

PÓS-GRADUAÇÃO 2013

PROCESSAMENTO DE IMAGENS MÉDICAS

APLICAÇÕES CLÍNICAS EM MEDICINA NUCLEAR

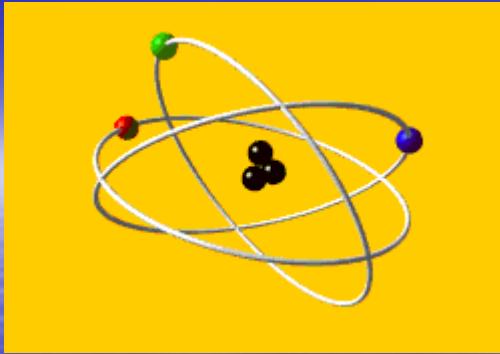
CLAUDIO MENEGHETTI

INCOR-HC-FMUSP

MEDICINA NUCLEAR :

“IN VITRO”: RIE
PROVAS DE FUNÇÃO
MEDIDAS CORPÓREAS

“IN VIVO” : CINTILOGRAFIA ANATOMO-FUNCIONAL
CINTILOGRAFIA METABÓLICA



MEDICINA NUCLEAR

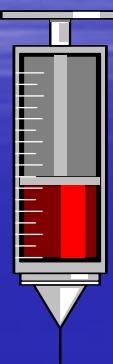
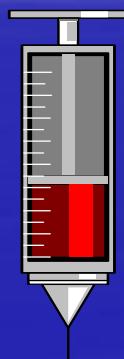
- “*in vitro*” - radioimunoensaio
 - diagnóstico:
 - provas funcionais
 - teste de Schilling - ^{57}Co B12
 - sobrevida de hemácias - ^{51}Cr
 - diagnóstico por imagem
 - terapia
 - tireóide - ^{131}I
 - dor óssea - ^{153}Sm

VOLEMIA

SANGUE = PLASMA + GLÓBULOS

SANGUE = HTC% + PLASMA% = 100%

ALBUMINA ^{99m}Tc



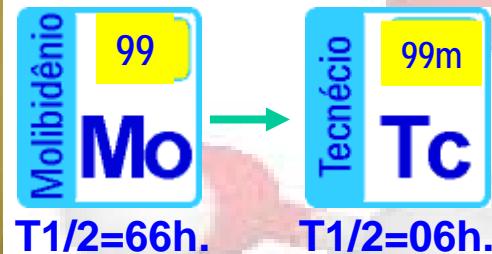
Paciente

Sangue = X litros

1 ml padrão
1 ml paciente

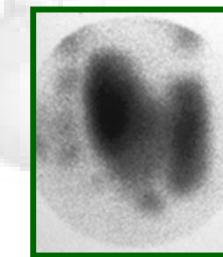


* estatística



Tecnécio 99m (^{99m}Tc)

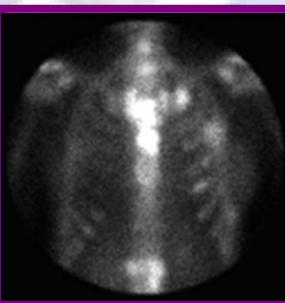
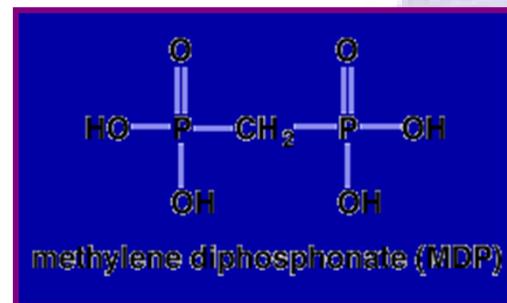
- Forma *livre* : $^{99m}\text{TcO}_4^-$



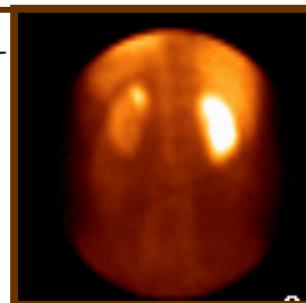
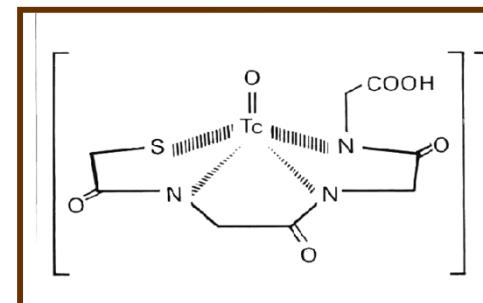
- Forma *marcada*

RADIOFÁRMACOS

Methylene diphosphonate
“ ^{99m}Tc- MDP ”



Mercaptoacetyltriglycine
“ ^{99m}Tc - MAG3 ”



RADIOFÁRMACOS

Controles químicos, físicos e biológicos.

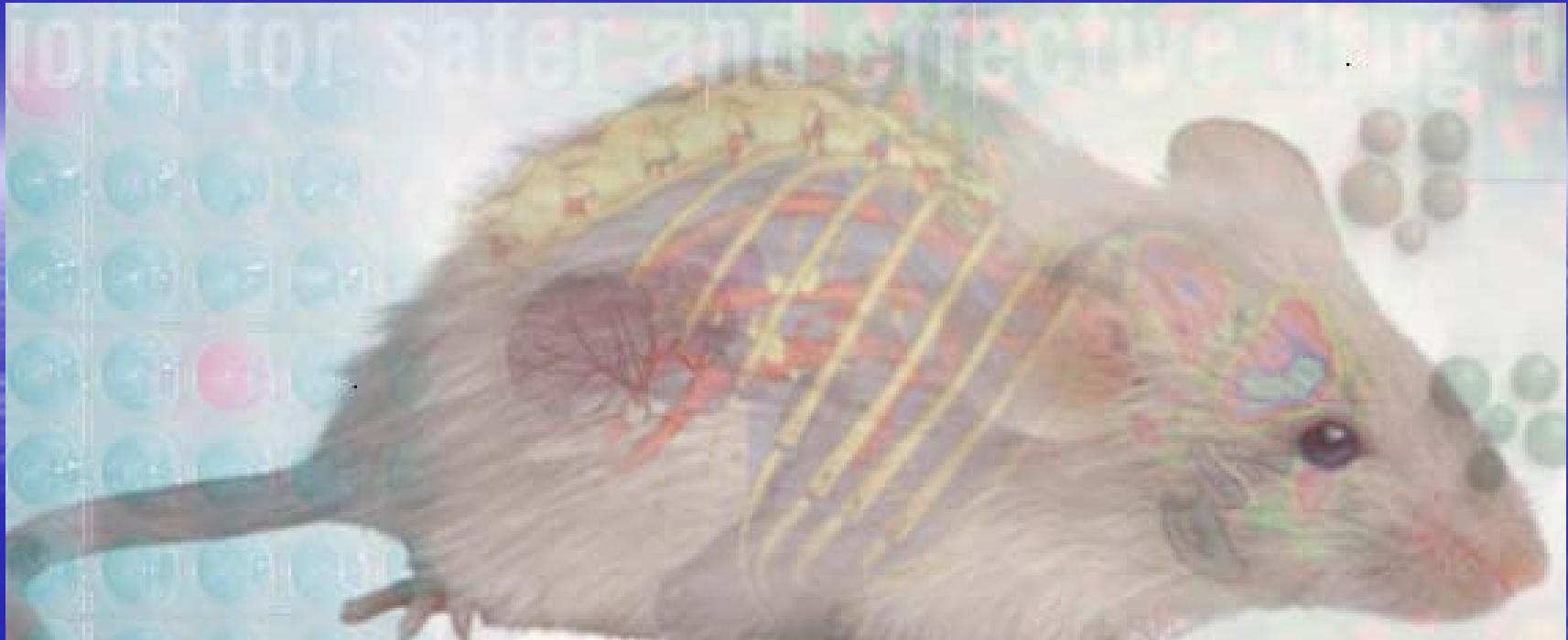


Vias de administração:

- Venosa
- Inalatória
- Oral
- Sondagem Vesical
- Sonda Naso Gástrica

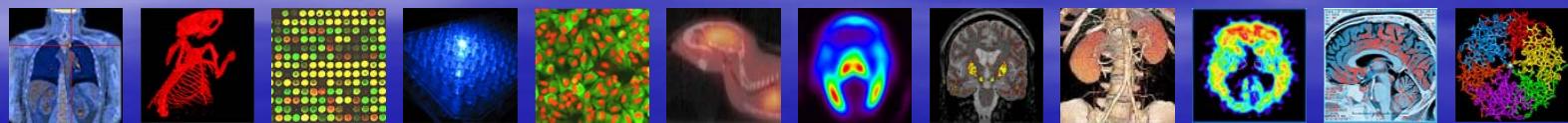
Dosimetria
Cloreto de Tálio-201

Dosimetria: (Rad/3.5mCi)	
corpo total	0.7
testículos	1.8
ovário	1.6
rins	4.2
intestino	0.9



CellTrace

In-Vivo Imaging for Molecular Medicine

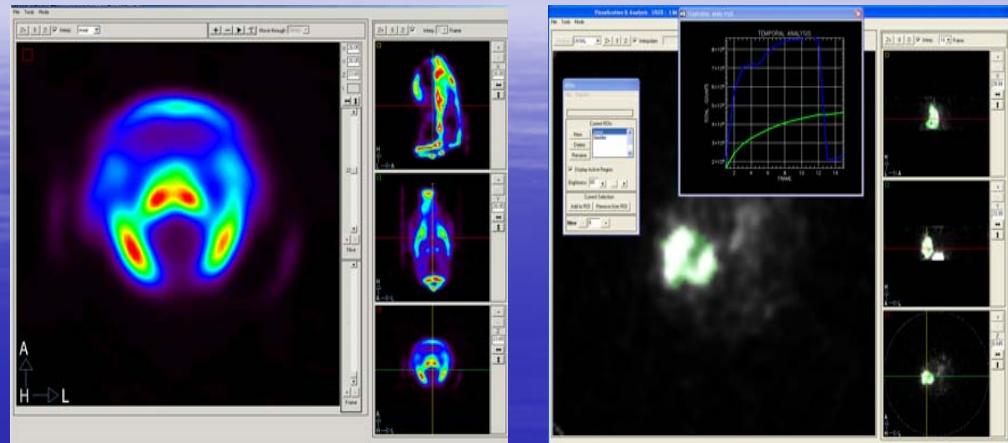


Pre-Clinical PET: eXplore



- High Sensitivity: >4%
- High-resolution: 1.6mm
- PET / CT Functionality

Common Bed, Software Fusion



1) Courtesy: Indiana Univ., Gary Hutchins

Triumph



SPECT

- CZT digital detectors
- interchangeable collimators

PET

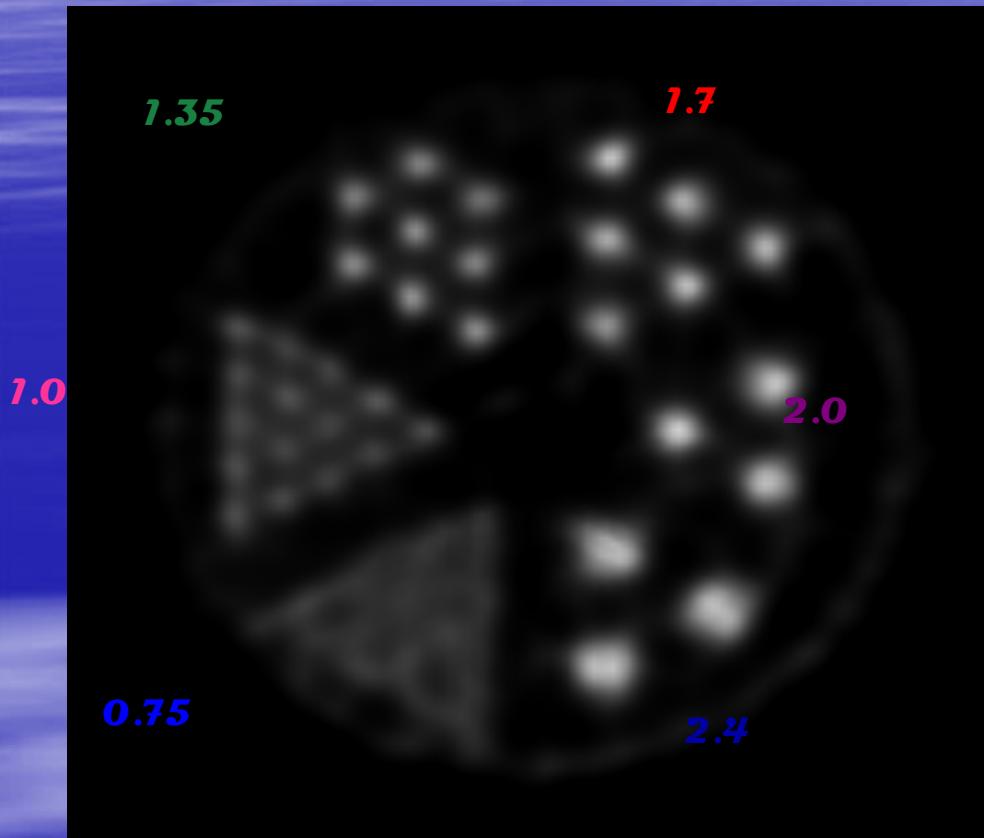
- digital PET detectors (APD)

CT

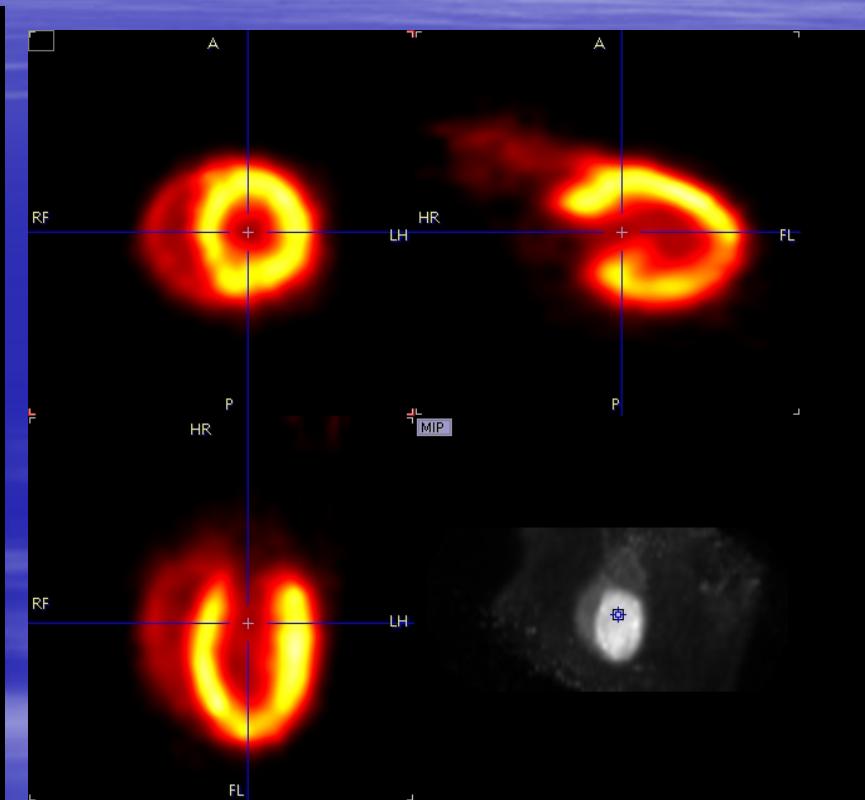
- **sub-minute low-dose scanning in normal usage mode**
- **high resolution mode when desired**

Resolution of LabPET

MicroDeluxe phantom



Mouse heart

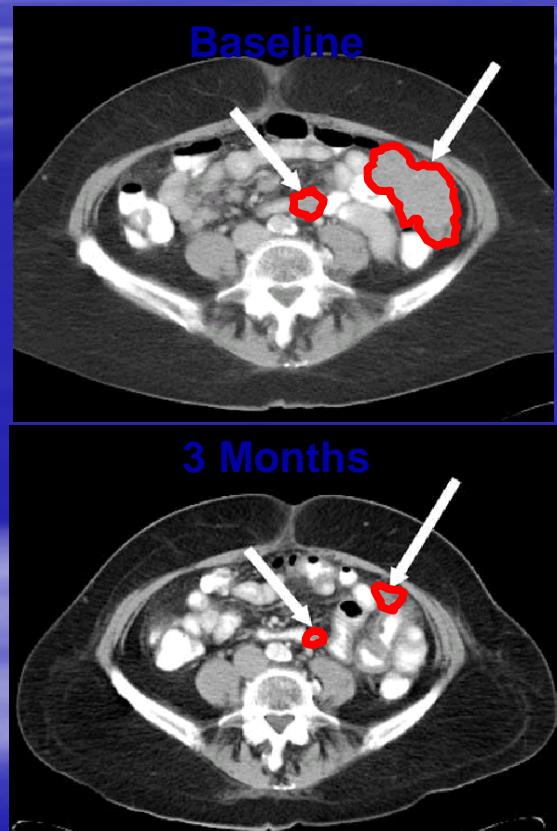


200 uCi FDG, 5 min acquisition

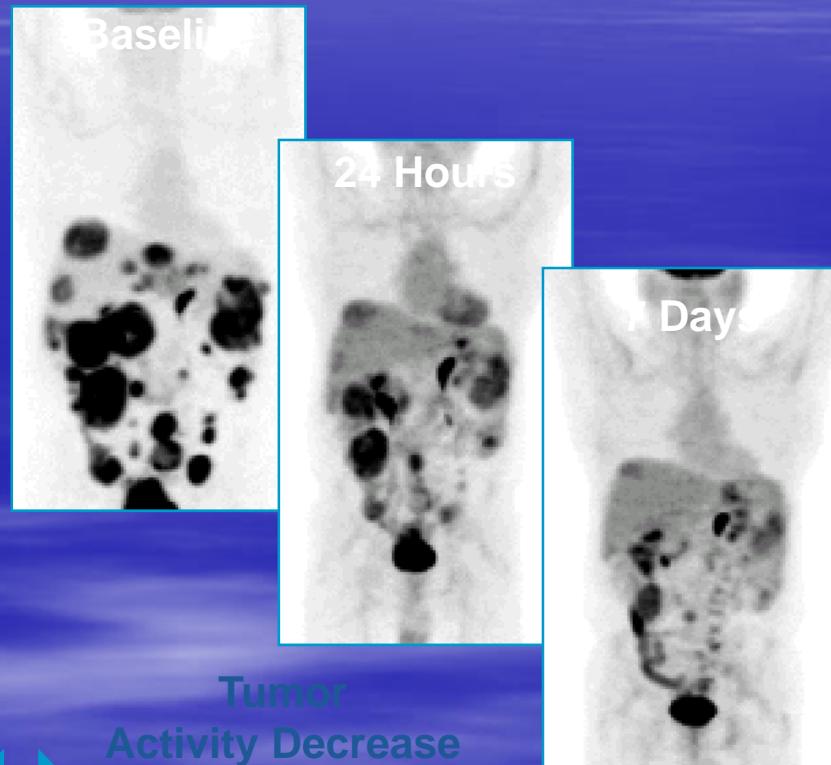
Large, low contrast items (large = low spatial frequency) do not show up if they have low contrast against background they may not be visible with PMT based systems whereas they are visible with APD based systems.

The Potential of Molecular Imaging – Cancer Therapy

Standard CT Anatomic Evaluation



PET – FDG Metabolic Evaluation



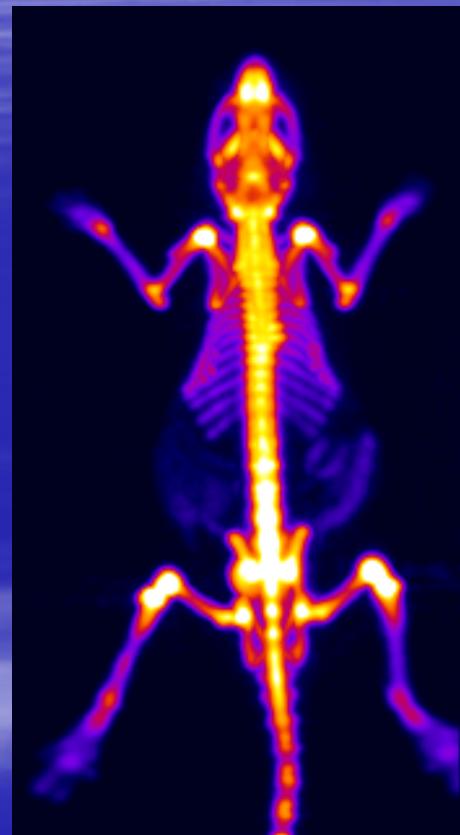
Tumor
Shrinkage
Observed
After Months

Tumor
Activity Decrease
Observed
Within Days

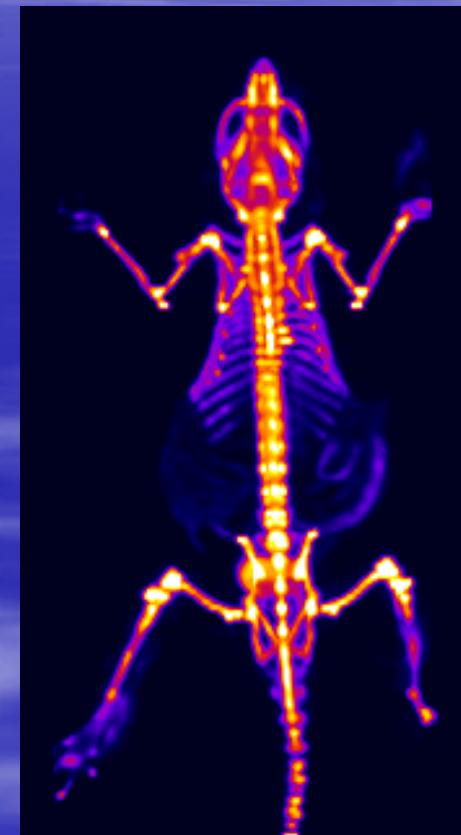
Images Courtesy of Dana Farber Cancer Institute

F18-Fluoride Whole Body Mouse

3D-FORE / 2D-FBP
Reconstruction



3D-OSEM Reconstruction
5 iterations, 25 subsets



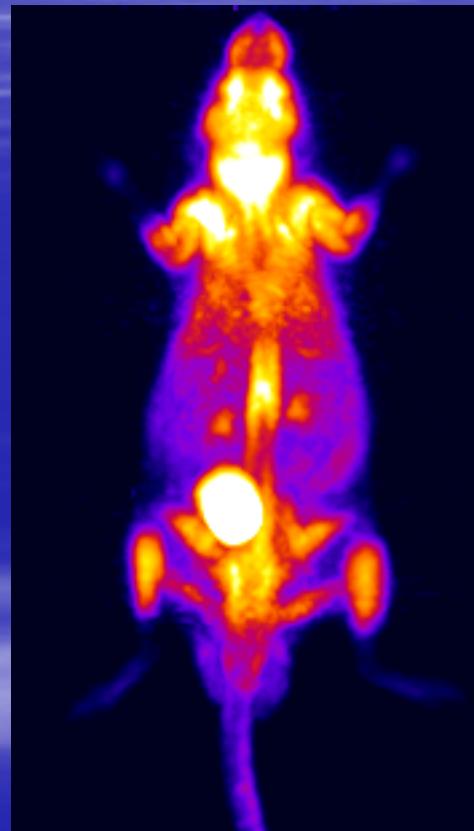
Protocol:

- F-18 Fluoride
- 30 gm mouse
- 45 min uptake
- 3 bed positions
- 4 slice overlap

Courtesy M. Pomper – JHMI-Baltimore

F18-FDG Whole Body Mouse

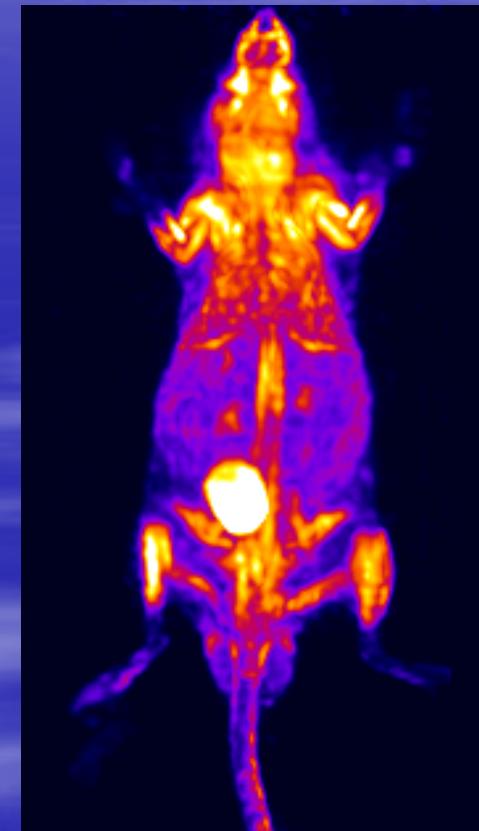
3D-FORE / 2D-FBP
Reconstruction



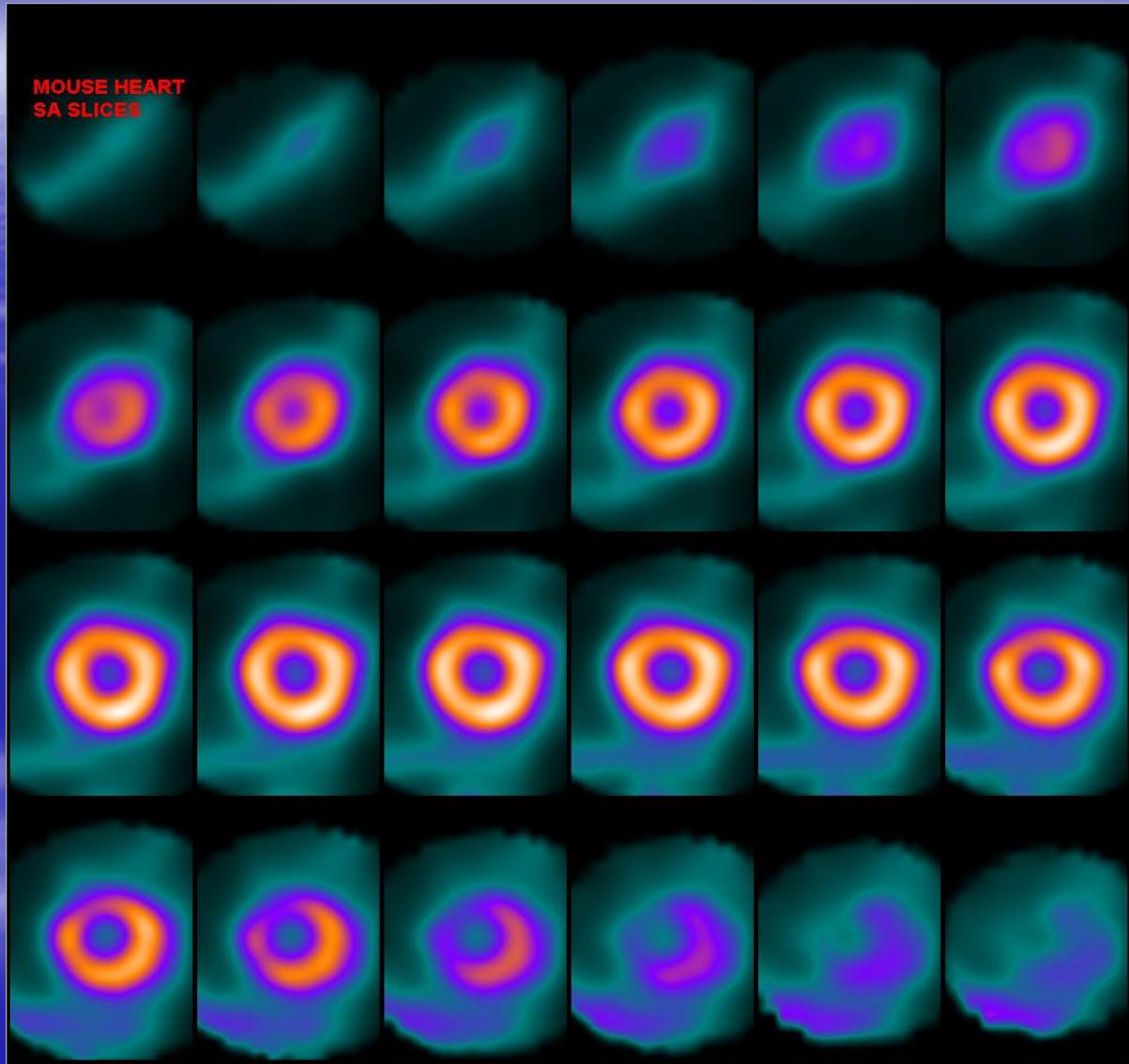
Protocol:

- F-18 FDG
- 20 gm mouse
- 30 min uptake
- 3 bed positions
- 4 slice overlap

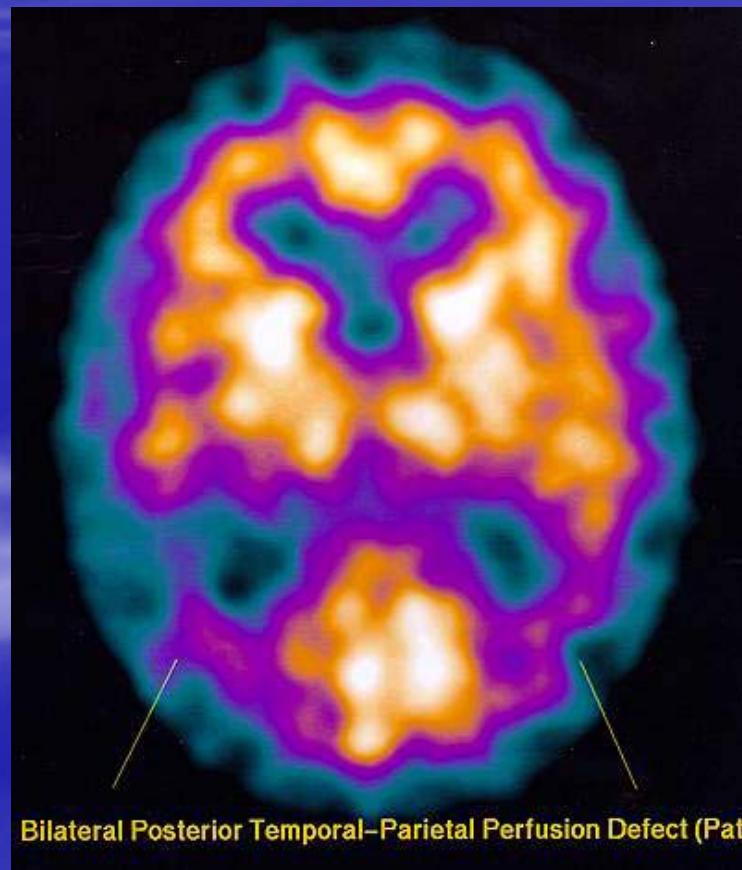
3D-OSEM Reconstruction
3 iterations, 50 subsets



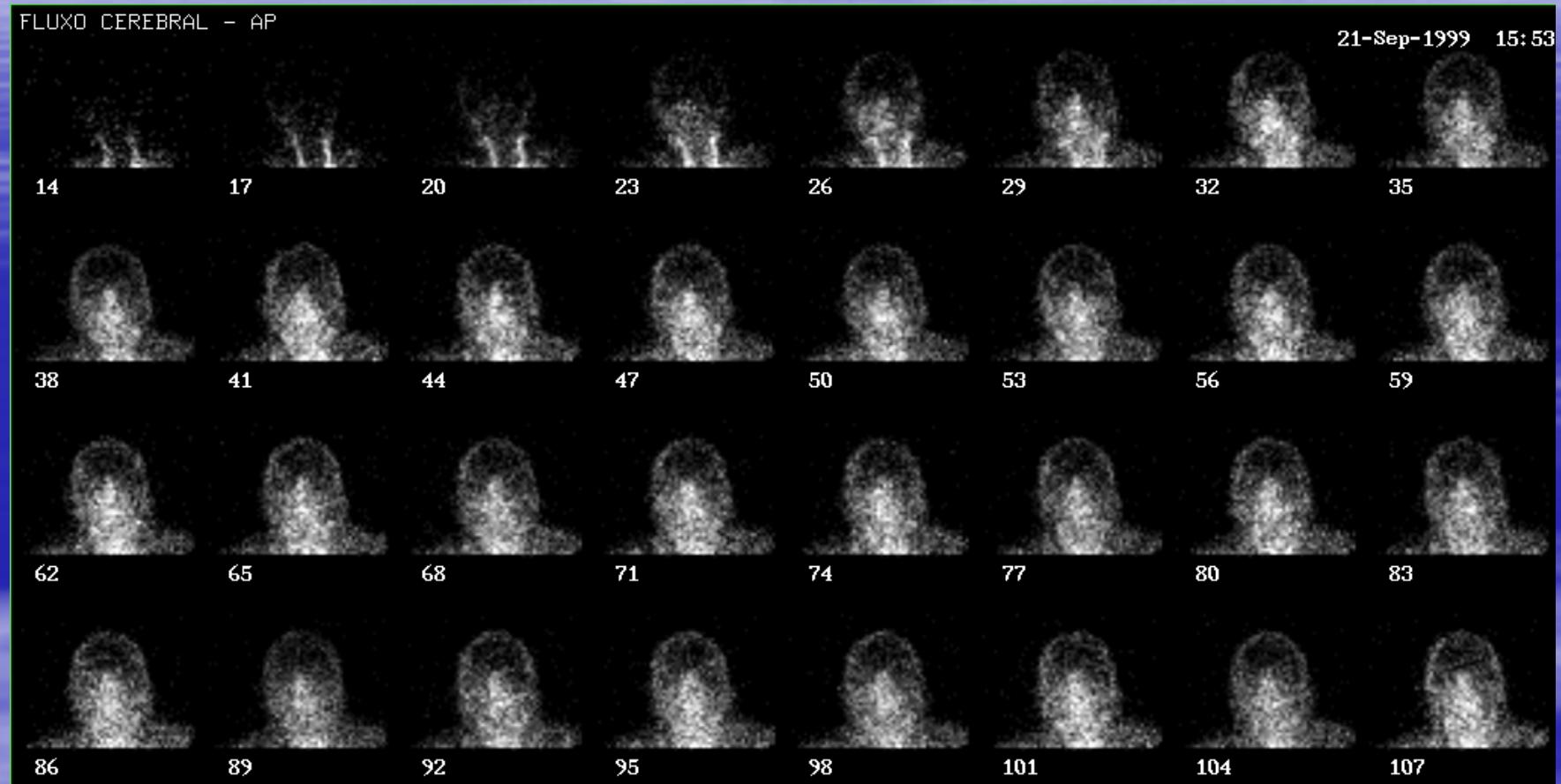
Courtesy M. Pomper – JHMI-Baltimore

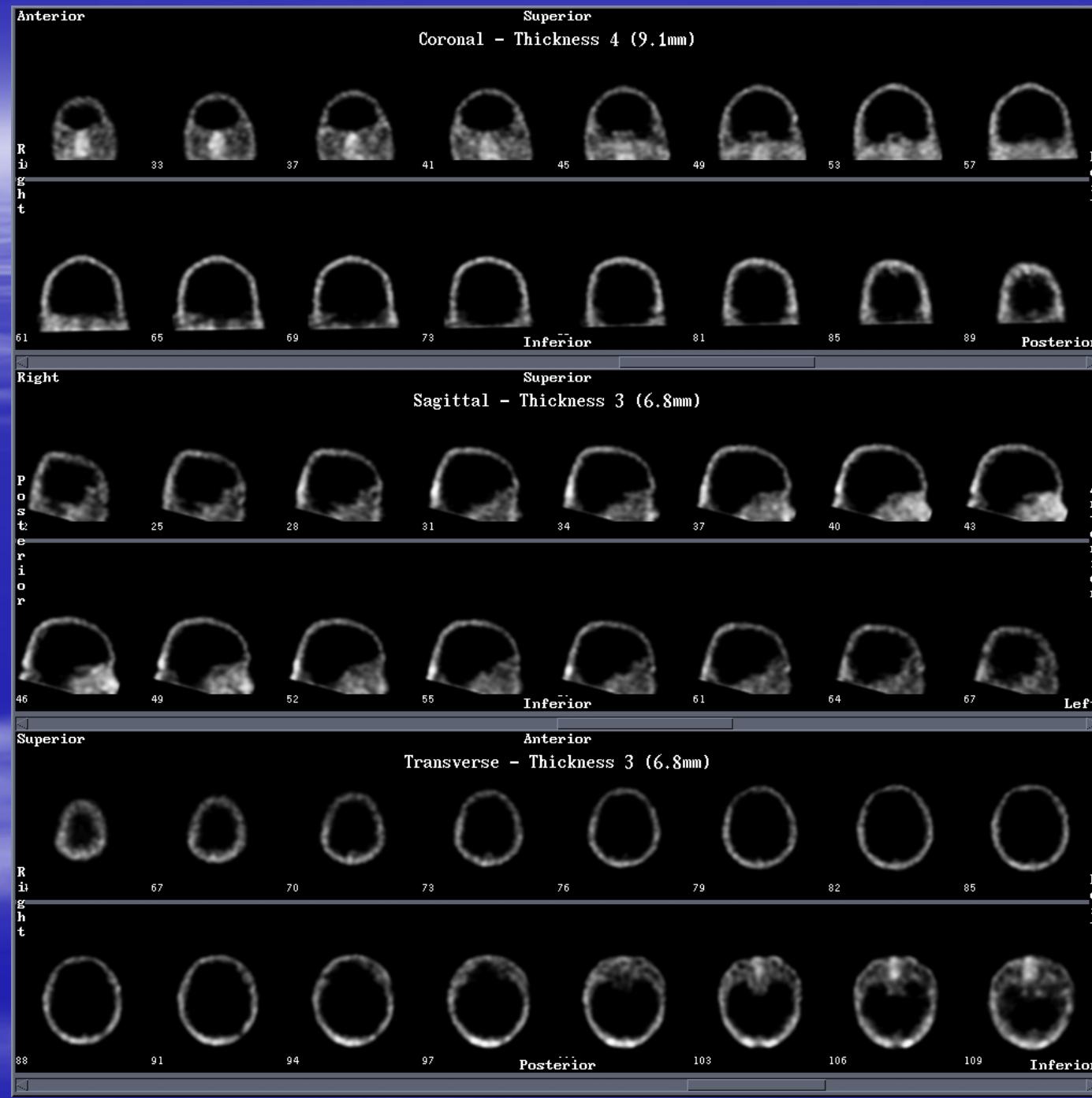


DOENÇA DE ALZHEIMER: defeito têmporo-parietal posterior bilateral



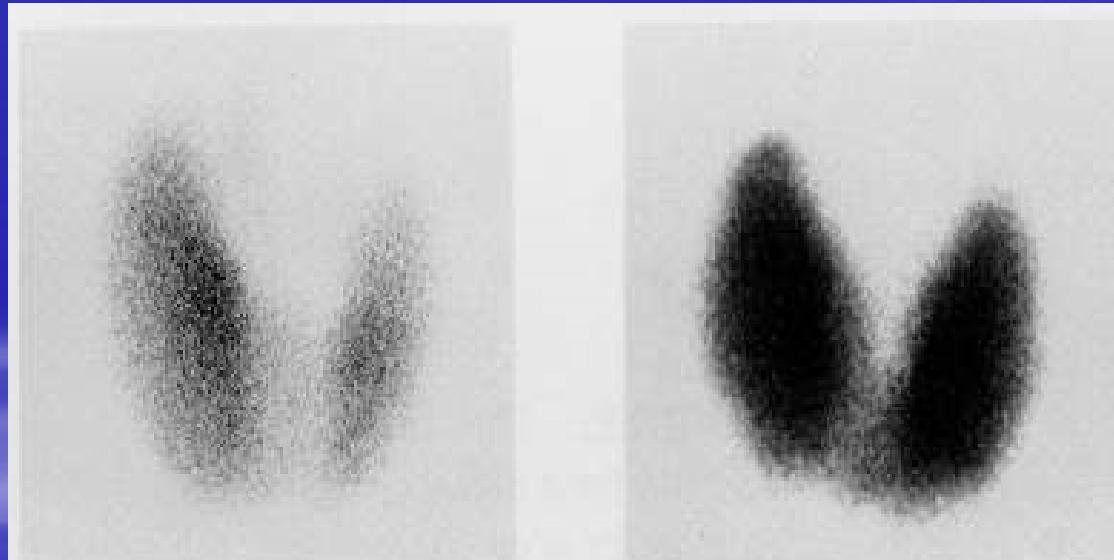
MORTE CEREBRAL





TIREÓIDE

Doença de Graves



TIREÓIDE

Nódulo único “frio”



- Adenoma folicular

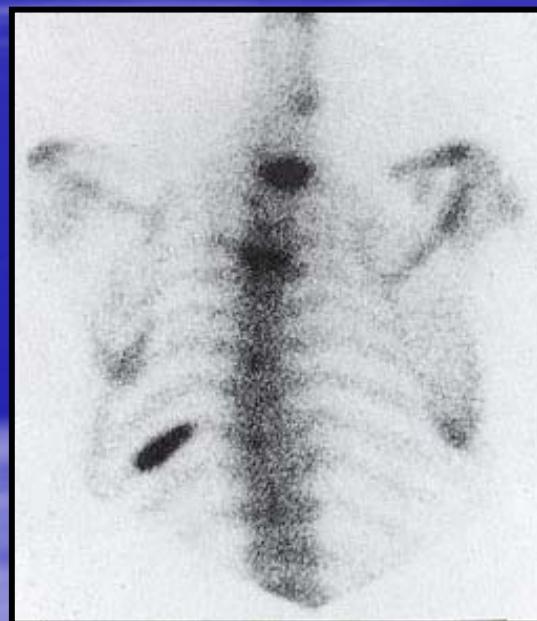
Cintilografia Óssea - Ca Próstata



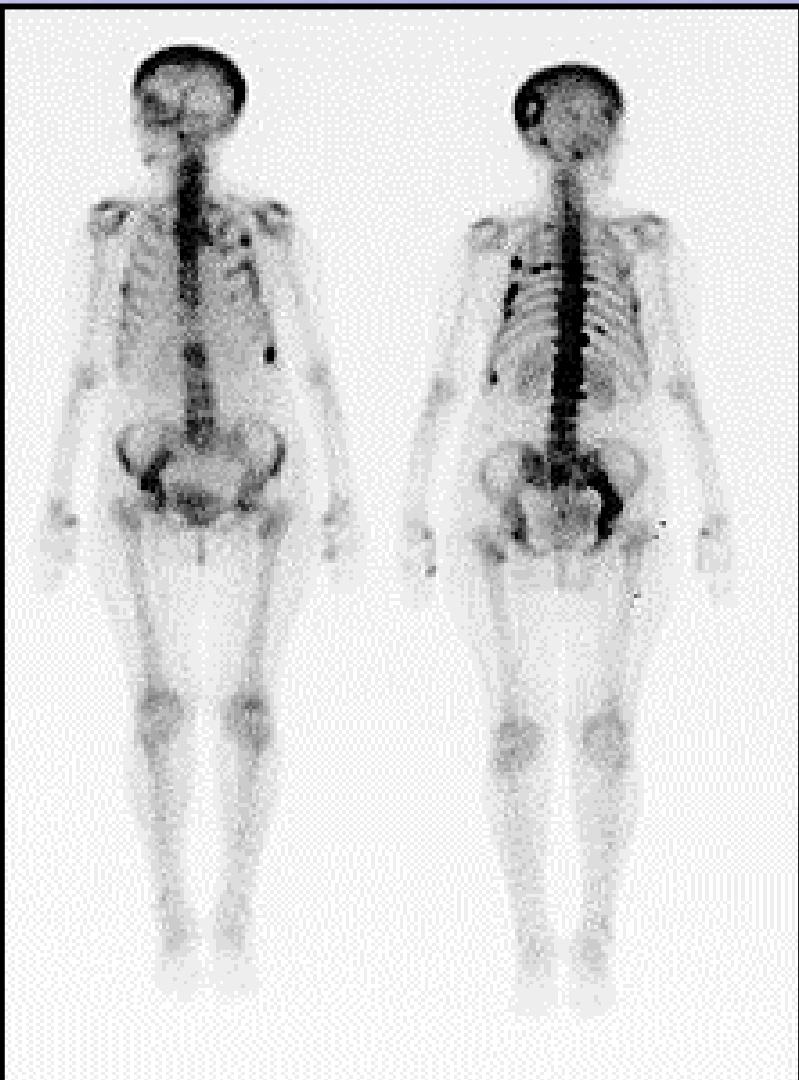
- osso é o local mais frequente de disseminação metastática
 - estadiamento:
 - PSA < 10 dispensável
 - PSA 10 - 20 discutível
 - PSA > 20 rotina
 - estudos seriados:
 - extensão
 - resultado terapêutico
- * terapia hormonal altera PSA

Cintilografia Óssea - Seguimento (progressão sem terapia)

Ca Próstata (3 meses)

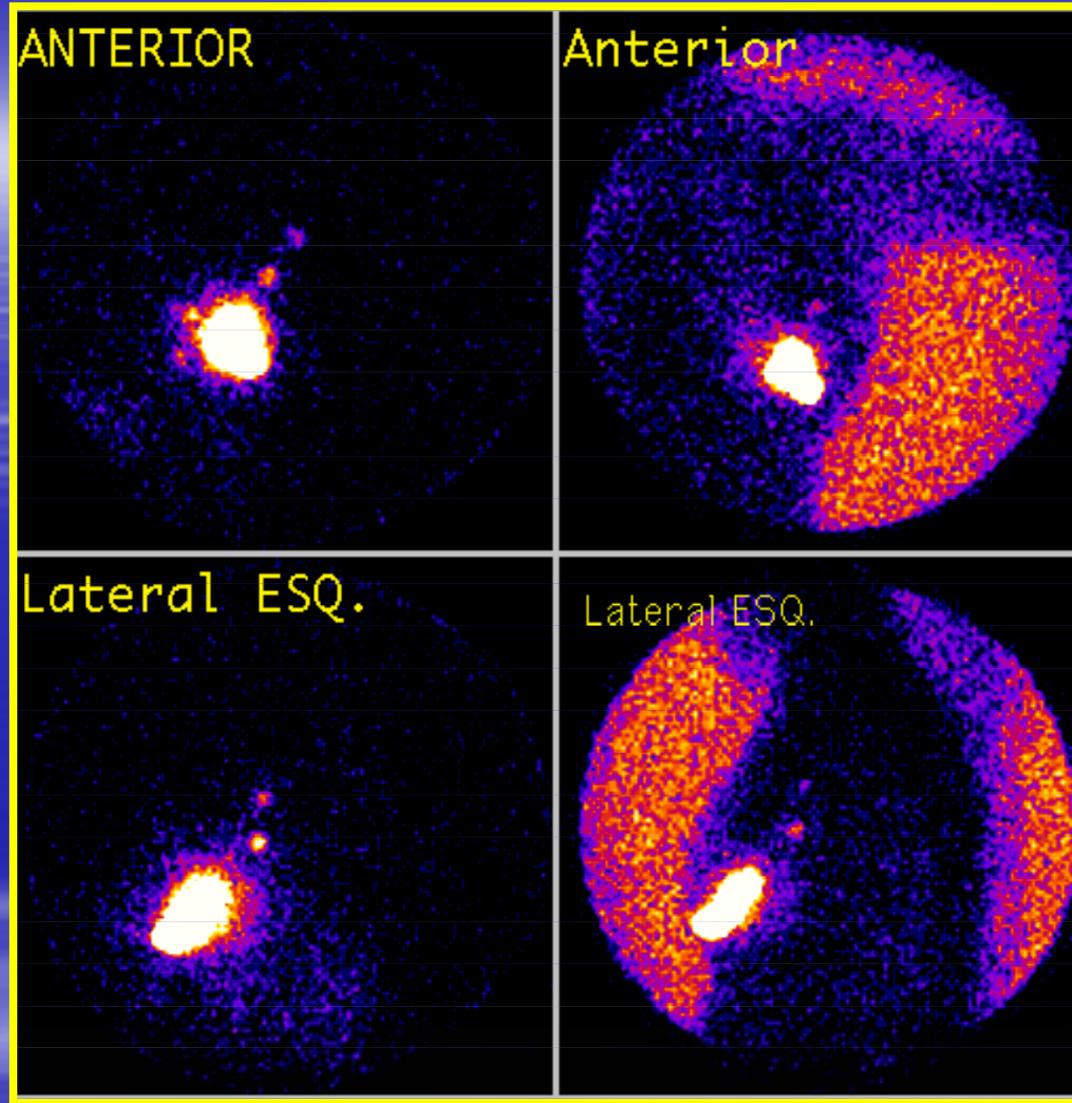


Cintilografia Óssea - Ca Mama



- metástases ósseas frequentes
- estadiamento:
 - discutível nos estadios I e II (< 10%)
 - estadios III e IV
- avaliação de sintomas relacionados (dor)
- avaliação de alterações em RX
- estudo basal (discutível)
- estudos seriados (seguimento)
- avaliação resposta terapêutica

Projeção anterior da mama esquerda



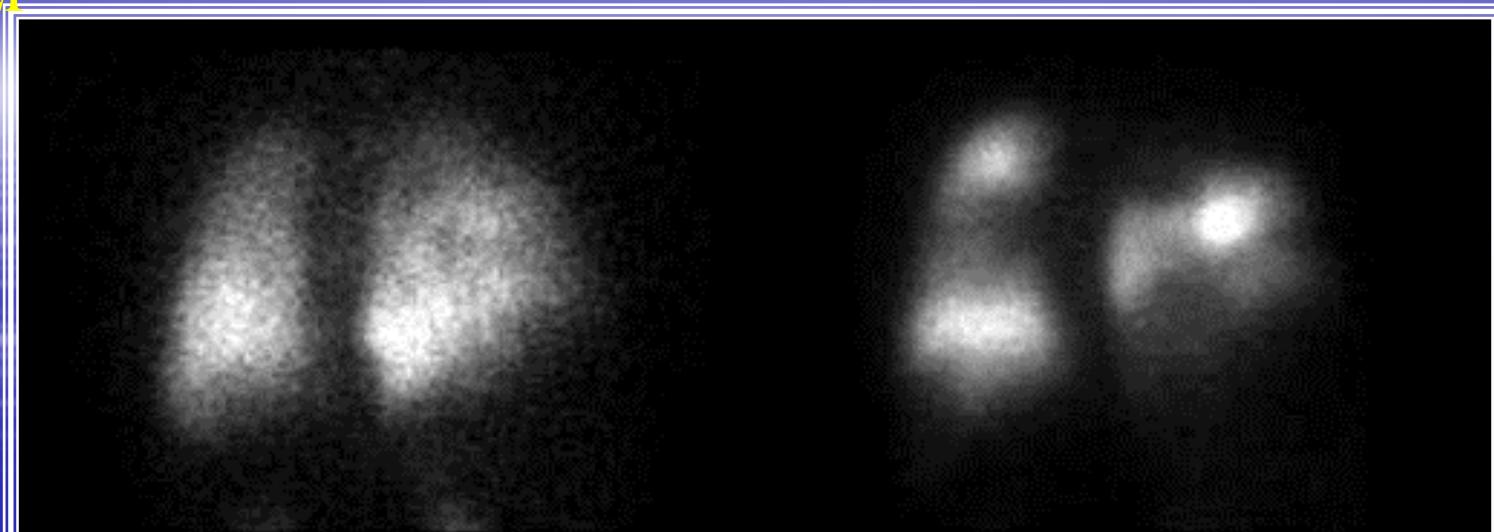
Projeção lateral esquerda

Projeção anterior com transmissão

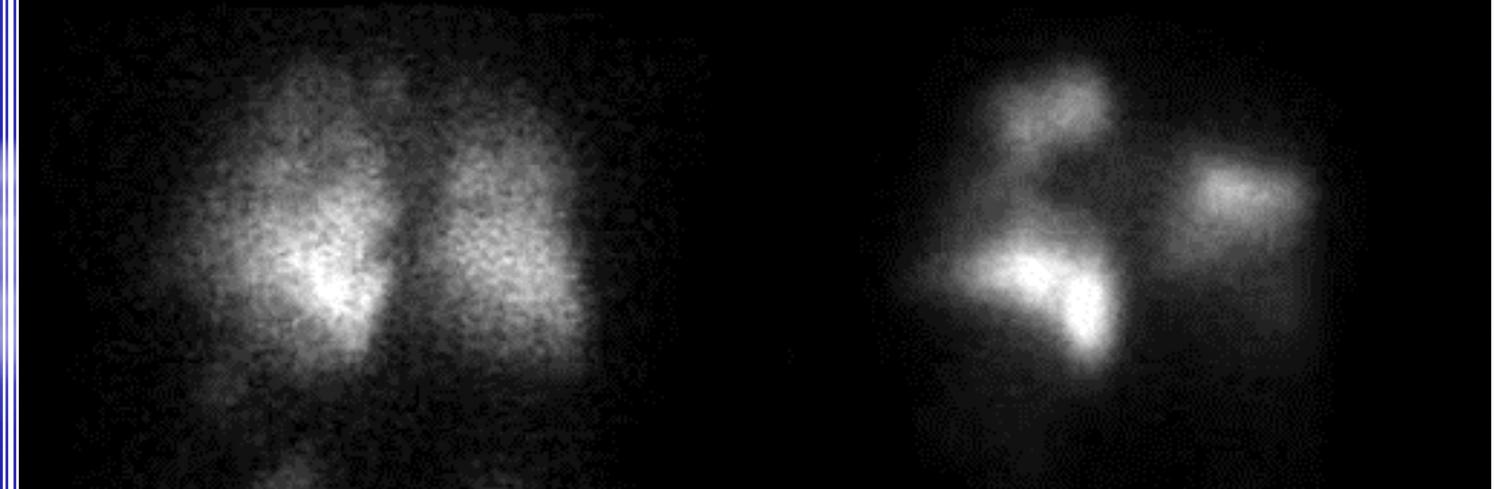
Projeção lateral esquerda com transmissão

Neste caso, evidencia-se em imagens tardias, após injeção de dextran-70 no quadrante superior e externo da mama esquerda a presença de áreas focais hipercaptantes na topografia das cadeias axilar e mamária interna.

TEP

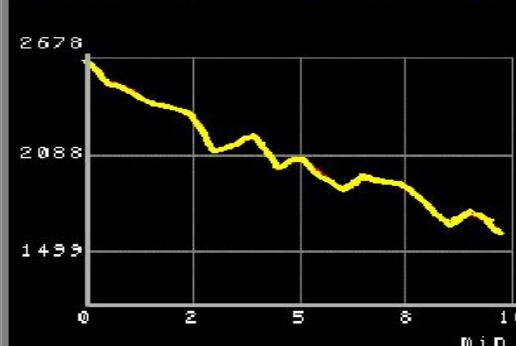
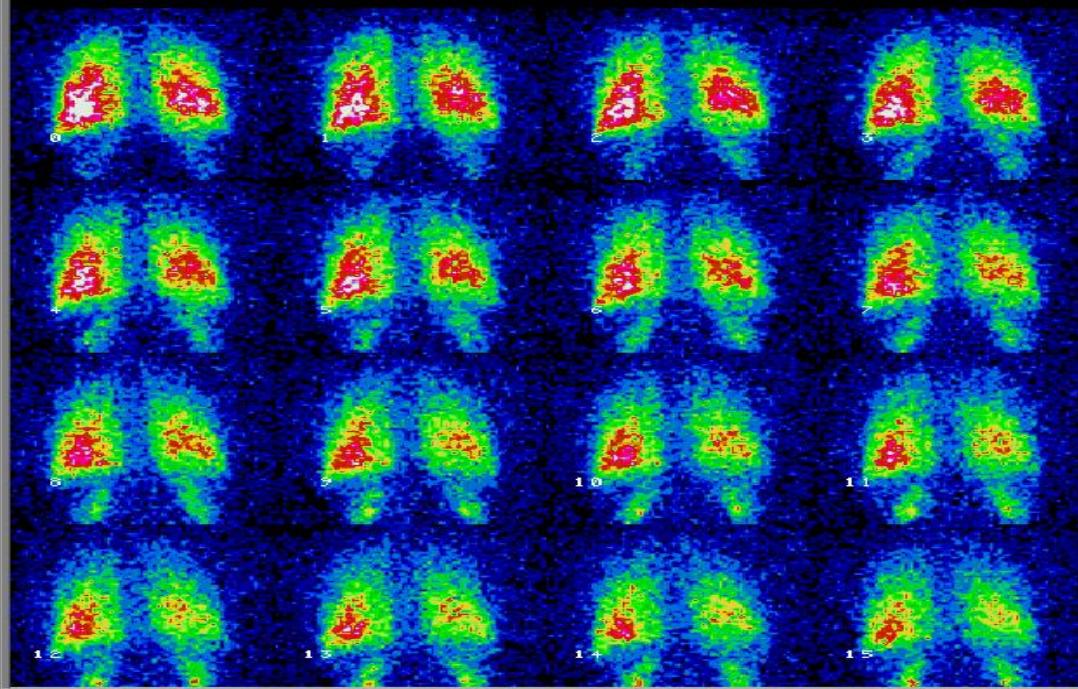


INALACAO OPD30-Tc 99RP00 PERFUSAO OPD-Tc 99RP0030



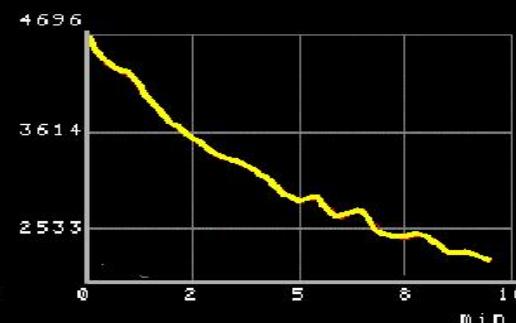
INALACAO OPE30-Tc 99LP00 PERFUSAO OPE-Tc 99LP0030

Clearance de DTPA-99mTc



Pulmón izquierdo

T $1/2 = 14$ min



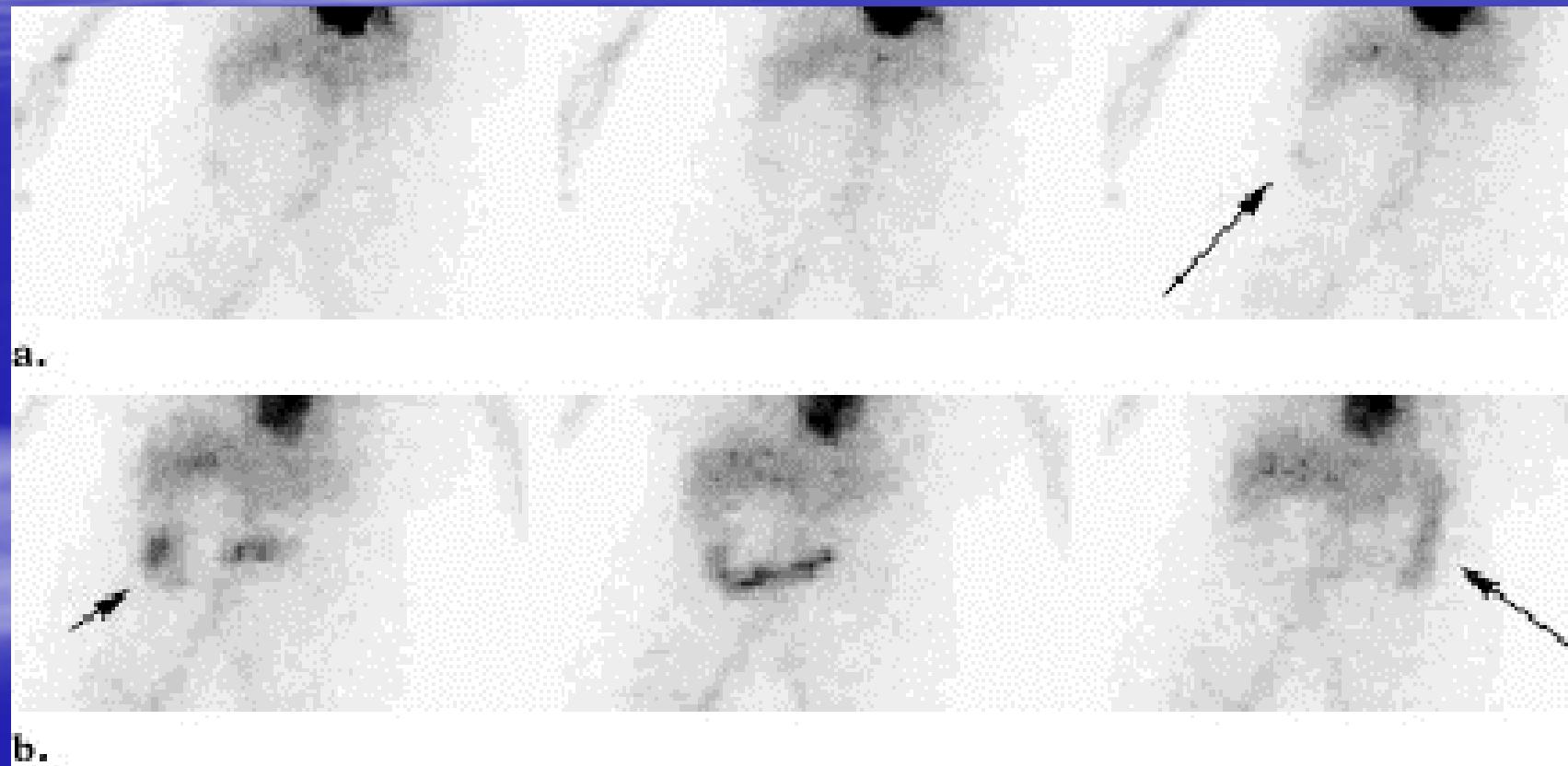
Pulmón Derecho

T $1/2 = 8$ min

T $1/2$ Total = 10 min

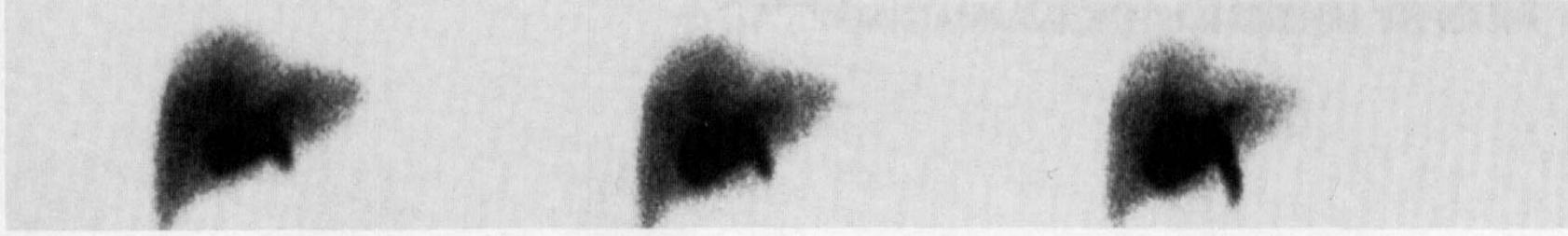
PESQUISA DE SANGRAMENTO INTESTINAL

HEMÁCIAS MARCADAS- Tc99m



DISIDA

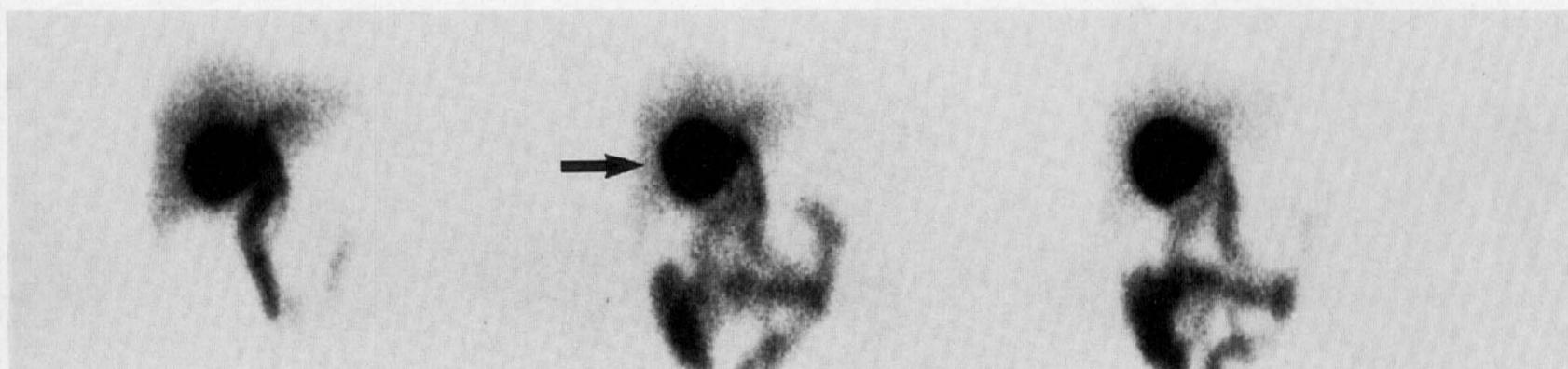
EXAME NORMAL



20 min

25 min

30 min



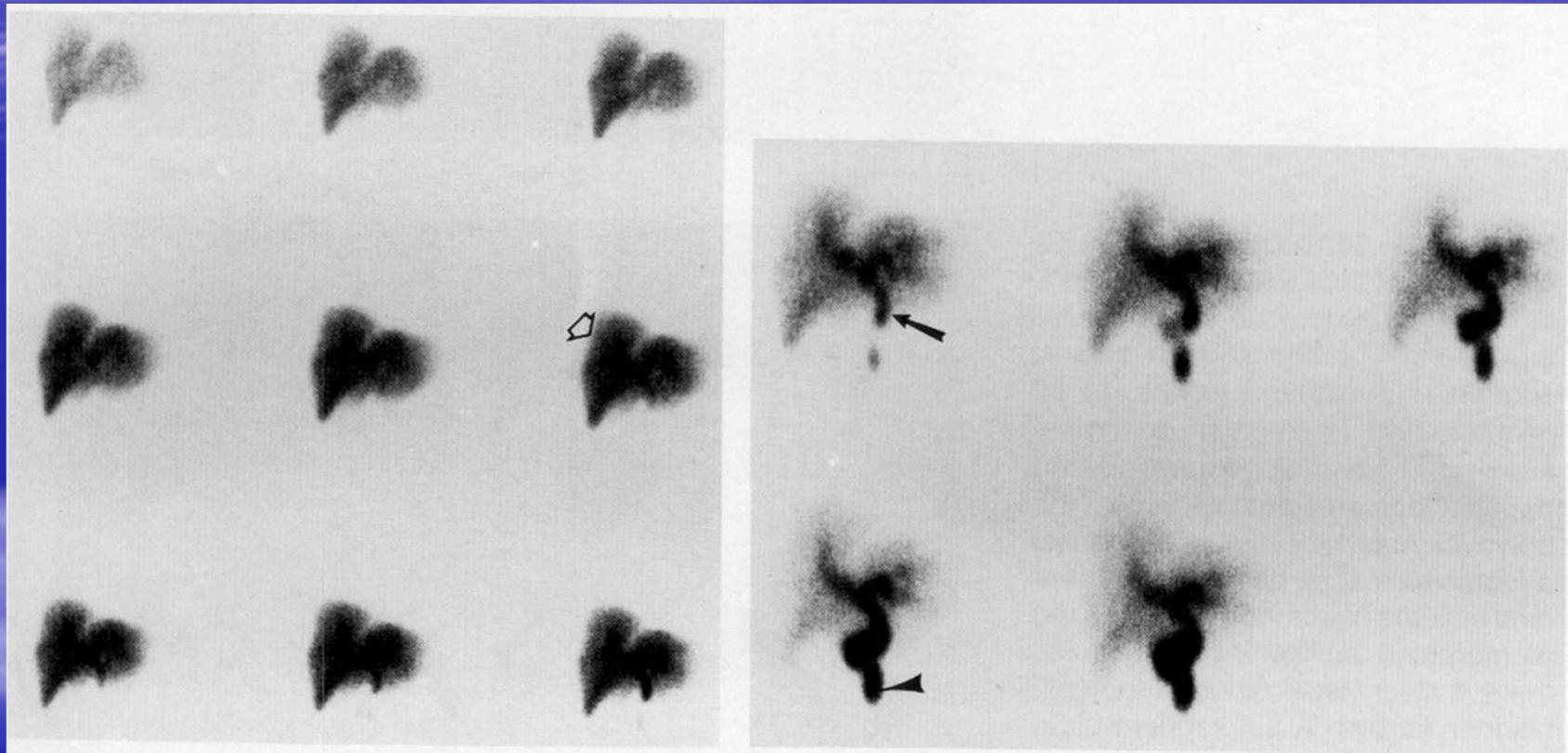
40 min

50 min

60 min

DISIDA

COLECISTITE AGUDA



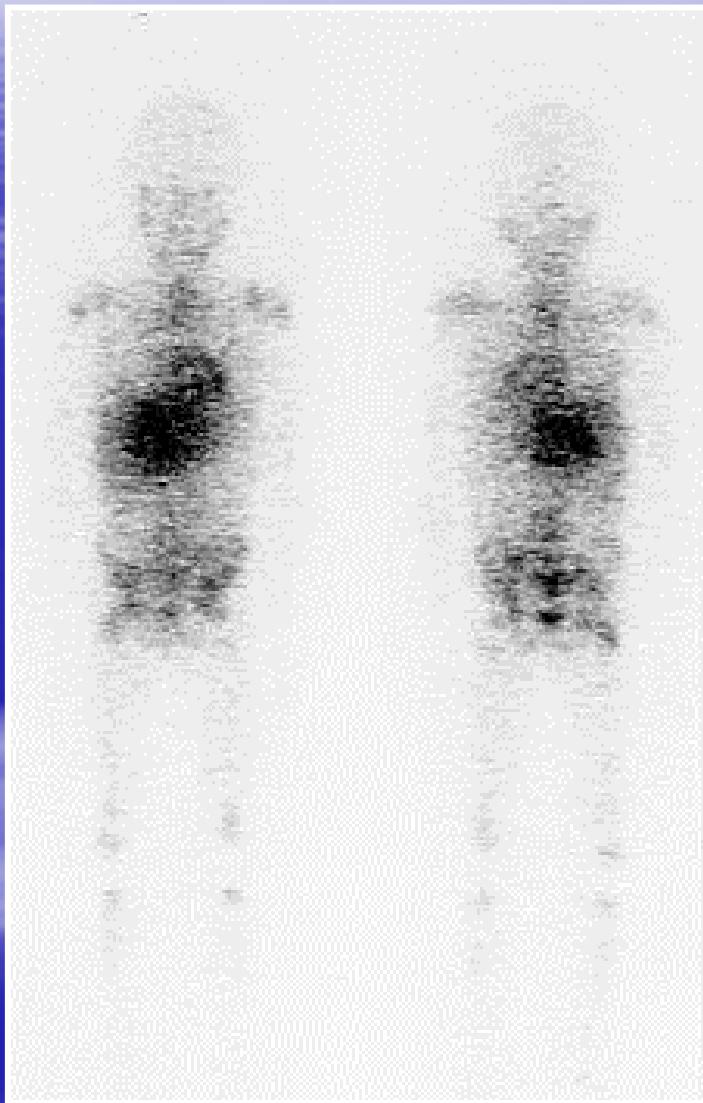
CINTILOGRAFIA RENAL ESTÁTICA COM DMSA-Tc99m



PIELONEFRITE
CRÔNICA

Envolvimento
difuso do rim D

Neuroblastoma - ^{131}I -MIBG



- Tumor sólido extracraniano mais comum na infância
- Sítios metastáticos: linfonodos regionais, fígado, osso e medula óssea
- MIBG: sensível para lesões esqueléticas e extra-esqueléticas

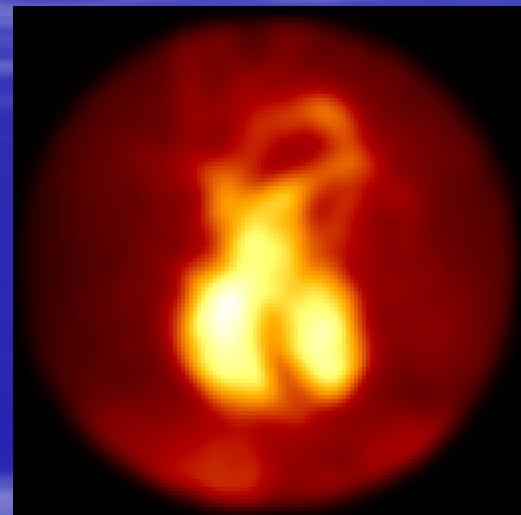
masc, 52 a -Linfoma de Hodgkin (esclerose nodular tipo II)

Tratamento quimioterápico :

A(Adriamicina) B (Bleomicina) V (Vimblastina) D (Dacarbazim)

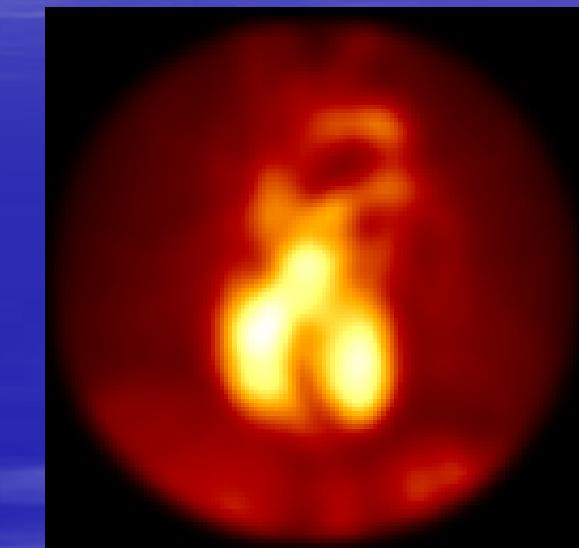
Pré - QT

FEVE =
52 %



Após
3º Ciclo QT

FEVE=
40 %



Interrompido QT

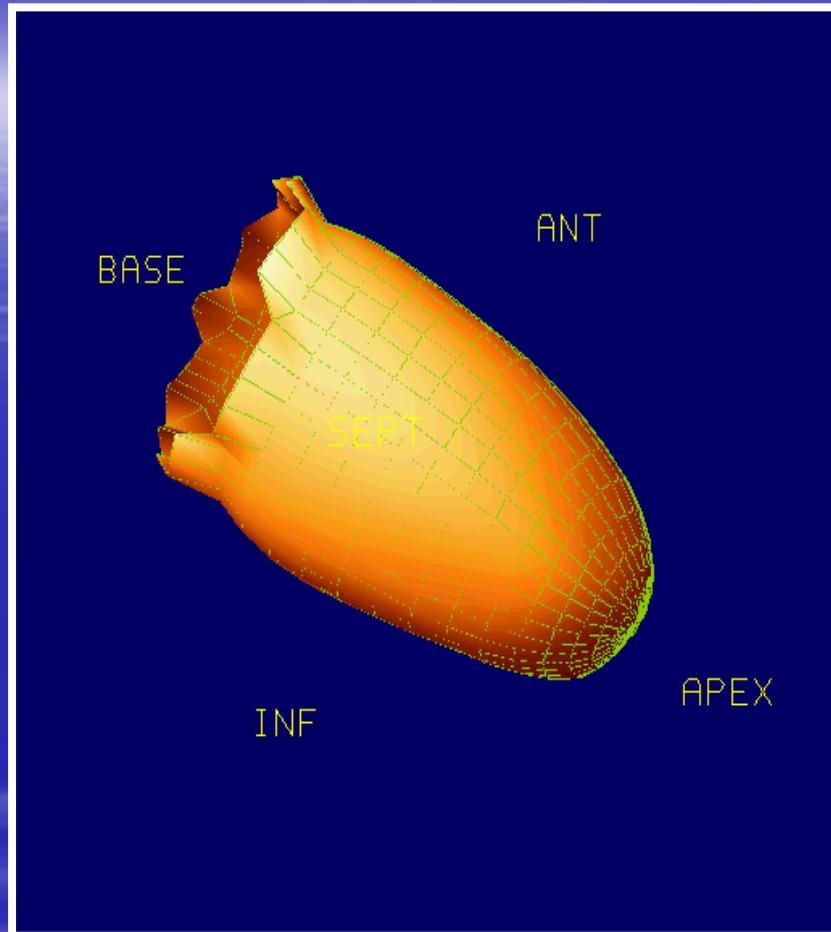
Substituído por C-MOPP:

Ciclofosfamida, Mecloretamina, Vincristina, Procarbazina,
Prednisona

GATED SPECT

Quantitativo

- Motilidade miocárdica
(global e segmentar)
- Espessamento de parede
- Volumes sistólico e diastólico
- Fração de ejeção de VE



FEVE= 54 %

PERFUSÃO MIOCÁRDICA

-SPECT-

Clinica

DAC- Suspeita

Pós IAM/ Angina instável

Baixa função de VE

Pós CAT

Cirurgia não cardíaca

Pós revascularização

Informação

Diagnóstico para pacientes média probabilidade

Prognóstico- Especialmente qdo alta probab.

Avaliação de risco

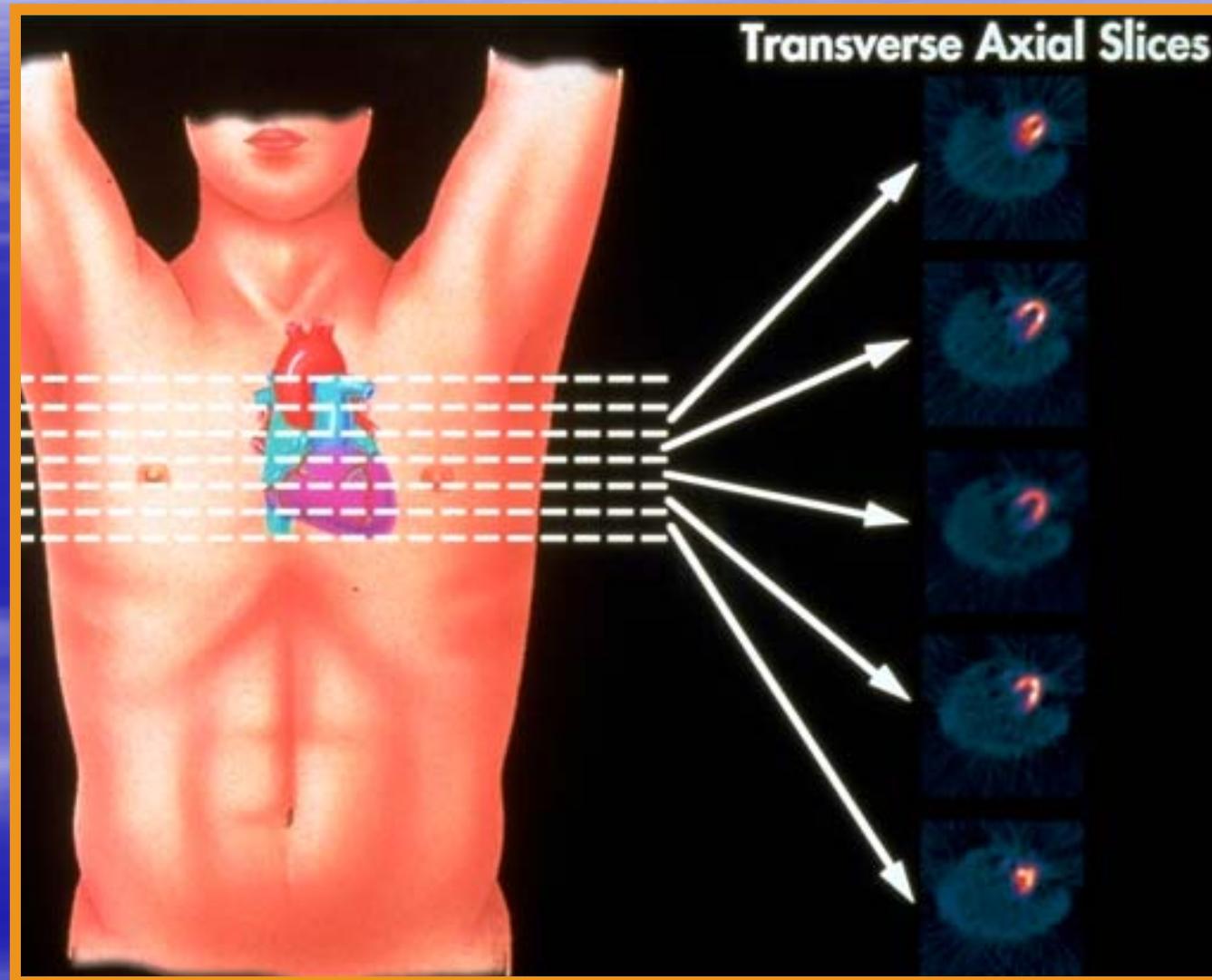
Miocárdio “stunned” ou hibernante

Tratamento clínico X revascularização

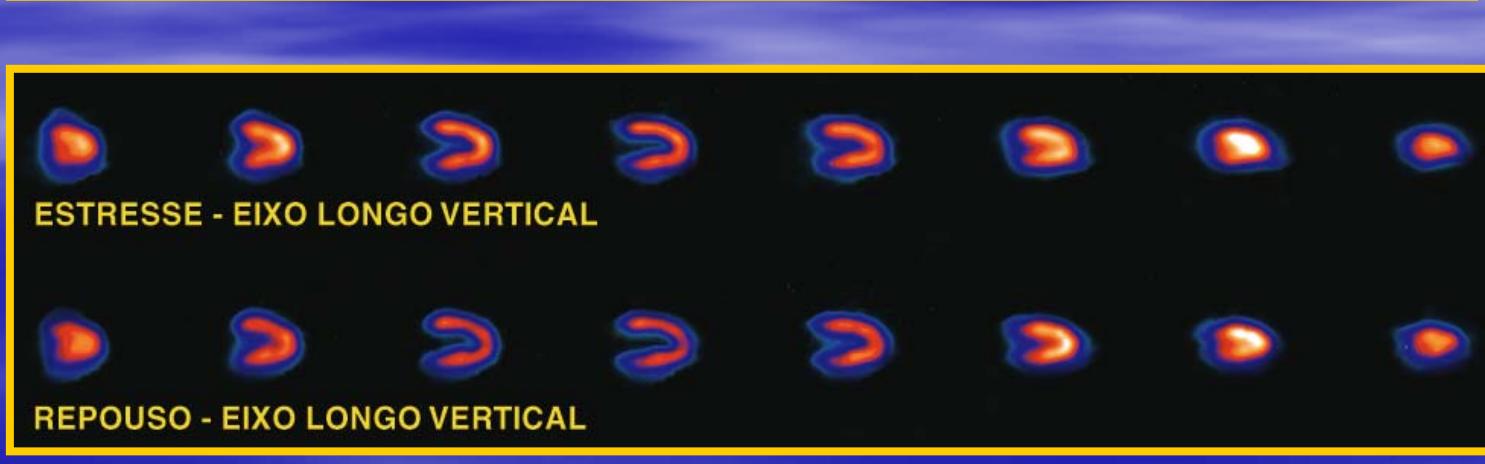
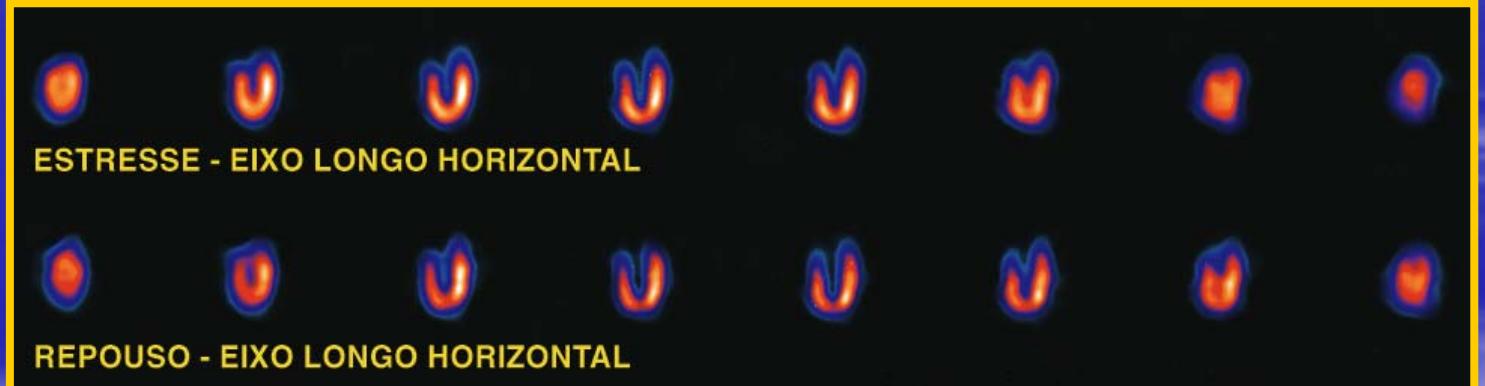
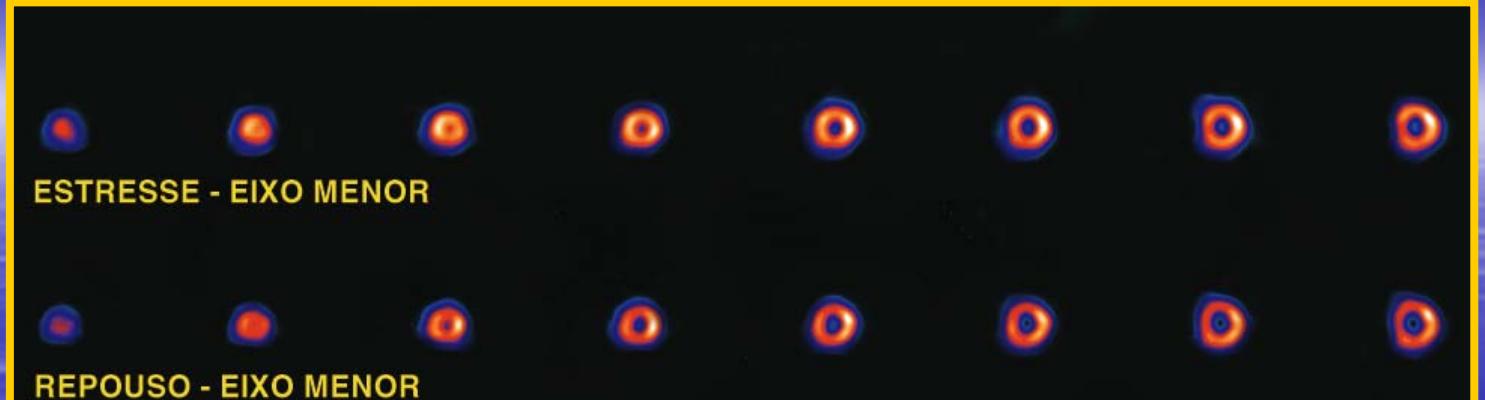
Avaliação de risco

Detecção de reestenose ou oclusão de ponte

RECONSTRUÇÃO

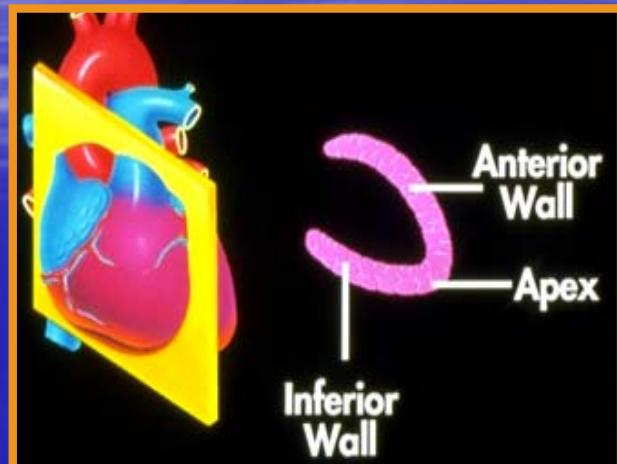


InCor
HC

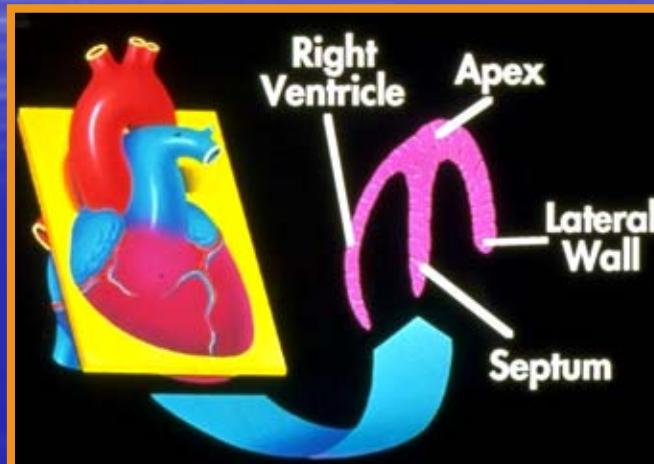


REORIENTAÇÃO

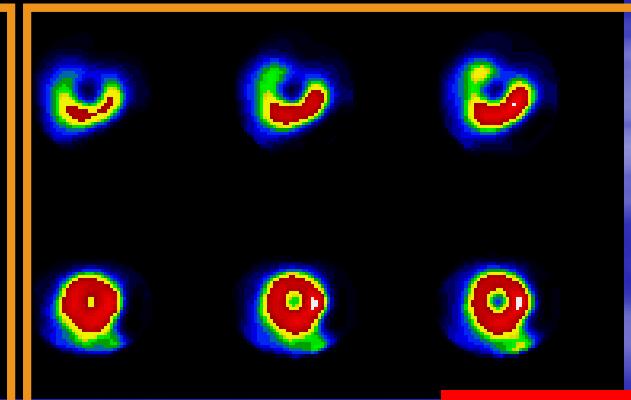
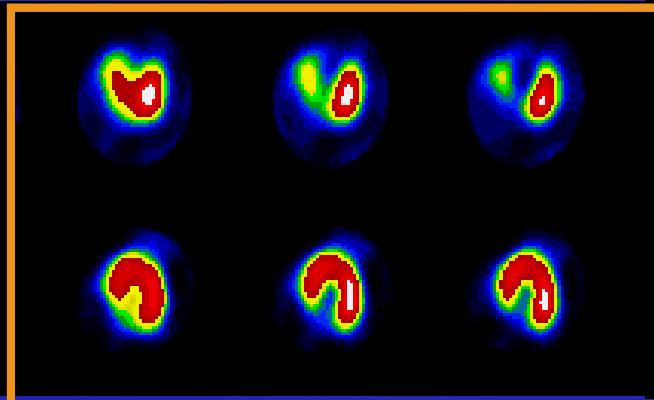
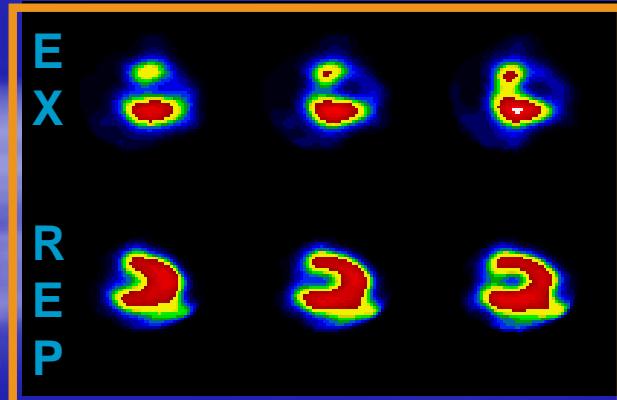
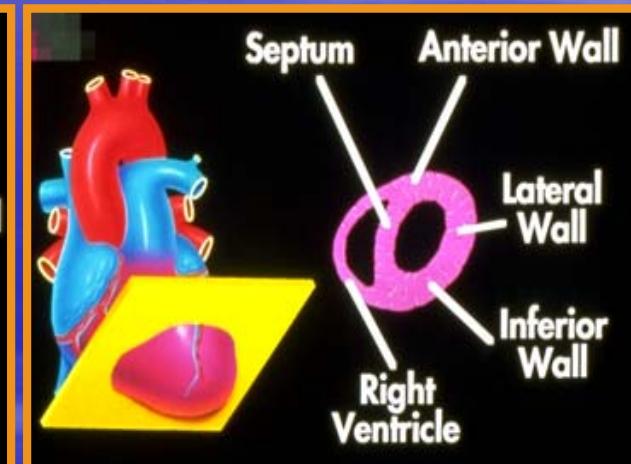
eixo longo vertical



eixo longo horizontal



eixo menor

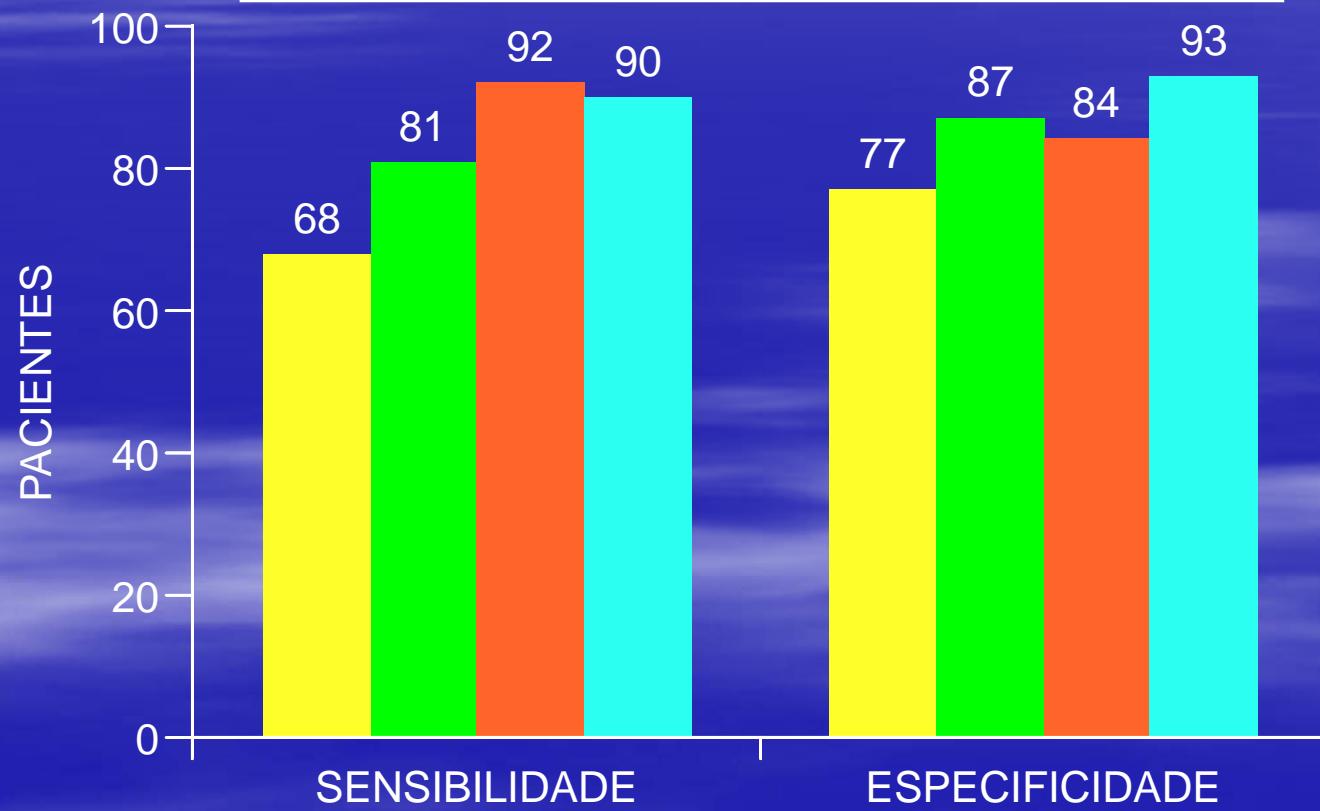


^{99m}Tc MIBI

InCor
HC

SENSIBILIDADE E ESPECIFICIDADE MÉTODOS PARA DETECCÃO DE DAC

- | | |
|--|-------------------------|
| ■ Ex. ECG (150 Estudos) | ■ Ex. Echo (14 estudos) |
| ■ Ex. SPECT TI-201 with Quantification (6 Estudos) | |
| ■ Ex. SPECT Tc-99m Sestamibi (3 Estudos) | |



BELLER E COLS

NL

EXERCÍCIO



REPOUSO

EIXO MENOR



EXERCÍCIO

REPOUSO

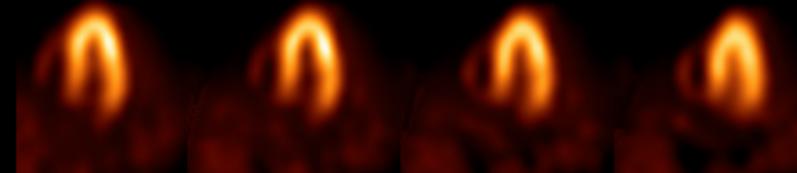
EIXO LONGO VERTICAL



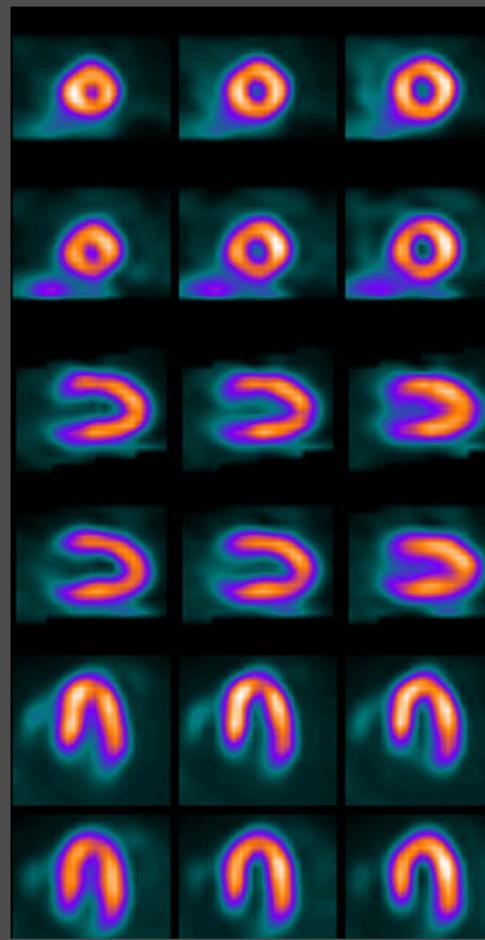
EXERCÍCIO

REPOUSO

EIXO LONGO HORIZONTAL

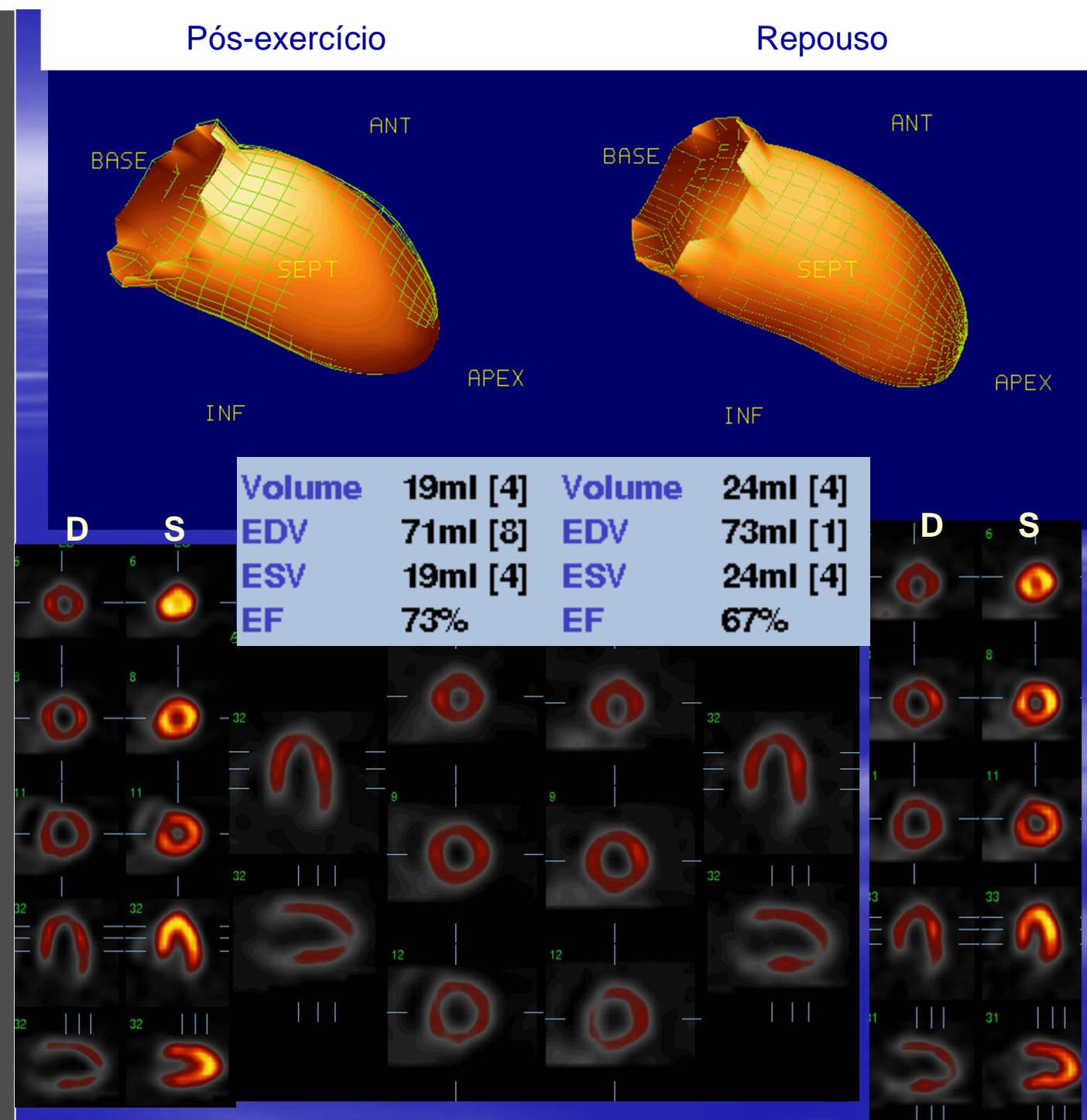


Perfusão miocárdica
 99m Tc-MIBI
Exercício- repouso



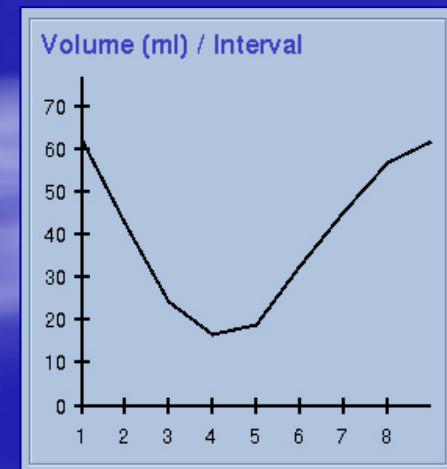
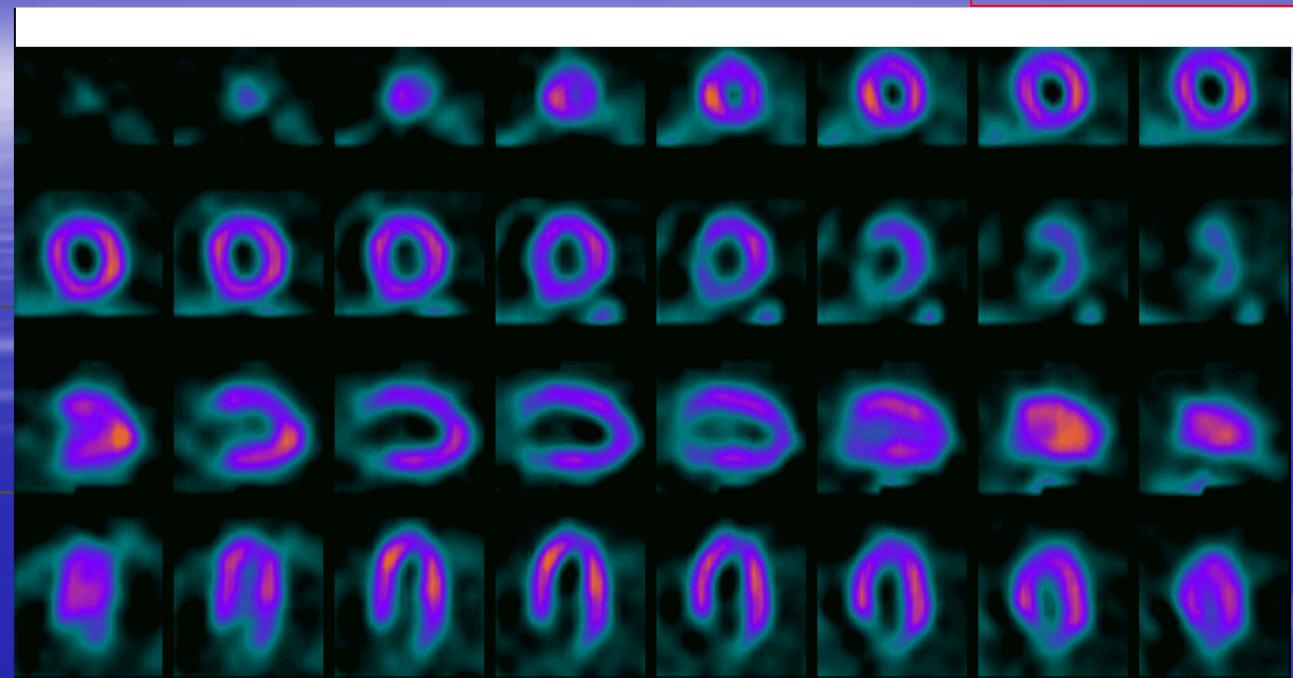
Pós-exercício

Repouso



GSPECT Quantitativo (QGS)

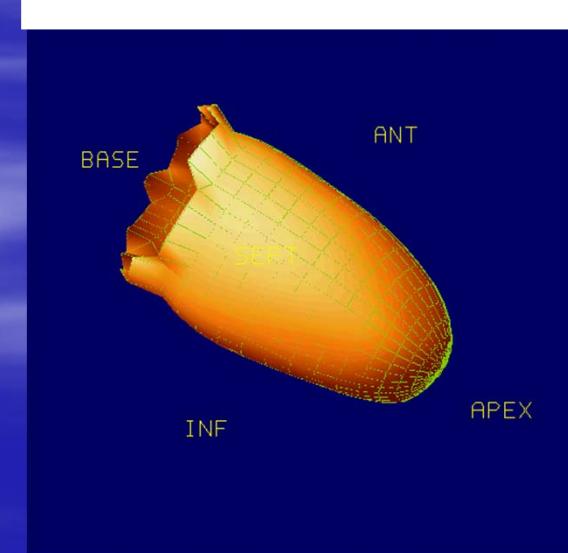
Germano, J Nucl Med, 1995
Germano, J Nucl Med, 1998

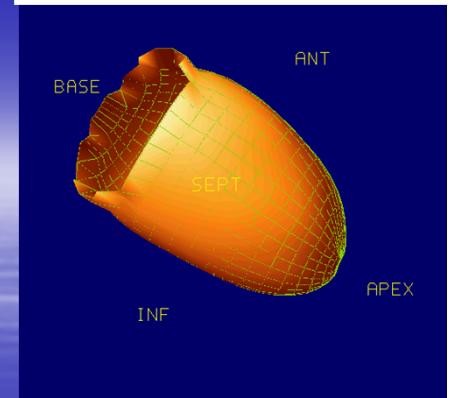
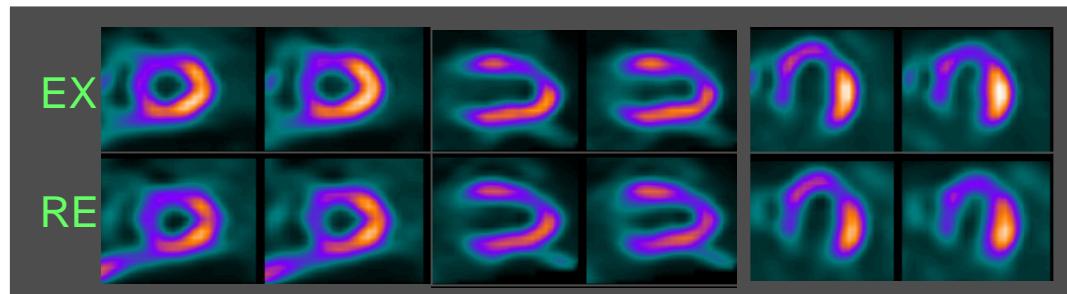


Volume diastólico final (ml)

Volume sistólico final (ml)

$$FE(\%) = \frac{\text{Vol. Diast} - \text{Vol. Sist}}{\text{Vol. Diast}}$$





GSPECT Quantitativo (QGS)

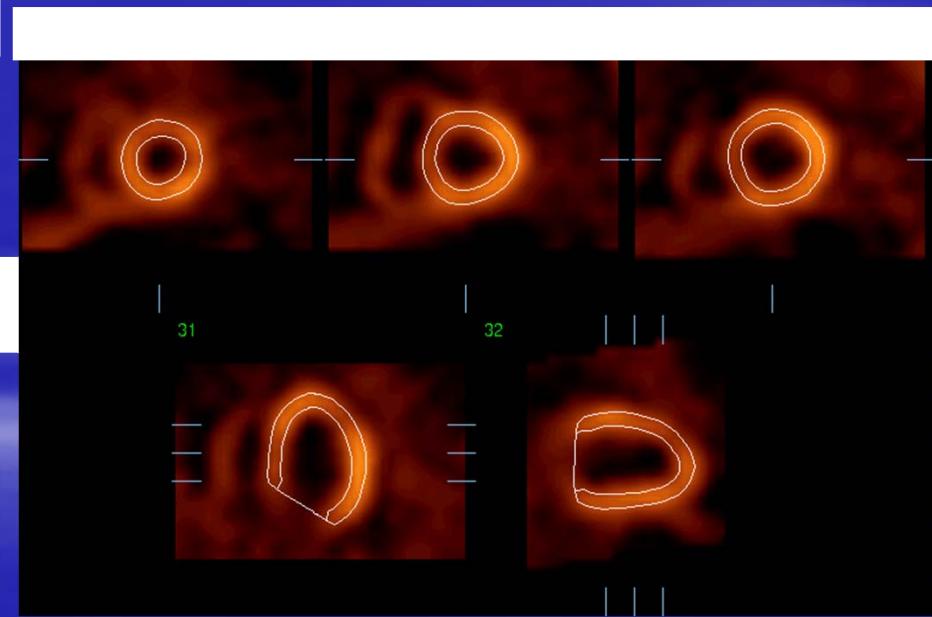
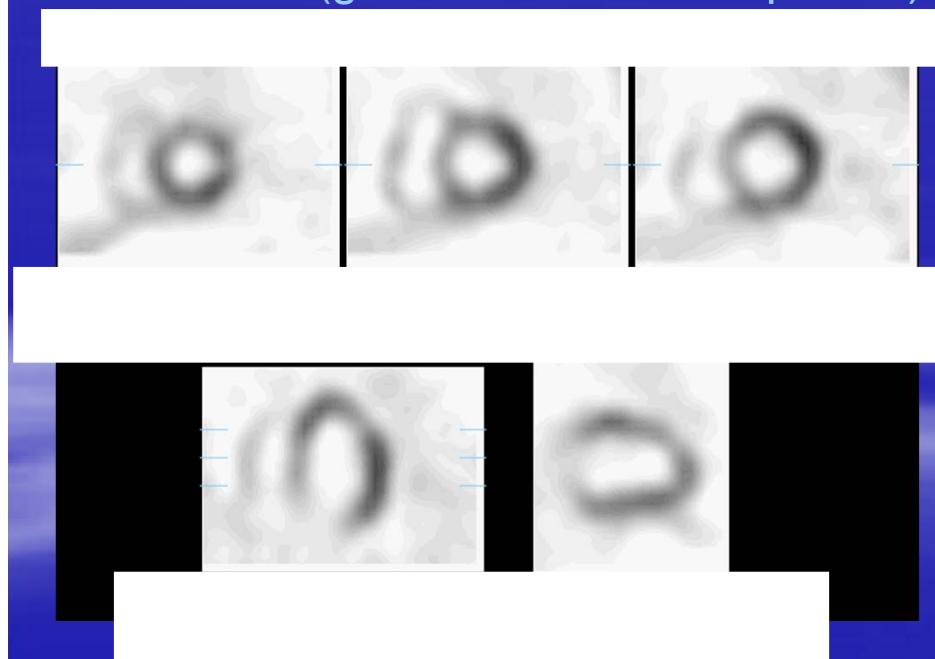
Espessamento (% diastóle)

Δ espessura parede (epic –endo)

diást e síst (geometria e volume parcial)

Motilidade regional (mm)

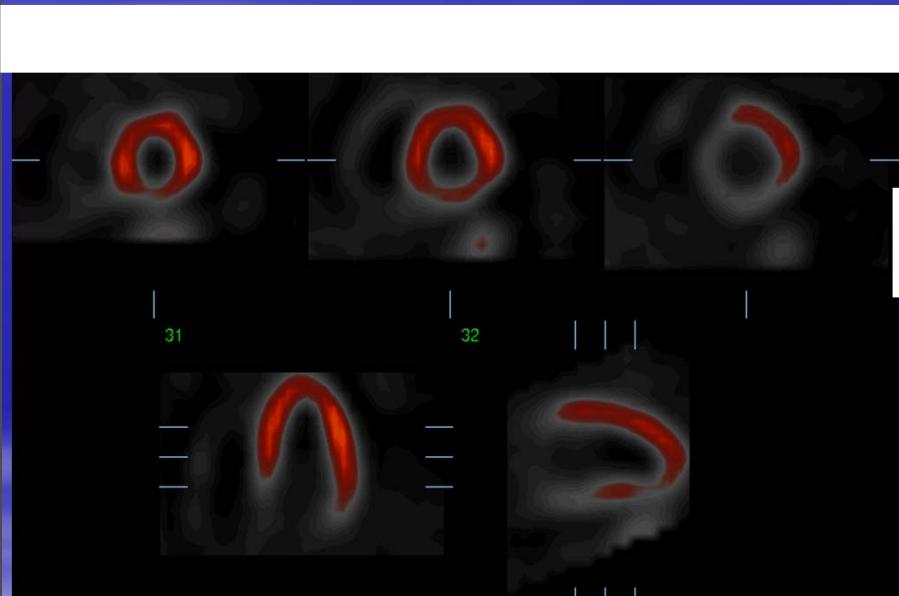
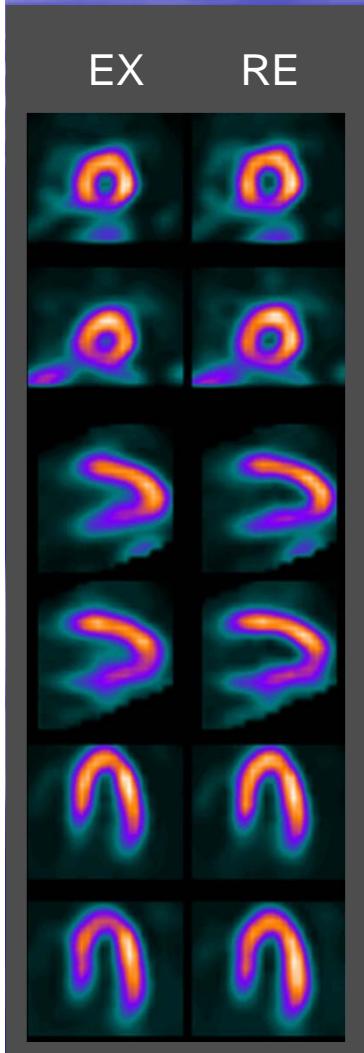
Δ distância (diast – síst) de pto endoc



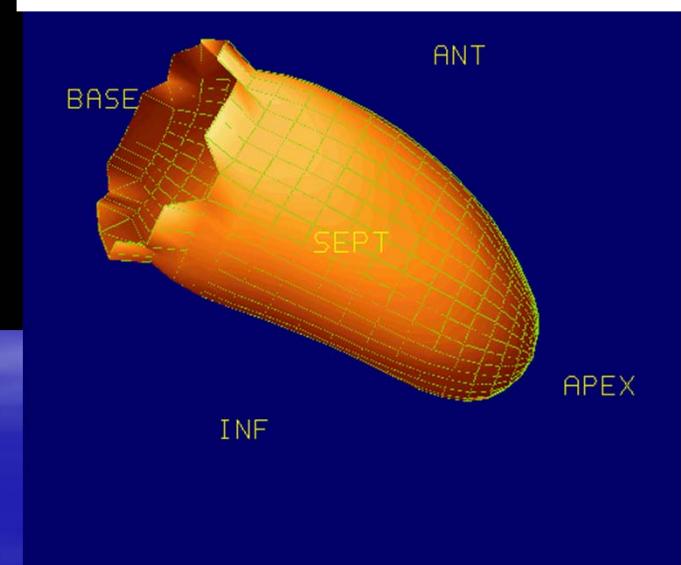
GSPECT Quantitativo → IMPORTÂNCIA ?

➤ ↑ especificidade por ↓ de artefatos (atenuações)

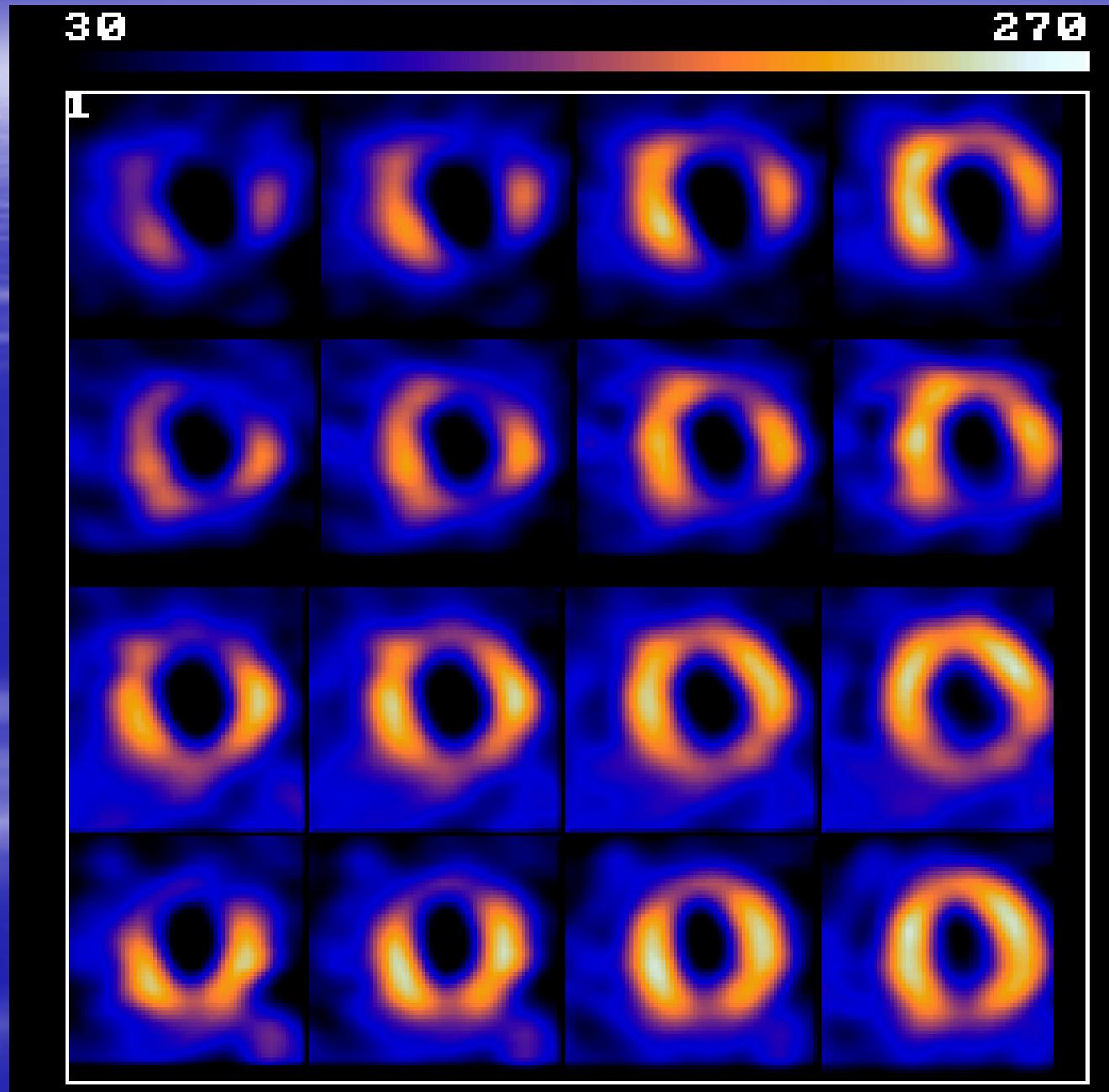
Especificidade: 84 % ⇒ 94 % (DePuey,1995)
Falso-positivos: 14 % ⇒ 03 % (Taillefer,1997)



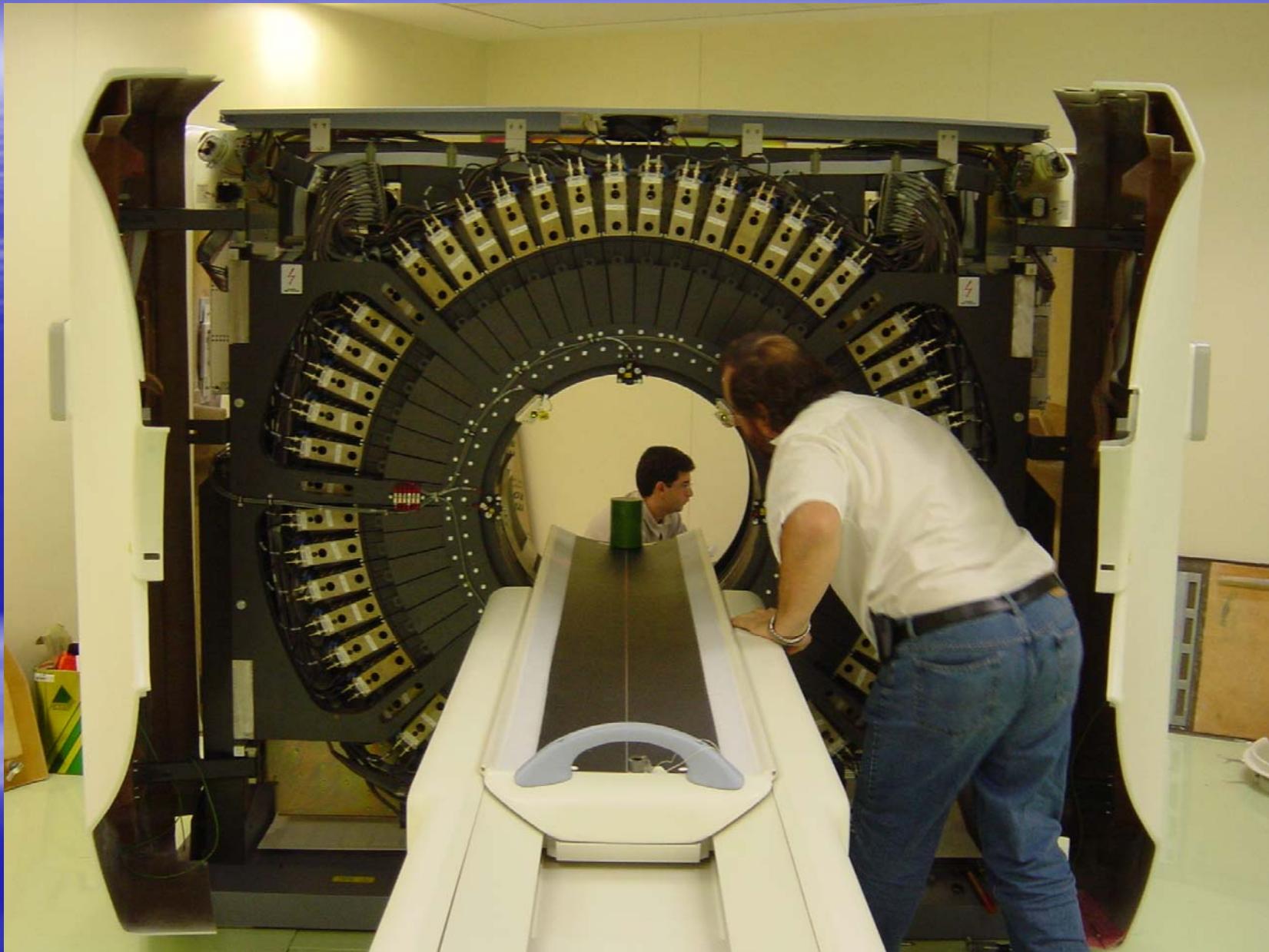
Volume	102ml [1]
EDV	102ml [1]
ESV	37ml [4]
EF	64%



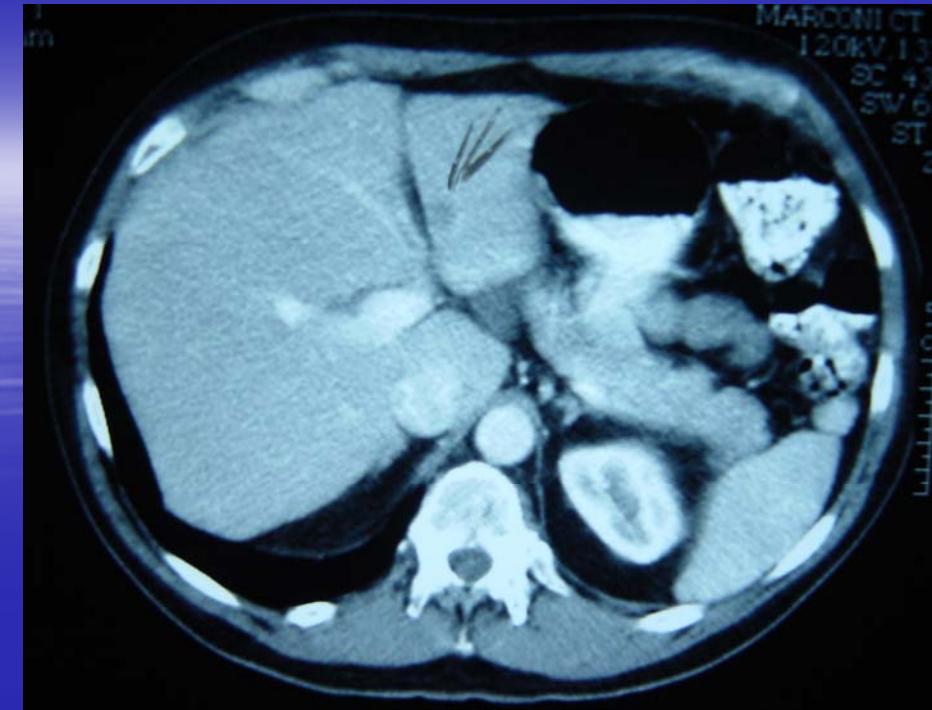
VIABILIDADE MIOCÁRDICA COM TÁLIO-201



PET DEDICADO



GM

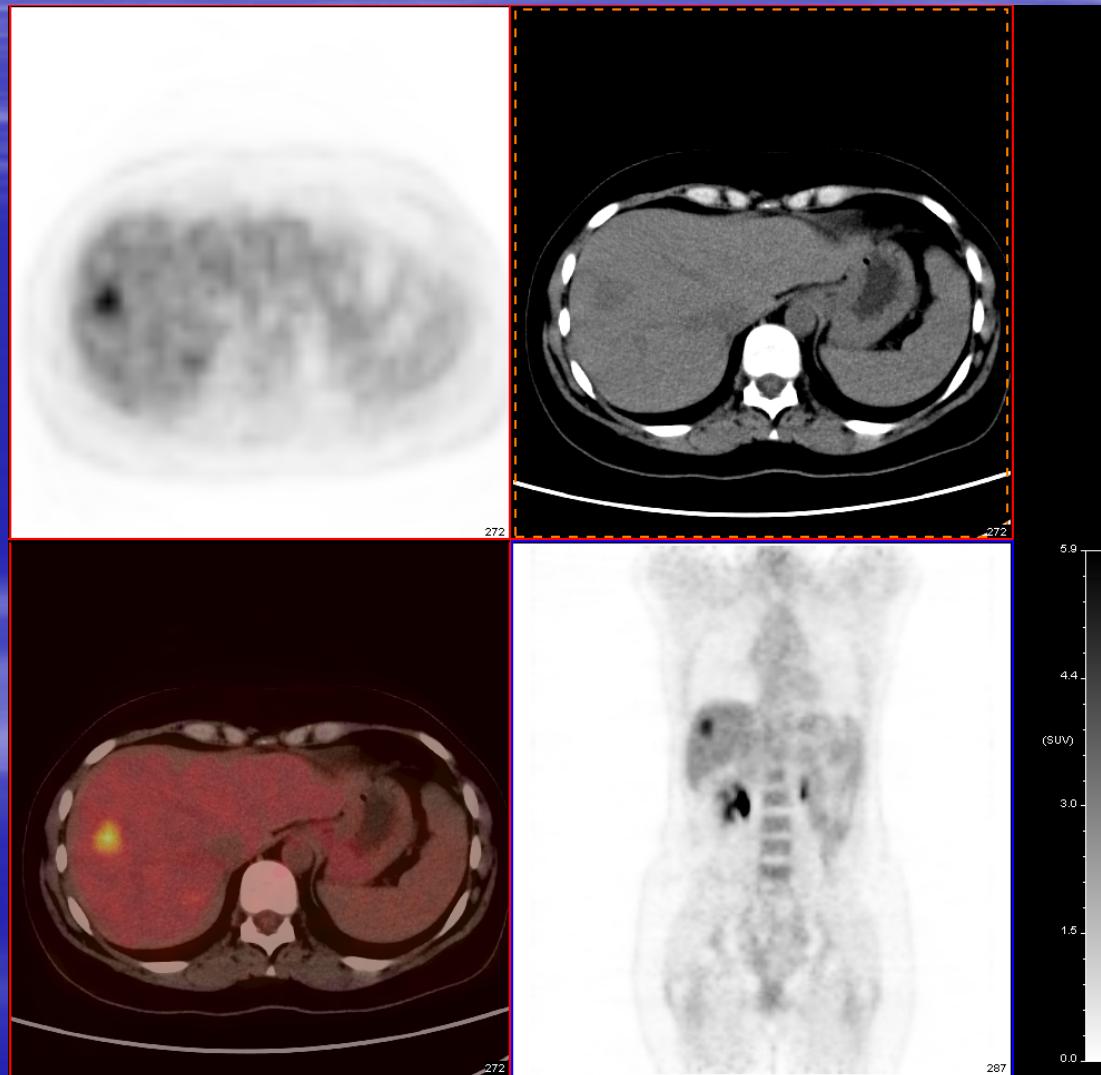


TC : 2 nódulos tratados

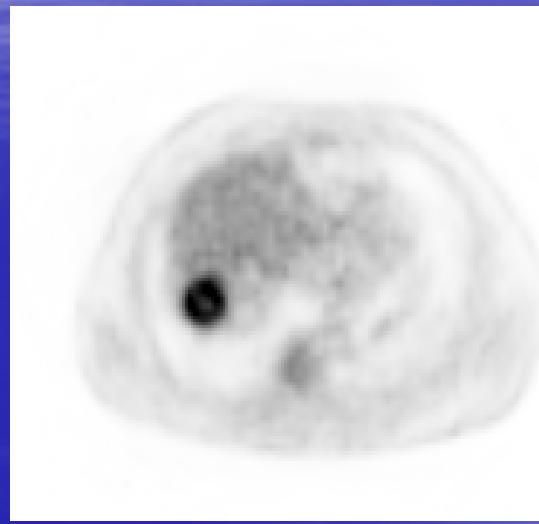
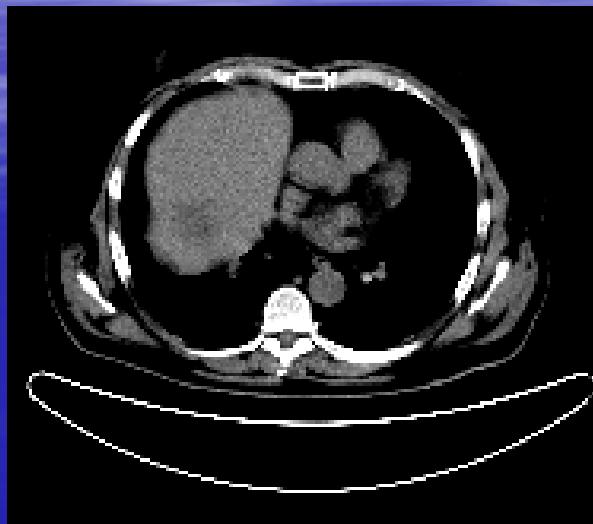
+

1 novo nódulo

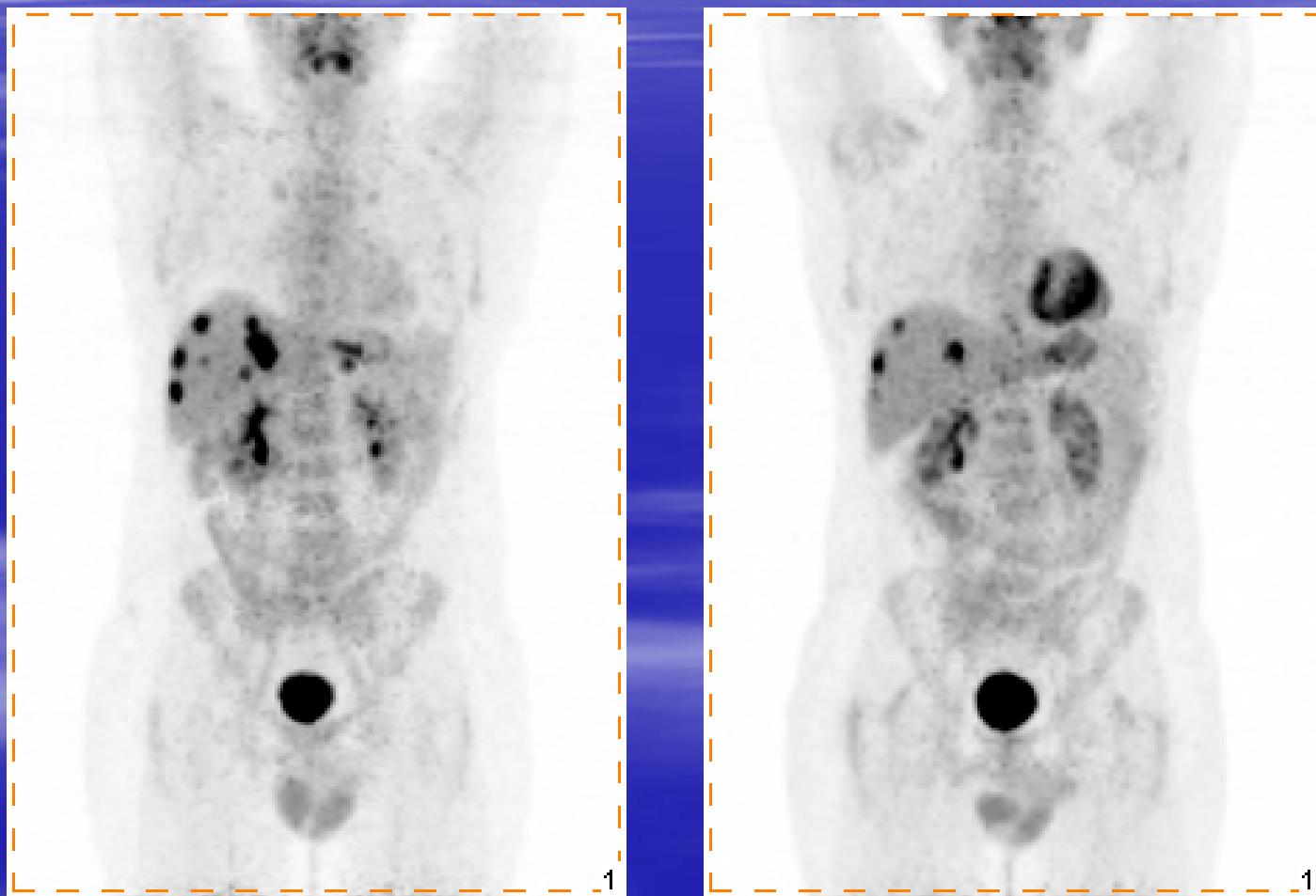
Metástase Hepática: Ca de colon



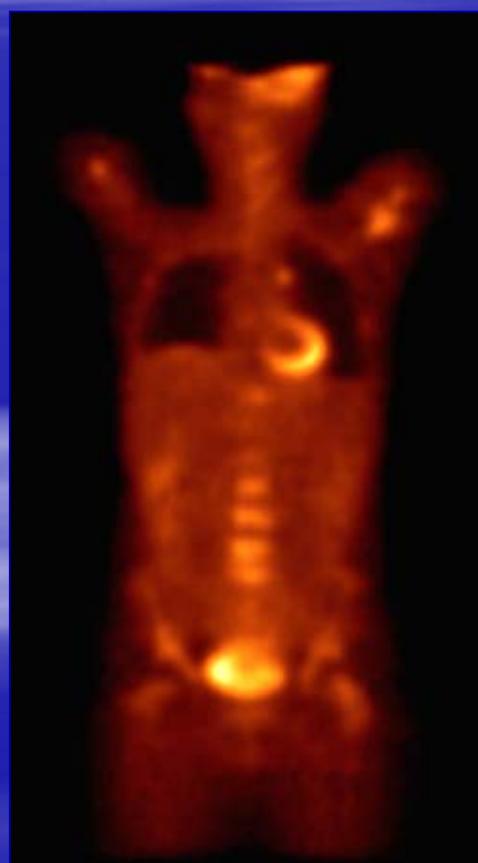
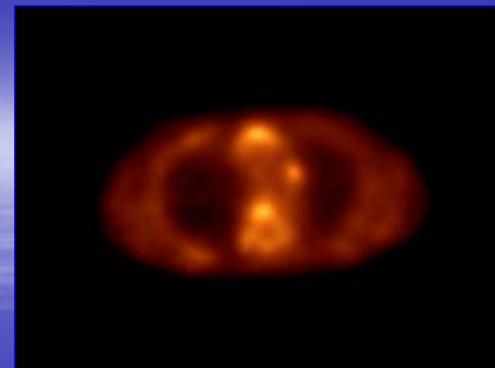
Metástase hepática: ca de colon



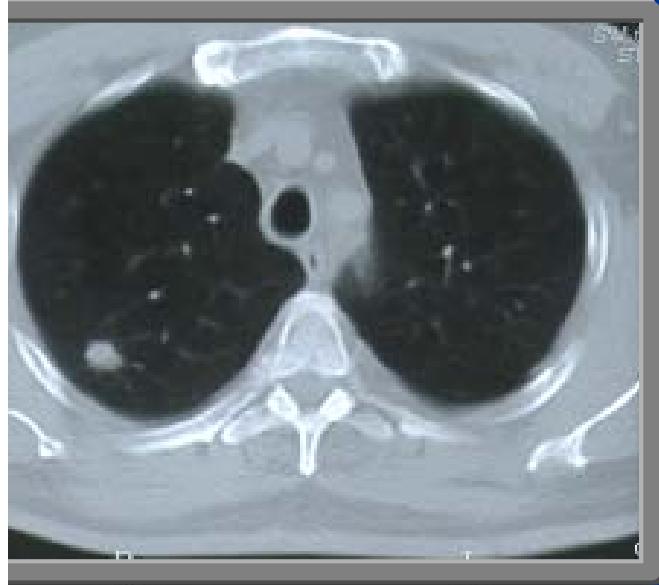
Metástases hepáticas



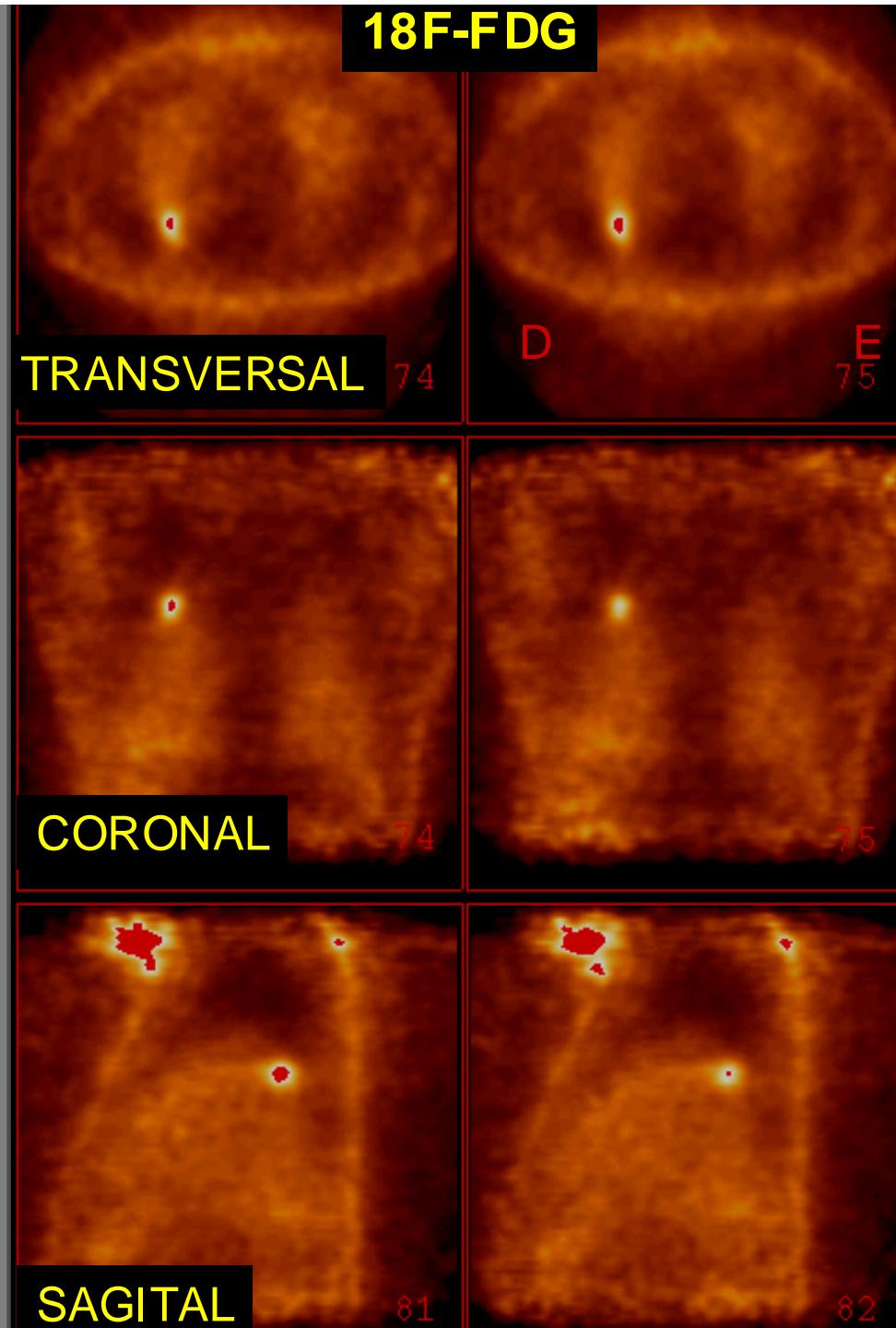
CVF



TC de torax



18F-FDG

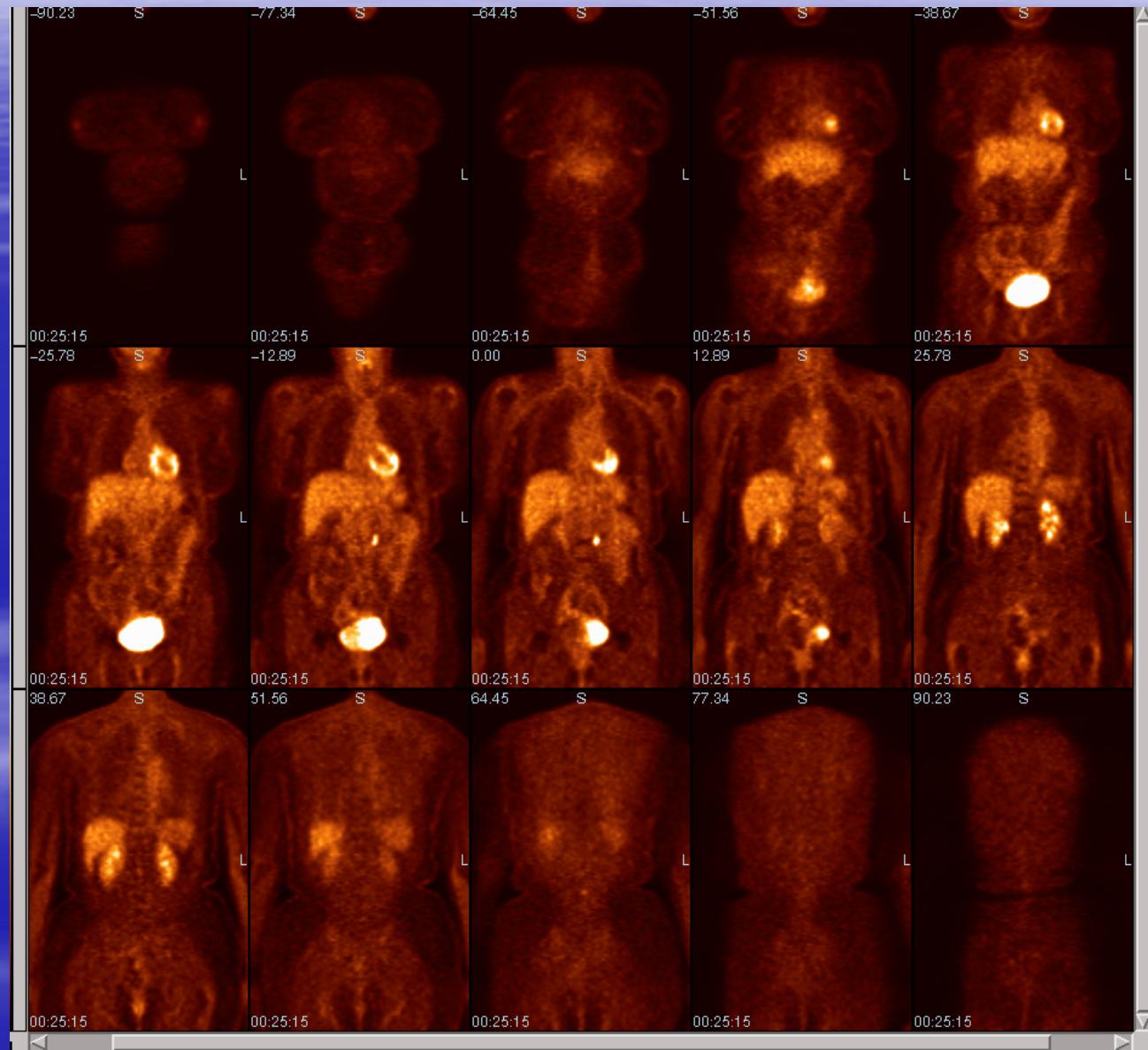


MB, 44 años, masc

**Ca indiferenciado de
grandes células**

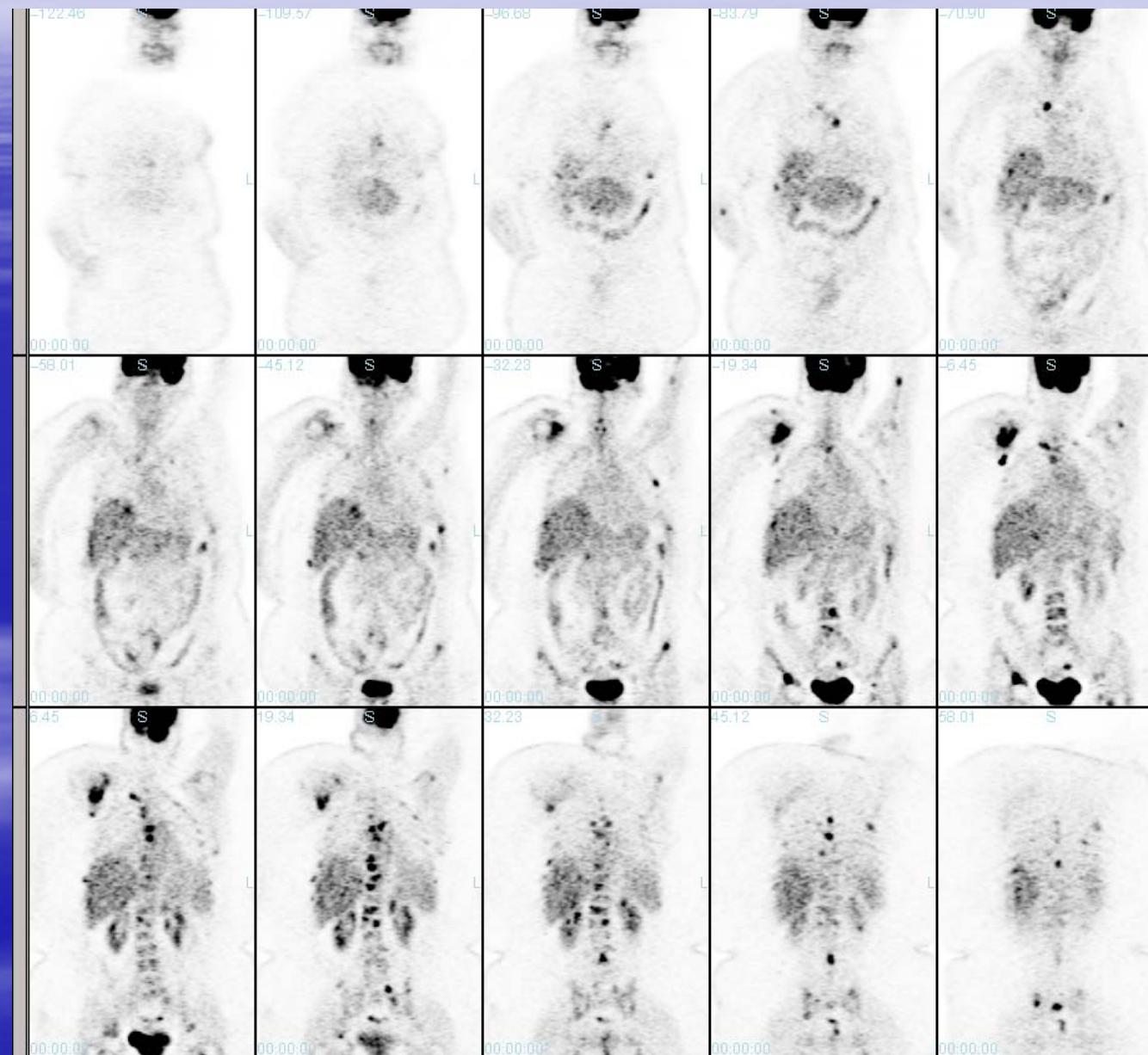
PET

LS
52 F
Ca Ov



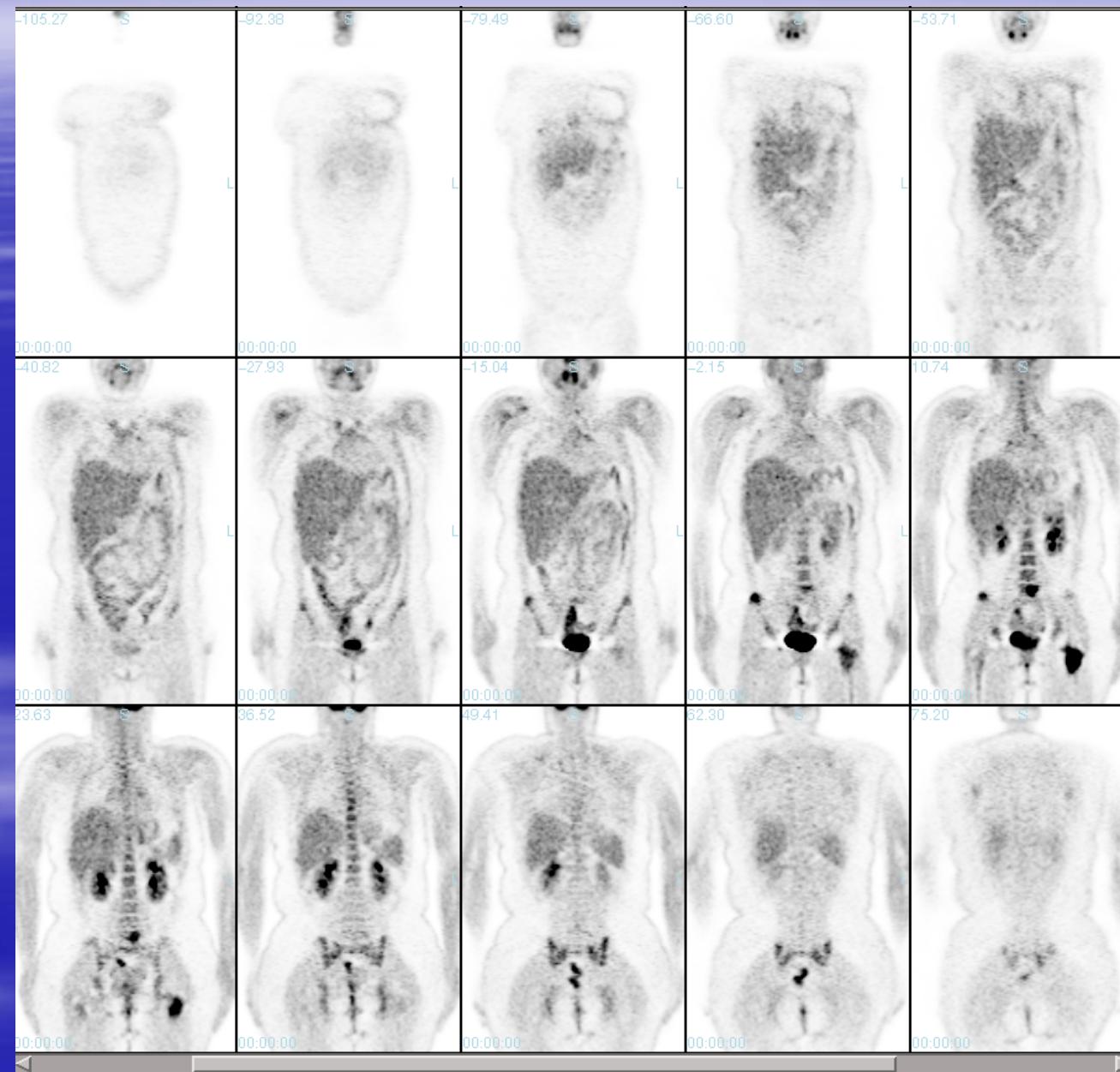
ALP
56F
Mama

PET



RNBM
Mama IIB

PET



Viabilidade com FDG x Protocolos

◆ Jejum:

- ➔ Captação baixa pelo miocárdio normal
- ➔ Grau de captação é variado
- ➔ Distribuição é heterogênea

◆ Jejum + Glicose:

- ➔ Acentua a diferença de captação entre miocárdio viável e cicatricial

◆ Jejum + Glicose + Insulina:

- ➔ Necessários nos pacientes com baixa resposta na liberação de insulina

◆ “Clamping” insulínico - euglicêmico:

- ➔ Indispensável no diabético.
- ➔ Facilita a padronização e interpretação das imagens.

Viabilidade Miocárdica

Imagens Combinadas

➔ ^{13}N - Amônia -PET X $^{99\text{m}}\text{Tc}$ -MIBI-SPECT

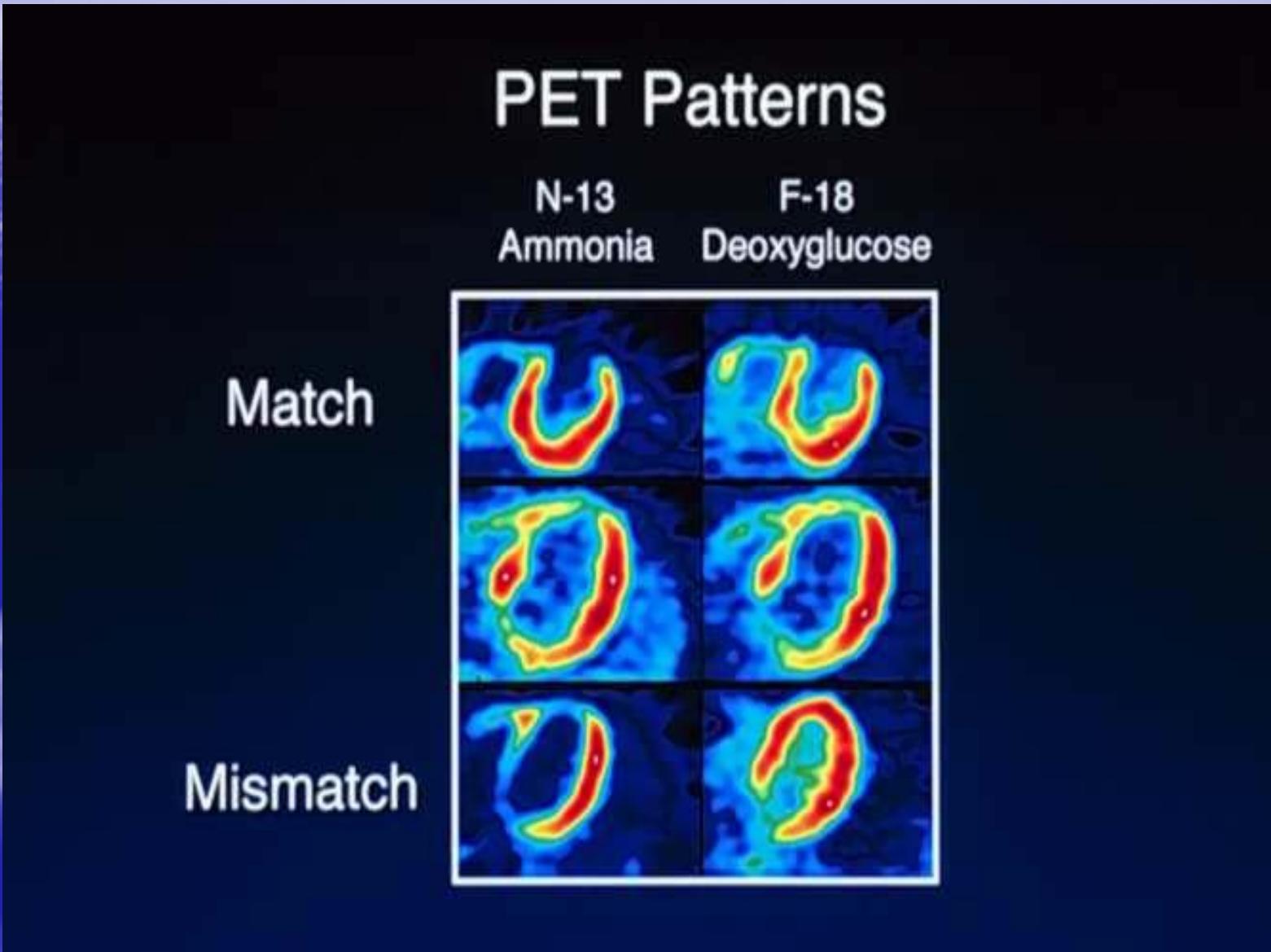
MIBI superestima defeitos nas paredes septal e inferior do VE.

➔ ^{18}FDG -PET X $^{99\text{m}}\text{Tc}$ -MIBI-SPECT

Correção de atenuação deve ser considerada para não superestimar áreas viáveis.

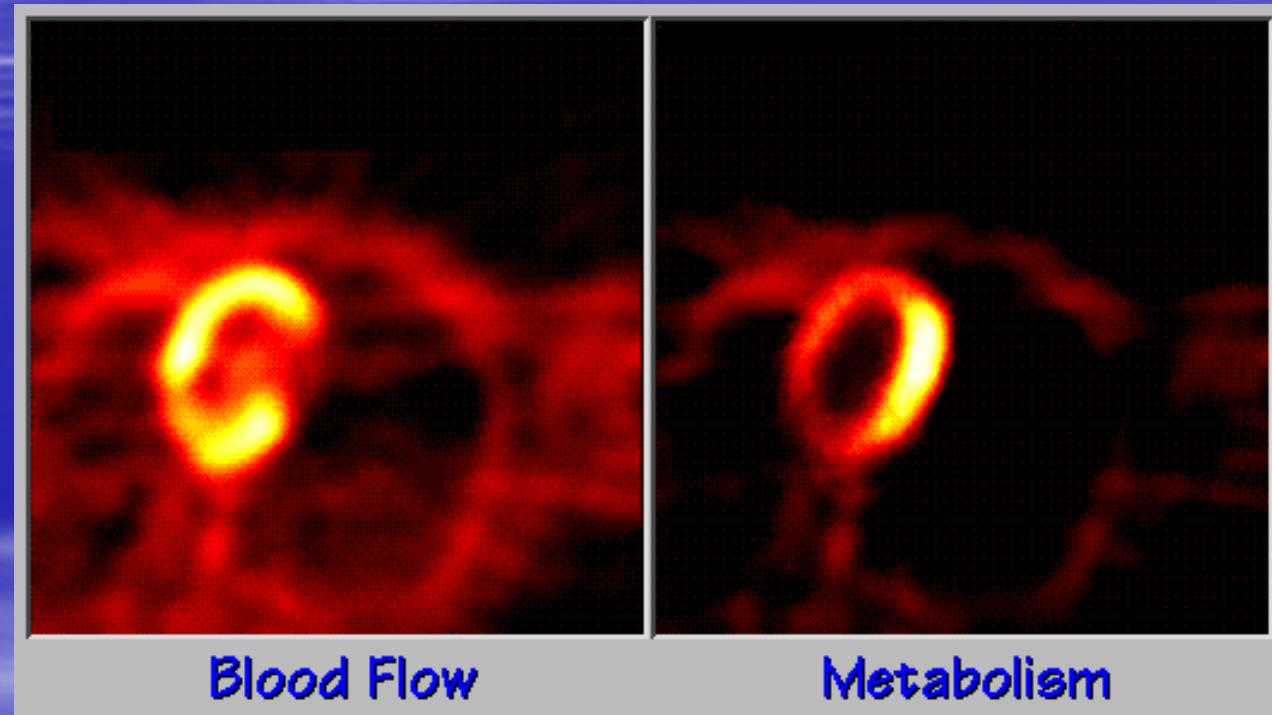
- Sand and cols - J Nucl Cardiol 1998

IMAGENS DE PET: PERFUSÃO E METABOLISMO DE GLICOSE



Aplicações em Cardiologia

Viabilidade
miocárdica
(Mismatch)



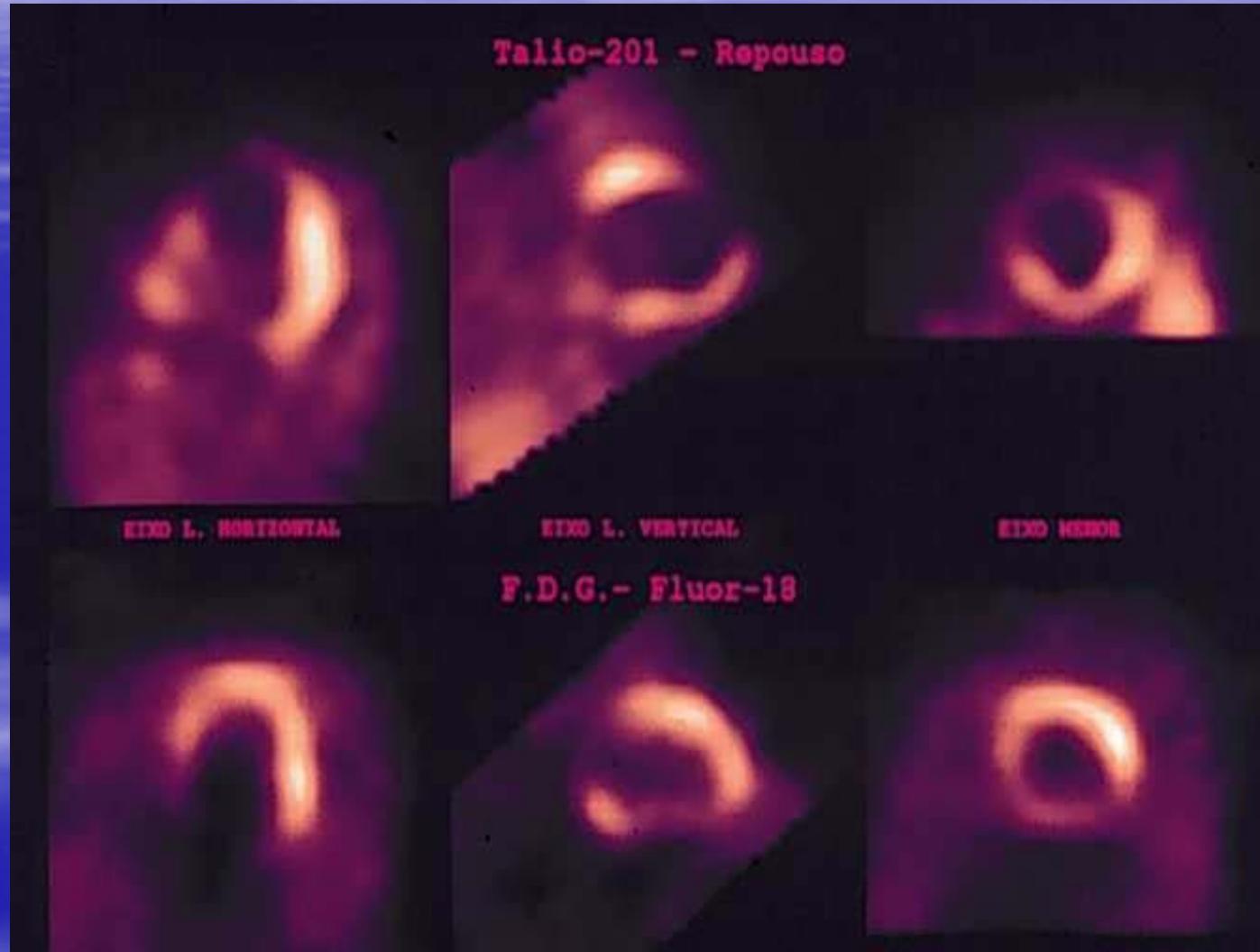
NH₃ – N₁₃

FDG – F₁₈

VIABILIDADE MIOCÁRDICA: TÁLIO X GLICOSE

TÁLIO-201

^{18}FDG

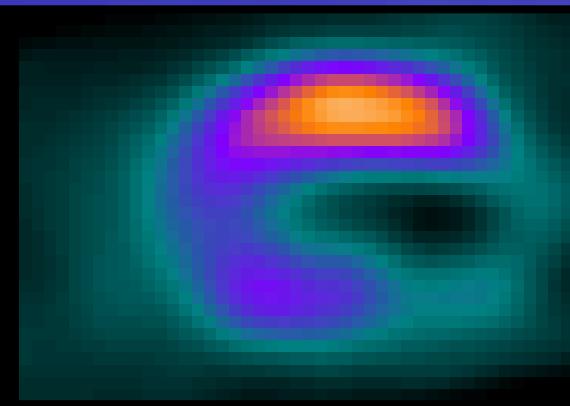
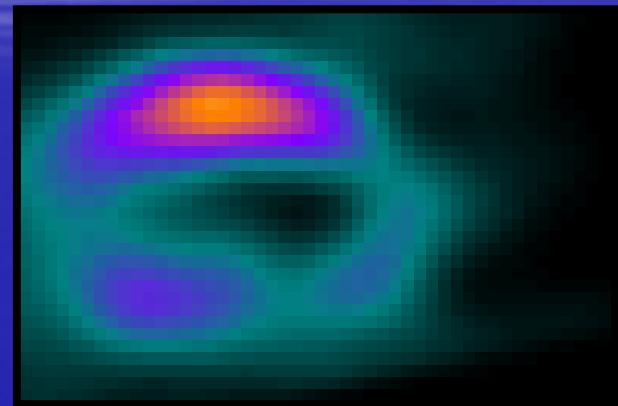


INCOR

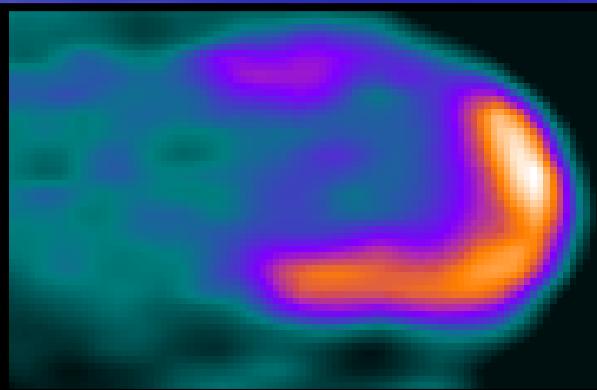
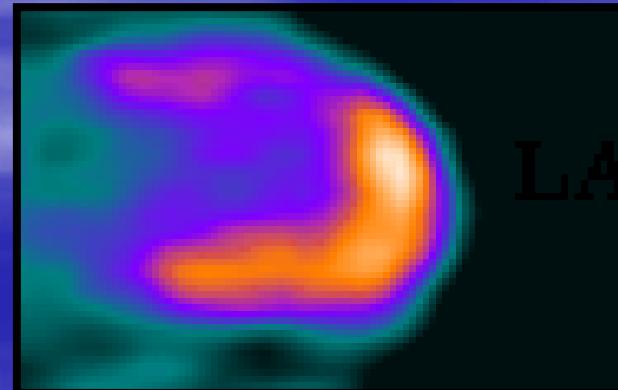
SPL



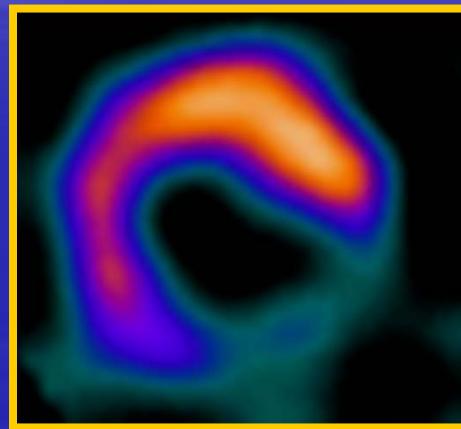
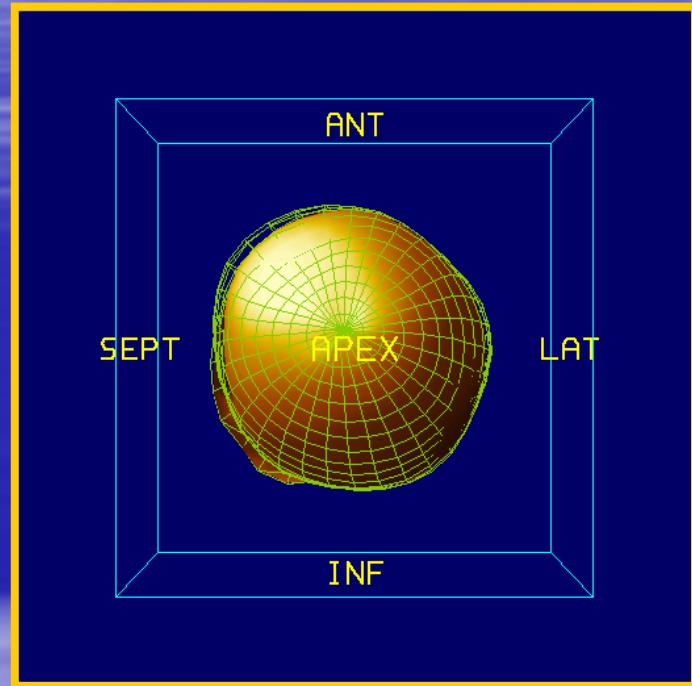
Perfusão



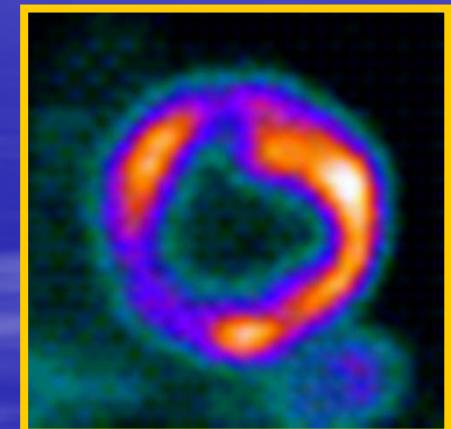
Met Glicose
FDG-F18
PET



AZ

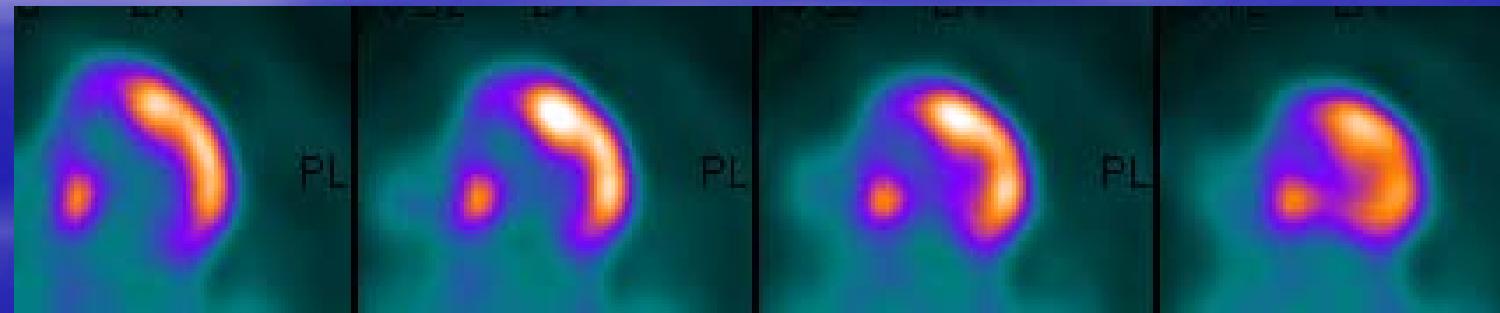
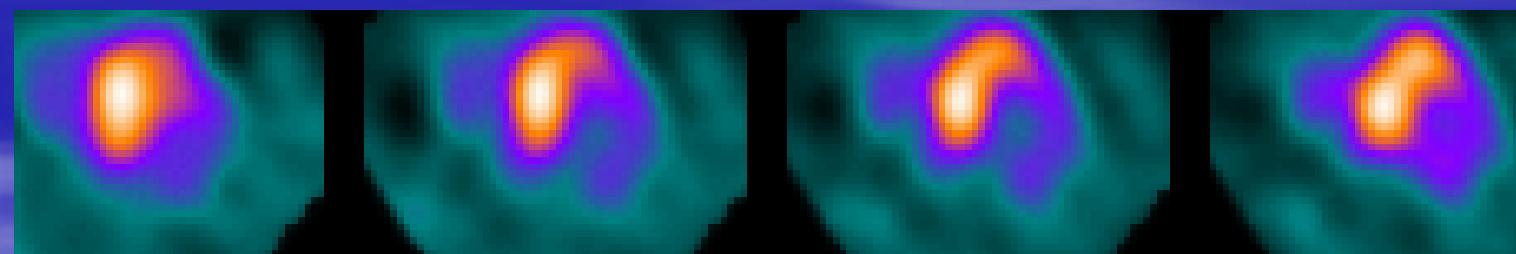
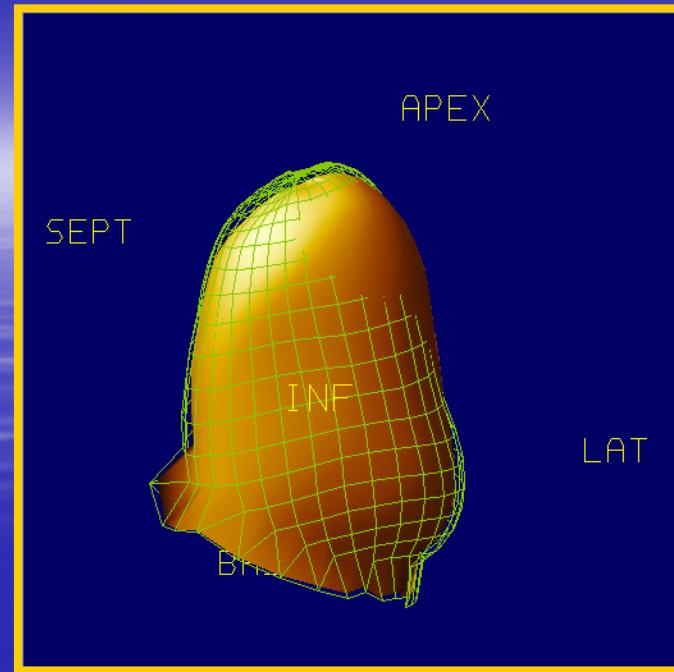


Perfusão

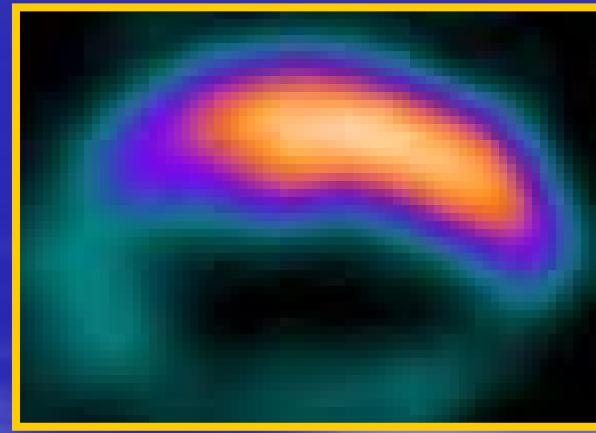
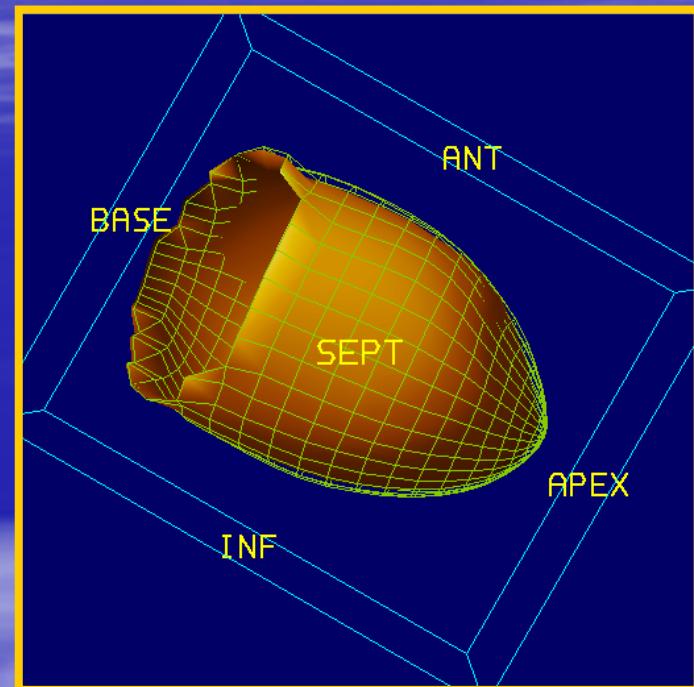


MetGlicose
FDG-PET

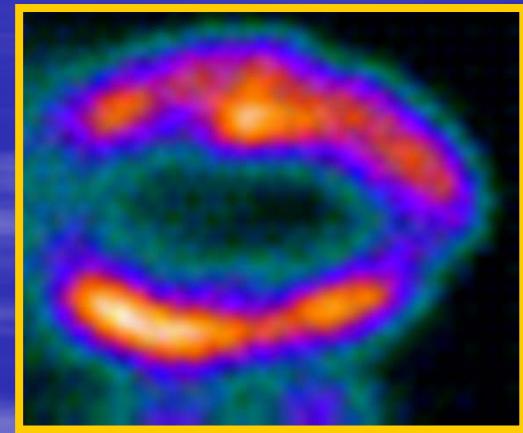
VSC



AZ

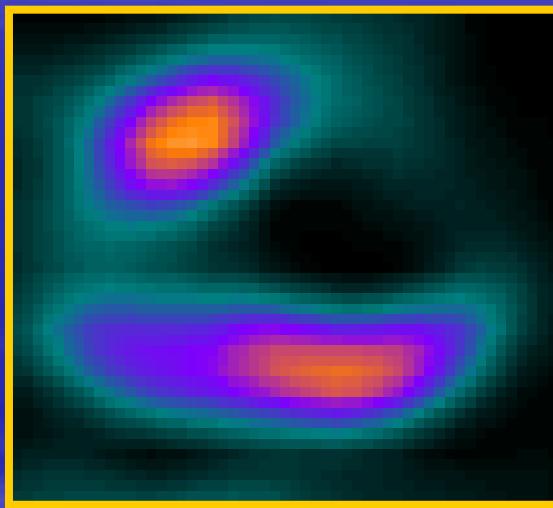
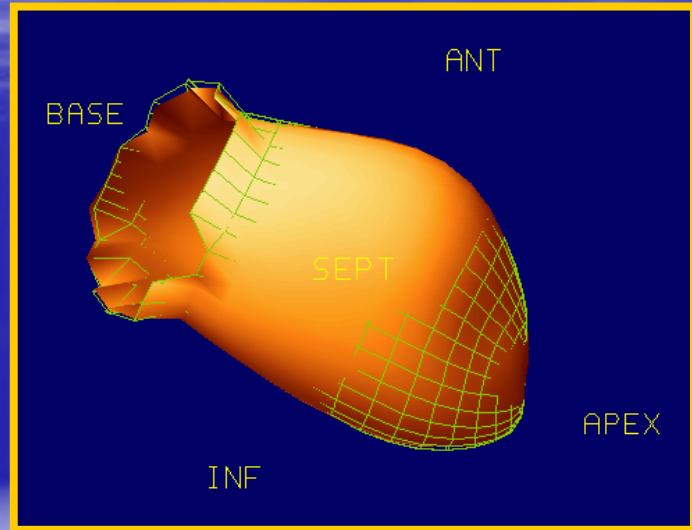


Perfusão

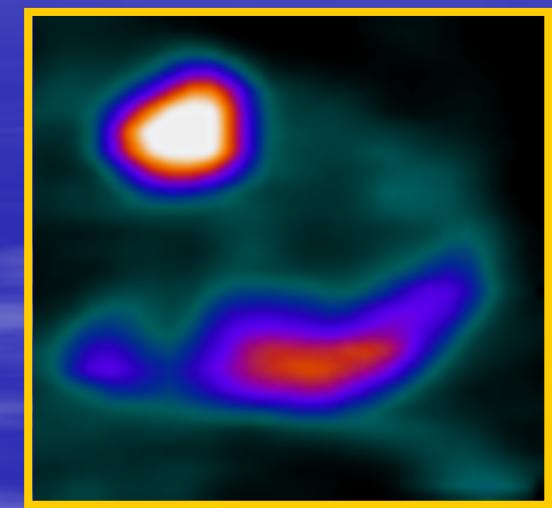


MetGlicose
FDG-PET

ML

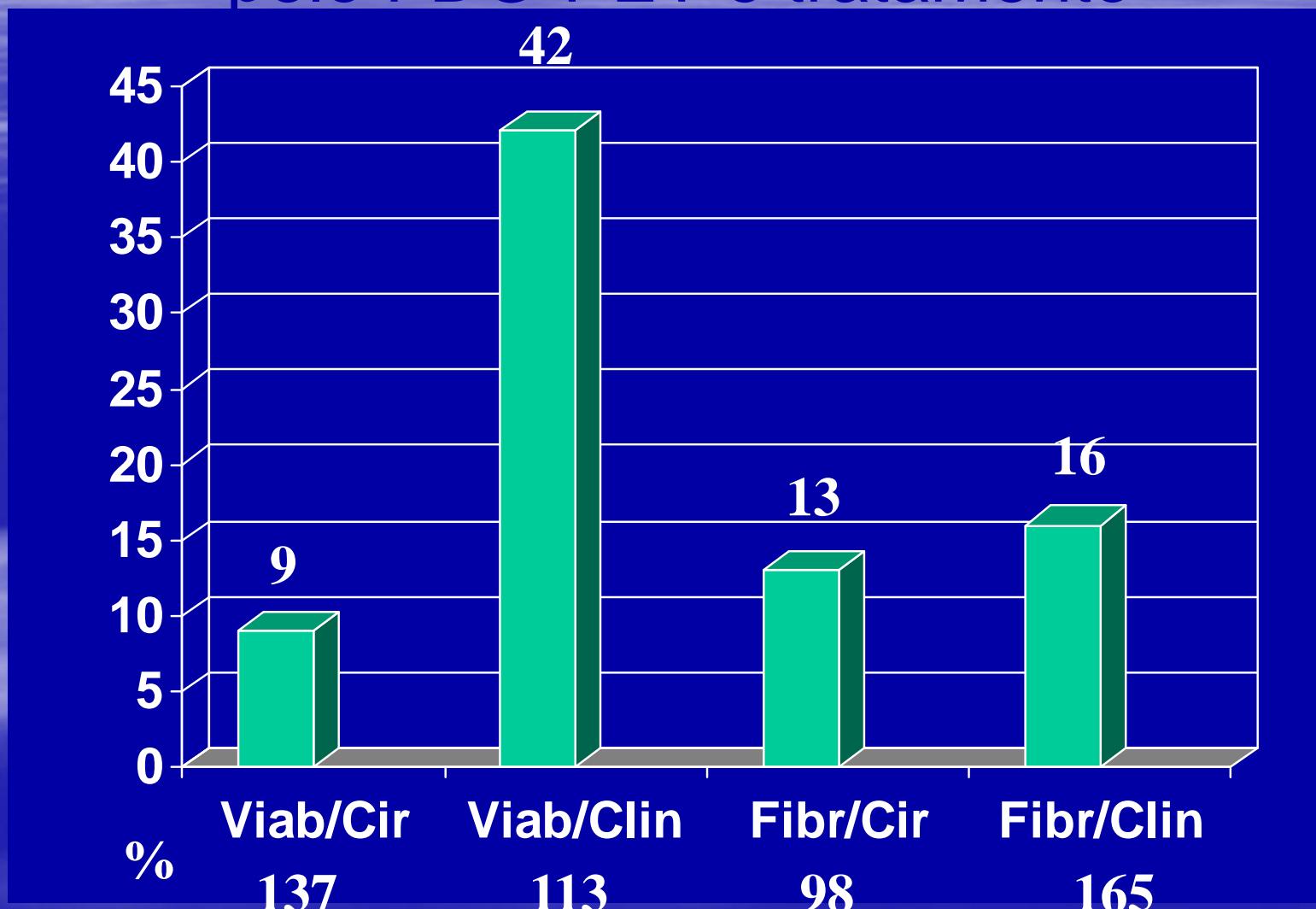


PERFUSÃO

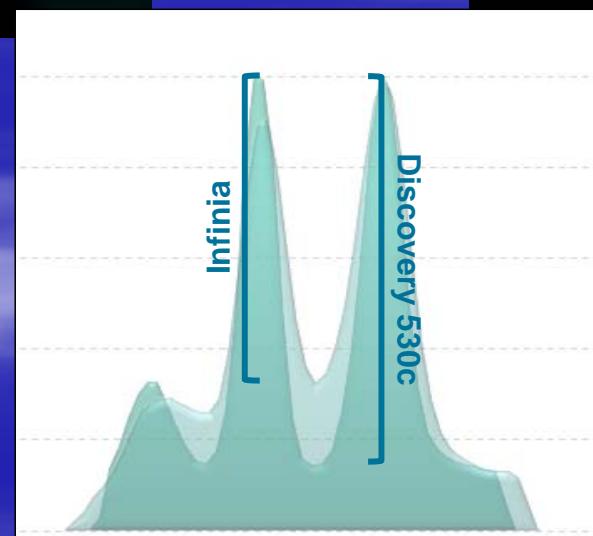
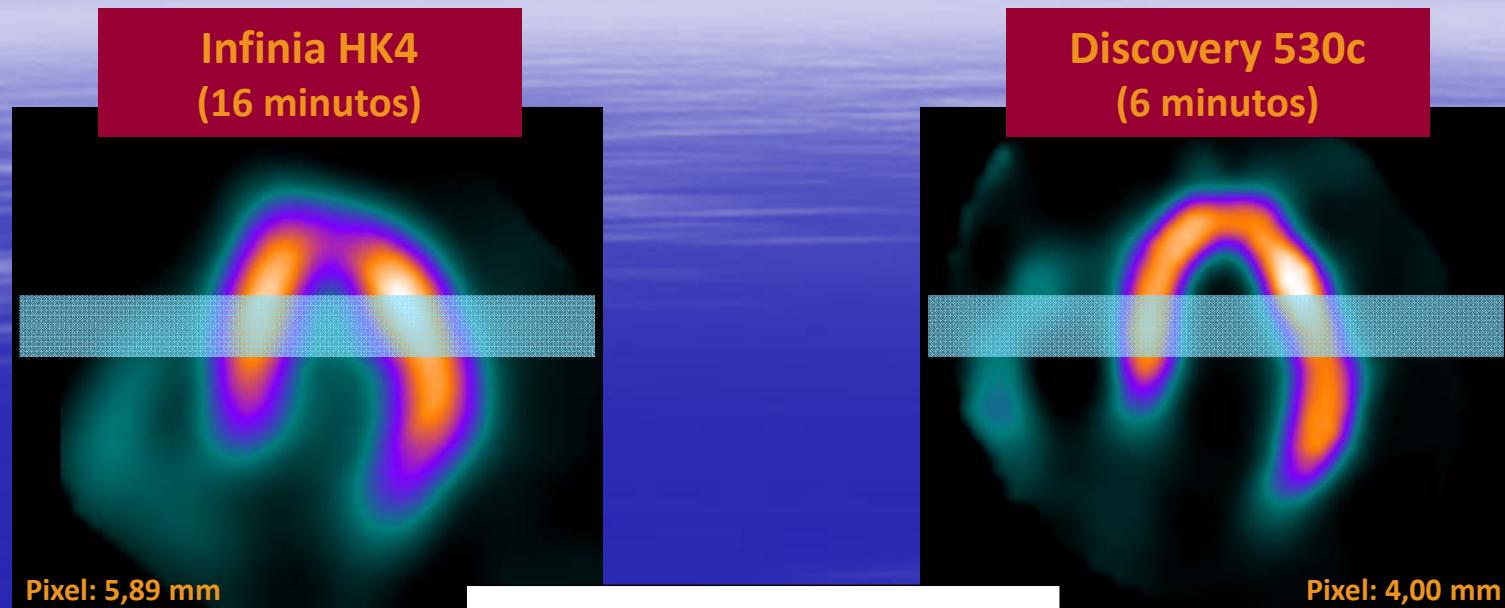


MET GLICOSE
FDG-PET

% Eventos de acordo com a presença/ausência de músculo viável pelo FDG-PET e tratamento

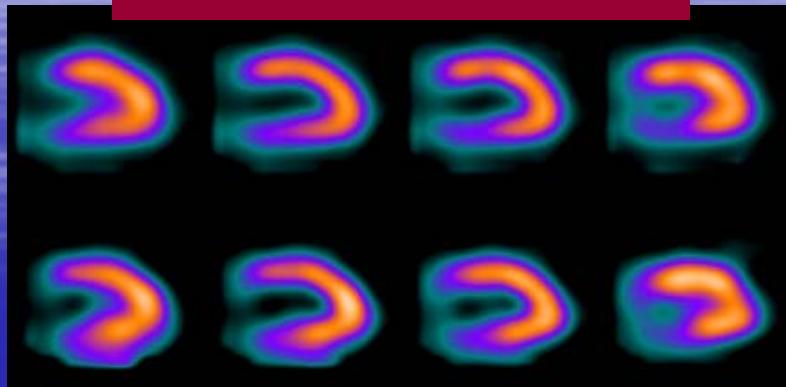


Discovery™ NM 530c – Hospital Israelita Albert Einstein

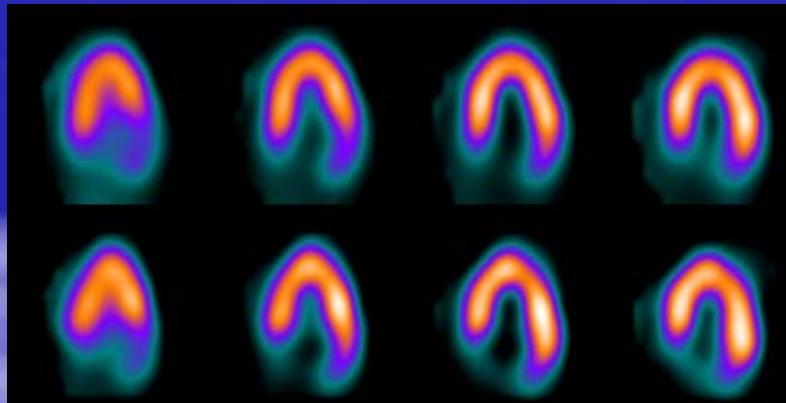
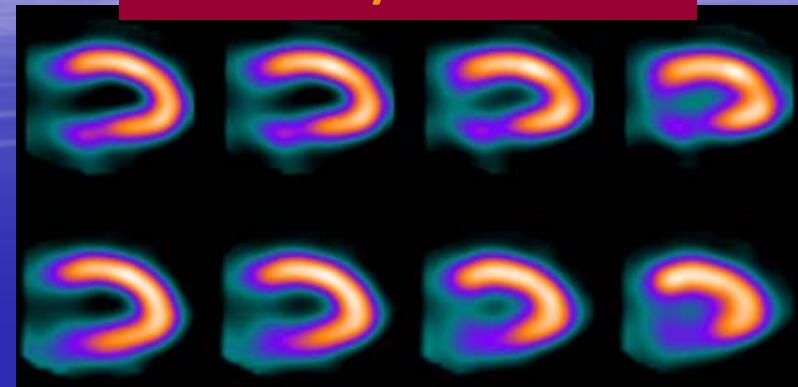


Discovery™ NM 530c – Hospital Israelita Albert Einstein

Câmara convencional



Discovery™ NM 530c



Repouso: 10 mCi / Estresse: 30 mCi
Tempo aquisição: 17 minutos

Repouso: 6 mCi / Estresse: 18 mCi
Tempo aquisição: 6 minutos

TRAÇADORES DE PERFUSÃO PARA PET

OS TRAÇADORES MAIS USADOS SÃO:

H_2O^{15} MEIA VIDA = 127 SEGUNDOS

$^{13}\text{NH}_3$ MEIA VIDA = 10 MINUTOS

^{82}Rb MEIA VIDA = 76 SEGUNDOS

$^{18}\text{F-X}$ MEIA VIDA = 110 MINUTOS

SOMENTE RUBÍDIO NÃO NECESSITA
CICLOTRON. É OBTIDO COM GERADOR
DENTRO DA SALA.

Vantagens das Imagens Cardíacas de Perfusion com PET

- Melhor eficiência
- Menor dose de exposição
- Menos artefatos de atenuação
- Melhor resolução espacial e contraste

*Quantificação do fluxo sanguíneo regional miocárdico
(ml/min/g)*

SPECT X PET

PERFUSÃO MIOCÁRDICA DE REPOUSO
PERFUSÃO MIOCÁRDICA DE ESTRESSE
VOLUME DIASTÓLICO
VOLUME SISTÓLICO
FRAÇÃO DE EJEÇÃO
DÉBITO CARDÍACO

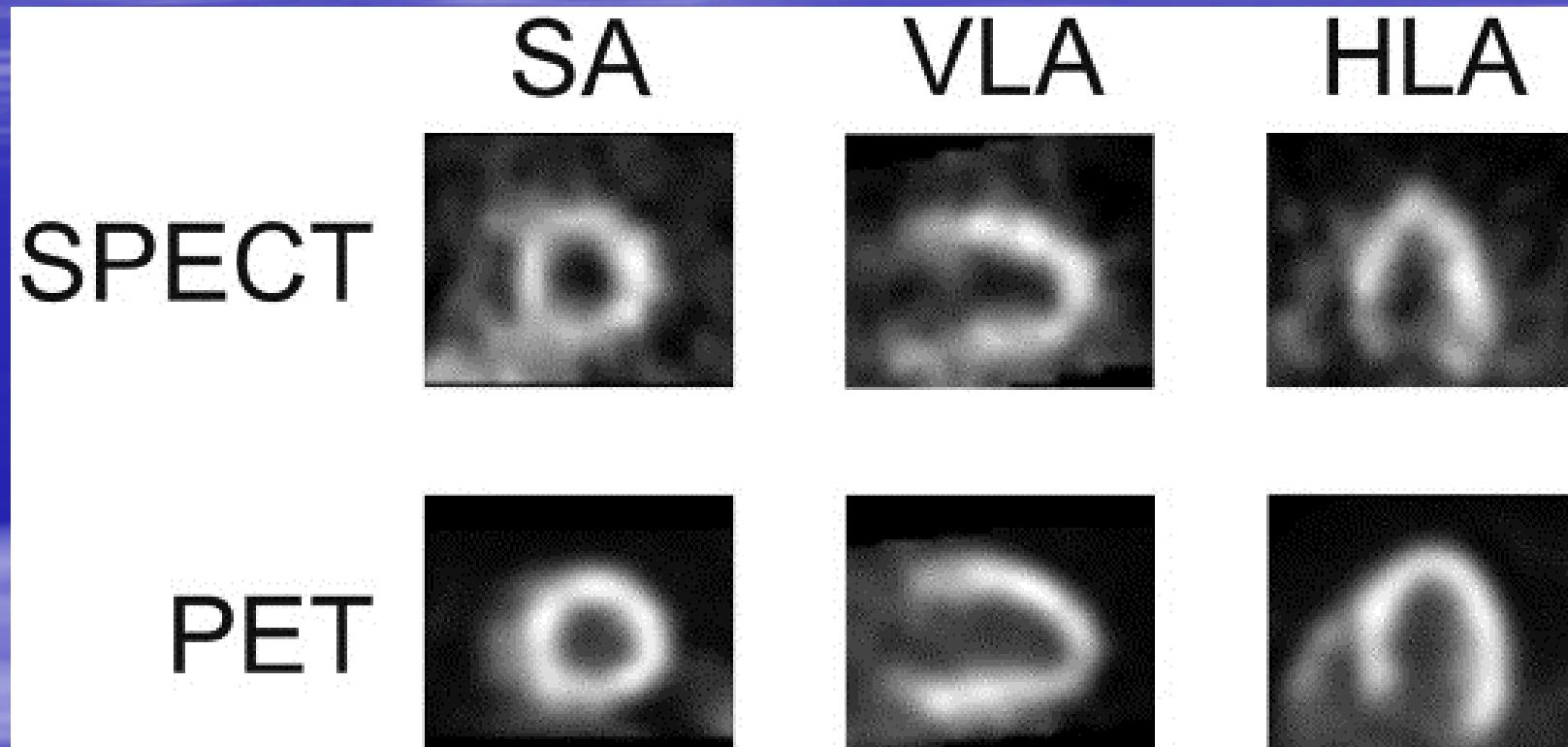
DIFERENÇAS ENTRE SPECT E PET

PET TEM CORREÇÃO DE ATENUAÇÃO
NÃO UNIFORME. MAIS ACURADA.

MELHOR QUANTIFICAÇÃO DE
PARÂMETROS FISIOLÓGICOS DO QUE
SPECT

QUANTIFICAÇÃO ABSOLUTA E NÃO
INVASIVA DO FLUXO SANGUÍNEO
MIOCÁRDICO (ml/g/min)
QUANTIFICAÇÃO ABSOLUTA DA
RESERVA CORONARIANA

Perfusão Miocárdica PET



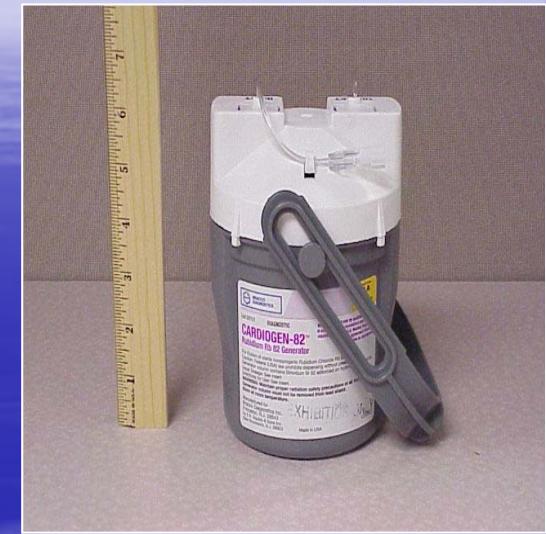
^{82}Rb

Sensibilidade & Especificidade

Autor	Sensib	Especif	# Pts
Gould	95%	100%	50
Demer	94%	95%	193
Go	93%	78%	202
Schelbert	97%	100%	45
Yonekura	93%	100%	49
Williams	98%	93%	146
Stewart	84%	88%	319
Média.	93% +/- 8	92% +/- 5	766

Perfusão Miocárdica PET Gerador Rb 82

- Rubídio-82 (Rb-82) é produzido pelo decaimento do estrôncio-82 (Sr-82)
- 75 seg T_½
- Cinética:
 - Análogo ao K
 - Alta taxa de extração
- Defeitos visibilizados 2-7 minutos após Inj
- Mesma dose estresse e repouso
- Estresse farmacológico



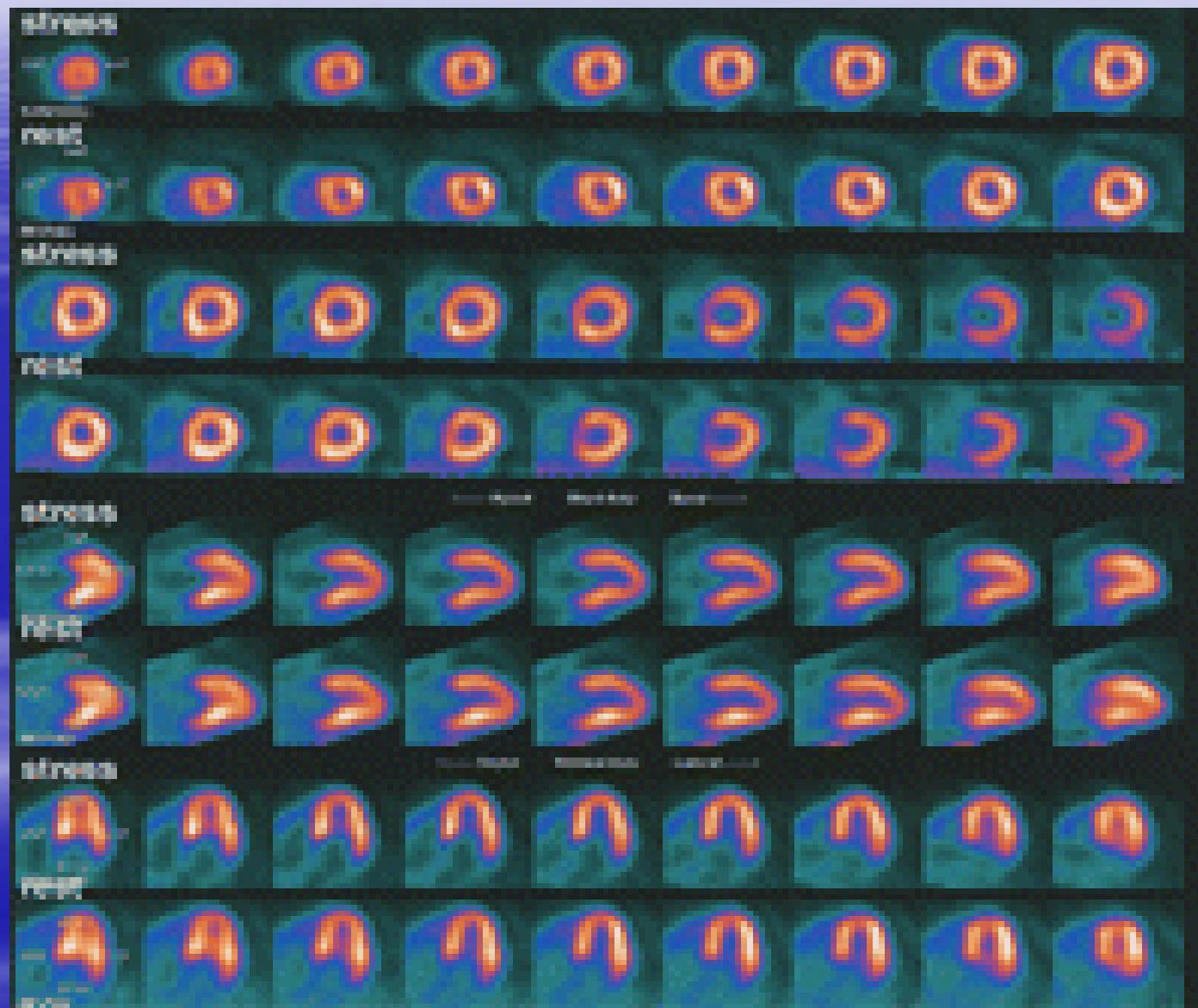
Tempo do estudo : 25 minutos

**Avaliação acurada da perf e função : obesos, mulheres,
estresse farmacológico**

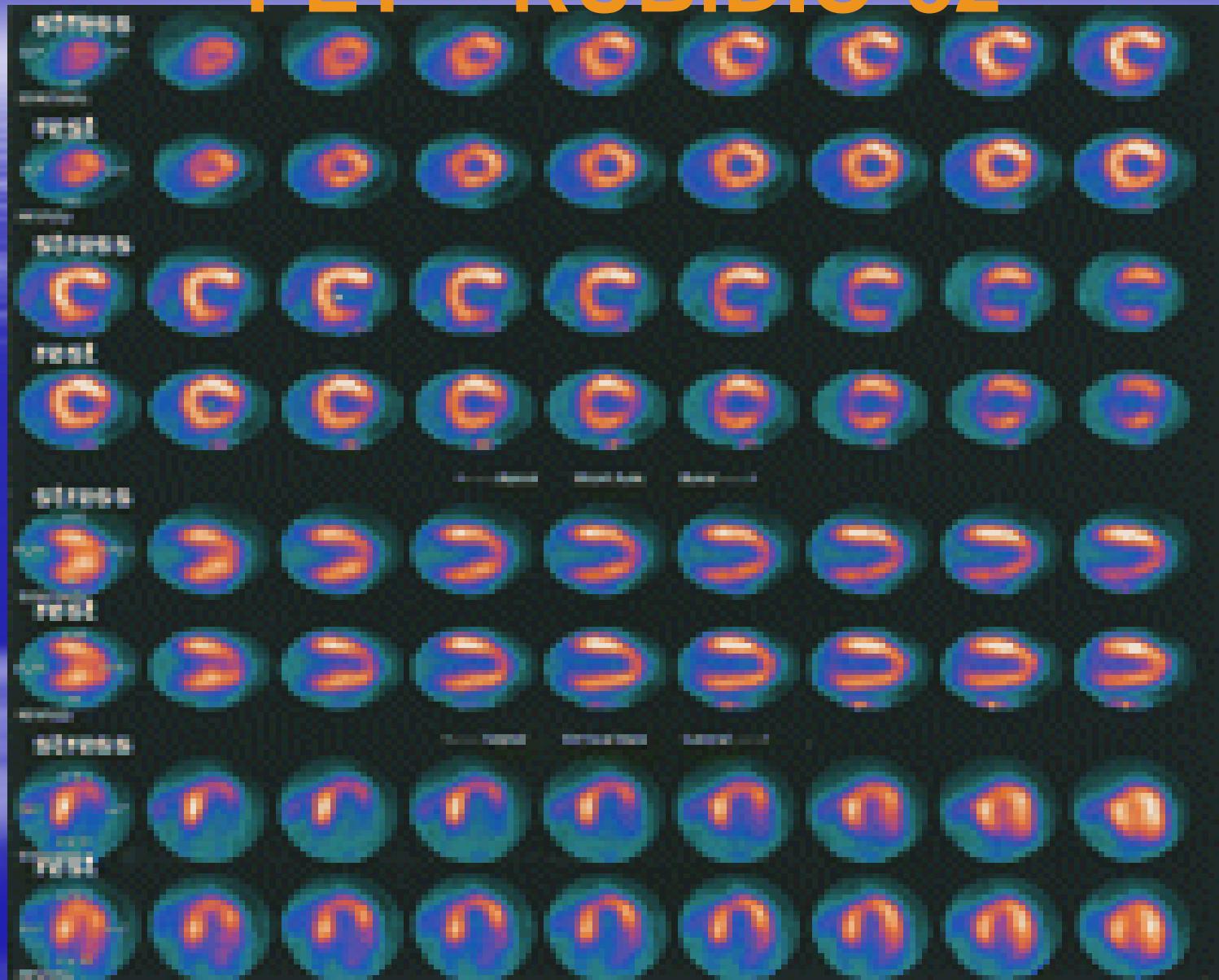
PET/CT

Quantificação do fluxo sanguíneo miocárdico

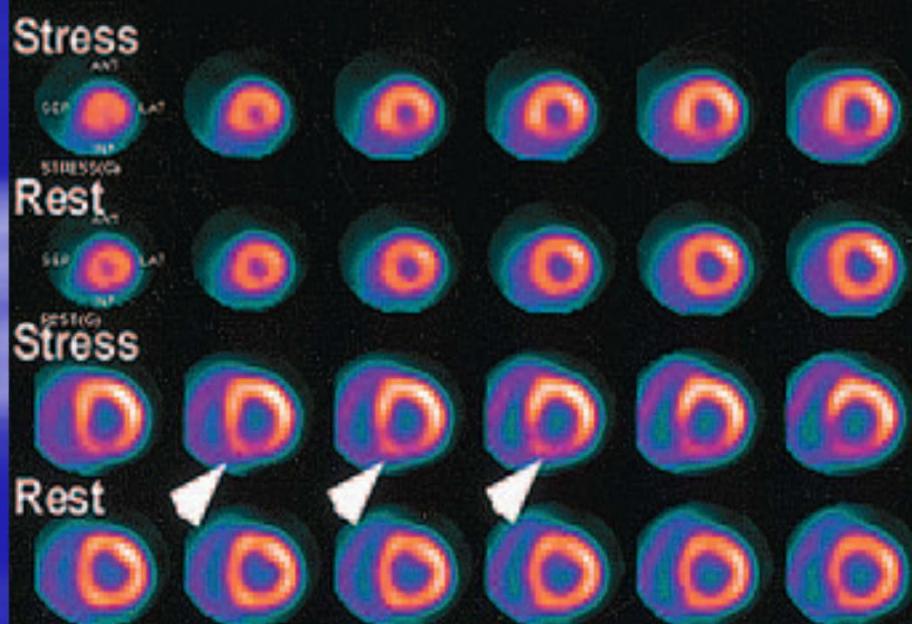
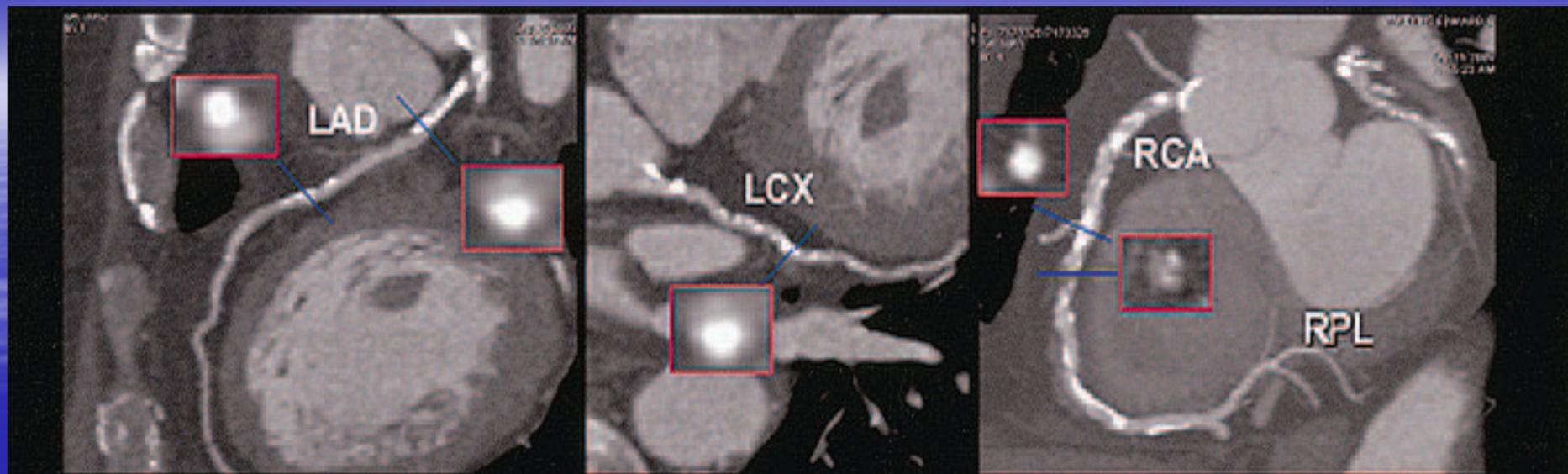
PET – RUBÍDIO-82



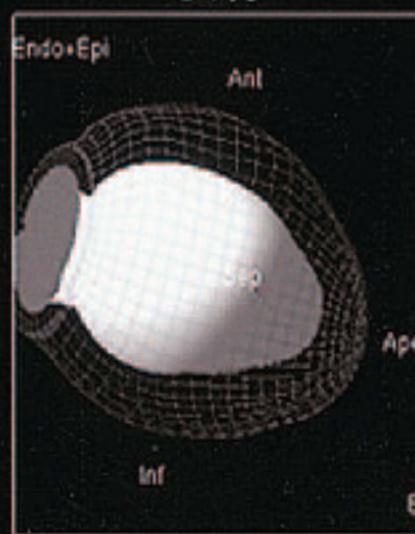
PET – RUBÍDIO-82



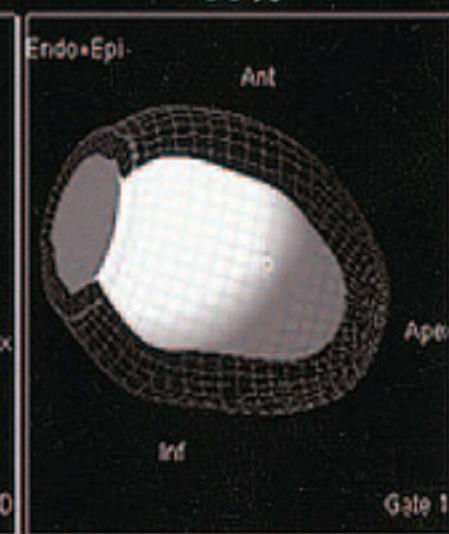
PET-CT



Baseline LVEF
54%



Peak stress LVEF
63%



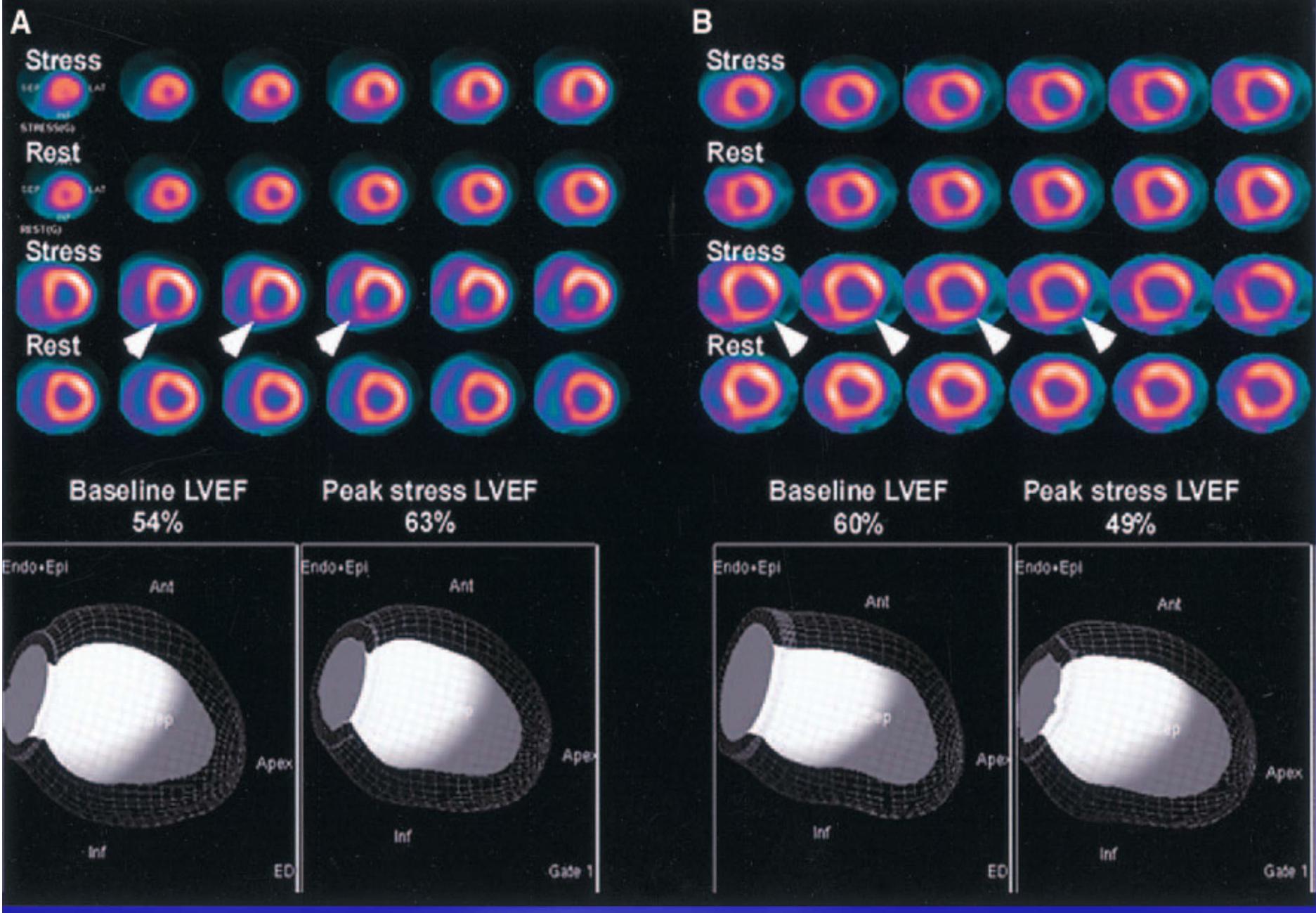
Reduced Myocardial Flow Reserve Quantified With Rubidium-82 PET is an Independent Predictor of Three Vessel Coronary Artery Disease

Maria C Ziadi¹; Robert A deKemp²; Rebecca E Tee³;
Kathryn Williams³; Ann Guo³; Jennifer M
Renaud³; Benjamin J Chow³; Terrence D
Ruddy³; Renee Hessian³; Ross A Davies³; Judy
Etele³; Linda Garrard³; Rob S Beanlands³

¹ Univ of Ottawa heart Institute, Ottawa, Canada

N=112	Patients without $\geq 70\%$ 3-vessel CAD (n=88)	Patients with $\geq 70\%$ 3-vessel CAD (n=24)
Age, mean (SD)	61 (± 11)	69 (± 10) *
Diabetes, n (%)	25 (28%)	11 (46%) *
Hypertension, n (%)	54 (61%)	20 (83%) *
Positive Family Hx, n (%)	40 (45%)	17 (71%) *
SSS, mean (SD)	7 (± 7)	12 (± 8) *
TID, n (%)	12 (14%)	8 (33%) *
Rest flow, mean (SD)	0.9 (± 0.3)	0.9 (± 0.3)
Stress flow, mean (SD)	2 (± 0.7)	1.1 (± 0.5) *
Global MFR, mean (SD)	2.2 (± 0.8)	1.2 (± 0.4) *

RUBÍDIO-82



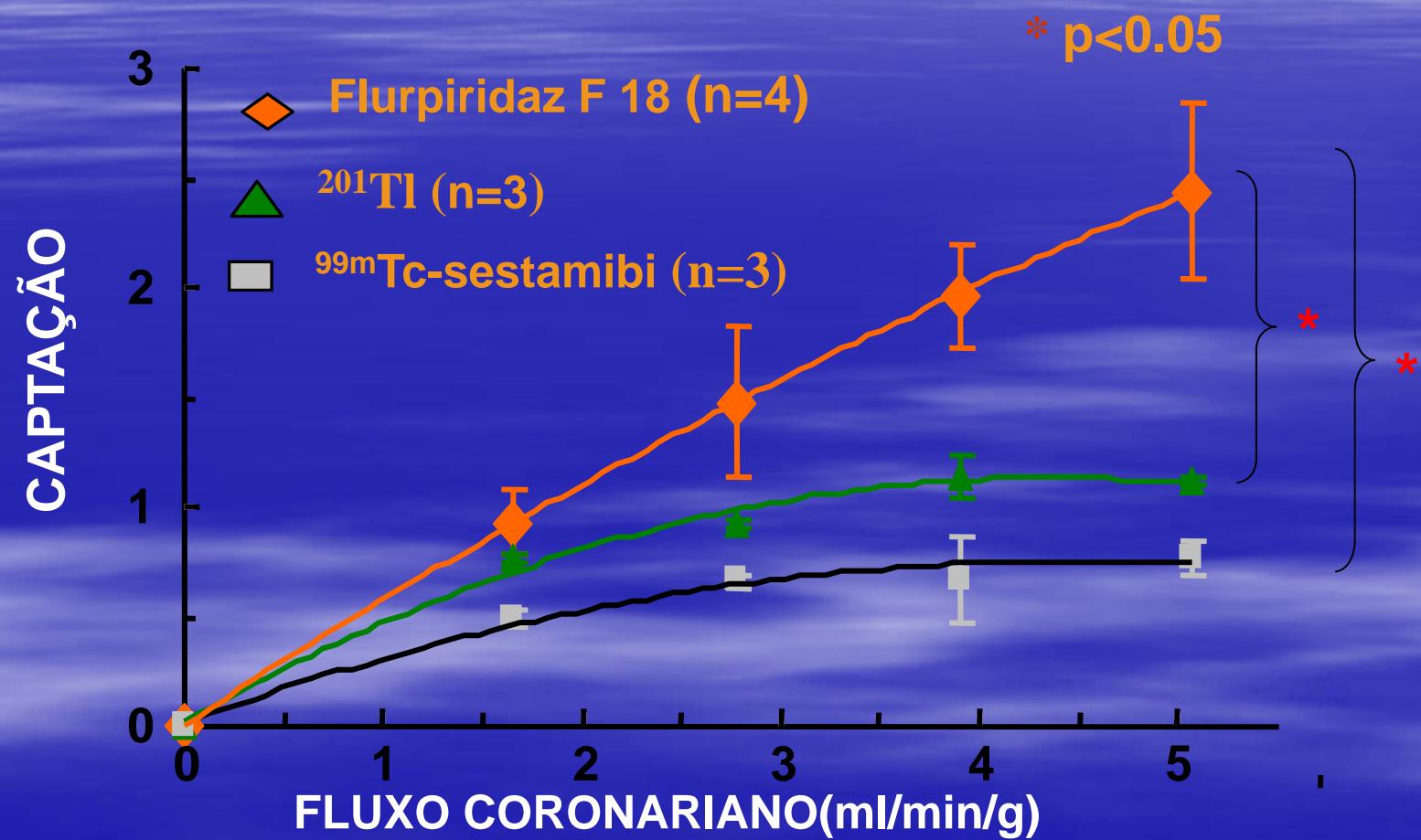
FLUORPIRIDAZ

POR QUE PERFUSÃO MIOCÁRDICA COM PET?

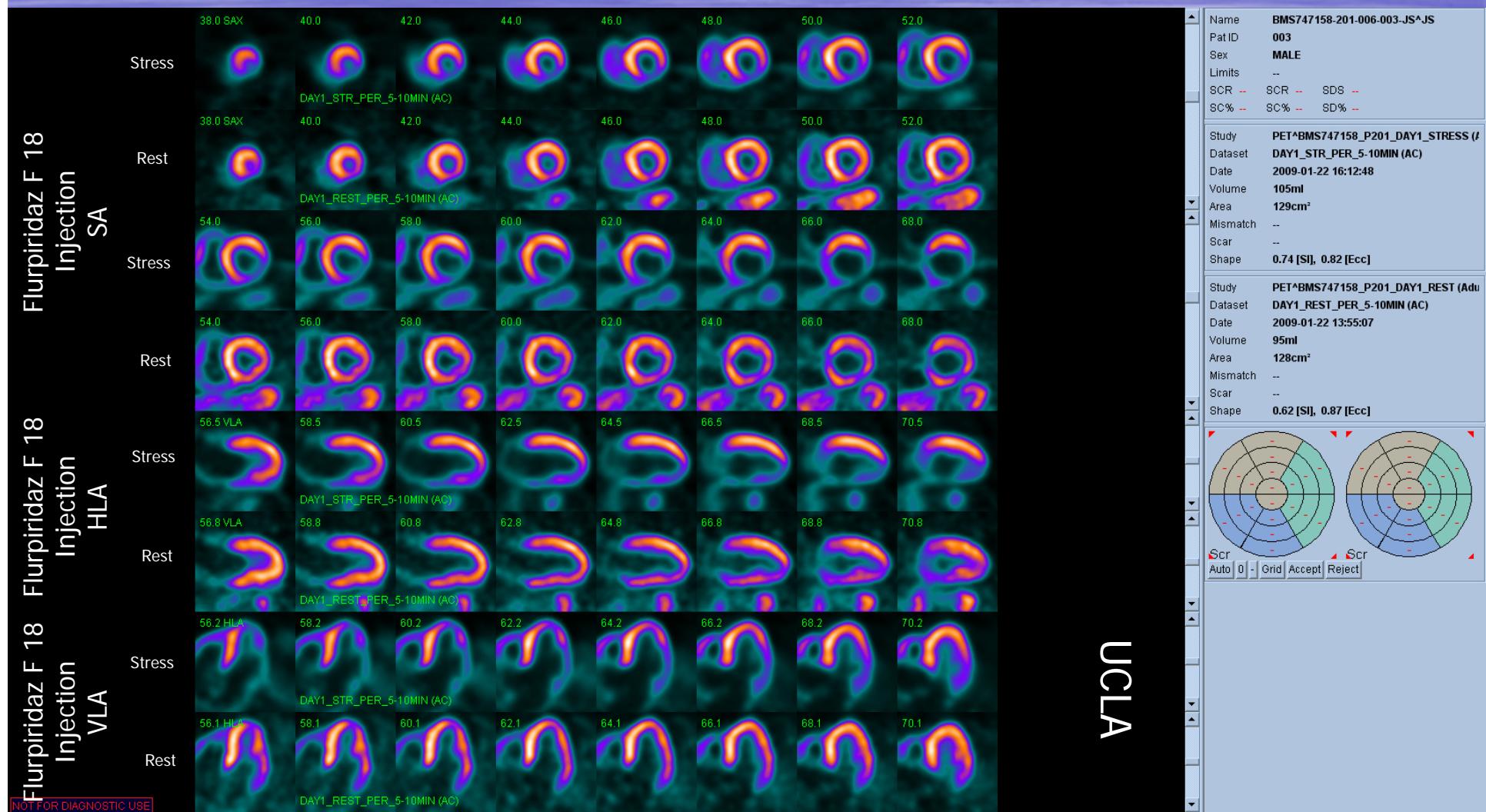
- PROPRIEDADES DO PET
 - ALTA RESOLUÇÃO ESPACIAL
 - MAIOR SENSIBILIDADE
 - CORREÇÃO DE ATENUAÇÃO VALIDADA
 - QUANTIFICAÇÃO DA PERFUSÃO MIOCÁRDICA E DA RESERVA DE FLUXO CORONARIANO
- ESTRESSE FÍSICO OU FARMACOLÓGICO
- ALTA ENERGIA DO FÓTON-
- REDUÇÃO DE ARTEFATOS

FLUORPIRIDAZ

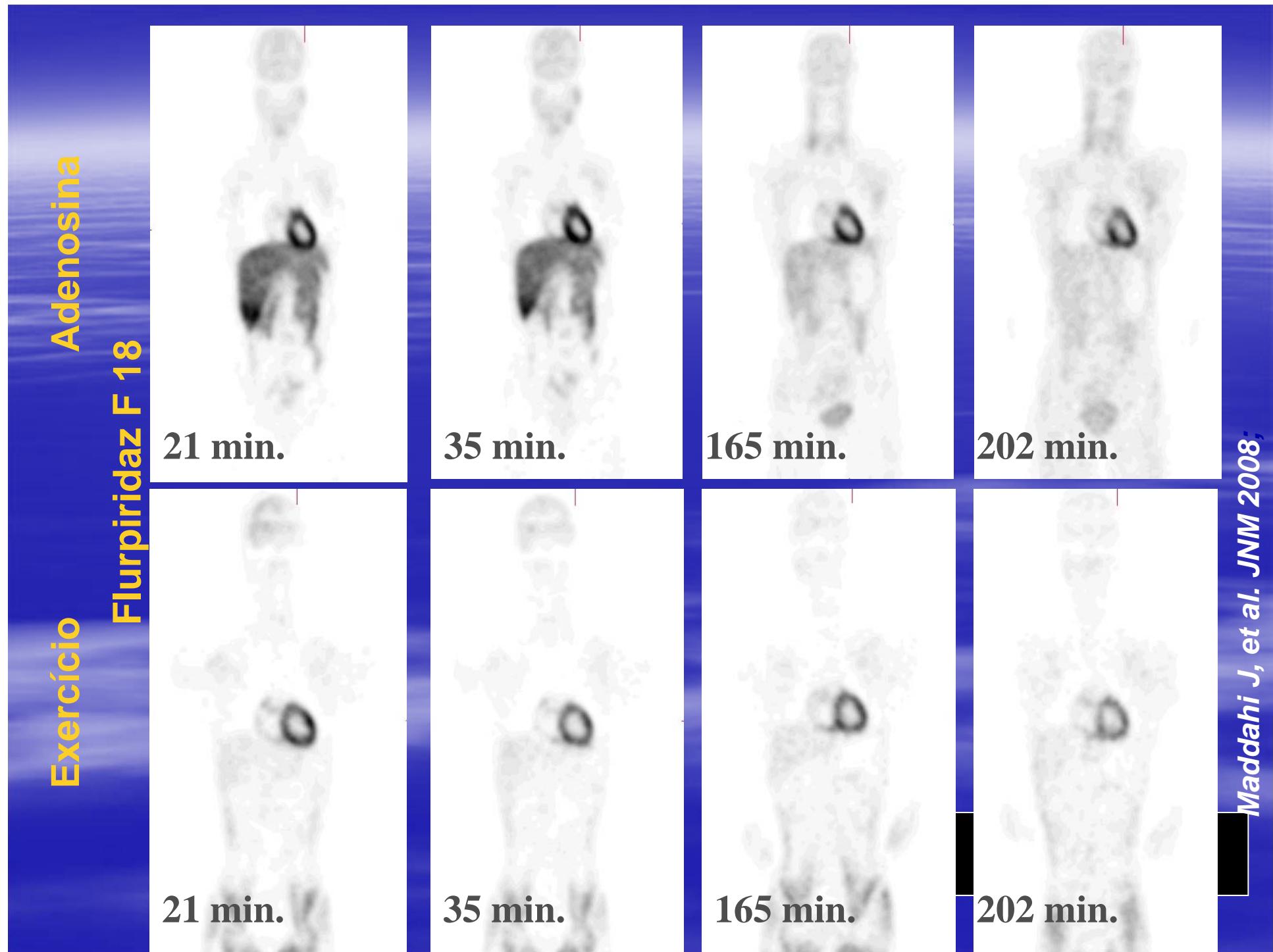
CAPTAÇÃO NA PRIMEIRA PASSAGEM EM COELHOS



Adapted from Yu, et al., *J Nucl Cardiol.* 2007;14(6):789-98

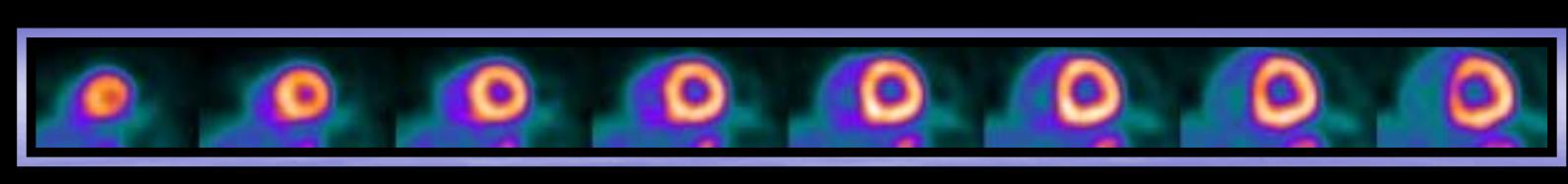


UCLA

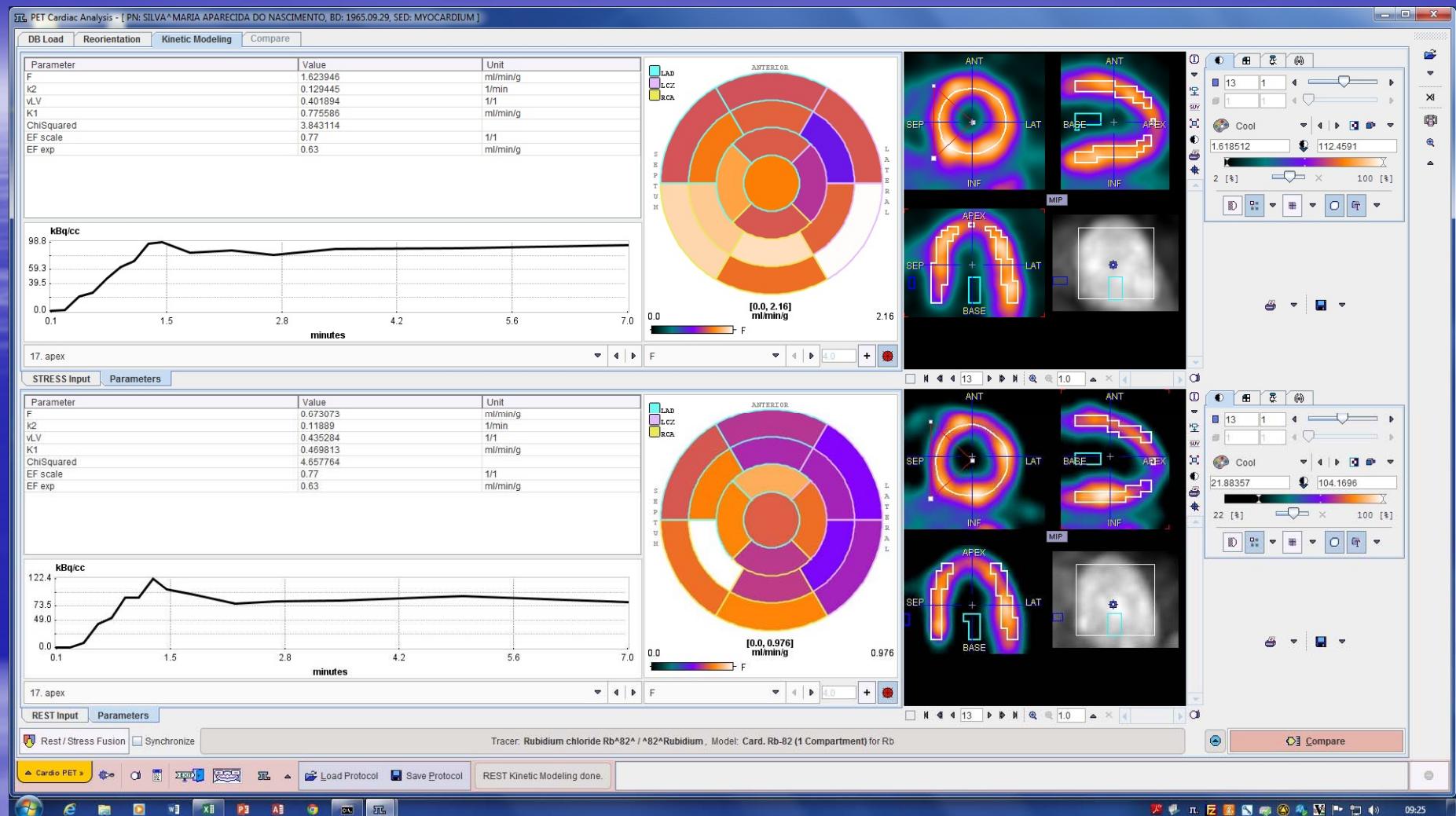


MANS NL

Rb-82 PET/CT



MANS NL



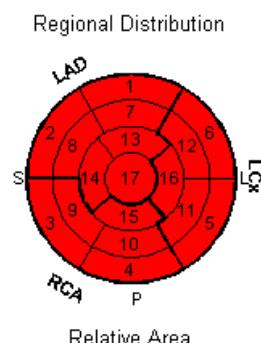
Coronary Flow Reserve (CFR) Summary



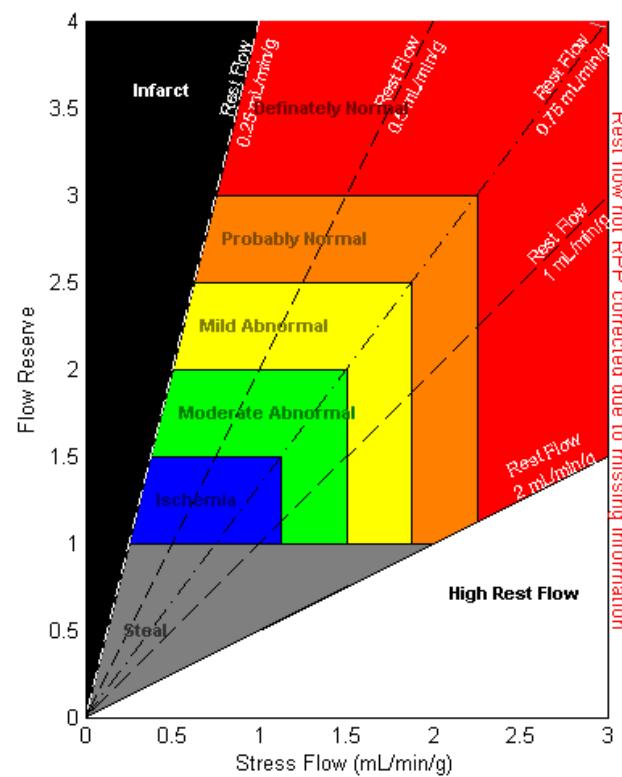
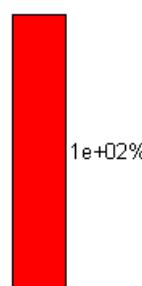
Processed with
FlowQuant®
Version: V2.4 (2013)

Exam Type: Rubidium Flow
Kinetic Model: Rubidium One-Compartment 2K Constant DV
Processing Date: 28-May-2013

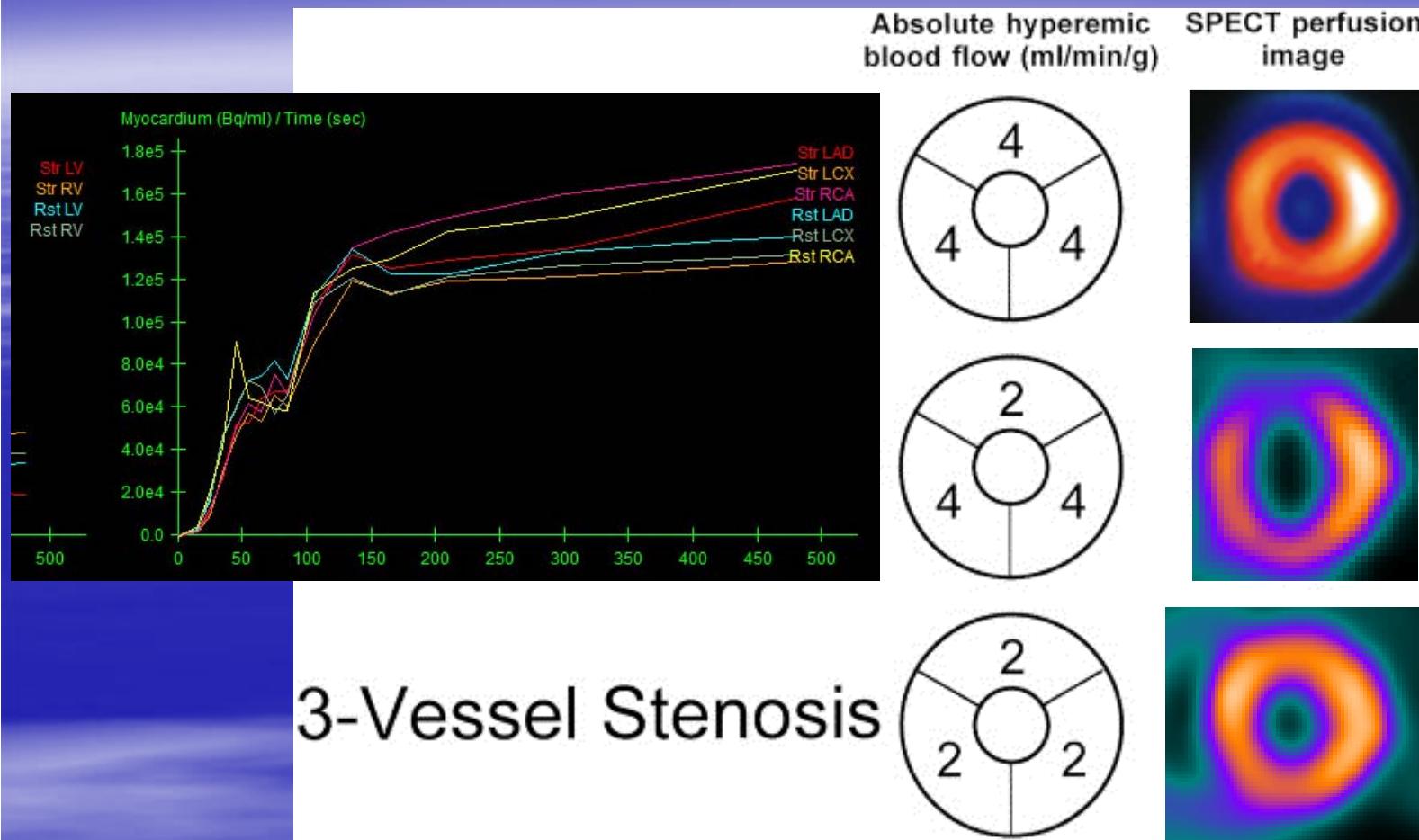
	○ LV	◇ LAD	□ LCX	△ RCA
Rest (mL/min/g) (unadjusted)	0.75	0.77	0.61	0.88
Stress (mL/min/g)	3.81	3.96	3.03	4.32
Reserve	5.13	5.33	4.96	4.94



Relative Area



Perfusão Miocárdica PET



SPECT

Triarterial com isquemia balanceada(redução homogênea na reserva de fluxo nas 3 cor. maiores que apresentam lesões obstrutivas)

Ao estresse não há redução seg ou regional na captação do RF (Perf Relativa)

RESERVA CORONÁRIA

É a habilidade/capacidade de aumentar o fluxo sanguíneo coronário em resposta à demanda metabólica

É necessário Lesão cor > 80% para causar isquemia em Repouso*

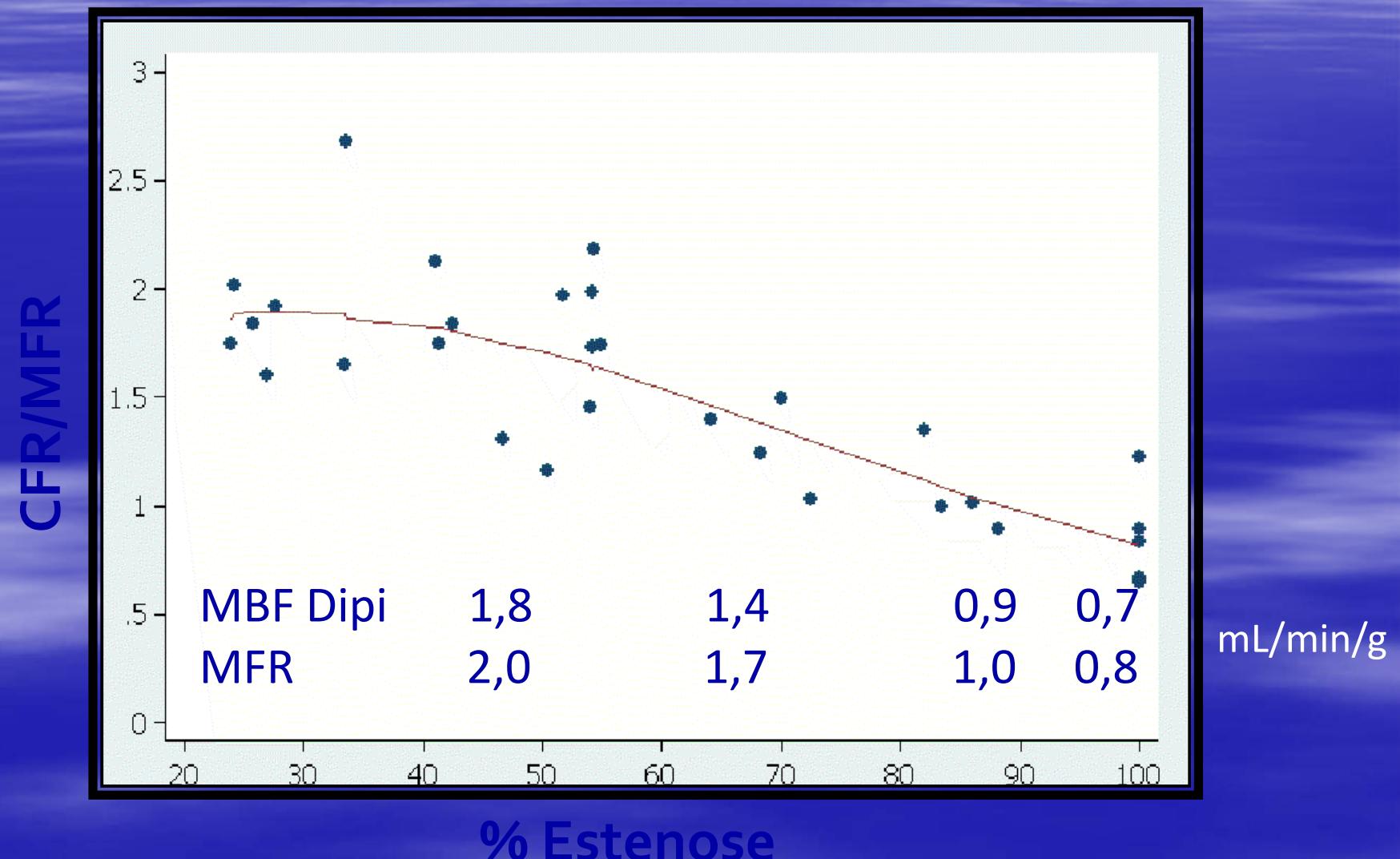


A Reserva Coronária está diminuída quando a estenose cor é > 40-50%

Apesar da dilatação arteriolar máxima, o fluxo sang não aumenta suficientemente para atender as necessidades metabólicas

Relação entre Estenose Coronária e Reserva de Vasodilatação Coronária(CFR/MFR)

Redução progressiva do MBF com dipiridamol e da Reserva do fluxo(MFR) com o aumento da Severidade da estenose coronária



Perfusão Miocárdica Rb-82

Prognóstico

Altamente preditor de Risco

Preditor Independente de RISCO Morte súbita e eventos cardíacos

Rb-82 PET NORMAL

Taxa Anual de Eventos Maiores muito baixa

< 0,09 % /ano *

*Chow et al JNuclMed 2005

< 0,4%/ano**

** Yoshinaga et al JACC 2006

Imagens de Perfusão Miocárdica

+

Reserva de Fluxo Miocárdico(MFR)

Período Livre de eventos > 3 anos

*Pts com DAC conhecida ou suspeita

Ziad MC et al JACC 2011;58:740-8

CurrCardiolRep 2013

PET/CT Rb-82

Fluxo Sanguíneo Miocárdico

MBF

Quantificação Absoluta

Da quantidade de sangue que está suprindo cada região do miocárdio

X Perfusão Relativa

Valores Normais

mL/min/g

MBF Repouso

< 1

MBF Estresse

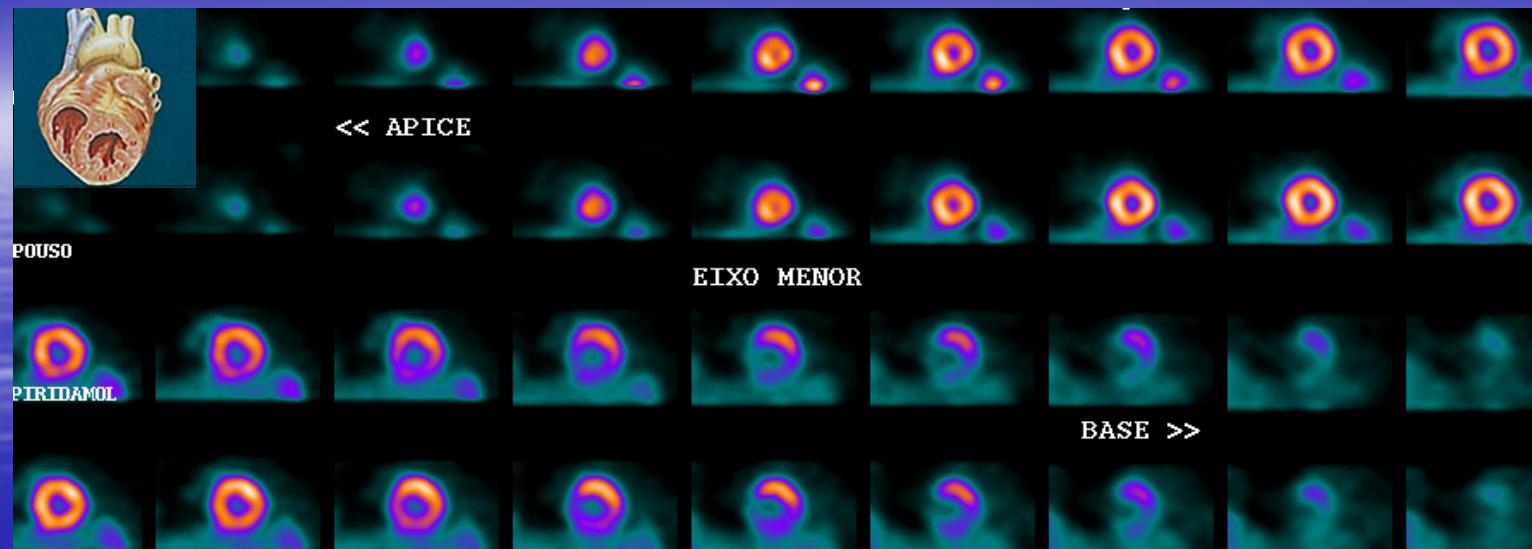
>2

MFR(Reserva)

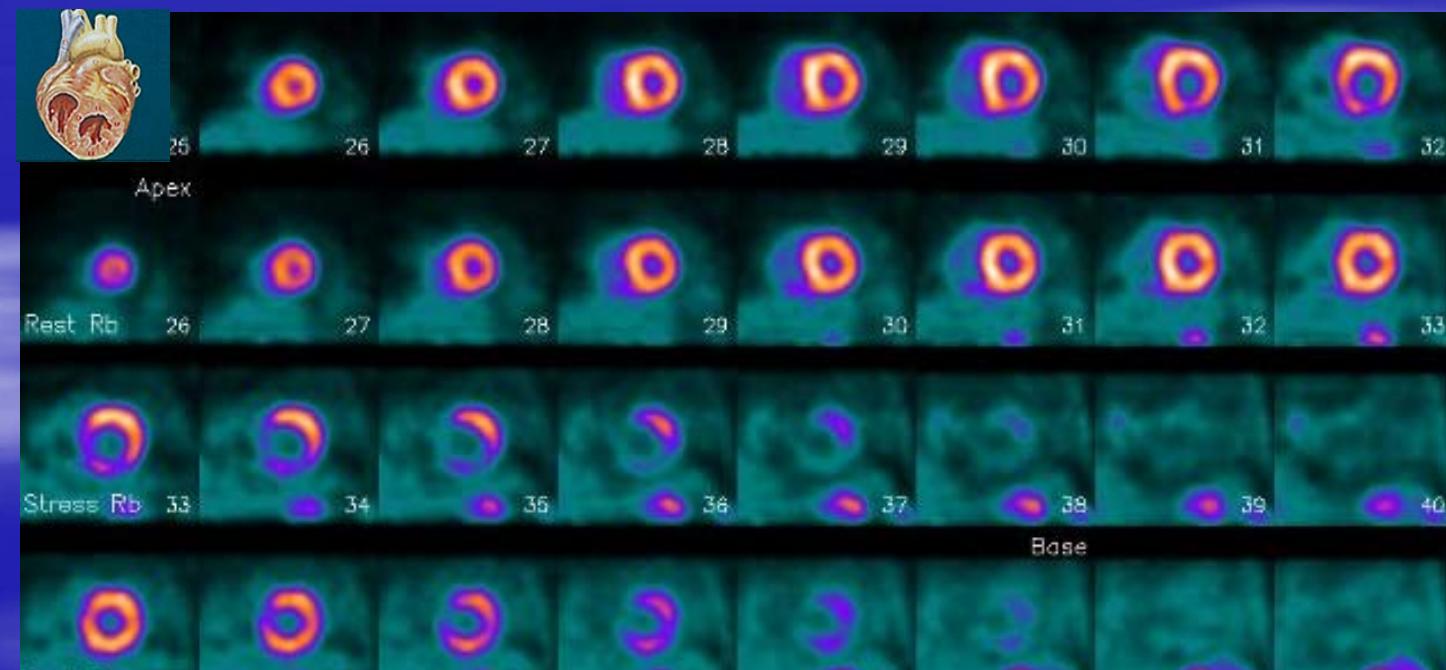
>2

Softwares de quantificação Flow Quant Cedars Sinai PMod

MFR



MIBI
SPECT



Rb-82
PET/CT

Quantificação absoluta do FSM(ml/g/min)

Reserva de Fluxo (Coronariana)

A queda na RC deve-se a estreitamento de arts epicárdicas ou na ausência de DAC detectável angiograficamente, pode refletir disfunção da microcirculação cor.

Benefícios da quantificação/aplicações

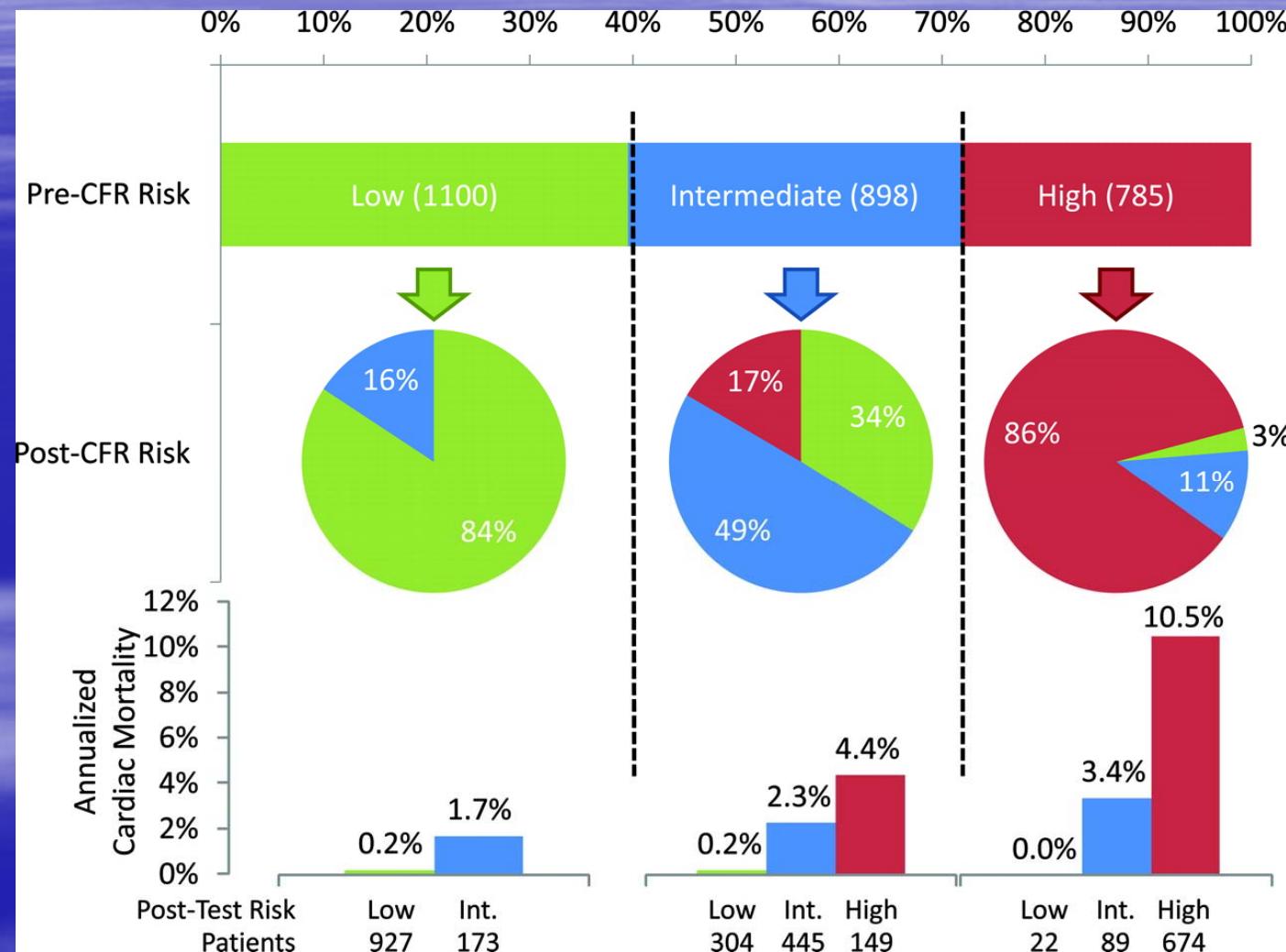
- O significado funcional de estenoses cor pode ser diretamente avaliado
- Investigação de disfunção microvascular** na atherosclerose inicial e em doença microvascular não aterosclerótica associada com cardiomiopatias primárias e secundárias
- Detecção de Dça multiarterial ou lesão de tronco** que podem produzir isquemia balanceada(aprox 13% de pts com lesões sign de tronco CE podem ter SPECT Normal)
- Avaliar objetivamente os efeitos de intervenções medicamentosas(trato clínico) ou procedimentos Intervencionistas**

Melhora o Diagnóstico de Isquemia Miocárdica

Reclassificação do RISCO

“Improved cardiac Risk Assessment with Noninvasive Measures of Coronary Flow Reserve(CFR)”

Murthy et al, Circulation 2011; 124:2215-2224



FFS

48 anos , Fem

DAC Triarterial em Trato Clínico desde 2007

DM, HAS, Obesidade

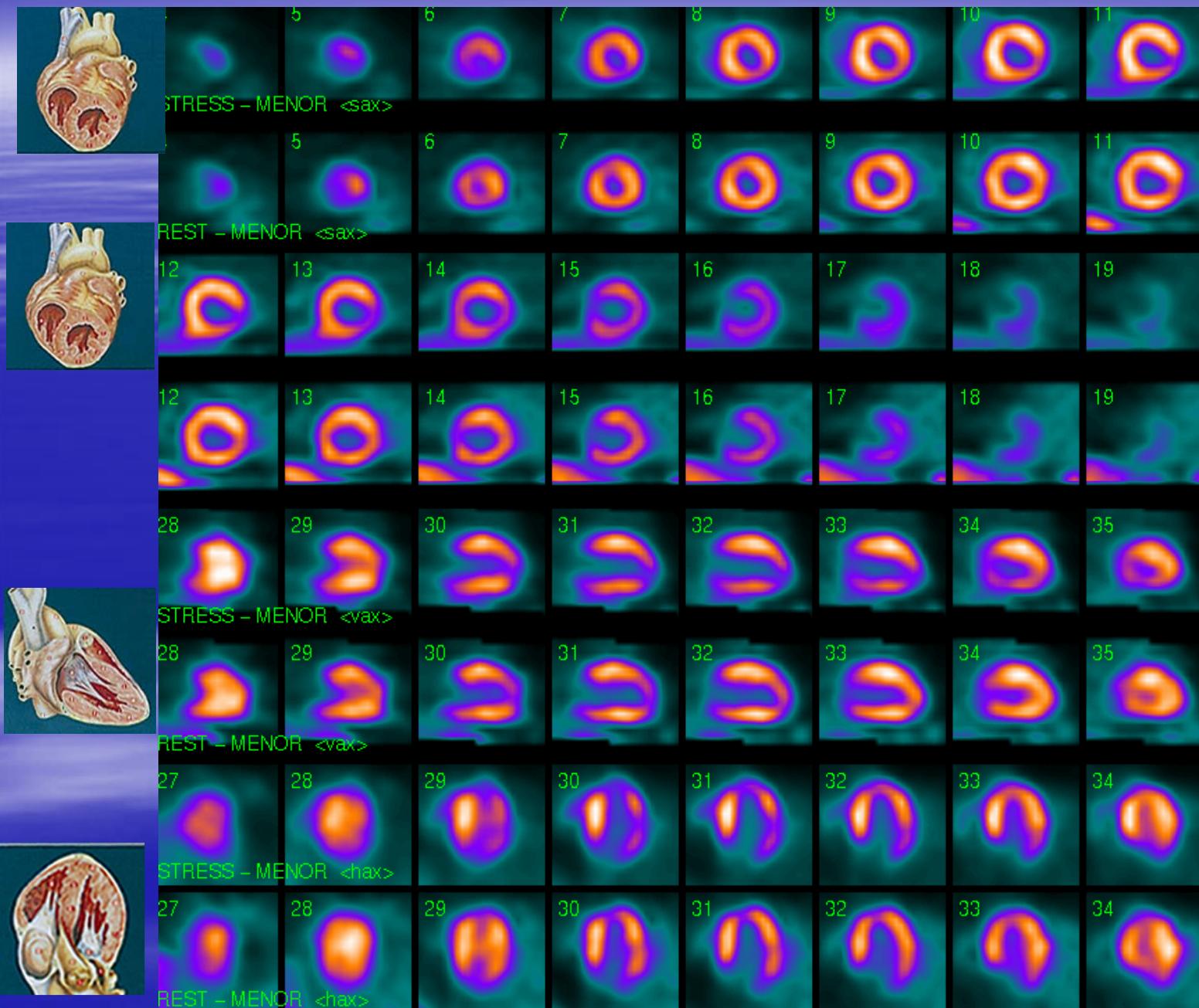
HDL 25 mg/dL LDL 66 mg/dL

FEVE Normal

- Dor precordial em fisgada

FFS

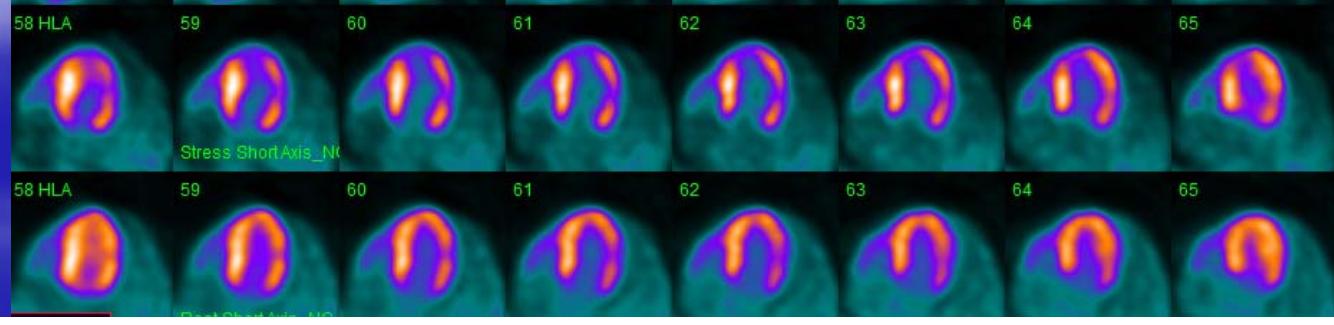
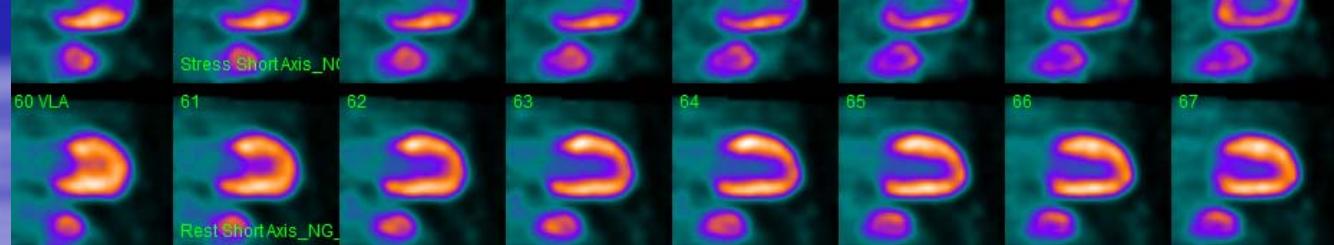
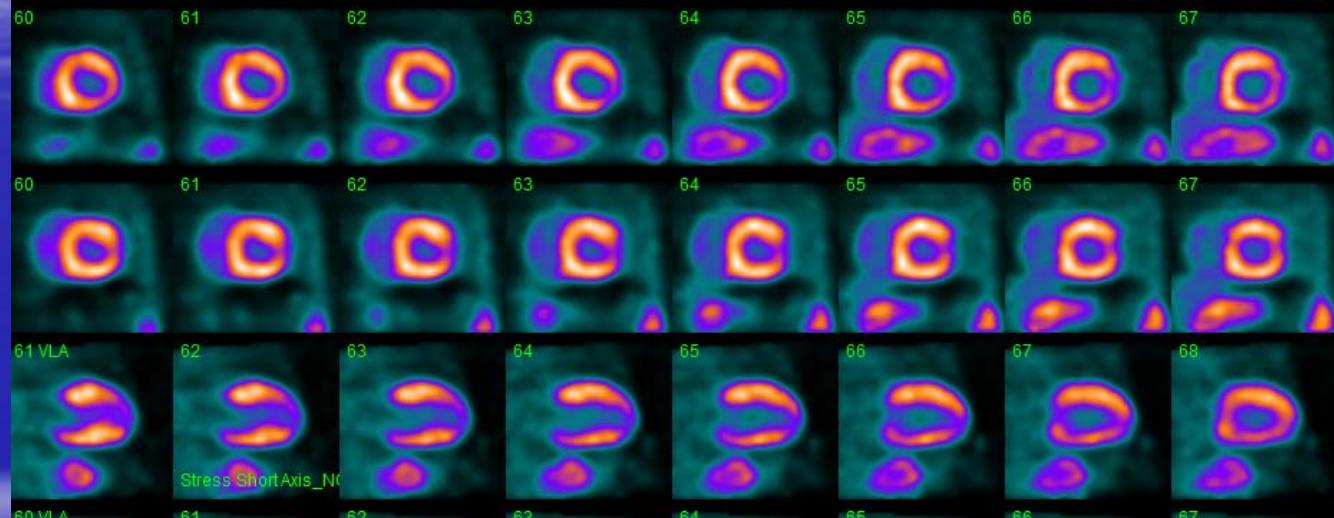
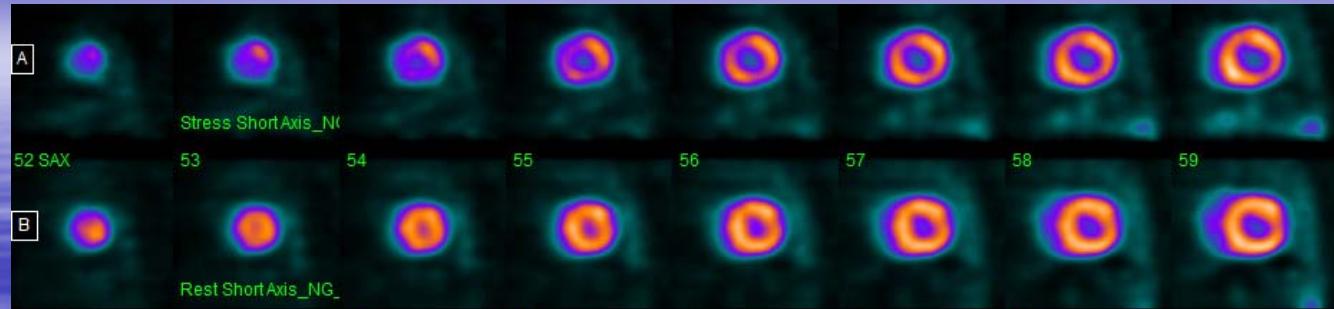
Perf Mioc MIBI-99mTc



Isquemia
Inf(ap)
IL(M,B)

FFS

Perf Mioc Rb-82 PET/CT

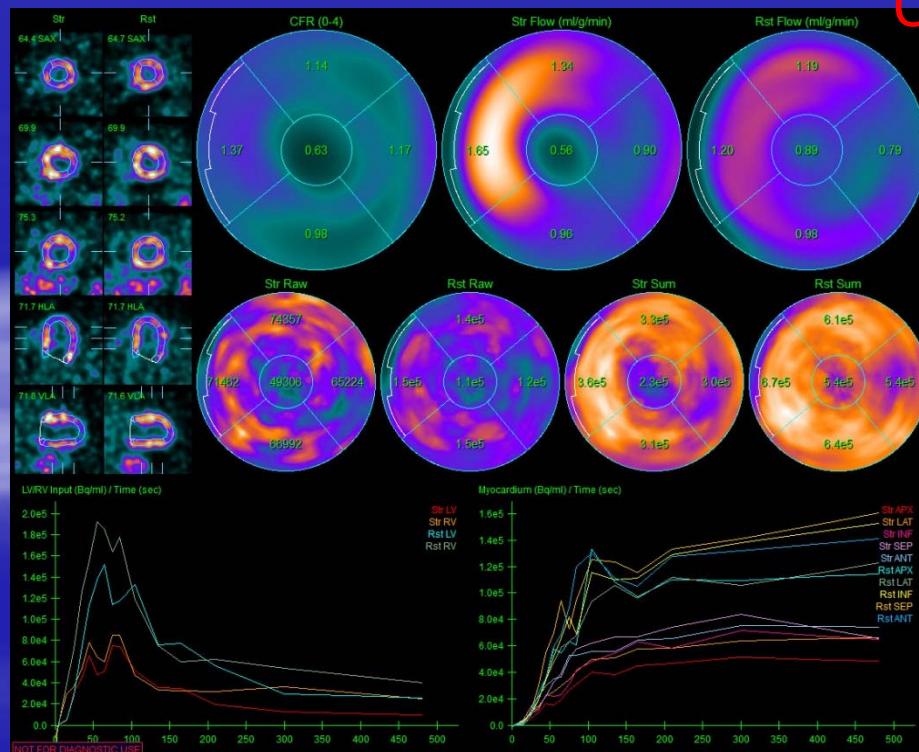


Isquemia
Inf (ap)
IL(M,B)

Apical
Anterior(A)
Sep(A)
AS(M)

FFS

Pat ID	3069507	
Sex	FEMALE	
Limits	--	
TID	1.21	
Lng:Hrt	--	
SSS 16	SRS 5	SDS 11
SS% 24	SR% 7	SD% 16



Rb-82 PET/CT

Imagens Perfusão

Isquemia mais extensa que a mostrada ao MIBI-Tc99m

Quantificação Absoluta MBF MFR
Reserva Coronária
CFR mL/min/g

LAD	1,03
LCX	1,19
RCA	1,09
Global	1,08

“Improved cardiac Risk Assessment with Noninvasive Measures of Coronary Flow Reserve(CFR)”

Murthy et al, Circulation 2011; 124:2215-2224

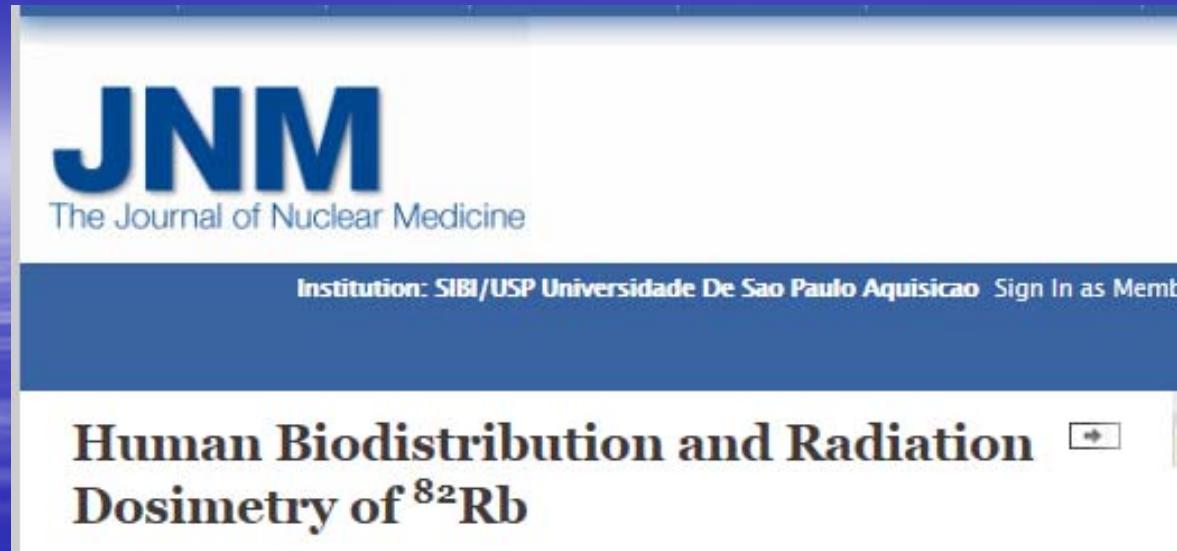
A adição da CFR a variáveis clínicas, FEVE Rep, Reserva de FEVE, extensão da fibrose miocárdica, extensão da isquemia miocárdica

Resultou em correta reclassificação de aproximadamente 1/3 de todos os Pacientes com Risco Intermediário

A melhor estimativa de Risco obtida com CFR pode alterar a conduta
•Melhorar fatores de risco, encaminhar para revascularização

A Avaliação quantitativa não-invasiva da Função Vasodilatadora Coronariana (Reserva Coronariana) com PET é um preditor poderoso e independente de Mortalidade Cardíaca em pts com DAC conhecida ou suspeita e fornece estratificação de risco incremental significativa sobre variáveis Clínicas e da Imagem de Perfusion Miocárdica(gated-PET)

Estas medidas quantitativas podem ser obtidas sem custo adicional, tempo de imagem ou exposição à radiação



JNuclMed 2010; 51:1592-99

Rb-82 Estresse e Repouso
+ CT

Baixa Exposição à Radiação : Dose efetiva 3,7 mSv

Exposição BG natural : 3,1 mSv