

SCINTIGRAPHIES CARDIAQUES

**Formation Générale en Sciences
Médicales – 2^o année**

Module cardiovasculaire

Denis Mariano-Goulart
Faculté de médecine et CHRU de Montpellier
<http://scinti.edu.umontpellier.fr>

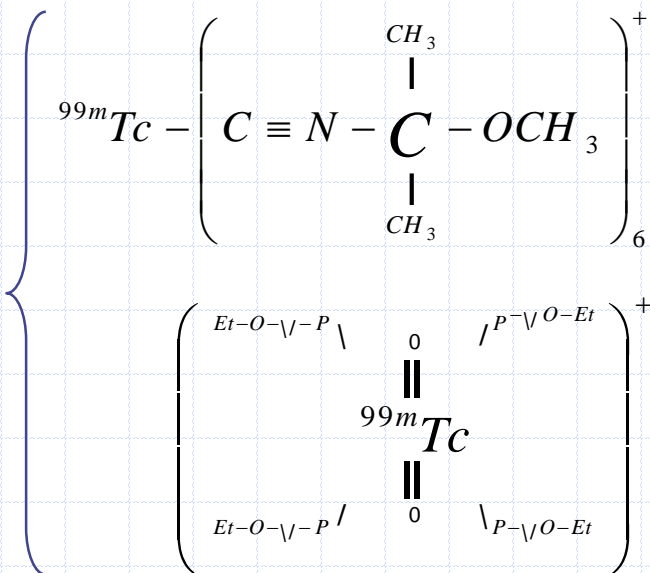
Indications

- **DIAGNOSTIC & SUIVI DES CORONAROPATHIES**
 - Pendant, après un angor, suivi douteux.
 - **ATTENTION : sténose \neq ischémie \Rightarrow traitement**
- **DEPISTAGE DES CORONAROPATHIES**
 - Pré-Op, cardiopathie,
 - FRCV, ischémie silencieuse (DNID,VIH)
- **RECHERCHE DE VIABILITE MYOCARDIQUE**
- **EVALUATION DE LA FONCTION SYSTOLIQUE VG**
 - À des fins pronostiques seulement
- **RECHERCHE DE MALADIE DE SURCHARGE CARDIAQUE**
 - Sarcoïdose cardiaque...

RADIOTRACEURS DE PERFUSION MYOCARDIQUE

- **CATIONS LIPOPHILES**

- MIBI, TETROFOSMINE
- Diffusion passive
- ∞ ddp transmembranaire
- 95% ∈ mitochondries
 - Muscle, Glandes exocrines
 - Cancers



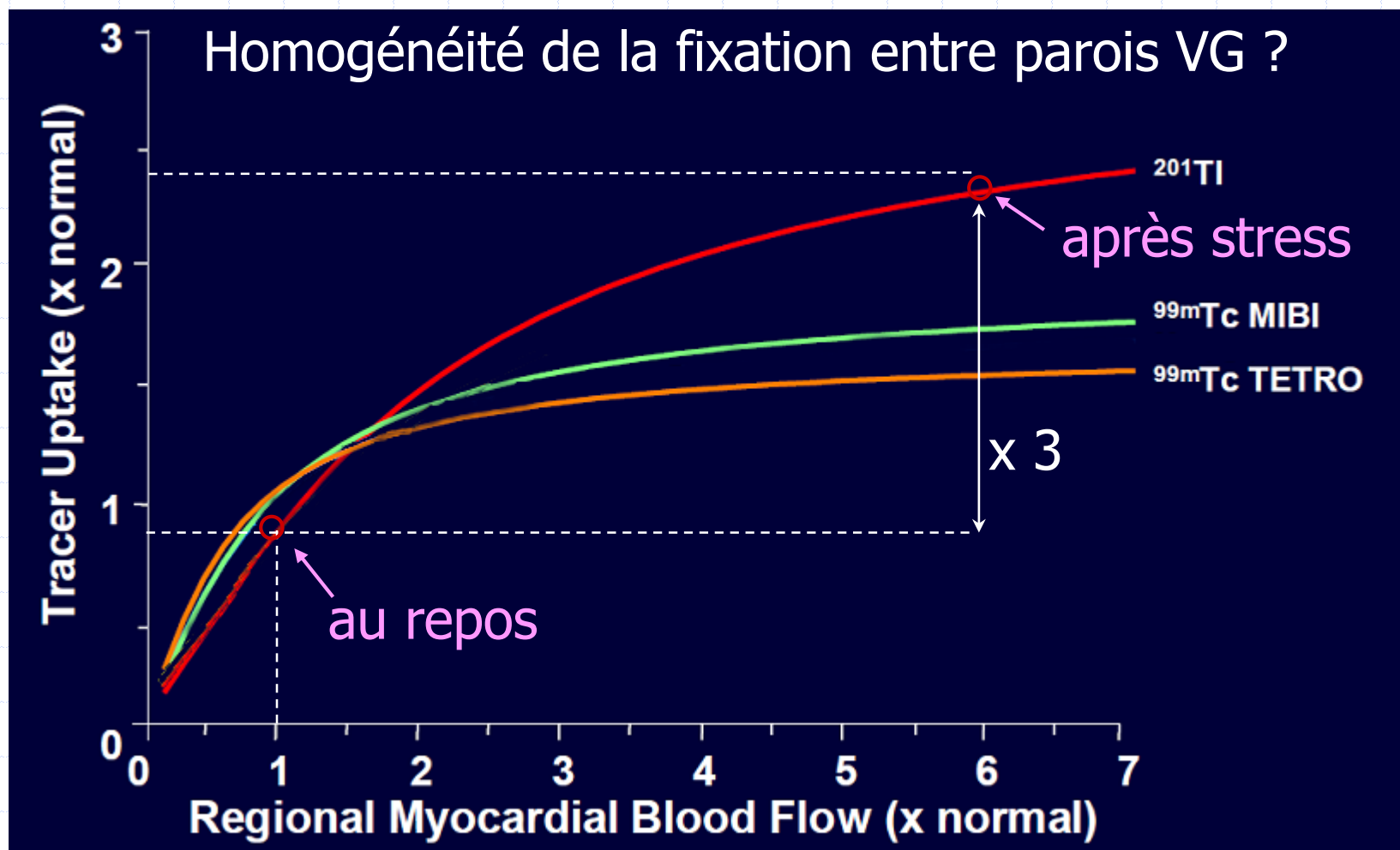
- **THALLIUM 201 (²⁰¹Tl)**

- Analogue du K (Na/K ATPase, cotransport Na/K/2Cl)

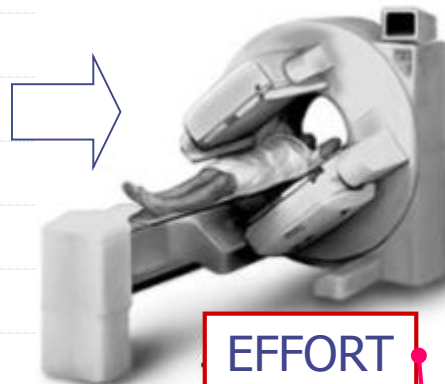
- **RUBIDIUM 82 (⁸²Rb)**

- Analogue du K (Na/K ATPase, cotransport Na/K/2Cl)
- En cours de développement clinique (quantification ++)

RADIOTRACEURS DE PERFUSION MYOCARDIQUE

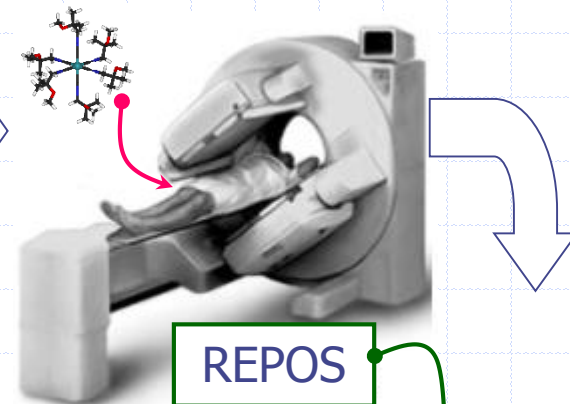


SCINTIGRAPHIE DE PERFUSION

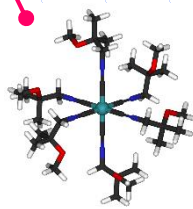
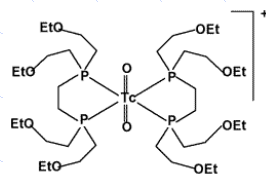


EFFORT

3 h

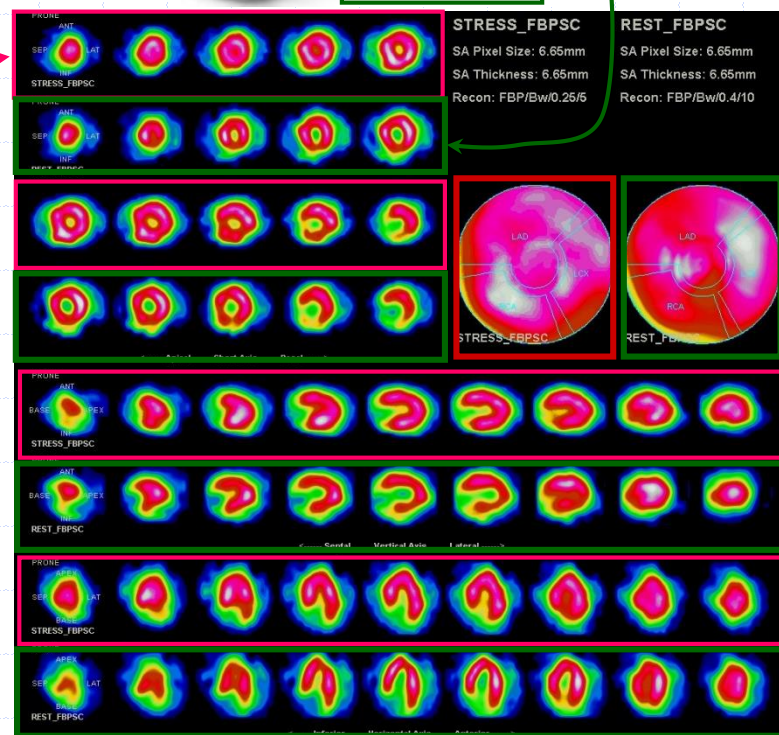
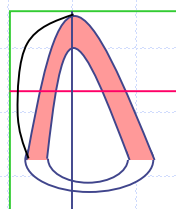
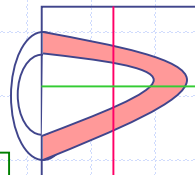
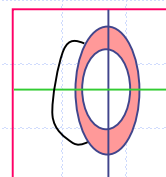


REPOS



201TI

Traceurs de perfusion myocardique



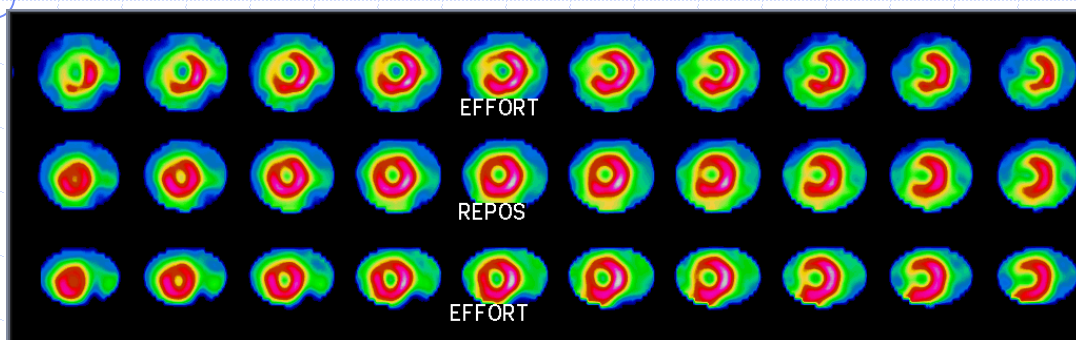
IRRADIATION

scintigraphie = 2 ou 7 mSv

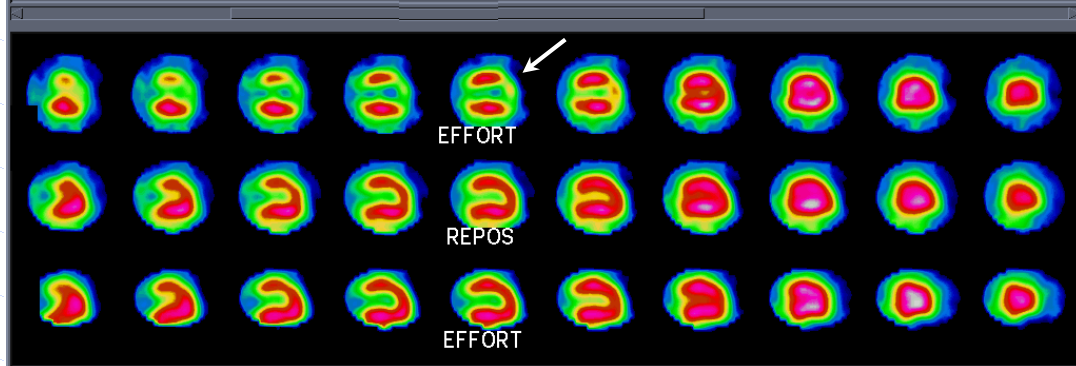
coronarographie = 5 mSv

coroscanner = 10 à 15 mSv

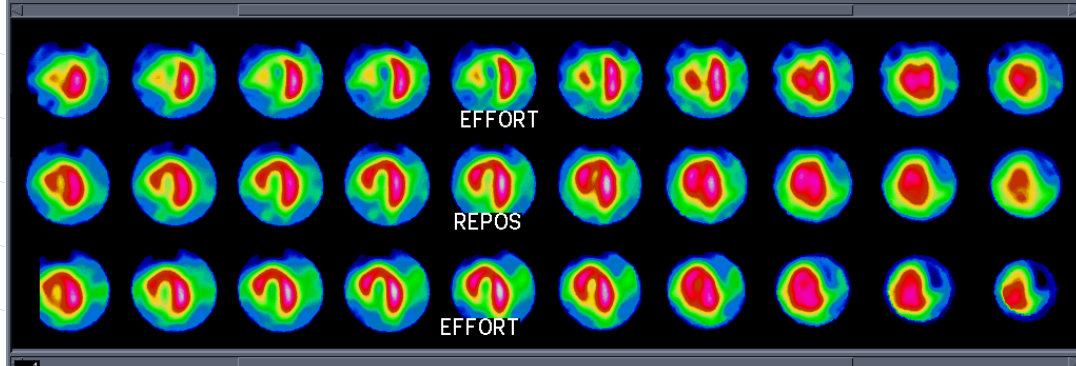
DEPISTAGE D'ISCHEMIE SILENCIEUSE (DIABETE)



EFFORT
REPOS
POST STENT

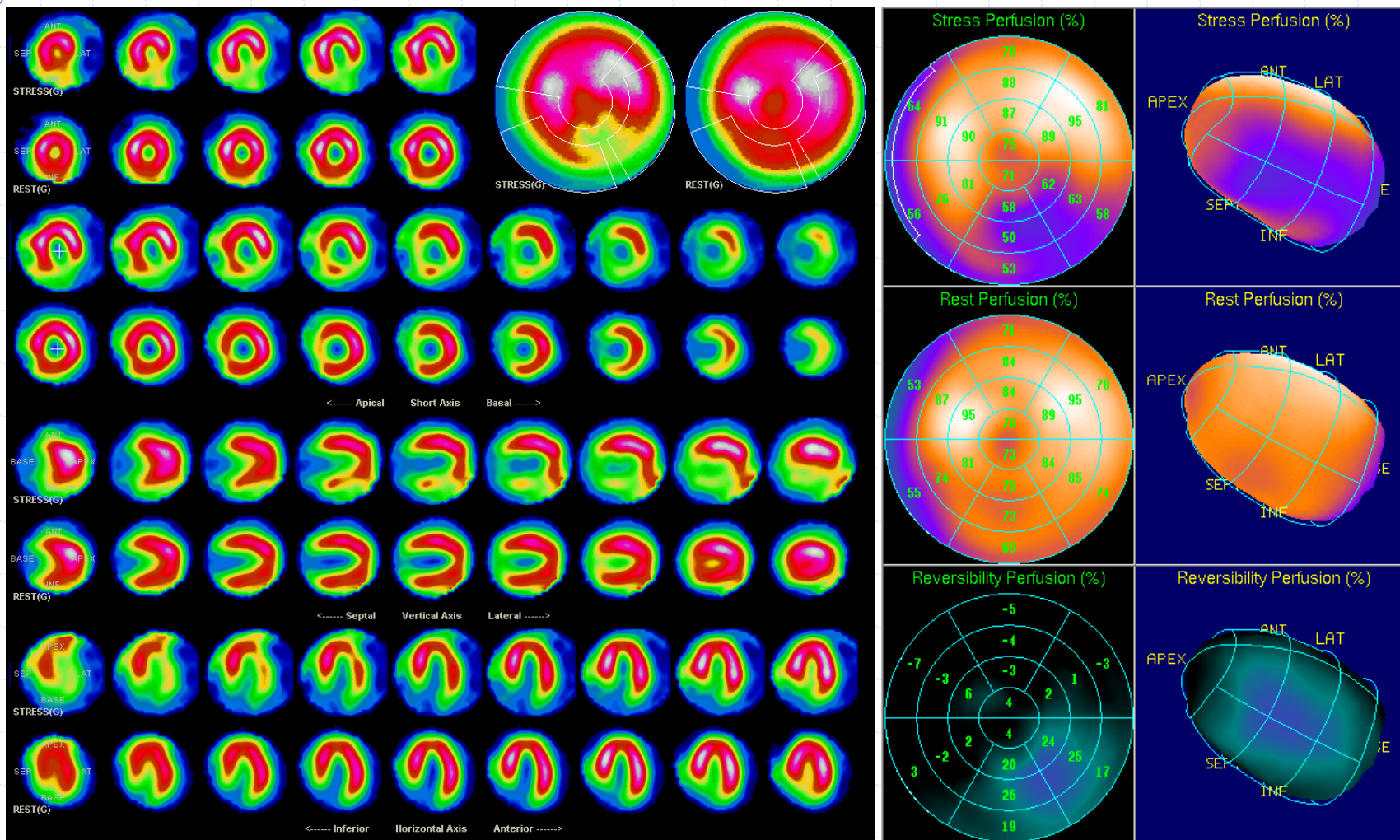


EFFORT
REPOS
POST STENT

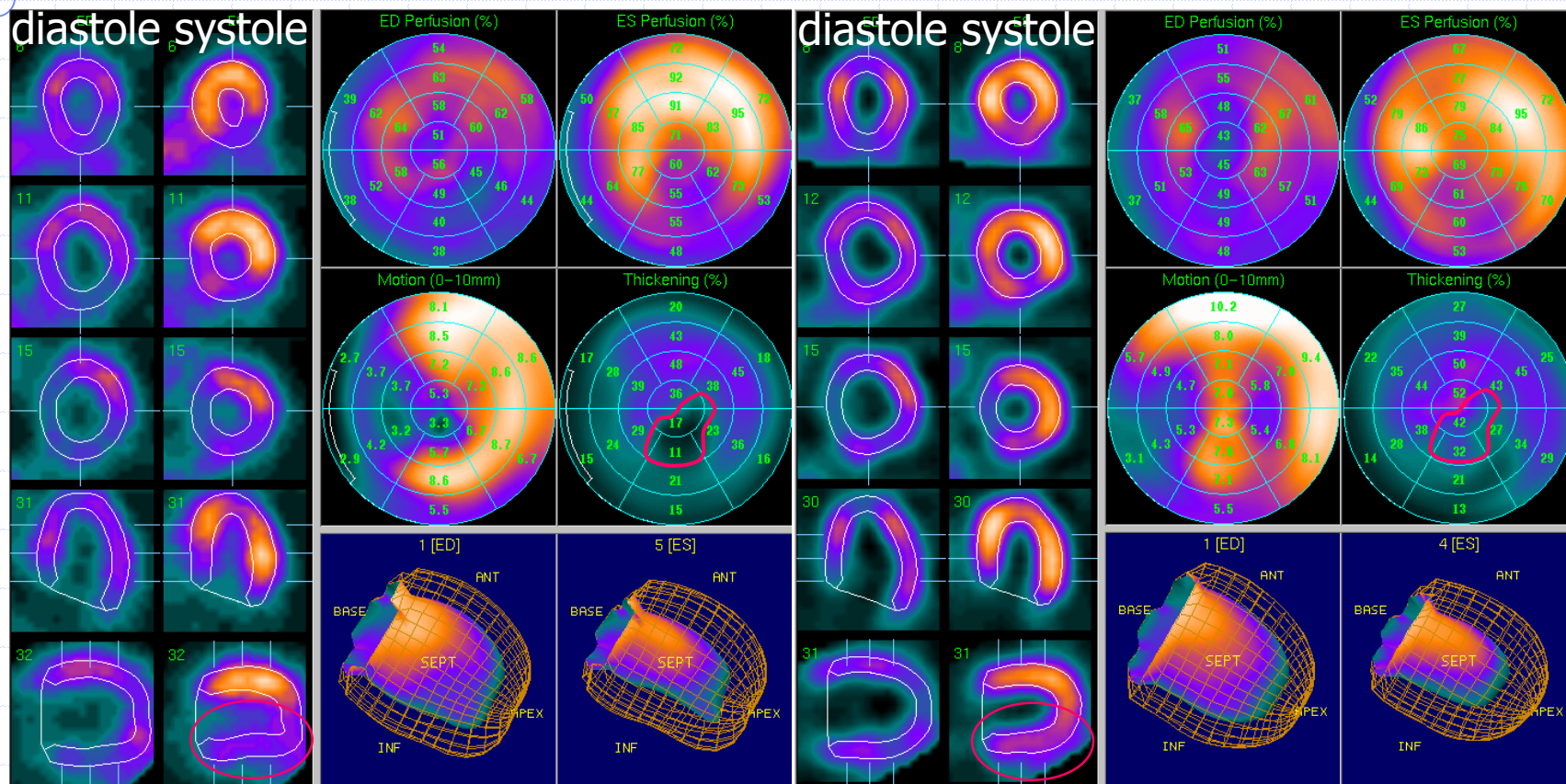


EFFORT
REPOS
POST STENT

DEPISTAGE D'ISCHEMIE SILENCIEUSE (HIV)



DEPISTAGE D'ISCHEMIE SILENCIEUSE (HIV)



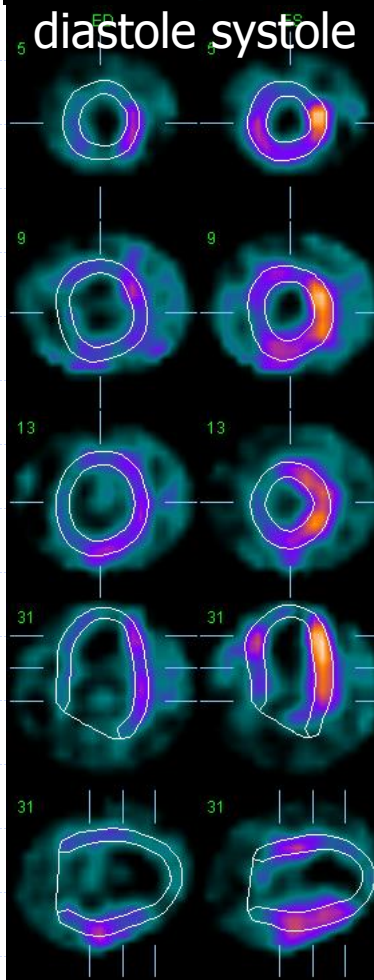
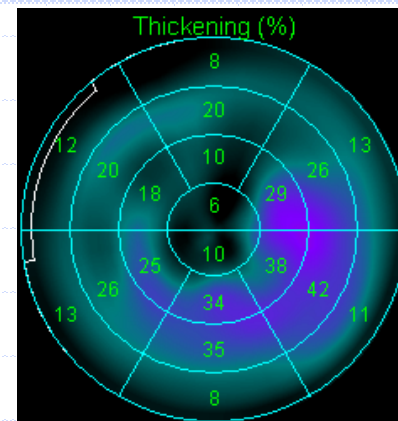
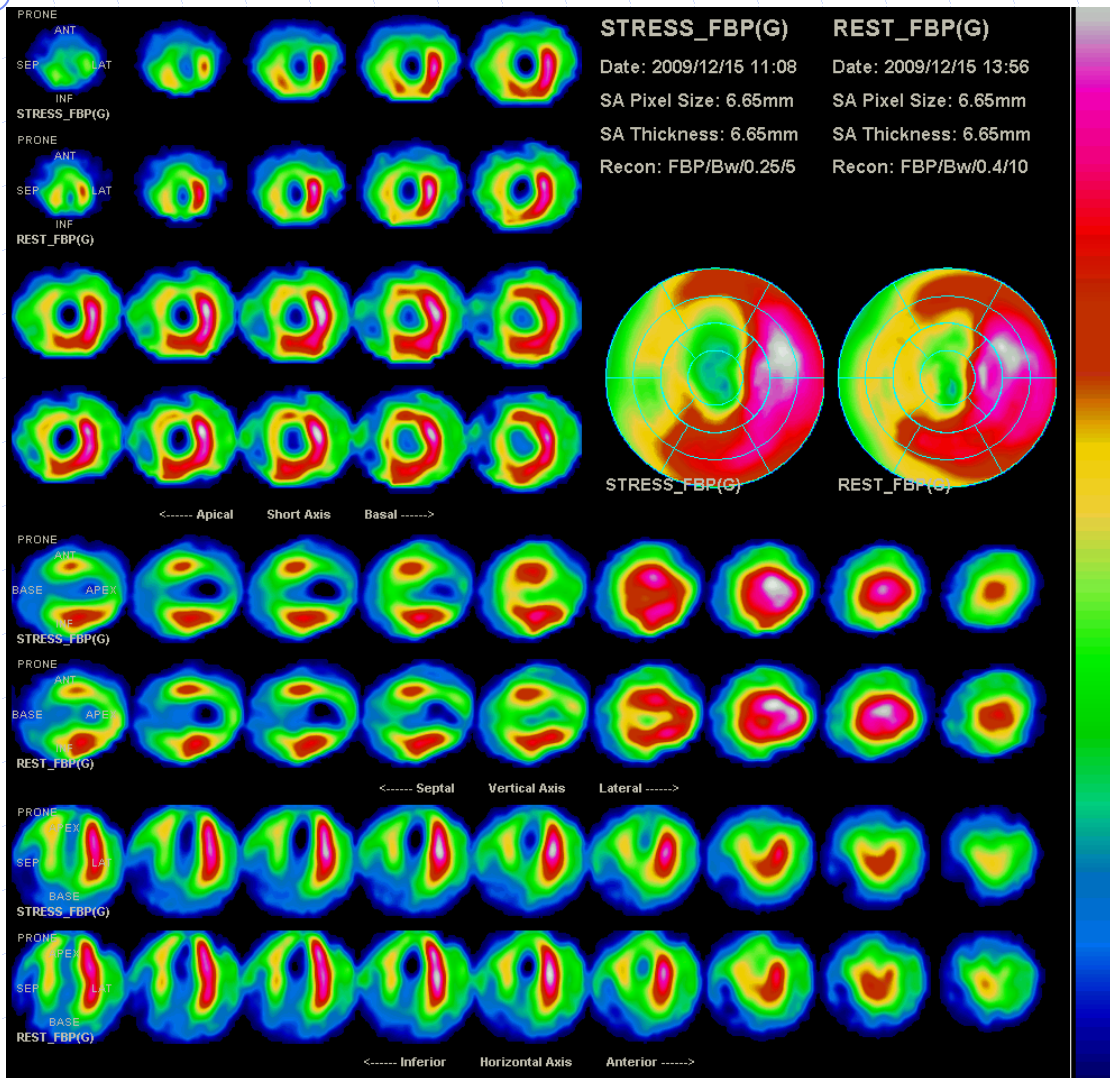
EFFORT

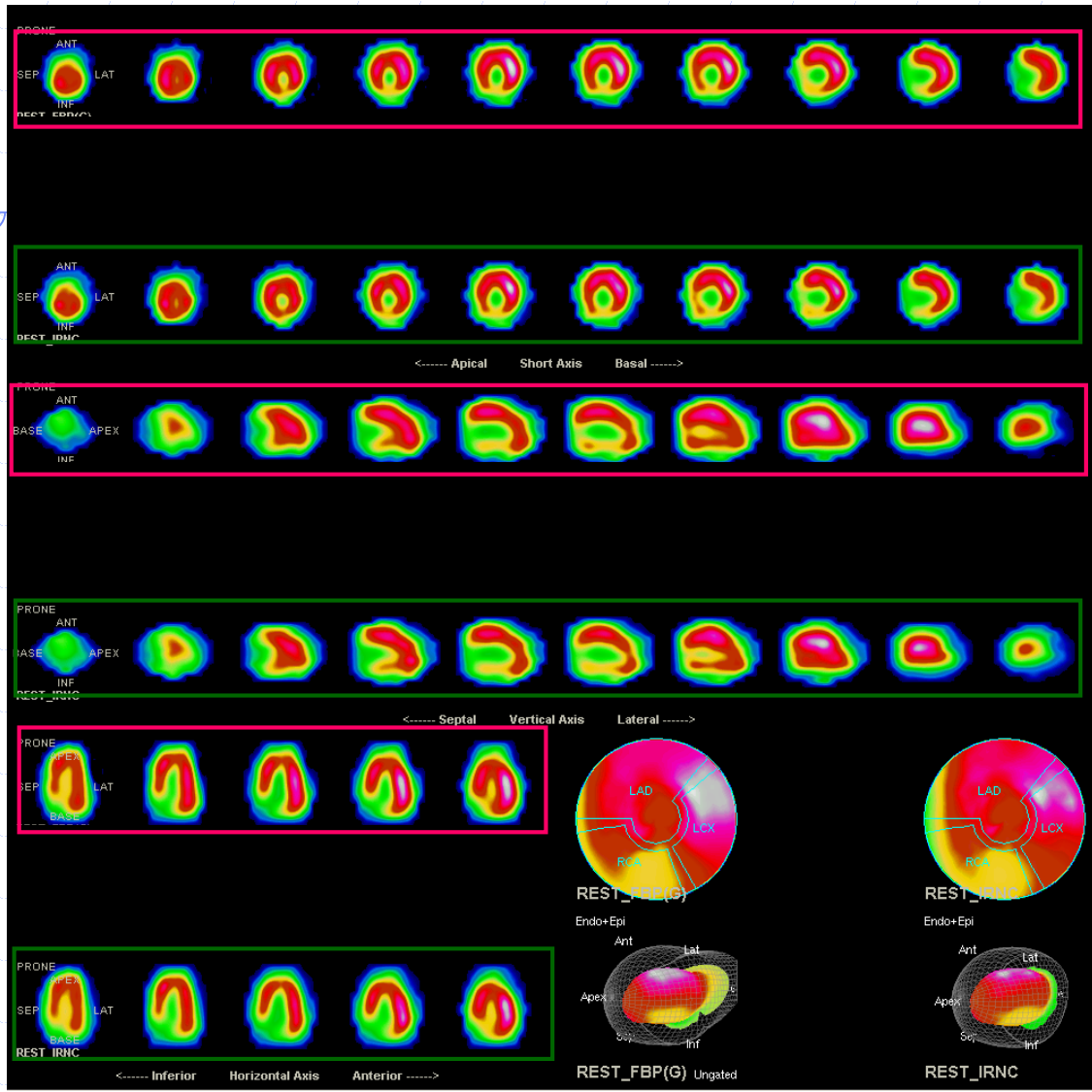
VTD/VTS=99/49 mL Fe = 51 %
 ES(apico-inf) = 11-17%

REPOS

VTD/VTS=101/47 mL Fe = 54 %
 ES(apico-inf) = 32-42 %

NECROSE

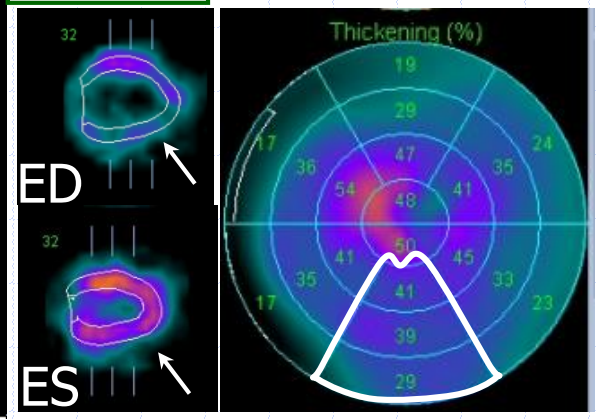




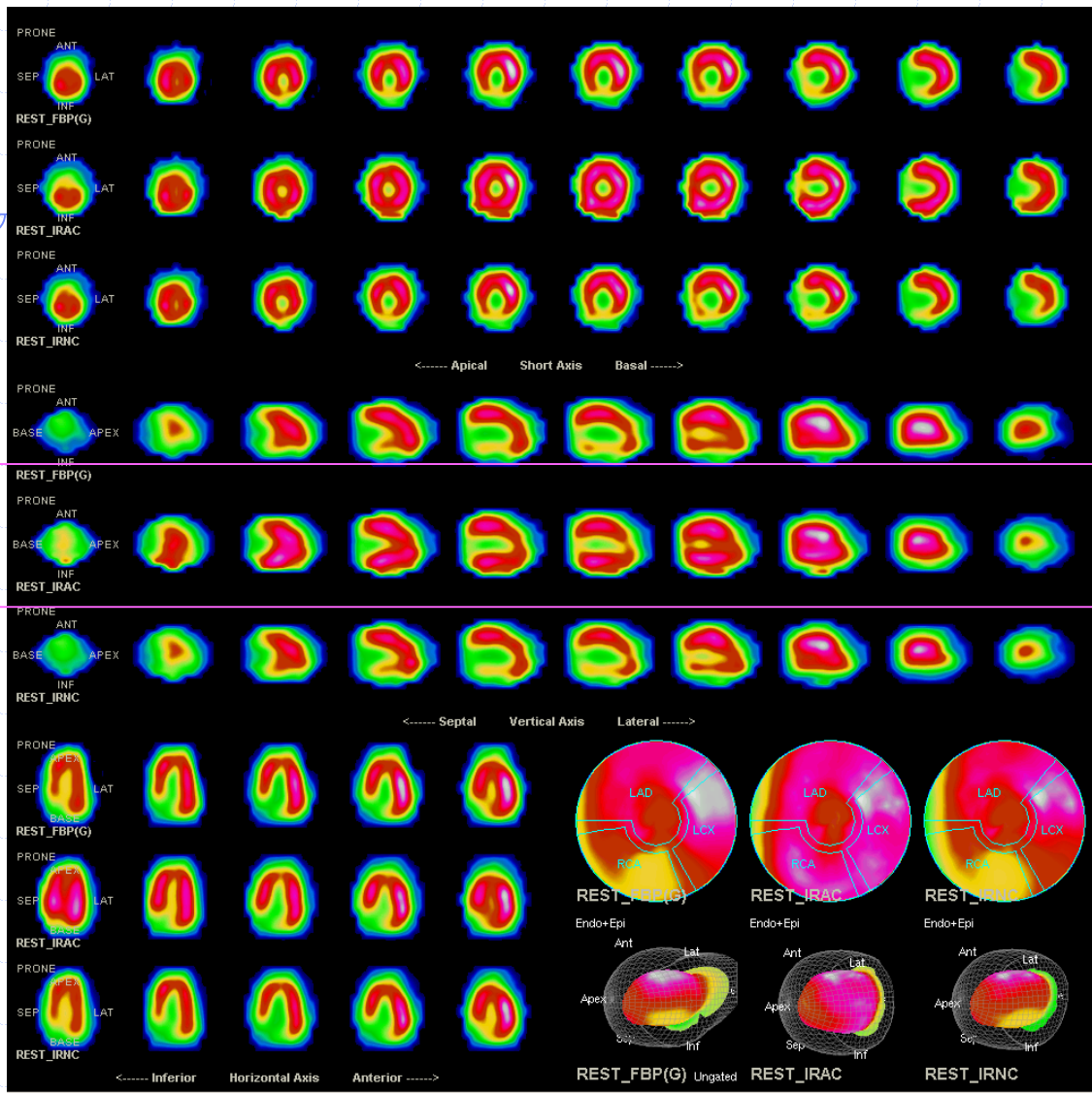
VOTRE DIAGNOSTIC ?

EFFORT

REPOS



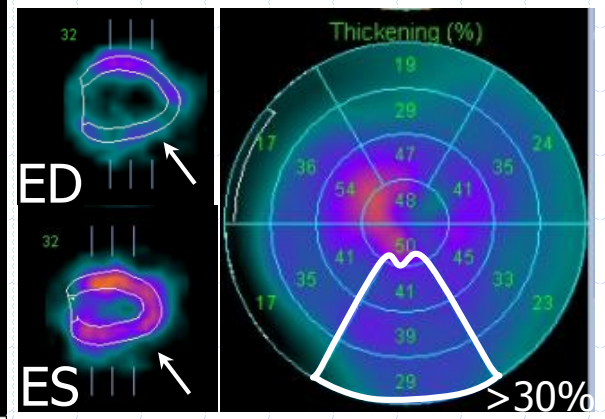
EXAMEN NORMAL



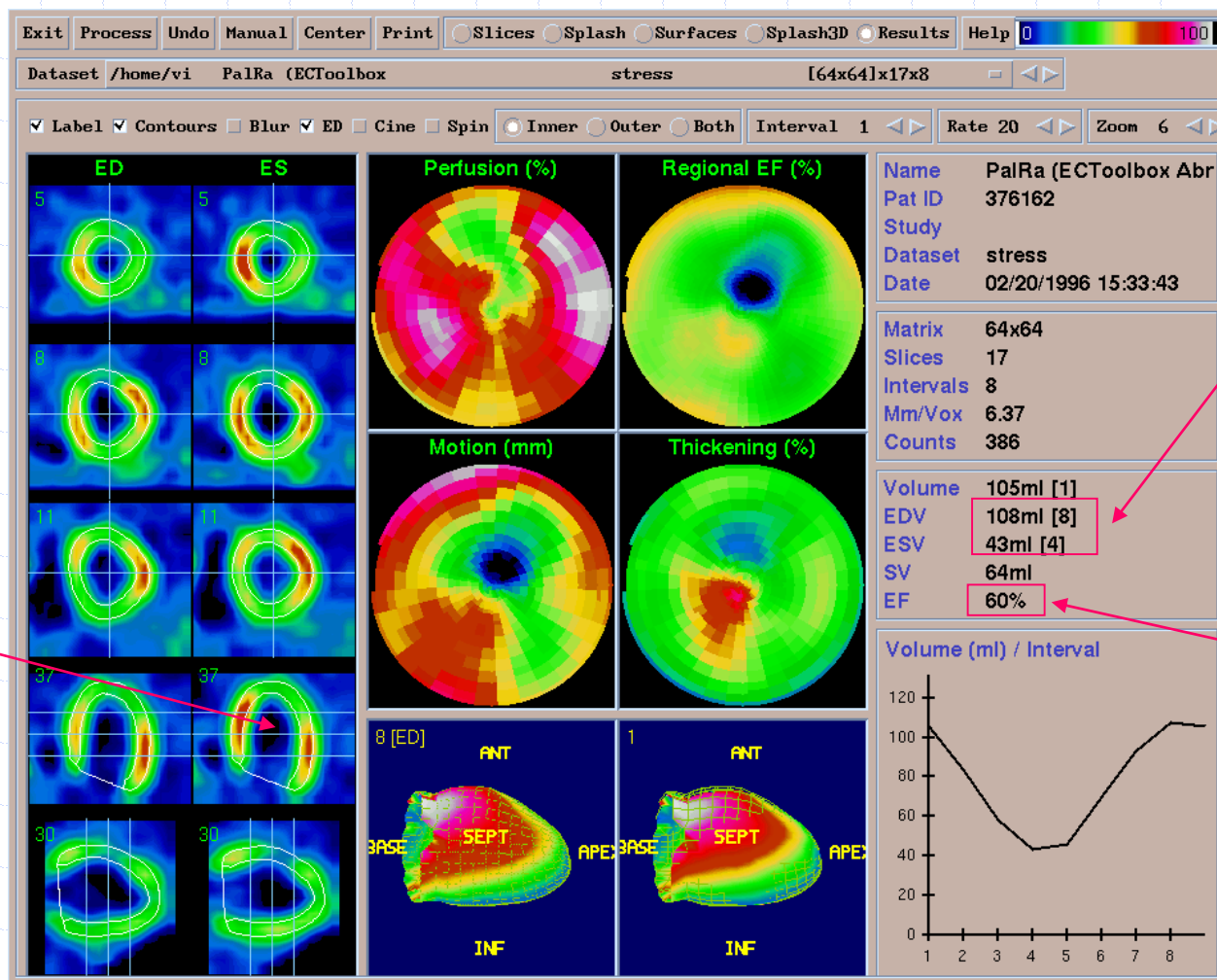
Sans correction

+ scanner X

Sans correction



FONCTION SYSTOLIQUE



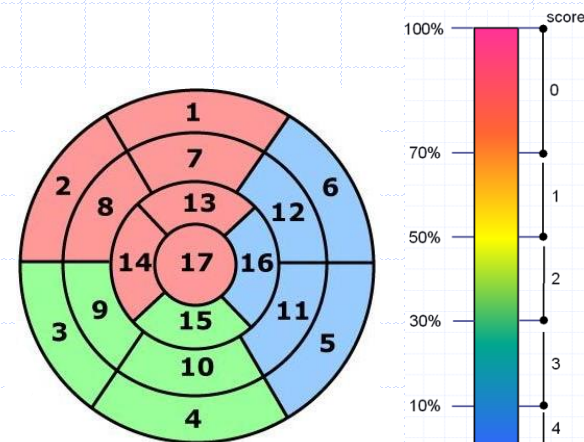
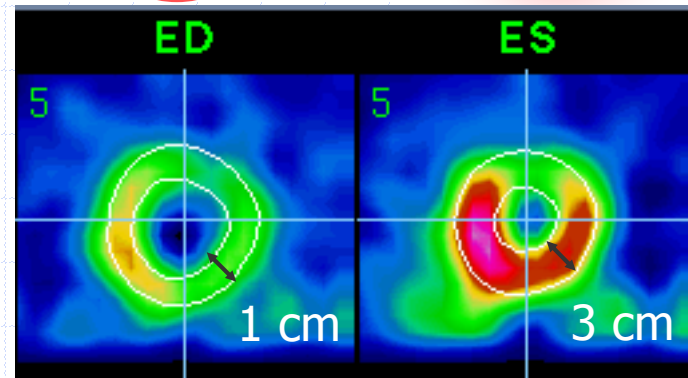
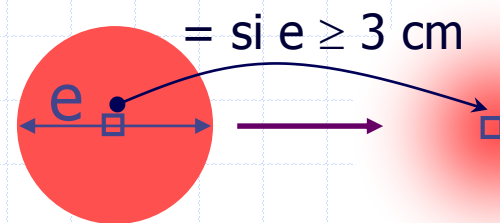
volumes
RR x 2 à 3

fraction
RR x 2 à 4

Épaississement
Systolique :
sévérité +
artefacts

SENSIBILITE ET SPECIFICITE

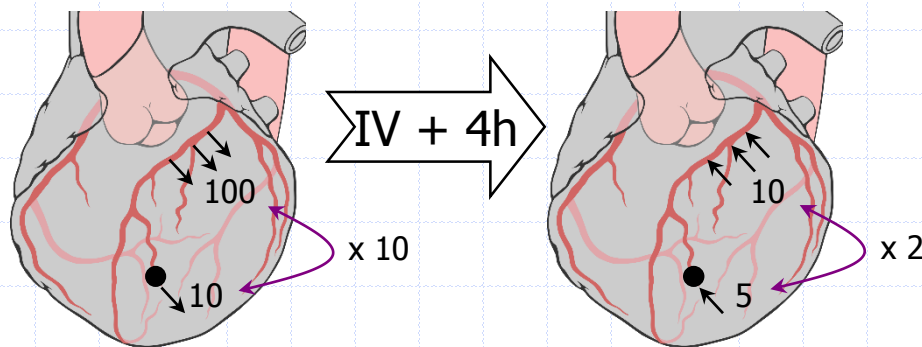
- Sensibilité > 90 %
 - Stress mixte:
 - effort + dipyridamole
 -
- Spécificité > 80 %
 - ACQUISITION :
 - Procubitus ± decubitus;
 - scanner X couplé
 - Synchronisée ECG
 - INTERPRETATION :
 - Epaisseur systolique
 - Quantification



RADIOTRACEURS DE VIABILITE MYOCARDIQUE

- **THALLIUM**

- Redistribution à 4 h \Rightarrow viabilité

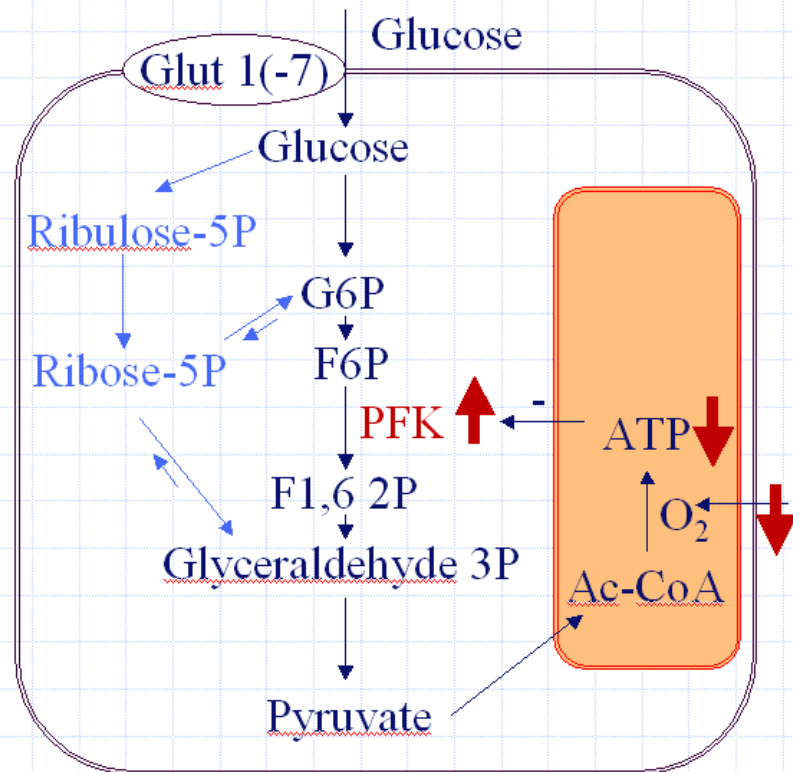


- **^{18}F -D-Glucose**

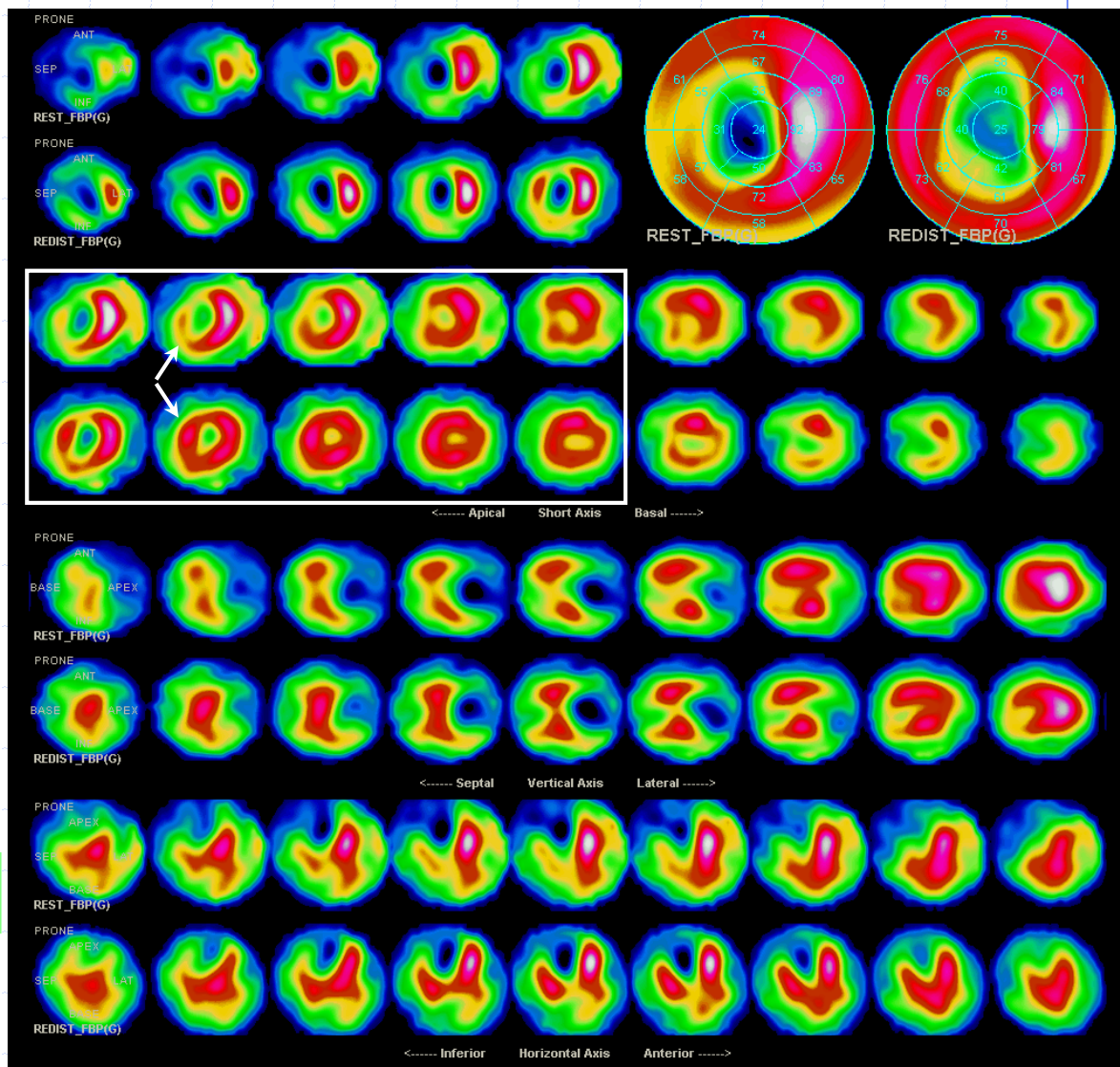
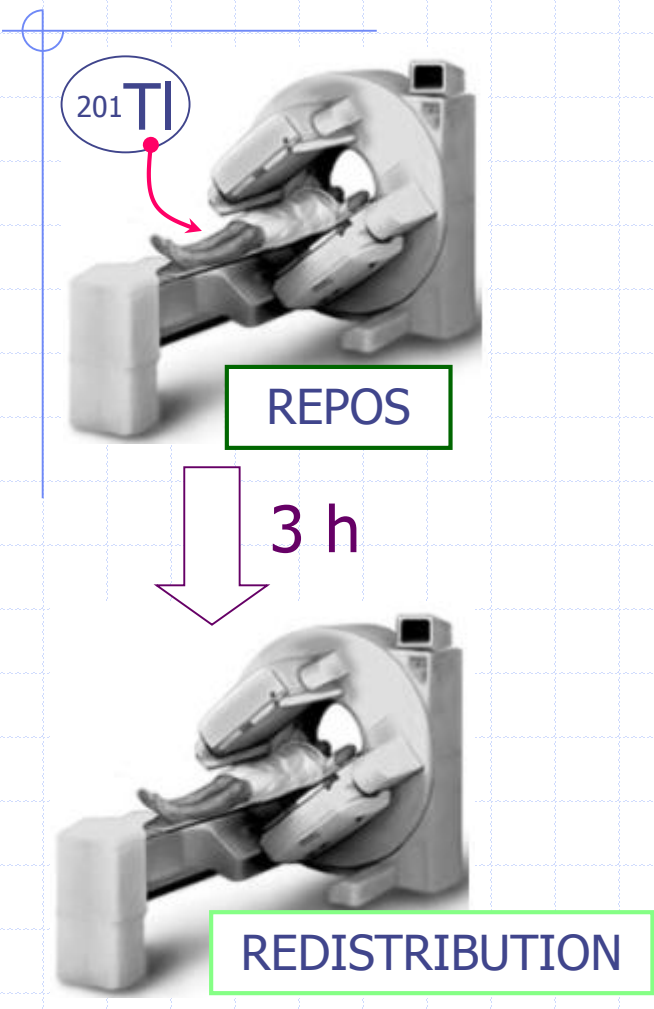
hypoxie viable



hyperfixation

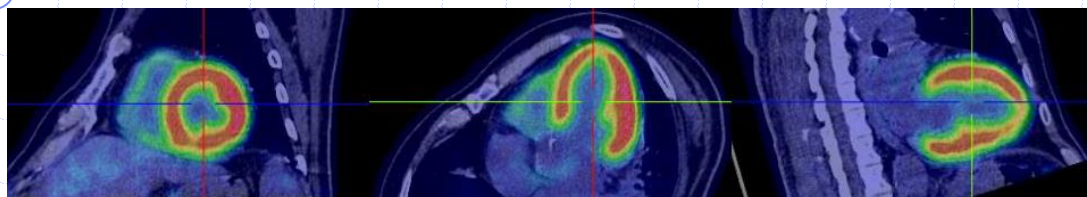


THALLIUM REPOS-REDISTRIBUTION

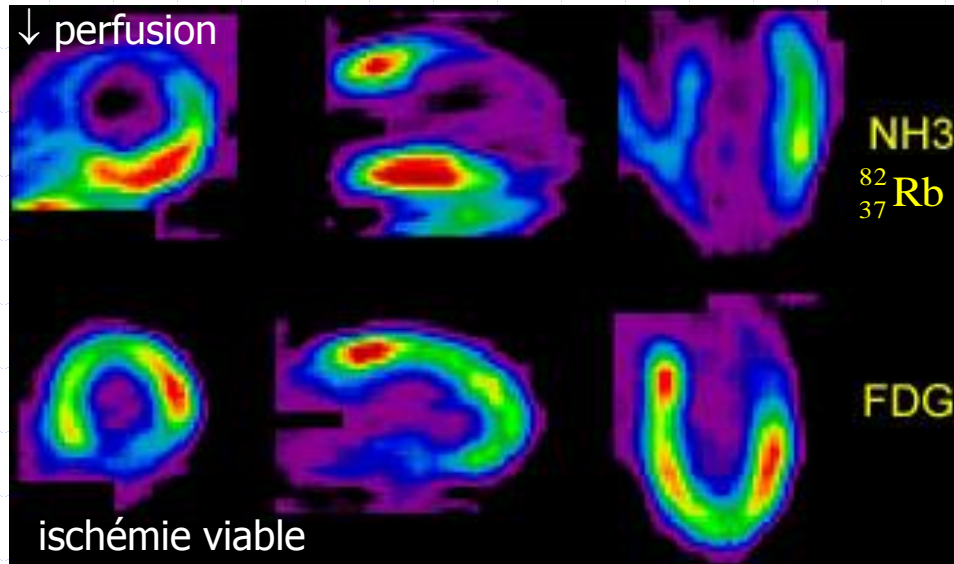
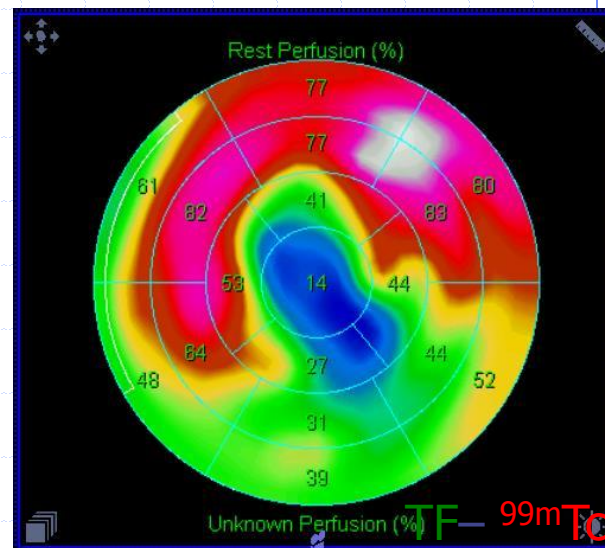


VIABILITE SEPTO-BASALE

VIABILITE & PERFUSION EN TEP

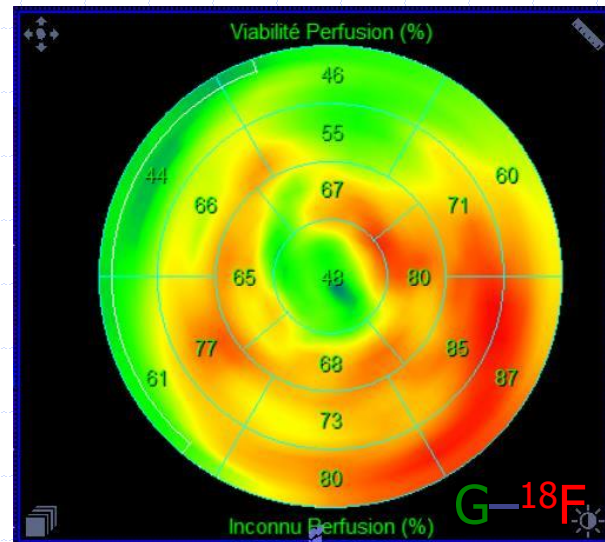


NORMAL



HIBERNATION ANTERO-SEPTO-APICALE

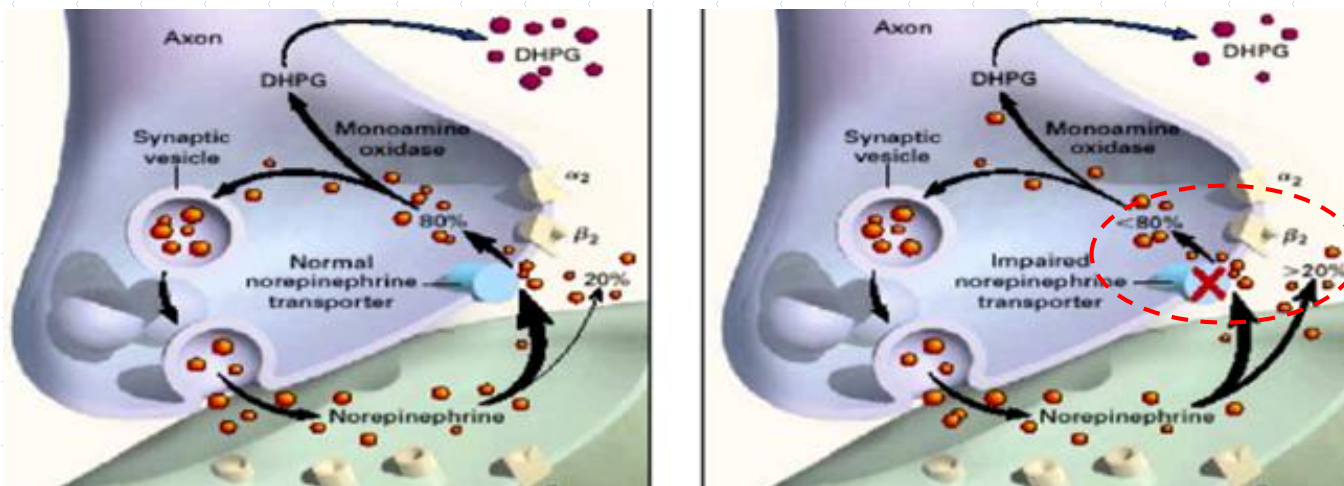
HIBERNATION INFERO-LATERALE



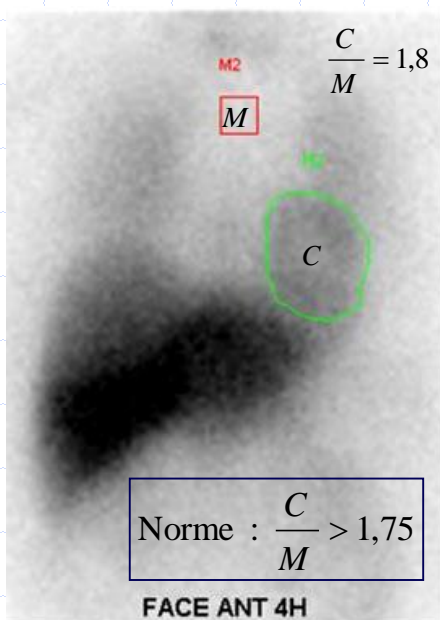
SYNTHESE SUR LA SCINTIGRAPHIE DE PERFUSION MYOCARDIQUE

- peu irradiant (2 ou 7 mSv)
- sensible et spécifique (> 85%)
- quantifie une ischémie myocardique
 - ischémie, hibernation, nécrose.
 - Analyse de la cinétique des parois (≡ écho. dobutamine)
- apporte une information pronostique
 - Quantification de la fonction systolique : FE, volumes
- apporte une information de viabilité
 - indications de revascularisation
- **coût** : 77 € (ECG d'effort) + Scinti.: 484 € (effort et repos)

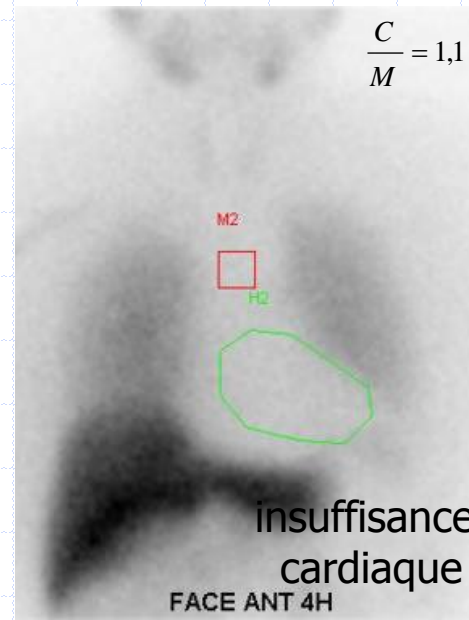
SCINTIGRAPHIE DE L'INNERVATION SYMPATHIQUE CARDIAQUE A LA MIBG



90% survie à 2 ans

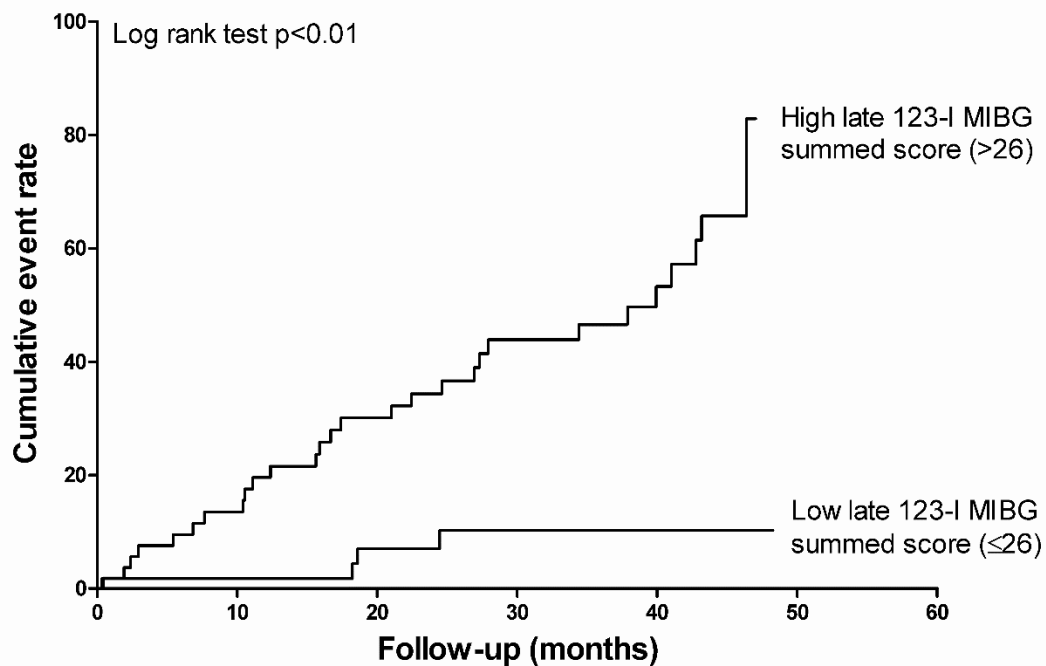
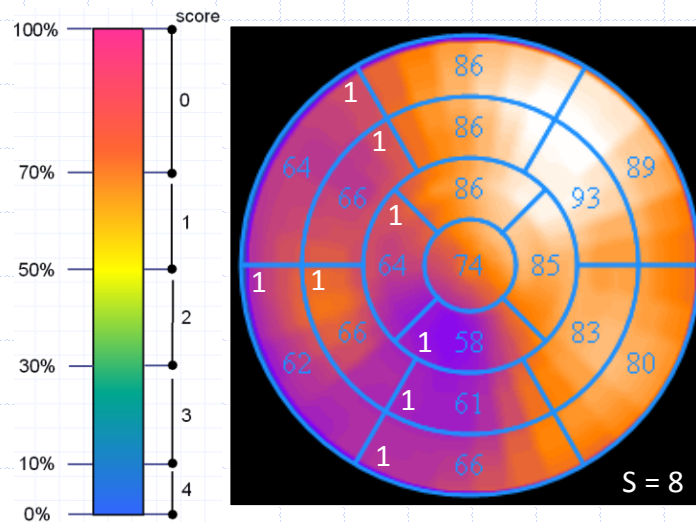
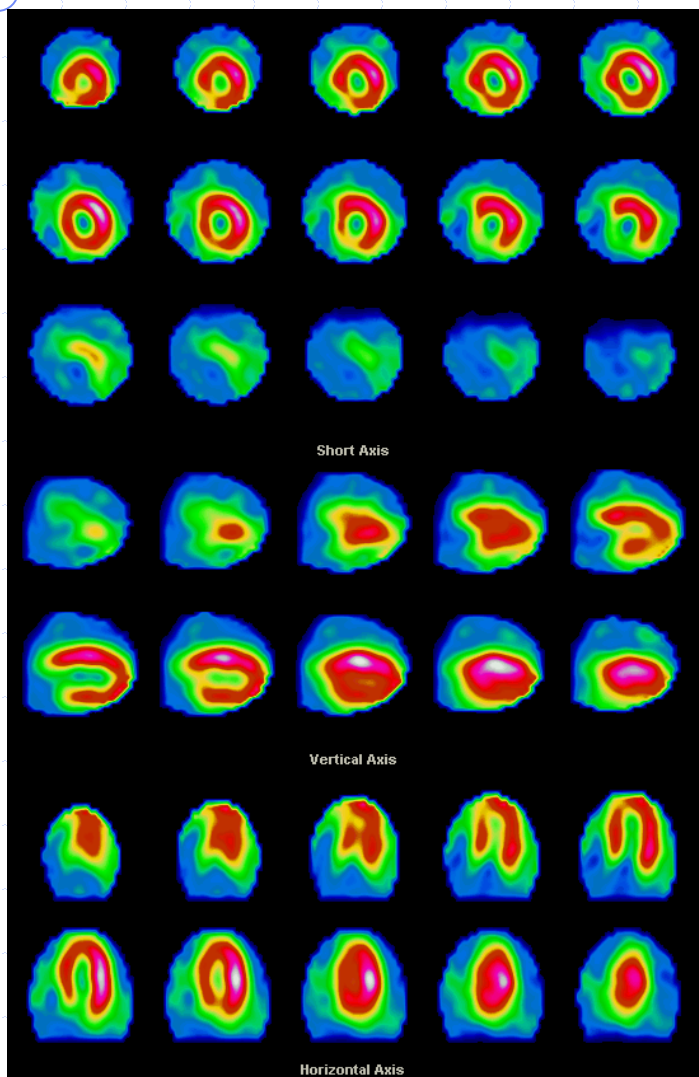


60% survie à 2 ans

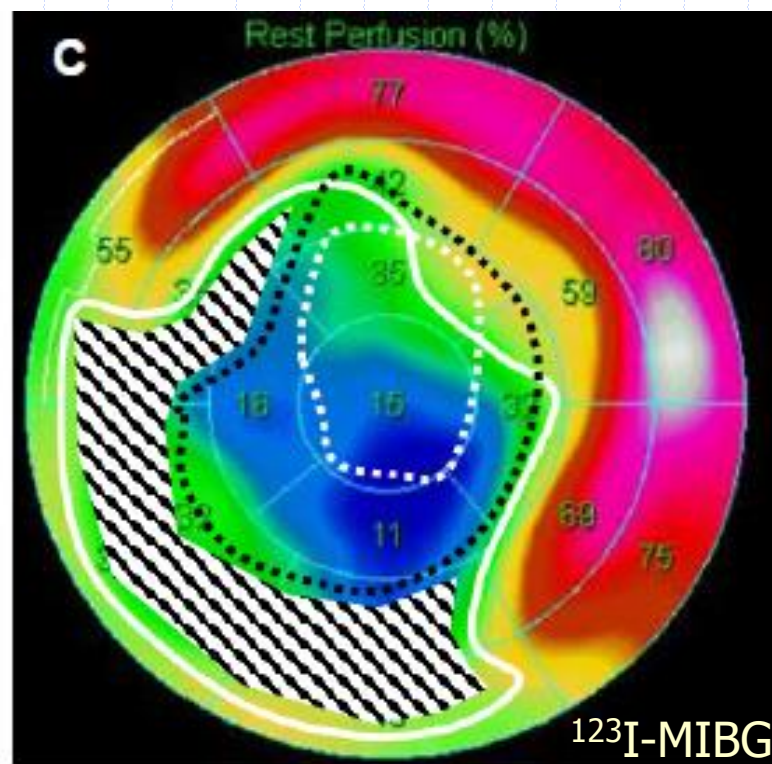
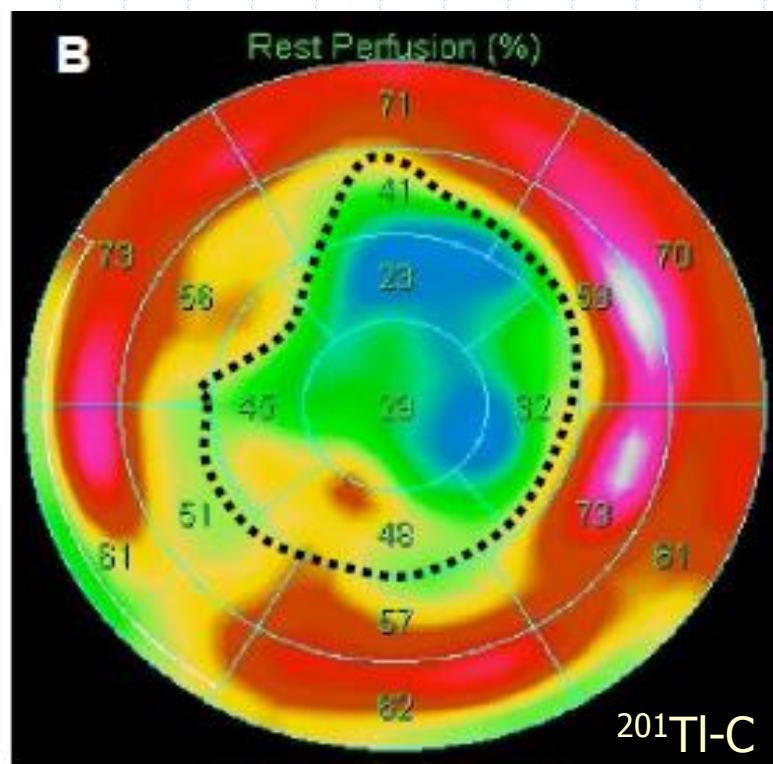


Pronostic d'une insuffisance cardiaque

MIBG (Défibrillateur)



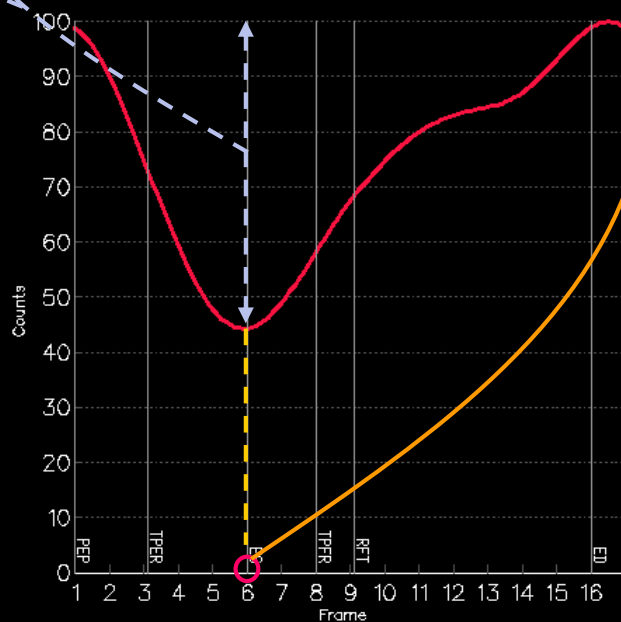
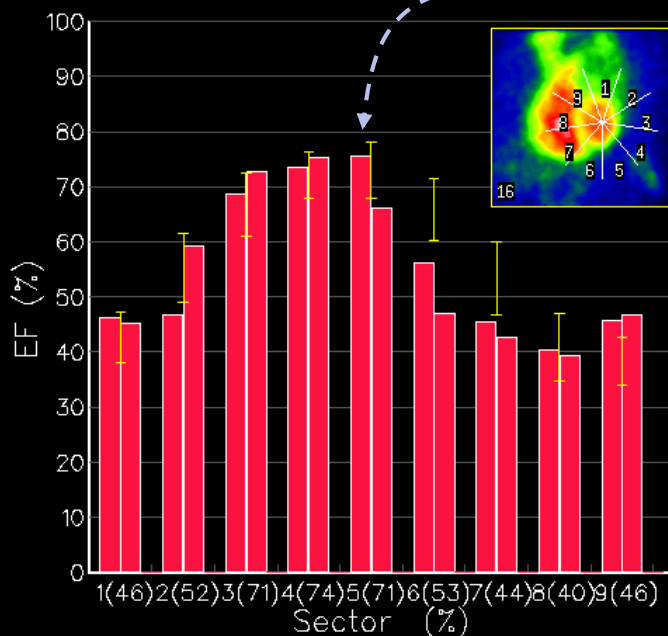
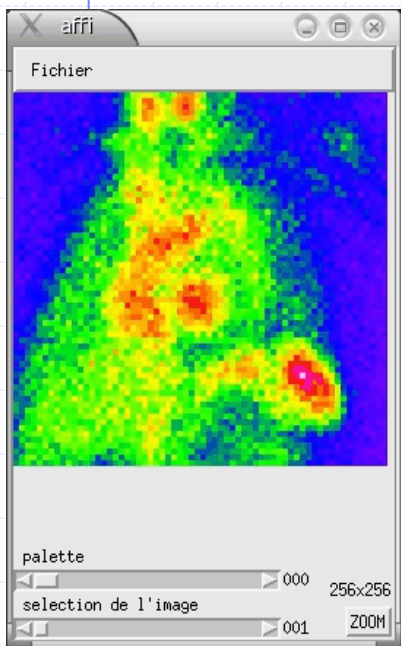
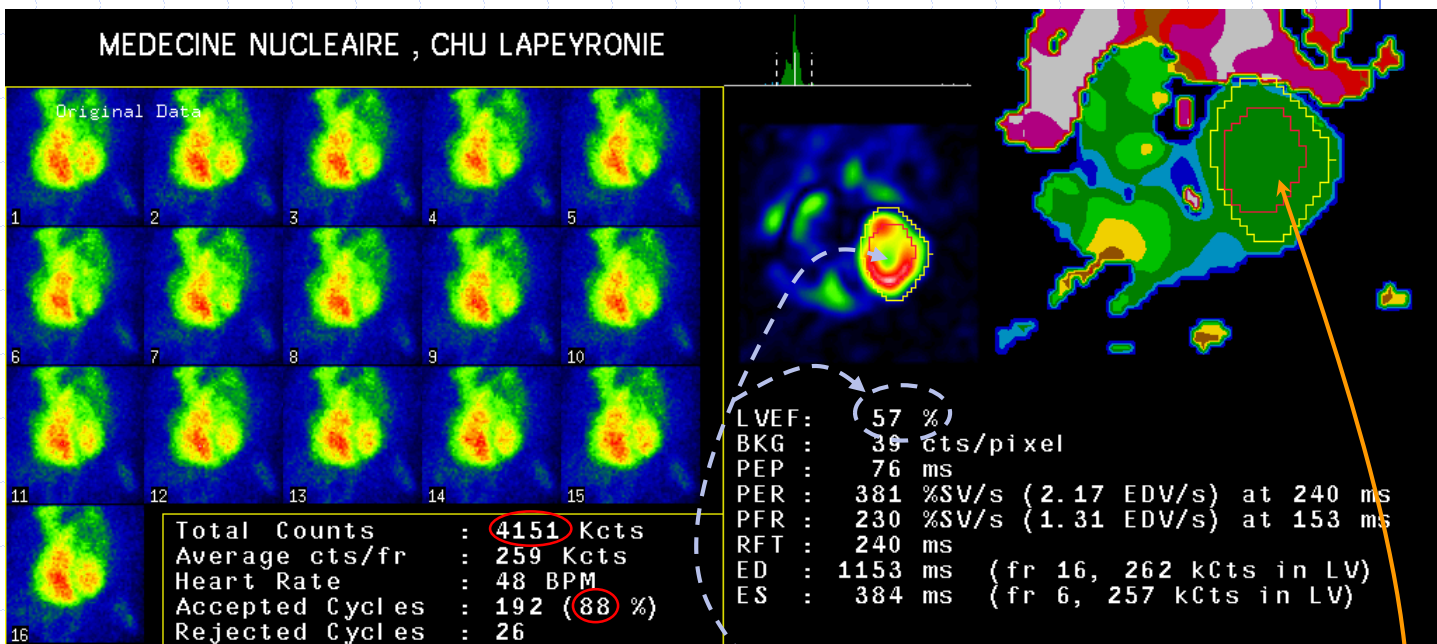
GACHETTES (VIABLES DESINNERVEES)



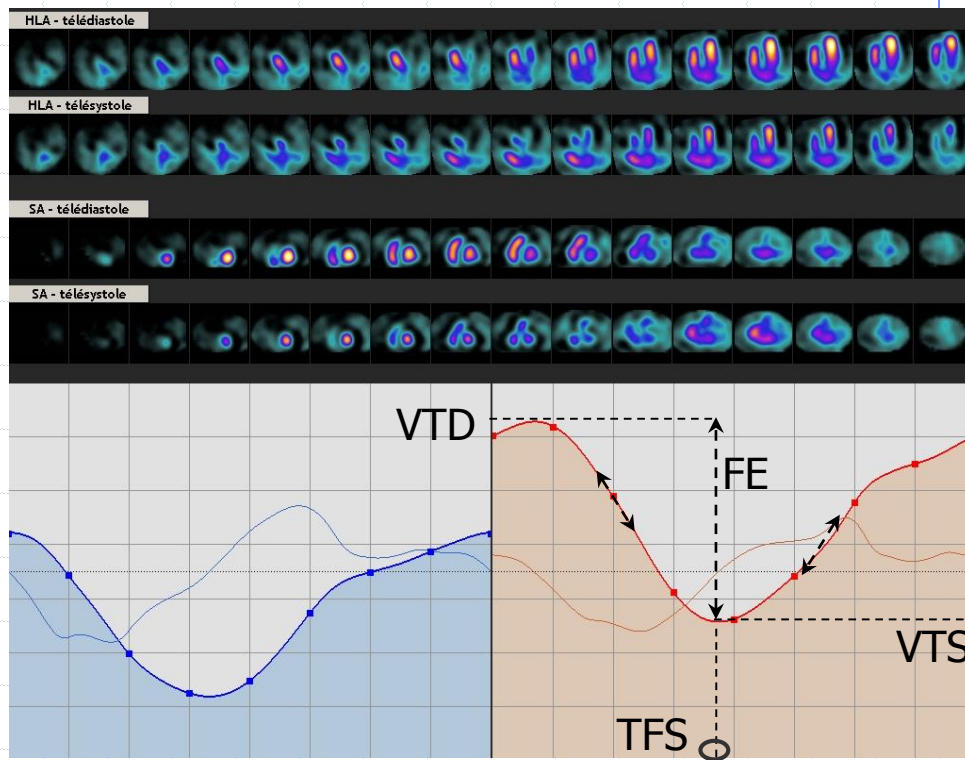
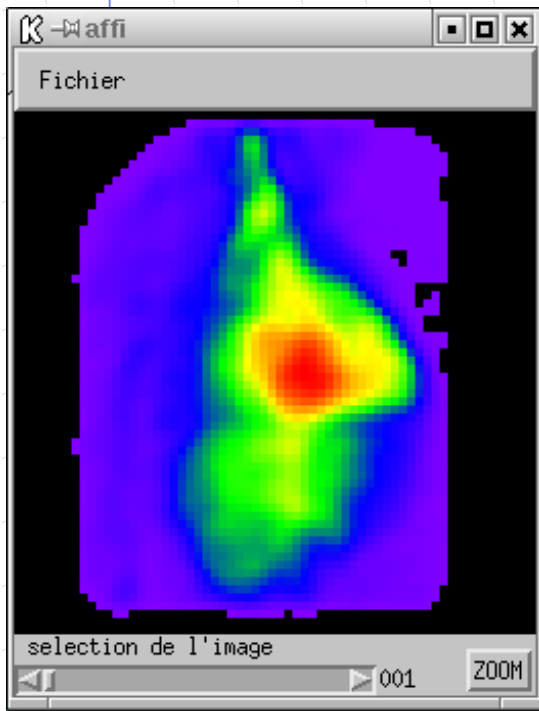
- 1- Clichés 3 h après administration de ^{201}Tl (70 keV) + ^{123}I -MIBG (159 keV)
- 2- Gâchettes corrélées au pic de troponine, à la \downarrow FEVG et \uparrow NYHA à un an

VENTRICULOGRAPHIE

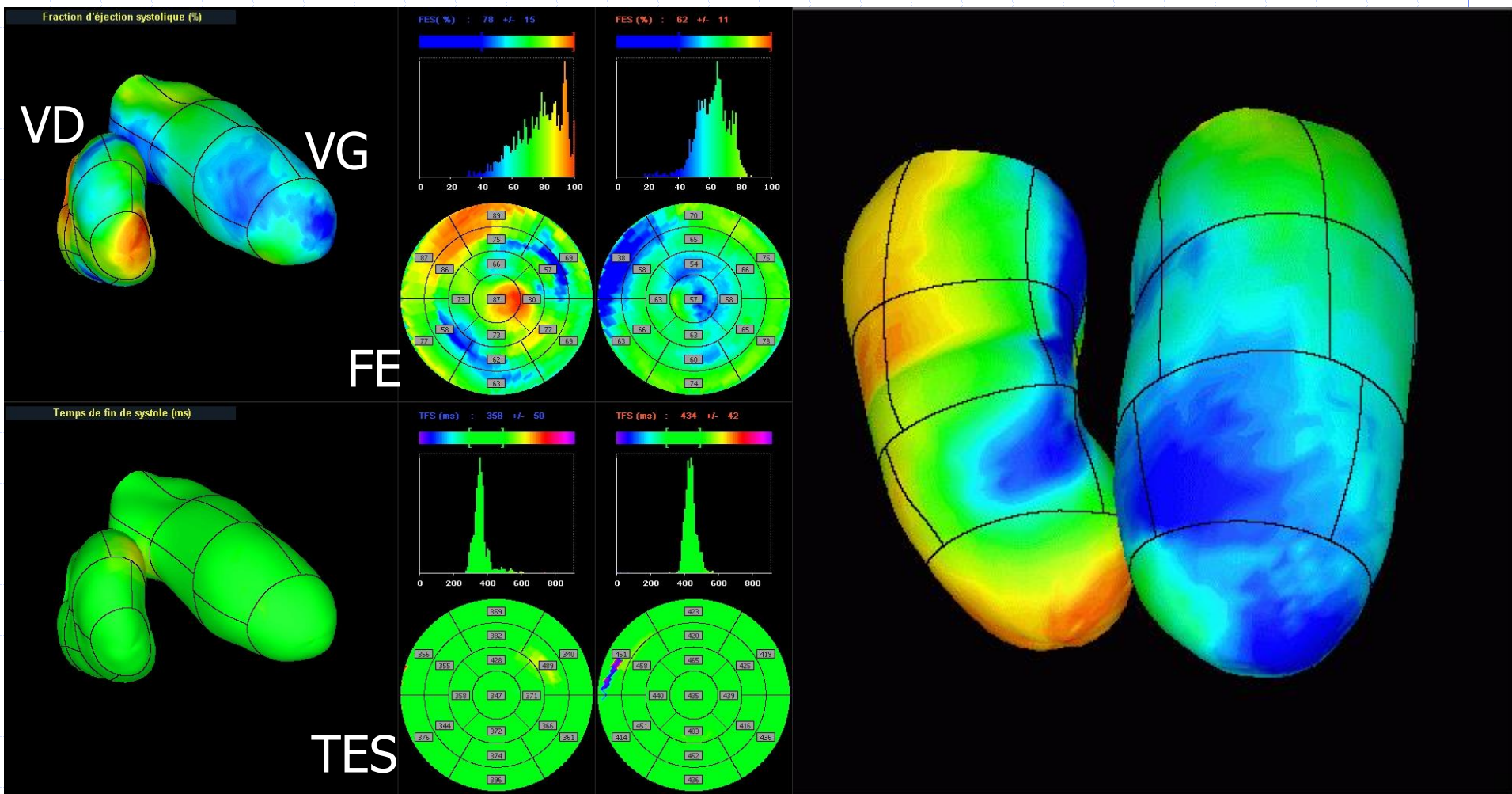
SD < 3%



TOMO-VENTRICULOGRAPHIE



ANALYSE 3D DE CTA LOCALES



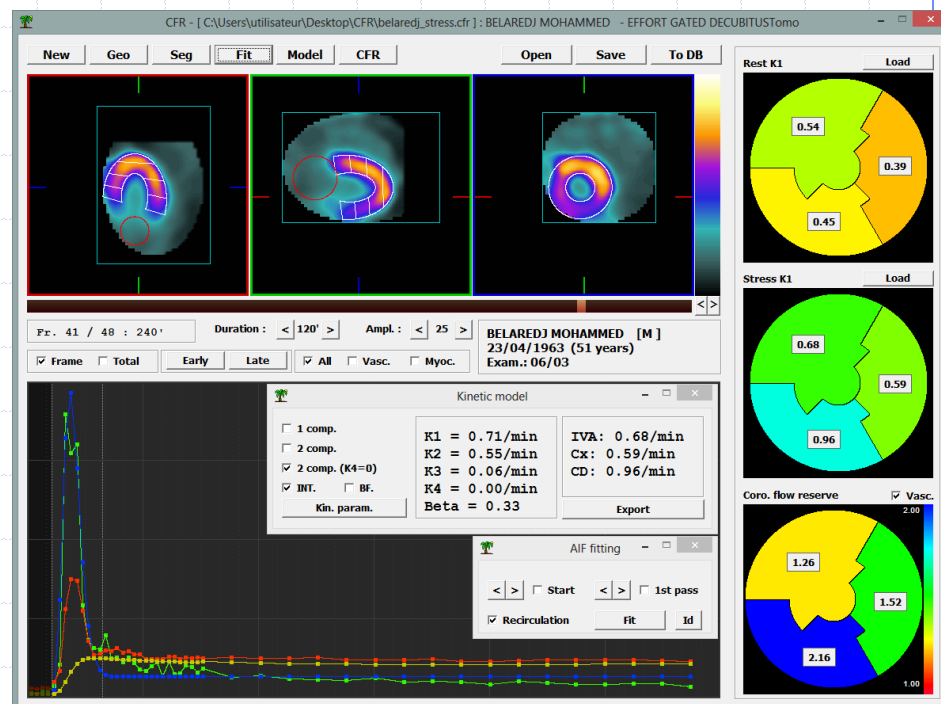
SYNTHESE SUR LA SCINTIGRAPHIE D'INNERVATION MYOCARDIQUE ET SUR LA VENTRICULOGRAPHIE

- **MIBG:pronostic d'une insuffisance cardiaque**
 - Intérêt dans l'indication d'un défibrillateur implantable
- **Ventriculographie isotopique**
 - Étalon or pour le suivi de la FE VG
 - Fonctions systoliques VD et VG : pronostic
 - Explorations d'arythmies intra-ventriculaires
- **Coût :**
 - MIBG = 180 €
 - Ventriculographie = 272 € (suivi) ou 405 € (rythmologie)

EN DEVELOPPEMENT...

• Protocoles (CZT)

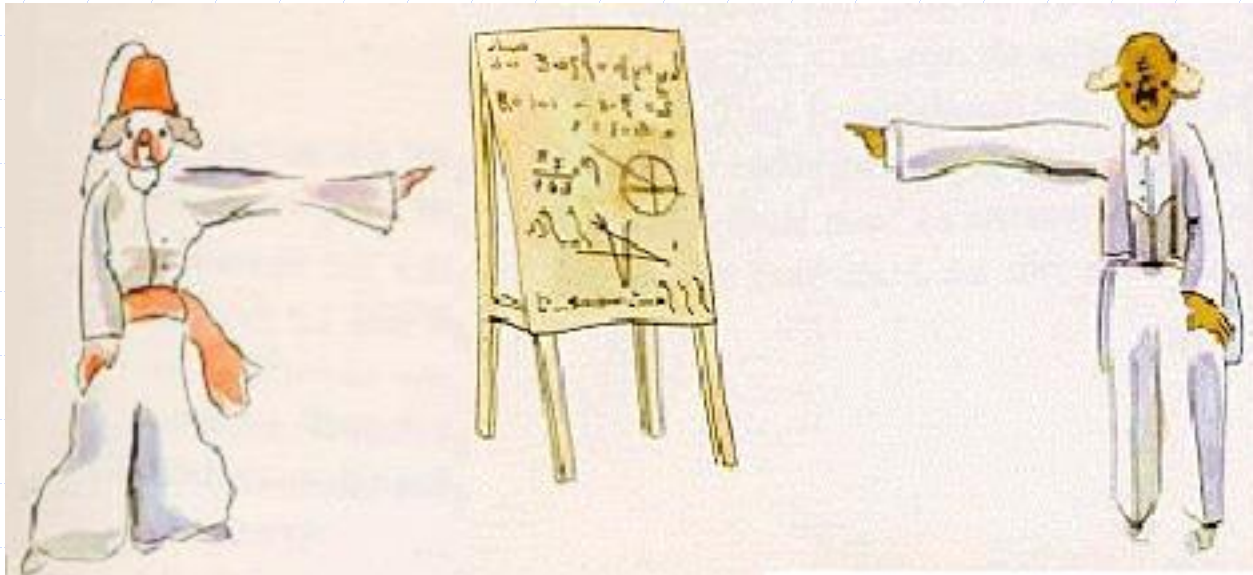
- R/E en 30 minutes
- Quantification absolue



• Nouveaux traceurs

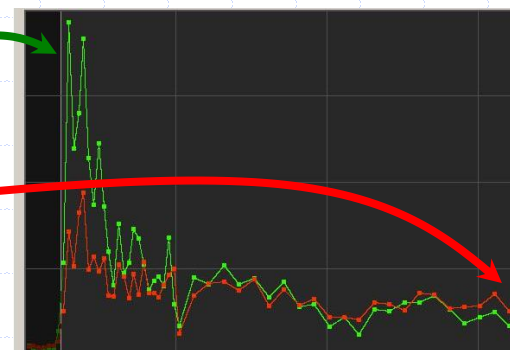
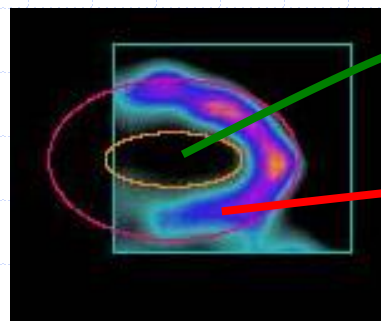
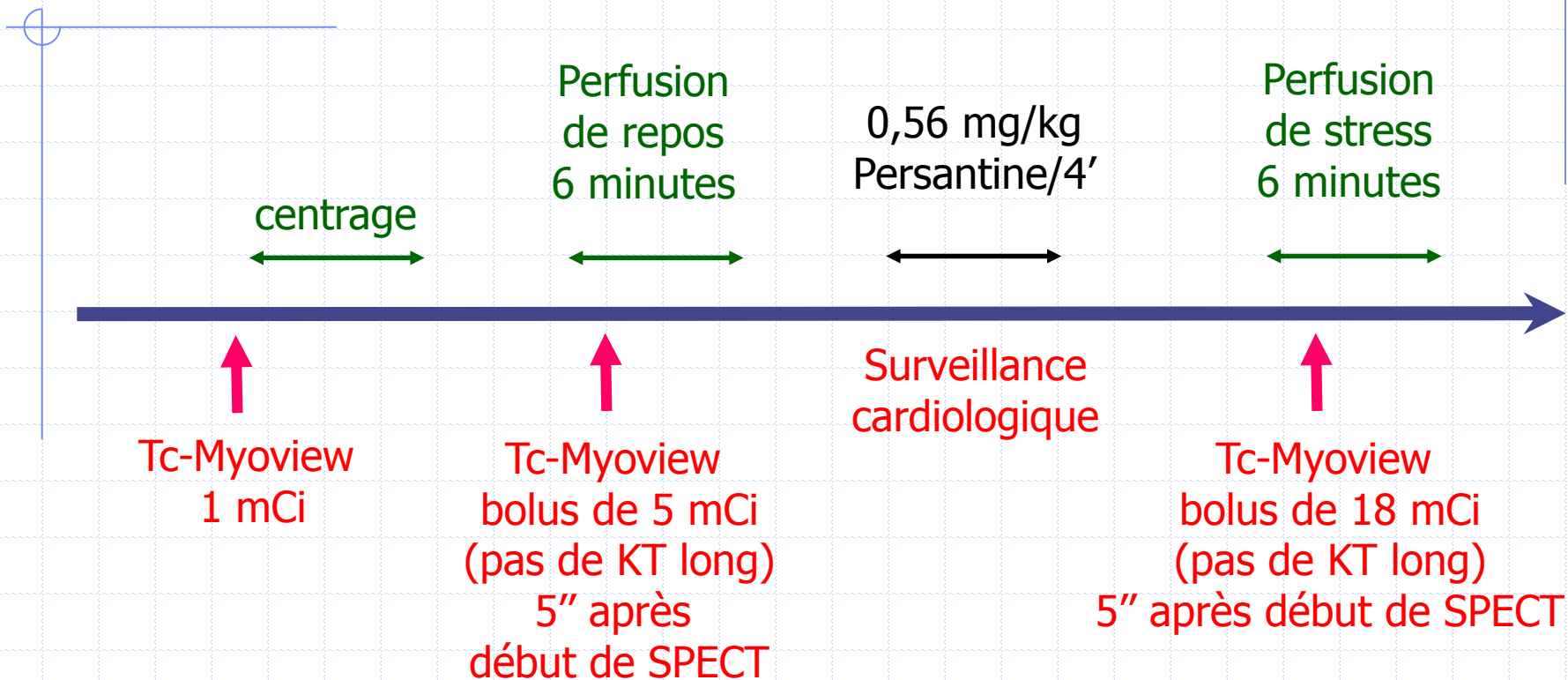
- Perfusion en TEP (générateurs de ^{82}Rb)
- Inflammation (athérosclérose)
- Plaque instable (risque d'infarctus du myocarde)
- Apoptose (pronostic précoce d'un IDM, greffe)

MERCI POUR VOTRE ATTENTION



3 revues de référence : J. Nucl Cardiol, Eur J Nucl Med, J Nucl Med
<http://scinti.edu.umontpellier.fr/enseignements/cours/>

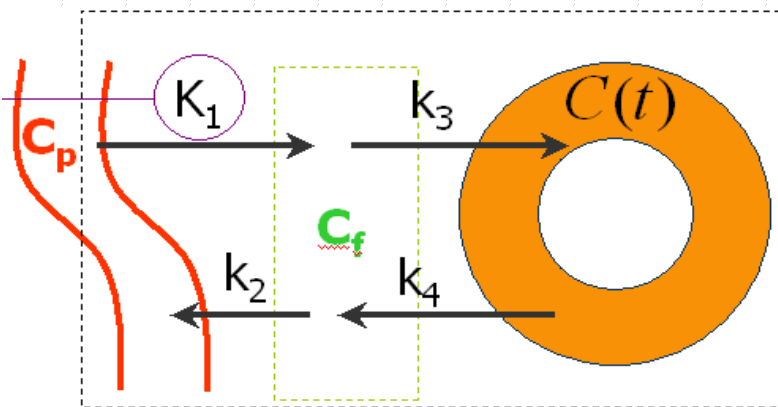
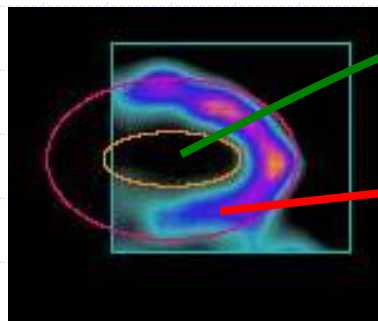
RESERVE CORONAIRE



RESERVE CORONAIRE

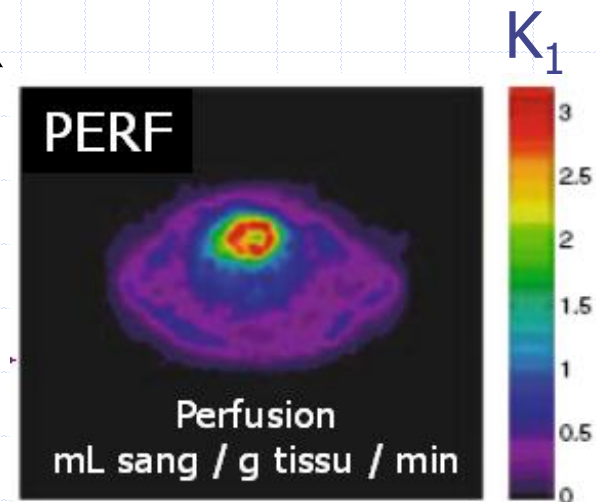
Intérêts :

Quantification absolue, suivi
Tri-tronculaires...

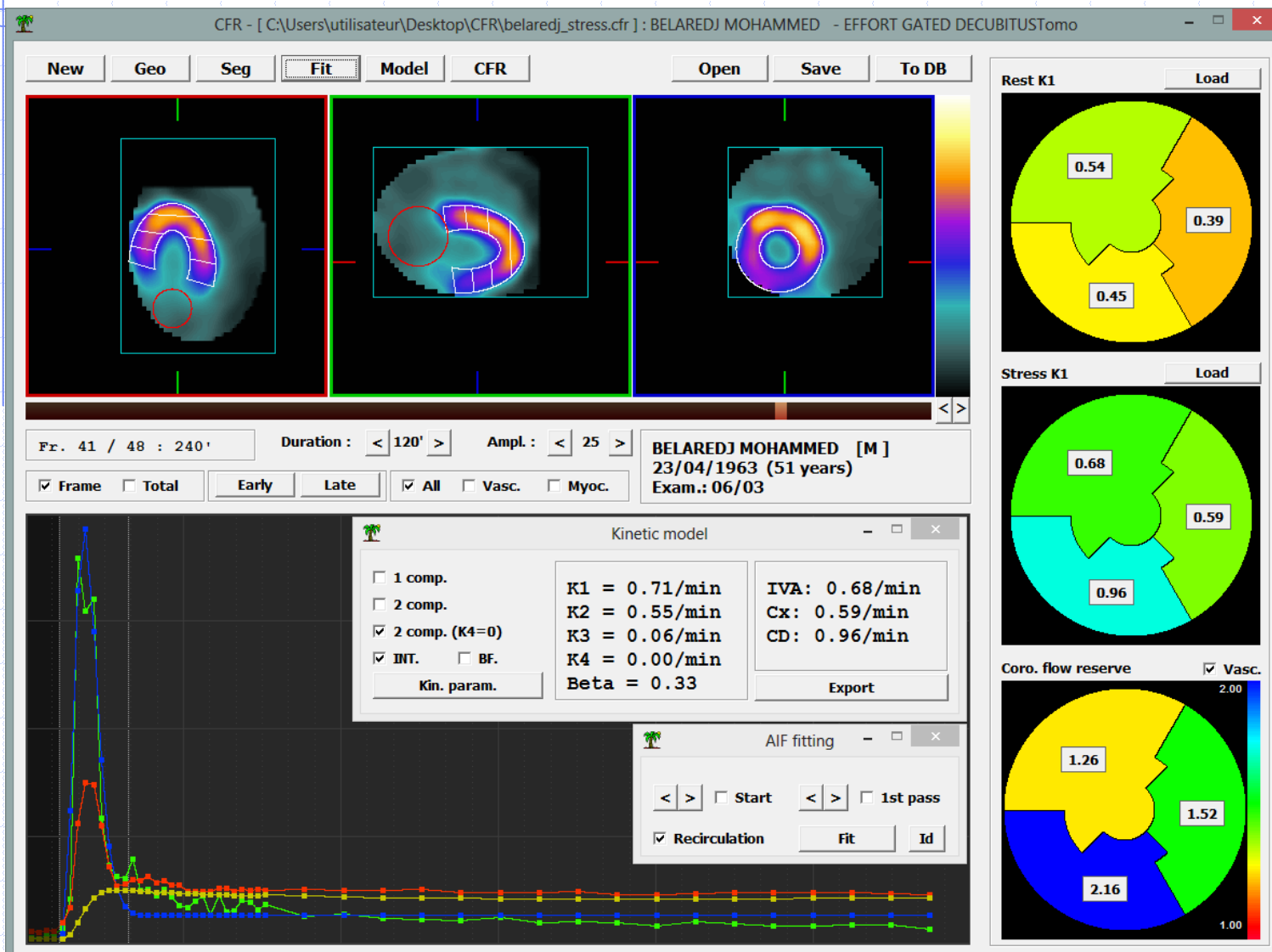


$$\frac{dC_f}{dt} = K_1 C_p(t) - (k_2 + k_3) C_f(t) + k_4 C(t)$$

$$\frac{dC}{dt} = k_3 C_f(t) - k_4 C(t)$$



RESERVE CORONAIRE



Occlusion CD
 distale stent
 H3
 +
 Lésions
 serrées
 bifurc.
 IVA-DIAG
 & Cx
 à tt en mars

TSM :
 ischémie inf