



**O Coração da Mulher:
Antigo Desafio, Novos Conhecimentos**

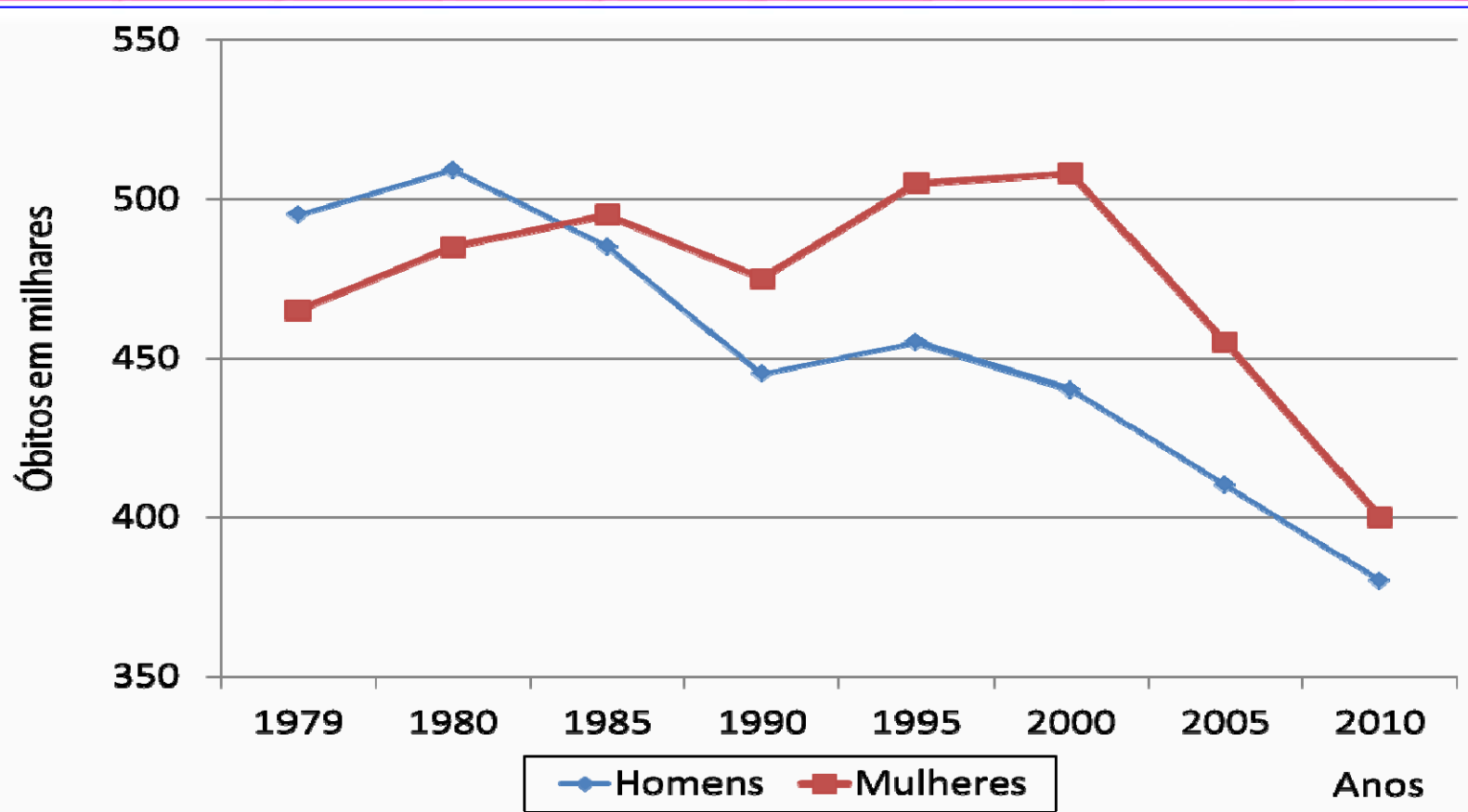
**Métodos Diagnósticos:
Particularidades da Mulher**

PAPEL DA MEDICINA NUCLEAR

**Paola Smanio
2016**



MORTALIDADE CARDIOVASCULAR



Heart Disease and Stroke Statistics – 2014 update. A report from the American Heart Association.
Circulation. 2014; 129(3):e28-e292.



REDUÇÃO MORBIDADE / MORTALIDADE

EM 2013 - 398.086 MULHERES MORTE CARDIOVASCULAR -EUA



DESAFIO



REDUÇÃO MORBIDADE / MORTALIDADE

INVESTIGAÇÃO / IDENTIFICAÇÃO PRECOCE SINTOMAS



ESTRATIFICAÇÃO DE RISCO
ADEQUADA



ESCOLHA MÉTODO DIAGNÓSTICO
APROPRIADO



REDUÇÃO MORBIDADE / MORTALIDADE

IDENTIFICAÇÃO PRECOCE SINTOMAS



1997 -**30%** das mulheres conheciam a importância DCV
1^a causa de morte na mulher
2012 -**56%** das mulheres têm este conhecimento



MUDANÇA DE FOCO



**WISE
DOENÇA NÃO OBSTRUTIVA - 50% CASOS**



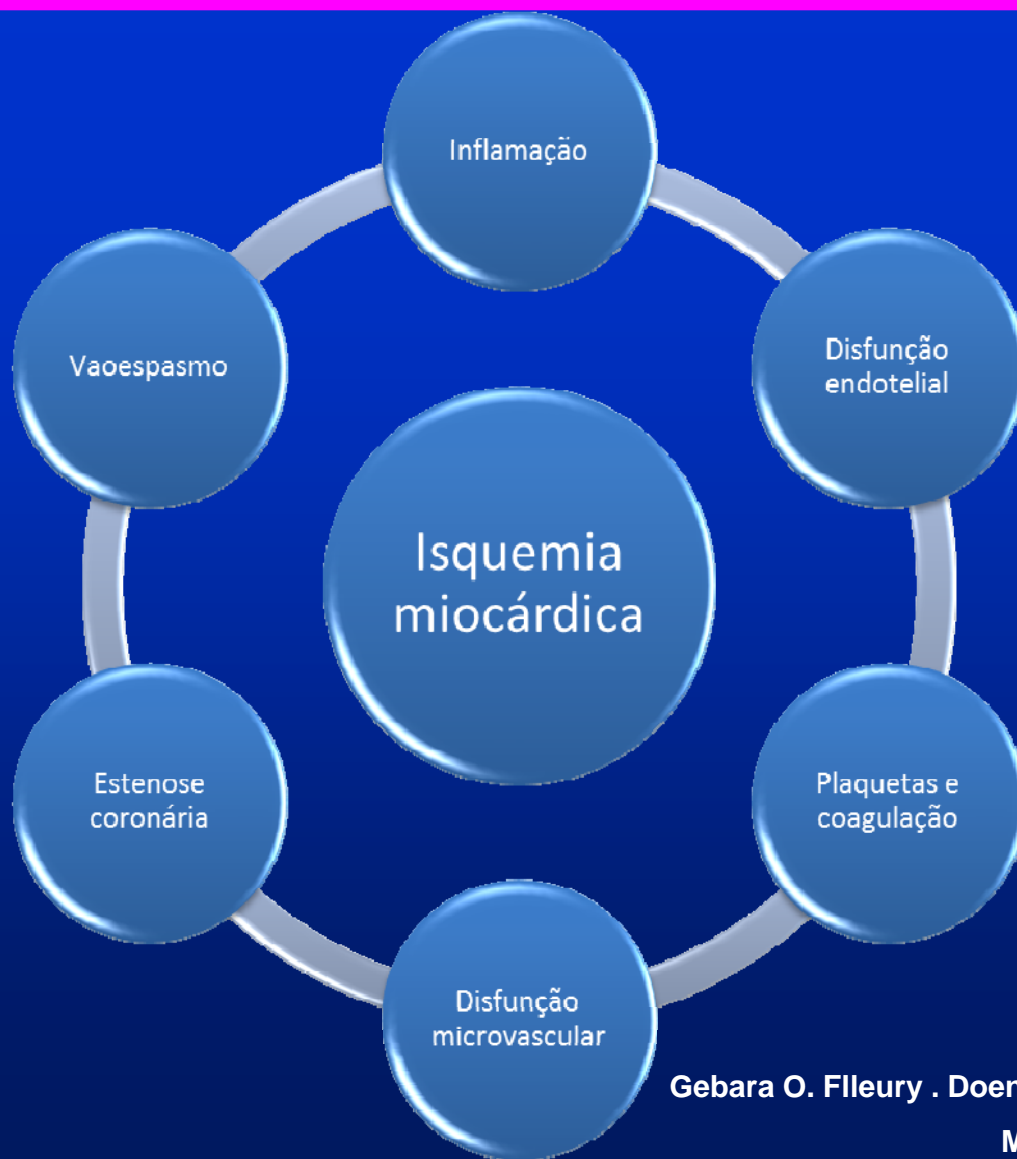
PIOR PROGNÓSTICO



ESTENOSE SIGNIFICATIVA X ISQUEMIA



ISQUEMIA MIOCÁRDICA MULTIFATORIAL



Gebara O. Filleury . Doença Cardiovascular na Mulher 2015

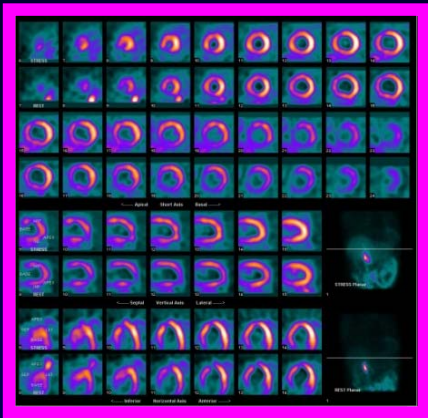
Marzilli M et al. JACC.2012;60:951-6



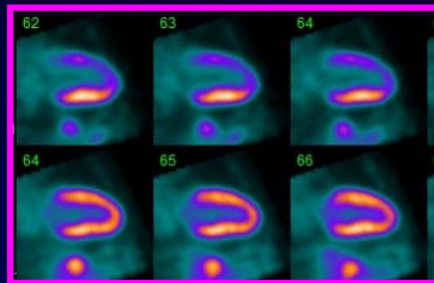
MEDICINA NUCLEAR

MEDICINA NUCLEAR

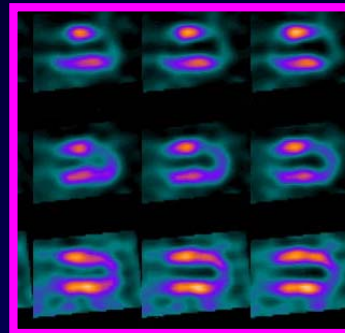
Perfusão – MIBI-^{99m}Tc



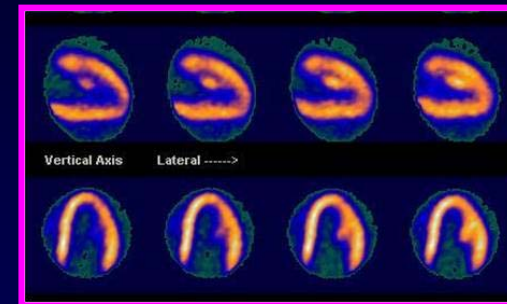
Perfusão - Rubídio



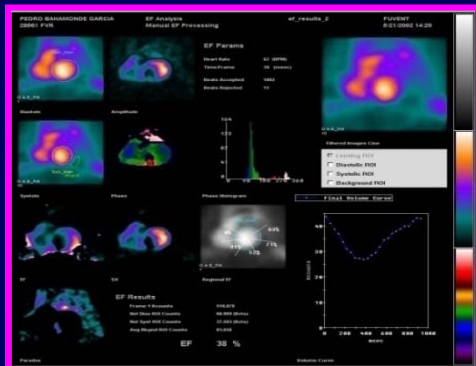
Red – Tálcio-201



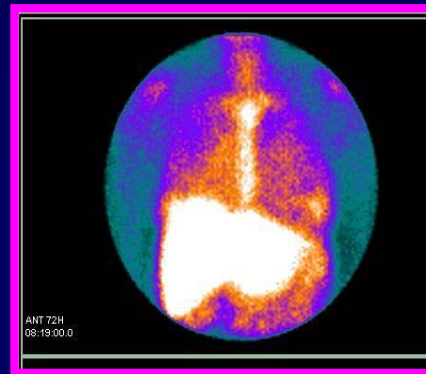
PET– FDG-¹⁸F



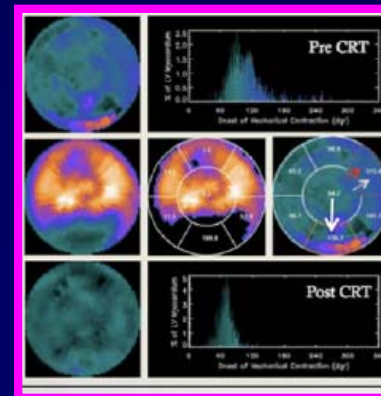
Função - Ventriculografia
Hemácias –PYP ^{99m} Tc



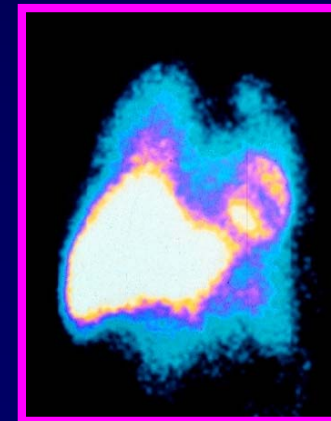
Cintilografia Card. -⁶⁷Ga



Sincronismo cardíaco

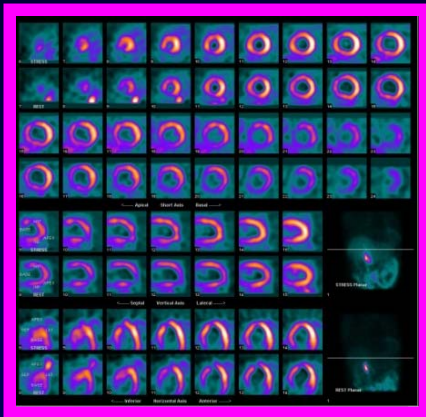


Cintilografia Card – MIBG-¹²³I

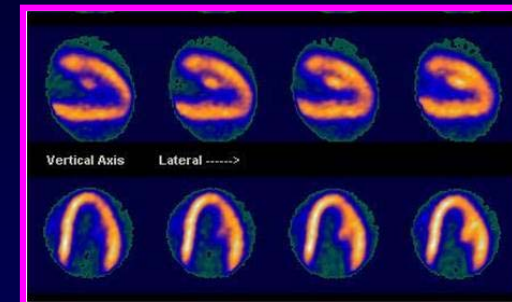


MEDICINA NUCLEAR

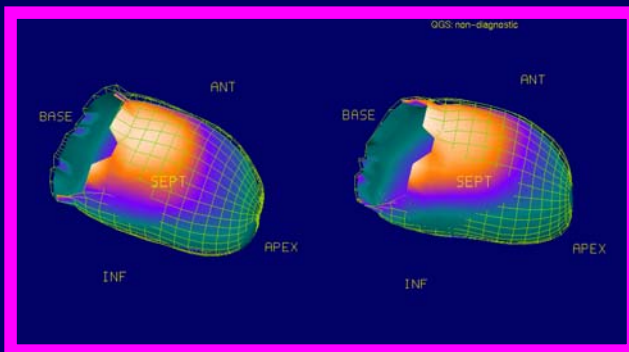
Perfusão – MIBI-^{99m}Tc



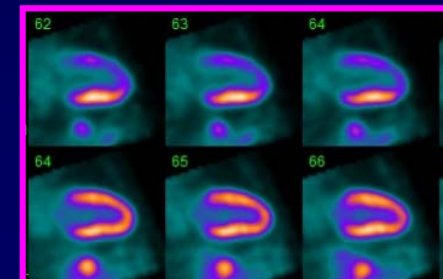
PET– FDG-¹⁸F



Gated- SPECT



Perfusão - Rubídio



CINTILOGRAFIA DO MIOCÁRDIO TAMBÉM EM MULHERES

MÉTODO ANTIGO

POUCAS
CONTRA INDICAÇÕES

DISPONÍVEL

CONTÍNUA EVOLUÇÃO

FUNCIONAL

SEGURANÇA

VALOR CONSAGRADO

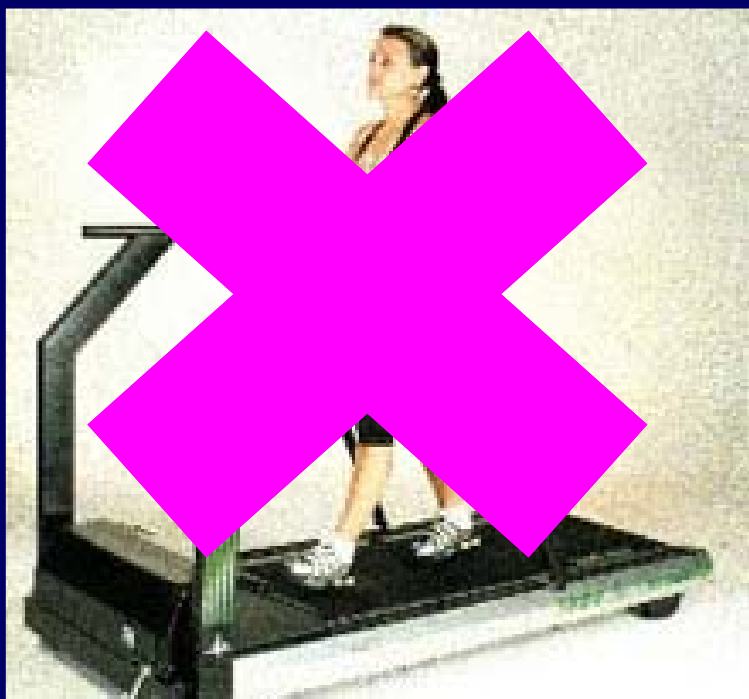
ESTRESSE FÍSICO OU
FARMACOLÓGICO

INFORMAÇÕES QUALITATIVAS E QUANTITATIVAS
PERFUSÃO MIOCÁRDICA + FUNÇÃO VE, VSF, VDF,
IMAGEM+PROVA FUNCIONAL + CLÍNICA



ESTRATÉGIA DIAGNÓSTICA INICIAL MEDICINA NUCLEAR

**Teste
Ergométrico**



**ECG BASAL ALTERADO:
BRE, MP, WPW, SVE, FA**



BAIXA CAPACIDADE FUNCIONAL



**LESÕES OSTEO-ARTICULARES
LESÕES MÚSCULO ESQUELÉTICO**



CONDIÇÕES CLÍNICAS

DIABETES

I RENAL CRÔNICA

AVC

OBESAS

IDOSAS

DPOC *

INSUF VASCULAR PERIFÉRICA*

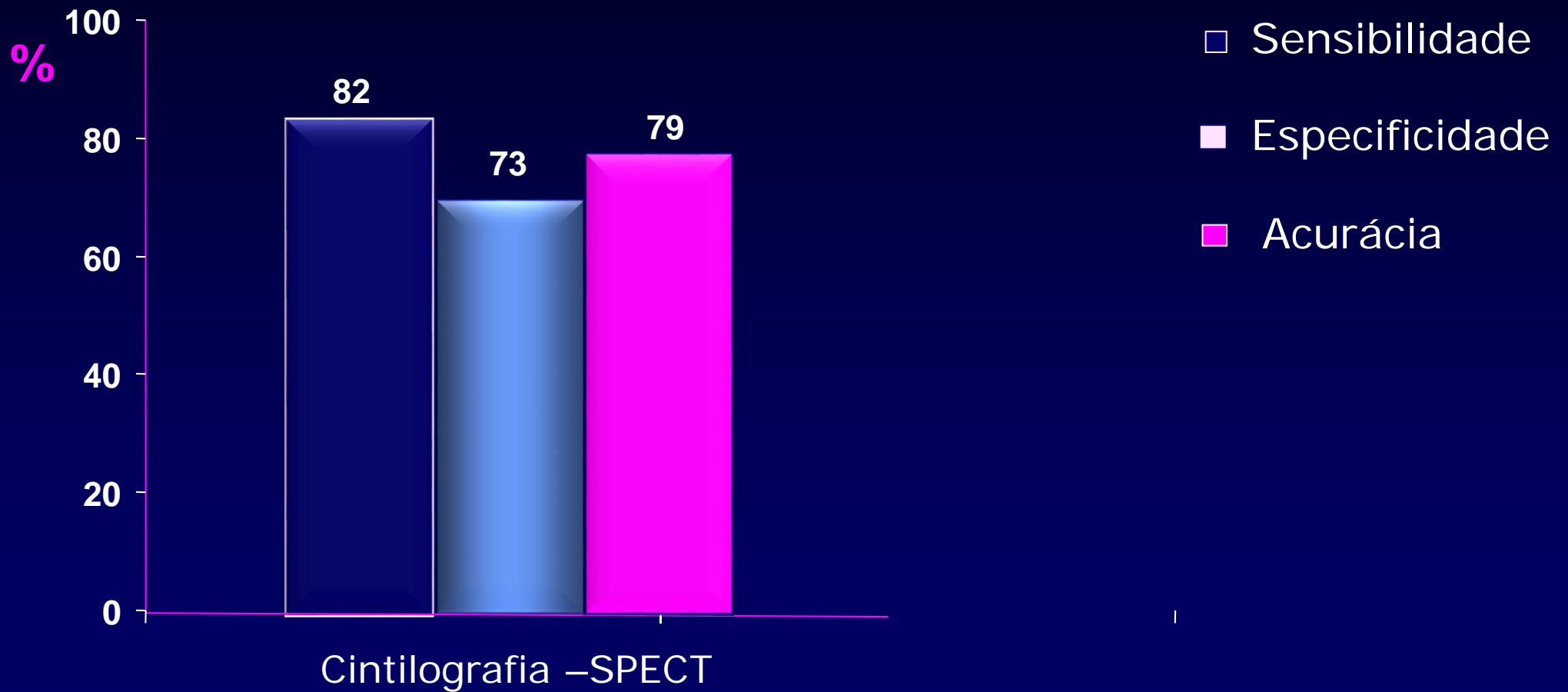
ACURÁCIA DIAGNÓSTICA EM MULHERES SINTOMÁTICAS

**SENSIBILIDADE = 78%-88% Exercício
= 91% farmacológica**

**ESPECIFICIDADE = 64%-91% Exercício
= 86% farmacológica**



SPECT



Gender differences in the diagnostic accuracy of SPECT myocardial perfusion imaging: A bivariate meta-analysis

1.148 MULHERES
1.142 HOMENS

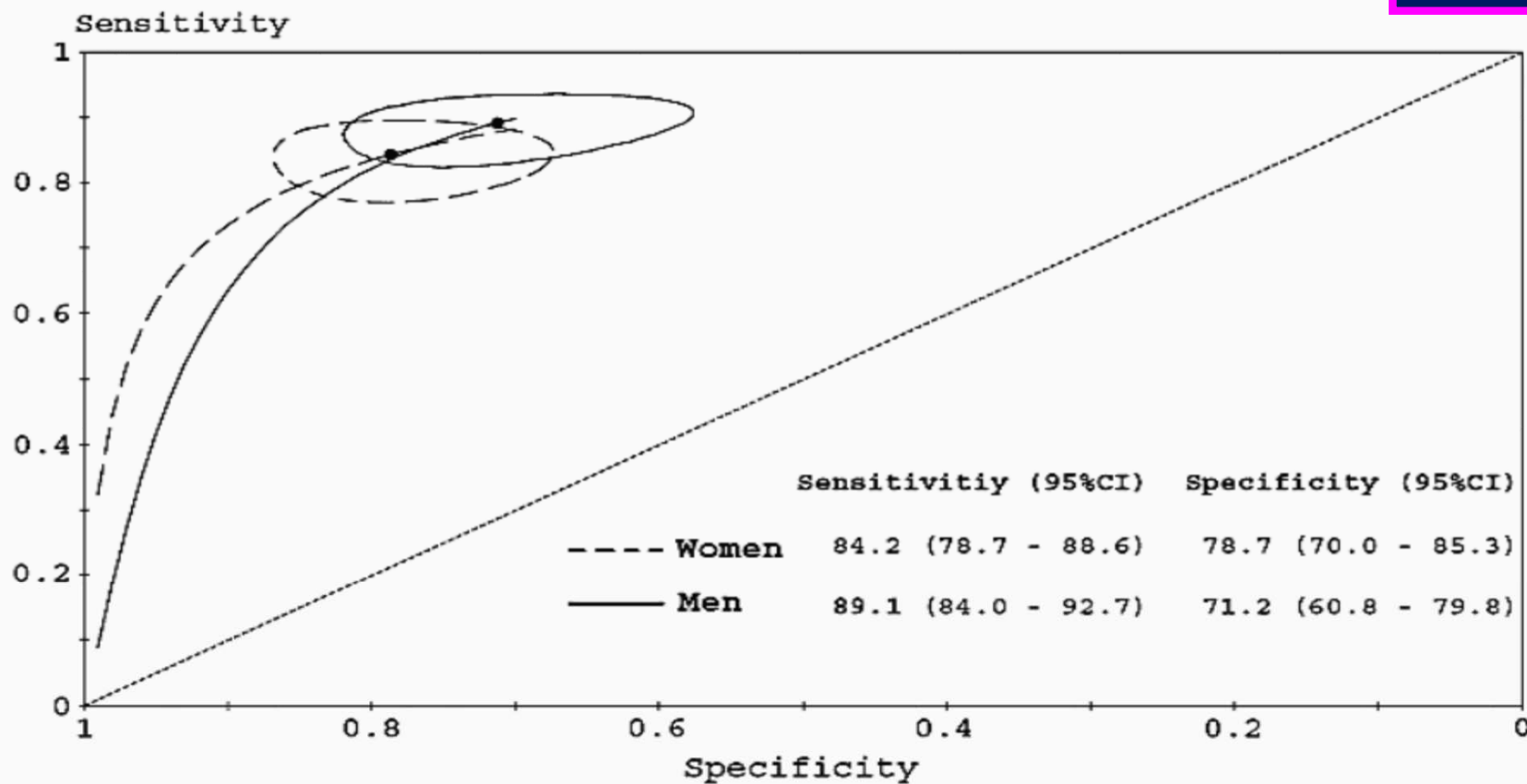


Figure 4. Summary ROC curves for SPECT in women and men.

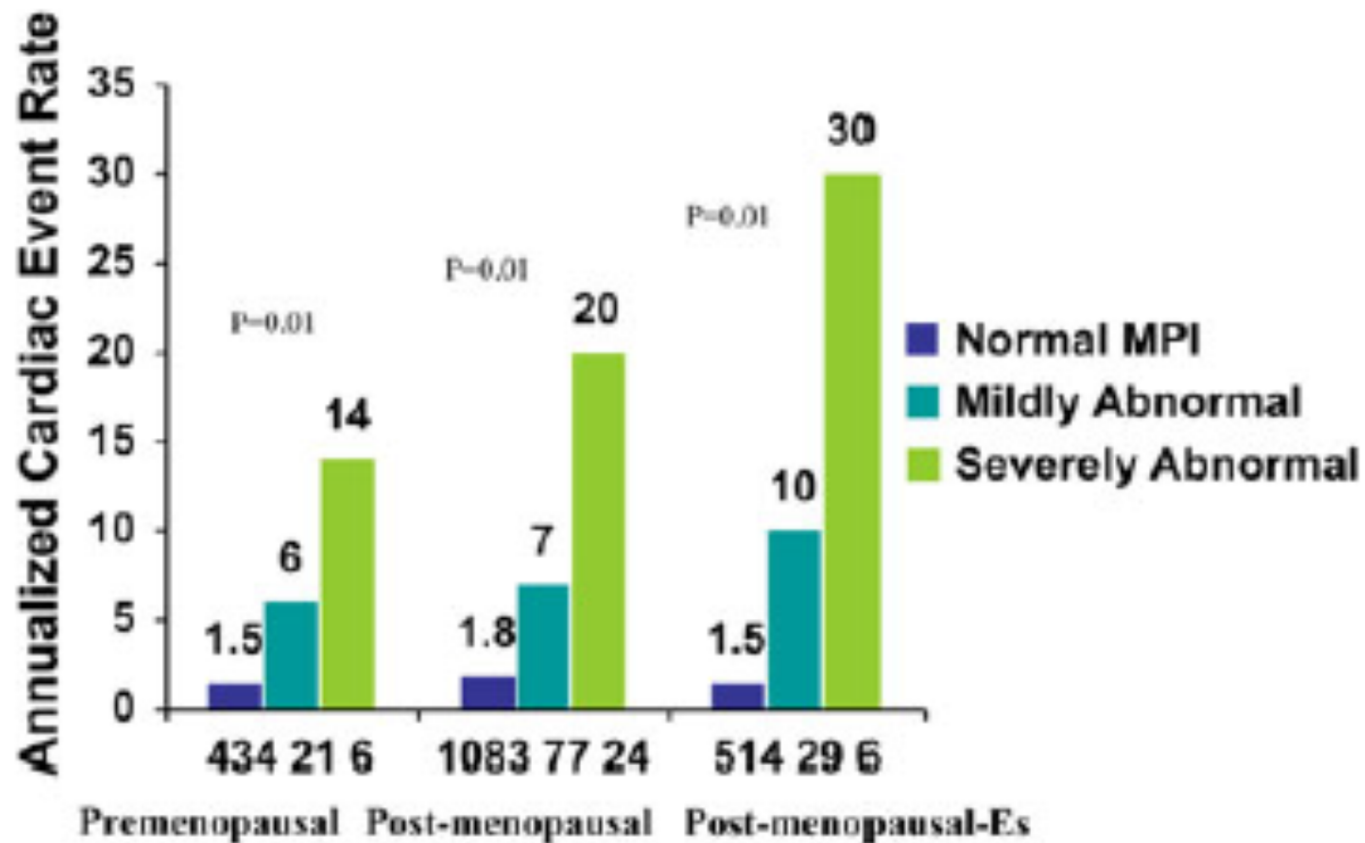
CINTILOGRAFIA X ESTRATIFICAÇÃO DE RISCO - Mulheres

Nº Mulheres	MN NL
7.500	<1%/ANO

Risk stratification of CAD with SPECT-MPI in women with known estrogen status

Nitesh Sood, MD,^{a,b,c} Fawad A. Kazi, MD,^{a,b} Justin B. Lundbye, MD,^{a,b} Deborah Katten, RN, MPH,^{a,b} and Gary V. Heller, MD, PhD^{a,b}

2.194 mulheres risco intermediário/alto
Pré-menopausa,
+TRH , Pós - TRH



Conclusion: Women with abnormal MPI had worse survival , regardless Estrogen Status.

Circulation

JOURNAL OF THE AMERICAN HEART ASSOCIATION



Role of Noninvasive Testing in the Clinical Evaluation of Women With Suspected Ischemic Heart Disease: A Consensus Statement From the American Heart Association

Jennifer H. Mieres, Martha Gulati, Noel Bairey Merz, Daniel S. Berman, Thomas C. Gerber, Sharonne N. Hayes, Christopher M. Kramer, James K. Min, L. Kristin Newby, J.V. (Ian) Nixon, Monvadi B. Srichai, Patricia A. Pellikka, Rita F. Redberg, Nanette K. Wenger and Leslee J. Shaw

on behalf of the American Heart Association Cardiac Imaging Committee of the Council on Clinical Cardiology and the Cardiovascular Imaging and Intervention Committee of the Council on Cardiovascular Radiology and Intervention

**ESTUDO DA PERFUSÃO MIOCÁRDICA SPECT/PET
MAIOR RISCO**

< 5 METS e ECG BASAL ALTERADO/NÃO INTERPRETÁVEL

CLASSE I - NÍVEL DE EVIDÊNCIA B

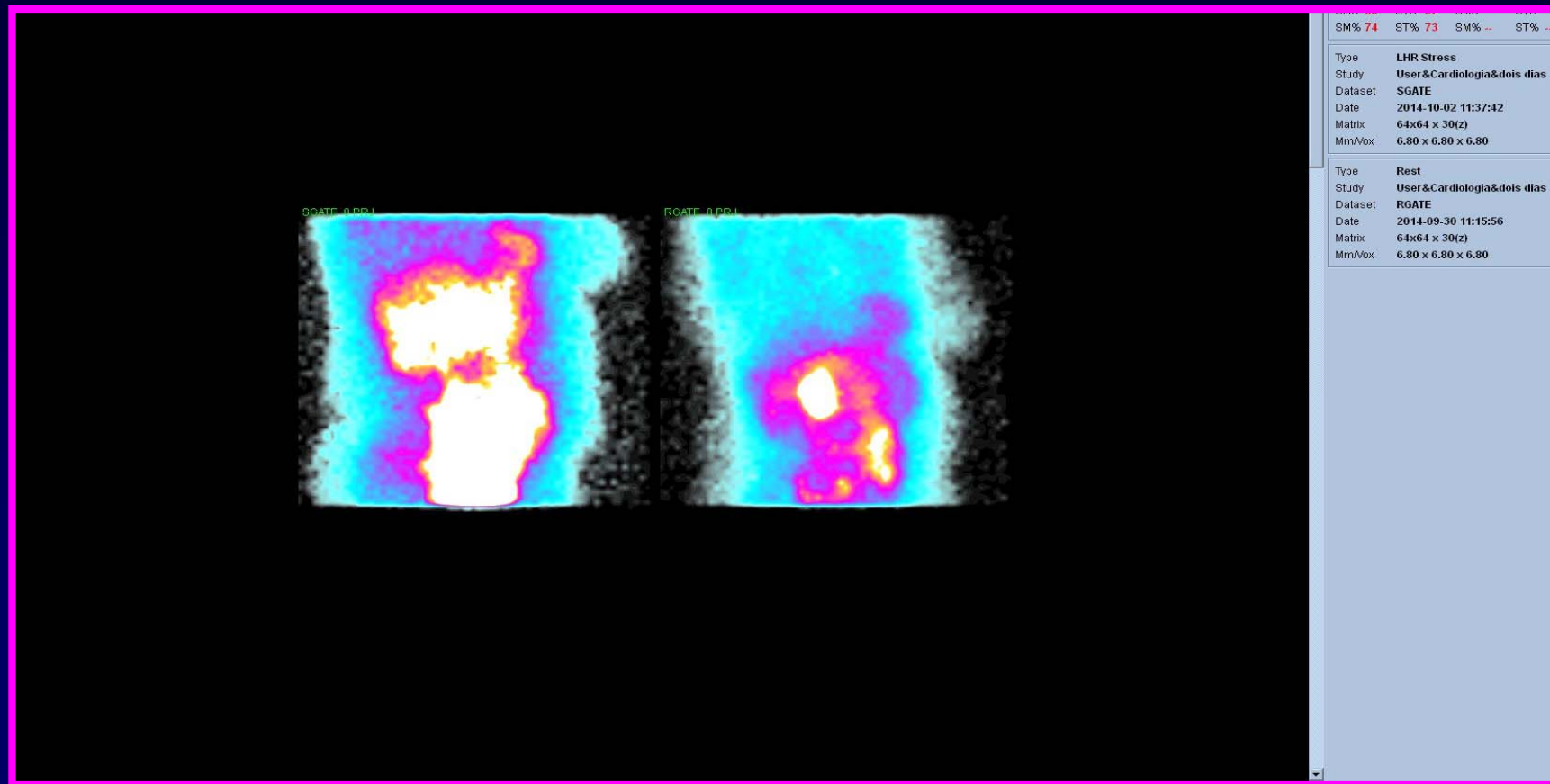
FATORES QUE AFETAM A ACURÁCIA DOS TESTES DIAGNÓSTICOS EM MULHERES

- Tolerância limitada ao exercício (> idade na investigação inicial)
- Influência hormonal no ECG (“digitalis-like” = false positive)
- Baixa voltagem ECG
- Menor prevalência de ESTENOSES SIGNIFICATIVAS
- Maior prevalência de dor torácica de causa não-isquêmica (MICROCIRCULAÇÃO, DISFUNÇÃO ENDOTELIAL)
- Maior prevalência de acometimento uni-arterial
- Diferenças anatômicas: vasos menores, coração menor e atenuação mamária

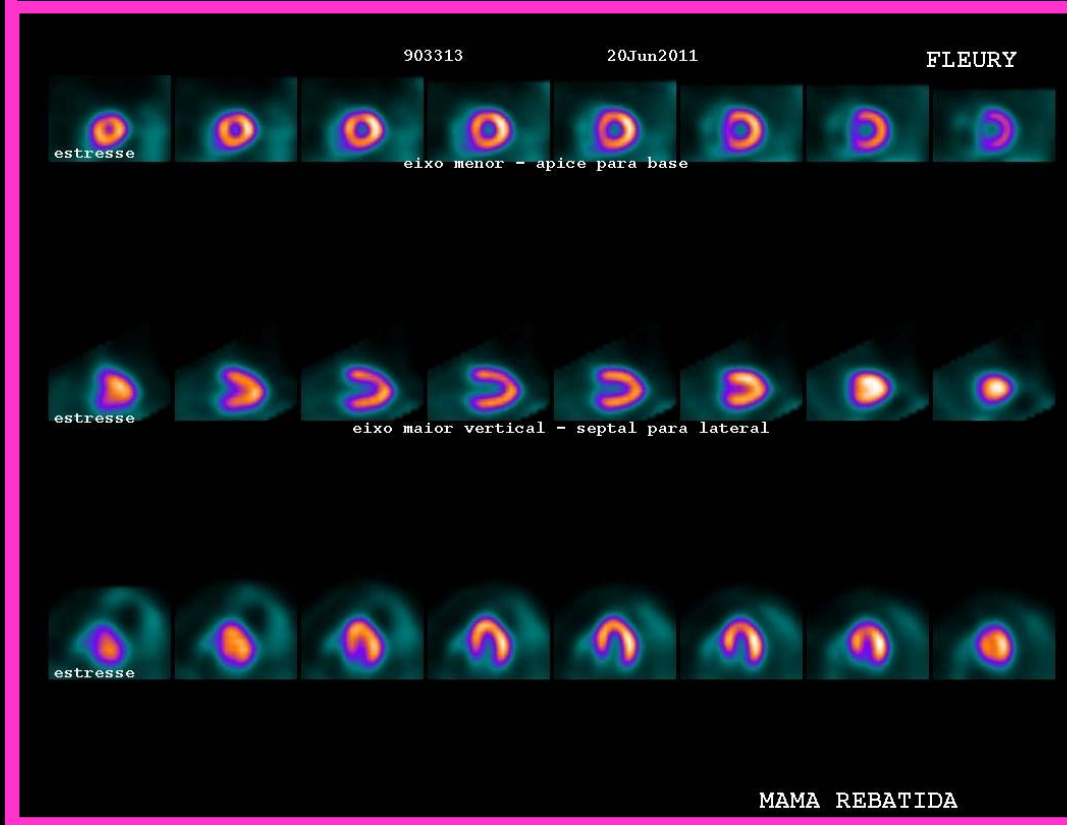
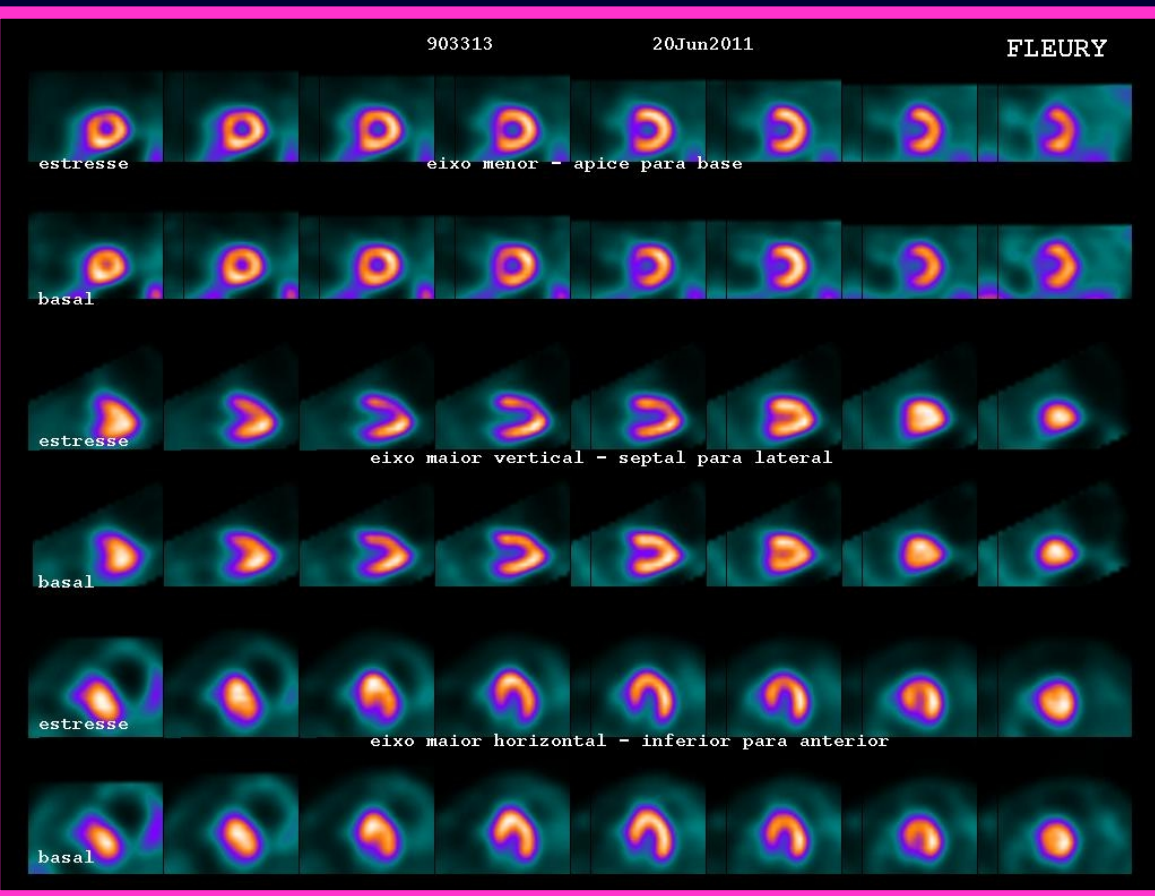
DESAFIOS NA CINTILOGRAFIA DO SEXO FEMININO

- Atenuação mamária (25% dos estudos em mulheres)
- Pequeno tamanho do coração
- Baixa frequência cardíaca atingida
- Radiação ionizante – MULHERES JOVENS

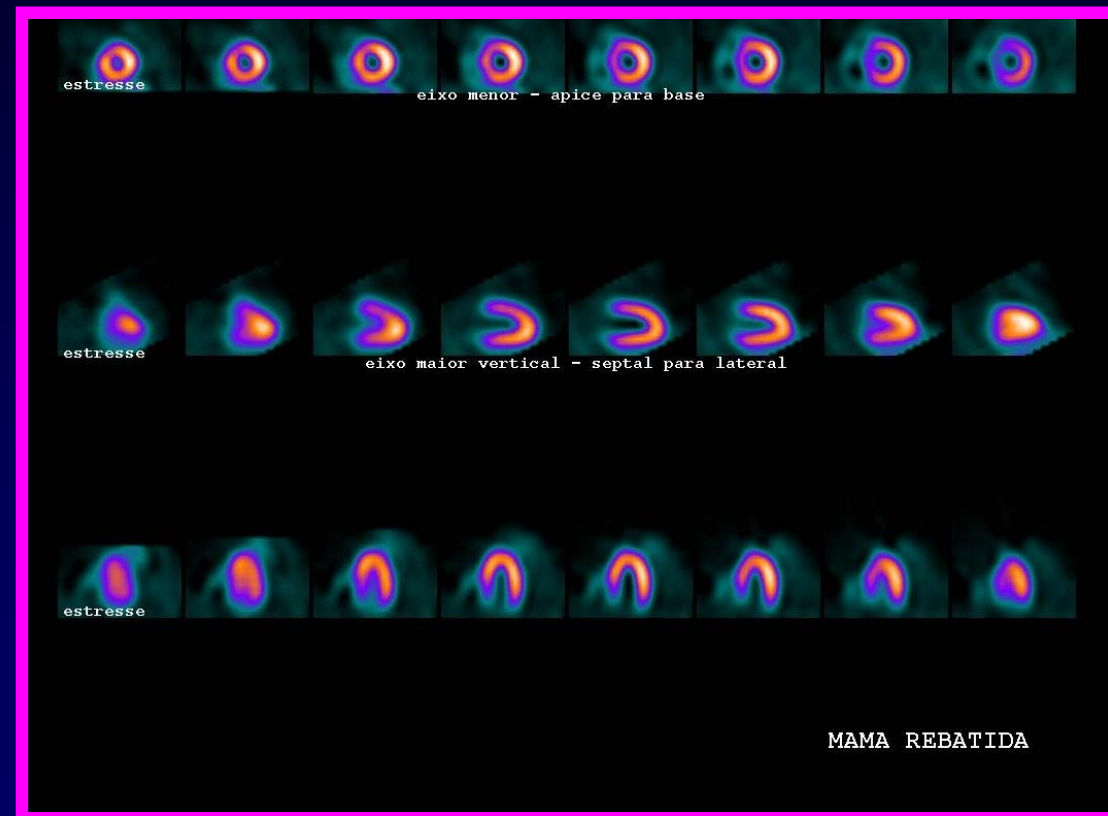
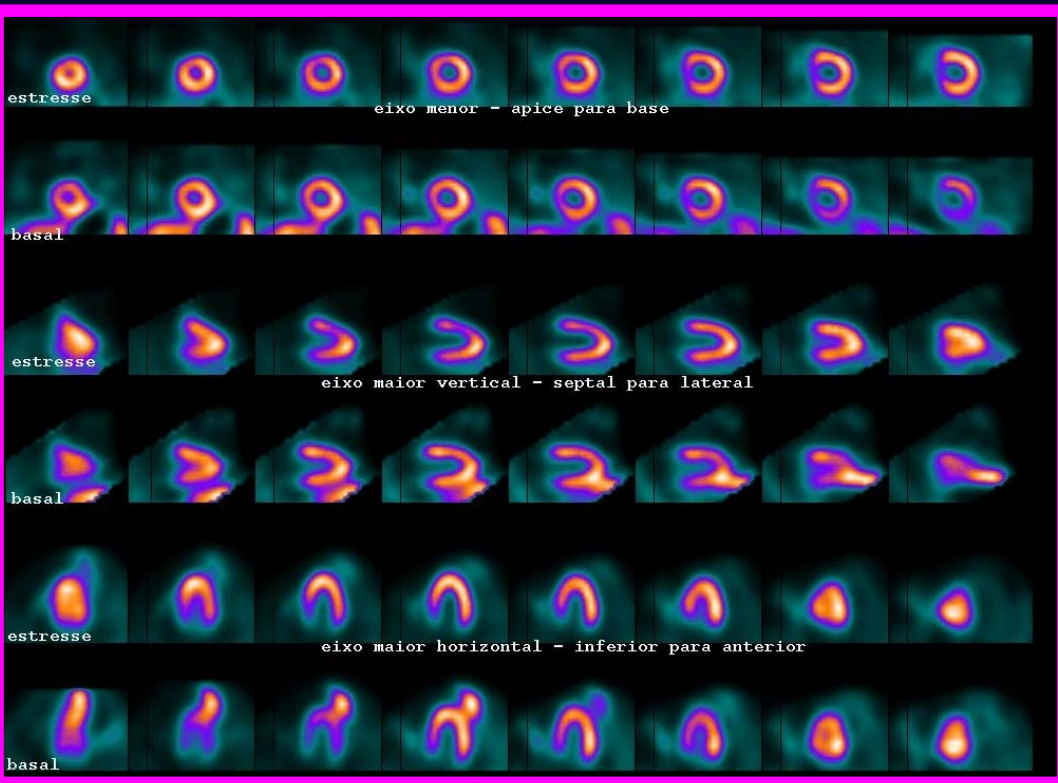
ATENUAÇÃO MAMÁRIA



POSICIONAMENTO - MAMAS



POSICIONAMENTO - MAMAS



DECUBITO DORSAL E VENTRAL

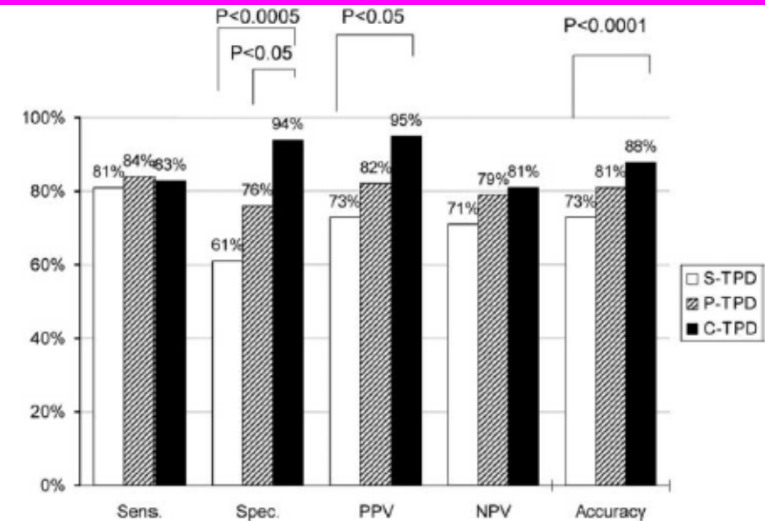
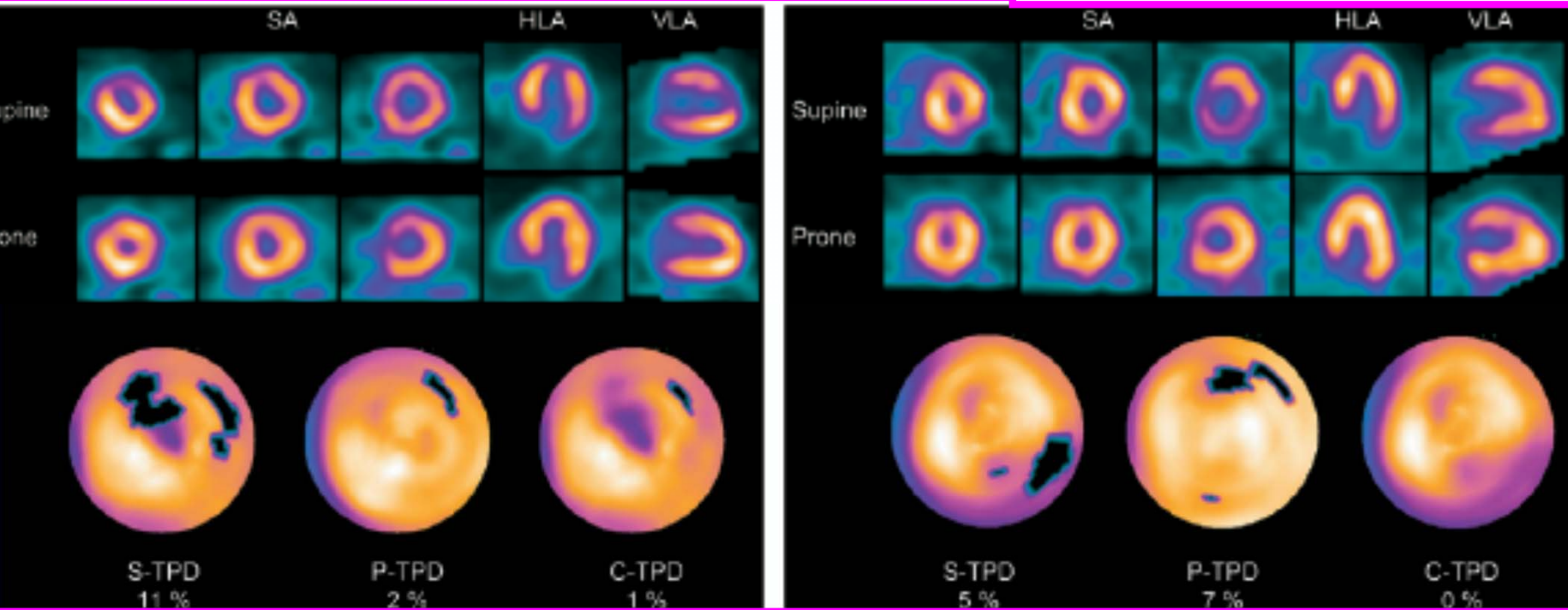


Figure 3. Optimal sensitivities, specificities, positive predictive values, negative predictive values, and accuracies for detection of CAD by S-, P-, and C-TPD in validation group (n = 113).



ASNC INFORMATION STATEMENT

Recommendations for reducing radiation exposure in myocardial perfusion imaging

Manuel D. Cerqueira, MD,^a Kevin C. Allman, MBBS,^b Edward P. Ficaro, PhD,^c Christopher L. Hansen, MD,^d Kenneth J. Nichols, PhD,^e Randall C. Thompson, MD,^f William A. Van Decker, MD,^g and Marko Yakovlevitch, MD^h

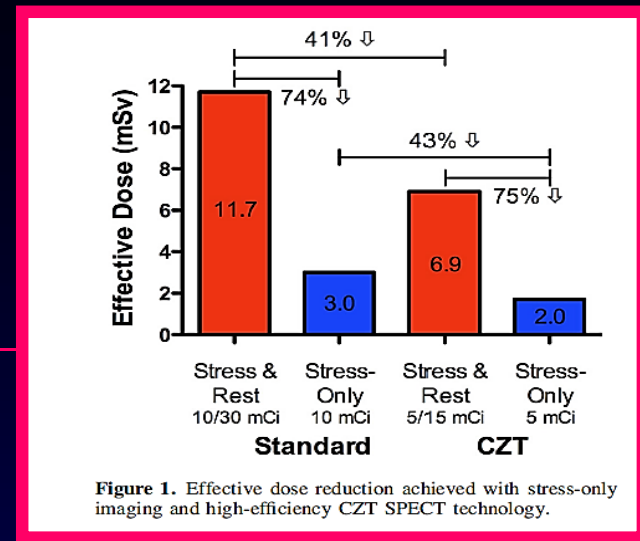
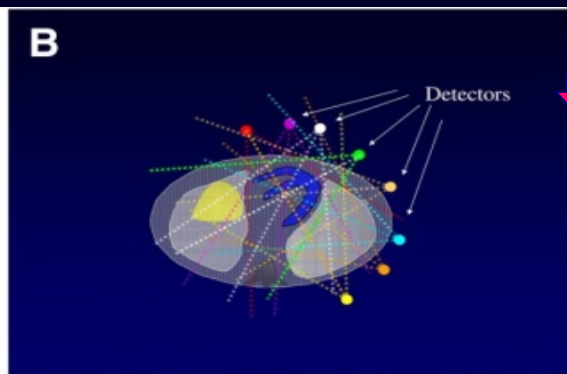
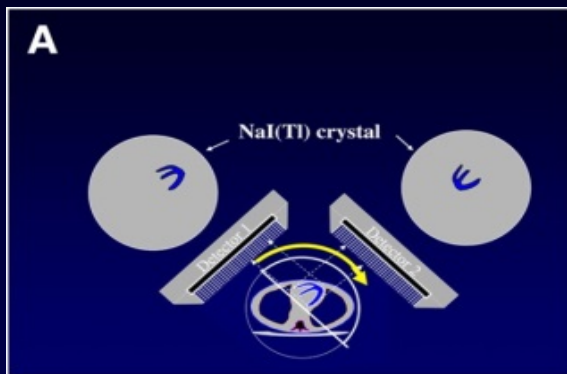


Figure 1. Effective dose reduction achieved with stress-only imaging and high-efficiency CZT SPECT technology.



**MENOS ATIVIDADE
MENOR TEMPO
GRANDE ACURACIA**

Schinkel AFL et al. J Nuc Cardiol 2012;19:901-6

BAIXA FC ATINGIDA

**USO DOS CRITÉRIOS
APROPRIADOS**

**ORIENTAÇÃO SOBRE O
PREPARO ADEQUADO**

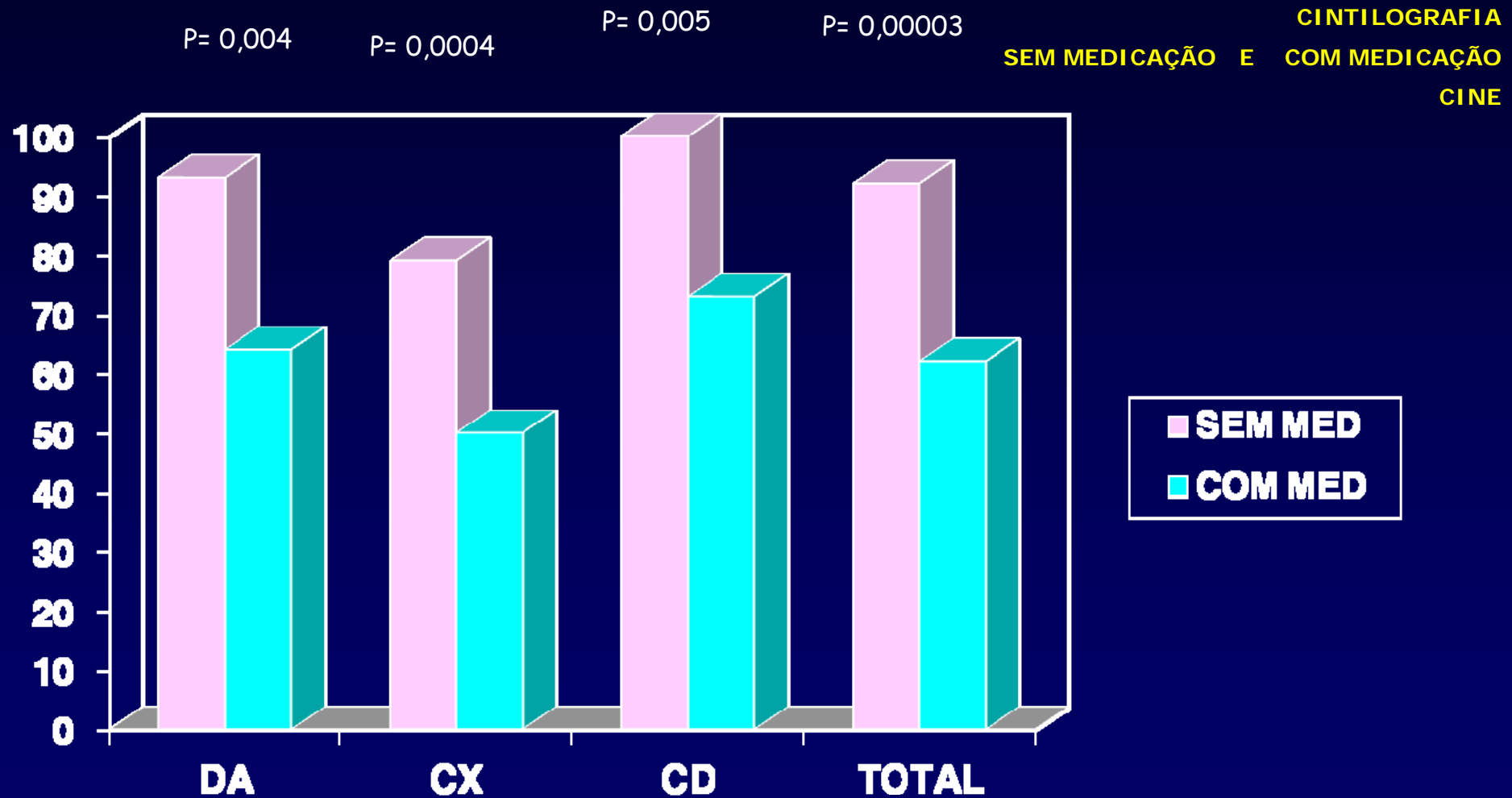
**ESCOLHA DO AGENTE DE
ESTRESSE ADEQUADO**

**ESCOLHA DO
PROTOCOLO ADEQUADO**

**ESTIMULAR O MAIOR
EXERCÍCIO POSSÍVEL**

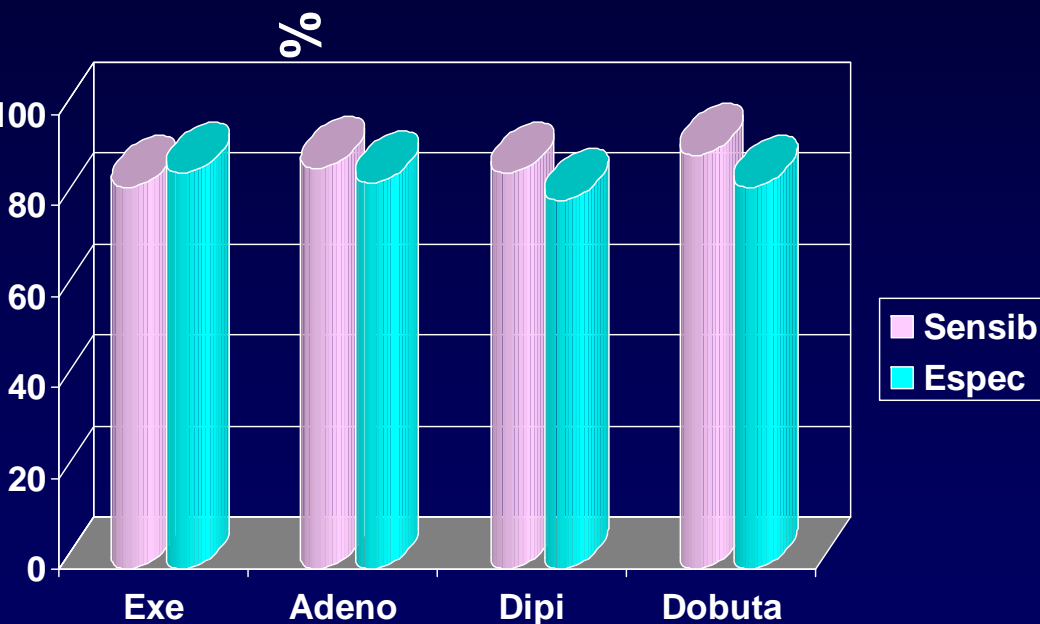
**BOA ACURÁCIA
DIAGNÓSTICA!!!!**

DIAGNÓSTICO OU ACOMPANHAMENTO ?



TIPO DE ESTRESSE X ACURÁCIA

600 mulheres - 125 (21%) isquêmicas



Cintilografias	SENSIBILIDADE	
TE (225)	86.4%	
DIPI (349)	81.6%	p=ns
DOBUTA (26)	90.9%	

*Leppo. J Nucl Cardiol 1996

*Calcina E SierraAlto W, Message D, Machado L, Smanio P. SOCESP 2014

ASNC INFORMATION STATEMENT

Recommendations for reducing radiation exposure in myocardial perfusion imaging

Manuel D. Cerqueira, MD,^a Kevin C. Allman, MBBS,^b Edward P. Ficaro, PhD,^c Christopher L. Hansen, MD,^d Kenneth J. Nichols, PhD,^e Randall C. Thompson, MD,^f William A. Van Decker, MD,^g and Marko Yakovlevitch, MD^h

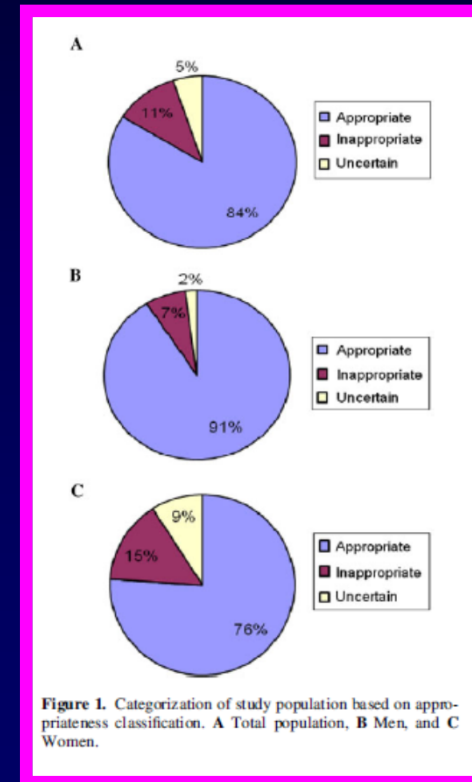
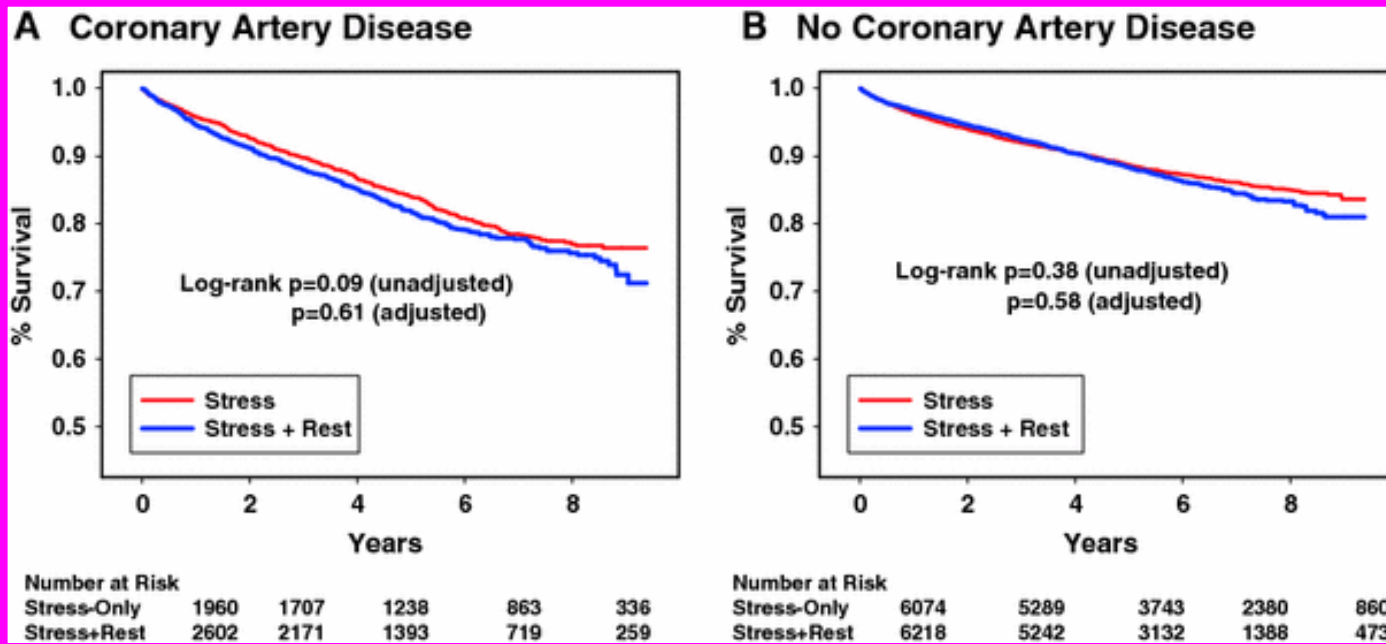
J Nucl Cardiol. May 2010

Gender disparity and the appropriateness of myocardial perfusion imaging

Aarti Gupta, MD,^a Sarah V. Tsiaras, MD,^a Shira I. Dunsiger, PhD,^b and Peter L. Tilkemeier, MD^a

J Nucl Cardiol; April 2011

- 1) Critérios apropriados
- 2) “Otimizar” dose – protocolos, novas tecnologias



TOMOGRAFIA POR EMISSÃO DE PÓSITRONS

The role of positron emission tomography in the evaluation of myocardial ischemia in women

Viviany R. Taqueti, MD, MPH,^{a,b} and Sharmila Dorbala, MD, MPH^{a,b}

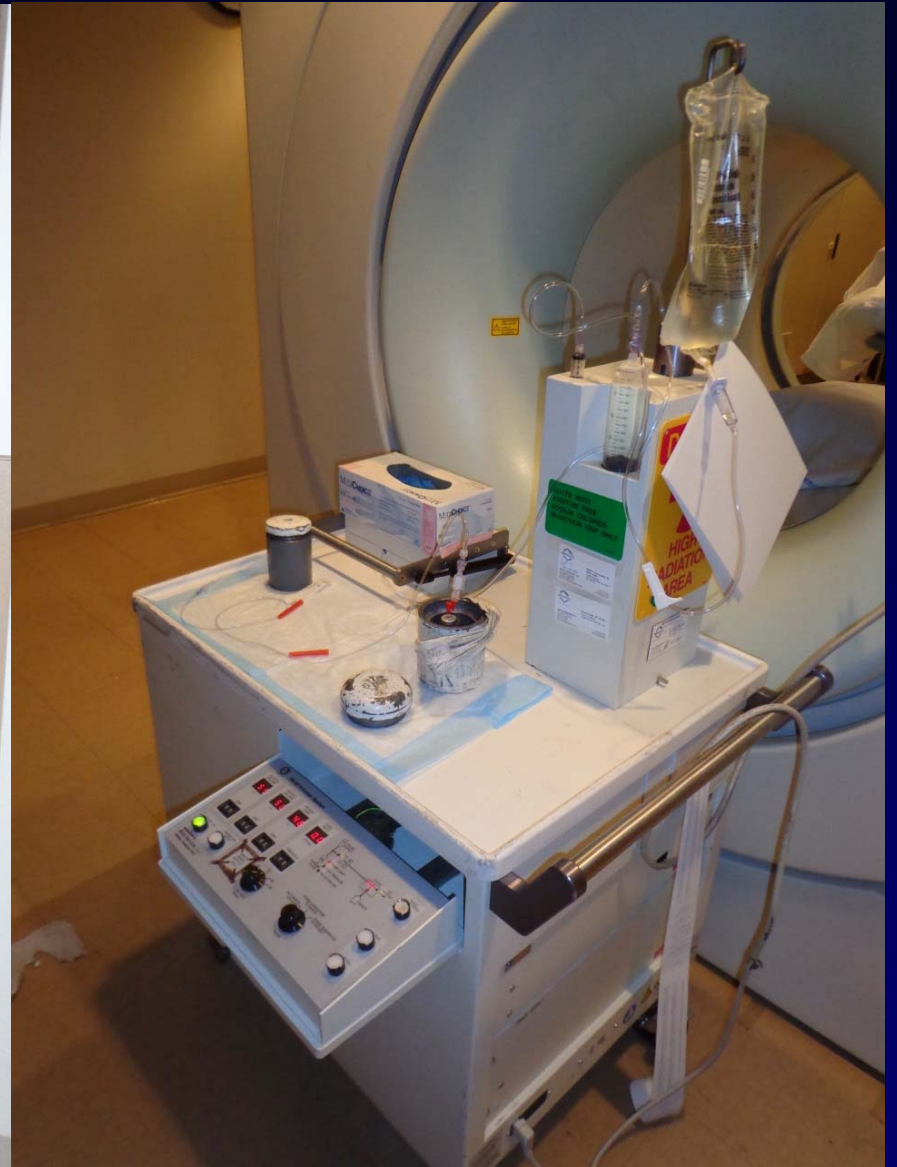
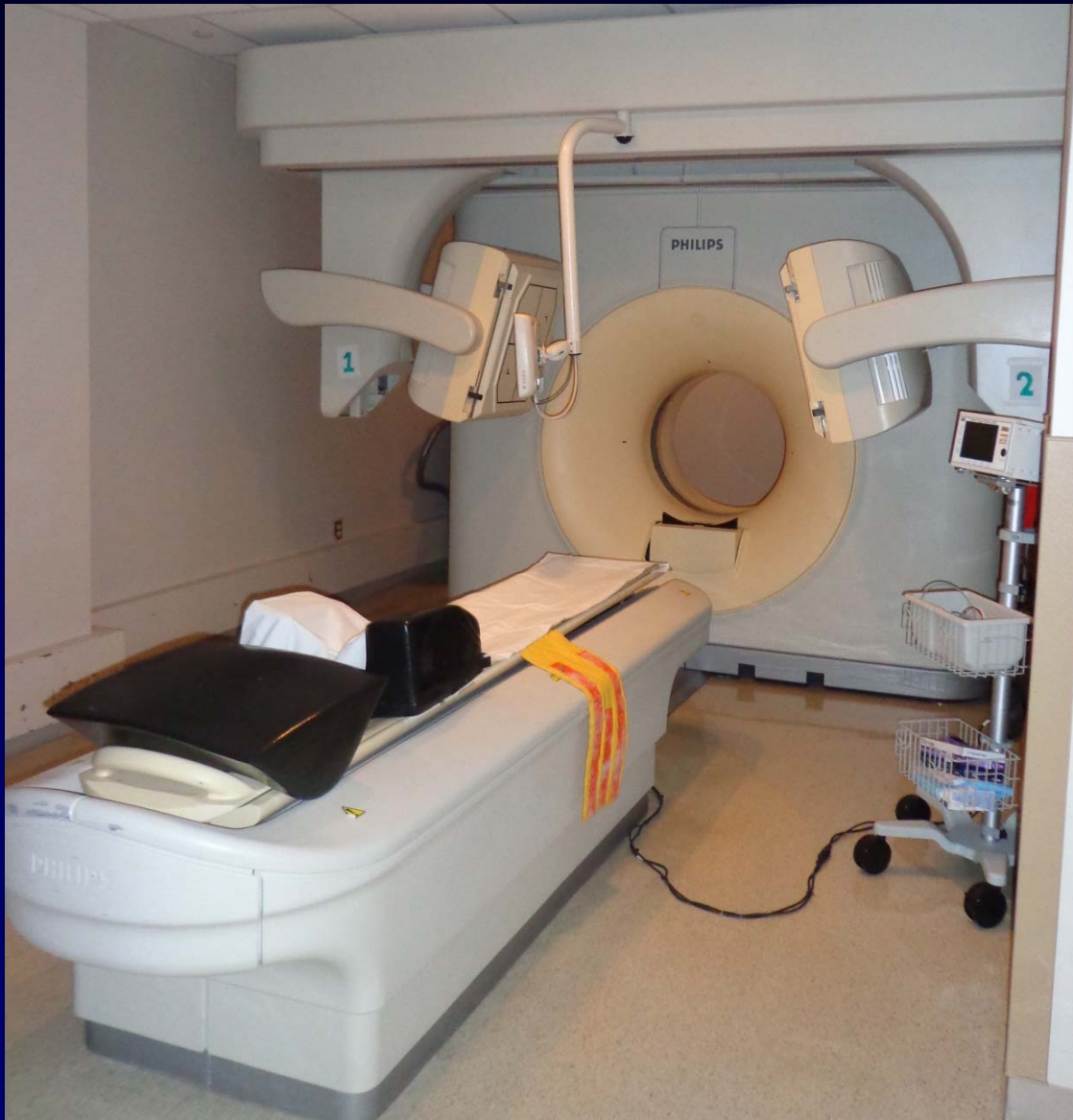
^a Noninvasive Cardiovascular Imaging Program, Departments of Medicine and Radiology, Brigham and Women's Hospital, Harvard Medical School, Boston, MA

^b Division of Nuclear Medicine and Molecular Imaging, Department of Radiology, Brigham and Women's Hospital, Harvard Medical School, Boston, MA

Received May 23, 2016; accepted Jul 7, 2016
doi:10.1007/s12350-016-0603-3

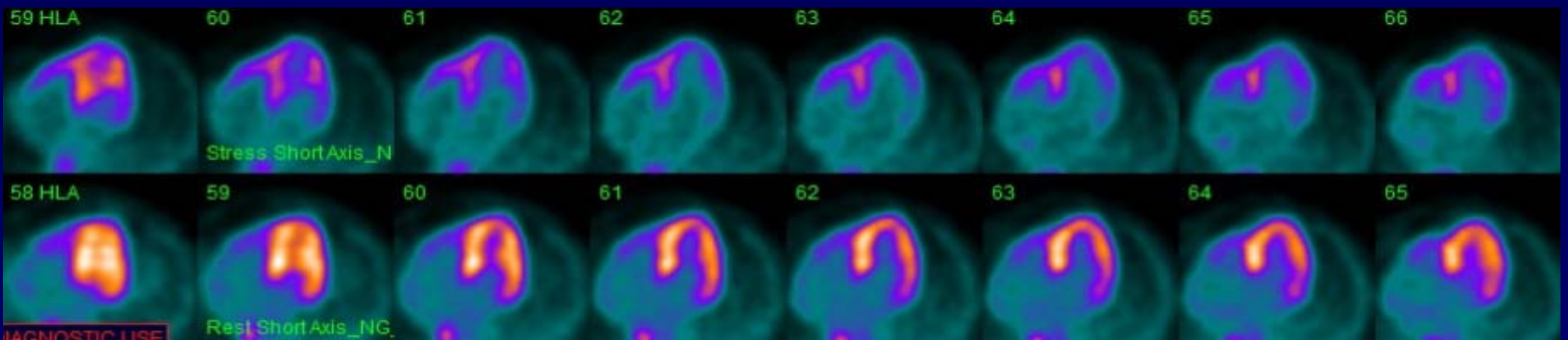
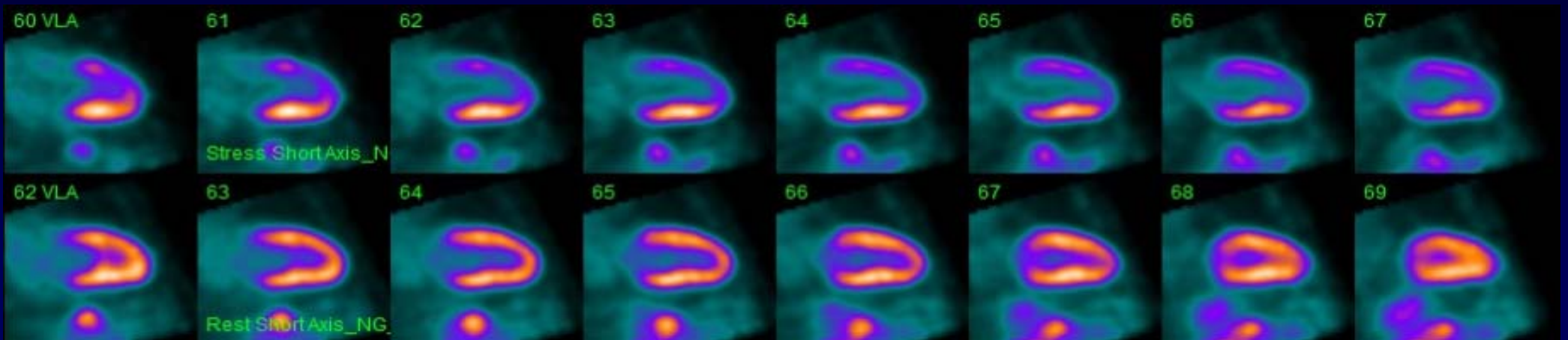
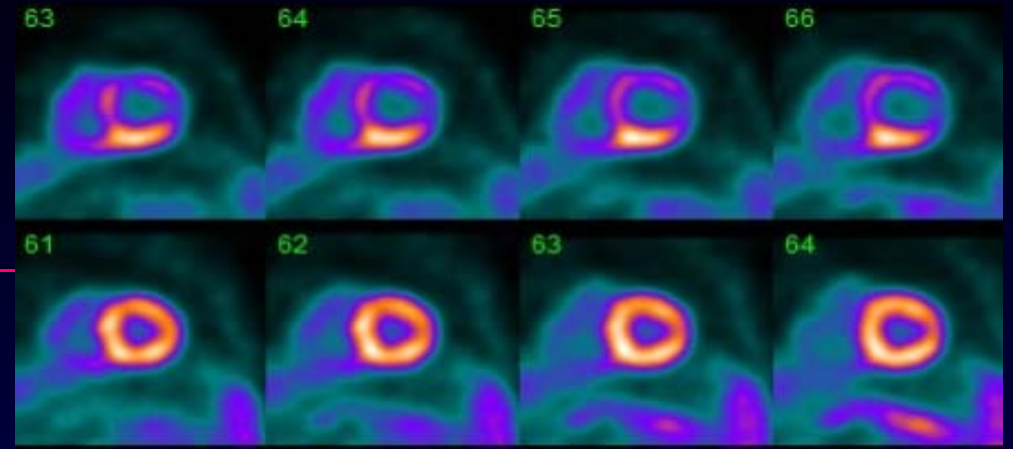
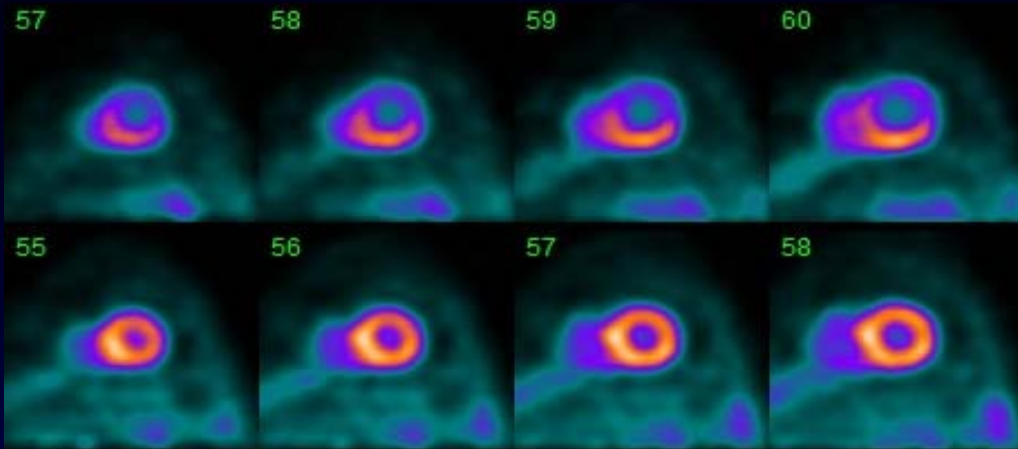
- ❑ Elevada acurácia diagnóstica
 - menos atenuação mamária
- ❑ Menor exposição radioativa
 - meia vida menor radiofármacos
- ❑ Medidas de fluxo e reserva de fluxo coronárias
 - mais de 1 artéria acometida
 - microcirculação –prognóstico

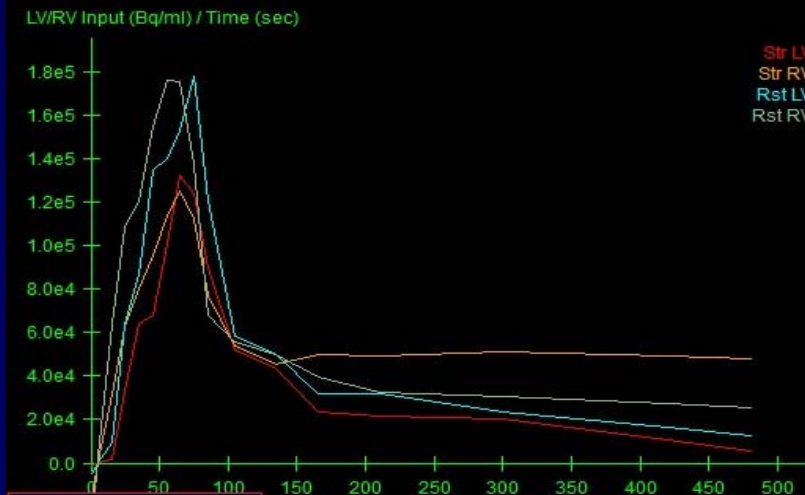
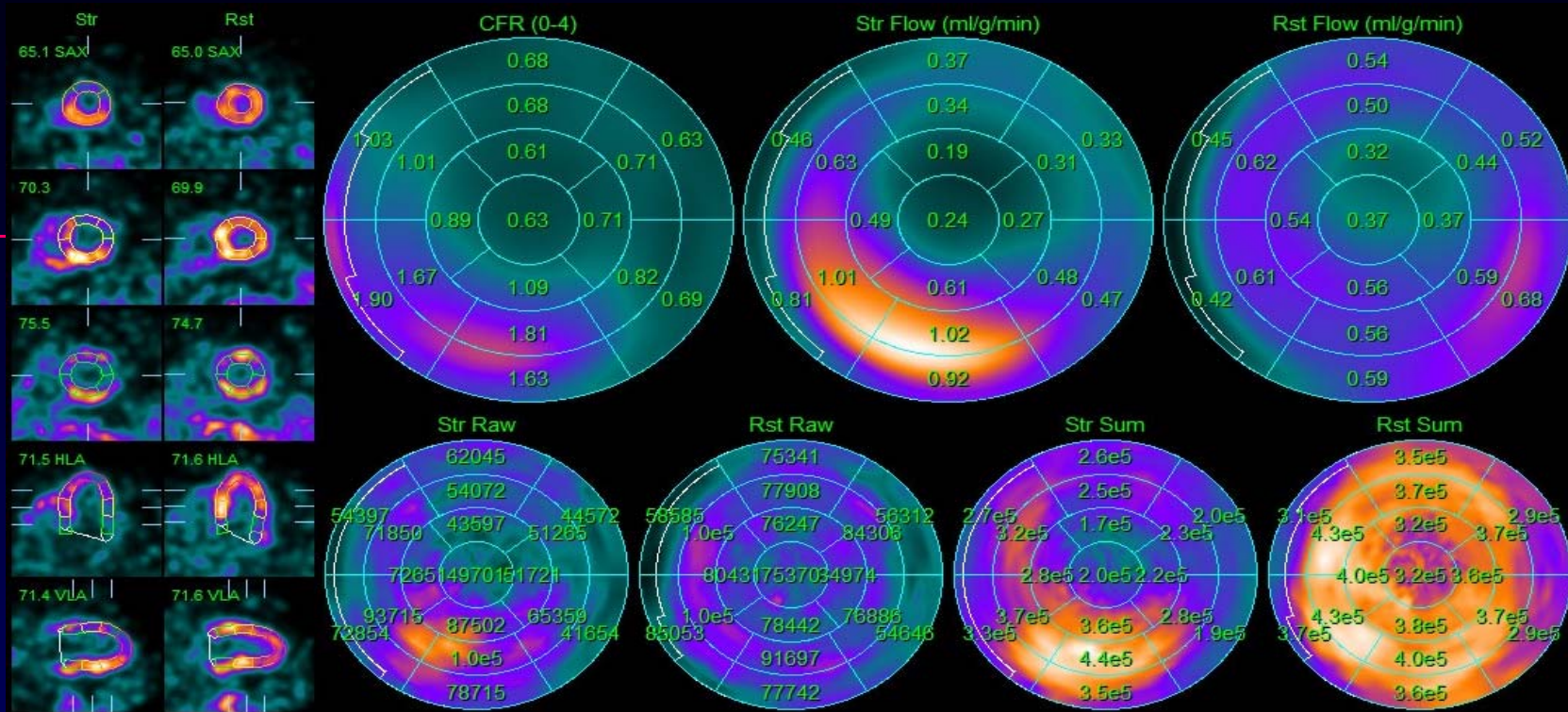
PET CARDÍACO



Rubidium - 82

Cortesia Dr .J. C. Meneghetti

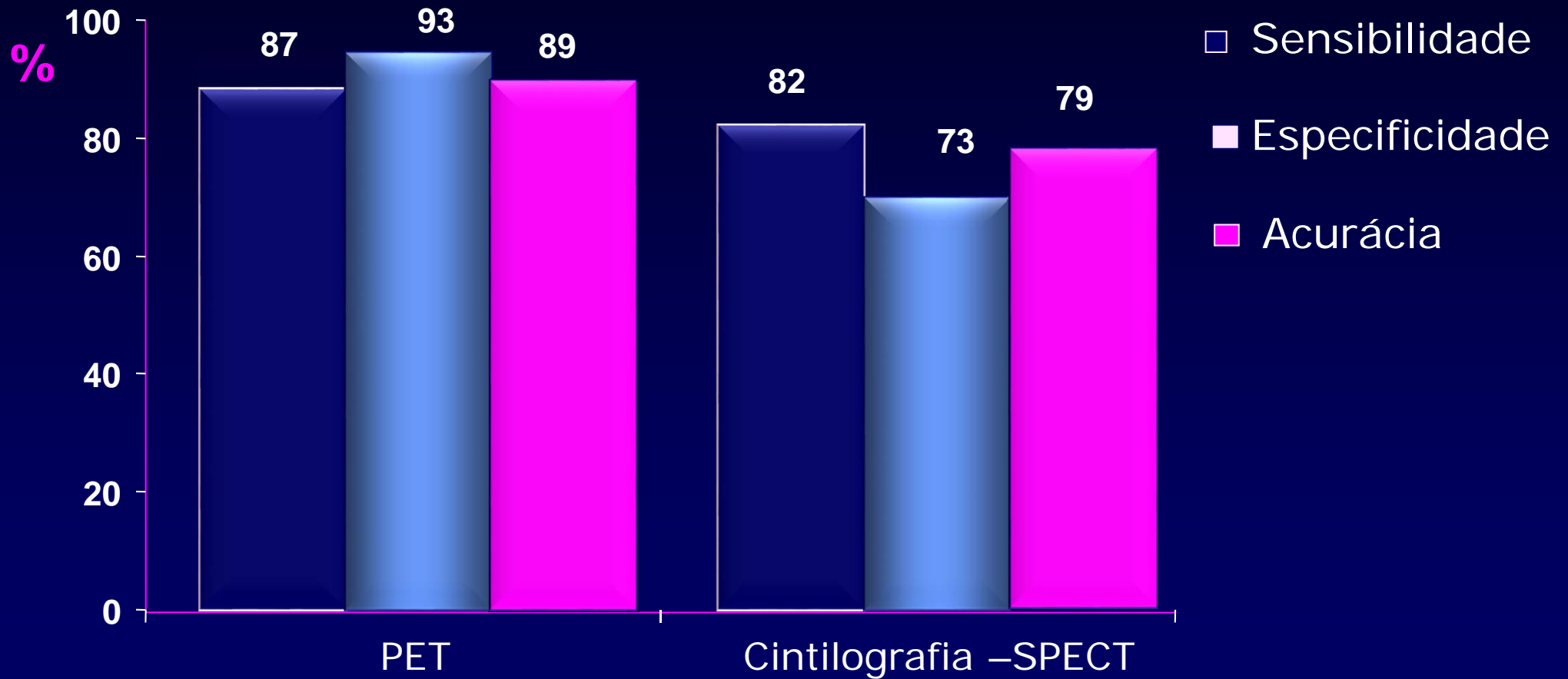




	Str Flow	Rst Flow	CFR	Str SF	Rst SF
APX	0.25	0.38	0.65	0.30	0.30
LAT	0.36	0.52	0.69	0.37	0.39
INF	0.86	0.57	1.54	0.34	0.34
SEP	0.65	0.55	1.18	0.38	0.32
ANT	0.32	0.46	0.68	0.31	0.33
TOT	0.49	0.50	0.95	0.34	0.34

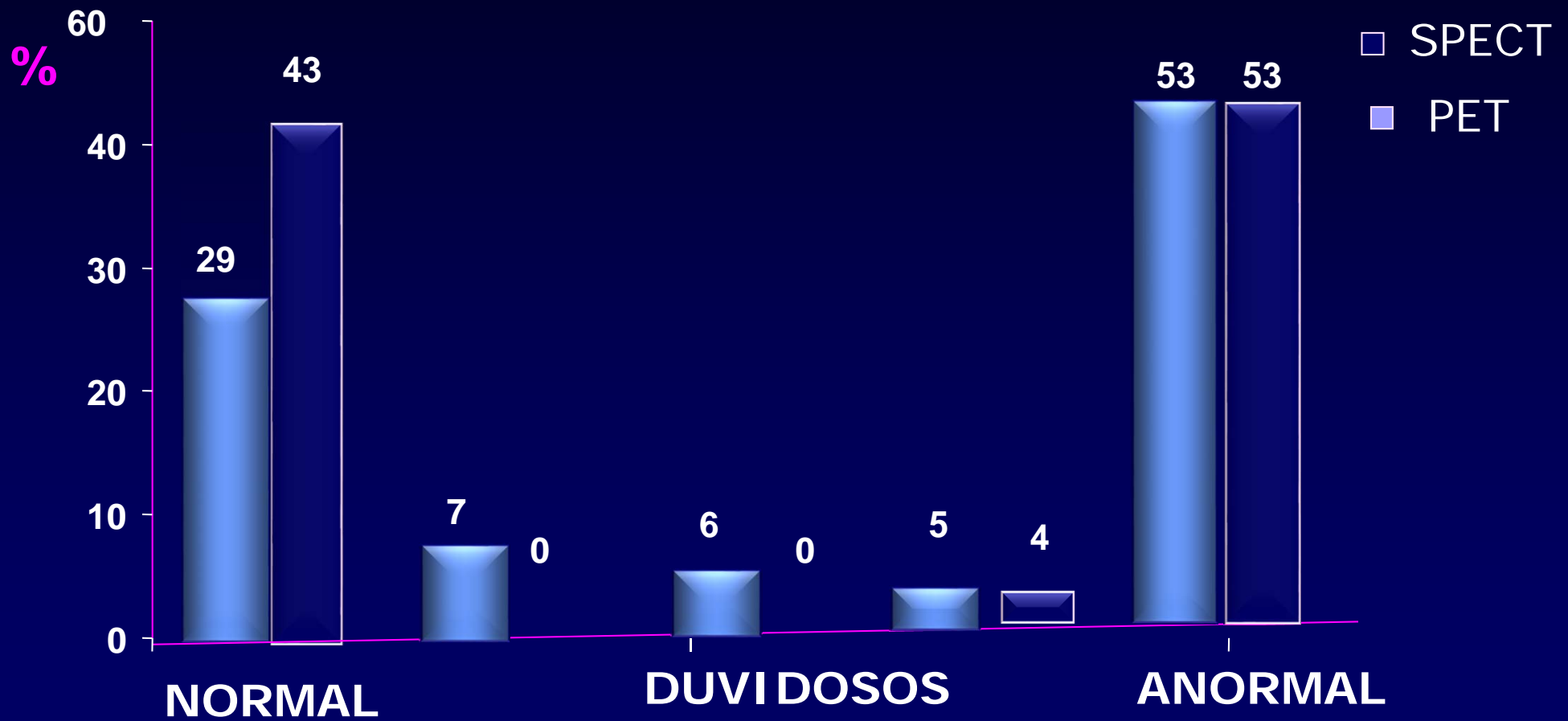


SPECT *versus* PET



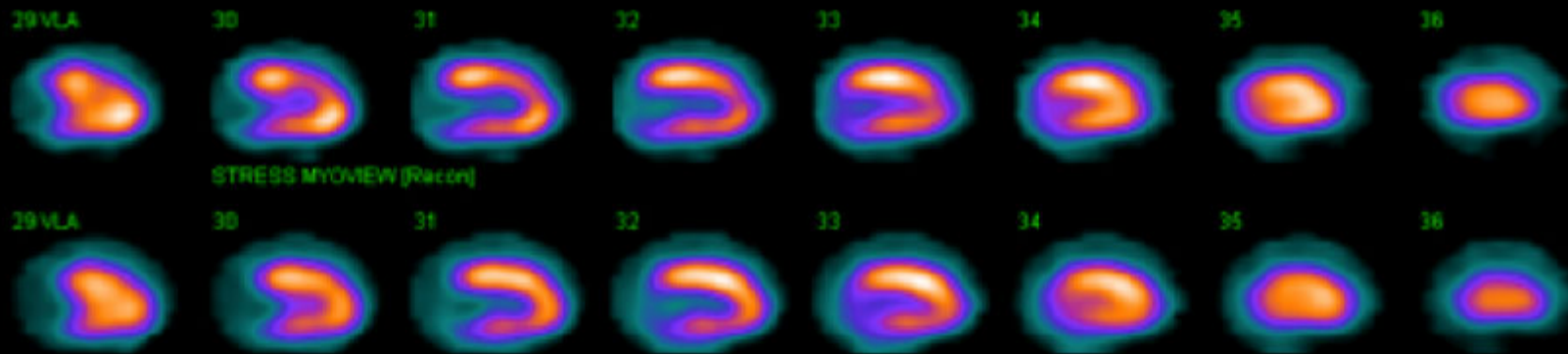


SPECT X PET

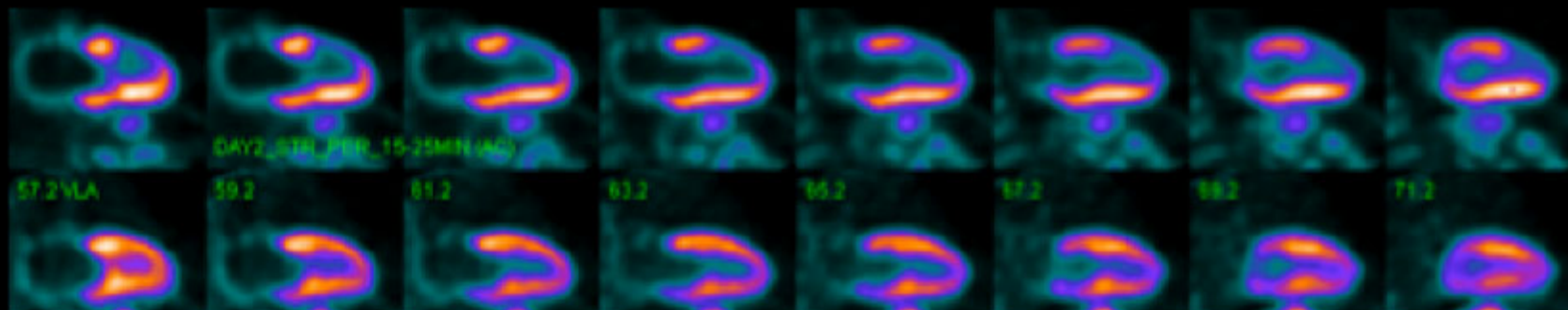


PET Flurpiridaz F-18

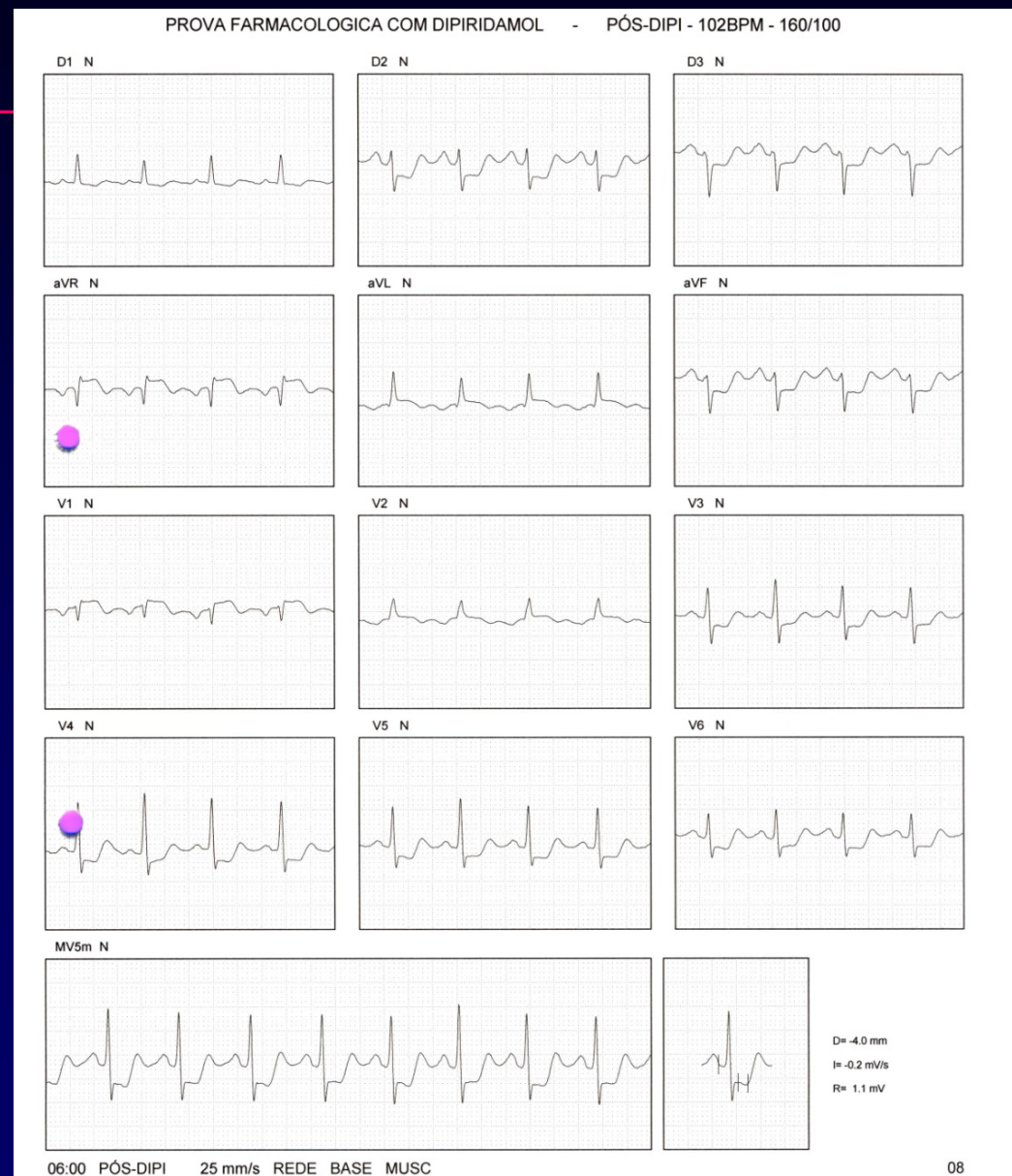
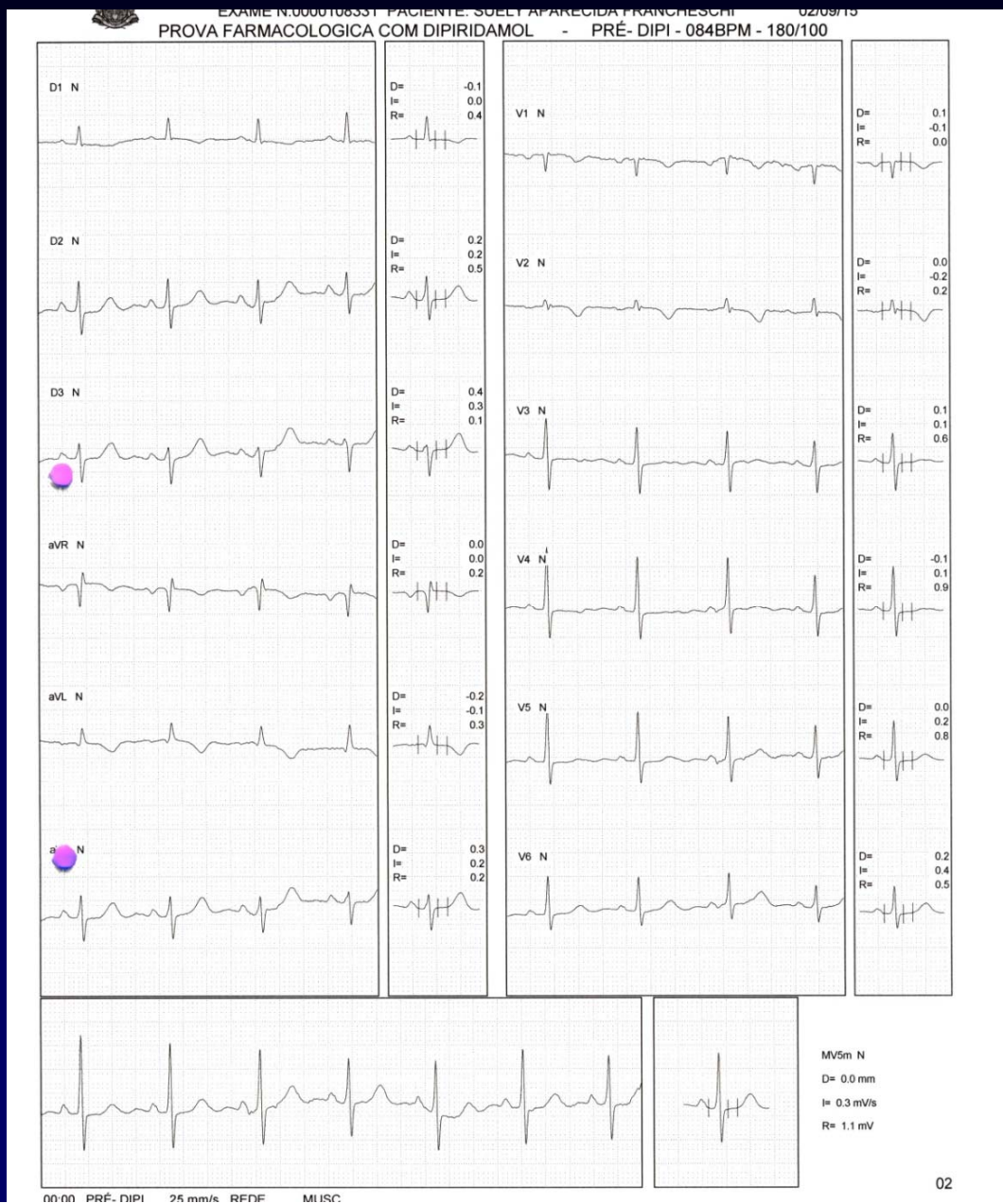
99mTc SPECT

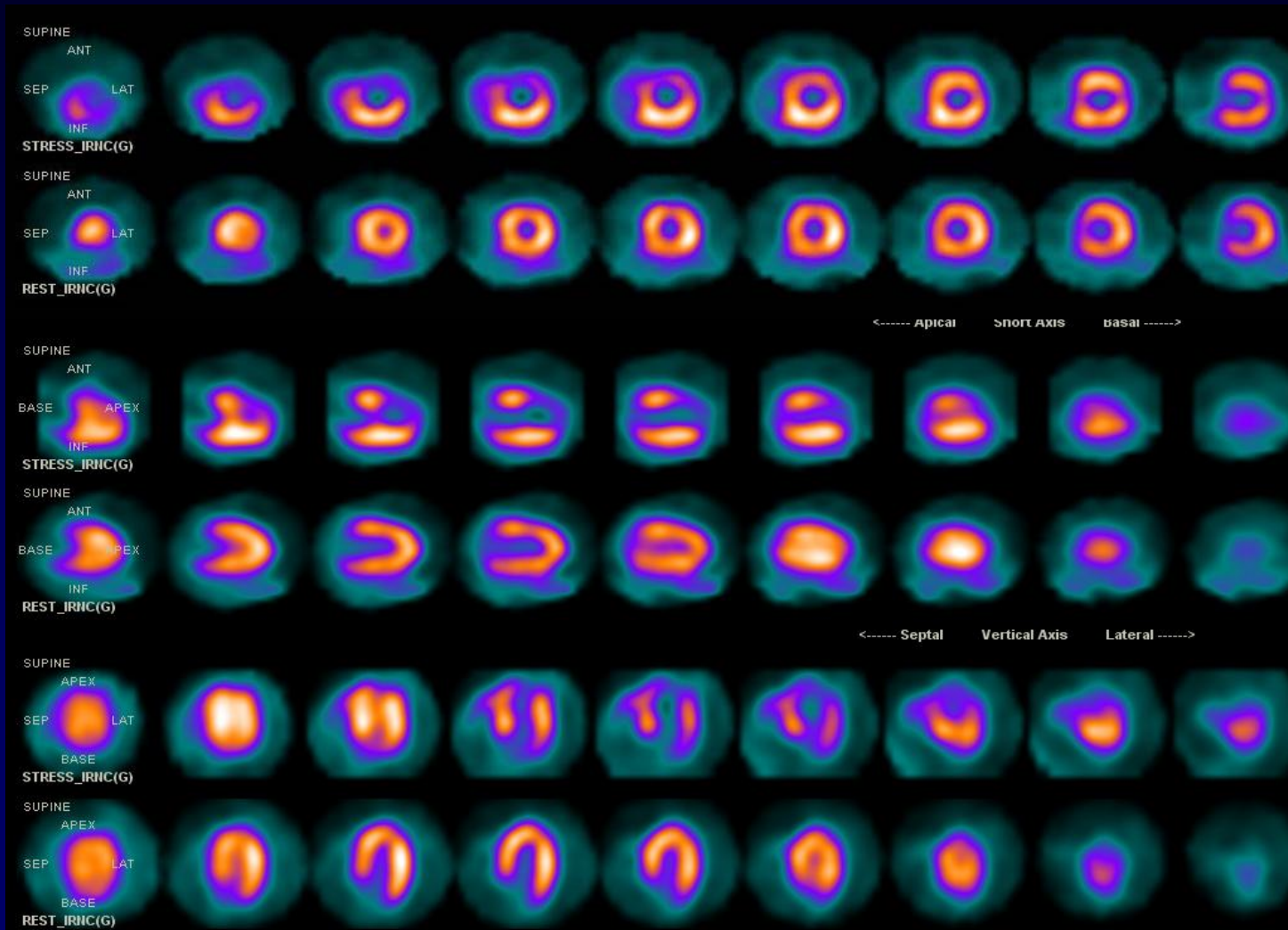


Flurpiridaz F 18 PET



1) S.A.R., 53^a, tabagista, hipertensa, dislipêmica, sobrepeso, dor precordial para dançar





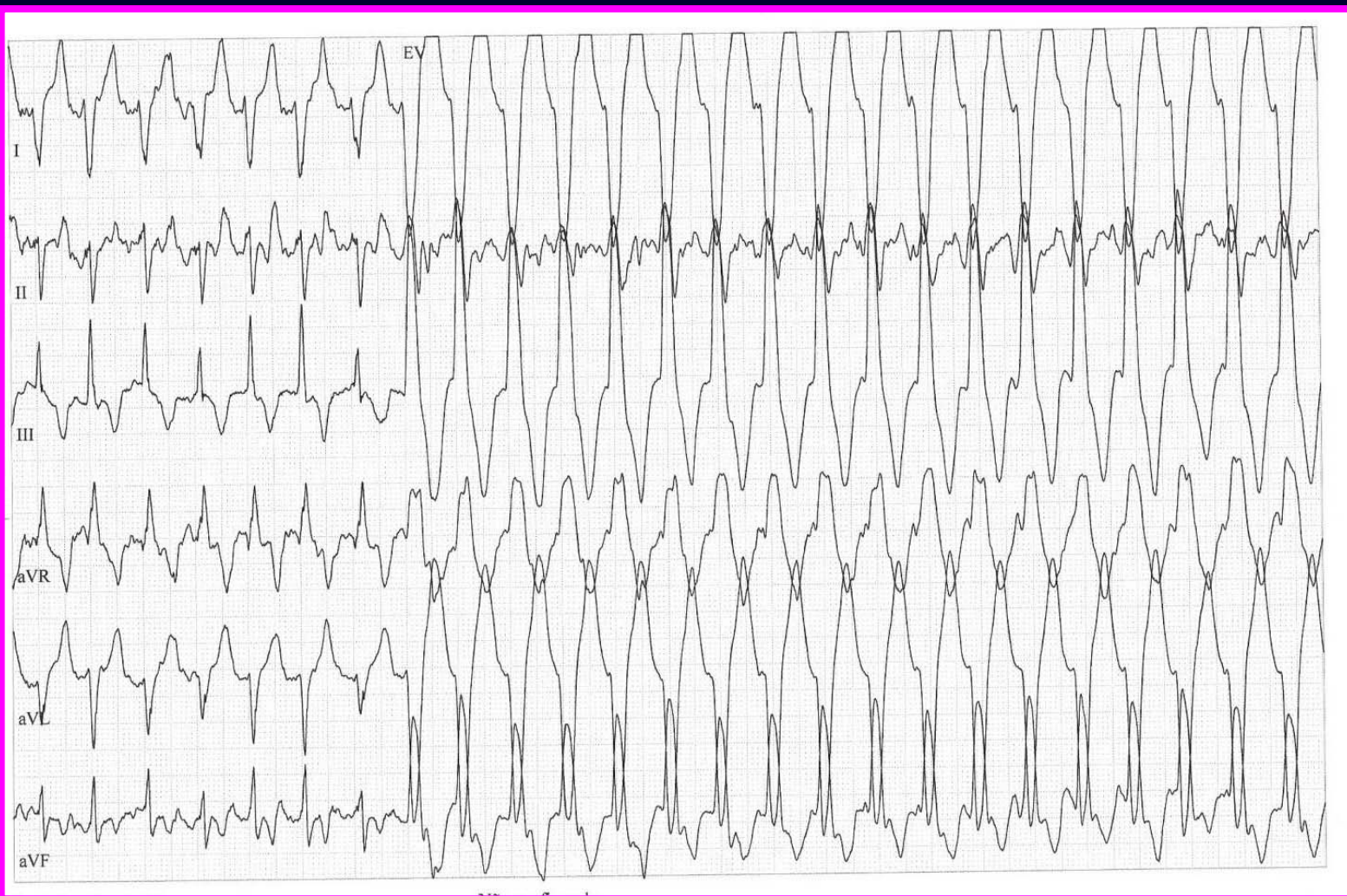
Sex	FEMALE						
SMS	10	STS	5	SMS	0	STS	0
SM%	12	ST%	10	SM%	0	ST%	0

Study	dois dias
Dataset	STRESS_FBP(G)
Date	2015-09-02 14:52:09
Volume	30ml [1]
EDV	64ml [6]
ESV	29ml [2]
EF	54%
Area	77cm² [1]
Eccentricity	0.79 [1]

Study	dois dias
Dataset	REST_FBP(G)
Date	2015-08-28 17:12:15
Volume	51ml [1]
EDV	54ml [8]
ESV	11ml [4]
EF	79%
Area	97cm² [1]
Eccentricity	0.85 [1]

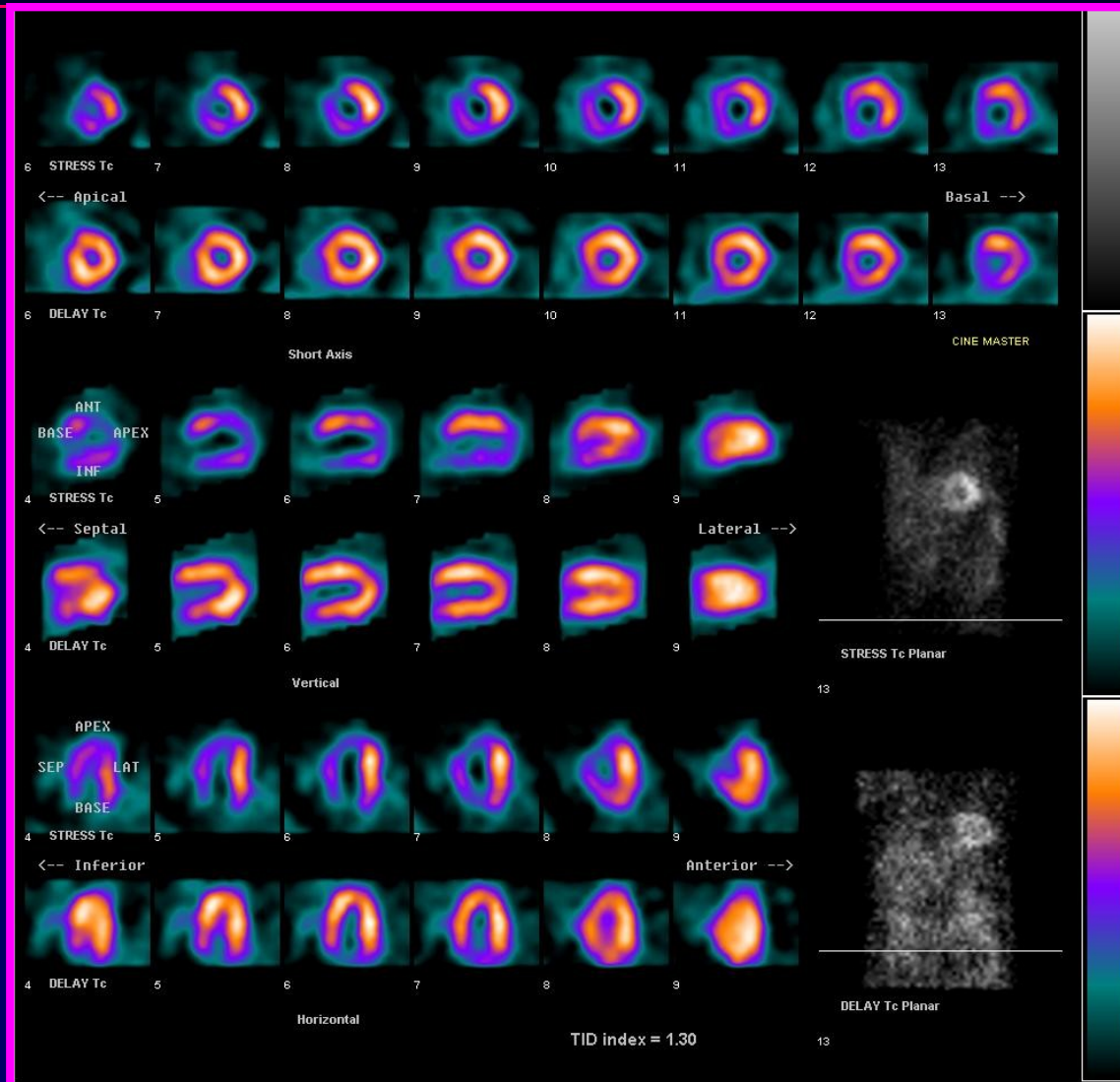
2) TAQUIARRITMIA AO ESFORÇO

L.J.S. feminino, 62 anos, dislipêmica, hipertensa, diabética
Há 6 meses queda da capacidade funcional, dispnéia com
aumento progressivo . Avaliação diagnóstica.



6º minuto de exercício.

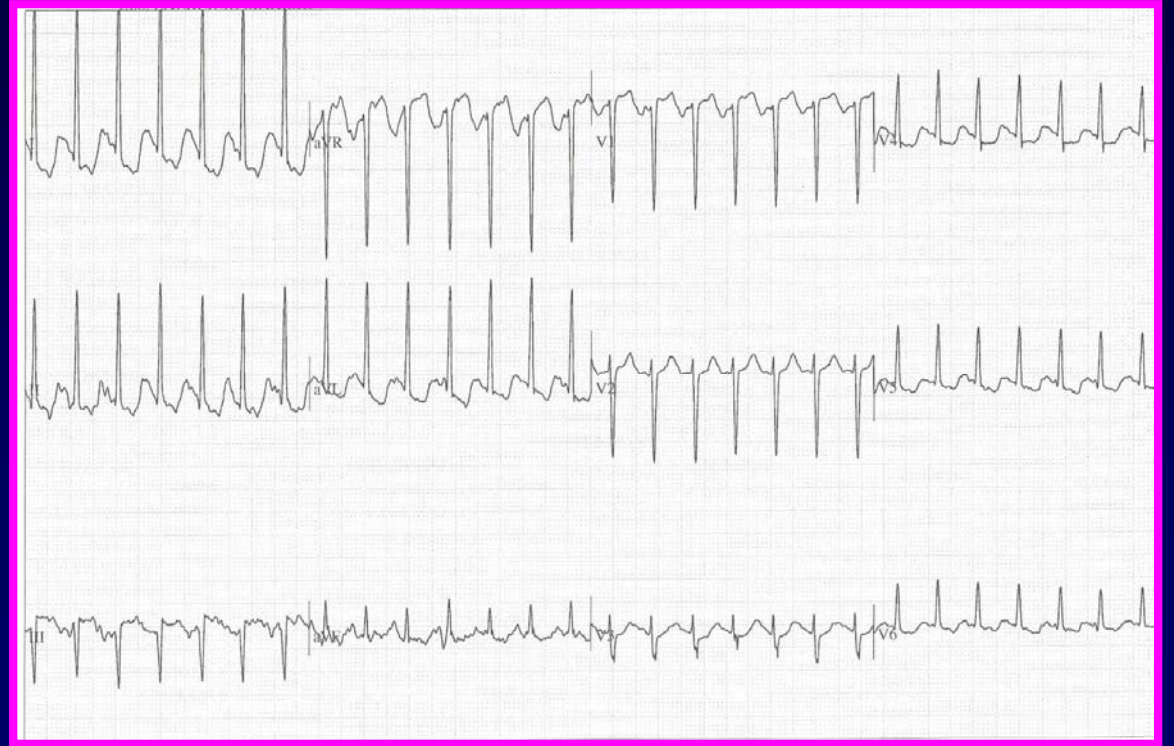
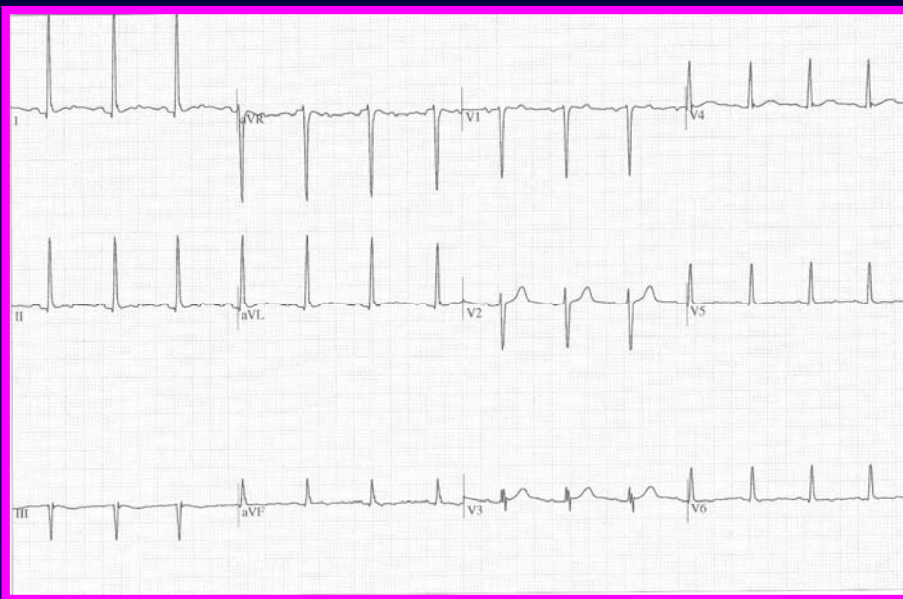
CINTILOGRAFIA MIOCÁRDICA (injeção MIBI -ARRITMIA)



3) BOA CAPACIDADE FUNCIONAL

M.E.R.O, FEMININO, 48 anos, dislipêmica, A. familiares +.
dor precordial.

Avaliação para corrida longa distância



CINTILOGRAFIA

