRS
- Determine QT interval
- evidence of increased cardiac ectopy or automaticity
- evidence of myocardial ischaemia.



Case #1 EA 70 yrs female

- Brought to ED hypotension, fatigue and dizziness.
- History: hypertension, episodes of AF
- Thx: Propafenone 425 mg X 2, Escitalopram 20 mg, Candesartan 16 mg, ASA 100 mg, Nebivolol 5 mg
- Vitals BP 90/60, HR 58, FR 26, SpO2 94%
- She appears pale, polypneic, some rales on auscultation.

Valori gasc ematici		
pH	7.355	← [7.350 - 7.450]
↓ pCO ₂	25.0	mmHg [35.0 - 45.0]
pO ₂	82.4	mmHg
Valori ossimetrici		
ctHb	4.3	g/dL ←
sO ₂	97.6	%
FO ₂ Hb	95.0	%
FCOHb	1.5	%
FIHb	2.3	%
FMethHb	1.2	%
Hct.c	13.8	%
Valori elettroliti		
cK ⁺	6.0	meq/L ←
cNa ⁺	139	meq/L
cCa ²⁺	2.34	meq/L
cCl ⁻	106	meq/L
Anion Gap, K ⁺ , c	26.0	meq/L
mOsm.c	285.2	mmol/kg
Valori metaboliti		
cGlu	126	mg/dL
cLac	9.5	mmol/L ←
Valori corretti con la temperatura		
pH(T)	7.355	
pCO ₂ (T)	25.0	mmHg
pO ₂ (T)	82.4	mmHg
Stato di ossigenazione		
ctO ₂ .c	2.6	mmol/L
p50.e	26.56	mmHg
Stato Acido Base		
cBase(Ecf).c	-10.9	mmol/L
↓ cHCO ₃ ⁻ (P).c	13.6	mmol/L [22.0 - 26.0]

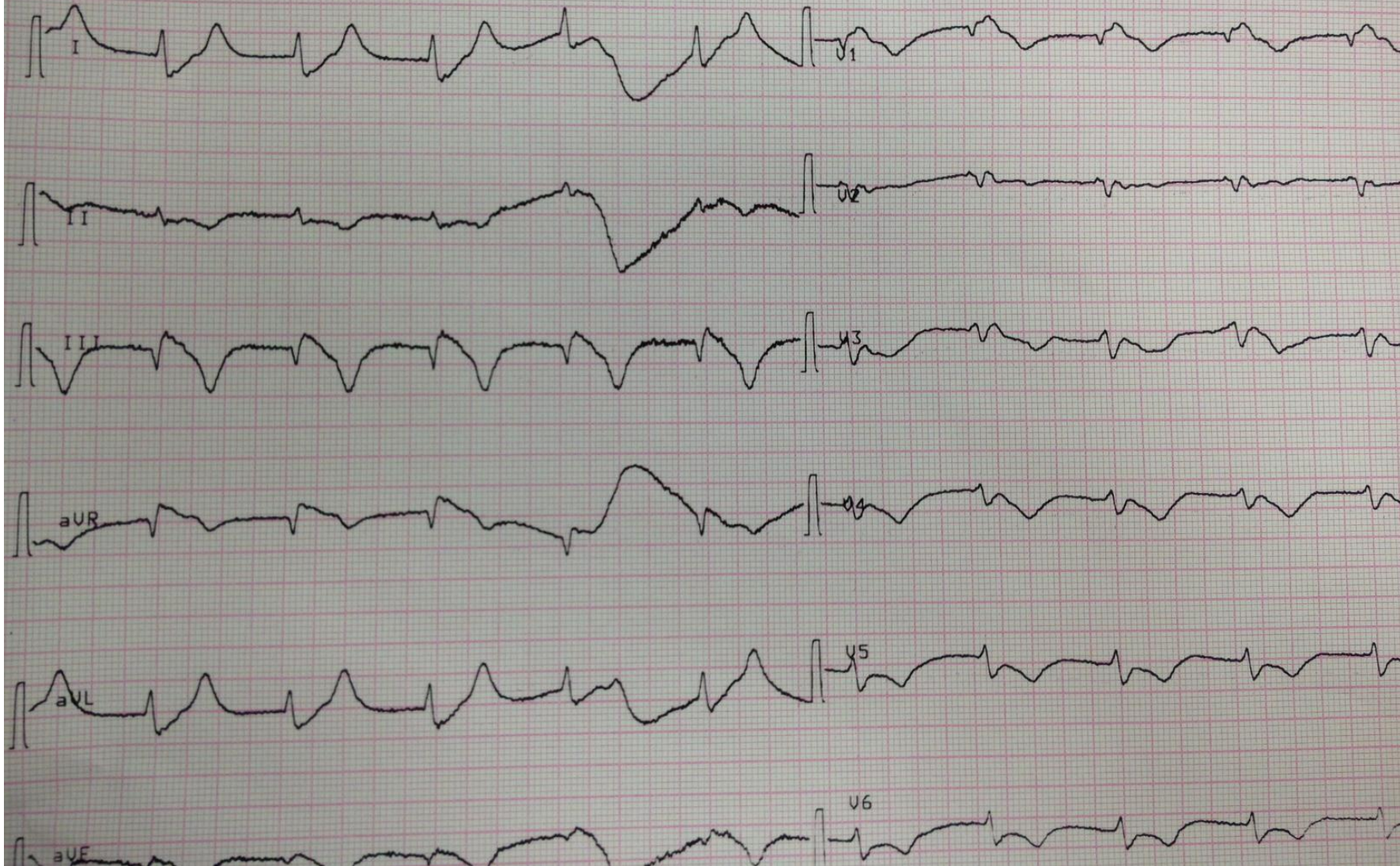
Note

..... cm / kg

PQ	- ms	P (II)	- mV
QRS	82 ms	S (V1)	-0.16 mV
QT	498 ms	R (V5)	0.22 mV
QTC	524 ms	Sokol.	0.38 mV

10 mm/mV

10 mm/mV



Case #2 EA 65 yrs male

- Presents to the ED for hypotensive episode
- History: CRF, hypertension, CHF NYHA II, episodes of AF.
- Thx: Flecainide 150 MG, ASA 100, LASIX 25 mg CP, Kanrenoate 100 mg. Since 4 days he started Valsartan 80 mg

The patient is sick, fatigued, and dyspneic

-BP 95/60 HR 100 SaO₂ 94%

Reduced lung sounds bilaterally

1111
B. V. NO
..... M / F
64 anni
..... cm / kg

100 bpm

Hsae el.:

P 180°

QRS-119°

T 18°

Intervalli:

RR 689 ms

P 48 ms

PQ 220 ms

QRS 122 ms

QT 434 ms

QTC 523 ms

P (II) -0.07 mV

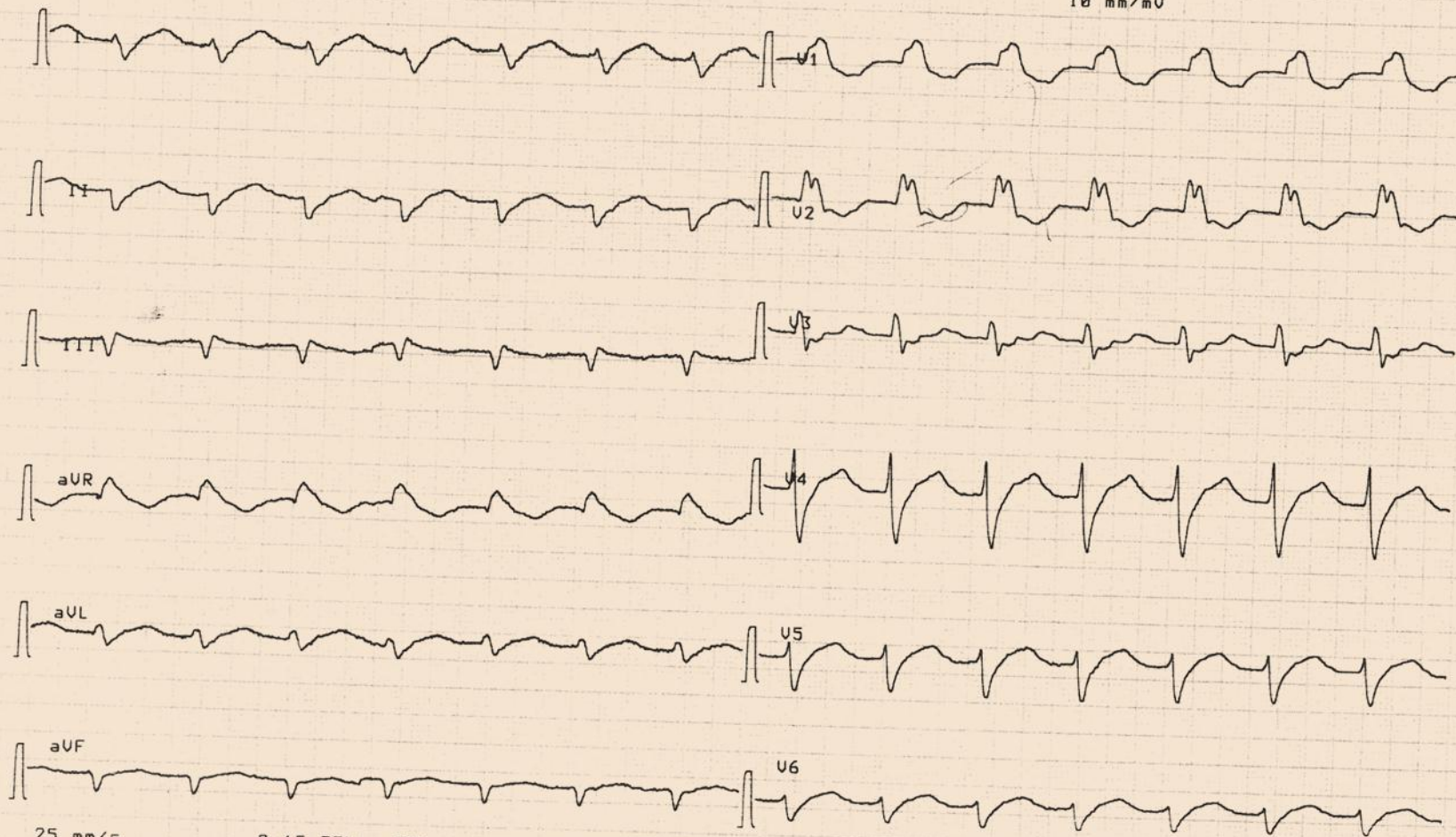
S (V1) - mV

R (V5) 0.25 mV

Sokol. 0.25 mV

10 mm/mV

10 mm/mV



25 mm/s

0.15-35Hz F50

SBS

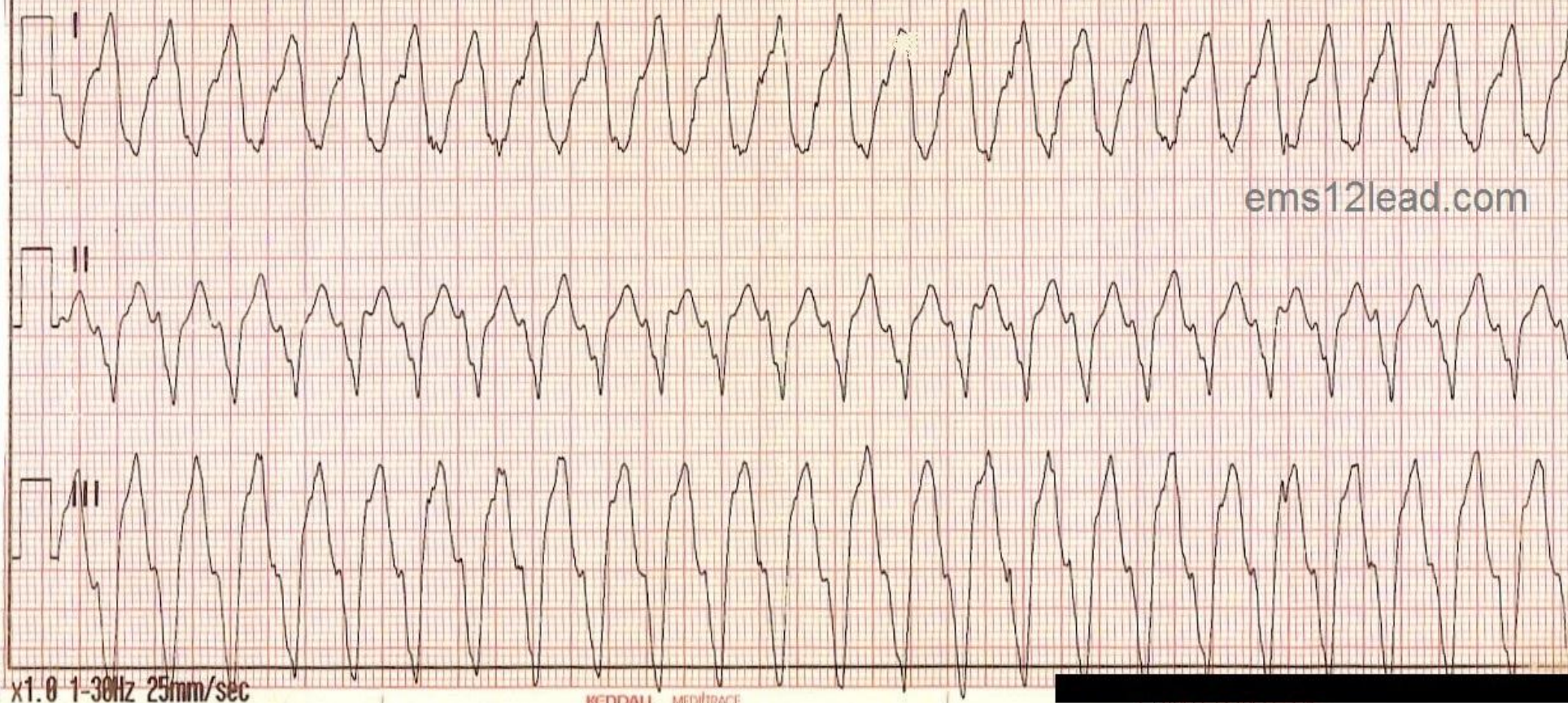
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ASL UC Pronto Soccorso

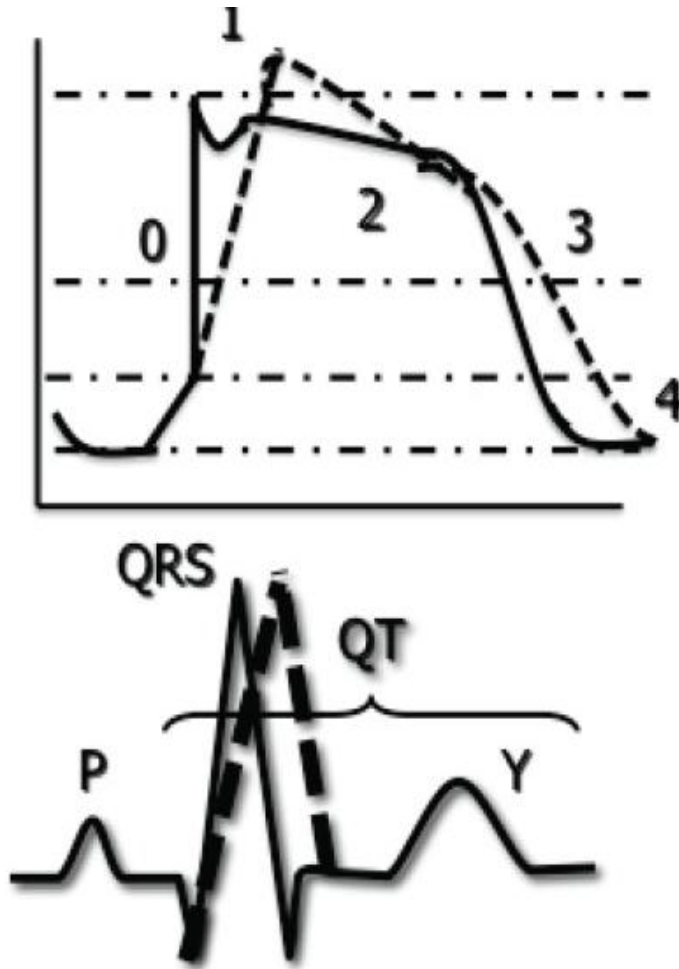
ESAOTE REF 9690029200

P8000Power 1e35 Cm

▼ Initial Rhythm



Na channel blocker toxicity



ECG features

- Intraventricular conduction delay- QRS > 100ms in lead II
- RBBB pattern
- Brugada pattern
- VT and VF
- Bradycardia with wide QRS
- Asystole
- ST changes with ischemia (cocaine toxicity)



Na channel blockers

- **Tricyclic antidepressant**

- Amitriptyline
- Desipramine
- Nortriptyline
- Imipramine

- **Class 1a antiarrhythmic agents**

- Procainamide
- Quinidine

- **Class 1c antiarrhythmic agents**

- Flecainide
- Propafenone

- **Local anaesthetics**

- Bupivacaine
- Cocaine

- **Phenothiazines**

- **Carbamazepine**

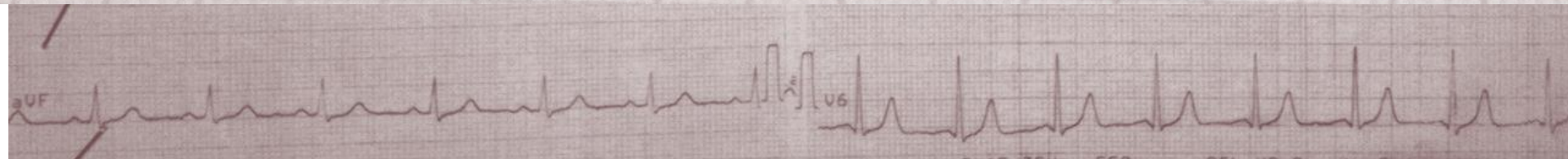
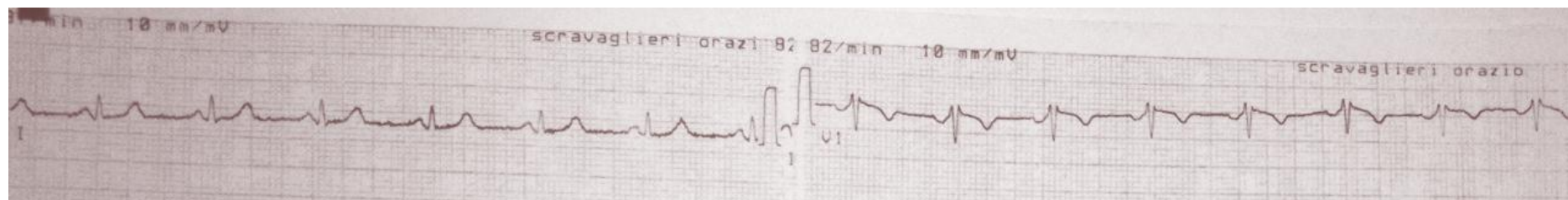
- **Chloroquine**

- **Diltiazem**

- **Dephenhydramine**

- **Hydroxychloroquine**

- **Propranolol**



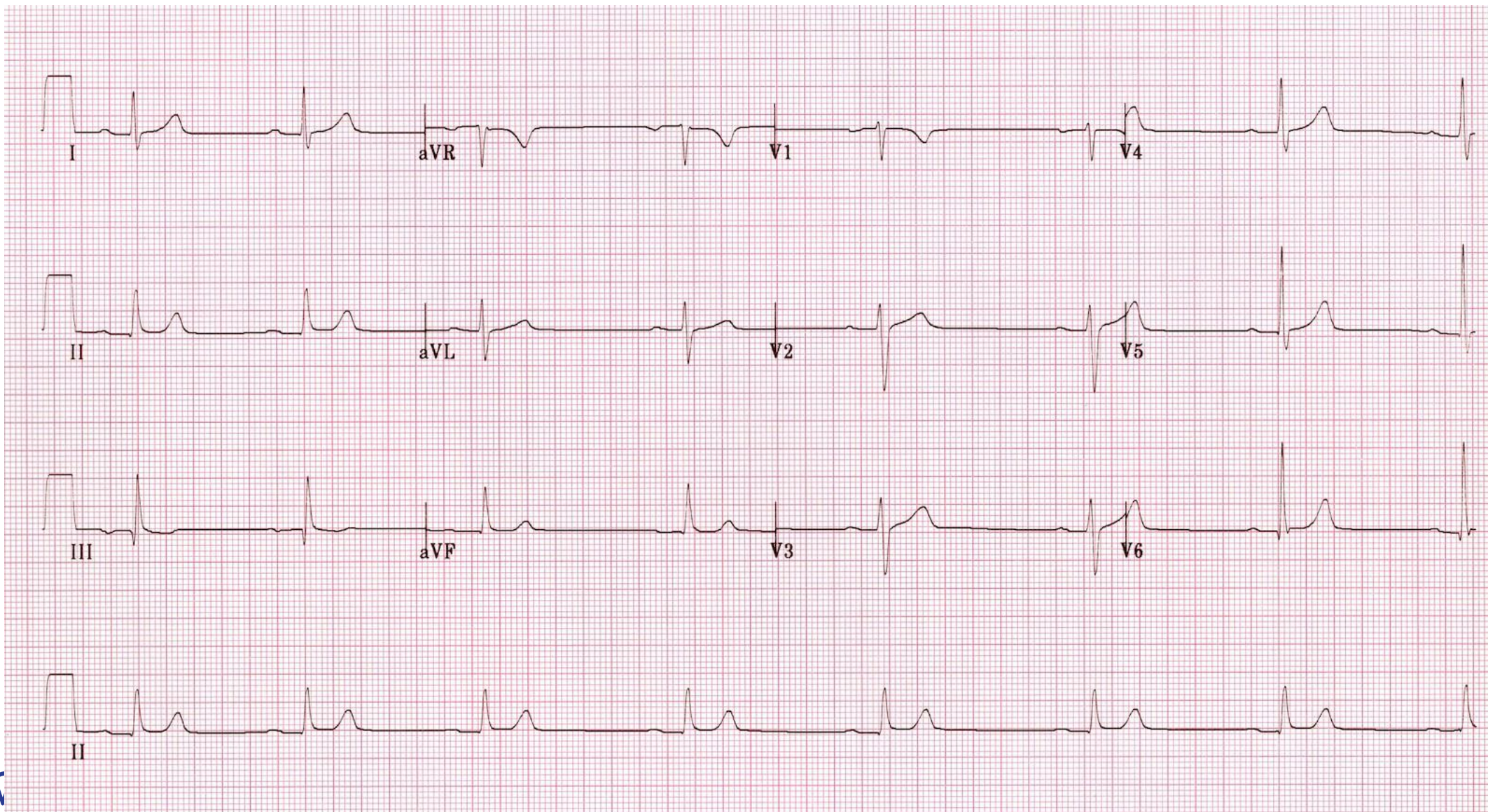
Management of acute poisoning

- Patients need to be managed in a monitored area equipped for airway management and resuscitation.
- Oxygen, i.v. line, monitor
- Administer IV **sodium bicarbonate** 100 mEq (1-2 mEq / kg); repeat every few minutes until BP improves and QRS complexes begin to narrow.
- **Hyperventilate** to maintain a pH of 7.50 – 7.55.
- Treat seizures with IV benzodiazepines (e.g. diazepam 5-10mg).
- Treat hypotension with a crystalloid bolus (10-20 mL/kg).
- Use vasoactive agents if fluids ineffective
- If arrhythmias occur, give more sodium bicarbonate. Lidocaine (1.5mg/kg) IV is a third-line agent (after bicarbonate and hyperventilation) once pH is > 7.5.
- **Avoid, beta-blockers and amiodarone** as they may worsen hypotension and conduction abnormalities.



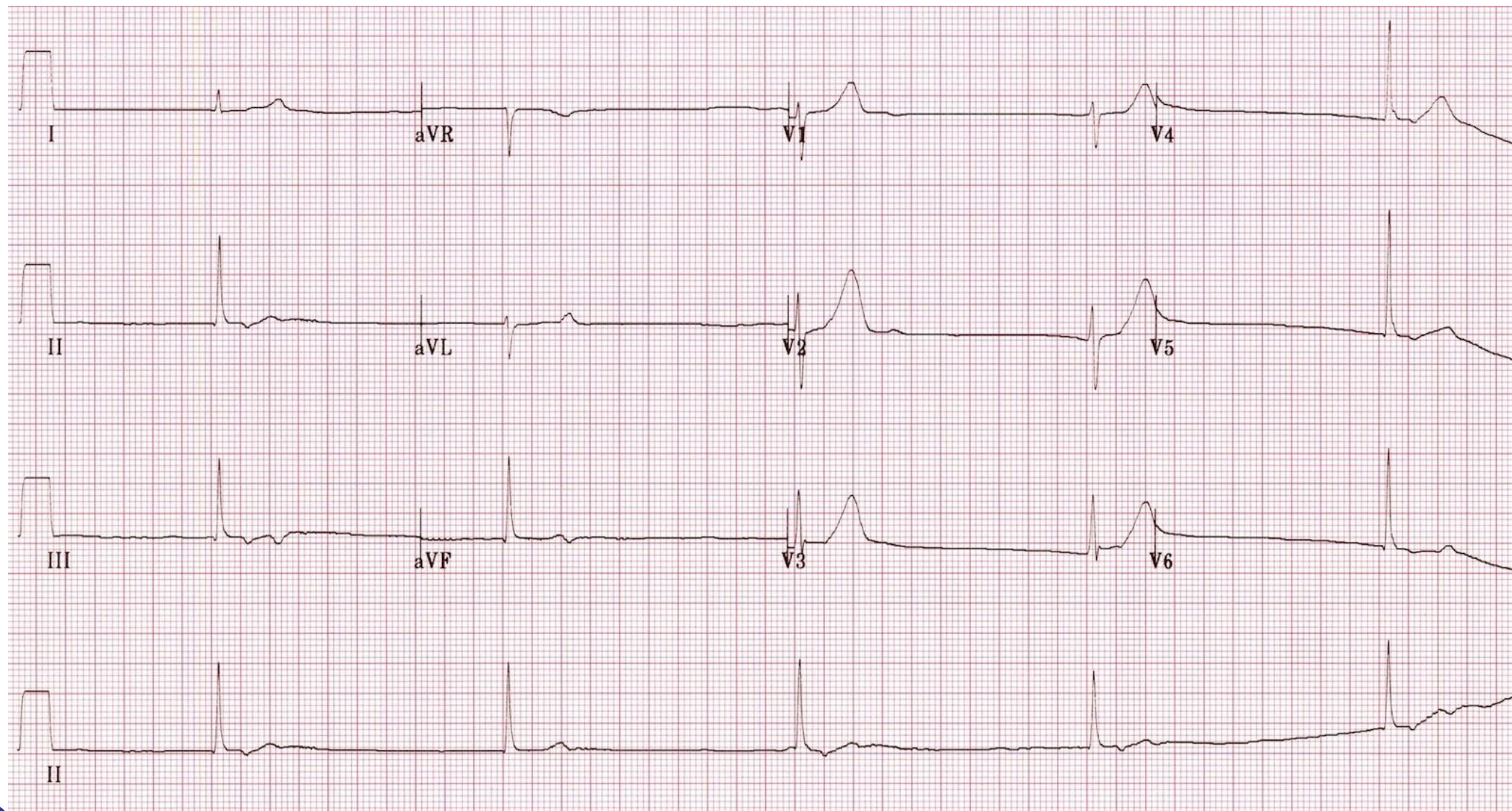
Case #3 RR 78 yrs male

- Presents in the ED because is feeling unwell, and week
- BP 110/60. HR 55 SpO2 98%
- He does not recall home therapy



Case #3 RR 78 yrs male

- In waiting room loss of consciousness, BP unmeasurable
- On the stretcher he awakes and is feeling a bit better
- BP 90/50 HR 30 RR 20



Beta-blocker and Calcium-channel blocker toxicity

- **Beta-blockers:**

- Atenolol,
- Metoprolol,
- Propranolol,
- Sotalol.

- **Cardioselective calcium-channel blockers:**

- Verapamil
- Diltiazem

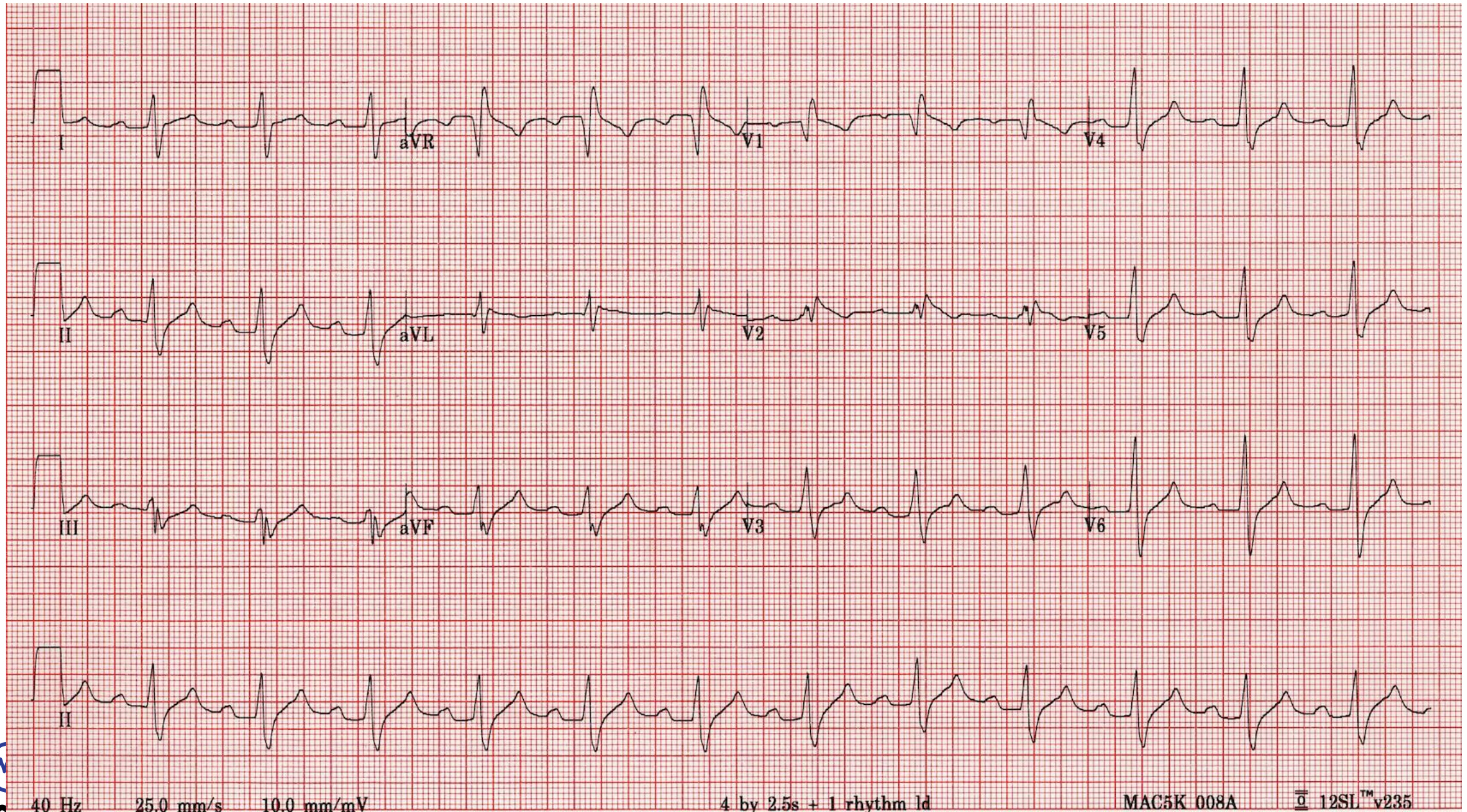


ECG effects

- Sinus bradycardia
- 1°, 2°, 3° degree block
- Junctional bradycardia
- Idioventricular rhythm

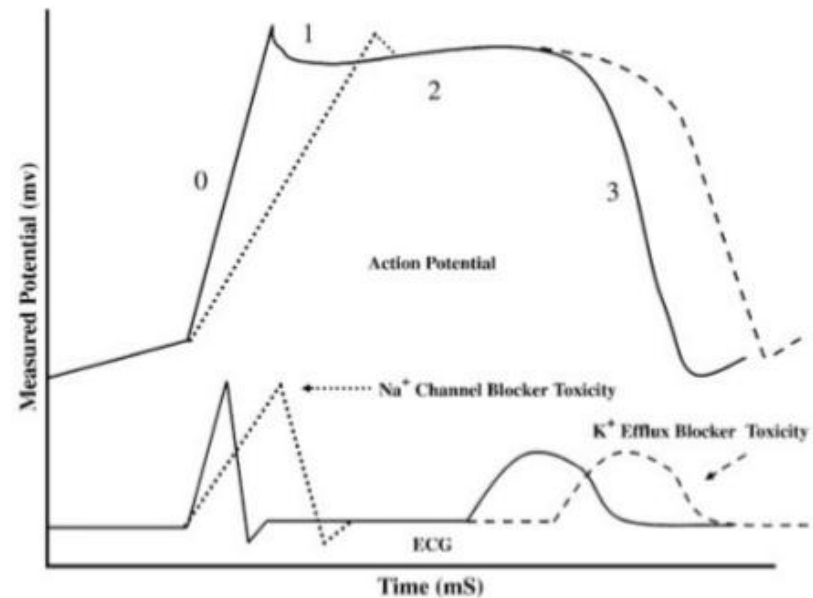
Propranolol overdose

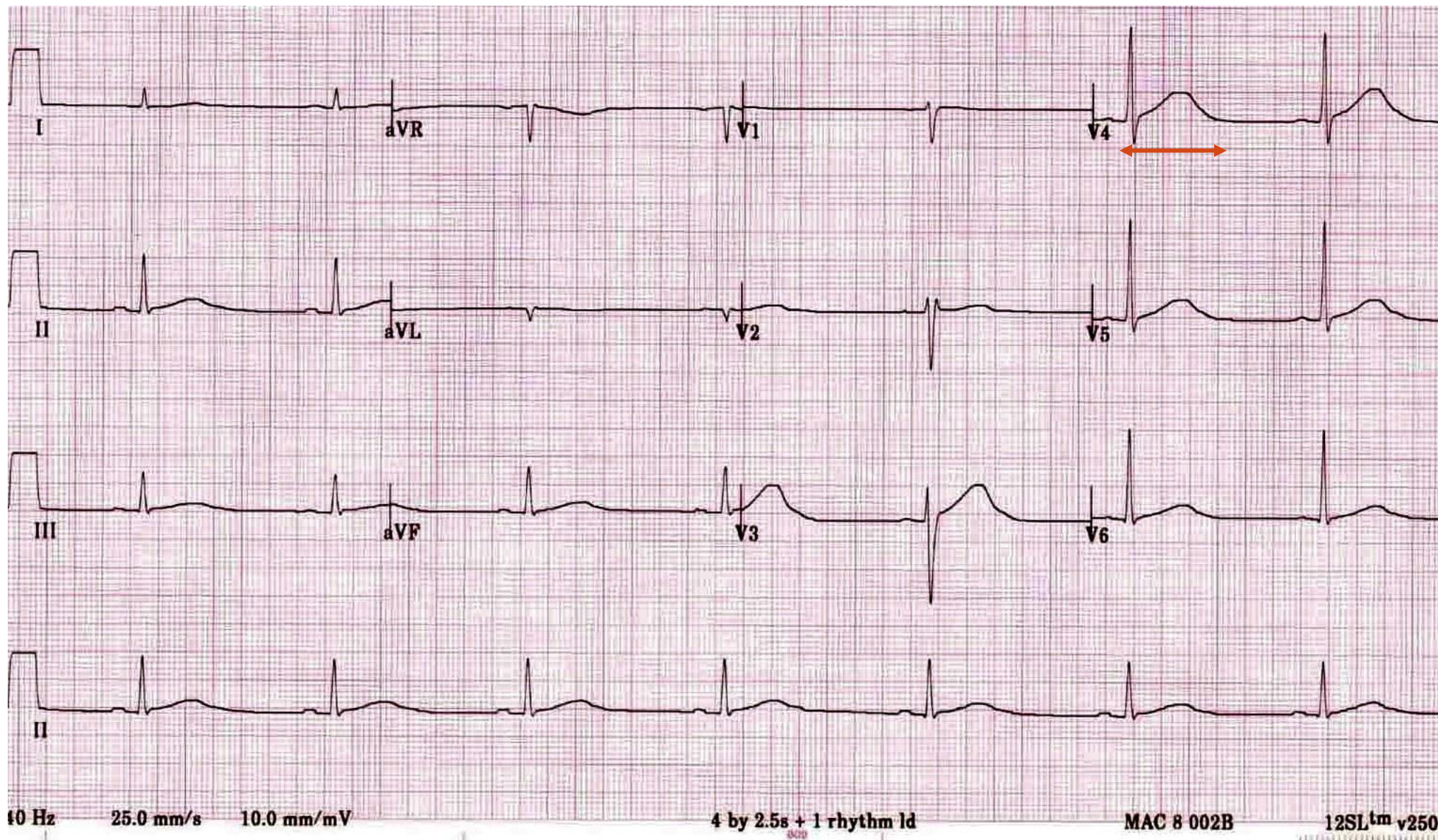
- Na channel block more relevant than beta-block
- Possible onset of coma, seizures, hypotension and ventricular arrhythmias.



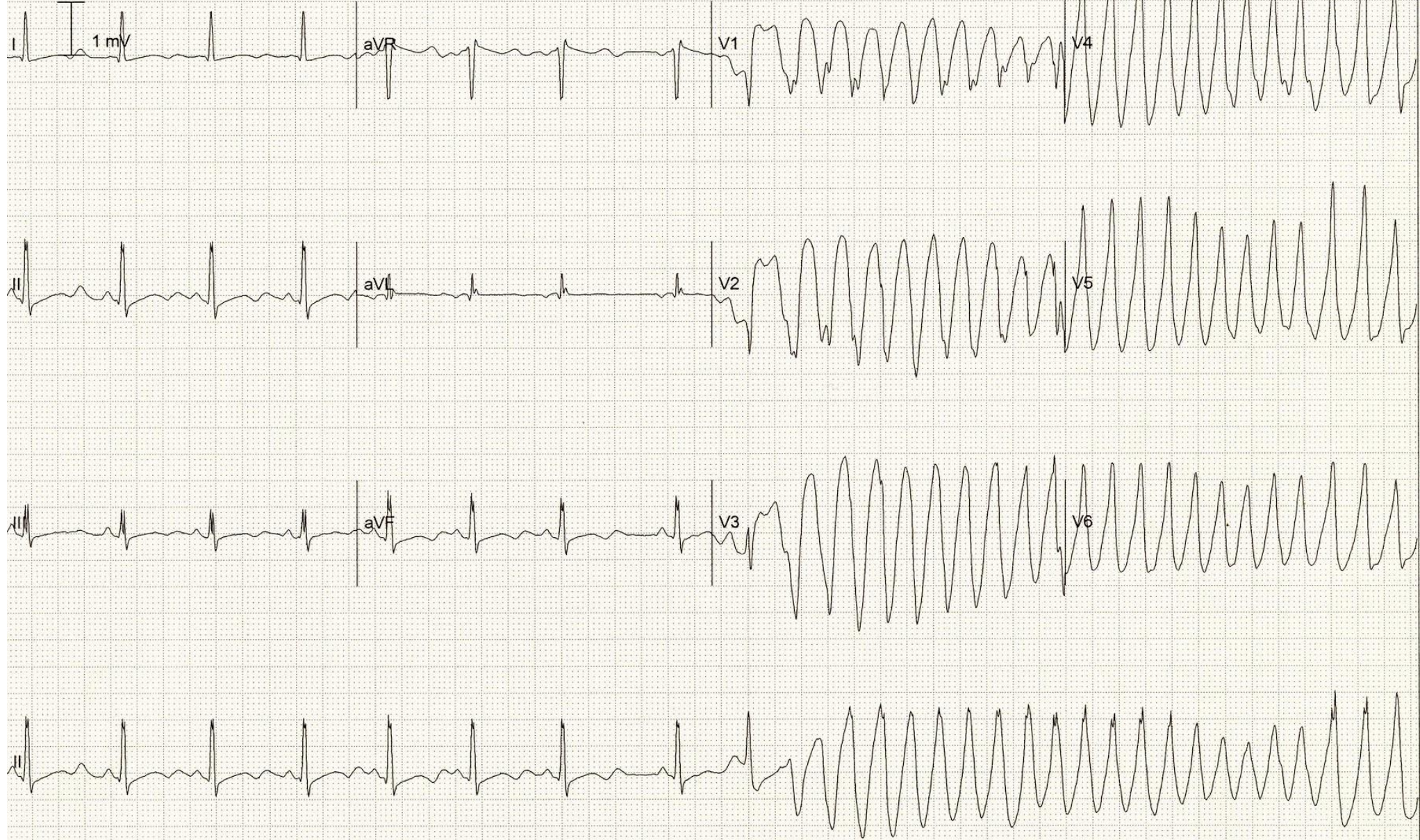
Sotalol overdose

- Bradycardia
- Long QT interval due to K⁺ efflux channels block





HR 90 PVC 9 RESP 22 T1 38.3



EUSE
EUROPEAN SOCIETY FOR EMERGENCY

12-Lead ECG (EASI Derived) Bandwidth: 0.50-20.0 Hz

22/06/03 22:16:27

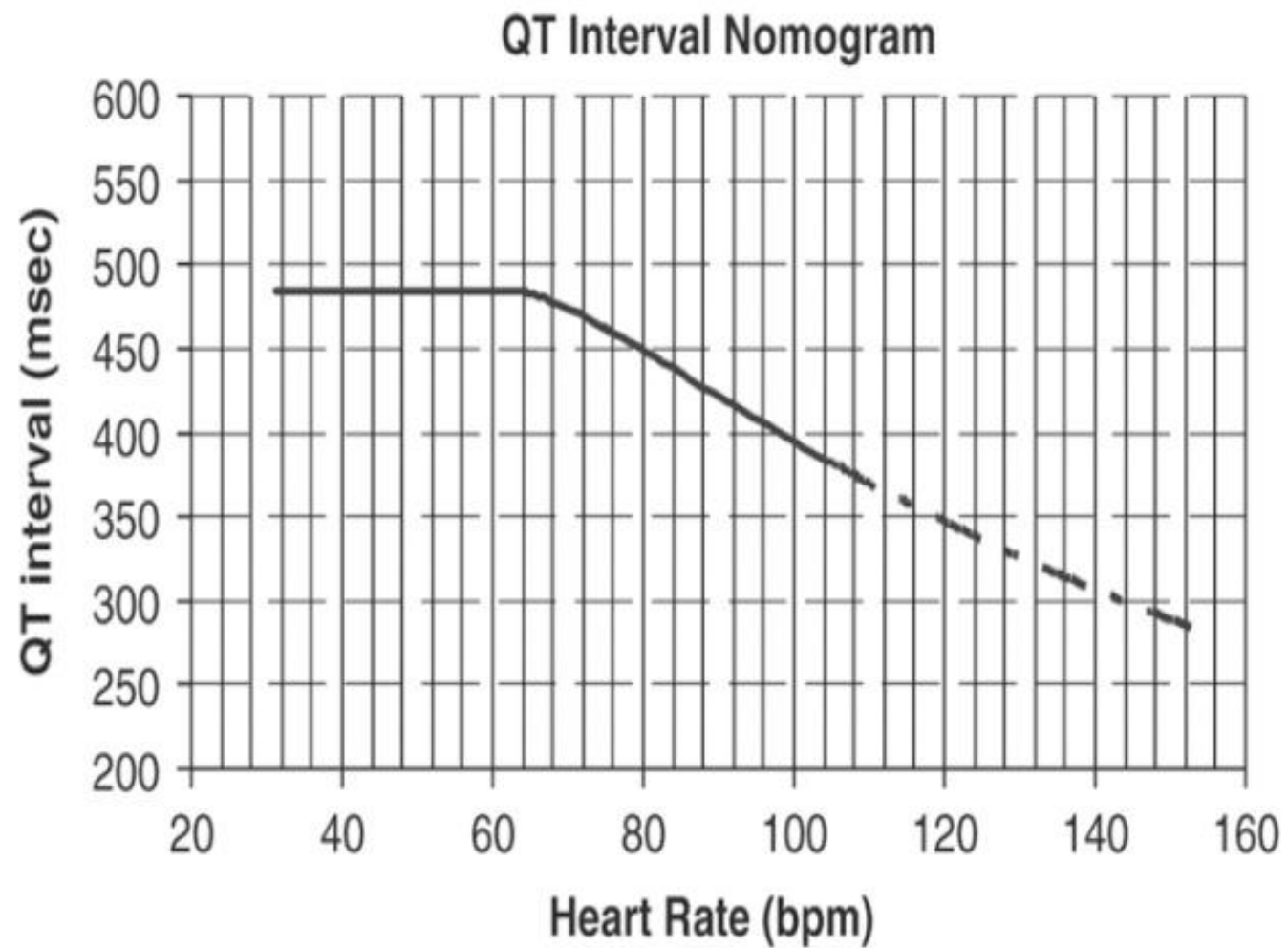
10 mm/mV 25.0 mm/s

Risk factors for long QT - TdP

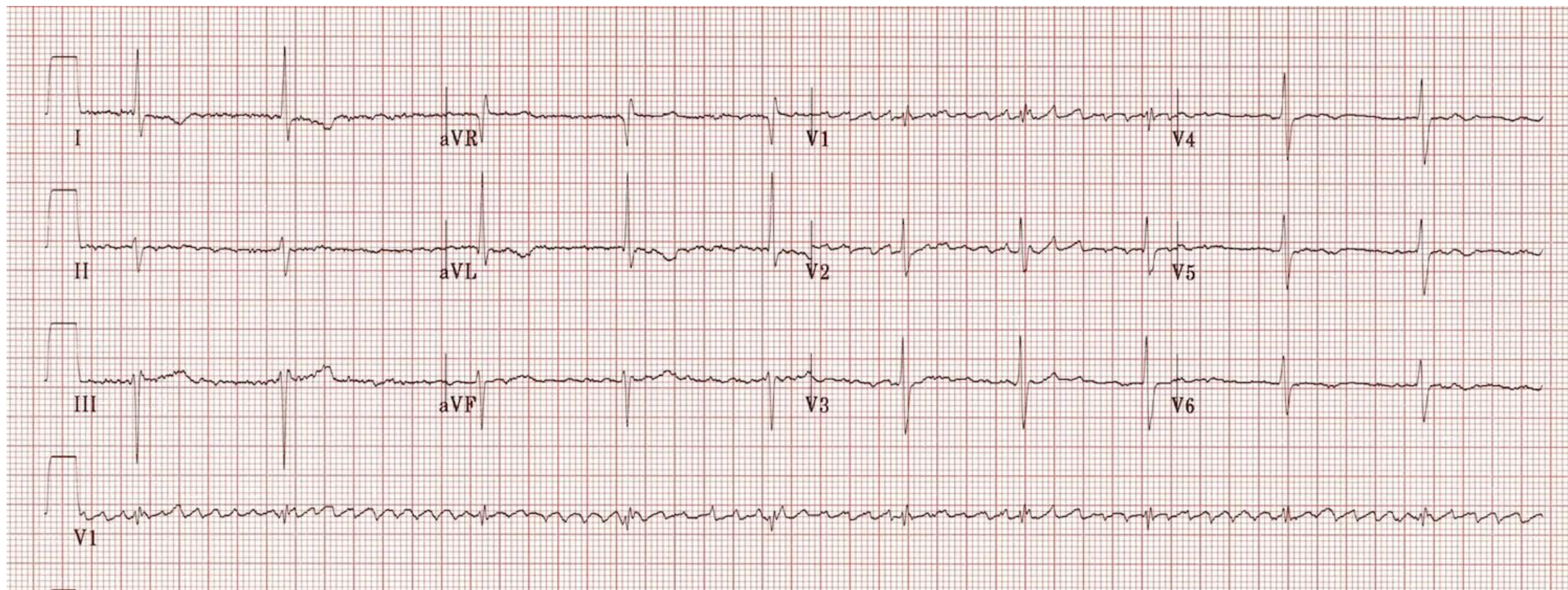
- Female gender
- > 60 years
- Genetic factors
 - Congenital long QT
 - History of drug-induced long QT
- Structural heart disease
- Hypokalemia, hypomagnesemia
- Dysthyroidism
- Use of sympathicomimetics

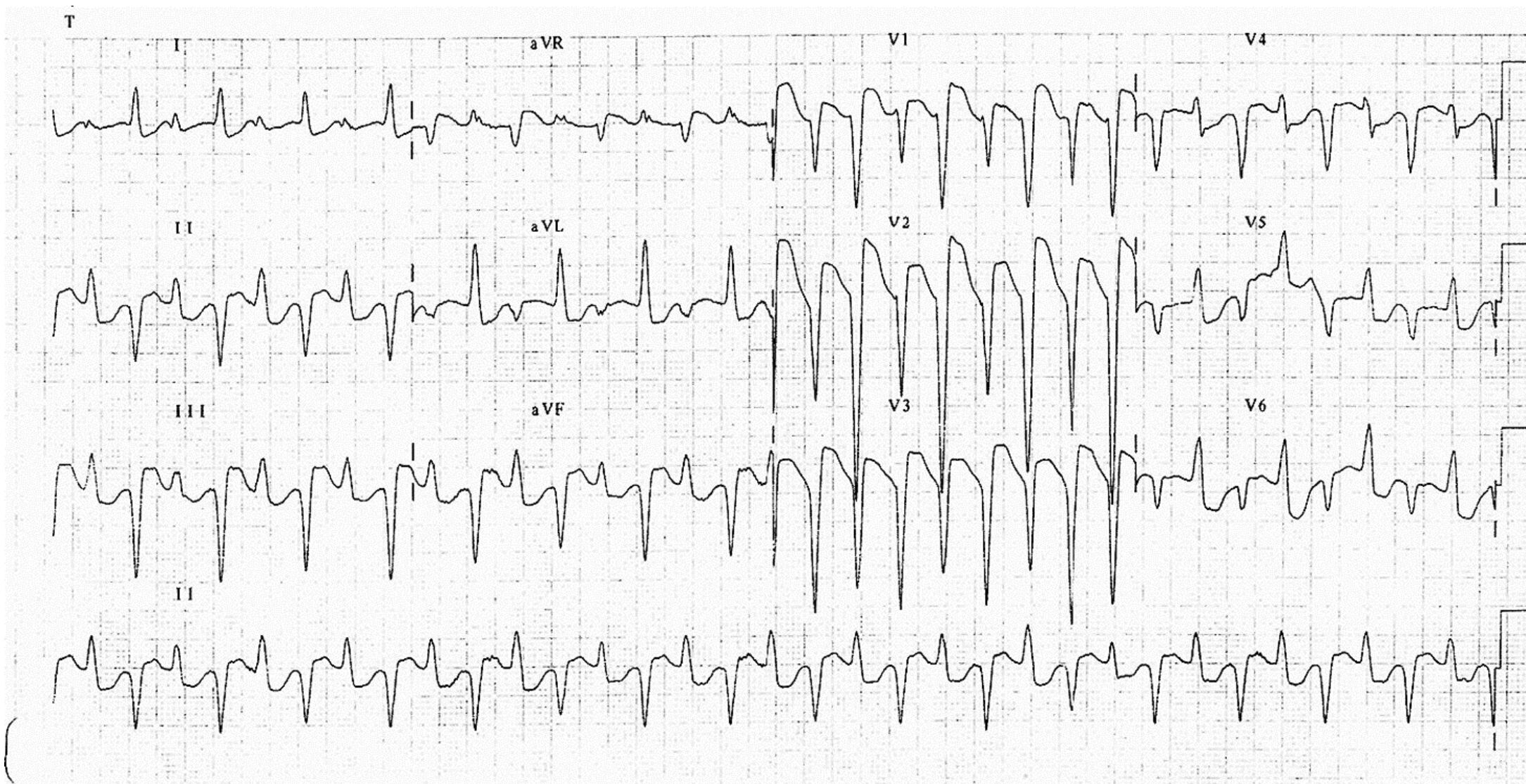


QT Interval Nomogram for determining 'at risk' QT-HR pairs from a single 12-lead ECG



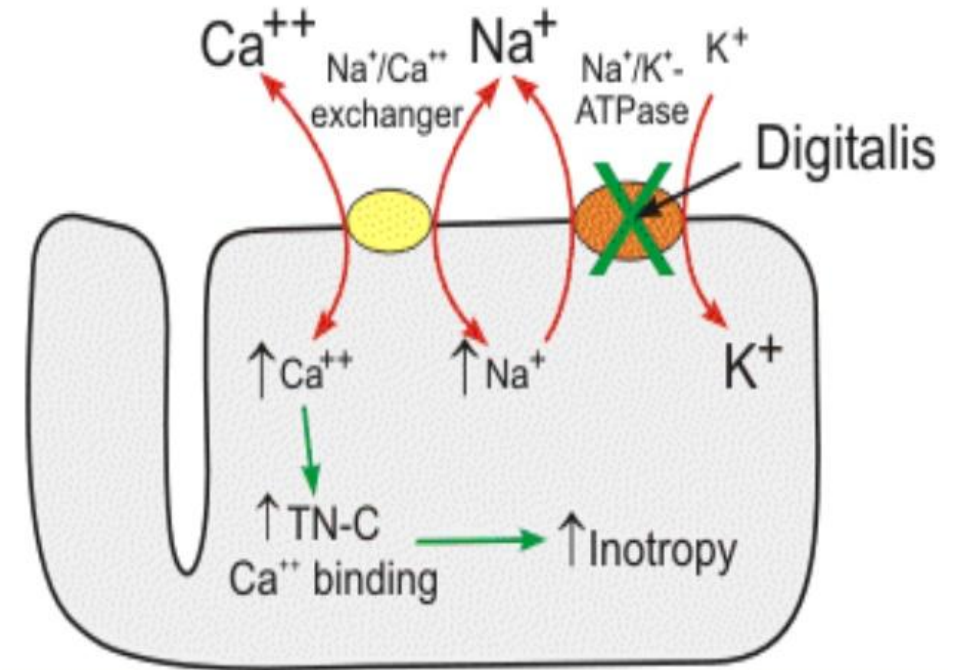
Arsenic trioxide*	Fosphenytoin	Quetiapine
Astemizole *	Gatifloxacin	Quinidine*
Atomoxetine	Gemifloxacin	Risperidone
Azithromycin	Haloperidol*	Ritodrine
Chloral hydrate	Ibutilide*	Ritonavir
Chloroquine*	Imipramine	Salmeterol
Chlorpromazine*	Isoproterenol	Sertindole
Ciprofloxacin	Itraconazole	Sertraline
Cisapride*	Ketoconazole	Sotalol*
Citalopram	Levalbuterol	Sparfloxacin*
Clarithromycin*	Levofloxacin	Tacrolimus
Clomipramine	Lithium	Tamoxifen
Clozapine	Methadone *	Telithromycin
Cocaine	Methylphenidate	Terbutaline
Desipramine	Mexiletine	Terfenadine*
Dexmethylphenidate	Midodrine	Thioridazine*
Diphenhydramine	Moxifloxacin	Tizanidine
Dobutamine	Nicardipine	Trazodone
Domperidone *	Norepinephrine	Trimethoprim-Sulfa
Dopamine	Nortriptyline	Trimipramine
Doxepin	Ofloxacin	Vardenafil
Droperidol *	Ondansetron	Venlafaxine
Ephedrine	Paroxetine	Ziprasidone
Epinephrine	Pentamidine*	





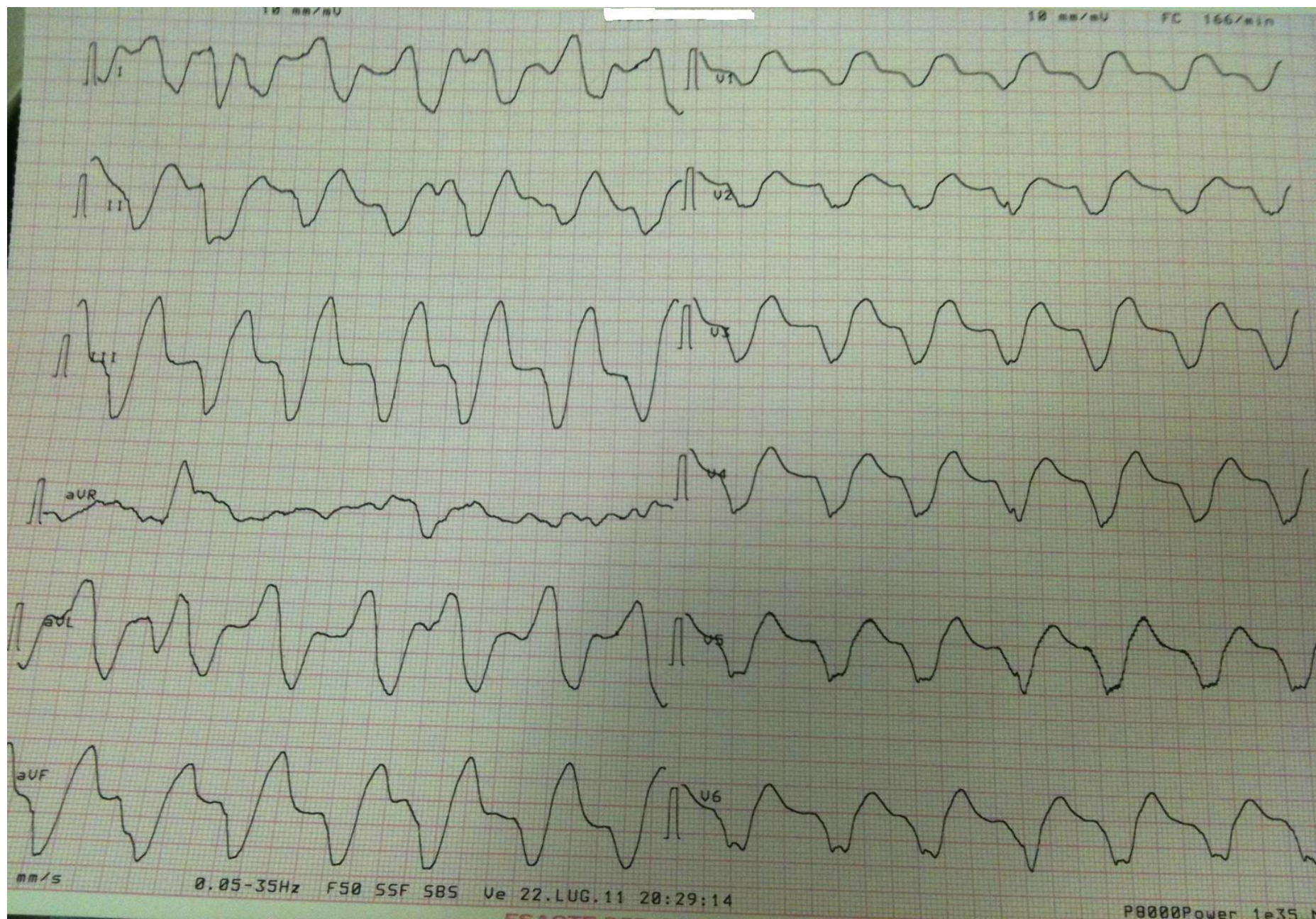
Digoxin poisoning

- Na-K ATPase blockade
- Excitant activity: AF, Afl, VT, VF
- Suppressant activity: sinus bradycardia, AV block
- Combination

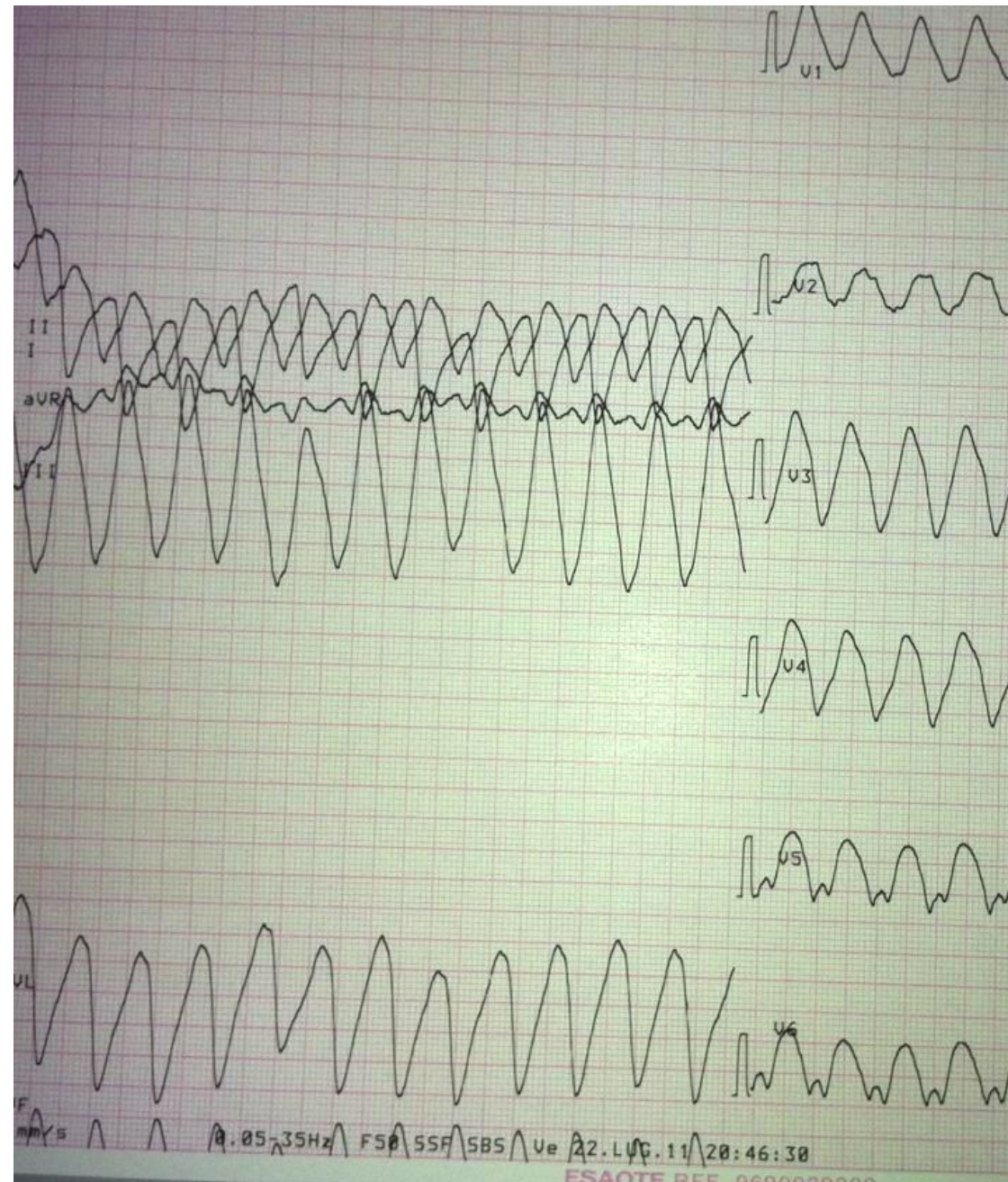


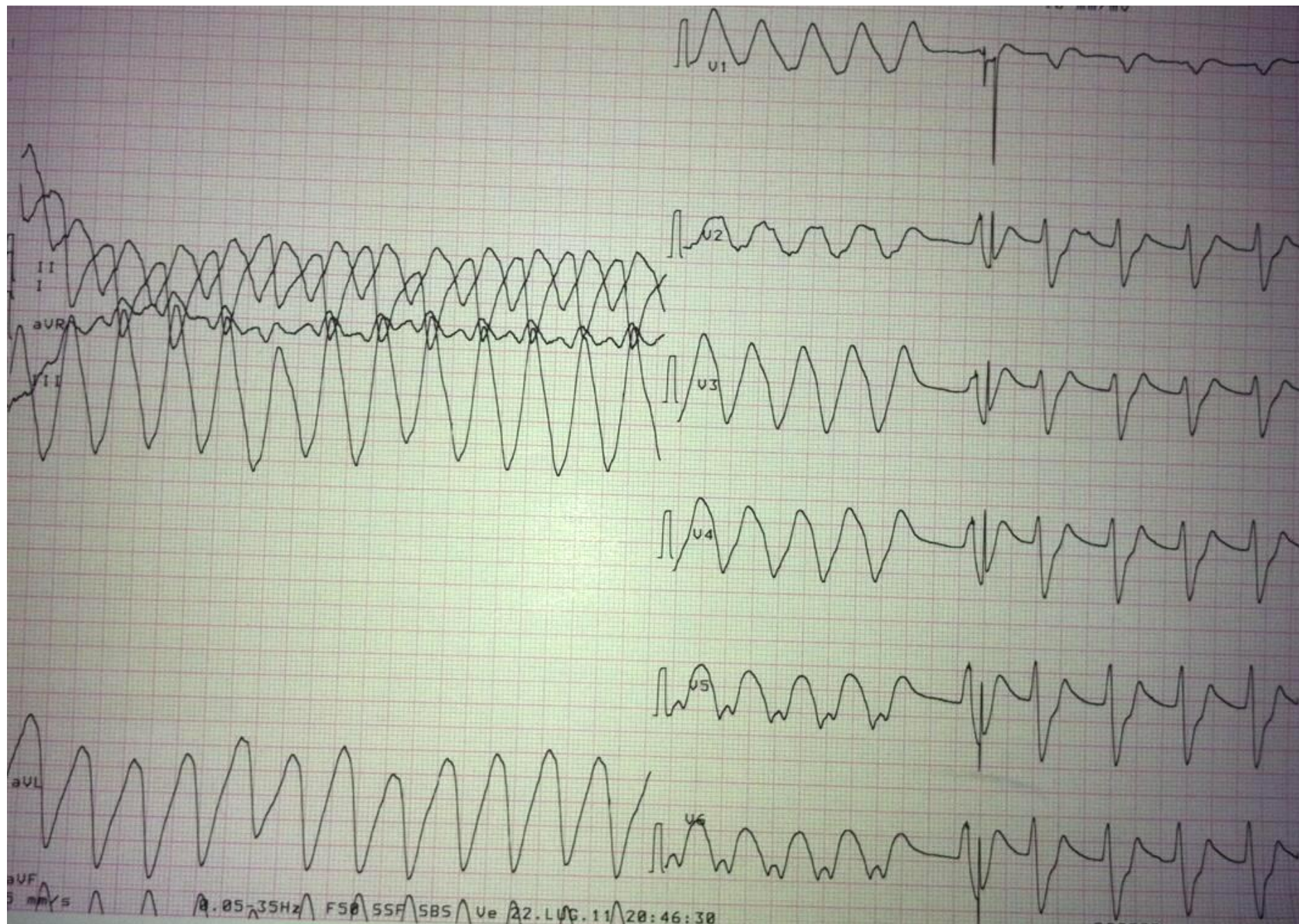
Case #4 AG 58 yrs female

- Refers fatigue and hypotension
- Obese, COPD with sleep apnea, AF.
- Thx: Amiodarone, Furosemide 75 mg/die, Sintrom, Vilanterol, Potassium Kanrenoate 100 mg x 2/die
- BP 170/100, HR 68, FR 28, SPO2 95%, TC 36° C
- Physical exam: unremarkable



Valori gasc ematici				
pH	7.383			[7.350 - 7.450]
pCO ₂	36.5	mmHg		[35.0 - 45.0]
pO ₂	66.2	mmHg		
Valori ossimetrici				
ctHb	11.2	g/dL		
sO ₂	93.2	%		
FO ₂ Hb	92.2	%		
FCOHb	1.6	%		
FHHb	6.7	%		
FMethb	-0.7	%		
Hct.c	34.6	%		
Valori elettroliti				
cK ⁺	7.8	meq/L		
cNa ⁺	122	meq/L		
cCa ²⁺	2.27	meq/L		
cCl ⁻	94	meq/L		
Anion Gap.K ⁺ .c	14.8	meq/L		
mOsm.c	253.1	mmol/kg		
Valori metaboliti				
cGlu	160	mg/dL		
cLac	1.4	mmol/L		
Valori corretti con la temperatura				
pH(T)	7.383			
pCO ₂ (T)	36.5	mmHg		
pO ₂ (T)	66.2	mmHg		
Stato di ossigenazione				
ctO ₂ .c	6.5	mmol/L		
p50.c	26.77	mmHg		
pO ₂ (x).c	30.2	mmHg		
Qx.c	1.6			
Stato Acido Base				
cBase(Ecf).c	-3.0	mmol/L		
Δ cHCO ₃ ⁻ (P).c	21.3	mmol/L		[22.0 - 26.0]





Conclusion

- Drug overdose is possible (and frequent) even in «normal therapy regimens»
- Normally a worsening of renal function or liver function is the cause of overdose
- When vague symptoms and a complex home therapy an ECG at triage may make the difference

Welcome to Glasgow!!

