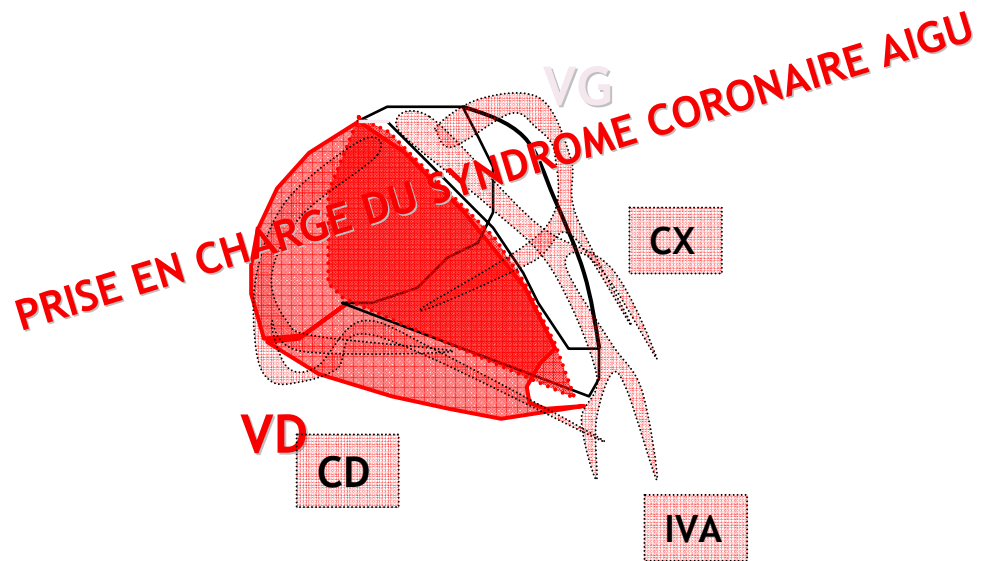




Dr TRAN-NGOC E.  
Département Cardiologie  
2010

5é Journée de formation du Département critique



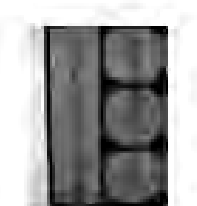
# Epidémiologie



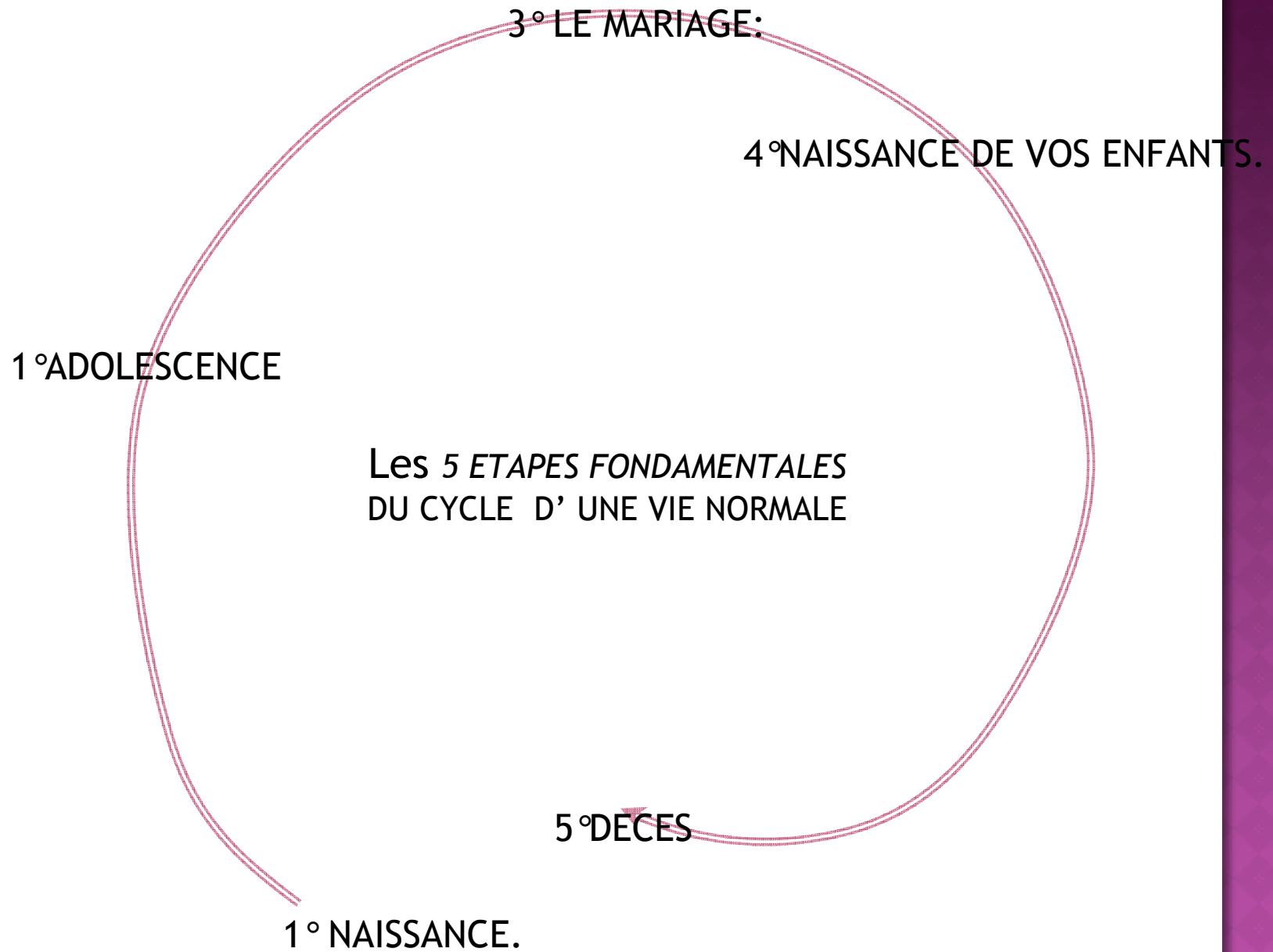
- AVC:
  - Incidence (AVC): 136 / 100 000 /an
  - 3<sup>ème</sup> cause de mortalité
  - 1<sup>ère</sup> cause de handicap



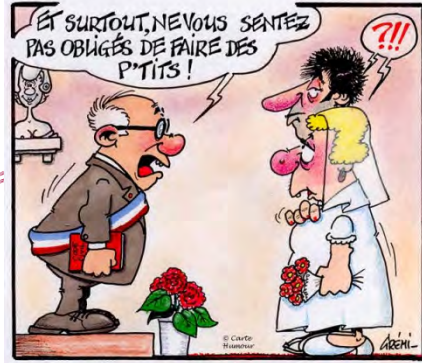
- IDM:
  - Incidence (Infarctus Myocarde): 233 / 100 000 /an chez l'homme – 37 / 100 000 / an chez la femme
  - 1<sup>ère</sup> cause de mortalité cardiovasculaire



- AOMI:
  - Incidence de la claudication intermittente : 500 / 100 000 / an entre 50-60 ans chez l'homme
  - Age de survenue retardé de 10 ans chez les femmes







**3° LE MARIAGE:**  
*Je peux plus faire ci, ni ça...*



**4° NAISSANCE DE VOS ENFANTS.**  
*je vais refaire ci et ça...*



**2° ADOLESCENCE:** *je fais ci, je fais ça...*



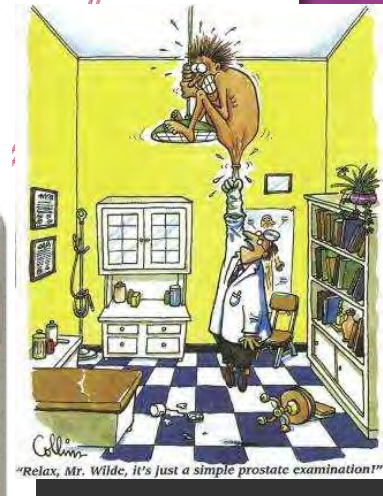
**MAARRREEEE!!!!!!**

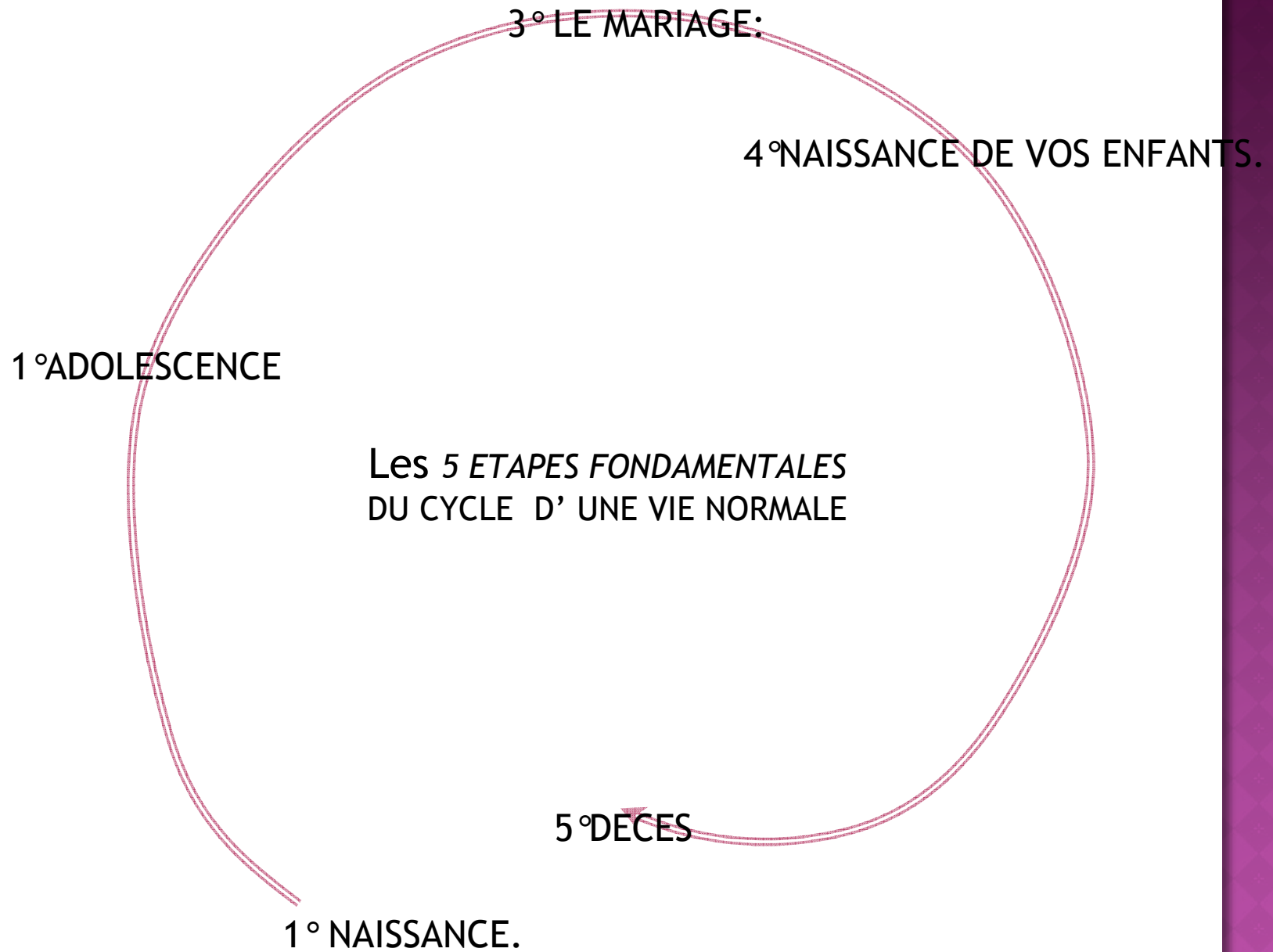
*Peut pas faire ci, peut pas faire ça...*



**5° DECES**

**1° NAISSANCE.**



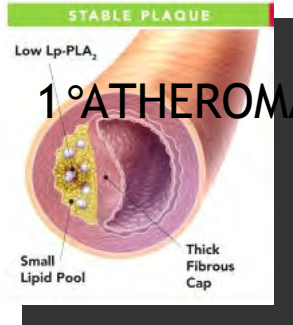




Les 5 *ETAPES FONDAMENTALES*  
DU CYCLE DE LA VIE D'UN CORONARIEN



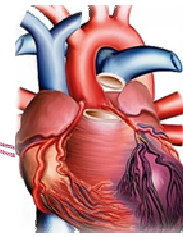
2° STENOSE CORONAIRE



1° ATHEROMATOSE CORONAIRE

TABAGISME  
CHOLESTEROL  
DIABETE  
HTA  
Sédentarité...

S.C.A



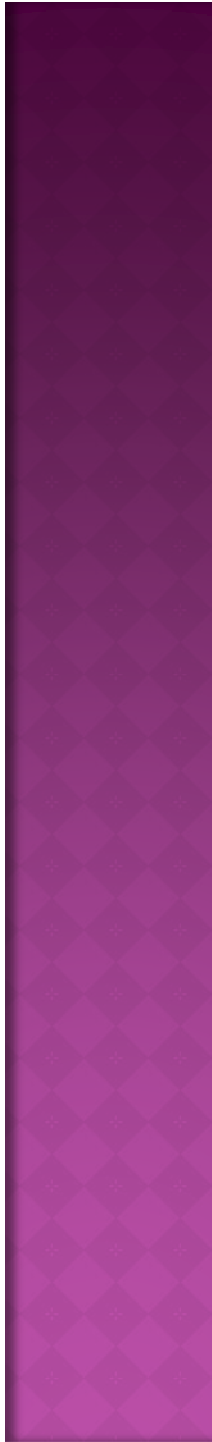
3° SYNDROME CORONAIRE AIGU  
*Angor instable*  
NSTEMI  
STEMI

4° INSUFFISANCE CARDIAQUE  
*Remodeling VG*  
*Insuff. Mitral*  
*BBG, asynchronisme*  
*TV, FV AICD*  
..... ↑ I.C., ↓ Q.L.

S.C.A

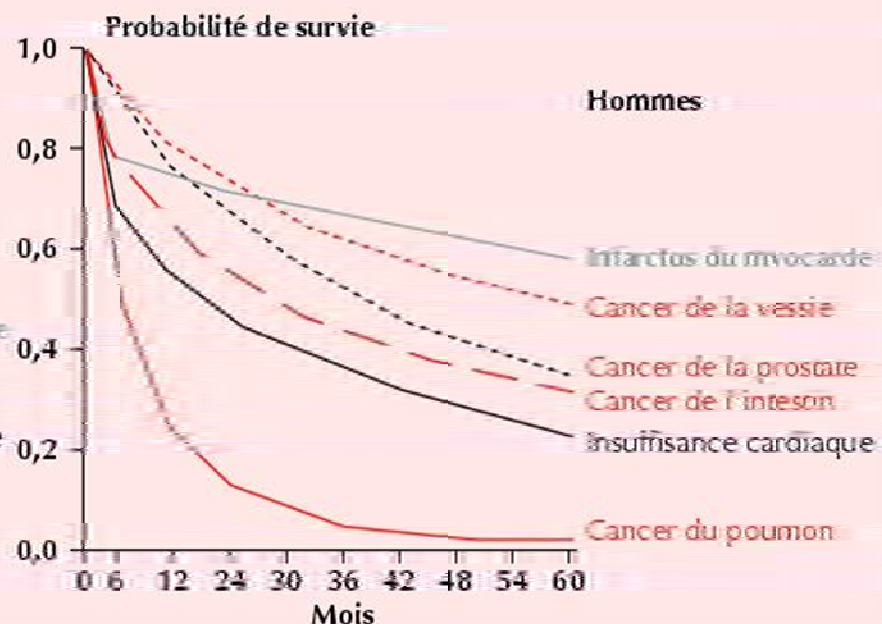
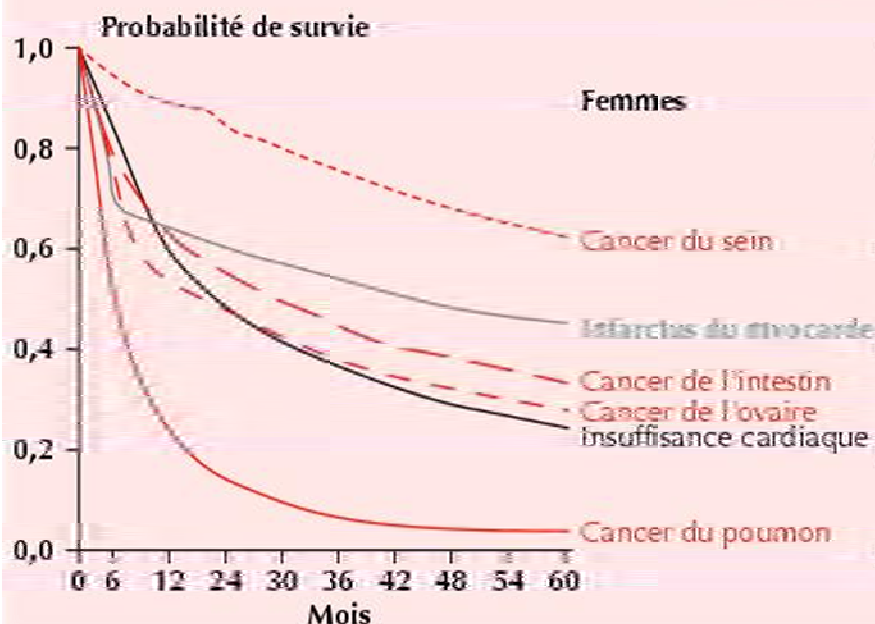
5° DECES

S.C.A





## PATIENTS HOSPITALISÉS

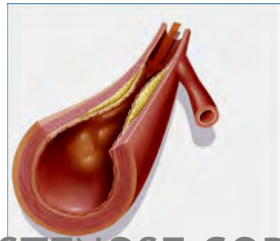


## DANGER POISON !

- Acétone** (Dissolvant)
- \*Naphtylamine**
- Méthanol** (Carburant pour fusée)
- Naphtalène** (Antimite)
- Nicotine** (Utilisé comme herbicide et insecticide)
- \*Cadmium** (Utilisé dans les batteries)
- Monoxyde de carbone** (Gaz d'échappement)
- \*Chlorure de Vinyle** (utilisé dans les matières plastiques)
- Acide Cyanhydrique** (Elait employé dans les chambres à gaz)
- Ammoniac** (Détergent)
- \*Uréthane**
- Toluène** (Solvant industriel)
- Arsenic** (Poison violent)
- \*Dibenzacridine**
- \*Polonium 210** (Elément radioactif)
- DDT** (Insecticide)
- \* Substances cancérigènes connues

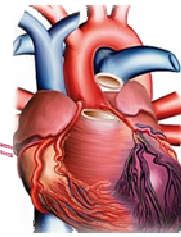
**ARRETEZ DE FUMER**



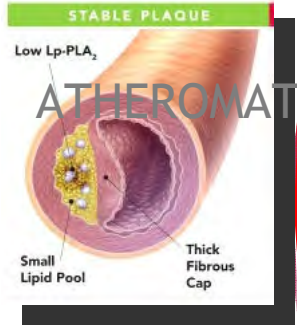


STENOSE CORONAIRE

S.C.A



SYNDROME CORONAIRE AIGU



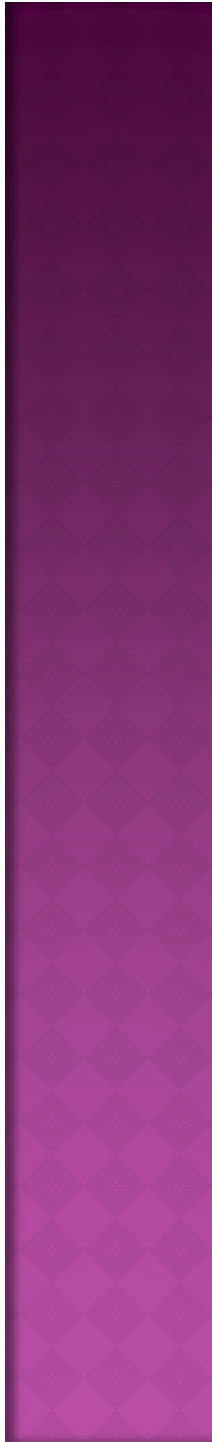
ATHEROMATOSE CORONAIRE

INSUFFISANCE CARDIAQUE

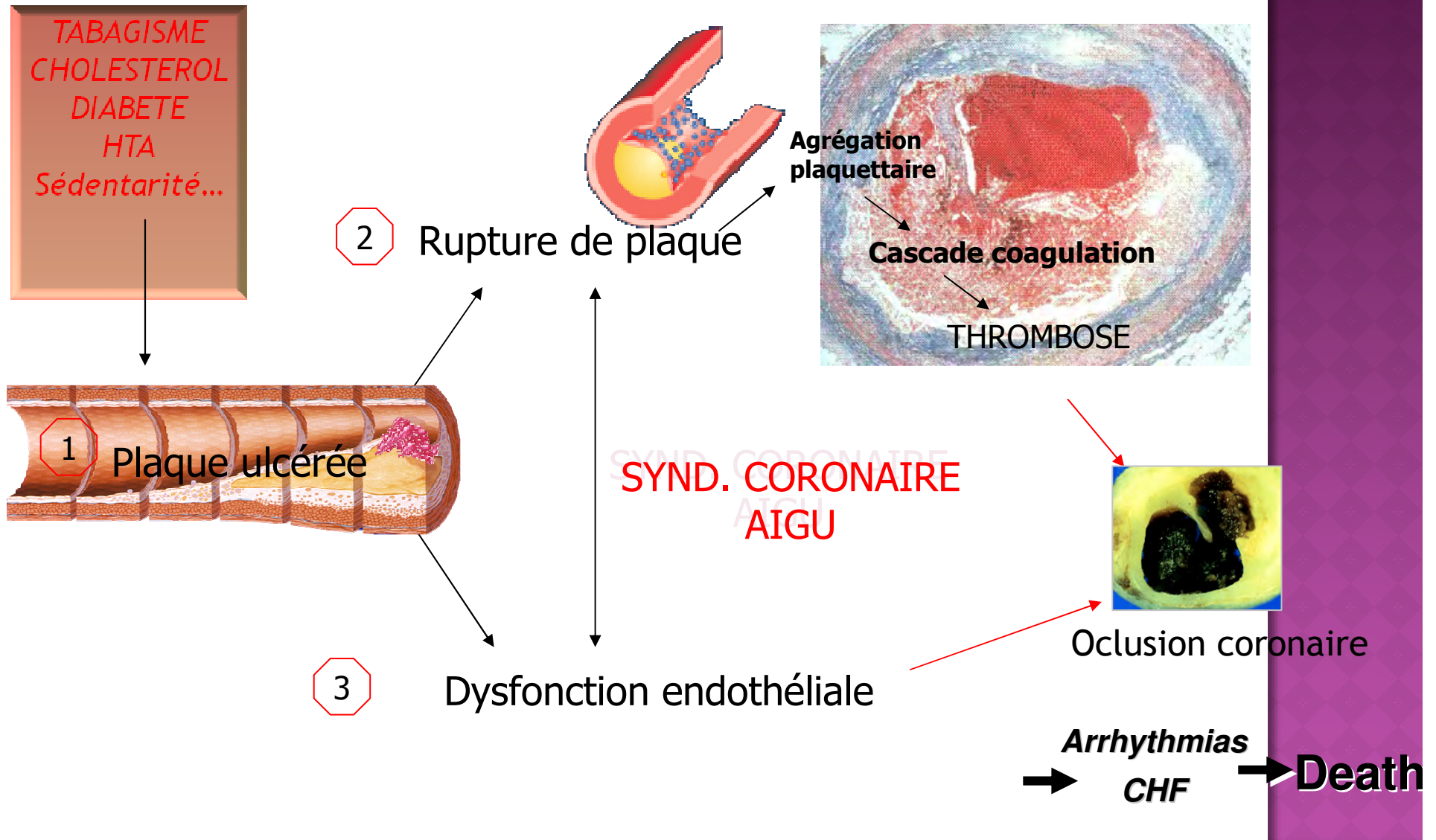
S.C.A

TABAGISME  
CHOLESTEROL  
DIABETE  
HTA  
Sédentarité...

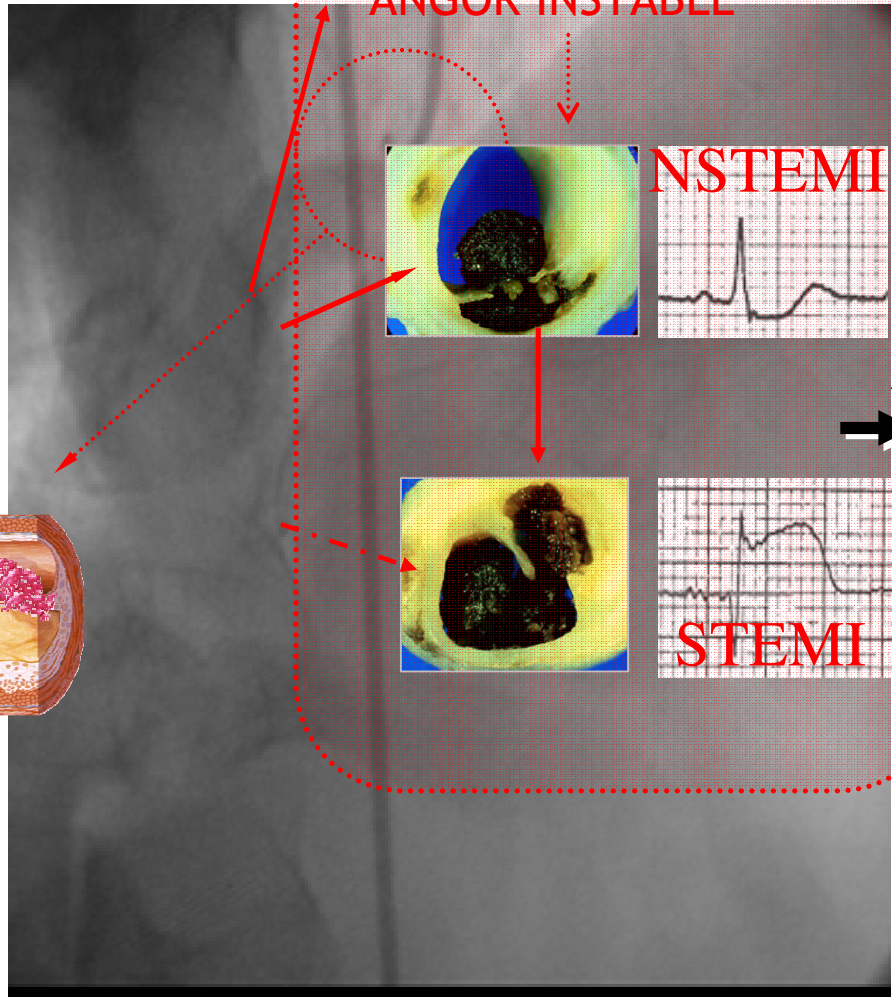
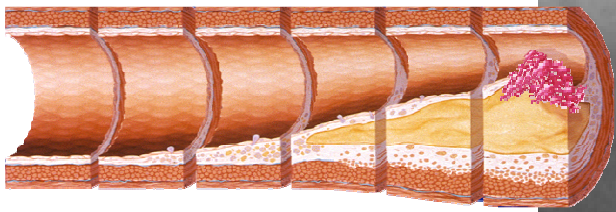
S.C.A



# PHYSIOPATHOLOGIE DU SYNDROME CORONAIRE AIGU.







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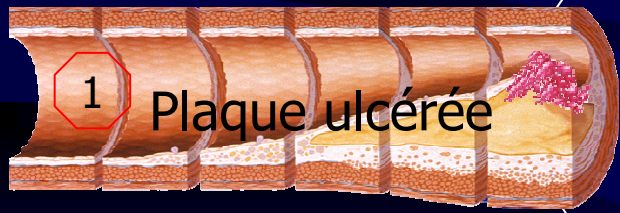
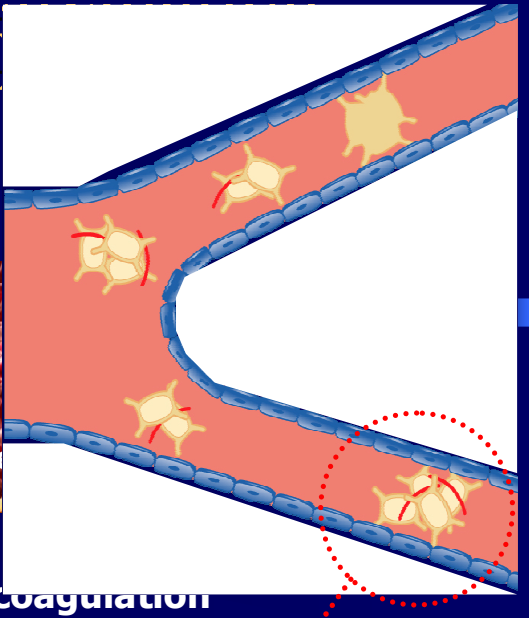
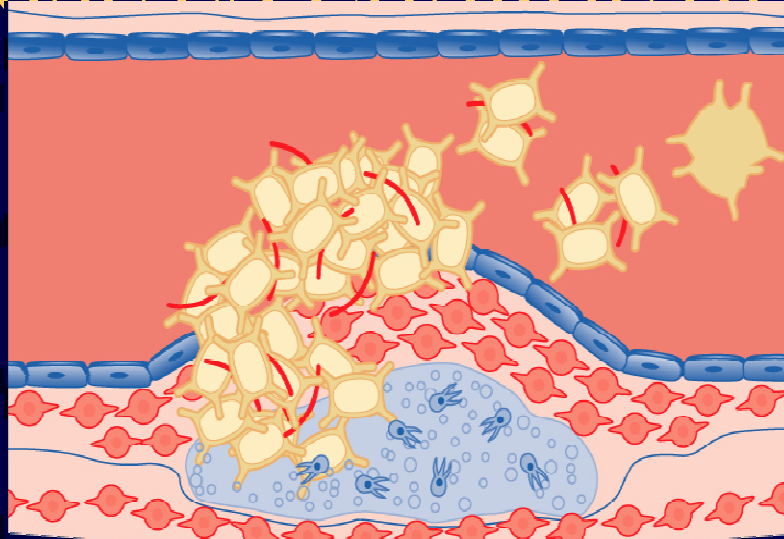
Arrhythmias

CHF

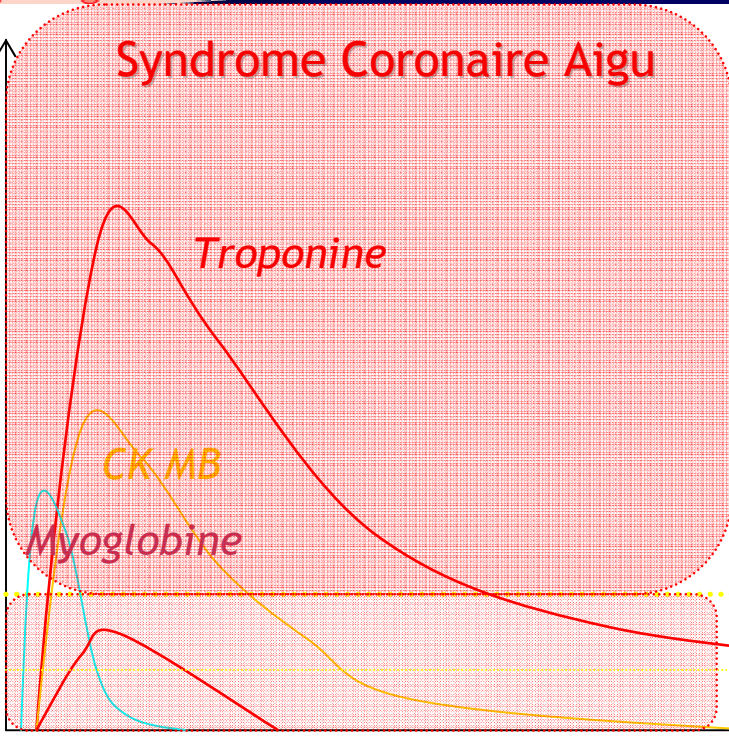
Death



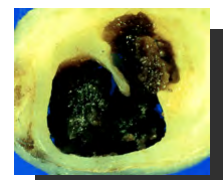
# PRISE EN CHARGE DU SYNDROME CORONAIRE AIGU.



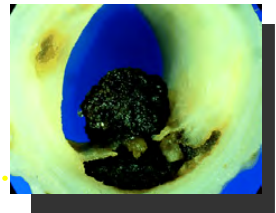
3 Dysfonction



STEMI



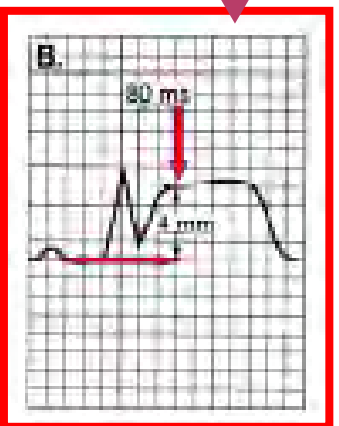
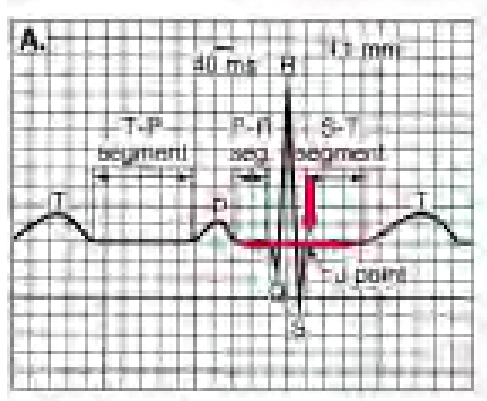
NSTEMI



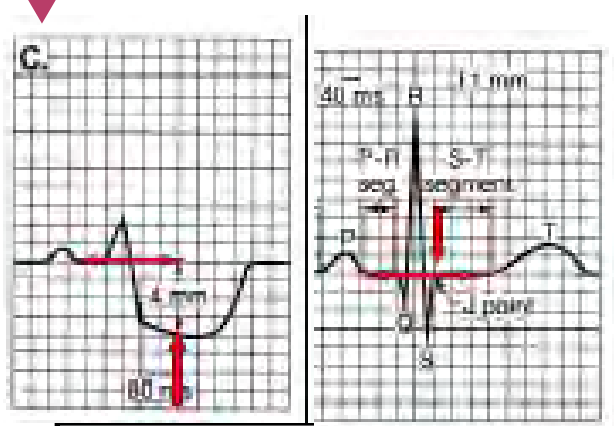
Angor Instable

# SYNDROME CORONAIRE AIGU

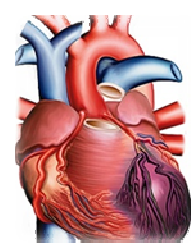
## E.C.G. 12 dérivations



STEMI



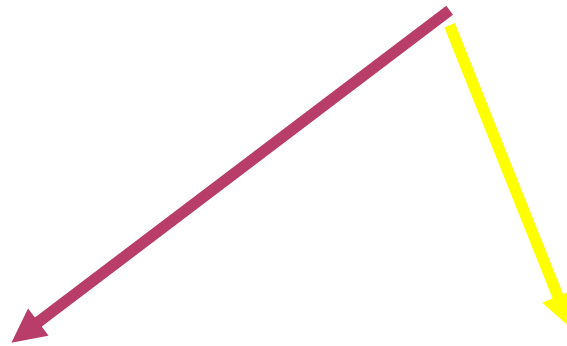
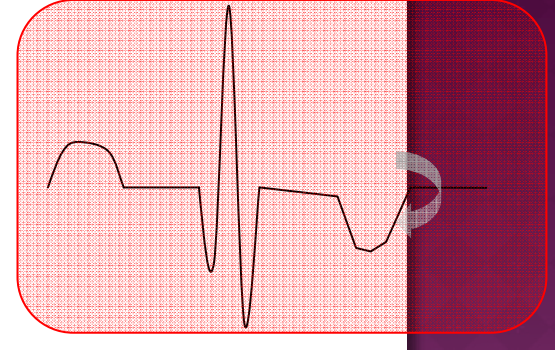
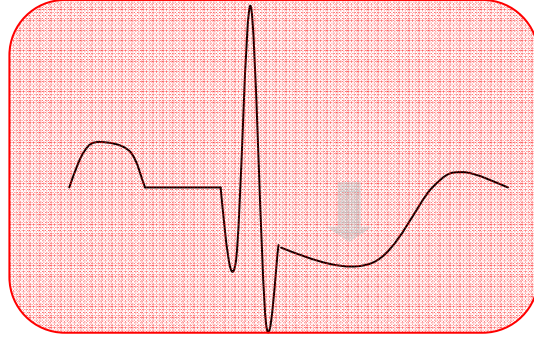
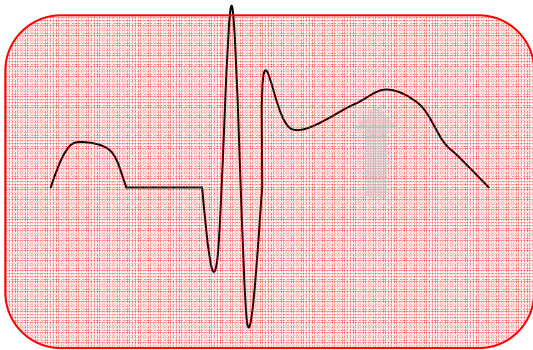
NSTEMI , Angor instable



DESOCCLUSION URGENTE  
*Time is muscle, Muscle is life*

Troponine

# SYNDROME CORONAIRE AIGU



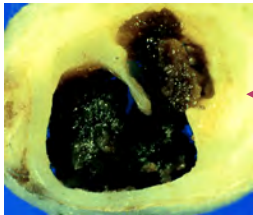
MYOCARDIAL INFARCTION

UNSTABLE ANGINA

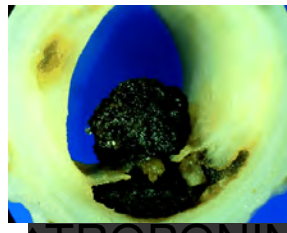
STEMI

NSTEMI

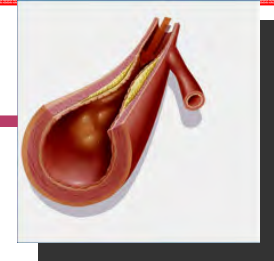
ANGOR INSTABLE

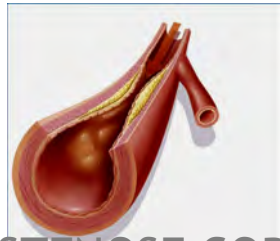


↑↑↑ TROPONINE



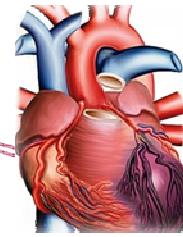
↑ TROPONINE





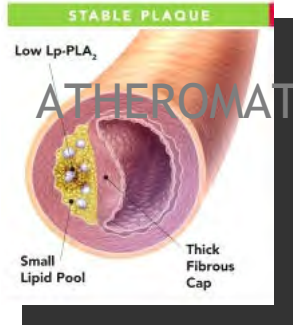
STENOSE CORONAIRE

S.C.A



SYNDROME CORONAIRE AIGU

SYMPTOMES DU S.C.A.



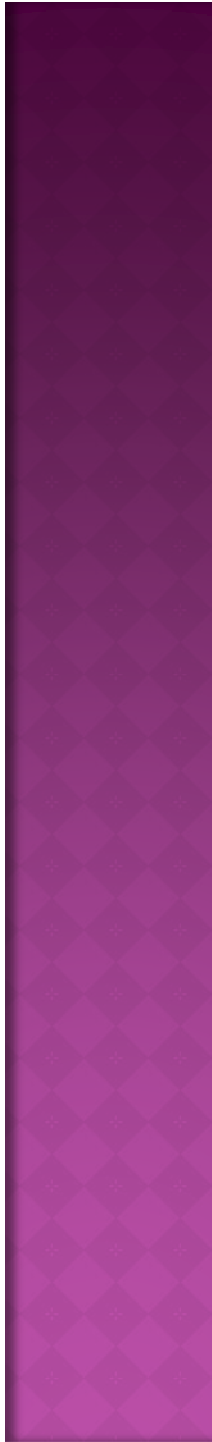
ATHEROMATOSE CORONAIRE

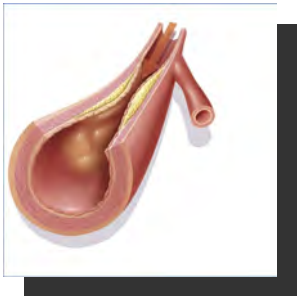
INSUFFISANCE CARDIAQUE

S.C.A

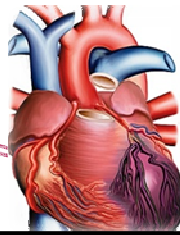
S.C.A

TABAGISME  
CHOLESTEROL  
DIABETE  
HTA  
Sédentarité...





S.C.A



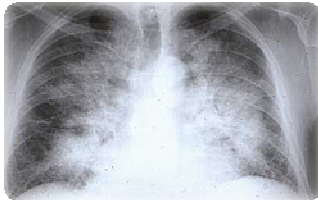
SYMPTOMES DU S.C.A.



ANGOR



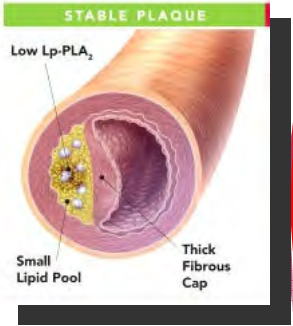
Diabétique, agé...



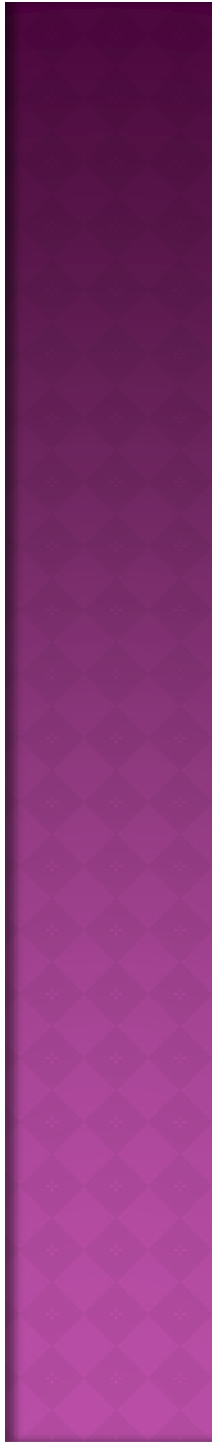
OPH

S.C.A

S.C.A

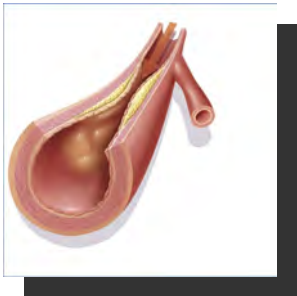
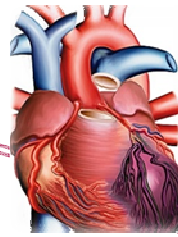


TABAGISME  
CHOLESTEROL  
DIABETE  
HTA  
Sédentarité...

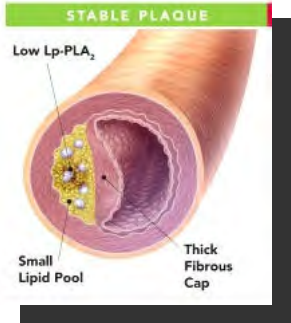
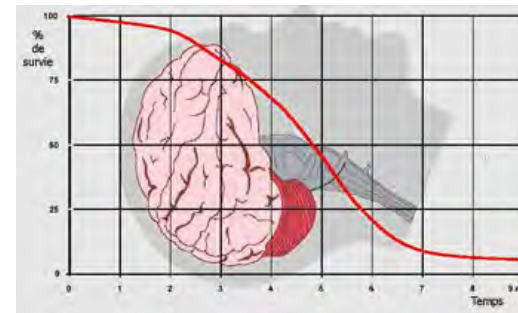




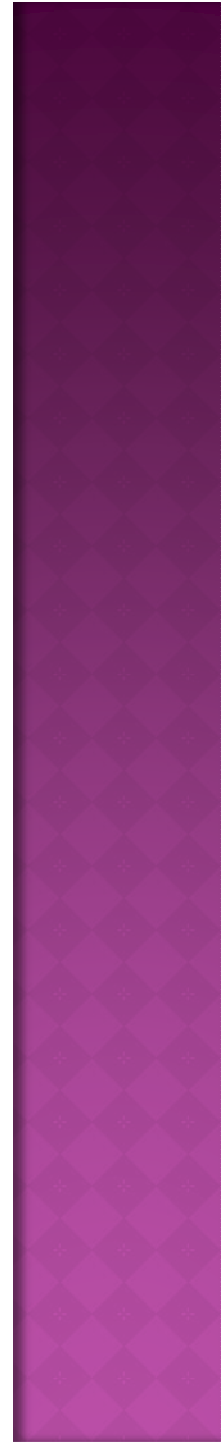
S.C.A

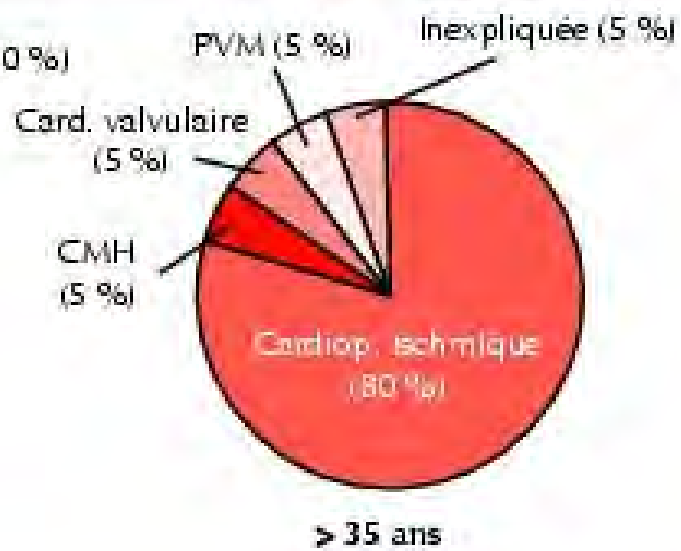
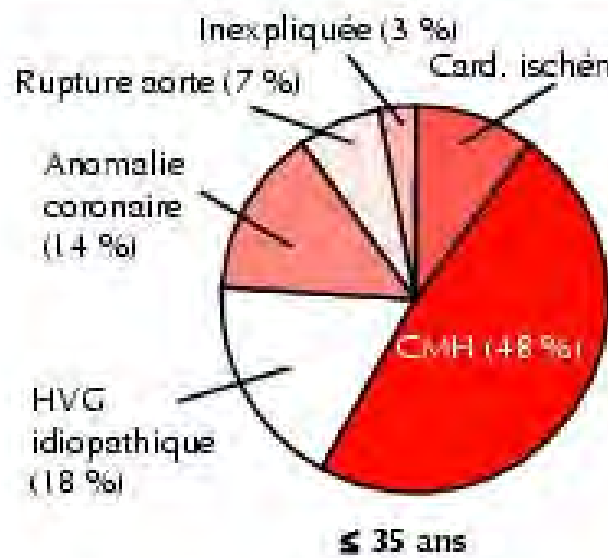


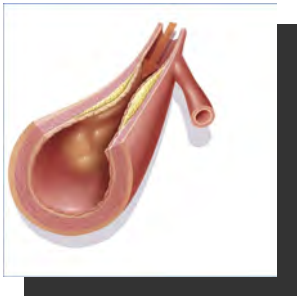
Mort subite



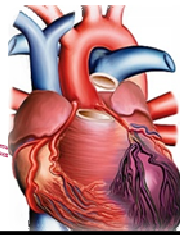
TABAGISME  
CHOLESTEROL  
DIABETE  
HTA  
Sédentarité...







S.C.A



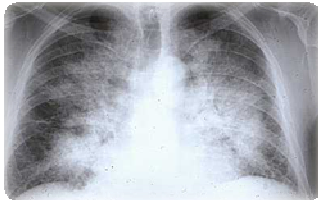
SYMPTOMES DU S.C.A.



ANGOR



Diabétique, agé...



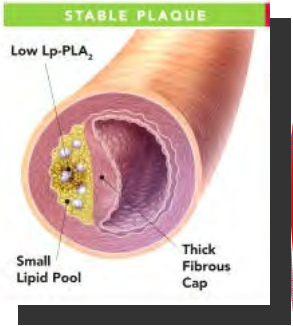
OPH

S.C.A

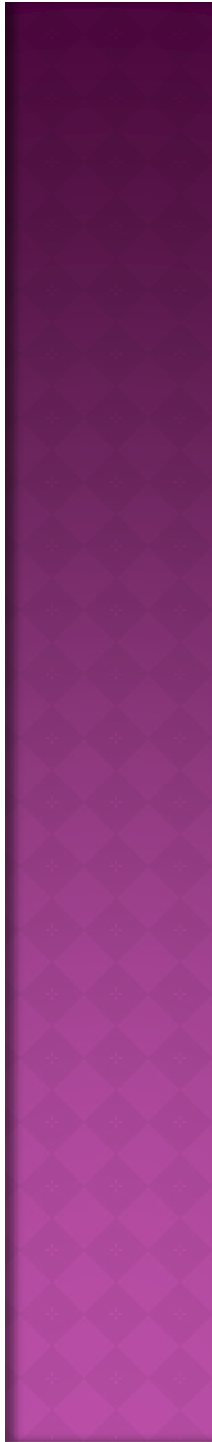


Mort subite

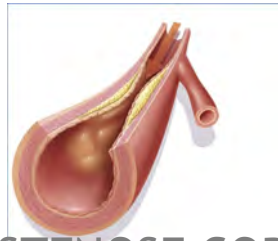
S.C.A



TABAGISME  
CHOLESTEROL  
DIABETE  
HTA  
Sédentarité...

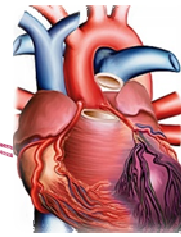




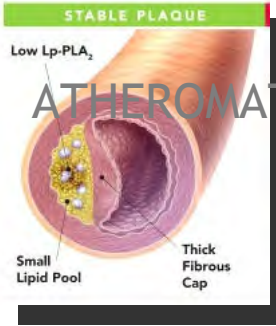


STENOSE CORONAIRE

S.C.A

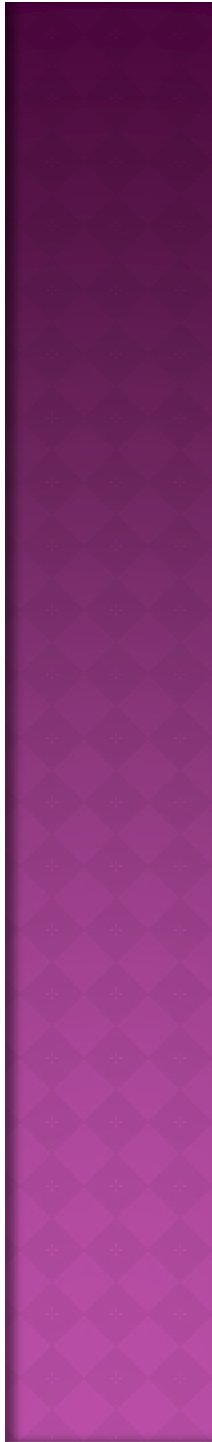


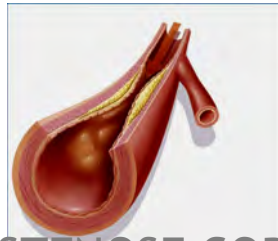
SYNDROME CORONAIRE AIGU



ATHEROMATOSE CORONAIRE

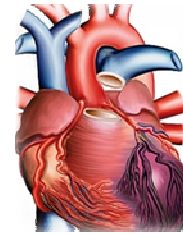
TABAGISME  
CHOLESTEROL  
DIABETE  
HTA  
Sédentarité...





STENOSE CORONAIRE

S.C.A



### SYNDROME CORONAIRE AIGU

1° ANGOR INSTABLE

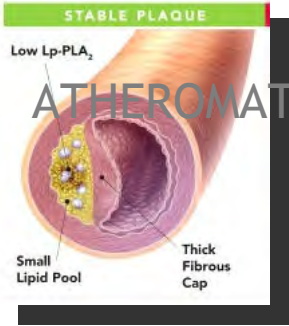
2° NSTEMI

3° STEMI

*Une même spectre, gravité différente*

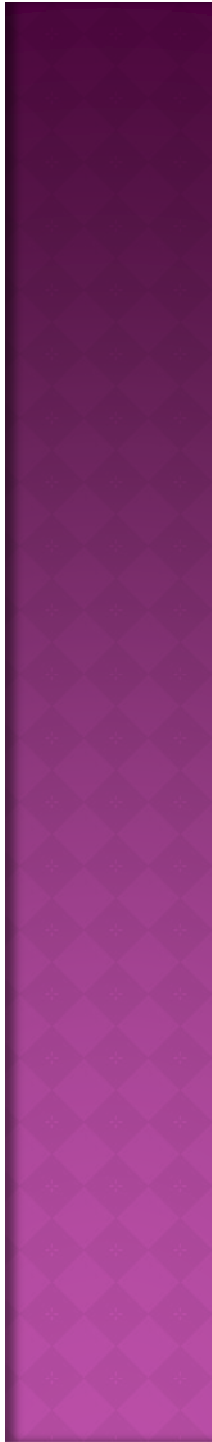
*Prise en charge différente*

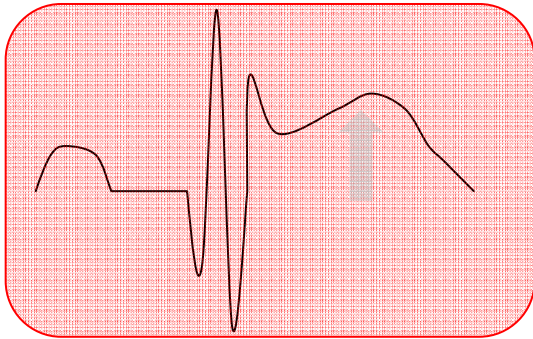
**(TIME IS MUSCLE, MUSCLE IS LIVE)**



ATHEROMATOSE CORONAIRE

TABAGISME  
CHOLESTEROL  
DIABETE  
HTA  
Sédentarité...





## MYOCARDIAL INFARCTION

**STEMI**



**T.V., F.V., Mort Subite**

DESOCCLUSION URGENTE par Thrombolyse soit angioplastie

*Time is muscle, Muscle is life*

MONITORING ECG.

ECG 12 dérivations.

MONITOTING T.A.

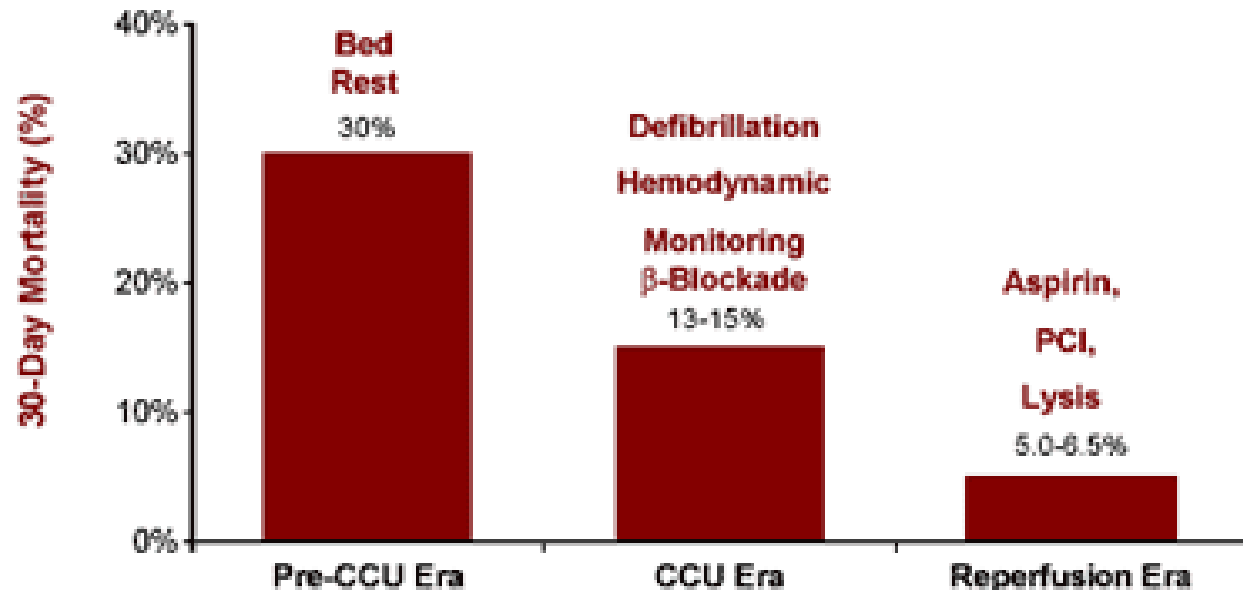
MONITOTING saturation.

PERFUSION IV bras gche.

# Consequences of STEMI

## Early Mortality Risk

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CCU = coronary care unit.

Antman EM. Acute Myocardial Infarction. In: Braunwald, ed. New York: W. B. Saunders; 2005.

**ST elevation STEMI**

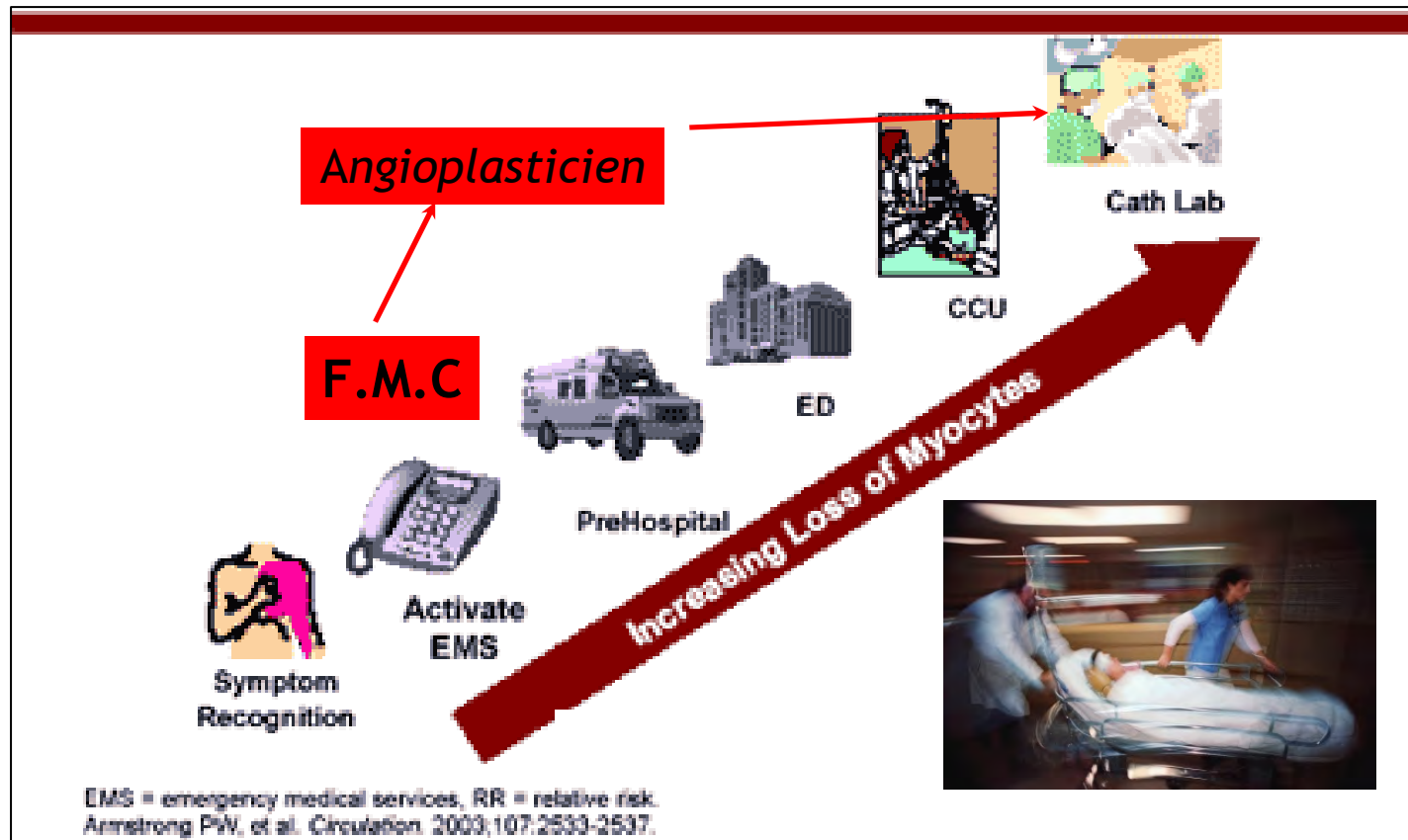
**TIME IS MUSCLE - MUSCLE IS LIVE**



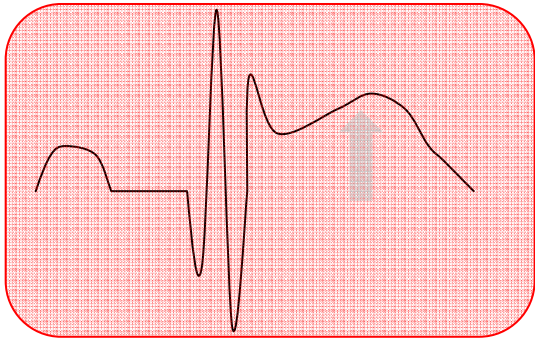
*Course contre la montre, pour la vie.  
EVITER les intermediaires  
Tél. à l' angioplasticien.*

# Delais Pour L'initiation d'une reperfusion pharmacologique ou Par angioplastie

TIME IS MUSCLE - MUSCLE IS LIVE



**EVITER LES INTERMEDIAIRES**



MYOCARDIAL INFARCTION

STEMI

MONITORING ECG.

**ECG 12 dérivations.**

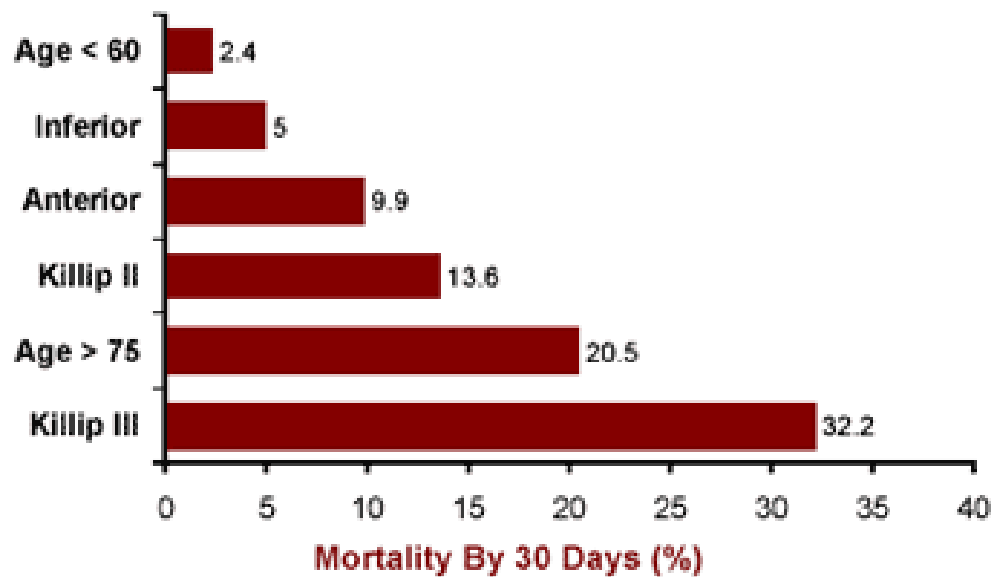
MONITOTING T.A.

MONITOTING saturation.

PERFUSION.

## Short-Term Risk of Death in STEMI Heterogeneous Mortality Risk

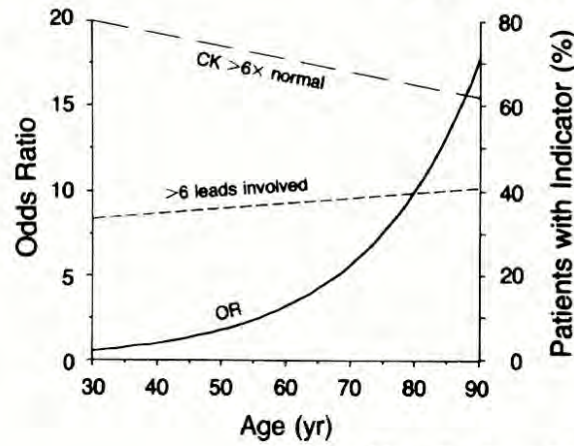
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Lee KL et al. *Circulation* 1995; 91:1659-1668.

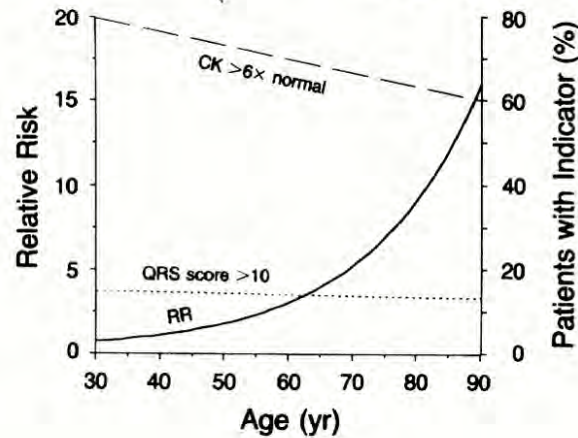


### Mortality during Hospitalization



Age	% Mortality	OR (95% CI)
≤40	1.9	1
41-45	2.2	3.7 (0.92-14.74)
46-50	2.1	2.0 (0.50-7.70)
51-55	3.1	3.1 (0.85-10.98)
56-60	3.5	3.9 (1.11-13.66)
61-65	5.8	5.3 (1.54-18.29)
66-70	10.1	8.5 (2.47-29.17)
71-75	14.7	10.1 (2.94-34.89)
76-80	18.9	12.2 (3.52-42.36)
>80	31.9	18.8 (5.30-66.80)

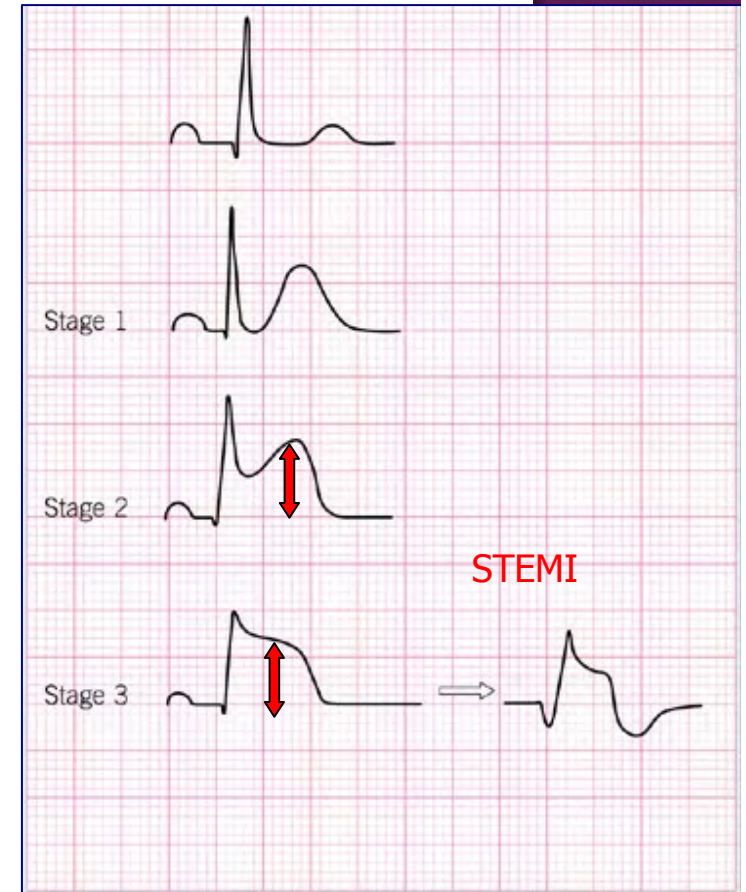
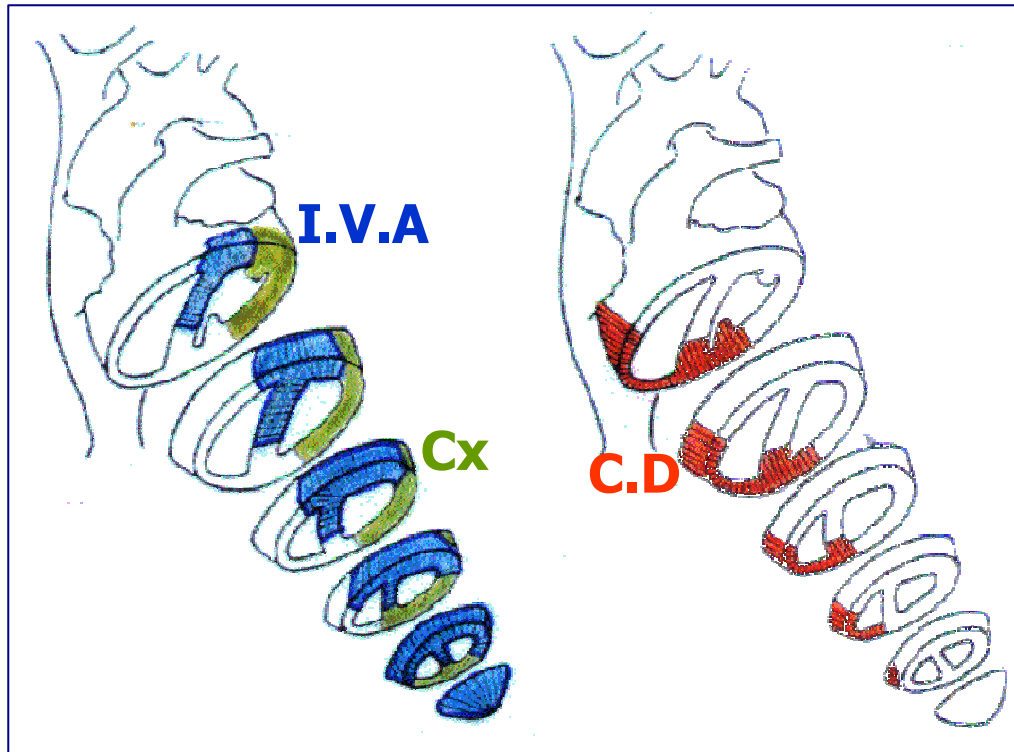
### Mortality from Discharge to 6 Months



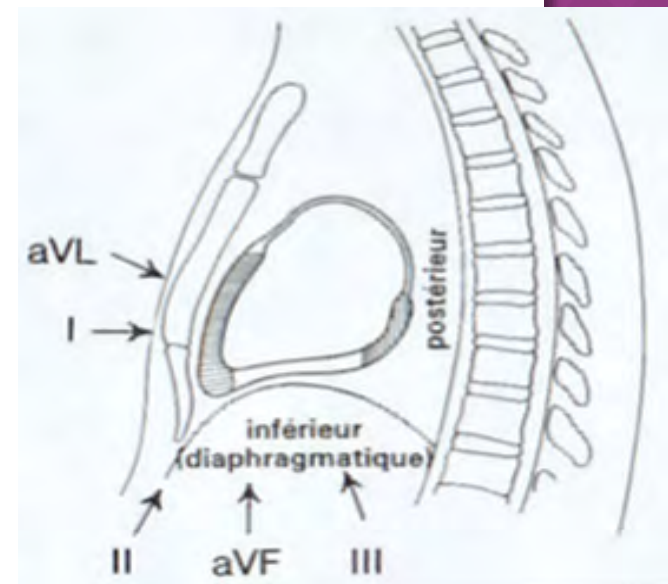
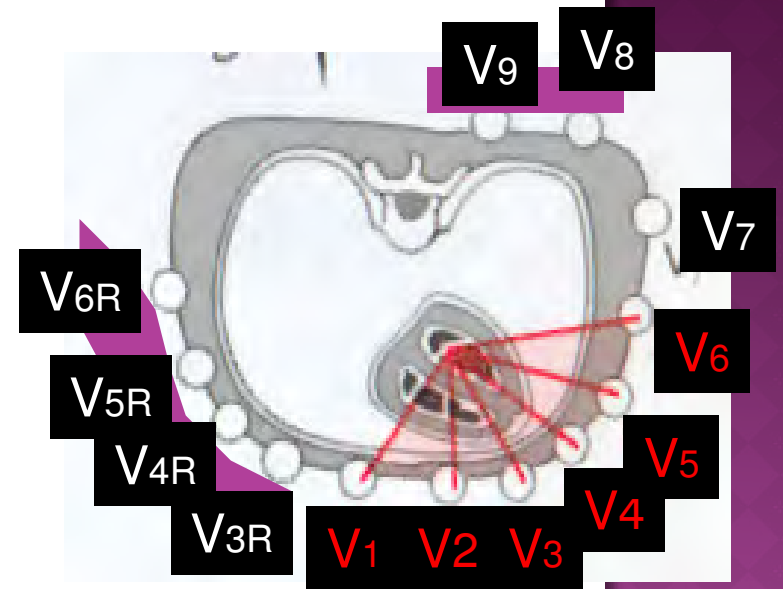
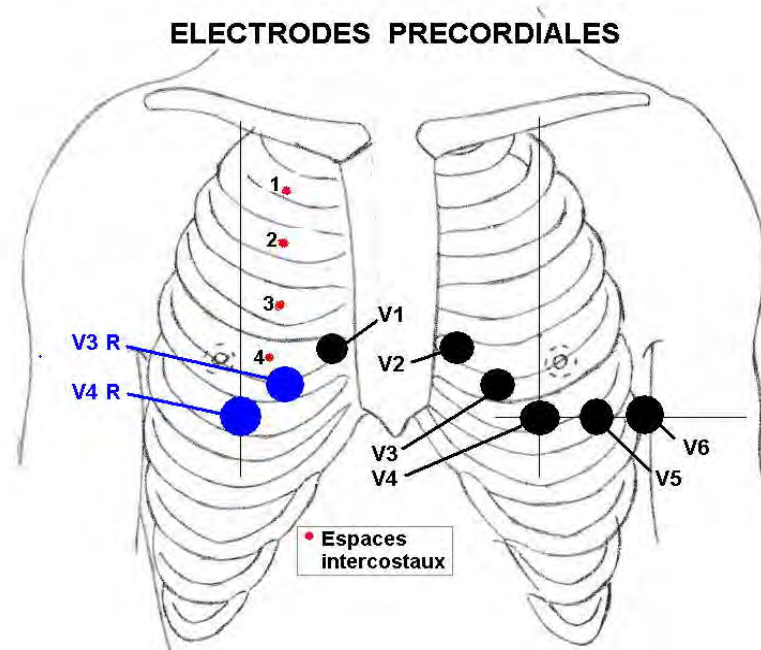
Age	% Mortality	RR (95% CI)
≤40	0.8	1
41-45	1.0	1.3 (0.31-5.53)
46-50	1.5	1.9 (0.54-6.78)
51-55	0.9	1.0 (0.27-3.73)
56-60	1.6	1.8 (0.52-6.00)
61-65	2.6	2.6 (0.79-8.52)
66-70	3.5	3.5 (1.08-11.55)
71-75	5.3	4.5 (1.38-14.77)
76-80	8.6	6.7 (2.04-22.00)
>80	11.6	9.0 (2.64-30.92)



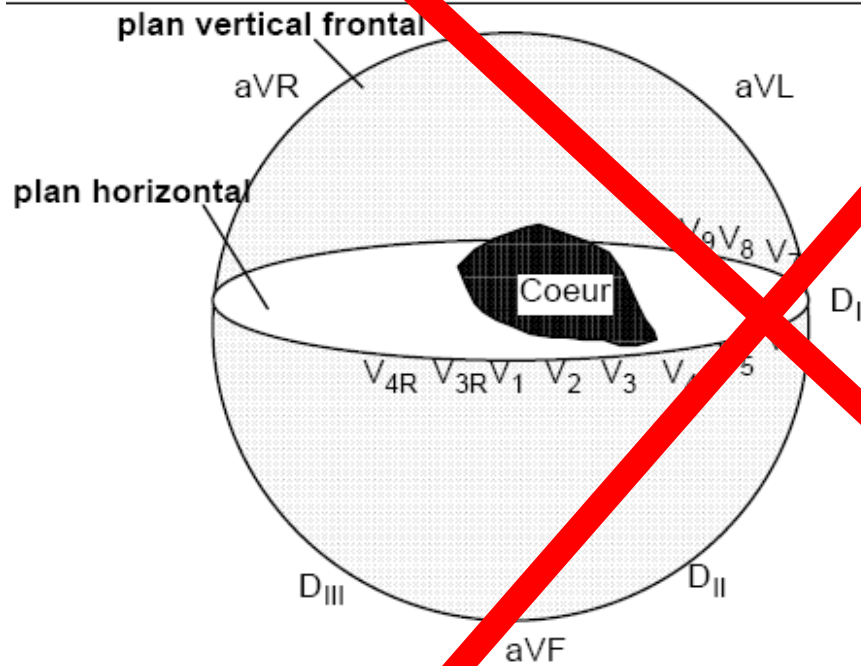
# TOPOGRAPHIE DE L'INFARCTUS.



# TOPOGRAPHIE DE L'INFARCTUS AVEC ÉLÉVATION DU SEGMENT ST: S.T.E.M.I.



## Territoire des modifications électriques



Les modifications électriques sont localisées à certaines dérivations, situées en face du territoire de l'infarctus ou recueillant des vecteurs dirigés dans la direction de la zone nécrosée. On distingue ainsi (figure ) différentes topographies d'infarctus:

- V1-V3: septum interventriculaire
- V3-V4: apex VG, souvent accompagné d'un microvoltage
- V5-V6: paroi latérale du ventricule
- V7-V9: latéro-basal. Souvent l'attention est attirée par des signes en miroir en V1-V2 (une onde Q en V7-V9 entraîne une augmentation de l'amplitude de l'onde R en V1-V2)
- D2,D3,VF: paroi inférieure
- D1,VL: latéral haut

**En SMUR les 12 dérivations sont suffisants**

↑ **ST** Dérivations: D<sub>II</sub>, D<sub>III</sub>, aVf

**STEMI Inférieur: CD, Cx**

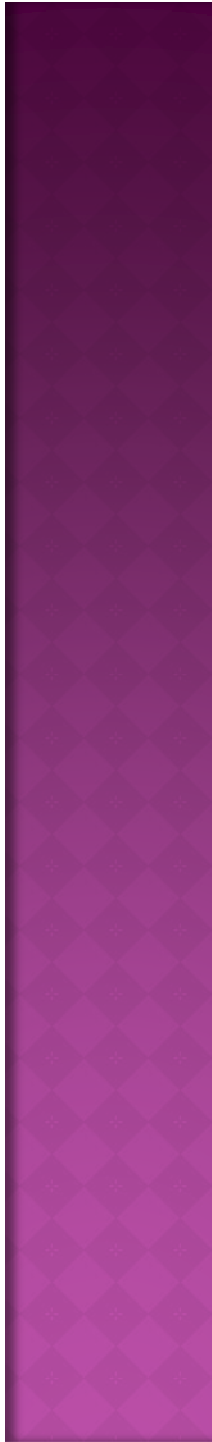
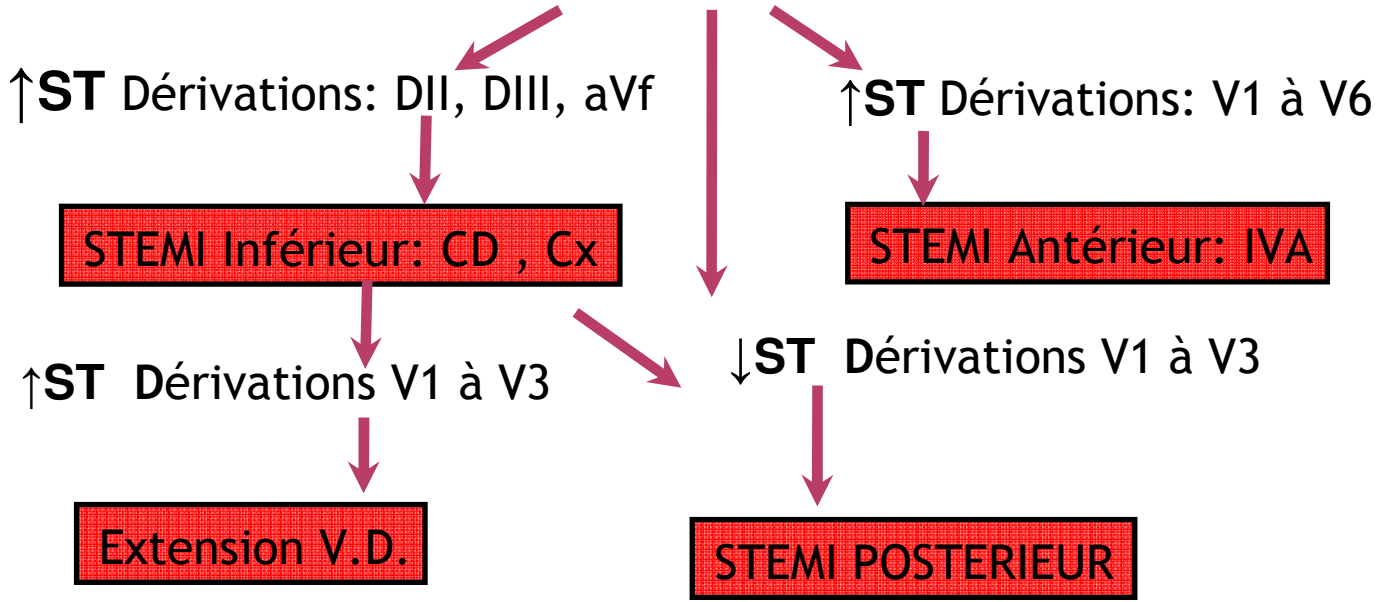
↑ **ST** Dérivations: V<sub>1</sub> à V<sub>6</sub>

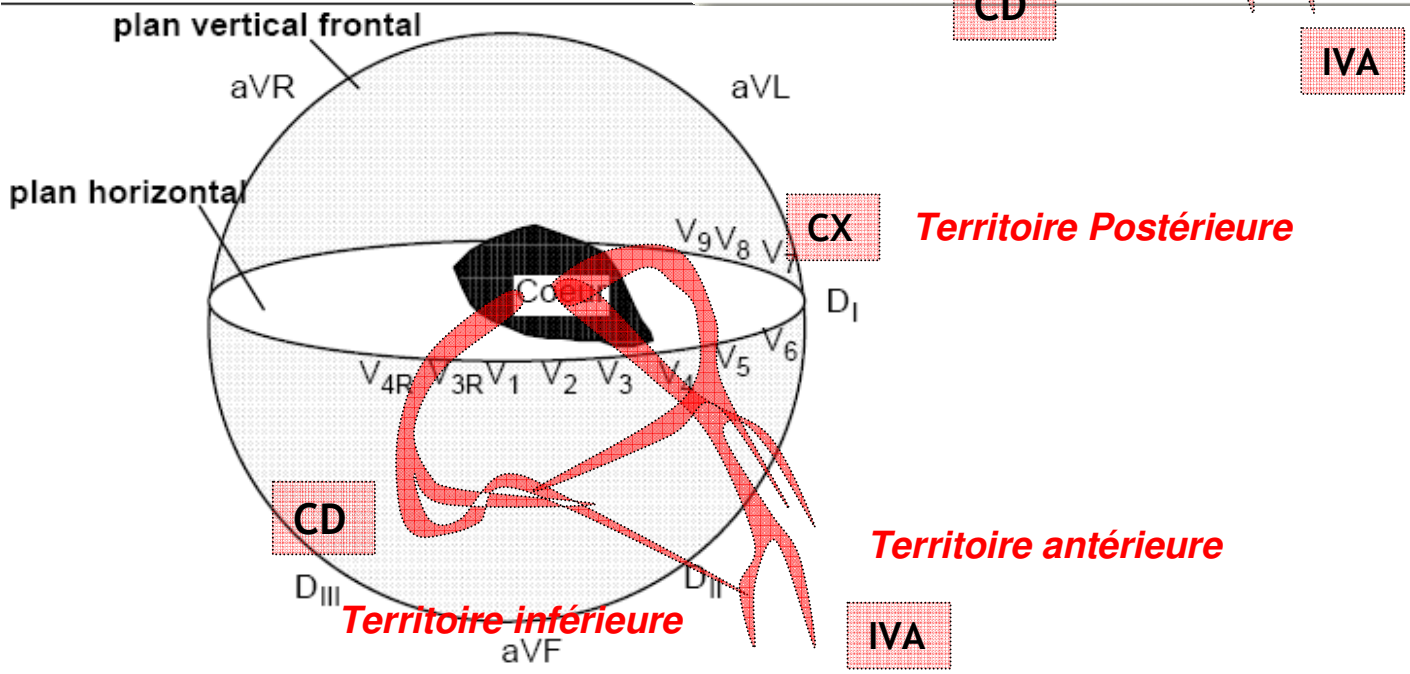
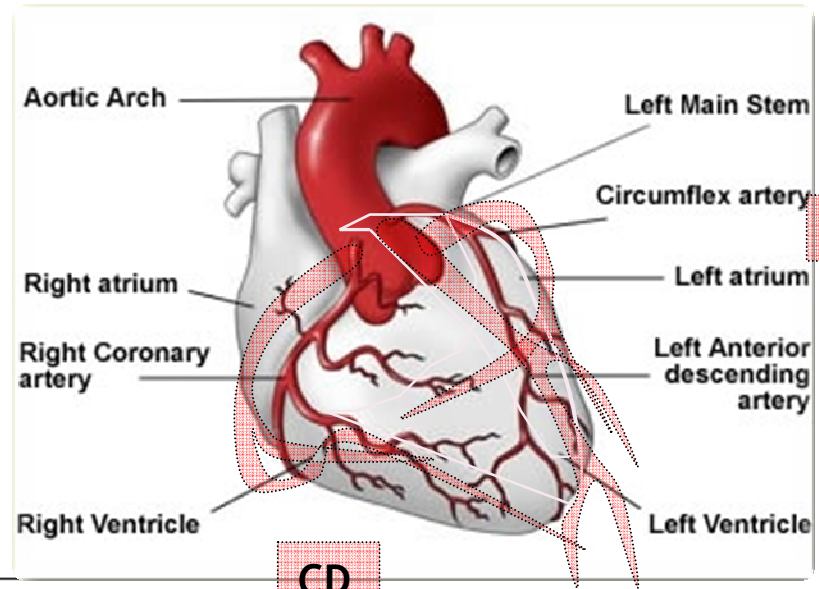
**STEMI Antérieur: IVA**

**REGARDEZ V<sub>1</sub> à V<sub>3</sub>**



**En SMUR les 12 dérivations sont suffisants**





**En SMUR les 12 dérivations sont suffisants**

↑**ST** Dérivations: DII, DIII, aVf

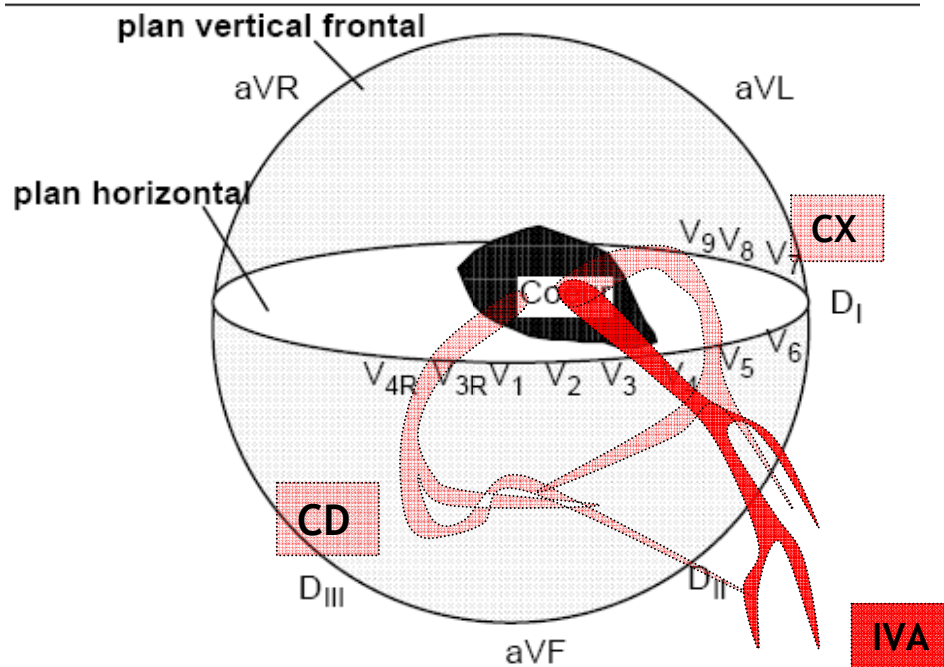
STEMI Inférieur: CD , Cx

↑**ST** Dérivations: V1 à V6

STEMI Antérieur: IVA

↓**ST** Dérivations V1 à V3

STEMI POSTERIEUR



**En SMUR les 12 dérivations sont suffisants**

↑ **ST** Dérivations: DII, DIII, aVf

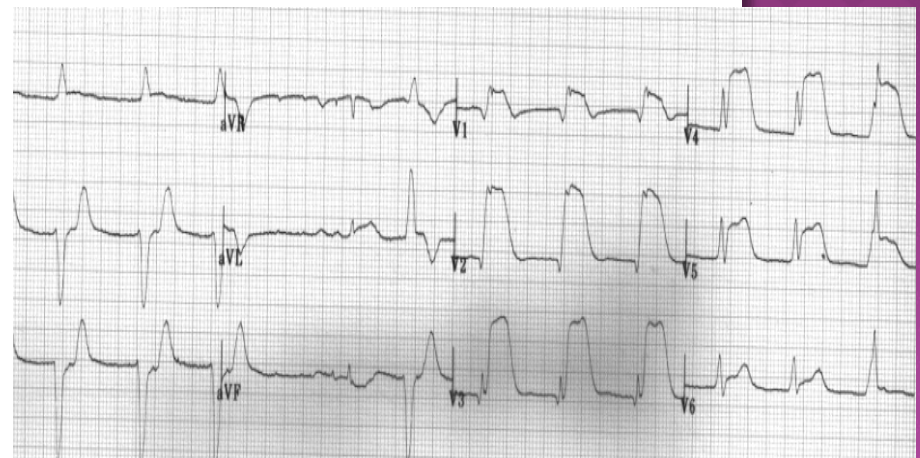
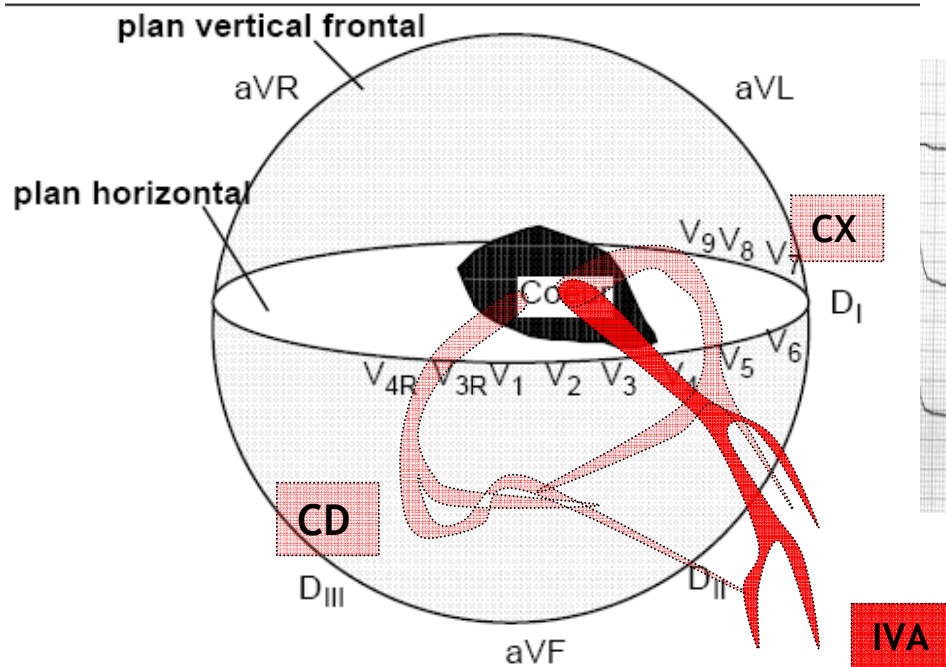
**STEMI Inférieur: CD, Cx**

↑ **ST** Dérivations: V1 à V6

**STEMI Antérieur: IVA**

↓ **ST** Dérivations V1 à V3

**STEMI POSTERIEUR**





**En SMUR les 12 dérivations sont suffisants**

**↑ST** Dérivations: DII, DIII, aVf

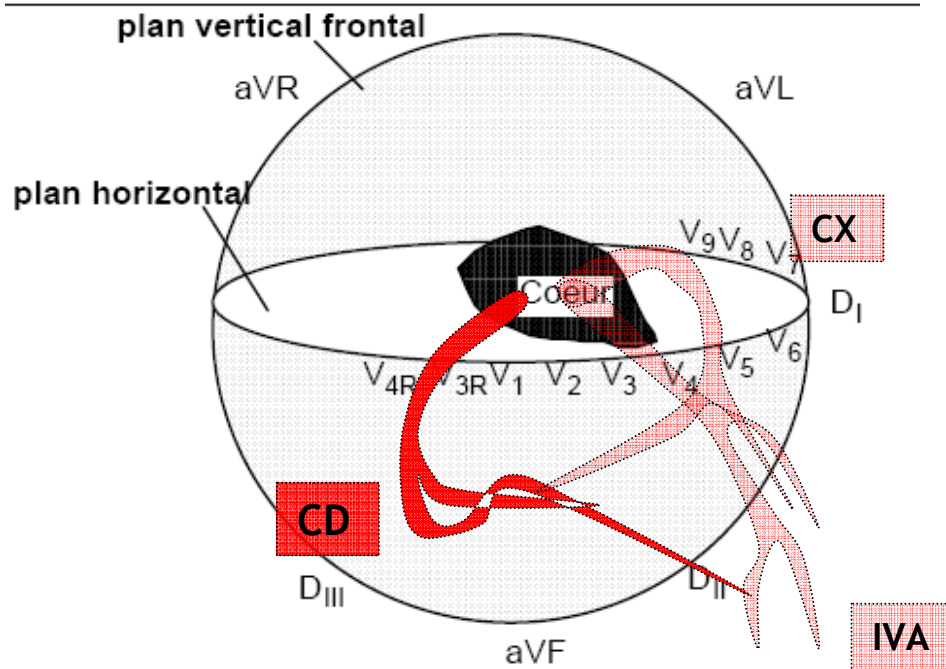
**STEMI Inférieur: CD, Cx**

**↑ST** Dérivations: V1 à V6

**STEMI Antérieur: IVA**

**↓ST** Dérivations V1 à V3

**STEMI POSTERIEUR**



**En SMUR les 12 dérivations sont suffisants**

↑ST Dérivations: DII, DIII, aVf

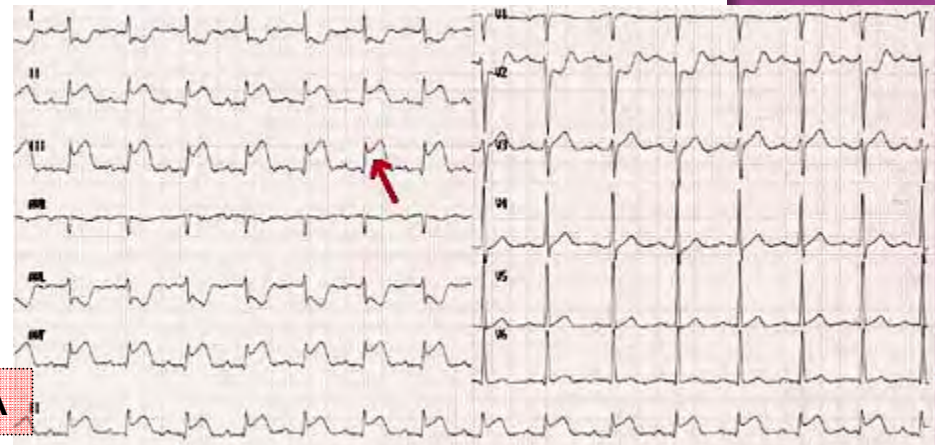
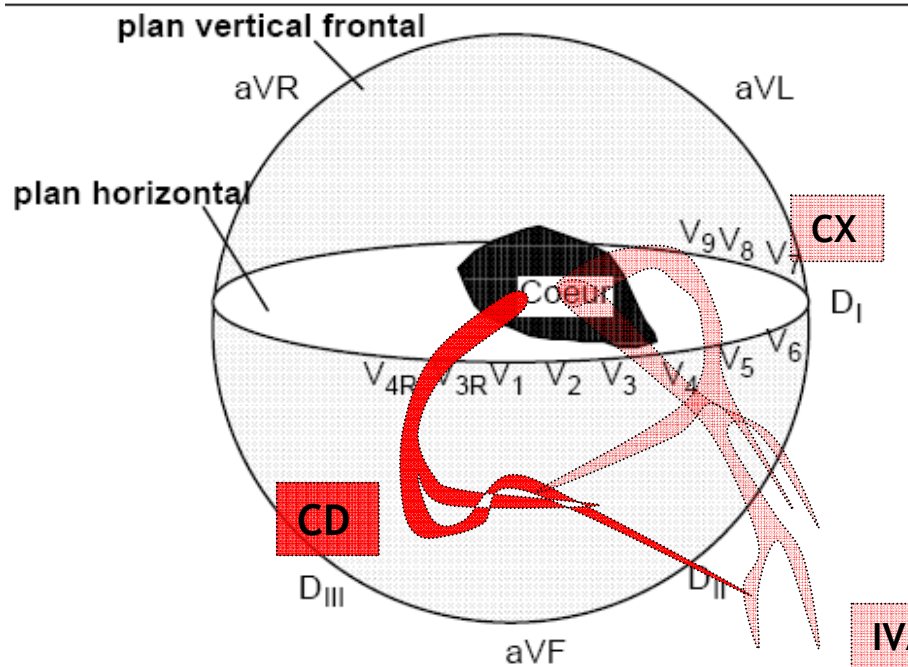
**STEMI Inférieur: CD, Cx**

↑ST Dérivations: V1 à V6

**STEMI Antérieur: IVA**

↓ST Dérivations V1 à V3

**STEMI POSTERIEUR**



**En SMUR les 12 dérivations sont suffisants**

**↑ST Dérivations: DII, DIII, aVf**

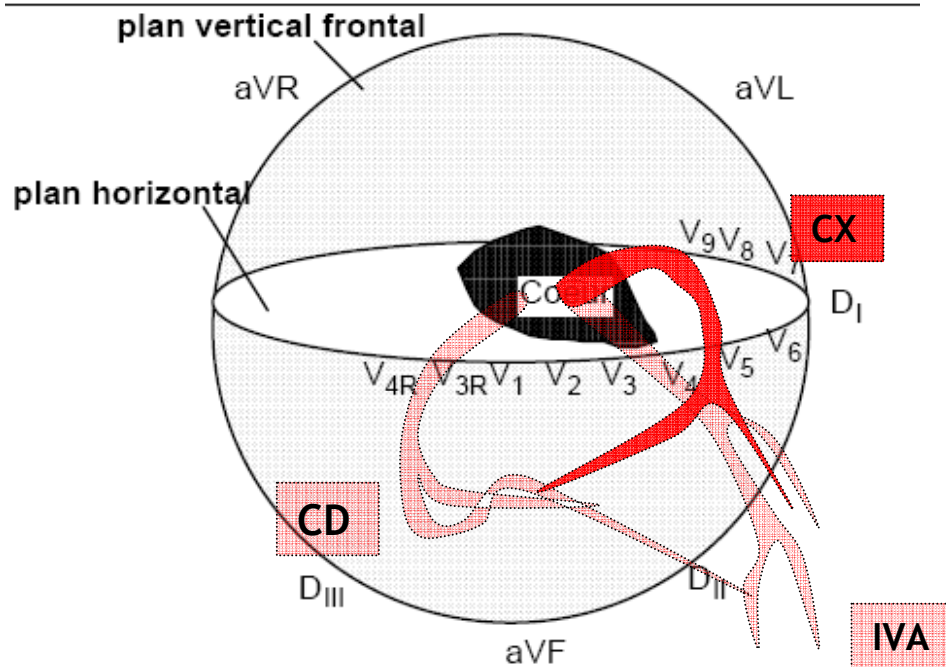
**STEMI Inférieur: CD, Cx**

**↑ST Dérivations: V1 à V6**

**STEMI Antérieur: IVA**

**↓ST Dérivations V1 à V3**

**STEMI POSTERIEUR**



**En SMUR les 12 dérivations sont suffisants**

**↑ST Dérivations: DII, DIII, aVf**

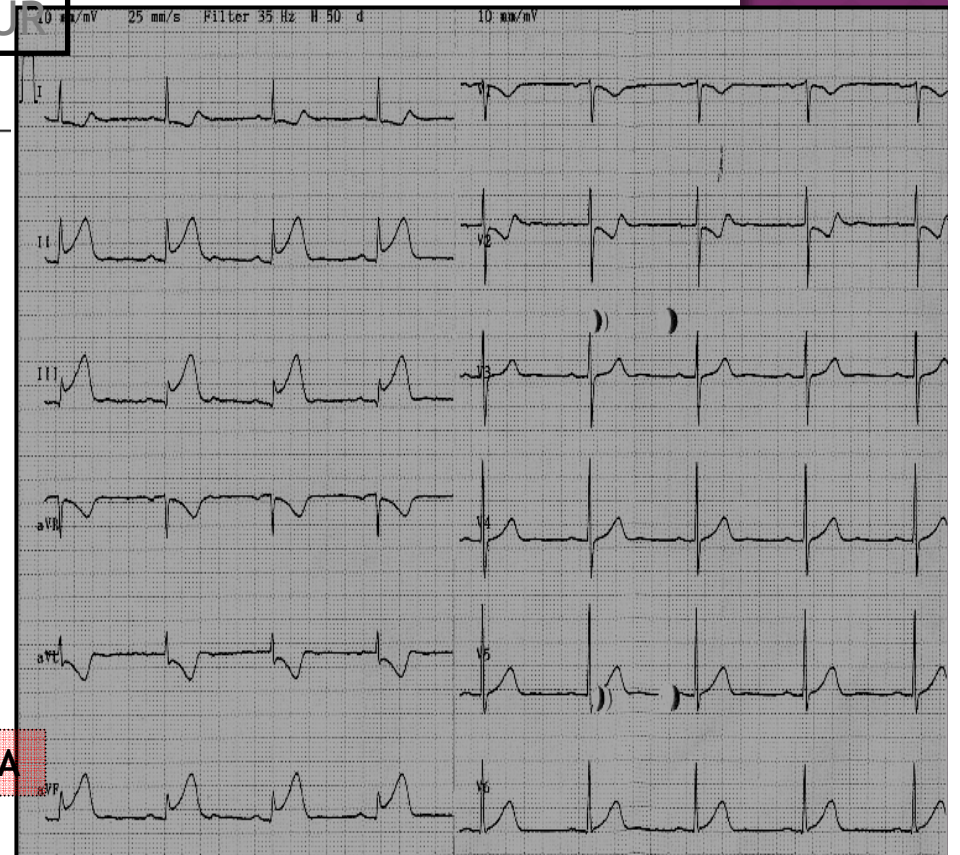
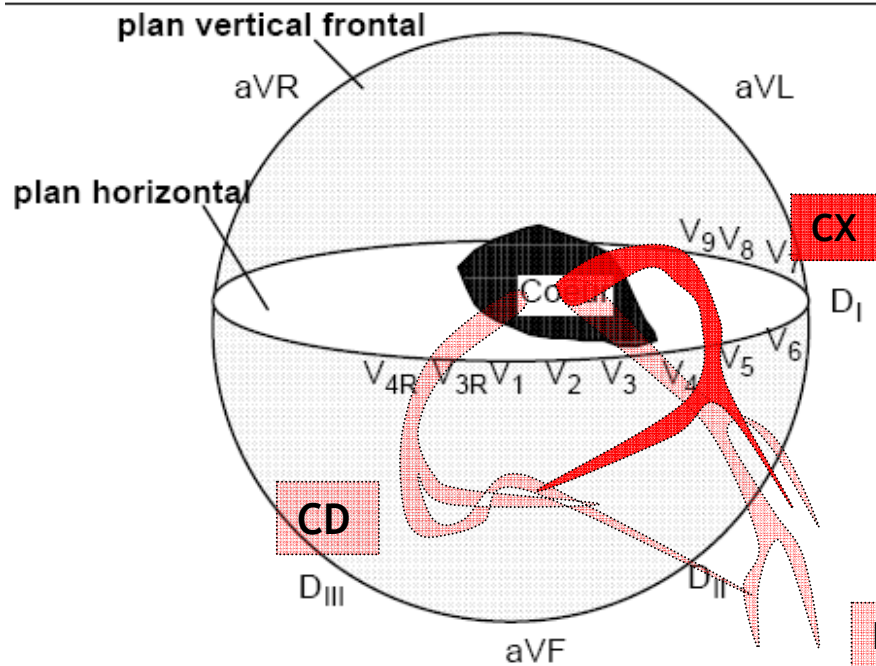
**STEMI Inférieur: CD, Cx**

**↑ST Dérivations: V1 à V6**

**STEMI Antérieur: IVA**

**↓ST Dérivations V1 à V3**

**STEMI POSTERIEUR**





**En SMUR les 12 dérivations sont suffisants**

↑**ST** Dérivations: DII, DIII, aVf

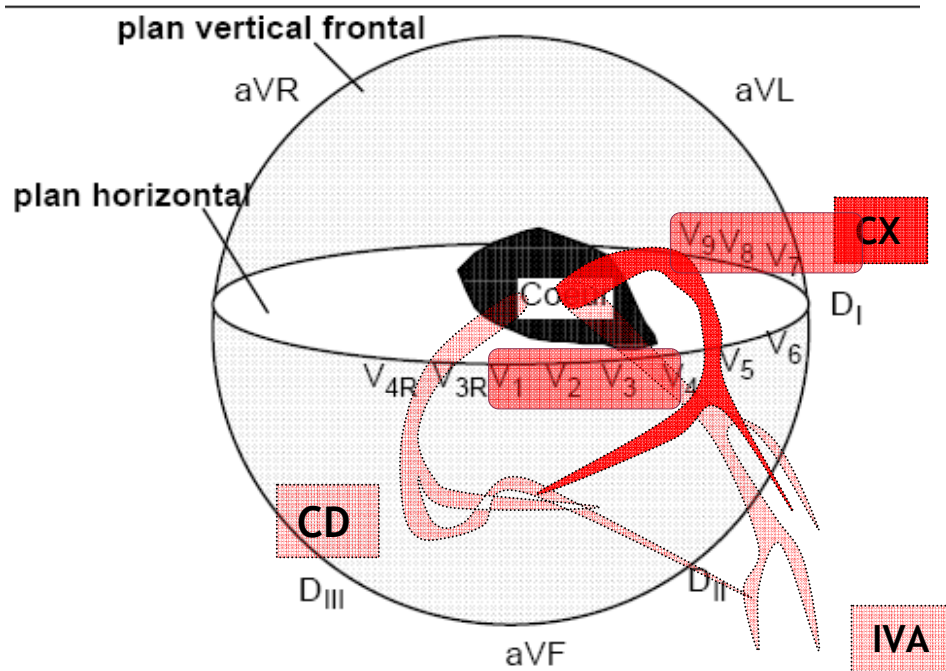
STEMI Inférieur: CD , Cx

↑**ST** Dérivations: V1 à V6

STEMI Antérieur: IVA

↓**ST** Dérivations V1 à V3

**STEMI POSTERIEUR**



**En SMUR les 12 dérivations sont suffisants**

↑ST Dérivations: DII, DIII, aVf

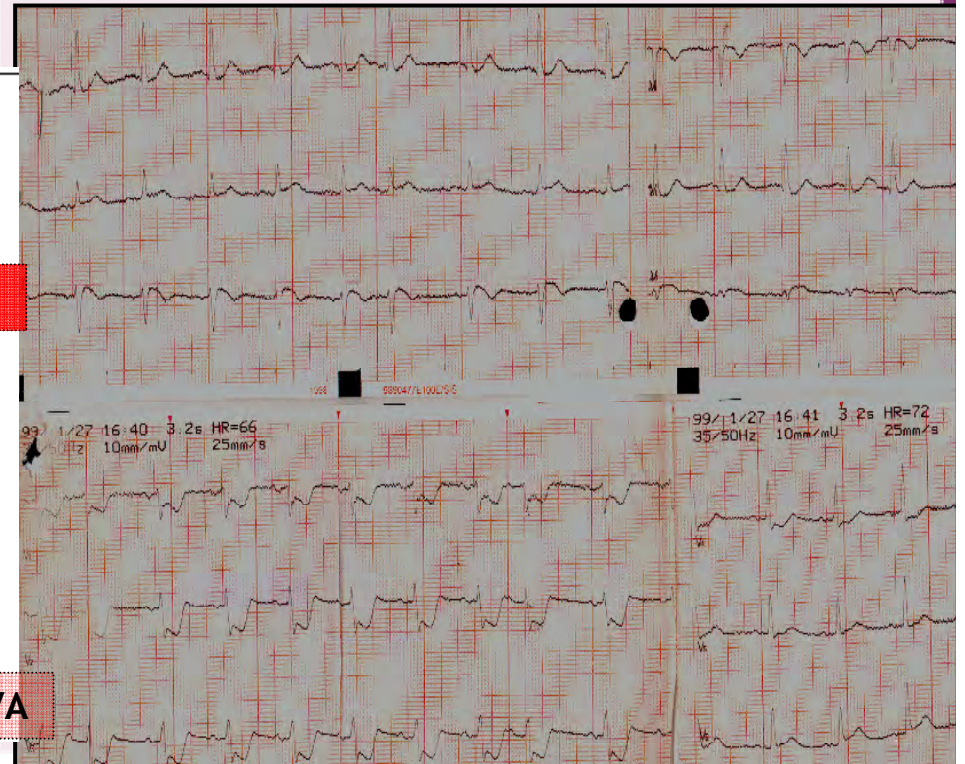
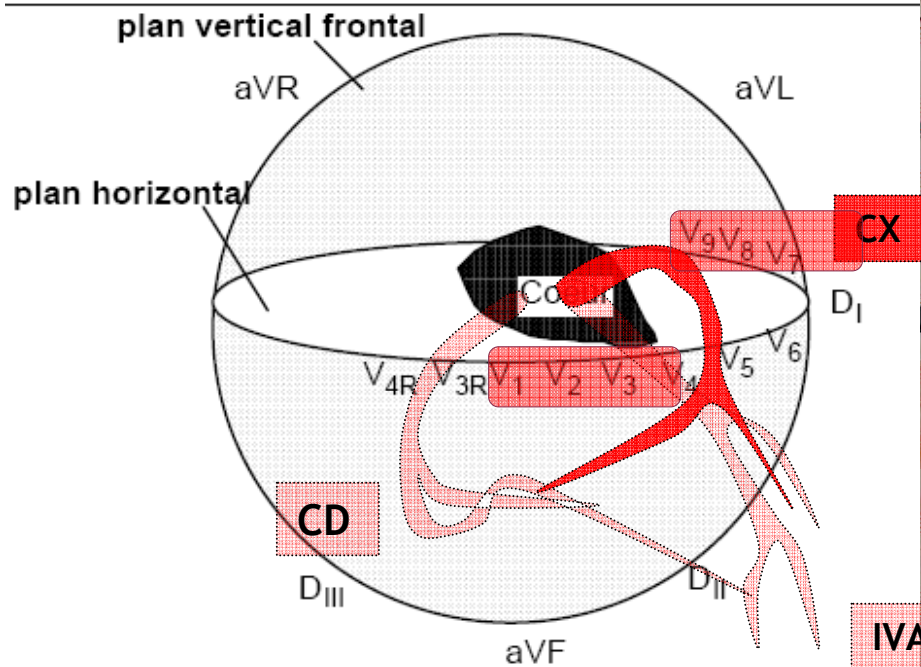
↑ST Dérivations: V1 à V6

STEMI Inférieur: CD, Cx

STEMI Antérieur: IVA

↓ST Dérivations V1 à V3

**STEMI POSTERIEUR**





**En SMUR les 12 dérivations sont suffisants**

**↑ST Dérivations: DII, DIII, aVf**

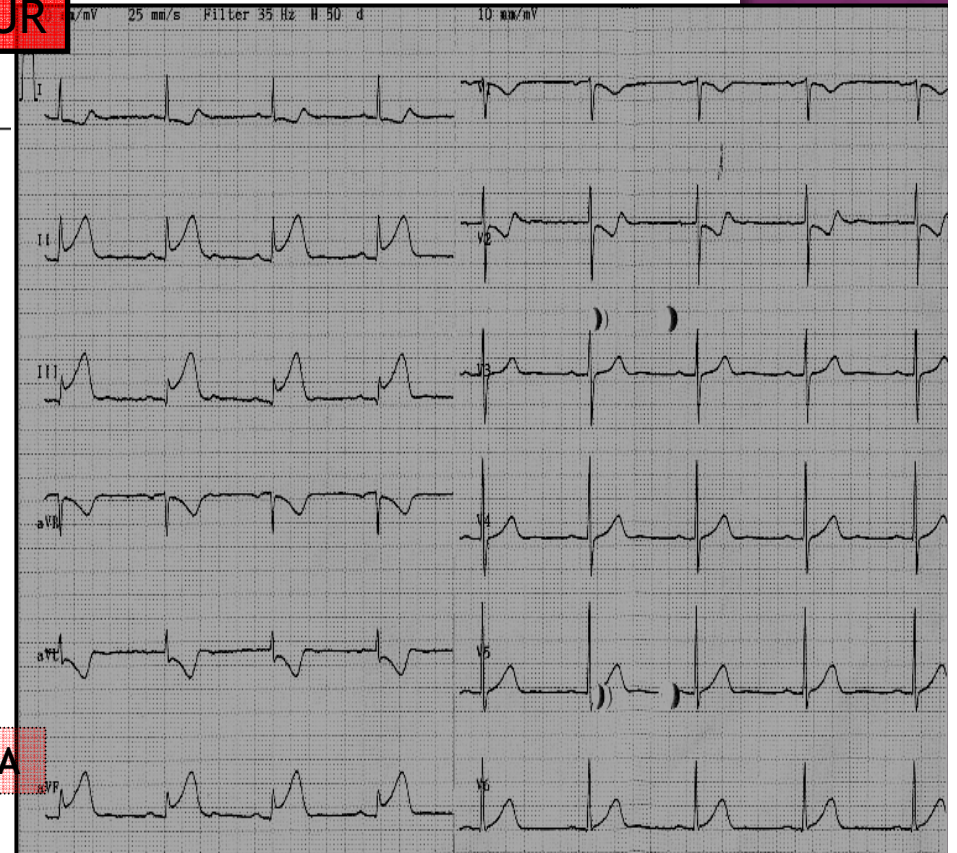
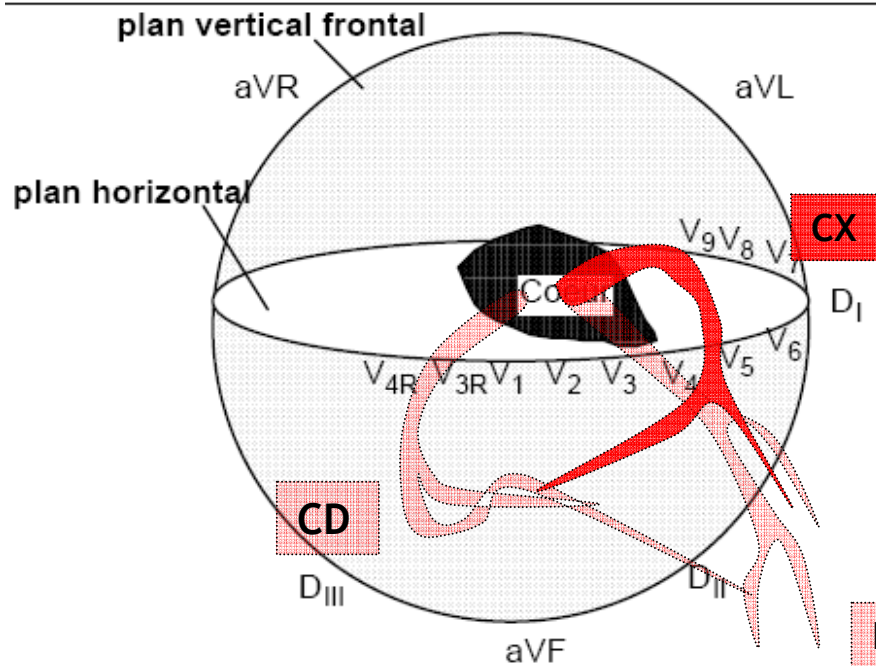
**↑ST Dérivations: V1 à V6**

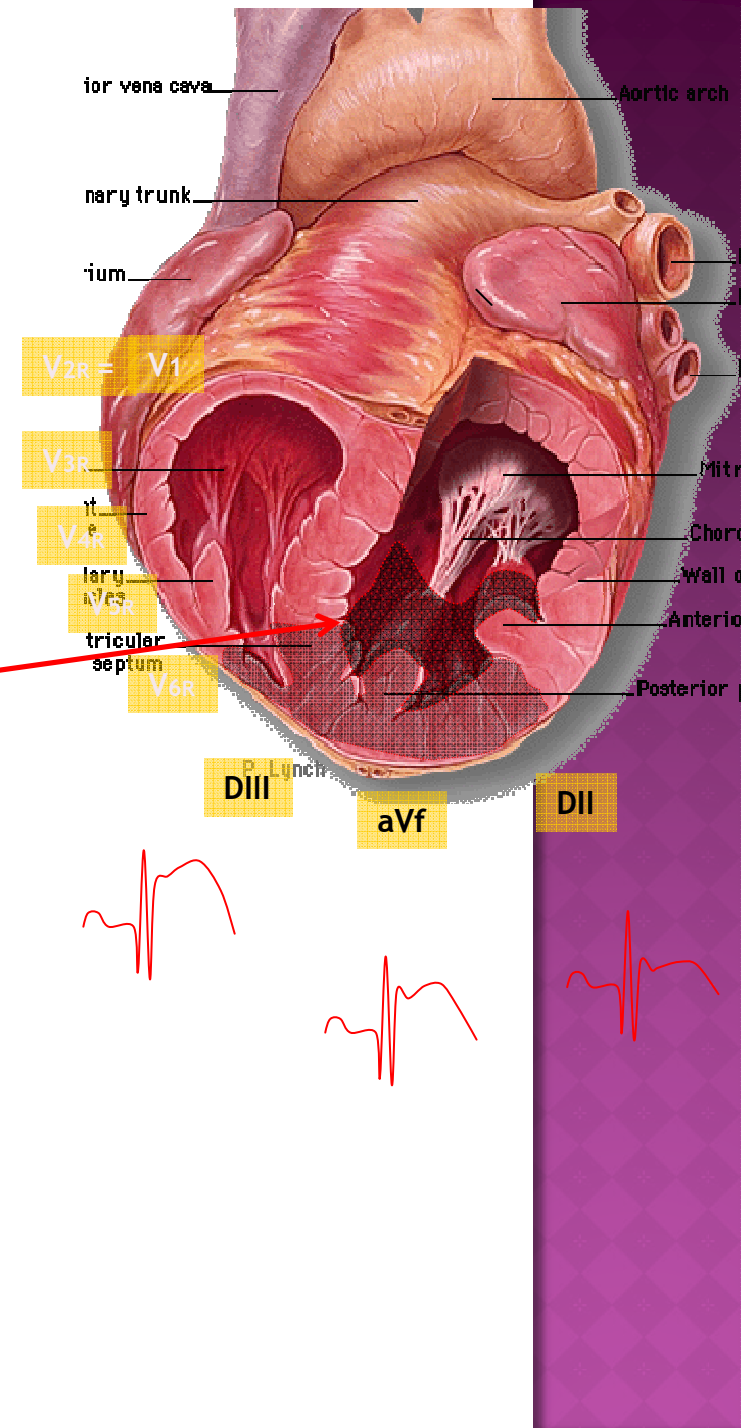
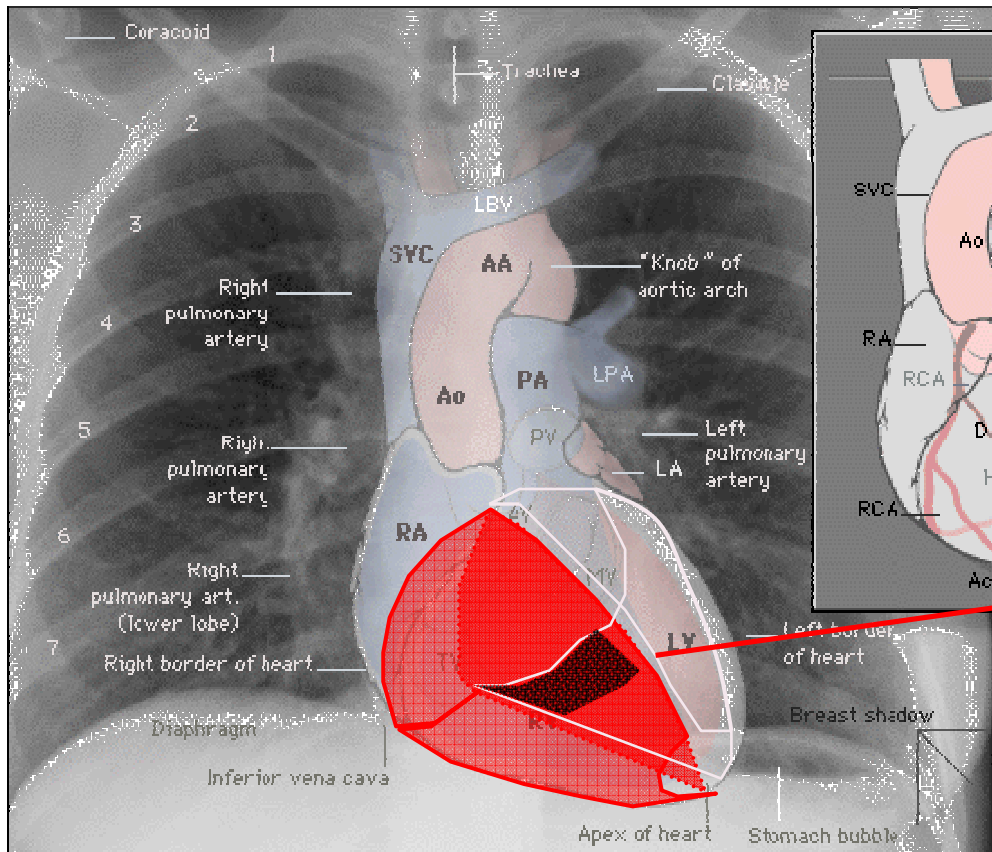
**STEMI Inférieur: CD, Cx**

**STEMI Antérieur: IVA**

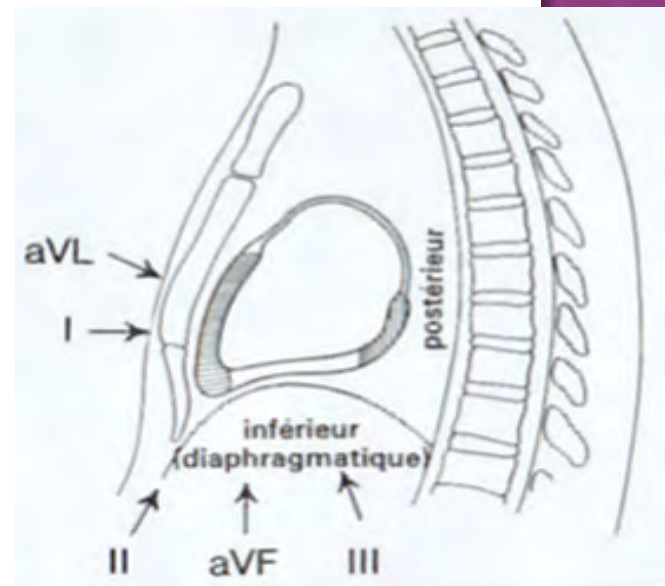
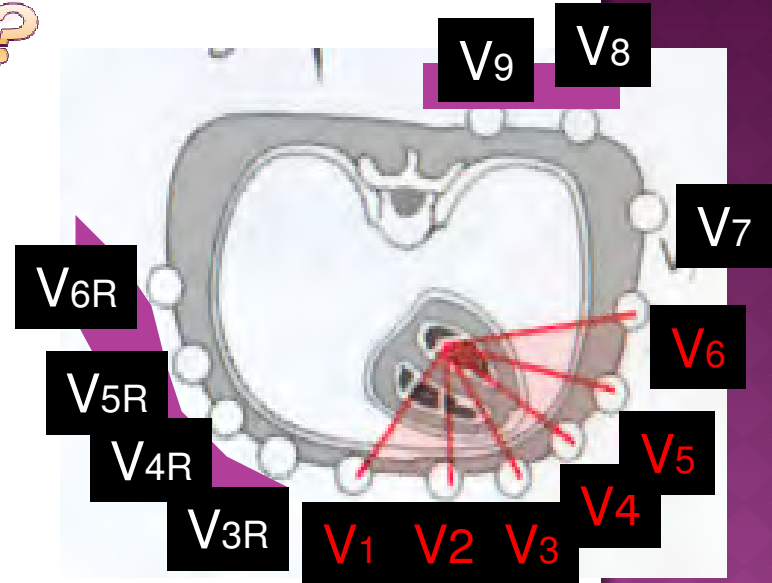
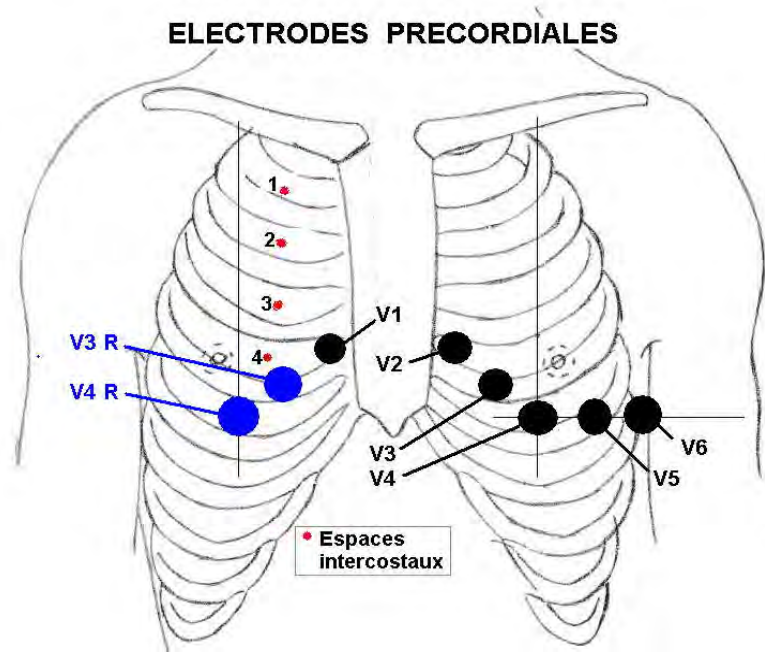
**↓ST Dérivations V1 à V3**

**STEMI POSTERIEUR**





# DÉRIVATION DROITE?





**En SMUR les 12 dérivations sont suffisants**

**↑ST Dérivations: DII, DIII, aVf**

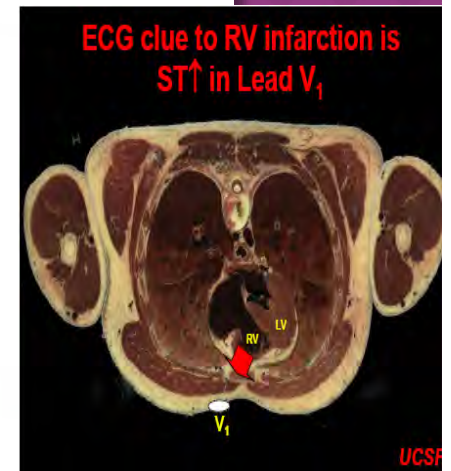
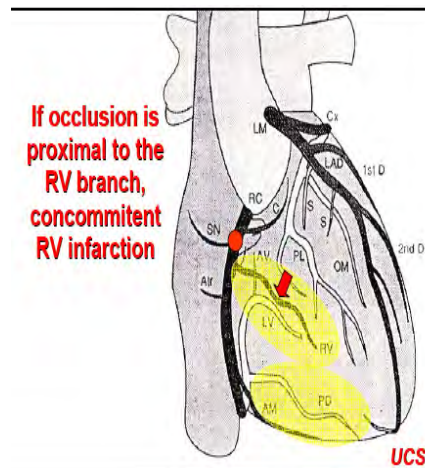
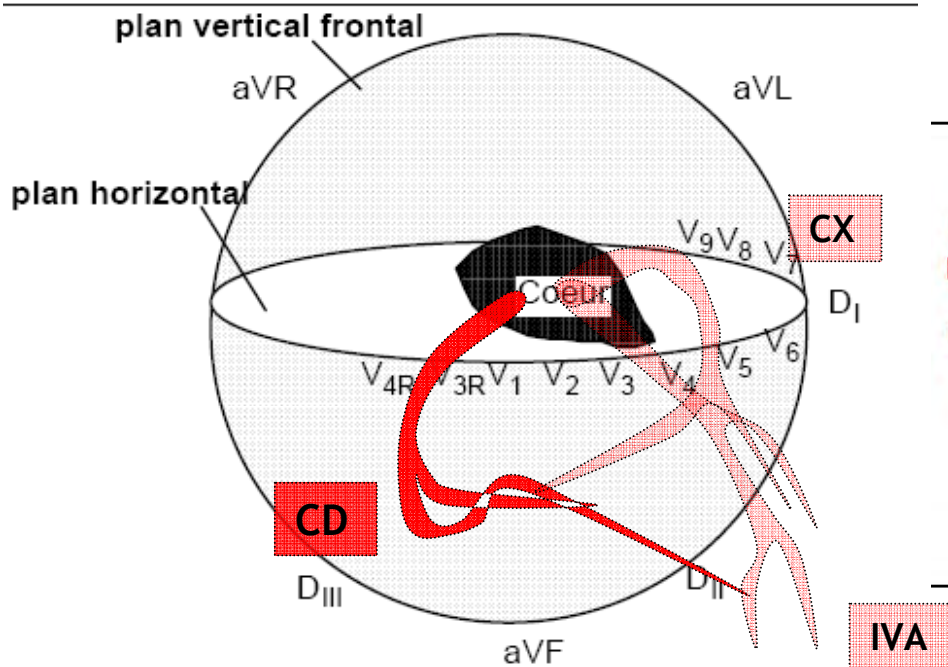
**STEMI Inférieur: CD, Cx**

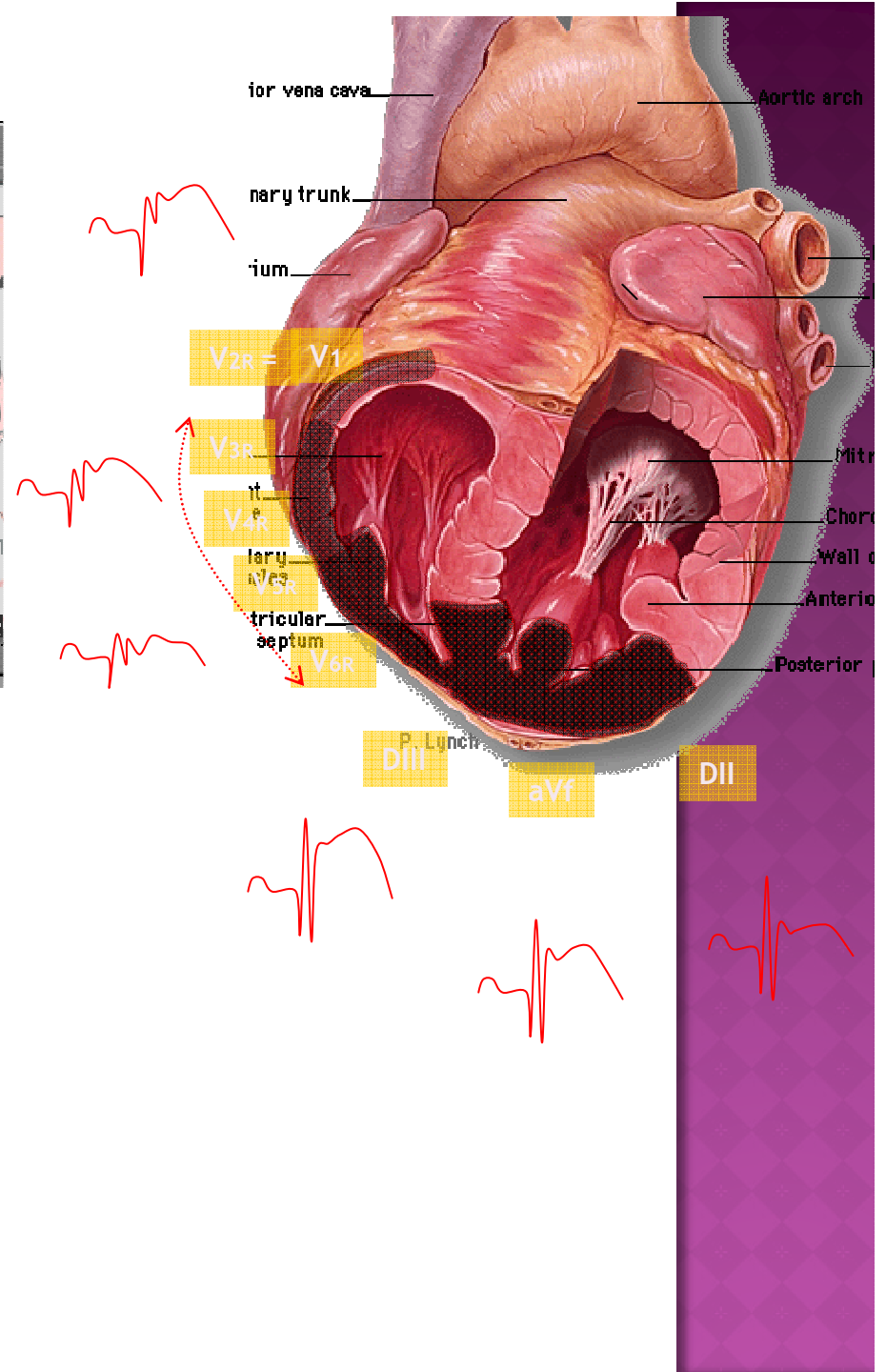
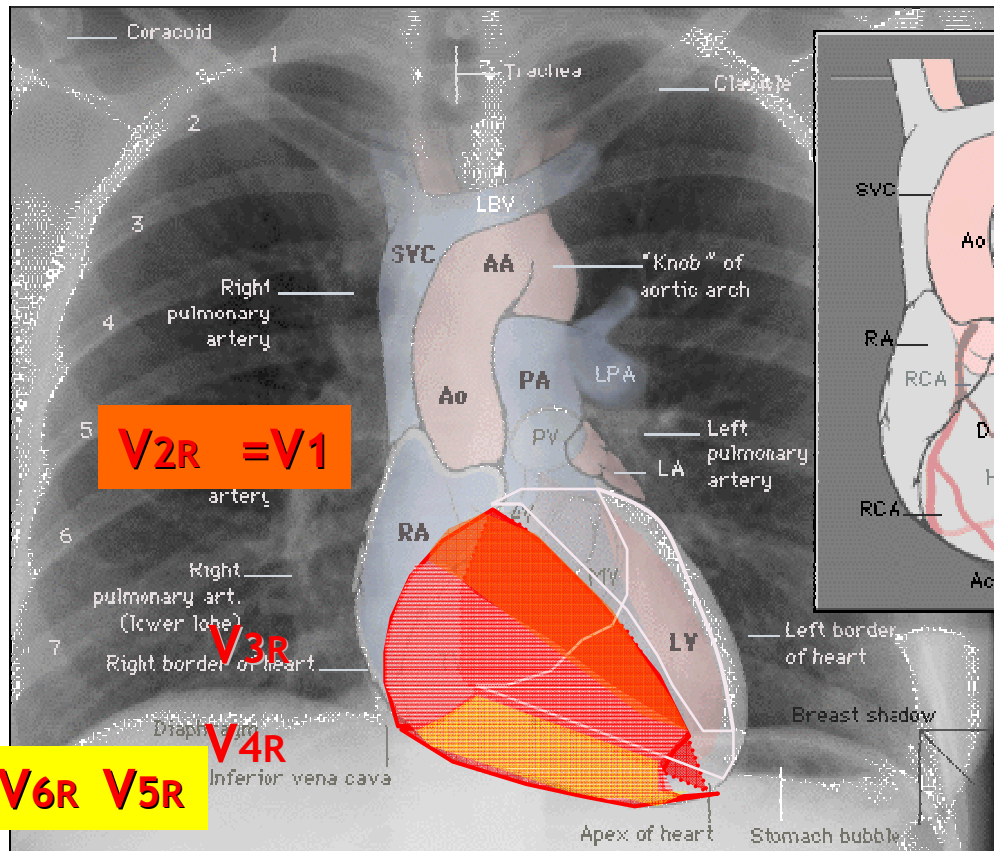
**↑ST Dérivations: V1 à V6**

**STEMI Antérieur: IVA**

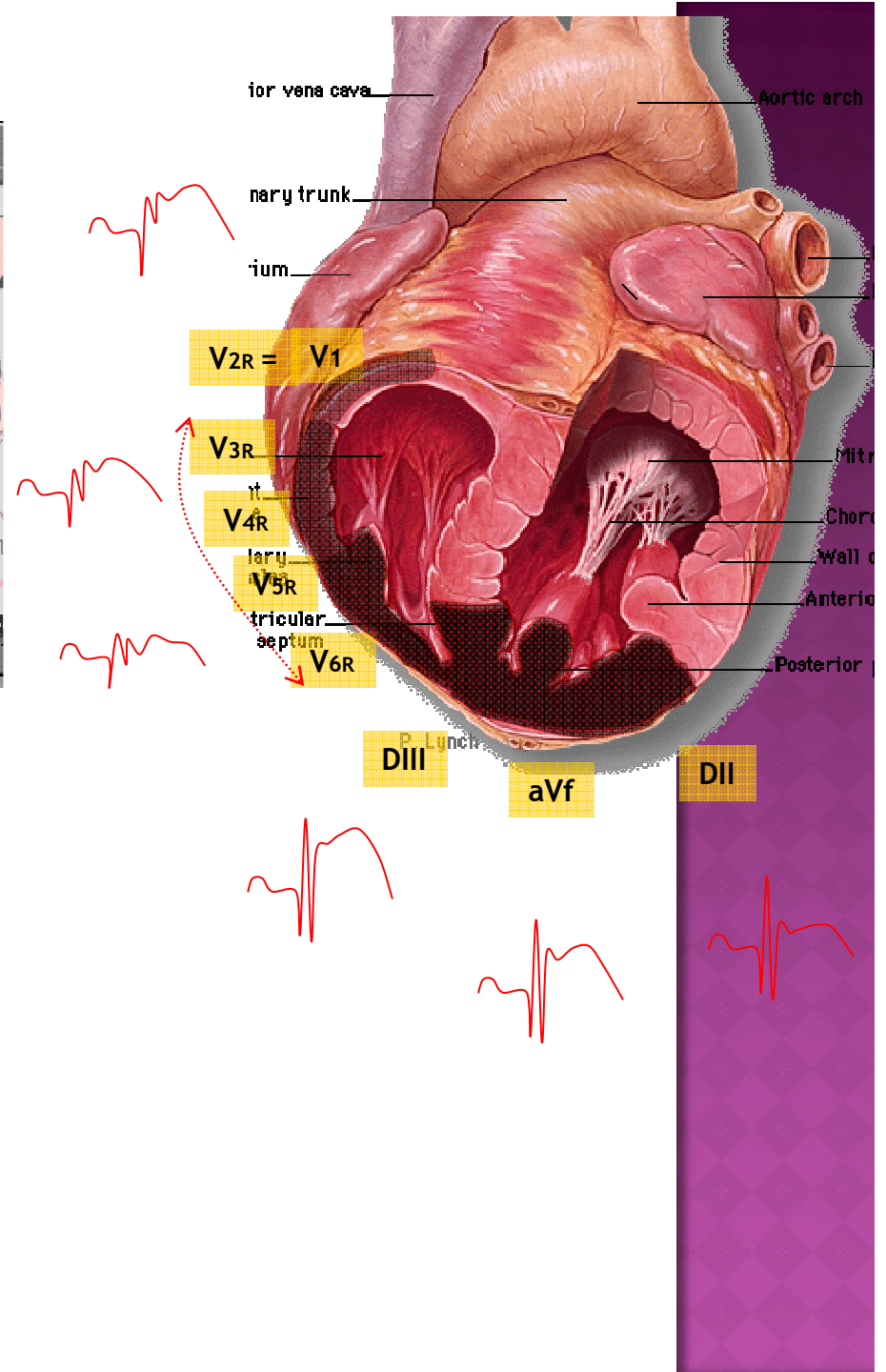
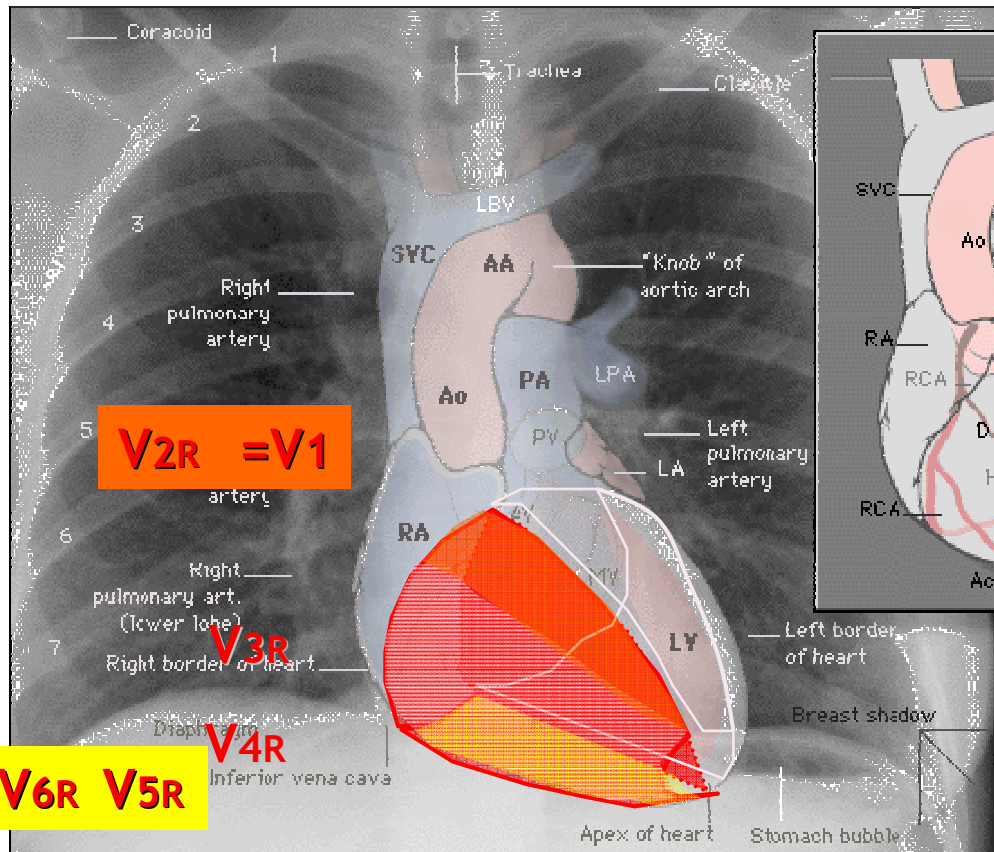
**↑ST Dérivations V1 à V3**

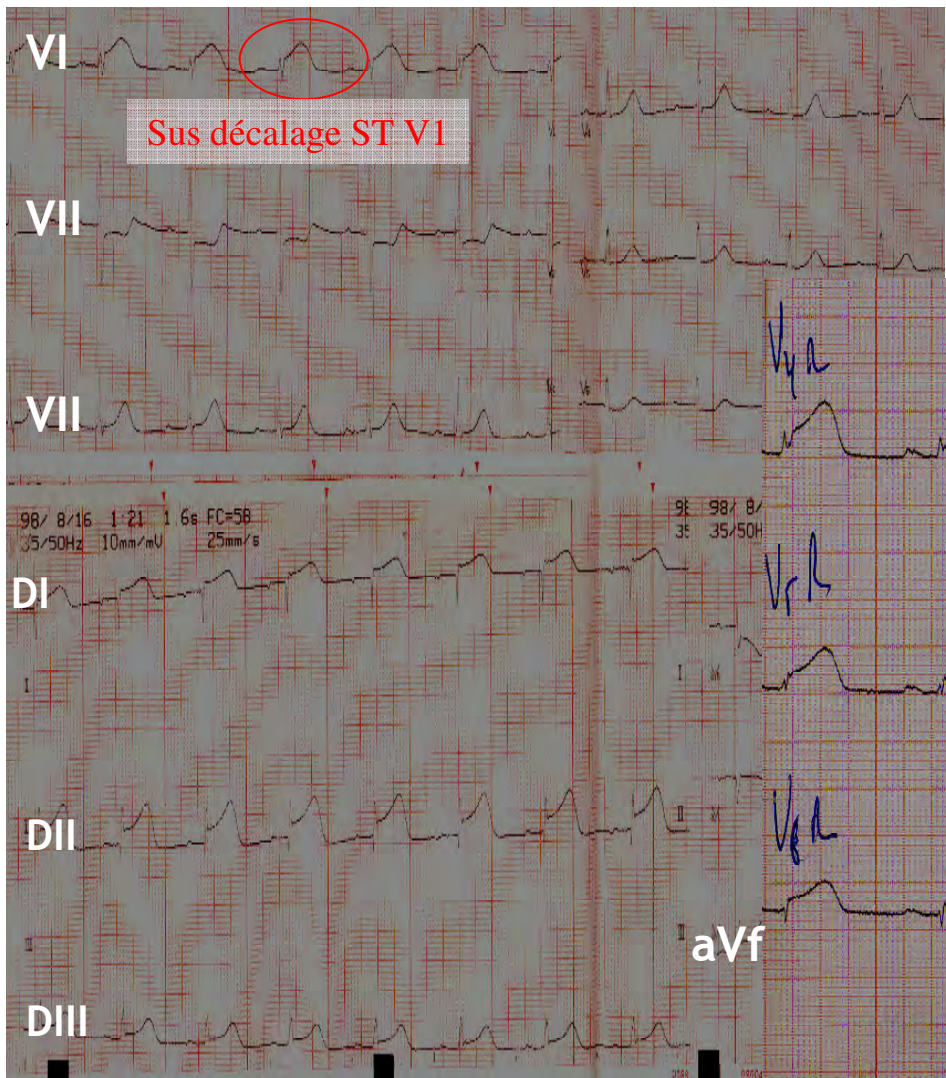
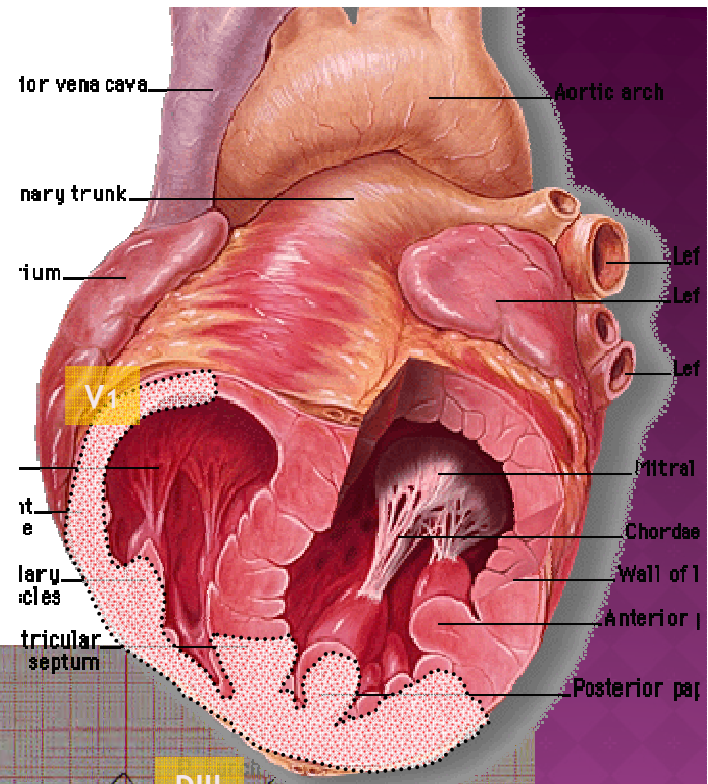
**EXTENSION Ventriculaire Droite**





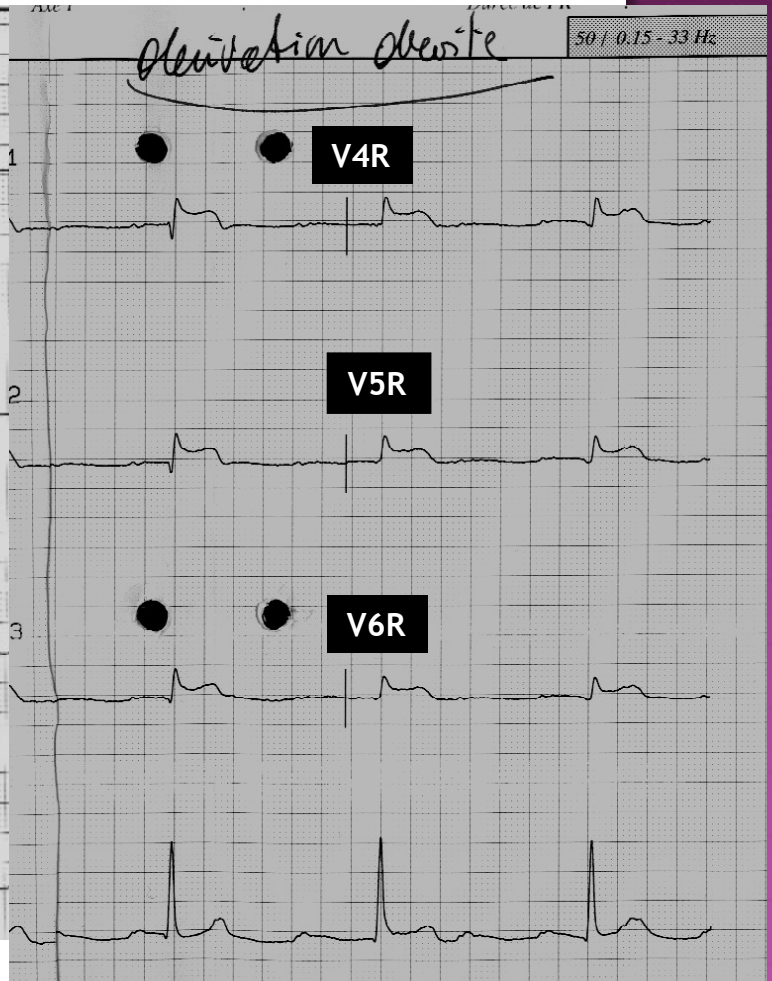
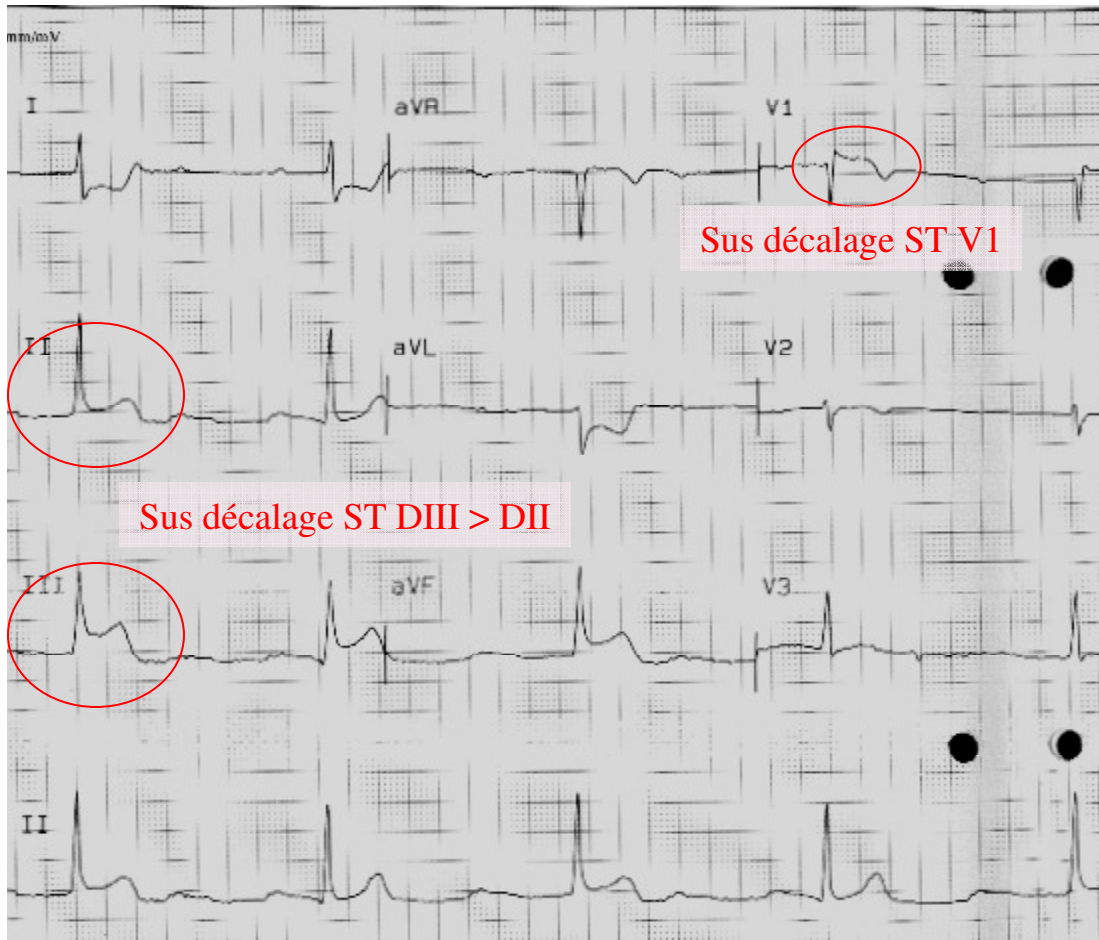






DIII  
aVf  
DII





En SMUR les 12 dérivations sont suffisants

*Dérivations DII, DIII, aVf*

*Dérivations V1 à V6*

STEMI Inférieur: CD , Cx

STEMI Antérieur: IVA

↑**ST** Dérivations: DII, DIII, aVf

↑**ST** Dérivations: V1 à V6

↑**ST** DIII > DII: CD

STEMI Inférieur+ extension VD

↑**ST** Dérivations: DII, DIII, aVf +

↑**ST** Dérivations V1 à V3

STEMI Inférieur+ extension post

↑**ST** Dérivations: DII, DIII, aVf +

↓**ST** Dérivations V1 à V3

STEMI POSTERIEUR

↓**ST** Dérivations V1 à V3

**ST elevation STEMI**

**TIME IS MUSCLE - MUSCLE IS LIVE**

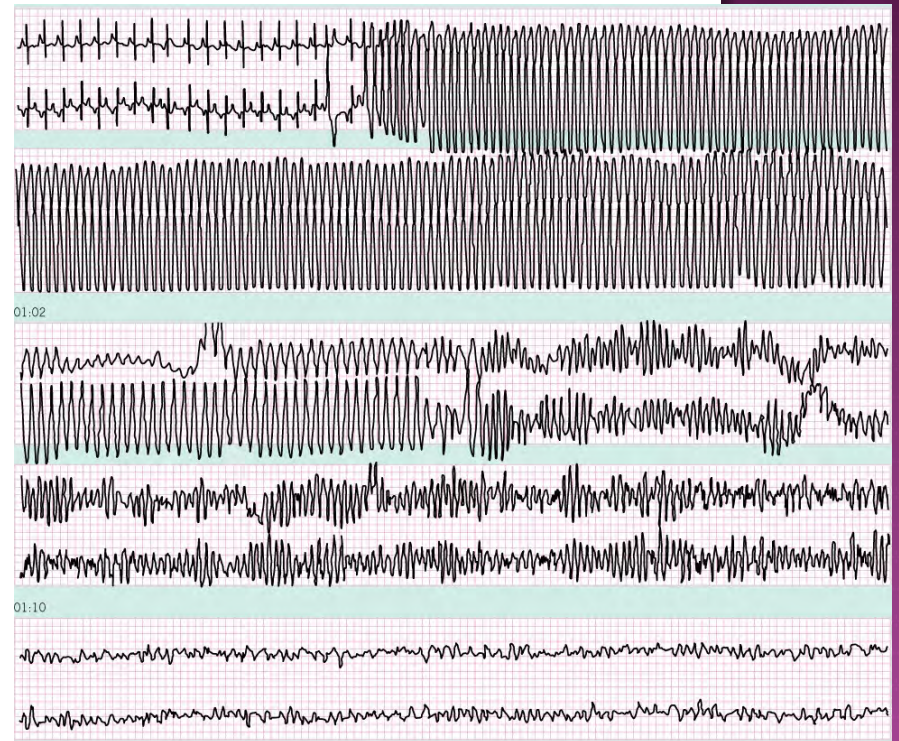


*Course contre la montre, pour la vie.  
EVITER les intermediaires  
Tél. à l' angioplasticien.*





Les internistes et cardiologues.  
L' interne, PG méd. Interne; PG unité  
Coronaire et ...enfin l' angioplasticien



Très malade!!!

Le MALADE

Supprimer les intermédiaires, allez directement au BUT.

# MANAGEMENT OF ACUTE MYOCARDIAL INFARCTION STEMI



**MONITORING ECG.**

ECG 12 dérivations.

**MONITOTING T.A.**

MONITOTING saturation.

**PERFUSION IV** bras gche.

## *Aims:*

- *to prevent death*
- *to minimise patient's discomfort and distress*
- *to limit the extent of myocardial damage*

## *Strategy:*

- Re-establish myocardial reperfusion before irreversible damage occurs:
  - *mechanically (percutaneous coronary intervention)*
  - *pharmacologically (induction of thrombolysis by fibrinolytic agent)*

MONITORING E.C.G., T.A. indispensable

### COMPLICATION ELECTRIQUE:

*Bradycardie: STEMI inf. fqt.*

*FA*

*TV, FV, phénomène R/T.: fqt tout type de STEMI*

### COMPLICATION MECANIQUE:

*Rupture Septum interventriculaire: STEMI antérieur*

*Rupture pilier Mitrale: STEMI Postérieur*

*Choc Cardiogénique: STEMI antérieur et VD.*

# PRISE EN CHARGE DES BRADYCARDIES SYMPTOMATIQUES

Fréquence cardiaque inférieure à 60 bpm avec des symptômes

- Monitoring ECG continu et de la TA
- Perfusion intra-veineuse
- O<sub>2</sub>
- ECG 12-dérivations dès que possible

- Evaluer et exclure:**
- Infarctus aigu du myocarde
  - Troubles ioniques (Hyperkaliémie)
  - Intoxication médicamenteuse
  - Hypothermie

Evaluation hémodynamique

INSTABLE  
\*

STABLE

- Atropine 0,5 mg à 3 mg IV - et/ou
- Stimulateur externe transcutané
- Discuter: 1. Dopamine: 2 - 20 µg/kg/min
- 2. Adrénaline: 2 - 10 µg/min

**Diagnostic ECG**

- Bloc AV complet
- Bloc AV 2ème degré, Mobitz II
- Pauses > 3 secondes

Observation et  
Monitoring

OUI

NON

Stimulateur cardiaque par voie transveineuse

Observation

\* INSTABLE : TA systolique < 90mmHg, Fréquence cardiaque < 40 bpm, Arythmie ventriculaire (TdP), Signes de dysfonction cardiaque gauche

• **Atropine** : ampoules de 0,5 et 1mg

• **Adrénaline** (Levorenine ®) : ampoules de 1 et 10 mg. Pompe de 10 mg dans 50 ml de glucose 5% ; infusion de 2 à 10 µg/min (= 0,6 à 3 ml/h)

• **Dopamine** (Dynatra ®) : ampoules de 50 et 200mg. Pompe de 200 mg dans 50 ml ; infusion de 2 à 20 µg/kg/min



BIWAC

MONITORING E.C.G., T.A. indispensable

### COMPLICATION ELECTRIQUE:

*Bradycardie: STEMI inf. fqt.*

*FA*

*TV, FV, phénomène R/T.: fqt tout type de STEMI*

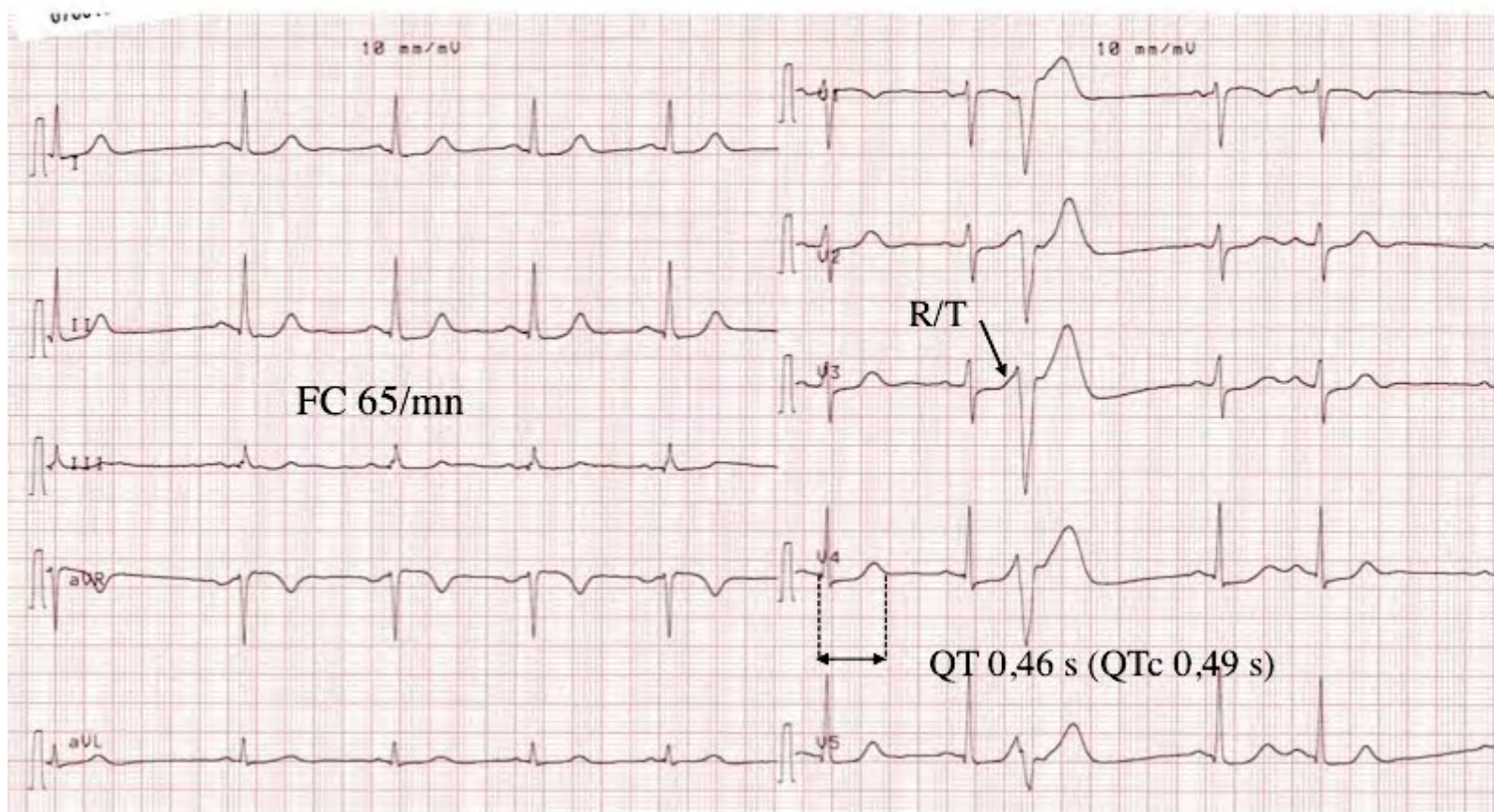
### COMPLICATION MECANIQUE:

*Rupture Septum interventriculaire: STEMI antérieur*

*Rupture pilier Mitrale: STEMI Postérieur*

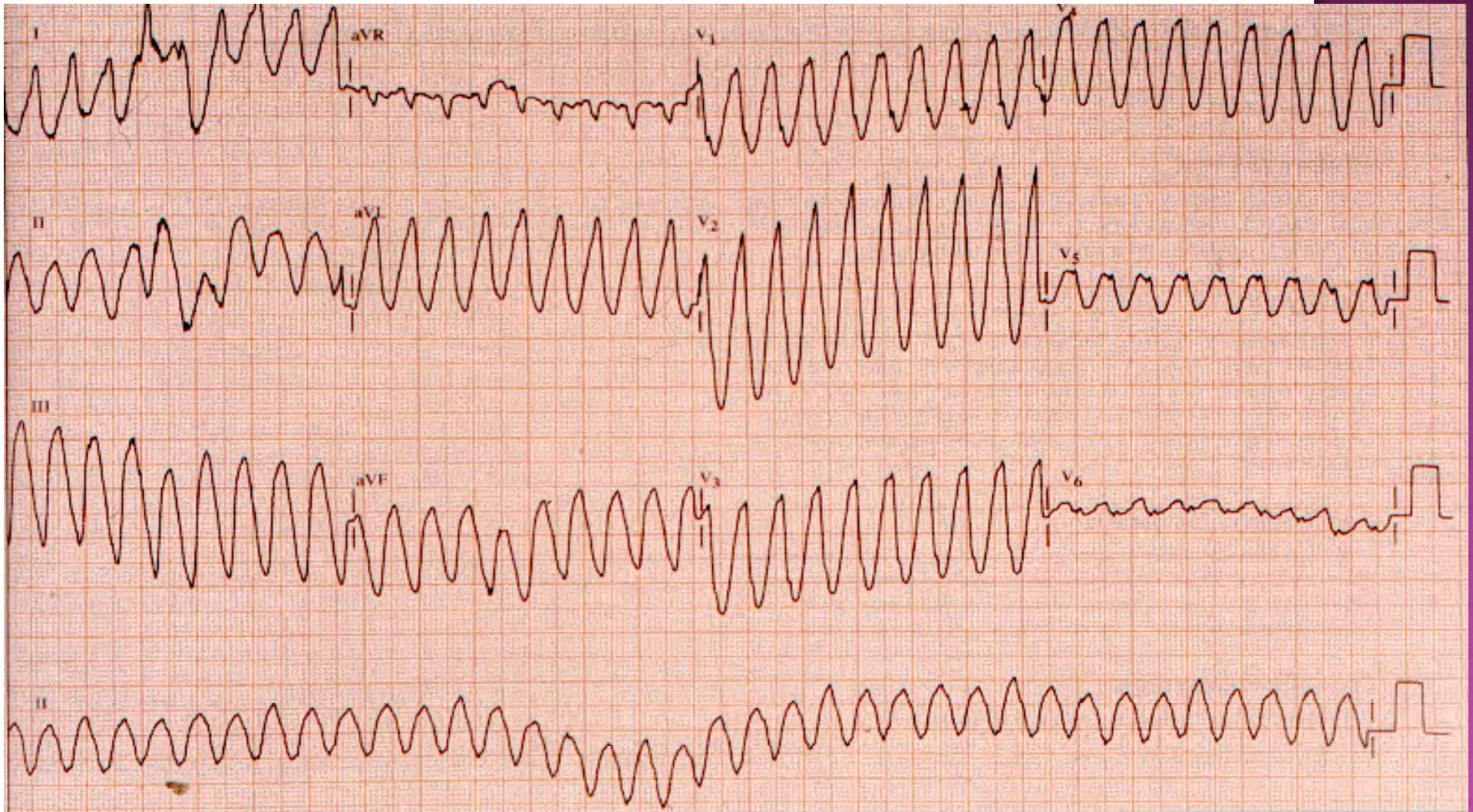
*Choc Cardiogénique: STEMI antérieur et VD.*



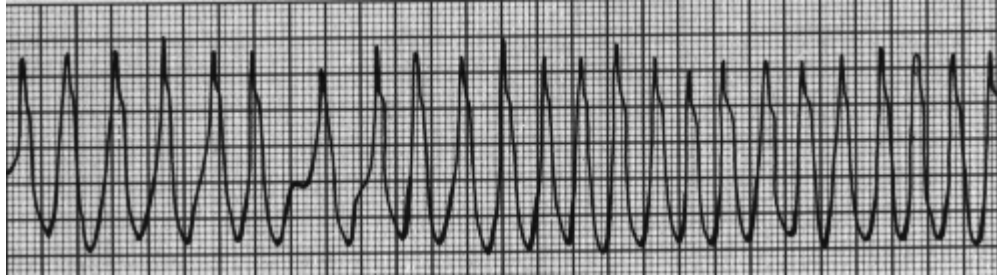




H 45 ans, Infarctus il y a quelques années , syncope et altération hémodynamique.  
Pouls non palpable mais patient conscient. Appel SMUR.







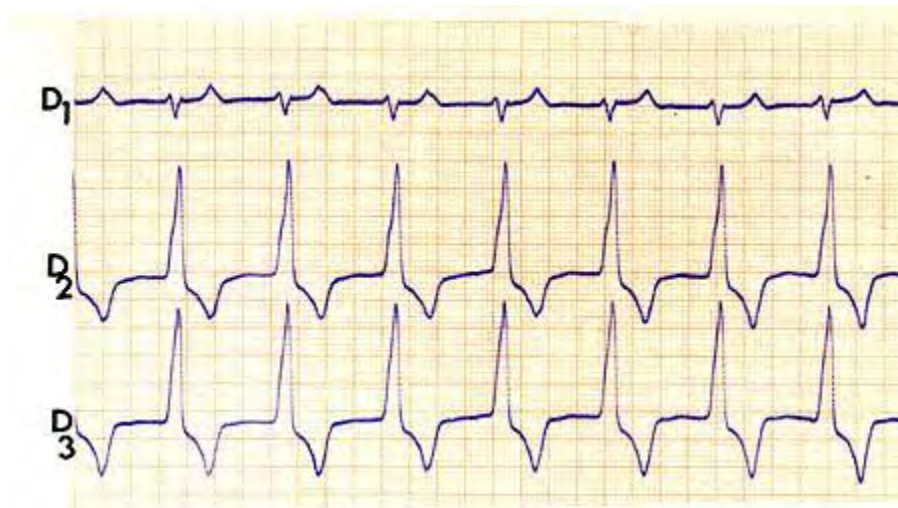
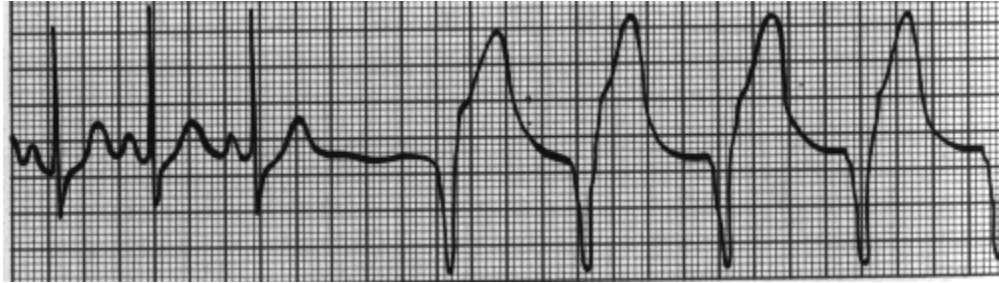
**T.V. polymorphe**



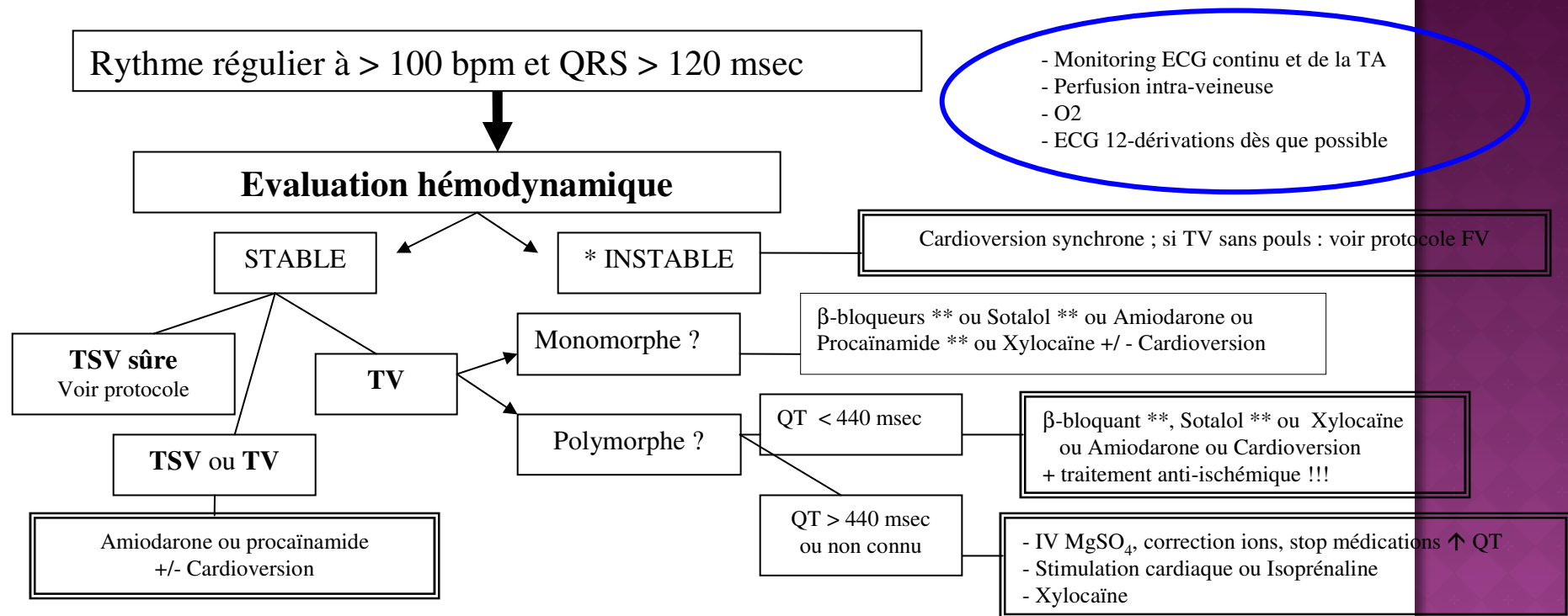
**F.V.**



# R.I.V.A.



# PRISE EN CHARGE DE TACHYCARDIES à COMPLEXES QRS LARGES



\* INSTABLE : TA systolique < 90 mmHg, clinique de décompensation cardiaque gauche, signes ou symptômes d'ischémie myocardique importante

\*\* Ne pas donner si signes ou symptômes de décompensation cardiaque gauche

- **β-bloquants\***: pex **Métoprolol** (Seloken®) : ampoule de 5 mg ; 5 mg IV lent (5 min), à répéter maximum 3x (15 mg)

- **Amiodarone** (Cordarone ®) : ampoule de 150mg ; 150 mg IV en 10 min, à répéter toutes les 10-15 minutes si nécessaire (maximum 2,2 gr/24 h)

- **Xylocaïne** (Xylocard ®) : ampoule de 100 et 1000 mg ; 0,5mg/kg en bolus IV, à répéter toutes les 5-10 minutes (max 200 mg en aigu)

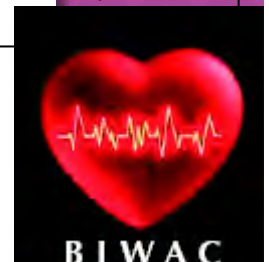
- **Procaïnamide\*** (Pronestyl ® ou prescription magistrale) : ampoule de 1 gr ; 10 à 15 mg/kg IV lente pour 50 à 100 mg/min

- **Sotalol\*** (Sotalex ®) : ampoule de 40 mg ; 1 à 1,5 mg/kg en IV lente (1 mg/min)

- **Isoprénaline** (Isuprel ®) ampoule de 0,2mg/1 ml ; infusion titrée de 1 ampoule dans 50 ml de NaCl 0.9%, jusqu'à obtenir un pouls de 100 bpm

- **MgSO<sub>4</sub>** : 1 à 2 gr en 5-10 minutes, à suivre par une infusion de 2 à 4 gr/jour

\* Ne pas donner en cas de dysfonction ventriculaire gauche (FEVG basse ou signes cliniques)



BIWAC



MONITORING E.C.G., T.A. indispensable

### COMPLICATION ELECTRIQUE:

*Bradycardie: STEMI inf. fqt.*

*FA*

*TV, FV, phénomène R/T.: fqt tout type de STEMI*

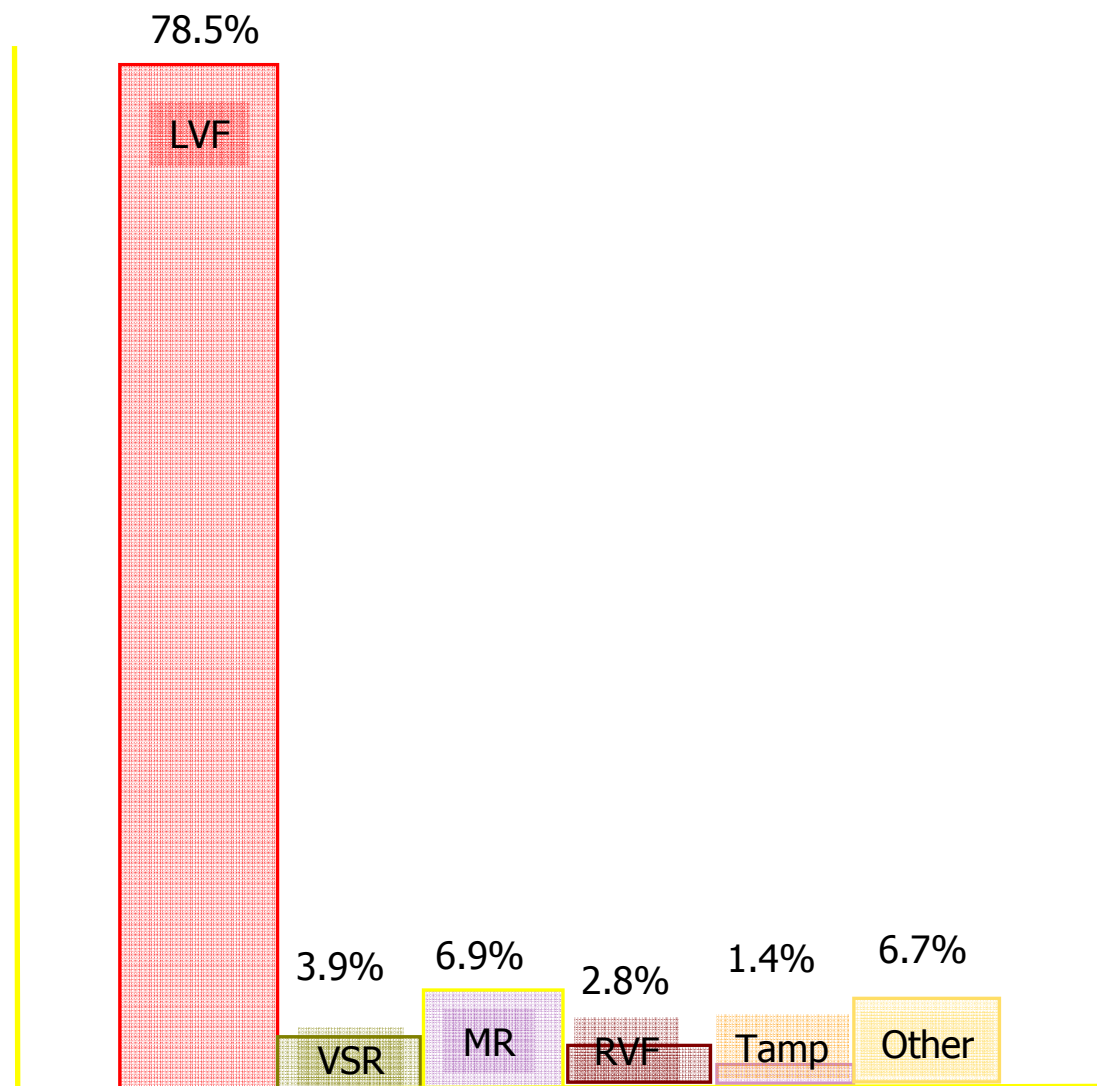
### COMPLICATION MECANIQUE:

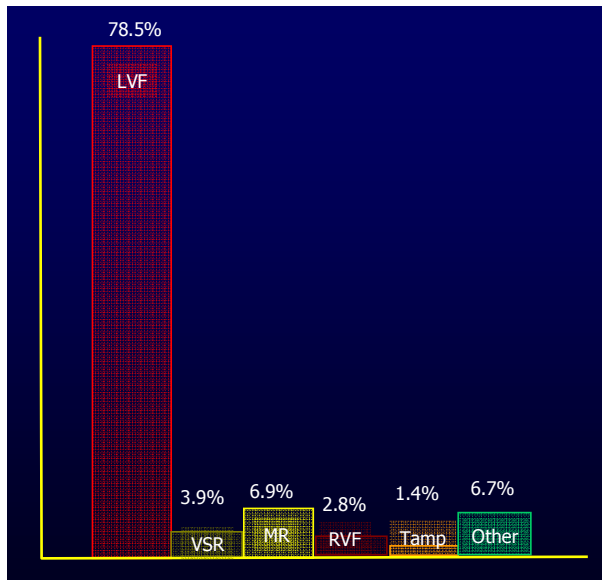
*Rupture Septum interventriculaire: STEMI antérieur*

*Rupture pilier Mitrale: STEMI Postérieur*

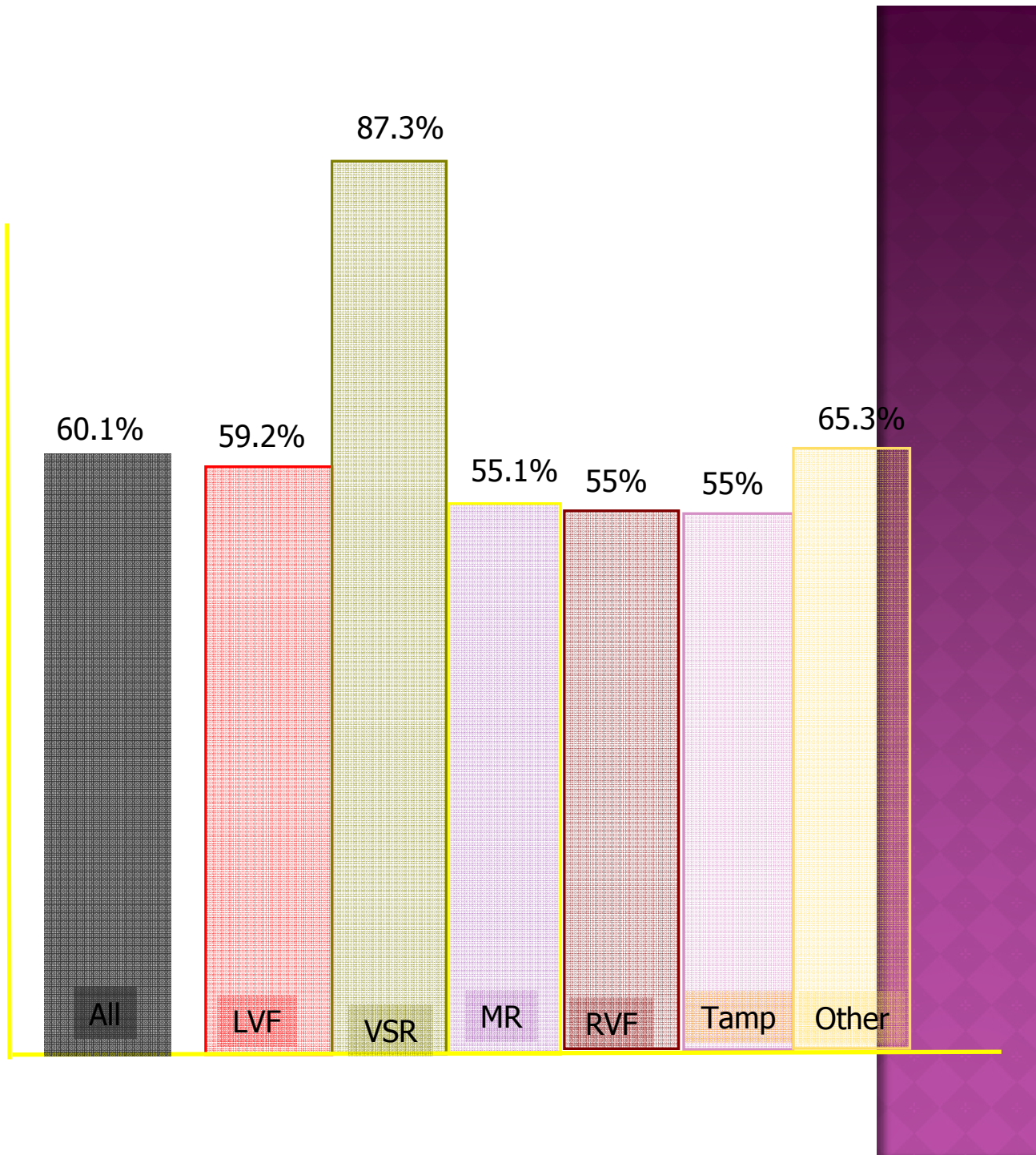
*Choc Cardiogénique: STEMI antérieur et VD.*

# ETHIOLOGIE DES CHOCs CARDIOGENICS





Mortality %



MONITORING E.C.G., T.A. indispensable

### COMPLICATION ELECTRIQUE:

*Bradycardie: STEMI inf. fqt.*

*FA*

*TV, FV, phénomène R/T.: fqt tout type de STEMI*

### COMPLICATION MECANIQUE:

*Rupture Septum interventriculaire: STEMI antérieur*

*Rupture pilier Mitrale: STEMI Postérieur*

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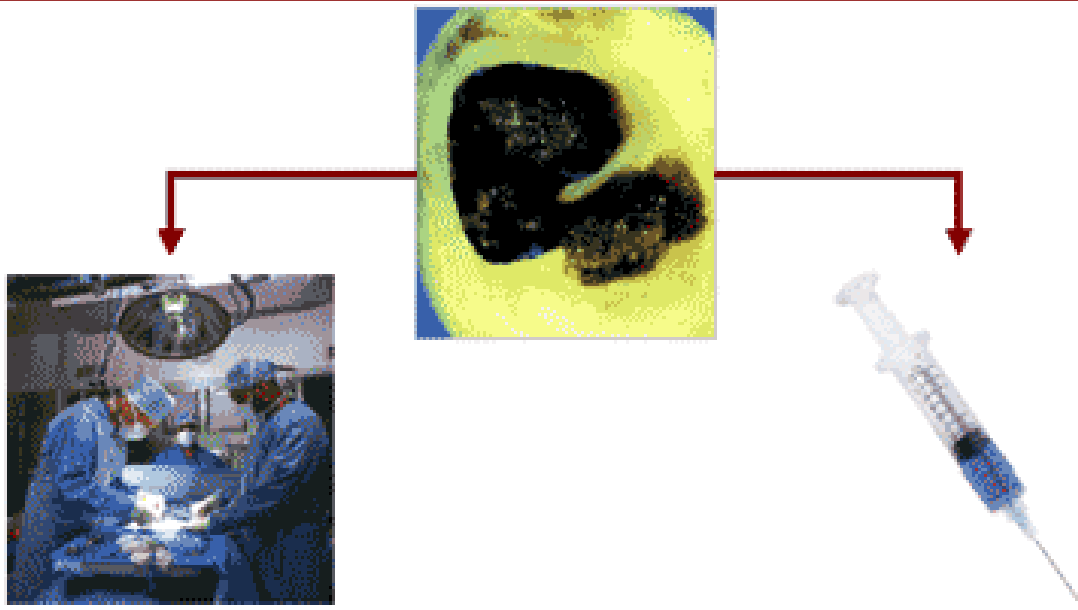
**LE MEILLEUR TRAITEMENT DES COMPLICATIONS,  
C'EST DE LES EMPECHER D'ARRIVER: REPERFUSION  
PRECOCE DE L'OCCLUSION.**



# REPERFUSION THERAPY.

## Primary PCI vs. Pharmacologic Treatment

---



Davies MJ. *Heart*. 2000;83:351-356.

**ETROITE COLLABORATION URGENTISTES ET ANGIOPLASTICIENS**

# LA PRISE DE DÉCISION DOIT

se baser sur l'ECG et la clinique (pas le labo)

respecter le consensus

être autonome (avis - fax limité aux vrais litiges)

être rapide

alerter directement l'angioplasticien



## Management of acute myocardial infarction in patients presenting with persistent ST-segment elevation

The Task Force on the management of ST-segment elevation acute myocardial infarction of the European Society of Cardiology:

**Authors/Task Force Members:** Frans Van de Werf, Chairperson (Belgium)\*, Jeroen Bax (The Netherlands), Amadeo Betriu (Spain), Carina Blomstrom-Lundqvist (Sweden), Filippo Crea (Italy), Volkmar Falk (Germany), Gerasimos Filippatos (Greece), Keith Fox (UK), Kurt Huber (Austria), Adnan Kastrati (Germany), Annika Rosengren (Sweden), P. Gabriel Steg (France), Marco Tubaro (Italy), Freek Verheugt (The Netherlands), Franz Weidinger (Austria), Michael Weis (Germany)

**ESC Committee for Practice Guidelines (CPG):** Alec Vahanian, Chairperson (France), John Camm (UK), Raffaele De Caterina (Italy), Veronica Dean (France), Kenneth Dickstein (Norway), Gerasimos Filippatos (Greece), Christian Funck-Brentano (France), Irene Hellemans (The Netherlands), Steen Dalby Kristensen (Denmark), Keith McGregor (France), Udo Sechtem (Germany), Sigmund Silber (Germany), Michal Tendera (Poland), Petr Widimsky (Czech Republic), José Luis Zamorano (Spain)

**Document Reviewers:** Sigmund Silber (CPG Review Coordinator) (Germany), Frank V. Aguirre (USA), Nawwar Al-Attar (France), Eduardo Alegria (Spain), Felicita Andreotti (Italy), Werner Benzer (Austria), Ole Breithardt (Germany), Nicholas Danchin (France), Carlo Di Mario (UK), Dariusz Dudek (Poland), Dietrich Gulba (Germany), Sigrun Halvorsen (Norway), Philipp Kaufmann (Switzerland), Ran Komowski (Israel), Gregory Y. H. Lip (UK), Frans Rutten (The Netherlands)

# REPERFUSION THERAPY. PCI

- ◉ Preferred reperfusion treatment if performed by an experience team as soon as possible after FMC. | A
- ◉ Time for FMC to balloon should be **<2 h in any case and <90 min** in pts presenting early (eg<2 h) with large infarct and low bleeding risk. | B
- ◉ Indicated for patients in shock and those with contraindications to fibrinolytic therapy irrespective of time delay. | B
- ◉ After failed fibrinolysis in pts with large infarcts if performed within 12 h. | IIa A

RESCUES PCI



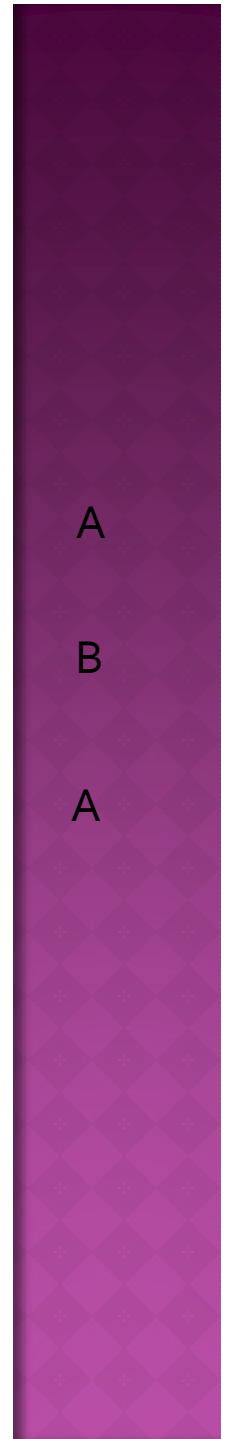
# REPERFUSION THERAPY: FIBRINOLYTIC THERAPY.

- ◉ In the absence of contraindications and if primary PCI cannot be performed within the recommended time.
- ◉ A fibrin-specific agent should be given.
- ◉ Pre-hospital initiation of fibrinolytic therapy.

I A

I B

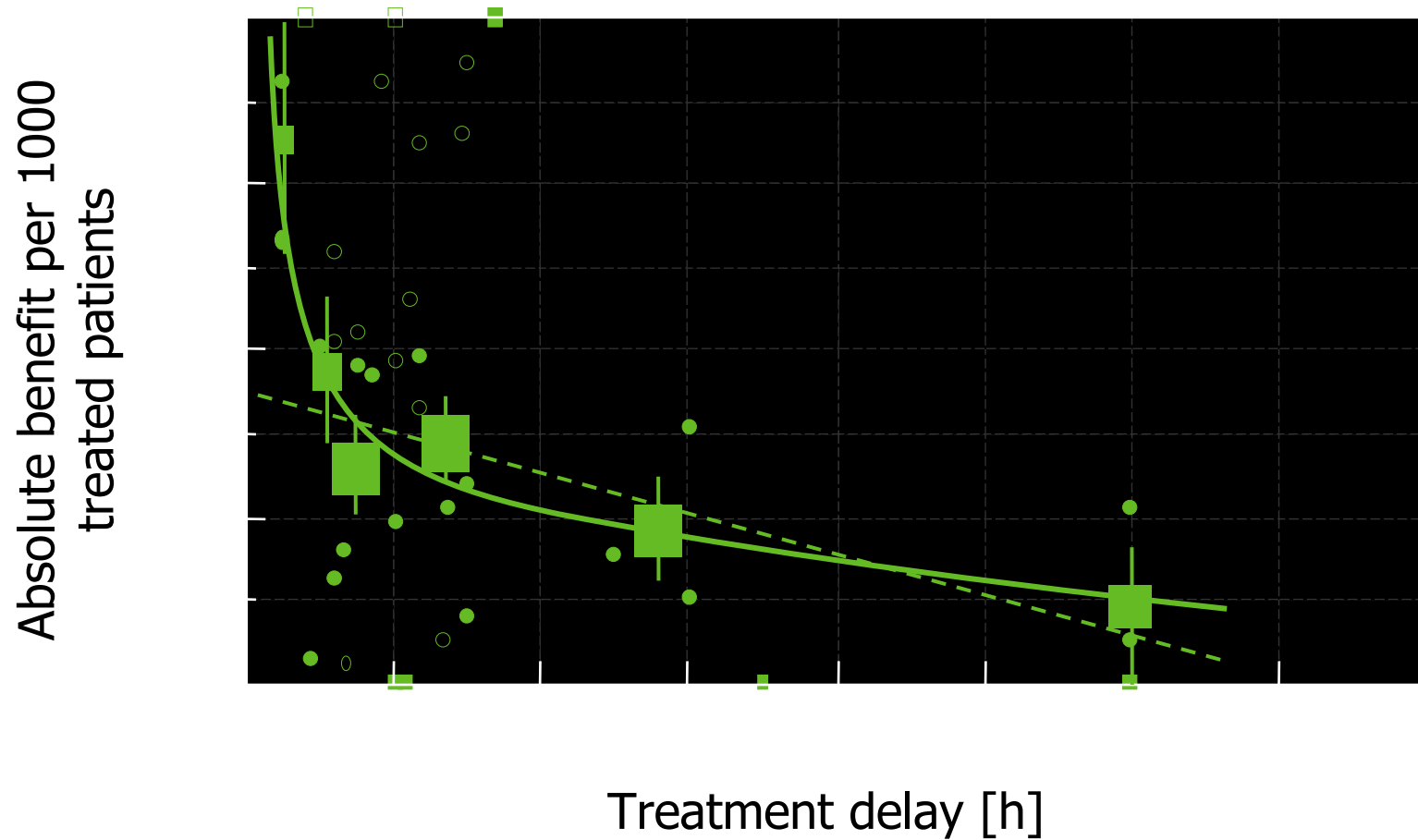
IIa A



## Articles

## Early thrombolytic treatment in acute myocardial infarction: reappraisal of the golden hour

Eric Boersma, Arthur C P Maas, Jaap W Deckers, Maarten L Simoons



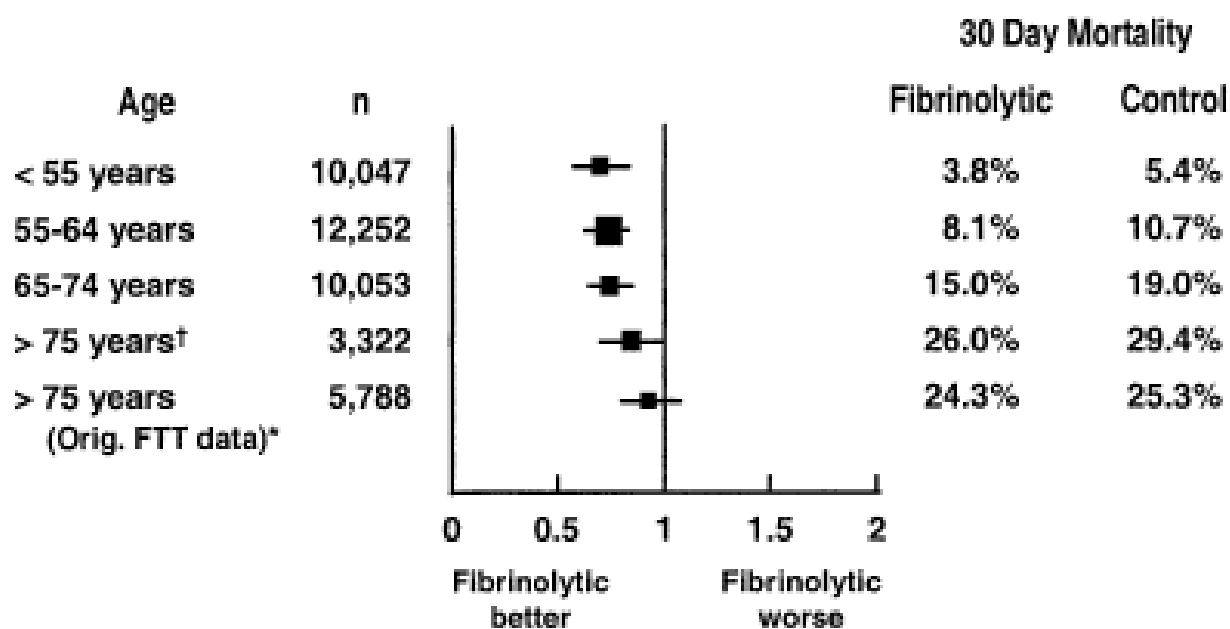
Boersma et al, *Lancet* 1996

## Reperfusion strategies for acute myocardial infarction in the elderly: Benefits and risks

Rajendra H. Mehta, Christopher B. Granger, Karen P. Alexander, Eduardo Bossone, Harvey D. White, and Michael H. Sketch, Jr

*J. Am. Coll. Cardiol.* 2005;45:471-478

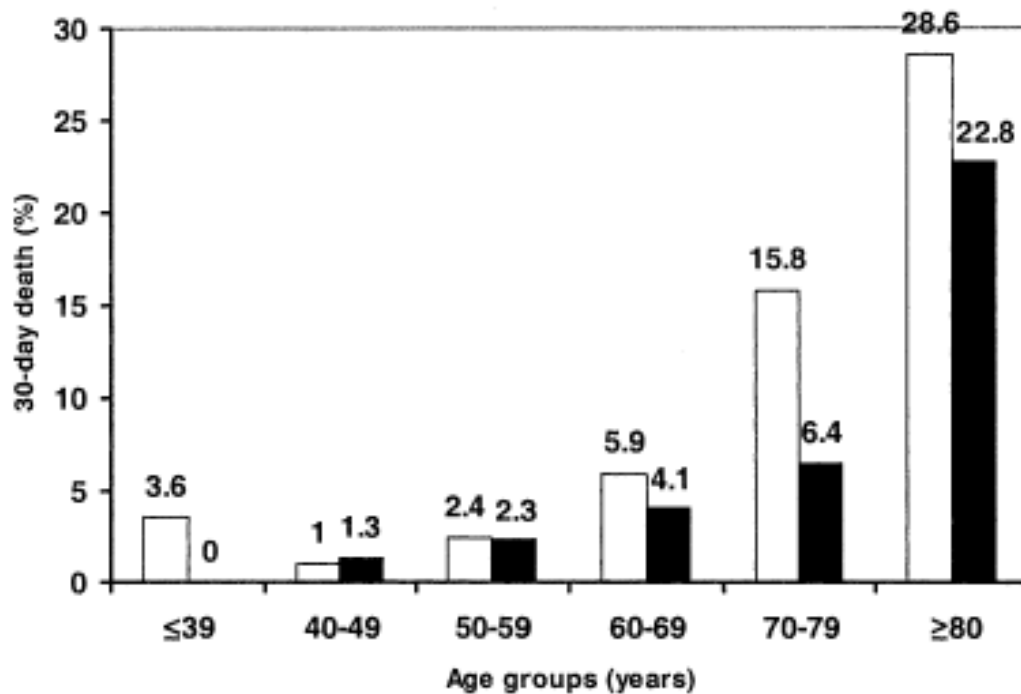
doi:10.1016/j.jacc.2004.10.065



**Figure 1.** Benefits of thrombolytic therapy in different age groups. FTT = Fibrinolytic Therapy Trialists.

## Reperfusion strategies for acute myocardial infarction in the elderly: Benefits and risks

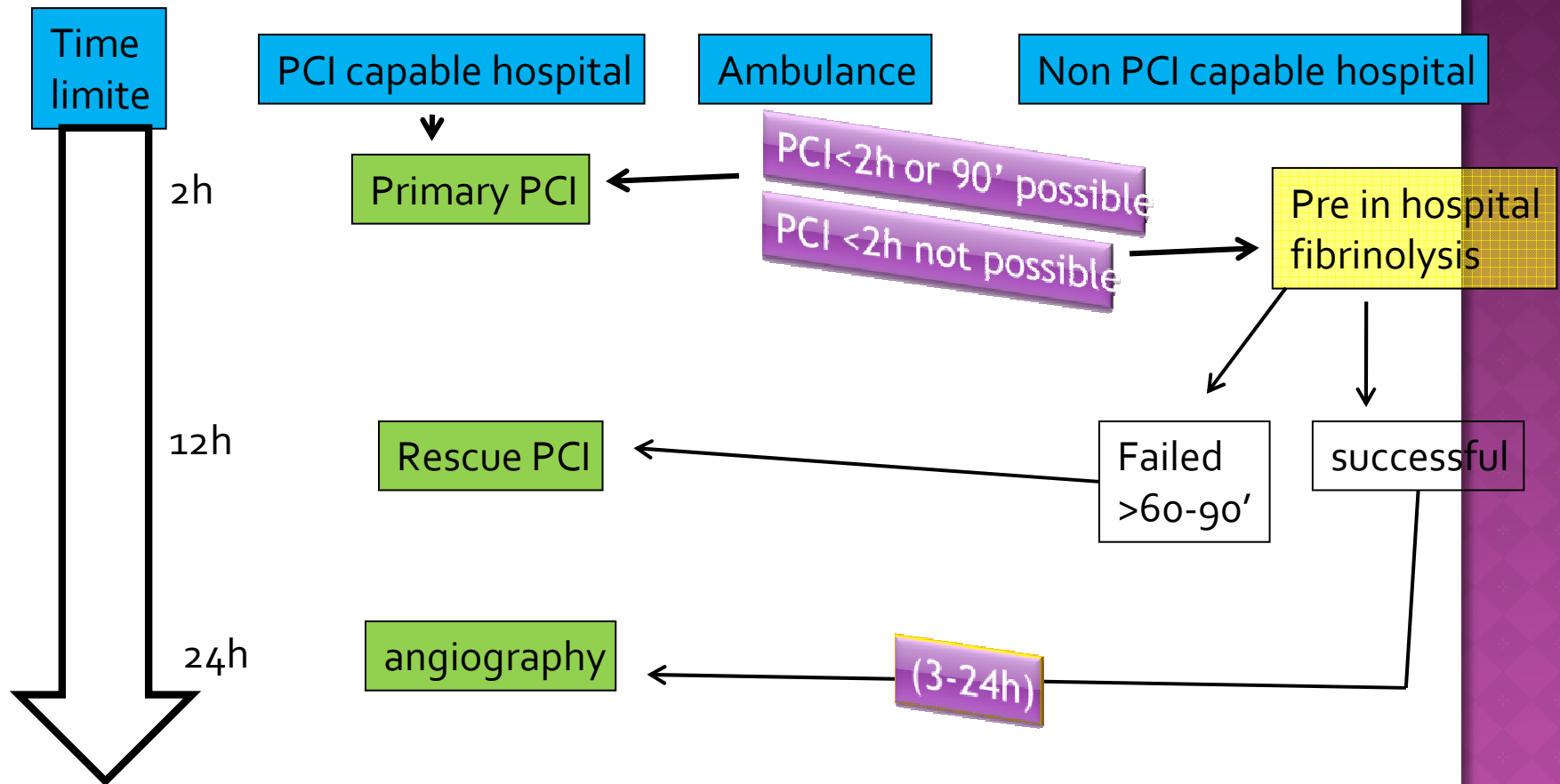
Rajendra H. Mehta, Christopher B. Granger, Karen P. Alexander, Eduardo Bossone, Harvey D. White, and Michael H. Sketch, Jr  
*J. Am. Coll. Cardiol.* 2005;45:471-478  
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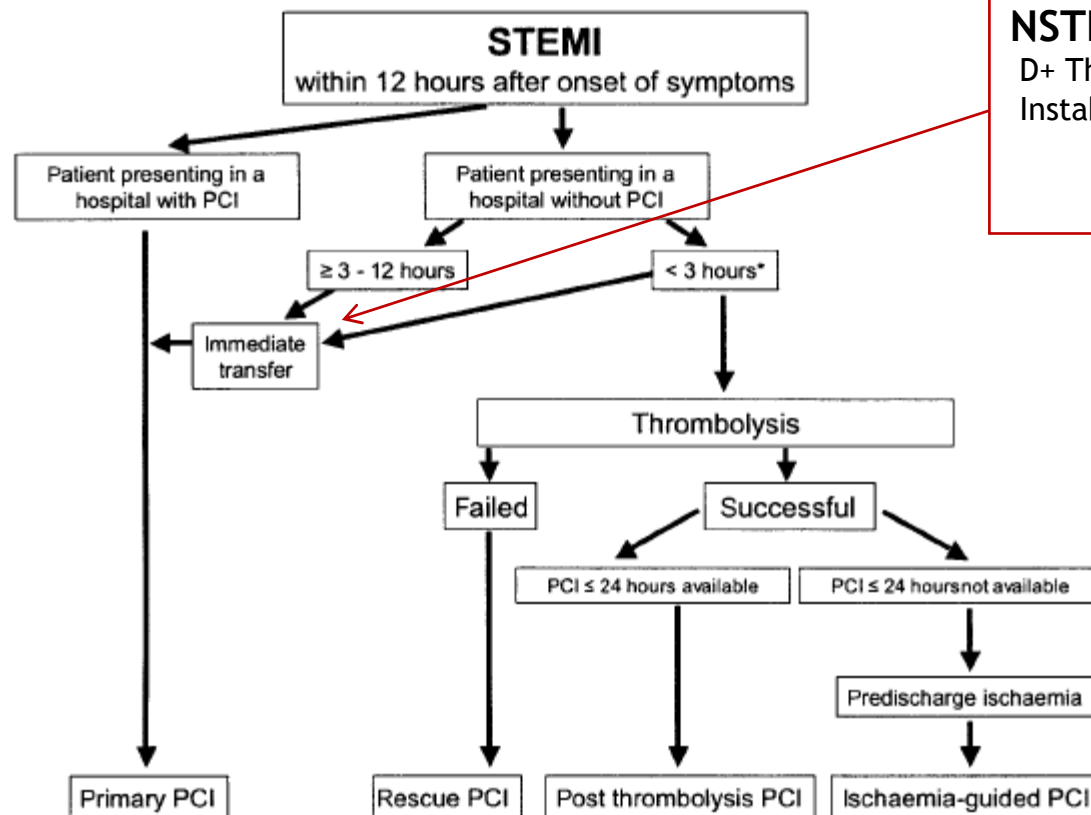


**Figure 2.** Thirty-day mortality in patients randomized to primary coronary angioplasty versus intravenous thrombolysis in the Primary Coronary Angioplasty Trialists' Overview. Open bars = lytic; solid bars = percutaneous coronary intervention.



# REPERFUSION STRATEGIES.





**NSTEMI**  
 D+ Th persistent  
 Instabilité hémodynamique  
 ou rythmique.

Figure 2 Within the first 3 h after onset of chest pain or other symptoms, thrombolysis is a viable alternative to primary PCI. \*If thrombolysis is contraindicated or the patient is at high risk, immediate transfer for primary PCI is strongly advised. The main rationale for possible preference of primary PCI over thrombolysis within the first 3 h is stroke prevention. The main rationale for preference of primary PCI over thrombolysis within 3-12 h is to salvage myocardium and to prevent stroke. If thrombolysis is preferred, it should not be considered to be the final treatment. Even after successful thrombolysis, coronary angiography within 24 h and PCI, if applicable, should be considered. Cardiogenic shock is discussed in section 2.3.4. Levels of recommendation are given in Table 7.

# RELIEF OF PAIN, BREATHLESSNESS AND ANXIETY.

Recommenations	Class	LOE
I.v. opioids (4mg to 8 morphine) with additional doses of 2mg at 5 to 15 min intervals.	I	C
O <sub>2</sub> (2-4L/min) if breathlessness or other signs of heart failure.	I	C
Tranquilliser – in vary anxious patients.	IIa	C

# Relief of Pain, Breathlessness and Anxiety.

## d. Nitrates

The GISSI-3<sup>143</sup> trial tested a strategy of routine transdermal use of nitrates vs. selected administration because of ongoing ischaemia in 19 394 patients. No significant reduction in mortality was observed with the routine administration. The ISIS-4 trial,<sup>144</sup> in which oral mononitrate was administered acutely and continued for 1 month, also failed to show a benefit. The routine use of nitrates in the initial phase of a STEMI has not been shown convincingly to be of value and is, therefore, not recommended.

**M: Morphine** oui  
**O: Oxygène** oui  
**N: Nitré** non  
**A: Aspirine** oui



# PRIMARY PCI: ADJUNCTIVE THERAPIES.

## ○ Antiplatelet co-therapy

- Aspirin
- AINS and COX2 selective inhibitors
- Clopidogrel loading dose
- GPIIb/IIIa antagonist
  - Abciximab
  - Tirofiban
  - Eptifibatide

I B

III B

I C

IIa A

IIb B

IIb C

PRASUGREL dose de charge

## ○ Antithrombin co-therapy

- Heparin
- Bivalirudin
- Fondaparinux

I C

IIa B

III B

## ○ Adjunctive devices

- Thrombus aspiration

IIb B

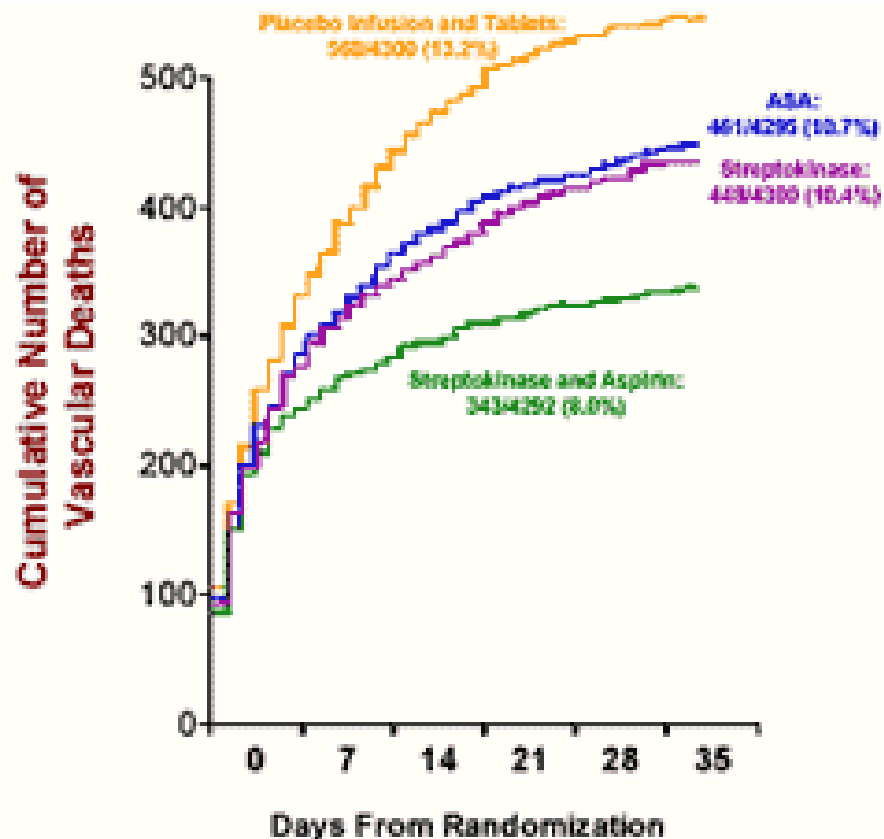
# Initial Management Therapy: ASA and Fibrinolytic

## ISIS-2

N = 17,187

ASA 23% Odds ↓

SK 25% Odds ↓



SK = streptokinase.

2nd International Study of Infarct Survival Collaborative Group. *Lancet*. 1988;2:349-60.

# PRIMARY PCI: ADJUNCTIVE THERAPIES.

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- AINS and COX2 selective inhibitors
- Clopidogrel loading dose
- GPIIb/IIIa antagonist
  - Abciximab
  - Tirofiban
  - Eptifibatide

I B

III B

I C

IIa A

IIb B

IIb C

PRASUGREL dose de charge

## ○ Antithrombin co-therapy

- Heparin
- Bivalirudin
- Fondaparinux

I C

IIa B

III B

## ○ Adjunctive devices

- Thrombus aspiration

IIb B

# FIBRINOLYTIC THERAPY: ADJUNCTIVE THERAPIES.

## ⦿ Antiplatelet co-therapy

- Aspirin I B
- Clopidogrel loading dose if age<75 I B
- Clopidogrel if age>75 start with maintenance dose. IIa B

## ⦿ Antithrombin co-therapy

- With alteplase, reteplase, tenecteplase:

Enoxaparin IV bolus followed 15min later by first Sc dose. If age >75 years no IV bolus and start with Reduce first sc dose. I A

If enoxaparine is not available: a weight-adjusted bolus

Of iv heparine followed by a weight adjusted iv Infusion with first aPTT control after 3h. I A

## DOSE OF ANTIPLATELET CO-THERAPIES. WITH PRIMARY PCI

- ⊙ Aspirine: 150-325 mg PO or 250 to 500 mg IV.
- ⊙ Clopidogrel: Oral dose 300 or 600 mg.
- ⊙ Prasugrel: 60 mg PO.
- ⊙ GPIIb/IIIa Inhib.: Abciximab: iv bolus of 0.25mg/Kg bolus by 0.125 ug/Kg per min infusion (max 10ug/min for 12 h).



## **DOSE OF ANTIPLATELET CO-THERAPIES. WITH FIBRINOLYTIC TREATMENT.**

- ⦿ **Aspirine:** 150-325 mg PO or 250 mg IV.
- ⦿ **Clopidogrel:** Oral dose 300 mg if age < 75 years; 75mg if age > 75 years.

**Table 8** Doses of fibrinolytic agents

	Initial treatment	Specific contraindications
Streptokinase (SK)	1.5 million units over 30–60 min i.v.	Prior SK or anistreplase
Alteplase (t-PA)	15 mg i.v. bolus 0.75 mg/kg over 30 min then 0.5 mg/kg over 60 min i.v. Total dosage not to exceed 100 mg	
Retepase (r-PA)	10 U + 10 U i.v. bolus given 30 min apart	
Tenecteplase (TNK-tPA)	Single i.v. bolus 30 mg if <60 kg 35 mg if 60 to <70 kg 40 mg if 70 to <80 kg 45 mg if 80 to <90 kg 50 mg if $\geq$ 90 kg	

# DOSE OF ANTITHROMBIN CO-THERAPIES. WITH PRIMARY PCI AND FIBRINOLYTIQUE.

**Table 10** Doses of antithrombin co-therapies

## With primary PCI

Heparin	I.v. bolus at a usual starting dose of 100 U/kg weight (60 U/kg if GPIIb/IIIa antagonists are used). If the procedure is being performed under activated clotting time (ACT) guidance, heparin is given at a dose able to maintain an ACT of 250–350 s (200–250 s if GPIIb/IIIa antagonists are used). Infusion should be stopped at the end of the procedure.
Bivalirudin	I.v. bolus of 0.75 mg/kg followed by an infusion of 1.75 mg/kg/h not titrated to ACT and usually terminated at the end of the procedure.

## With fibrinolytic treatment

Enoxaparin	In patients <75 years and creatinine levels $\leq 2.5$ mg/mL or 221 $\mu\text{mol/L}$ (men) or $\leq 2$ mg/mL or 177 $\mu\text{mol/L}$ (women): i.v. bolus of 30 mg followed 15 min later by s.c. dose of 1 mg/kg every 12 h until hospital discharge for a maximum of 8 days. The first two s.c. doses should not exceed 100 mg.  In patients >75 years: no i.v. bolus; start with first s.c. dose of 0.75 mg/kg with a maximum of 75 mg for the first two s.c. doses. In patients with creatinine clearance of <30 mL/min, regardless of age, the s.c. doses are repeated every 24 h
Heparin	I.v. bolus of 60 U/kg with a maximum of 4000 U followed by an i.v. infusion of 12 U/kg with a maximum of 1000 U/h for 24–48 h. Target aPTT: 50–70 s to be monitored at 3, 6, 12, and 24 h
Fondaparinux	2.5 mg i.v. bolus followed by an s.c. dose of 2.5 mg once daily up to 8 days or hospital discharge if creatinine $\leq 3$ mg/mL or 265 $\mu\text{mol/L}$

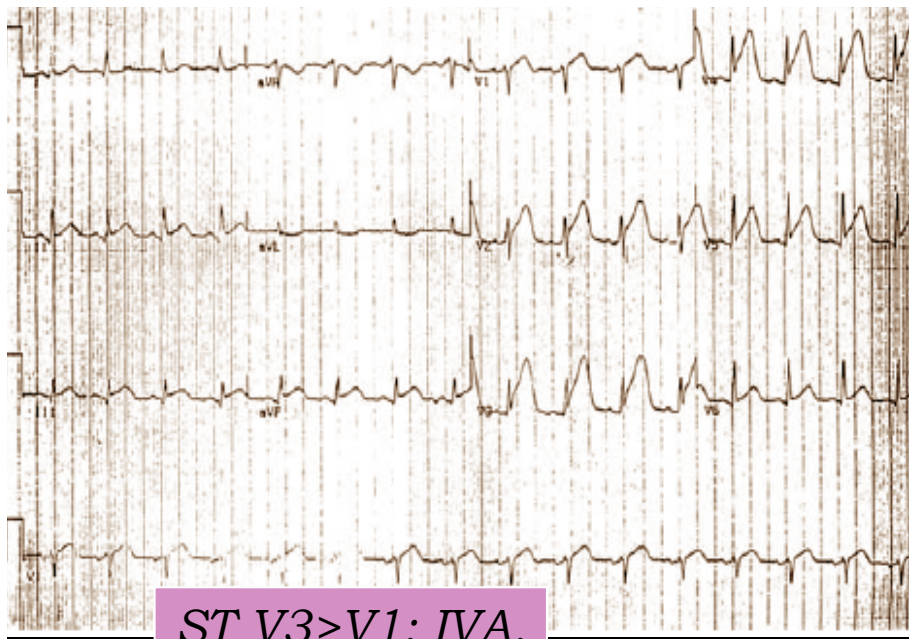
# CONCLUSION

- ◉ REPERFUSION LA PLUS PRECOCE=EFFICACITE COURT TERME (complication) et LONG TERME.
- ◉ Collaboration ETROITE avec les urgences et SMUR.
- ◉ Nouveaux antiagrégants plaquettaire sont prometteurs: Prasugrel, ticagrelor...
- ◉ Nouveaux anticoagulants?

*Groupe I: ↑ ST V1-V4 et ↑ ST inf.*

*Groupe I: ↑ ST V1-V4.*

*Groupe I: ↑ ST V1-V4 et ↓ ST inf.*



*ST V3 > V1: IVA.*

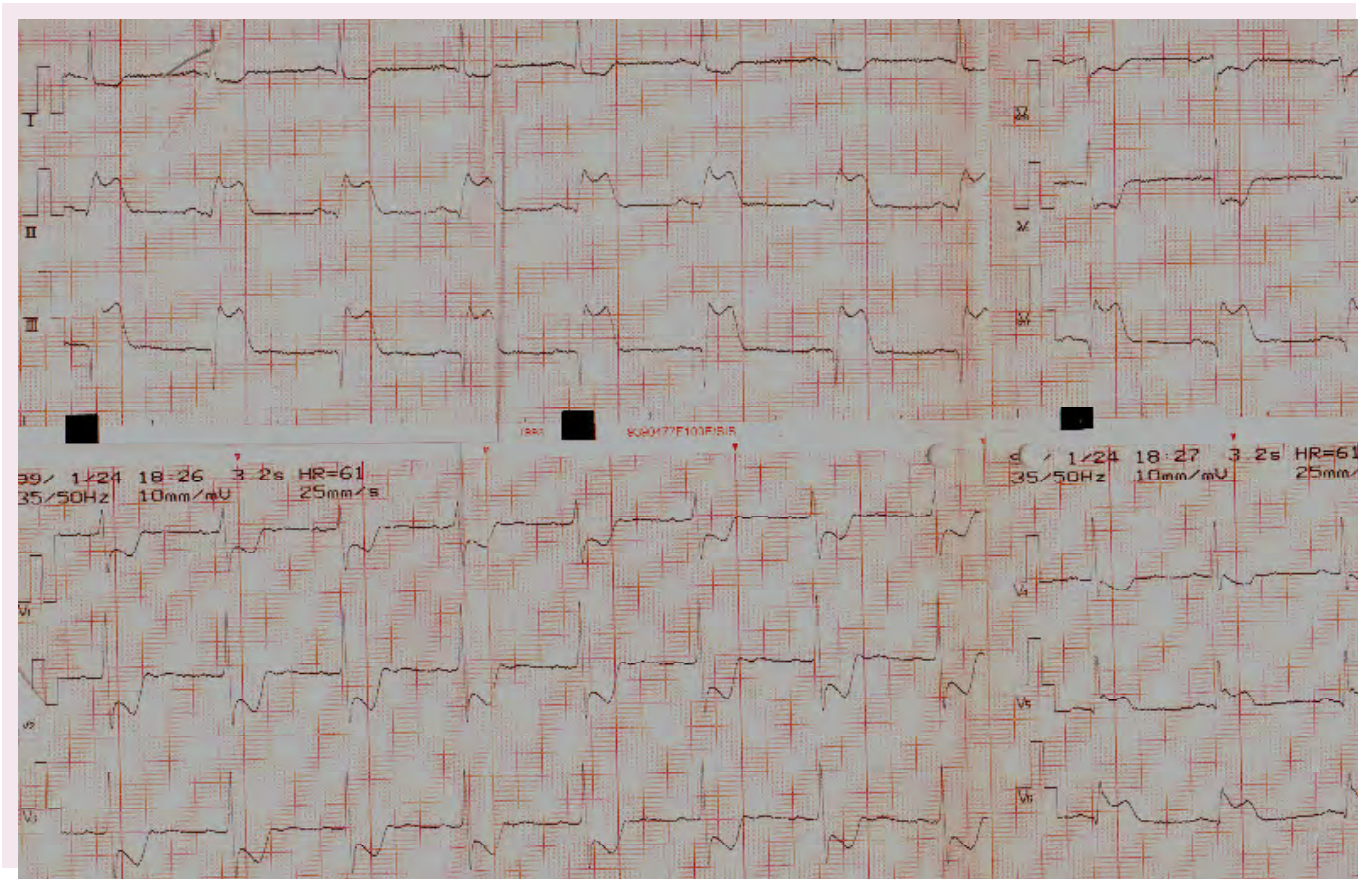
**Table III.** Angiographic findings of patients among the 3 groups

Characteristics	Group 1 (n = 179)	Group 2 (n = 447)	Group 3 (n = 420)	P
Infarct-related artery (%)	(N = 161)	(N = 407)	(N = 387)	.001*
LAD	36	97	97	
RCA	59	2	<1	
LCX	5	1	<1	
LMCA	0	0	1	
Site of occlusion (%)				.001
IRA-LAD	(n = 54)	(n = 314)	(n = 338)	
Proximal LAD	11	23	50	
Mid-LAD	61	65	35	
Distal LAD	9	3	1	
Diagonal	19	8	14	
IRA-RCA	(n = 98)	(n = 3)	(n = 2)	
Proximal RCA	67	100	50	
Mid-RCA	27	0	50	
Distal RCA	6	0	0	
TIMI flow grade at IRA (%)*	(n = 179)	(n = 447)	(n = 420)	NS
TIMI-0/1	42	38	39	
TIMI-2	19	23	22	
TIMI-3	39	38	39	
≥2-Vessel disease (%)*	47	44	40	NS

Characteristic	IRA-RCA (n = 85)	IRA-LAD (n = 57)	P
Median sum STE II, III, aVF (mm)	7.0	3.0	.0001
Median Sum STE lead V <sub>1</sub> (mm)	1.0	1.0	NS
Median sum STE lead V <sub>3</sub> (mm)	1.0	4.0	.0001
STE V <sub>1</sub> ≥ V <sub>3</sub> (%)	35	12	.001



# STEMI INFÉRIEURE (AVEC ↓ST V1-V3).



# INFARCTUS INFÉRIEURE: CD OU CX ?

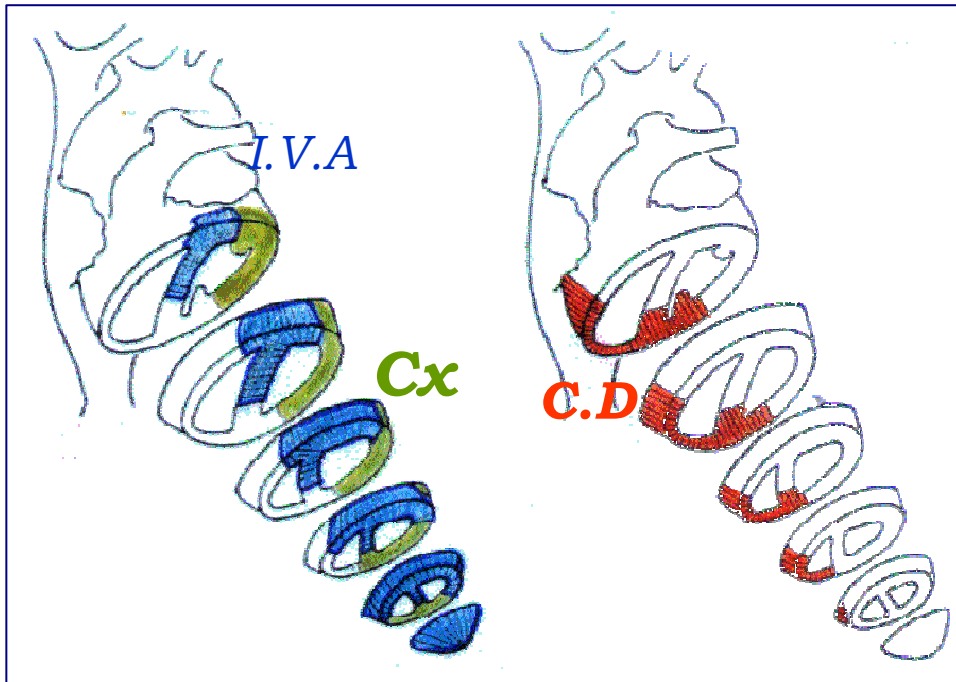
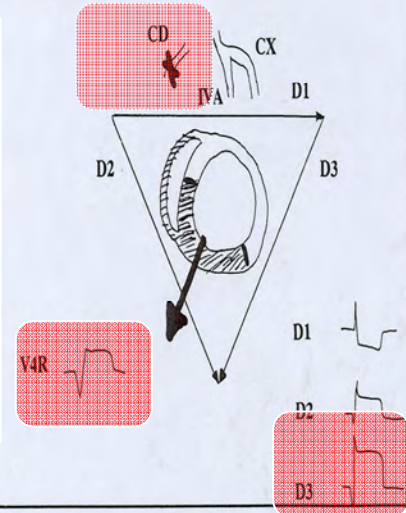


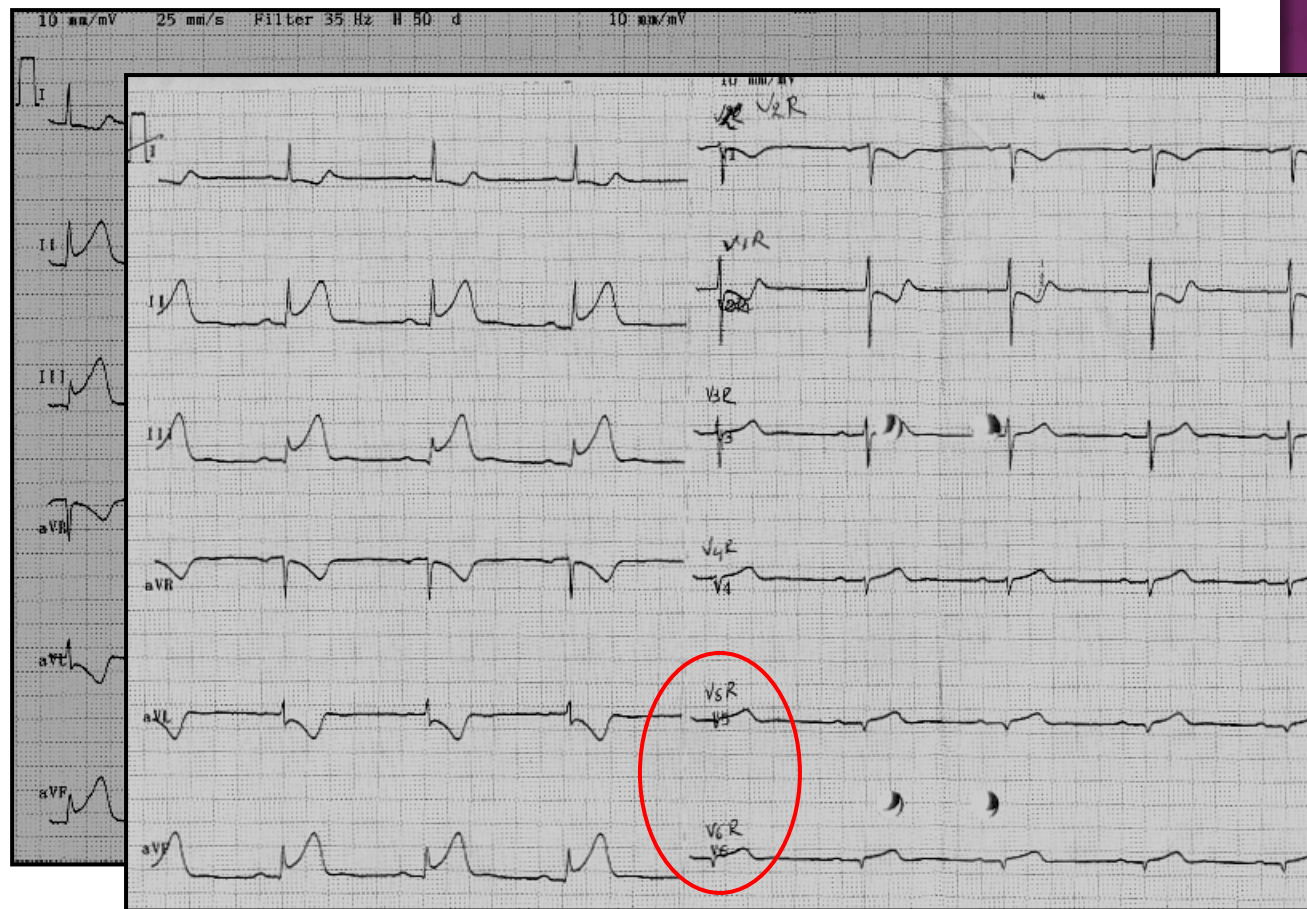
Figure. Représentation des vecteurs électriques correspondant aux courants de lésion induits par la nécrose inférieure.

A : Patient 1

B : Patient 2

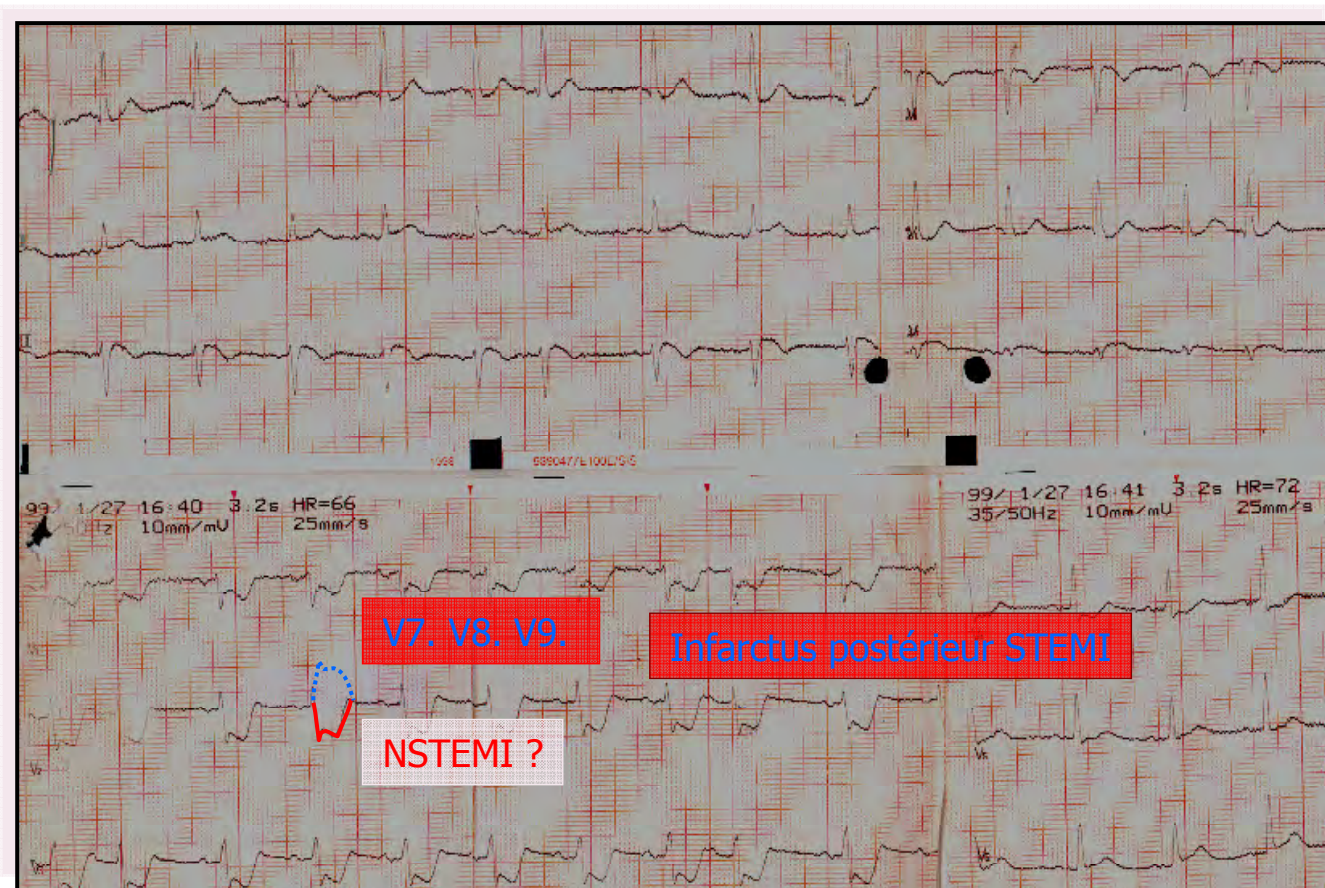


# ASPECT PARTICULIER DE L'INFARCTUS INFERIEUR.

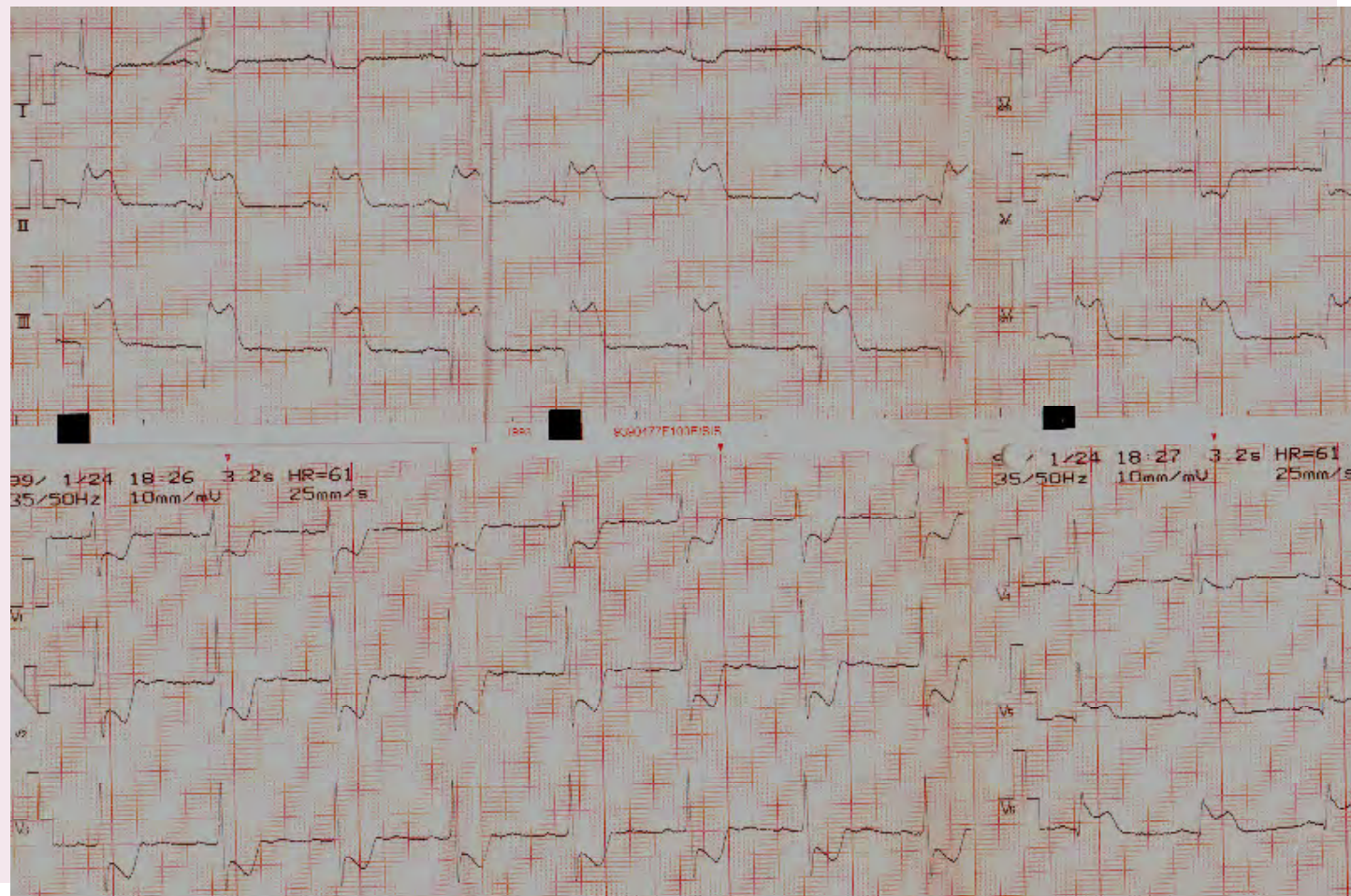




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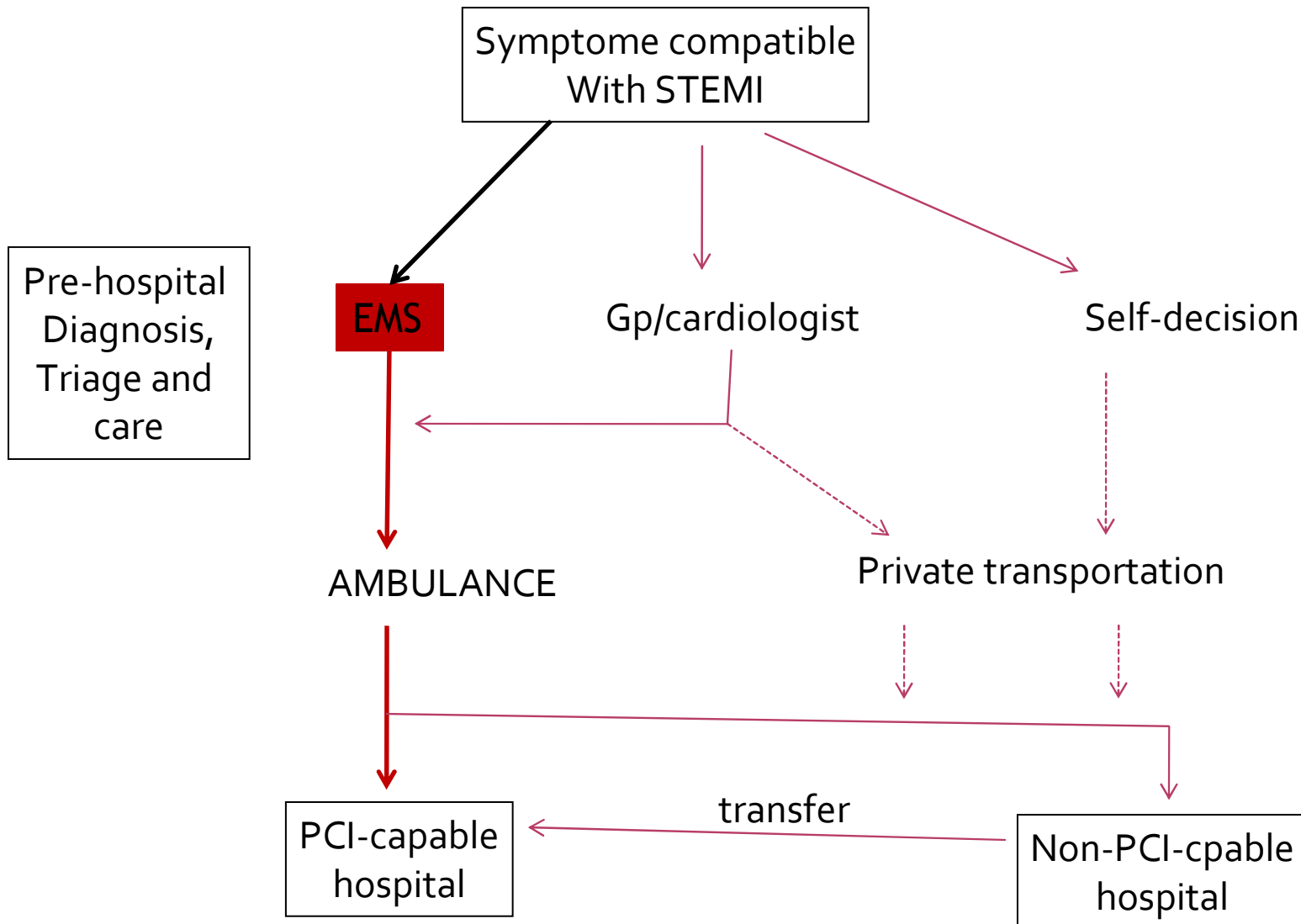


# ASPECT PARTICULIER DE L'INFARCTUS INFERIEUR.





# PRE-HOSPITAL MANAGEMENT



MONITORING E.C.G., T.A. indispensable

### COMPLICATION ELECTRIQUE:

*Bradycardie: STEMI inf. fqt.*

*FA*

*TV, FV, phénomène R/T.: fqt tout type de STEMI*

### COMPLICATION MECANIQUE:

*Rupture Septum interventriculaire: STEMI antérieur*

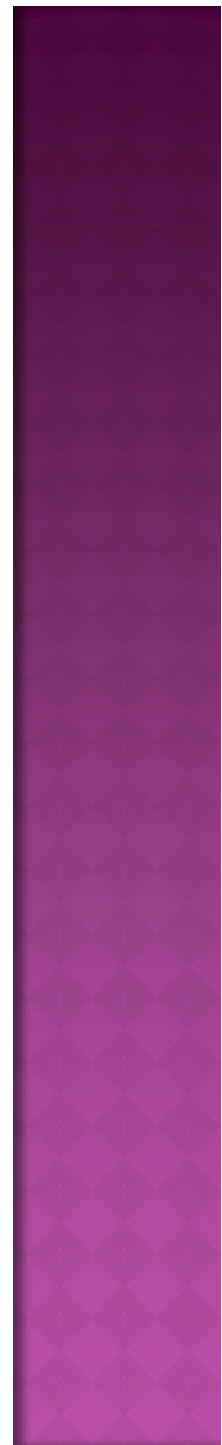
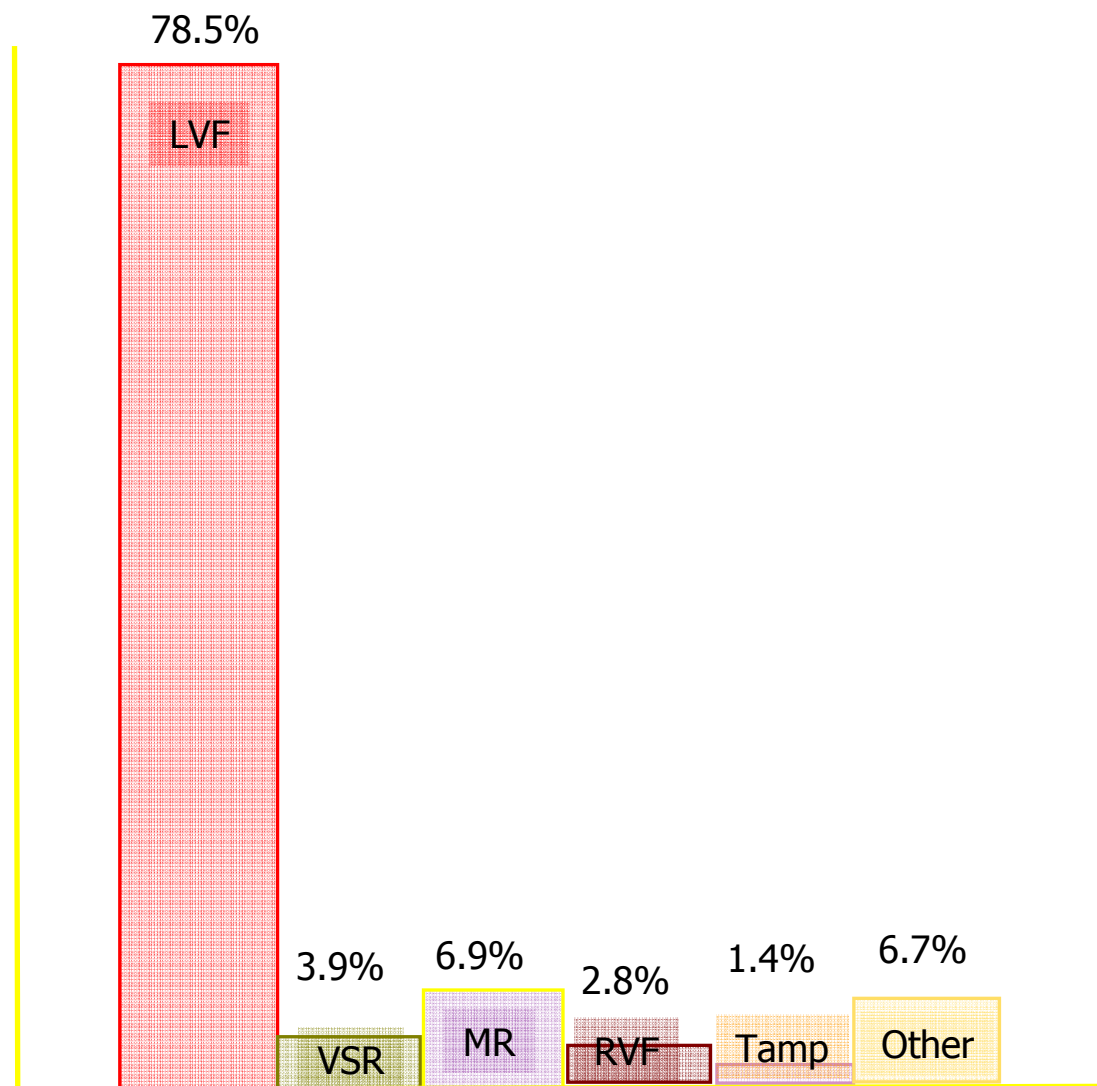
*Rupture pilier Mitrale: STEMI Postérieur*

*Choc Cardiogénique: STEMI antérieur et VD.*

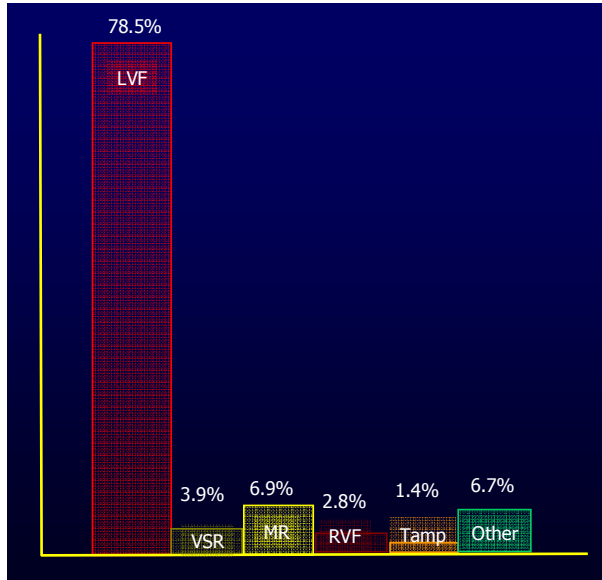




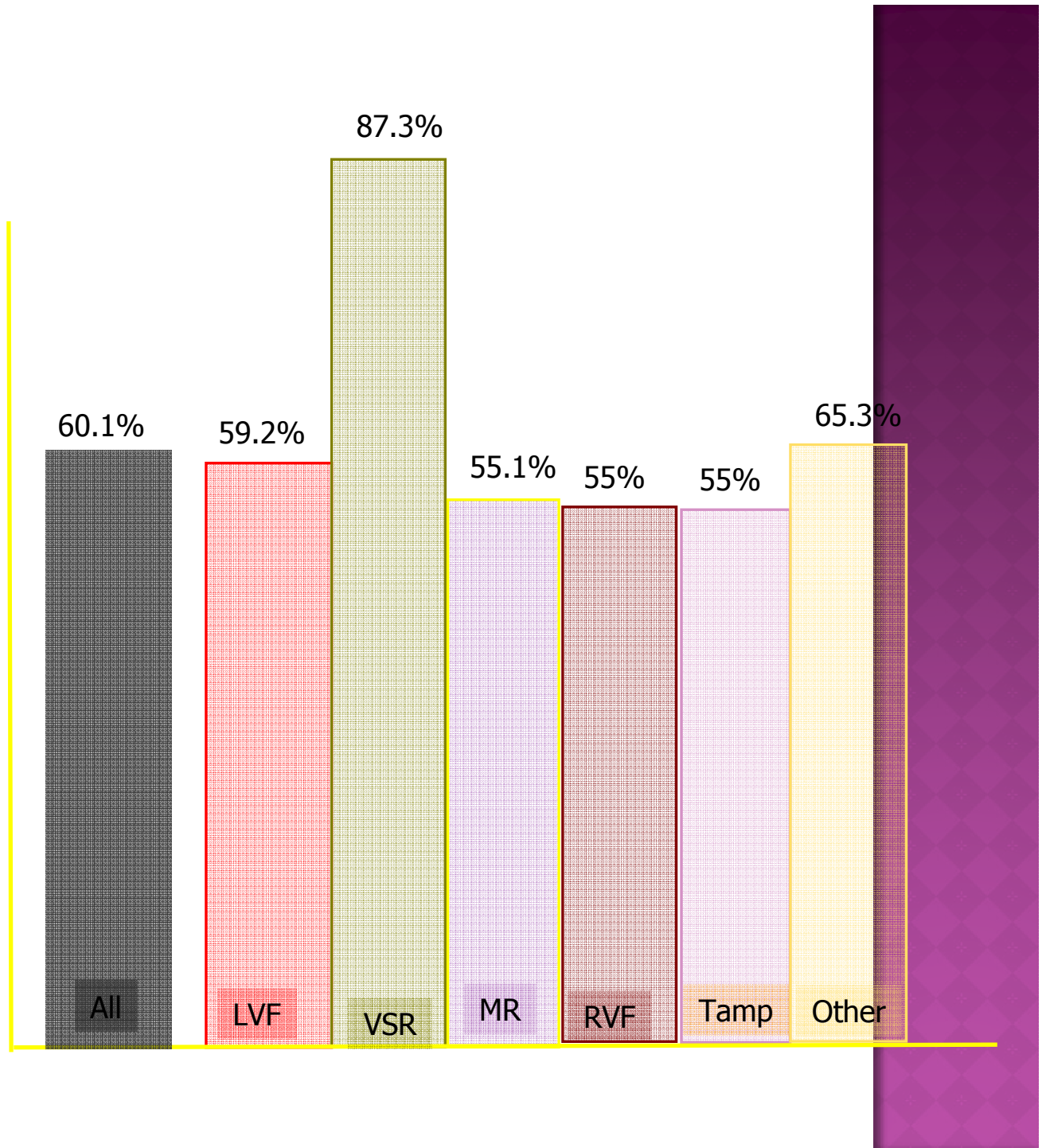
# ETHIOLOGIE DES CHOCs CARDIOGENICS







**Mortality %**



# CRITÈRES D'ÉCHEC DE LYSE

Attendre 60 min

Persistance d'un Pardee

Persistance de la douleur

Interprétations souvent litigieuses



Groupe I: ↑ ST V1-V4 et ↑ ST inf.

Groupe II: ↑ ST V1-V4.

Groupe III: ↑ ST V1-V4 et ↓ ST inf.

**GUSTO** *Am. Heart J* 2003;146:653

STEMI inférieure avec  
 ↑ ST V1 uniquement =  
 très spécifique de la CD.  
 100% *Am.Heart.J* 2001;141:615

**Table III.** Angiographic findings of patients among the 3 groups

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*Am. Heart J* 2003;146:653

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Attendre 60 min

Persistance d'un Pardee

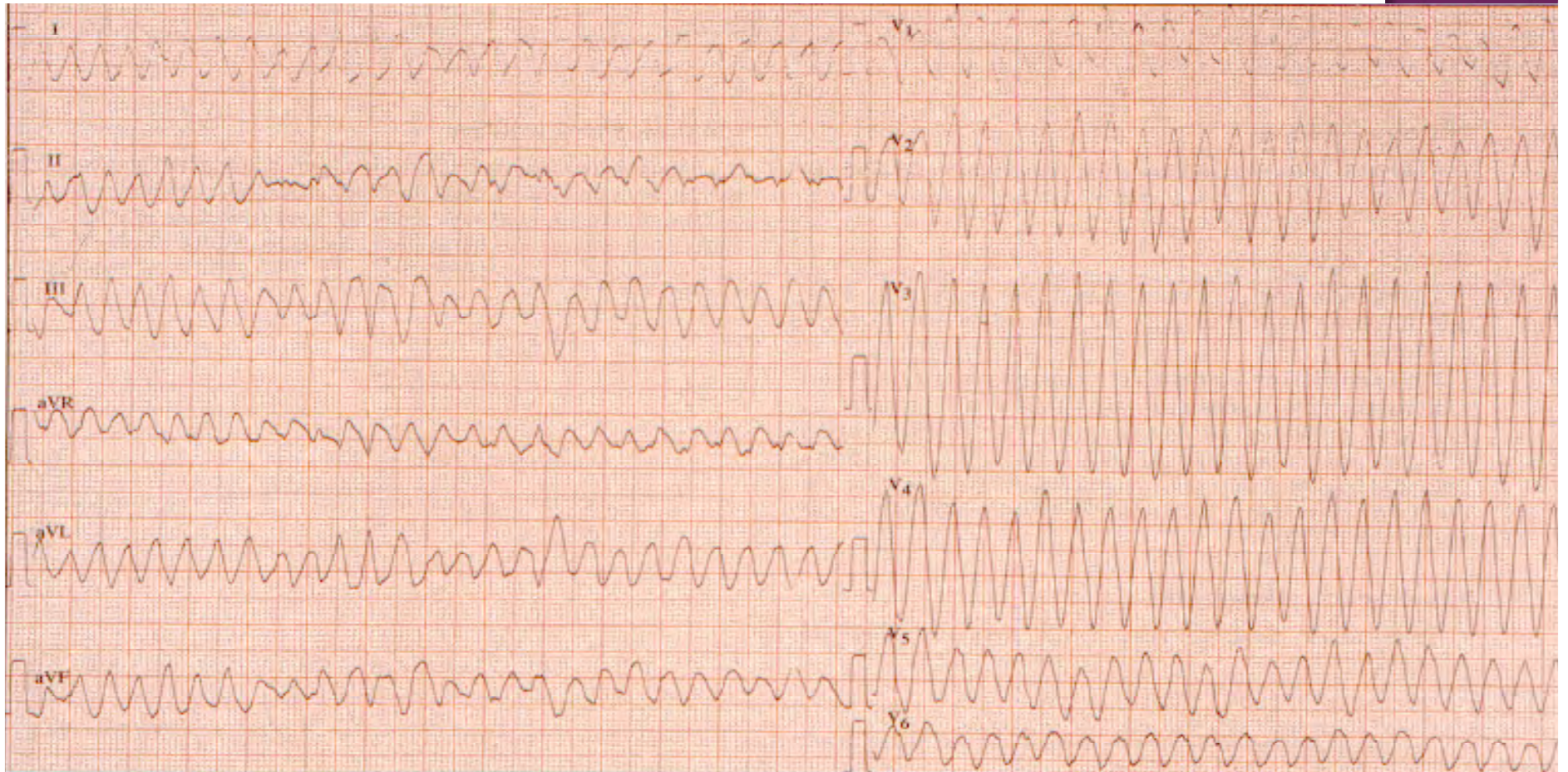
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Interprétations souvent litigieuses

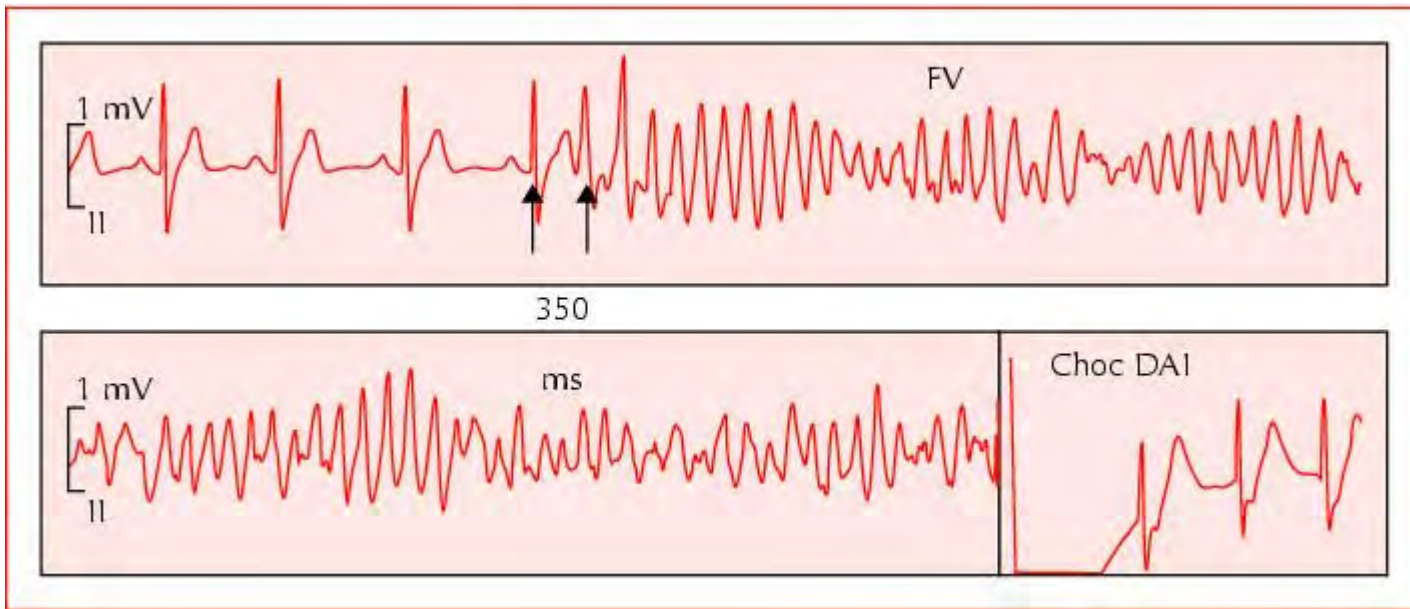




H 58 ans: STEMI inférieure, thrombolyse IV.  
Après quelques minutes :





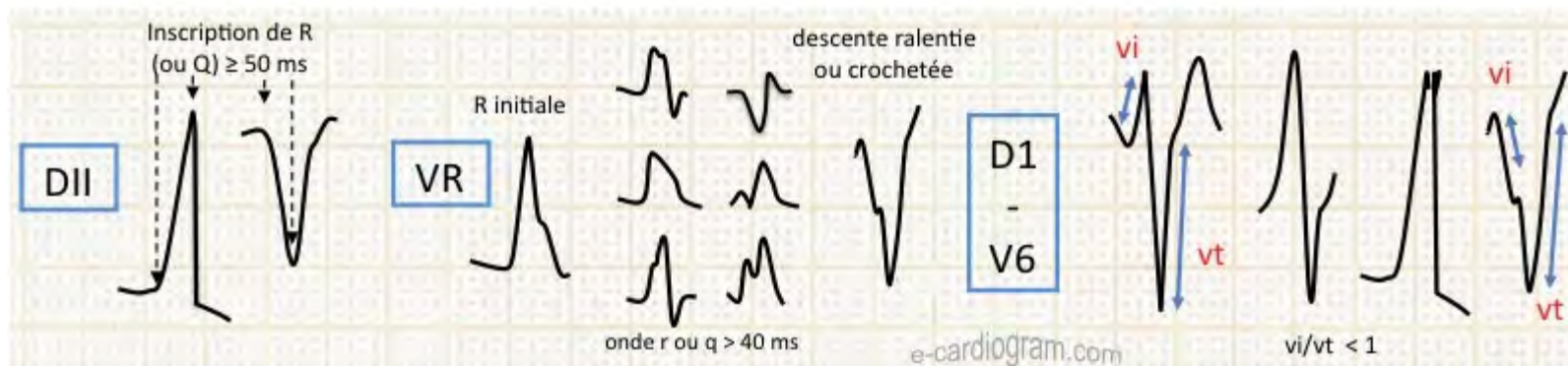


# Tachycardie ventriculaire

## algorithmes récents

Indice de Pava  
en DII

Nouvel algorithme  
de Vereckei



Pava LF... Brugada J. R-wave peak time at DII...  
Heart Rhythm. 2010

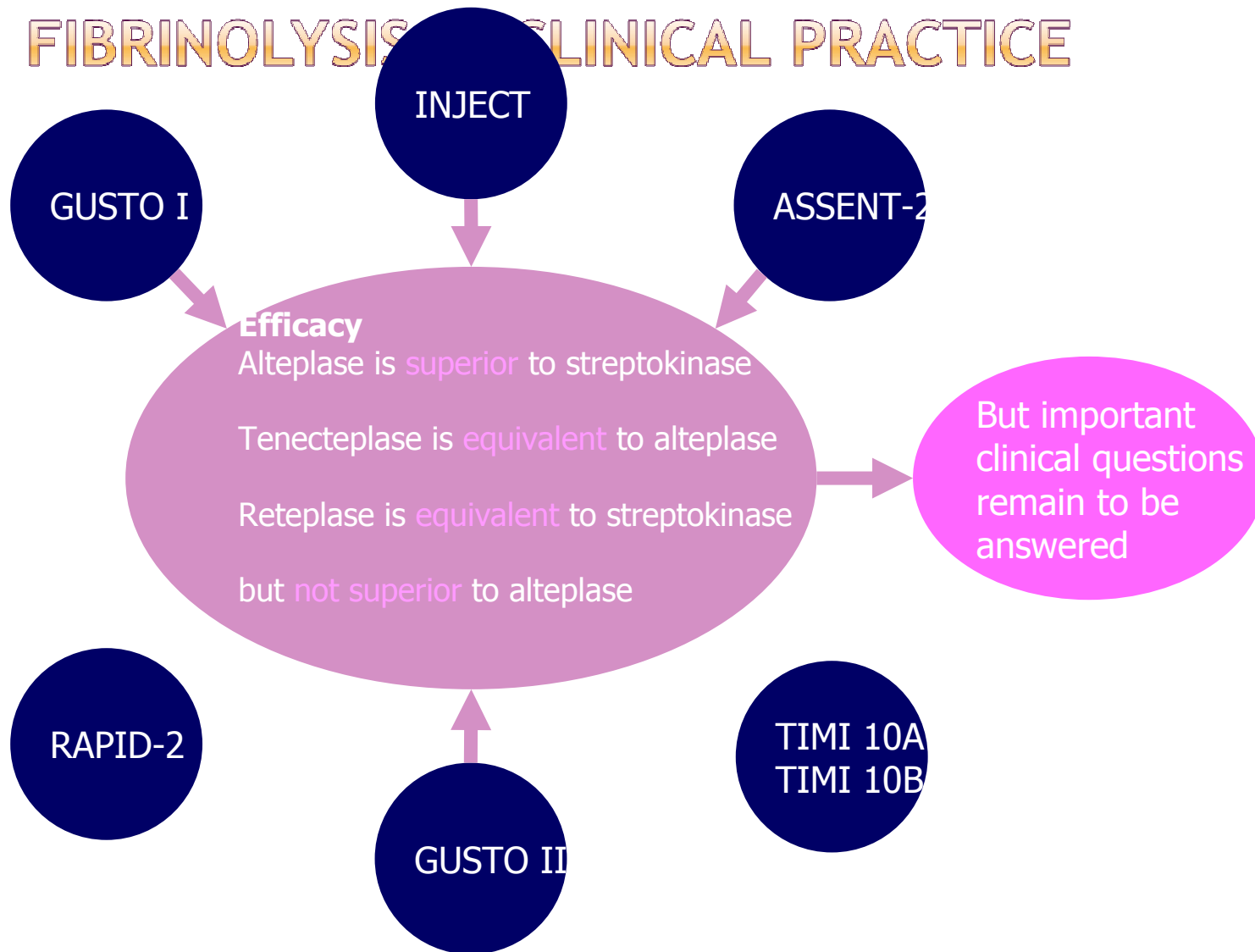
Vereckei A et al. New algorithm using only lead aVR...  
Heart Rhythm 2008

## Clinical Objectives in Management of STEMI

---

1. *Minimize the extent of irreversible injury*
2. *Prevent recurrent ischemia/MI*
3. *Avoid complications of reperfusion rx*
4. Manage electrical instability
5. Promote infarct healing and recovery

# FIBRINOLYSIS IN CLINICAL PRACTICE



**Table 7** Contraindications to fibrinolytic therapy

**Absolute contraindications**

- Haemorrhagic stroke or stroke of unknown origin at any time
- Ischaemic stroke in preceding 6 months
- Central nervous system trauma or neoplasms
- Recent major trauma/surgery/head injury (within preceding 3 weeks)
- Gastrointestinal bleeding within the last month
- Known bleeding disorder
- Aortic dissection
- Non-compressible punctures (e.g. liver biopsy, lumbar puncture)

**Relative contraindications**

- Transient ischaemic attack in preceding 6 months
- Oral anticoagulant therapy
- Pregnancy or within 1 week post-partum
- Refractory hypertension (systolic blood pressure  $> 180$  mmHg and/or diastolic blood pressure  $> 110$  mmHg)
- Advanced liver disease
- Infective endocarditis
- Active peptic ulcer
- Refractory resuscitation



