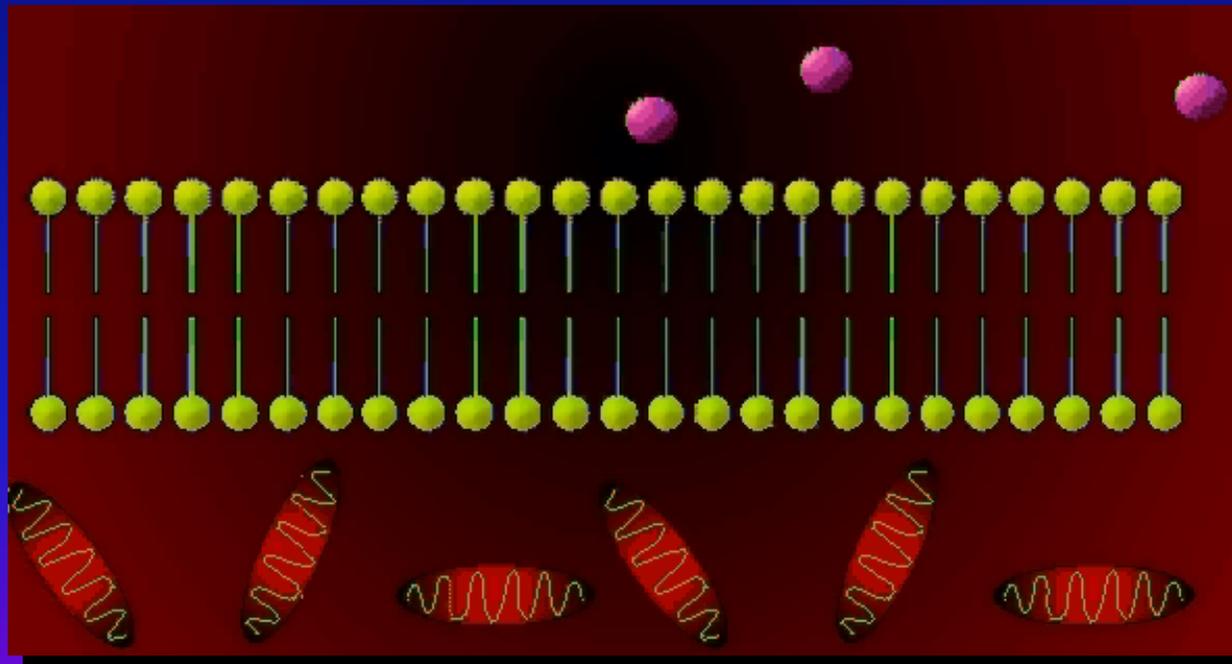


# *I Radiofarmaci:*

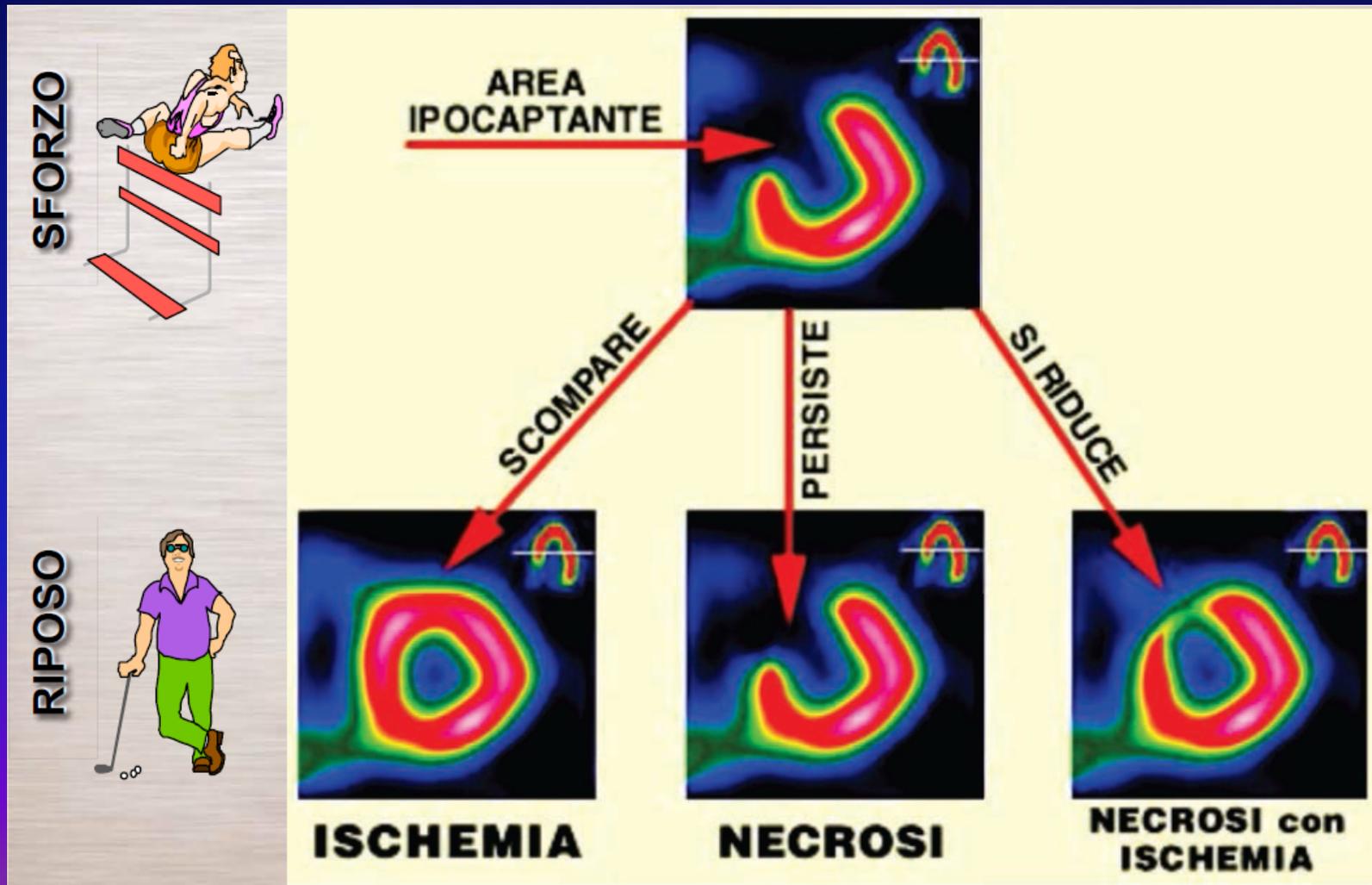
*$^{99m}\text{Tc}$ -sestamibi e  $^{99m}\text{Tc}$ -tetrofosmin*



# Miocardioscintigrafia

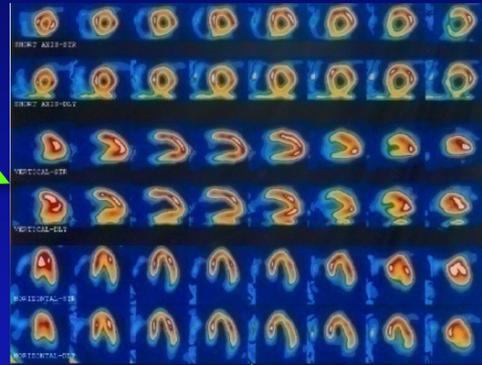
- *In tutti i pazienti vengono effettuati **due studi separati**:*
  - *uno in condizioni di **stress ergometrico o farmacologico**;*
  - *ed uno in condizioni **basali di riposo**.*
- *Dalle **immagini** derivanti dai due studi, poste a confronto, si ricavano le eventuali **differenze** e si pone, quindi, una **diagnosi**.*

# Il "razionale"

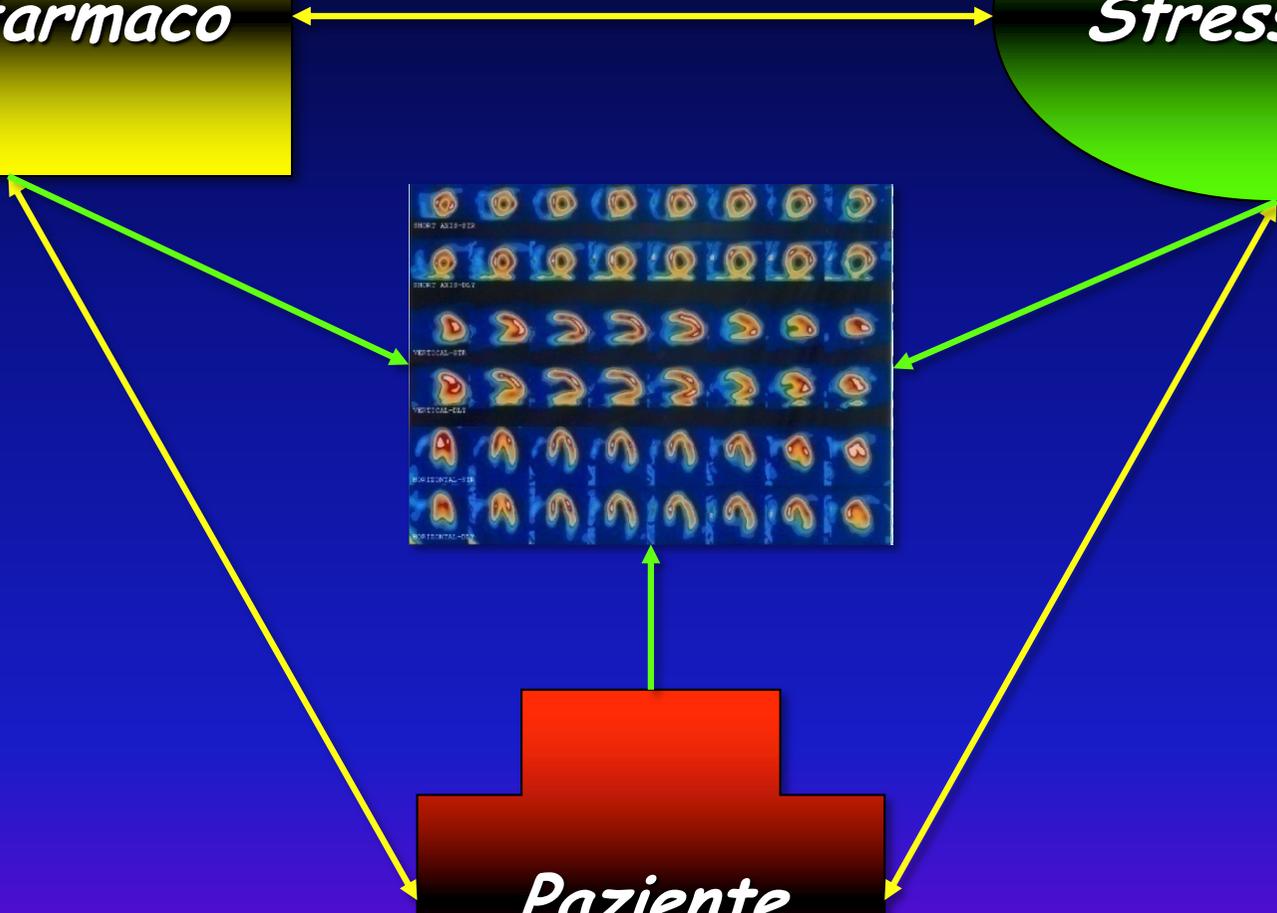


*Radiofarmaco*

*Stress-test*



*Paziente*



# Caratteristiche del paziente

*Influenzano:*

- *tipo e quantità di tracciante impiegato:*
  - *obesità;*
  - *Sesso;* } *[Watson, 1990; Garcia, 1990].*
- *patologie G.I. (reflusso o ernia);*
- *tipo di stress-test da applicare:*
  - *impedimento fisico all'esercizio (pazienti ortopedici, vasculopatici periferici, ecc...);*
  - *blocco di branca sinistra;*
  - *alcuni tipi di pace-maker;*
  - *controindicazioni alla esecuzione del test ergometrico (aritmie maggiori, ipertensione grave, stenosi aortica, cardiomiopatia ostruttiva ipertrofica, ecc...).*



# Gli stress tests

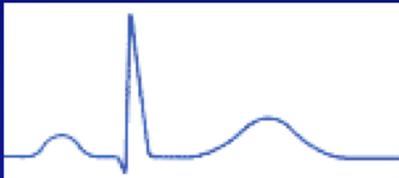
- *Esercizio dinamico*
- *Tests farmacologici*
  - *vasodilatatori*
  - *inotropi/cronotropi*
- *Cold pressor test*
- *Mental stress test*
- *Pacing atriale*



# Test Ergometrico: esecuzione (I)

## 1) Test al treadmill (tappeto rotante)

### Protocollo di Bruce

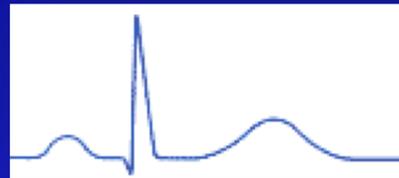


	<i>velocità</i>	<i>pendenza</i>
	<i>mph</i>	<i>%</i>
<i>Stadio 0</i>	<i>1.7</i>	<i>0</i>
<i>Stadio 1</i>	<i>1.7</i>	<i>10</i>
<i>Stadio 2</i>	<i>2.5</i>	<i>12</i>
<i>Stadio 3</i>	<i>3.4</i>	<i>14</i>
<i>Stadio 4</i>	<i>4.2</i>	<i>16</i>
<i>Stadio 5</i>	<i>5</i>	<i>18</i>



# *Test Ergometrico: esecuzione (II)*

## *2) Test al cicloergometro*



*Step di 25W o 30W*

*Incrementi ogni 2 o 3 minuti*



# Test ergometrico: protocolli

- *Quando iniettare il tracciante?*
  - *Dopo il raggiungimento della frequenza cardiaca target, almeno 85% della FC max teorica (220-età), oppure*
  - *evidenza di ischemia (sintomi e/o ECG).*
- *Il paziente dovrebbe continuare l'esercizio per 1-2 minuti dopo l'iniezione (in relazione al tracciante usato).*
- *Se è necessario interrompere l'esercizio per effetti avversi e/o alterazioni emodinamiche, la decisione di iniettare o meno dipende dal giudizio clinico.*

# *Test ergometrico: vantaggi*

- *Maggiormente fisiologico.*
- *Informazioni aggiuntive:*
  - *capacità funzionale;*
  - *emodinamica (risposta pressoria, modulazione cronotropa, ecc...).*
- *Aritmie.*
- *Sintomi.*

# *Test ergometrico: limitazioni*

- *Scarsa motivazione, affaticamento.*
- *Vasculopatie periferiche (claudicatio).*
- *Atrosi, limitazioni ortopediche.*
- *BPCO.*
- *Vasculopatie cerebrali.*
- *Parkinson o altre condizioni neurologiche.*
- *Fase precoce del post-infarto (5-7 giorni).*

# Stress farmacologico

- **VASODILATATORI**
  - **adenosina** (Strauss et al Am J Cardiol 39: 403-406; 1977)
  - **dipiridamolo** (Gould KL Am J Cardiol 33: 87-94; 1978)
- **CRONOTROPI - INOTROPI POSITIVI**
  - **dobutamina** (Mason et al Am Heart J 107: 481-485; 1984)

# Modalità di esecuzione dei tests farmacologici: i vasodilatatori

dipiridamolo  
0.56 (o 0.70) mg/kg



adenosina  
70 µg/kg/min



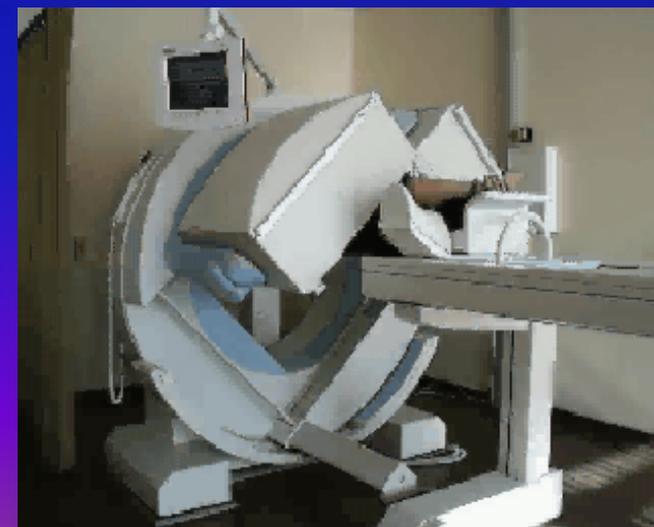
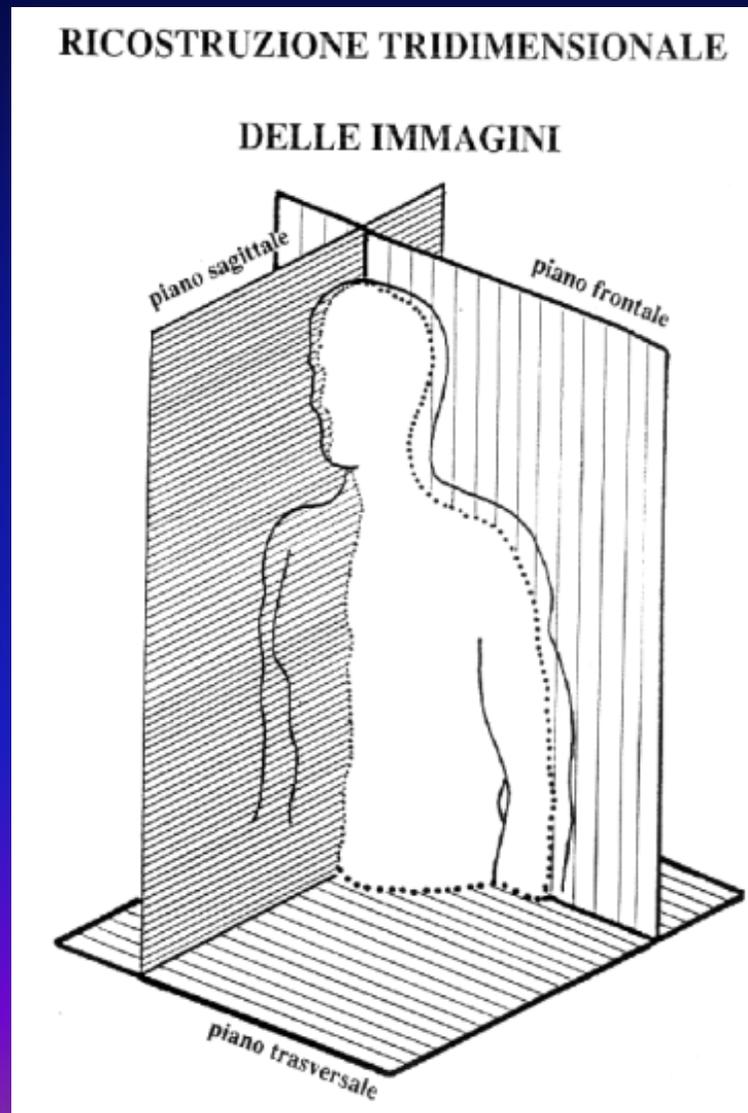
# Complicanze dei tests

	<i>Esercizio</i>	<i>Dipiridamolo (73806 pts)</i>	<i>Adenosina (9256 pts)</i>	<i>Dobutamina (3011 pts)</i>
<i>Morte</i>	<i>1/20000</i>	<i>1/10000</i>	<i>0</i>	<i>0</i>
<i>Infarto</i>	<i>1/3000</i>	<i>1/5000</i>	<i>1/10000</i>	<i>1/3000</i>
<i>TV/FV</i>	<i>1/2000</i>	<i>1/10000</i>	<i>1/10000</i>	<i>1/700</i>
<i>Broncospasmo</i>		<i>1/10000</i>	<i>1/1000</i>	
<i>TIA/ACV</i>		<i>1/10000</i>		
<i>BAV II</i>			<i>1/20</i>	
<i>BAV III</i>			<i>1/100</i>	
		<i>Lette 1995</i>	<i>Cerqueira 1994</i>	<i>Marwick 1997</i>

# *Modalità di acquisizione dello studio miocardioscintigrafico*

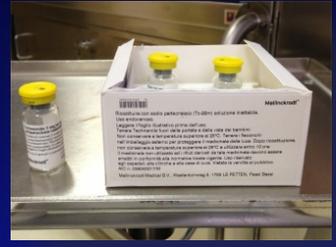
- *L'acquisizione delle immagini avviene in modalità tomografica (SPECT).*
- *Nella **SPECT** (tomografia computerizzata ad emissione di singolo fotone) la/le teste della gamma camera ruotano intorno all'asse maggiore del paziente assumendo posizioni ad angoli fissi.*
- *Tale modalità consente una **ricostruzione tridimensionale del ventricolo sinistro** con ottenimento delle sezioni asse corto, asse lungo orizzontale ed asse lungo verticale.*

# Acquisizione immagini SPECT

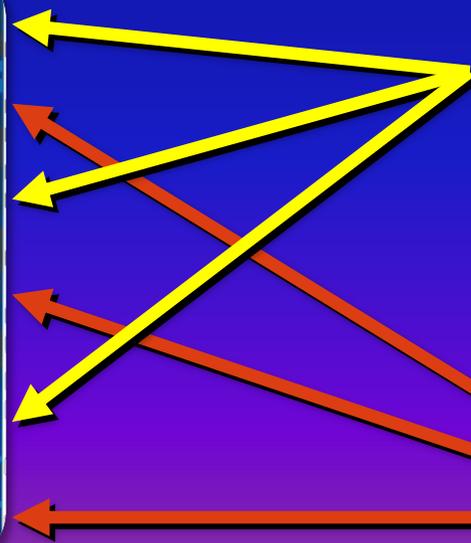
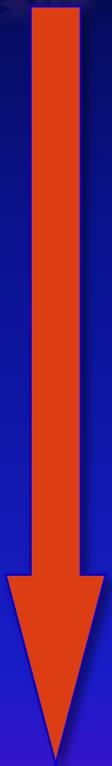
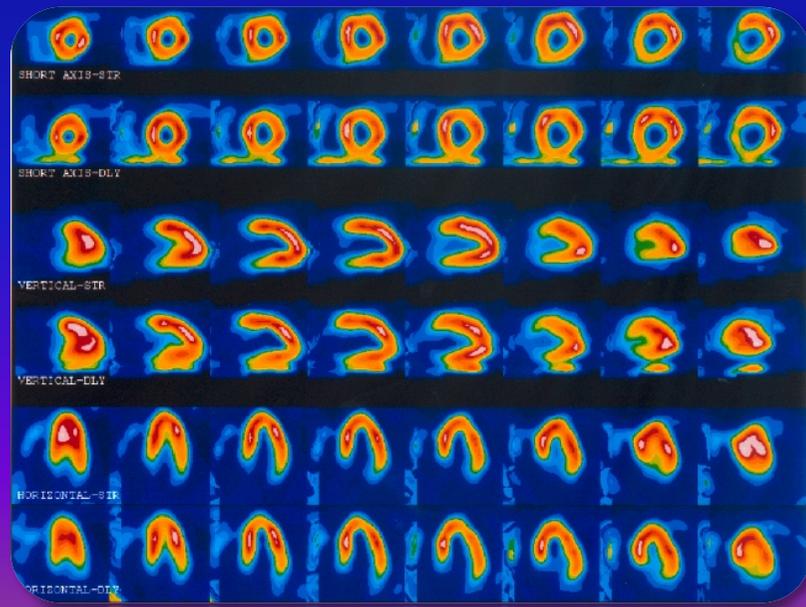
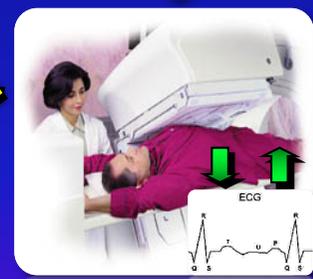
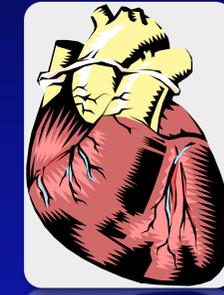
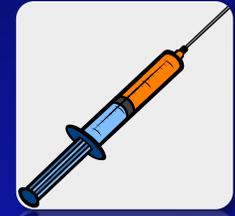
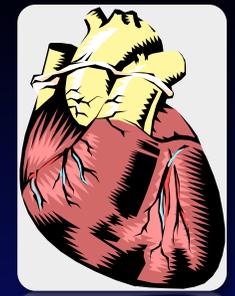
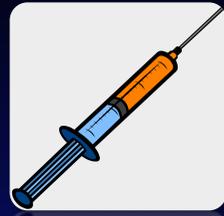


# Diagnostica per Immagini - Medicina Nucleare

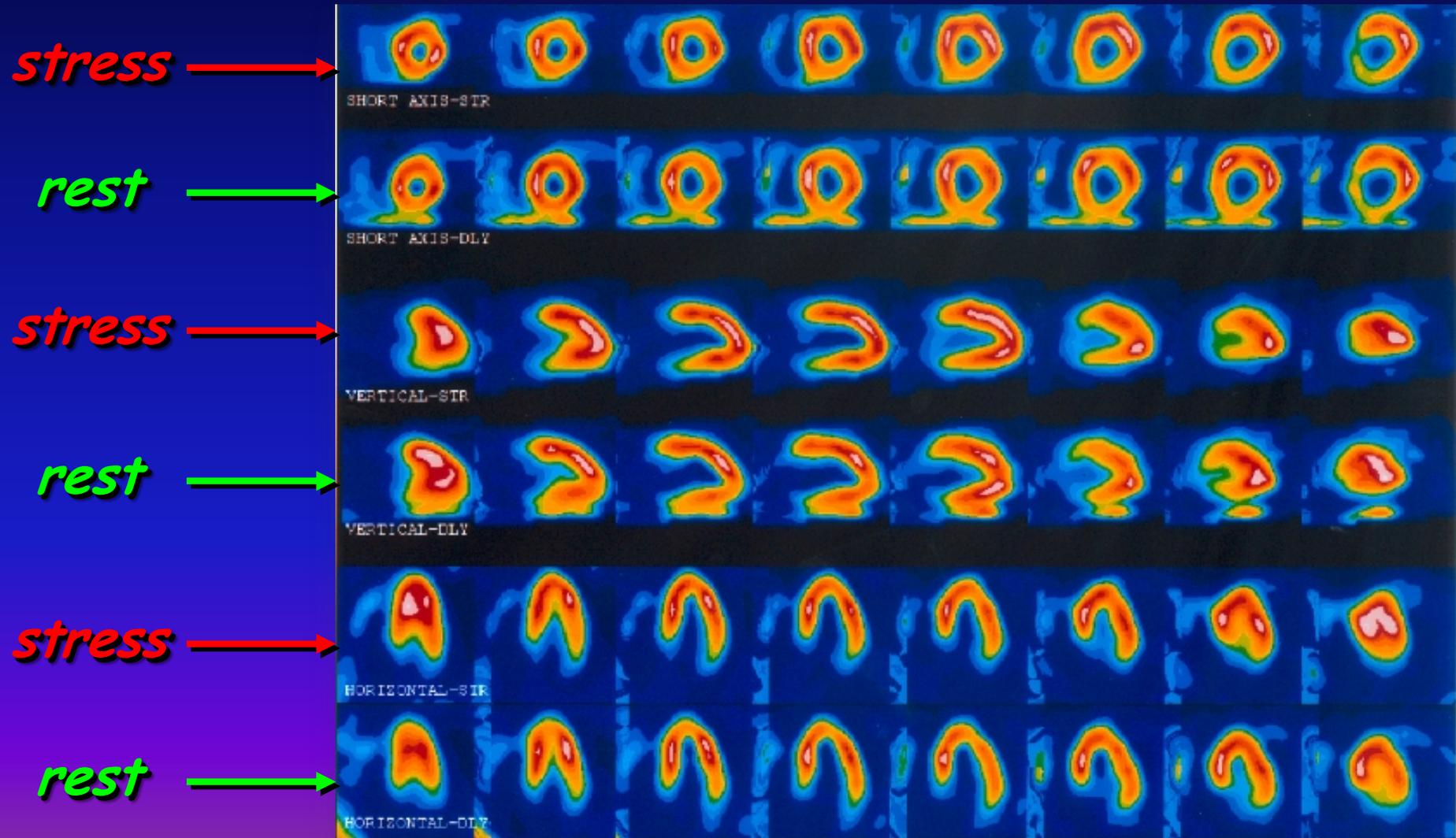
1° giorno



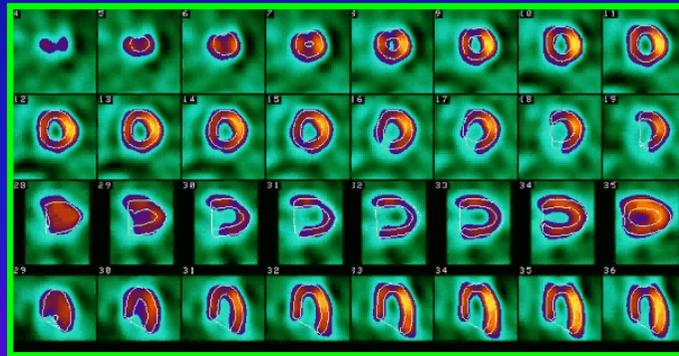
2° giorno



# *SPECT miocardica con $^{99m}\text{Tc}$ -sestamibi (quadro normale)*

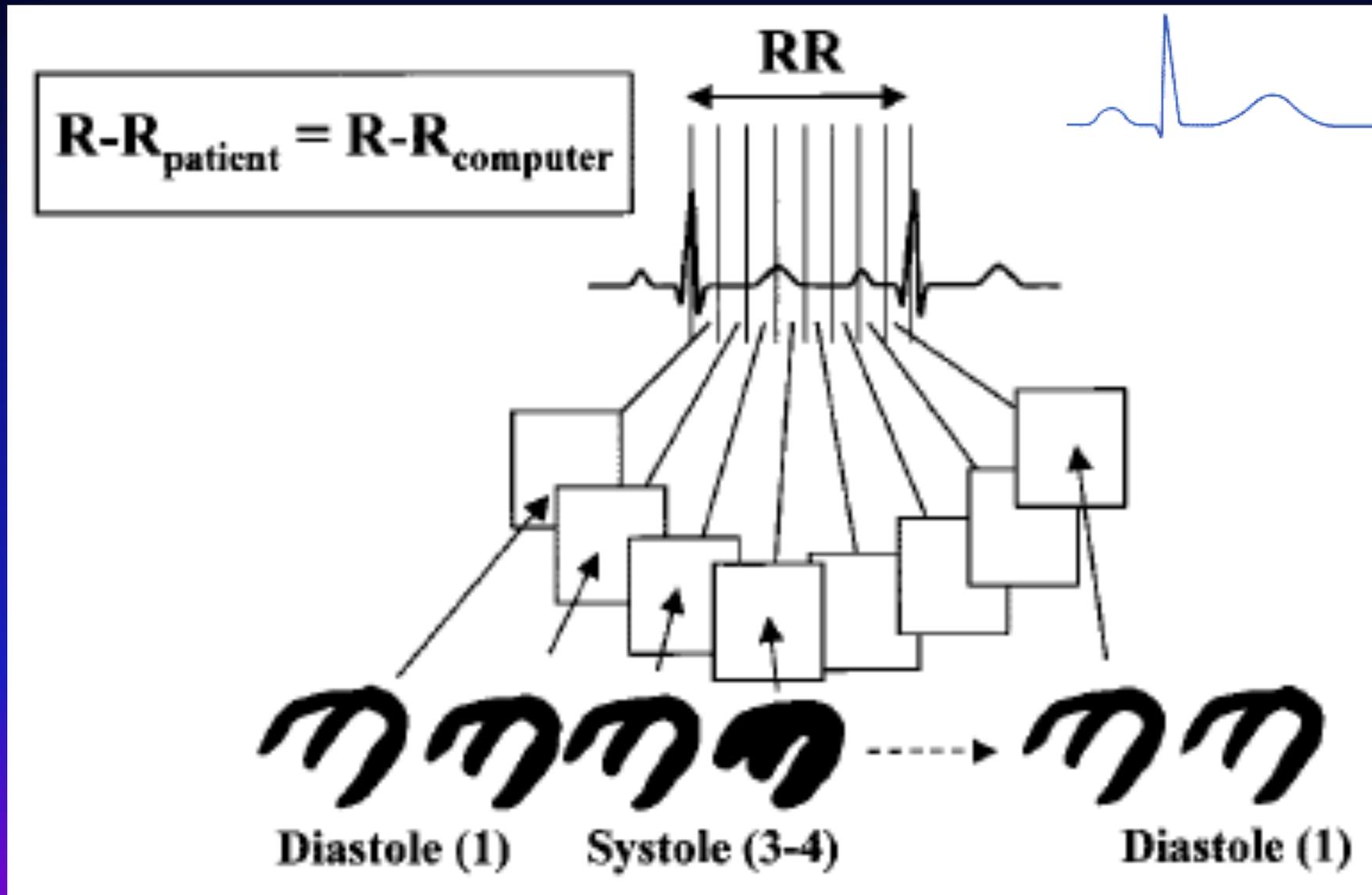


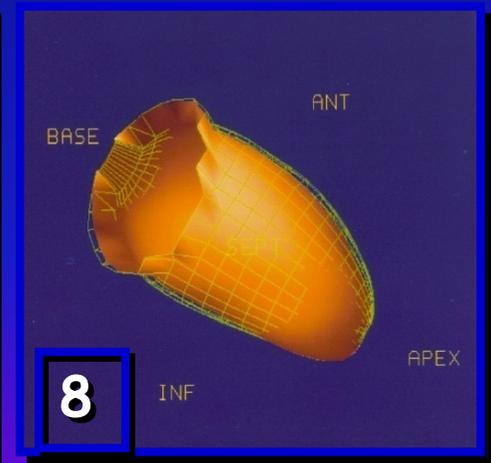
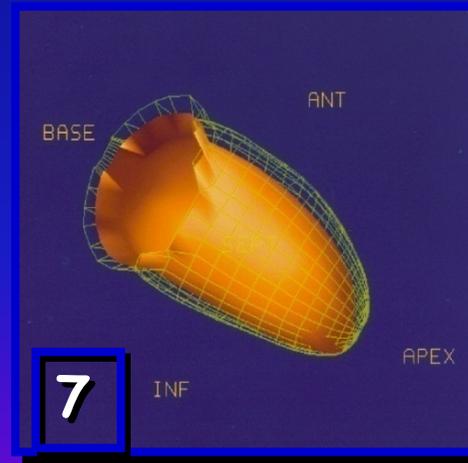
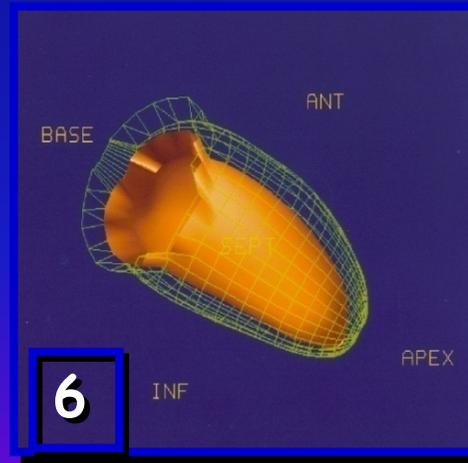
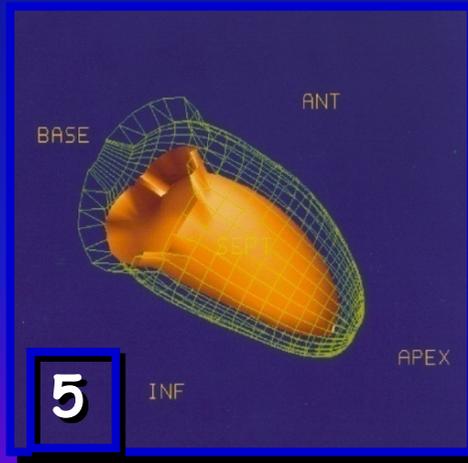
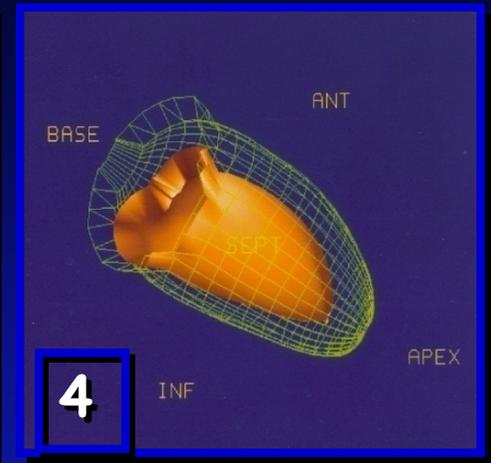
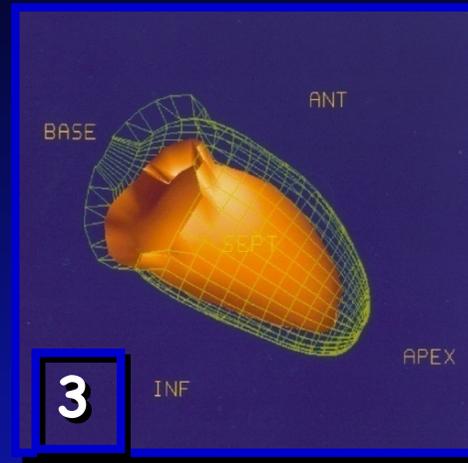
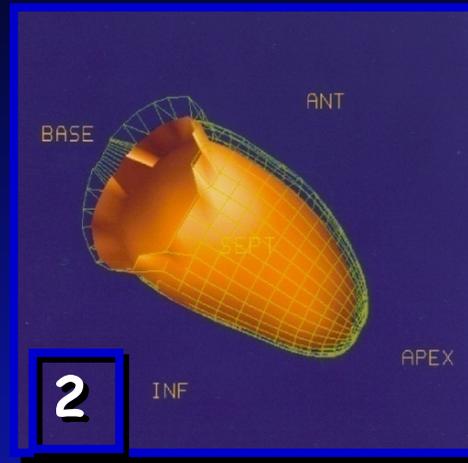
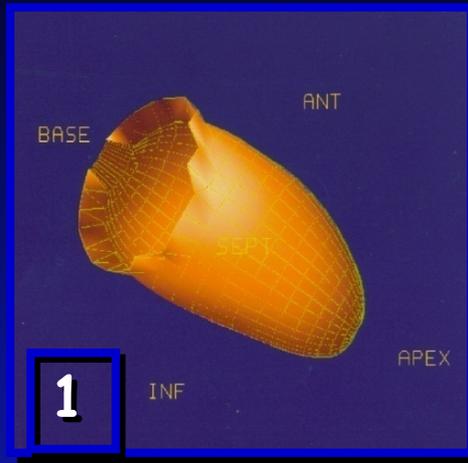
# La gated-SPECT



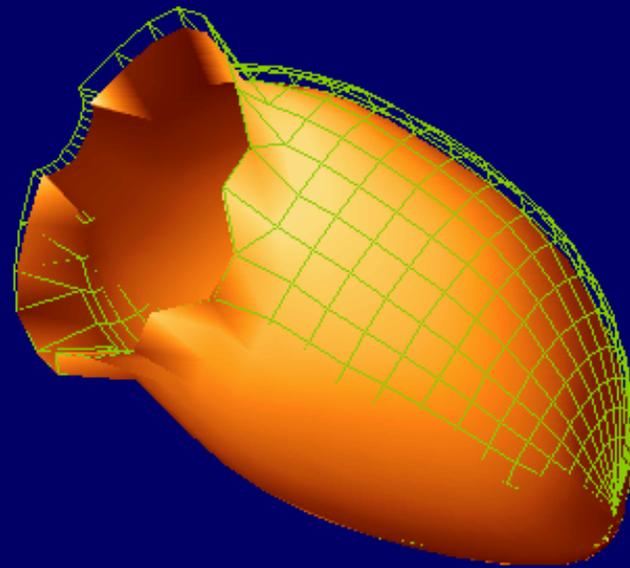
# La gated-SPECT

- *Tecnica scintigrafica che consente di ottenere, con una singola iniezione di tracciante, immagini della perfusione miocardica e della funzione del ventricolo sinistro in pazienti in ritmo sinusale.*
- *Essa prevede l'acquisizione delle immagini tomografiche in modo sincronizzato all'elettrocardiogramma (ECG).*





QGS: non-diagnostic



# *Indicazioni cliniche*

# Concetti generali

- La scintigrafia miocardica di perfusione **NON** è un'indagine cosiddetta di "I livello".
- Il paziente con sospetta cardiopatia ischemica **DEVE** eseguire in prima istanza un test da sforzo.
- Se questo risulta **negativo**, generalmente non si procede nell'iter diagnostico.
- Se questo risulta **positivo** per segni ECG e sintomi, solitamente si procede verso **test invasivi** quali la coronarografia.

# Concetti generali

- *Se, infine, il test risulta "dubbio" o il paziente non è in grado di esservi sottoposto, si procede alla effettuazione di un test diagnostico di II livello quale:*
  - *la scintigrafia miocardica di perfusione stress/rest;*
  - *l'ecocardiografia con stress farmacologico;*
  - *la risonanza magnetica con stress farmacologico;*
  - *l'angio-TC dell'arteria coronaria;*

**funzione**

**anatomia**

APPROPRIATE USE CRITERIA

**ACCF/ASNC/ACR/AHA/ASE/SCCT/SCMR/SNM 2009**  
**Appropriate Use Criteria for Cardiac Radionuclide Imaging**

A Report of the American College of Cardiology Foundation Appropriate Use Criteria Task Force, the American Society of Nuclear Cardiology, the American College of Radiology, the American Heart Association, the American Society of Echocardiography, the Society of Cardiovascular Computed Tomography, the Society for Cardiovascular Magnetic Resonance, and the Society of Nuclear Medicine

Endorsed by the American College of Emergency Physicians

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**Abstract**

The American College of Cardiology Foundation (ACCF), along with key specialty and subspecialty societies, conducted an appropriate use review of common clinical scenarios where cardiac radionuclide imaging (RNI) is frequently considered. This document is a revision of the original Single-Photon Emission Computed Tomography Myocardial Perfusion Imaging (SPECT MPI) Appropriateness Criteria (1), published 4 years earlier, written to reflect changes in test utilization and new clinical data, and to clarify RNI use where omissions or lack of clarity existed in the original criteria. This is in keeping with the commitment to revise and refine appropriate use criteria (AUC) on a frequent basis.

The indications for this review were drawn from common applications or anticipated uses, as well as from current clinical practice guidelines. Sixty-seven clinical scenarios were developed by a writing group and scored by a separate technical panel on a scale of 1 to 9 to designate appropriate use, inappropriate use, or uncertain use.

In general, use of cardiac RNI for diagnosis and risk assessment in intermediate- and high-risk patients with coronary artery disease (CAD) was viewed favorably, while testing in low-risk patients, routine repeat testing, and general screening in certain clinical scenarios were viewed less favorably. Additionally, use for perioperative testing was found to be inappropriate except for high selected groups of patients. It is anticipated that these results will have a significant impact on physician decision making, test performance, and reimbursement policy, and will help guide future research.

**Preface**

In an effort to respond to the need for the rational use of imaging services in the delivery of high quality care, the ACCF has undertaken a process to determine the appro-

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A) **Diagnosi** di malattia coronarica in pazienti selezionati:

- probabilità pre-test intermedia;
- pazienti a rischio "relativo";
- DD dolore toracico in PS.

B) Contributo alla **stratificazione prognostica** in pazienti con pregresso infarto (ricerca di ischemia residua).

C) Valutazione **pre e post rivascolarizzazione**

- a) PTCA (angioplastica coronarica);
- b) CABG (by-pass coronarici);
- c) trombolisi.

D) Valutazione (integrata con la coronarografia) di pazienti con **malattia coronarica già accertata**.

E) Valutazione di efficacia della **terapia coronaroattiva**.

**A) Diagnosi di malattia coronarica in pazienti selezionati:**

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