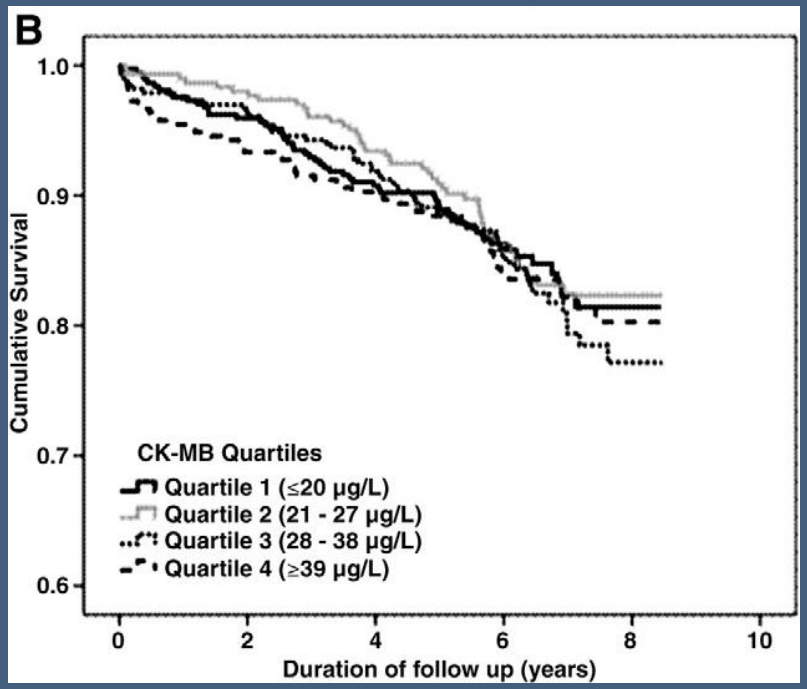
Exercise after CABG: The Good

~~The Bad and the Ugly~~

Ph Meurin. Les Grands Prés (Villeneuve Saint Denis)

No conflict of Interest

After CABG, the Prognosis is Good.....



Age	65 ± 10
Male Gender	80 %
Pre-op LVEF	60 ± 15 %
Pre-op MI	35 %
Diabetes	15-20 %
Hypertension	40 %
BMI	26

..... Which implies that life must be as normal as possible

Lund Soraas. Am Heart J 2012; Sellier P. Eur Heart J 2003;24:916-26

What Kind of Exercise are We Talking About ?

- Exercise Tests
- Cardiac Rehabilitation
- Exercise and Sports in the long term

Exercise Tests after CABG

1-To begin a cardiac rehabilitation Program:

2-To end a Cardiac Rehabilitation program

3-For follow-up in asymptomatic patient

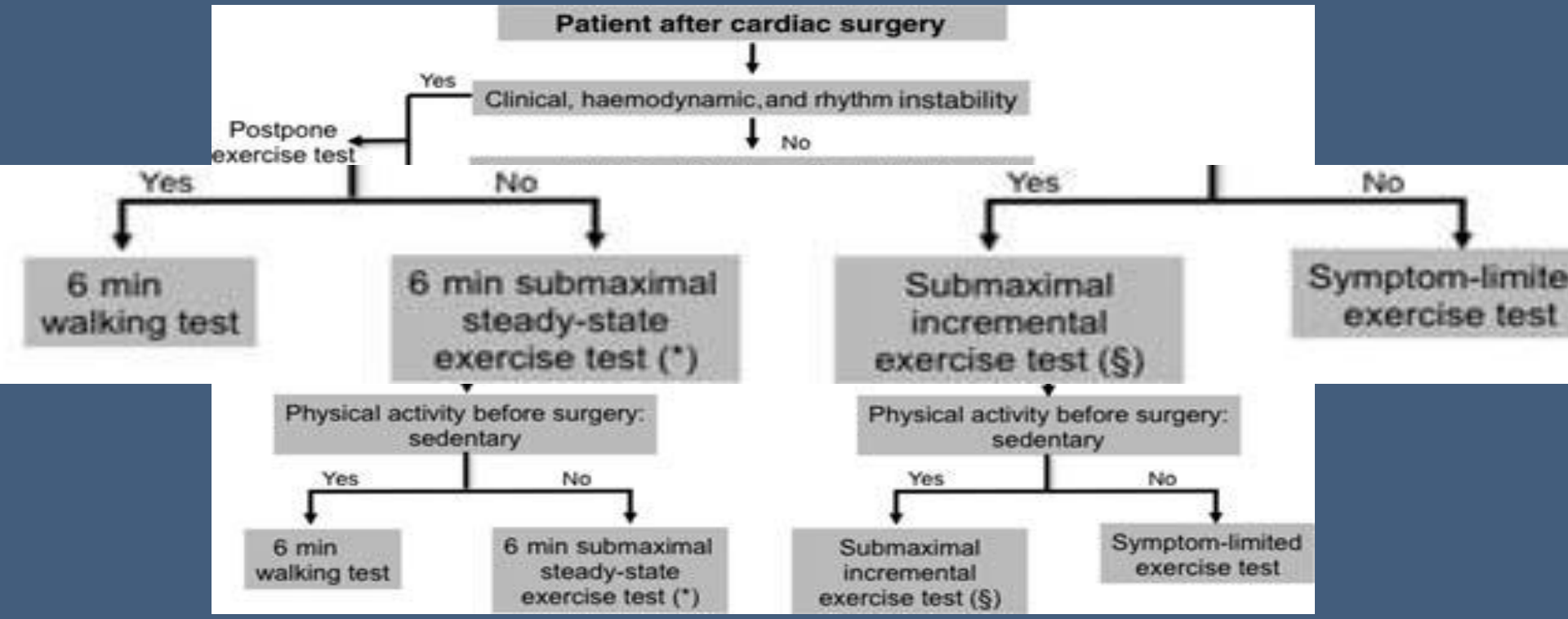
- **Every year for competitive sport[2,3]**
- **In every asymptomatic patient ?**

1- Sellier P et al. Eur Herat J 2003;24:916-26 ; 2-Douard H et al. Avis d'experts: coronaropathies et activités sportives. SFC Aout 2011 ; 3-Borjesson M et al.ESC study Group of Sports Cardiology. Eur J Cardiovasc Prev and Rehab 2006

1- Exercise Test at the Beginning of a Cardiac Rehabilitation Program: Moderate Intensity

-As of post-op Day 10 (sub-maximal)[1]

-To check the good tolerance of a moderate-medium intensity exercise, and to prescribe exercise training sessions



1- Référentiel des bonnes pratiques de la réadaptation cardiaque de l'adulte. SFC; 2- Piepoli M et al. Secondary prevention through cardiac rehabilitation: physical activity counselling and exercise training. Eur Heart J 2010.31:1967-76

2- Exercise Test Performed at the End of a Cardiac Rehabilitation Program: Should be Exhausting

- **Prognostication**

  - Rythm, blood pressure, ischemia, heart rate…
- **Return to work**
- **Relieve the patient from his anxiety**

  - Daily life, sexuality…

3-Exercise Test for Follow up in Asymptomatic Patients

Table 40 Strategies for follow-up and management in asymptomatic patients after myocardial revascularization

	Class[a]	Level[b]	Ref.[c]
Stress imaging (stress echo or MPS) should be used rather than stress ECG.	I	A	12, 269
Early imaging testing should be considered in specific patient subsets.[d]	IIa	C	—
Routine stress testing may be considered ≥2 years after PCI and ≥5 years after CABG.	IIb	C	—

 # all patients after CABG

Guidelines ESC on myocardial revascularization. Eur Heart J 2010.

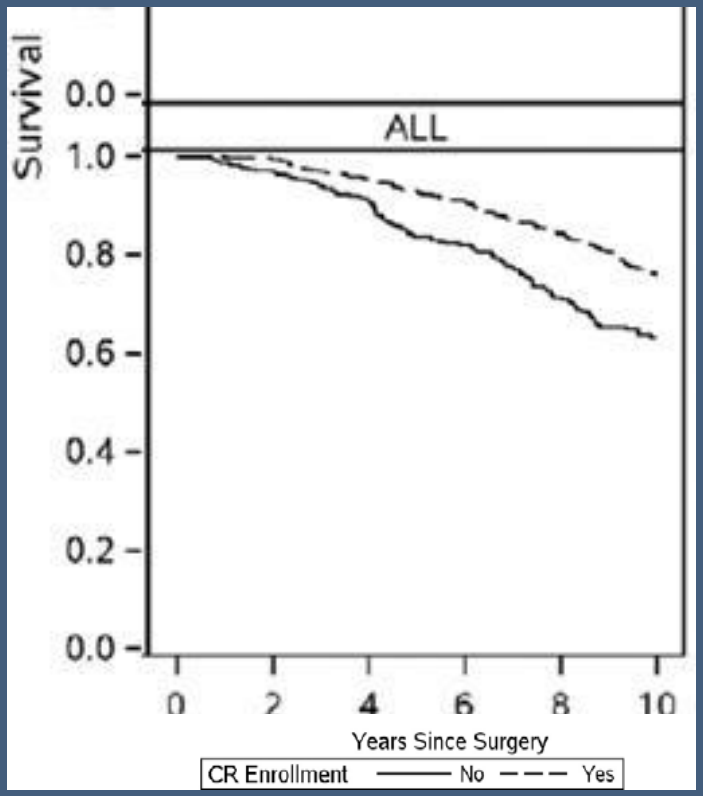
Exercise Training as a Component of a Cardiac Rehabilitation Program

Questions: Is cardiac rehabilitation after CABG

- **Safe?**
  - **1 evt / 50 000 Pt/h d'exercice**
  - **1 arrêt cardiaque pour 1,3 million Pt/h[1]**
- **Effective ?**

(1) Pavy et al. Arch Intern Med. 2006;166:2329-2334

Participation in cardiac rehabilitation and survival after CABG (Mayo Clinic).



846 consécutive patients
- 69% referred to CR:
- Beginning at post-op day 10
- 14 sessions/pt

10-year relative risk reduction in all cause Mortality of 46%:
- Rehabilited: 20%
- Non rehab: 45%
- (after matching: 27 vs 43%)

Pack Q, Goel K, Lennon R, Lahr B et al. Circulation. 2013;128:590-97

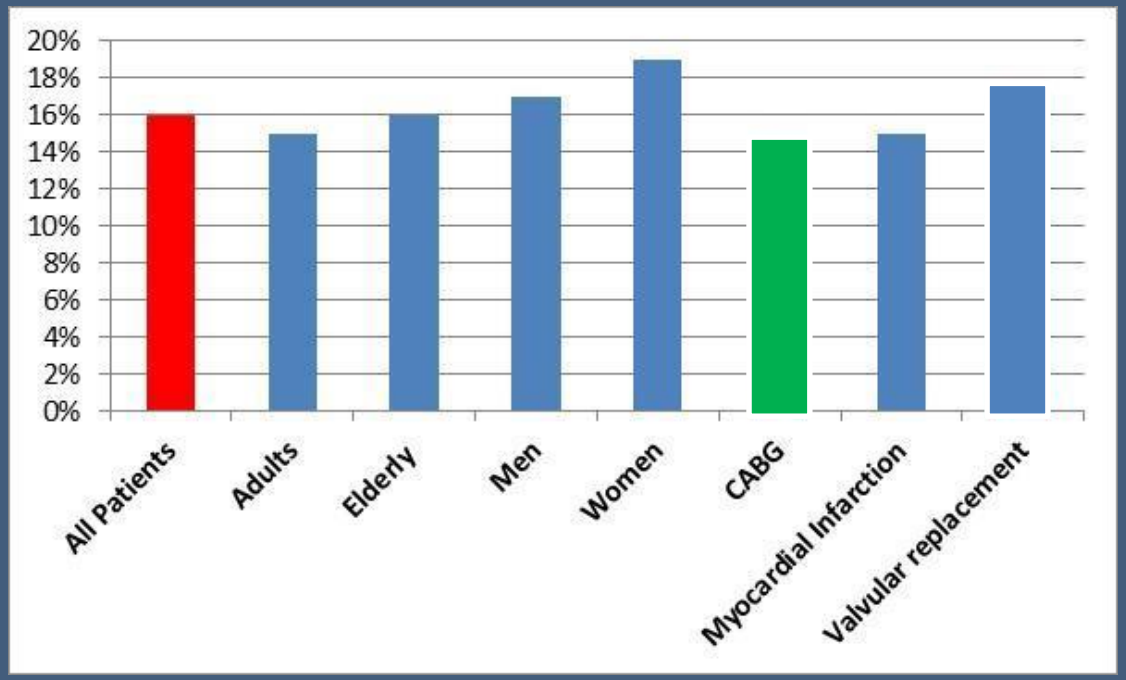
Cardiac Rehabilitation is recommended for all patients after CABG (class IA in Europe and in the USA[1,2]), with the referral ideally performed early postoperatively .

For instance: for Medicare beneficiaries, patients are covered for up to 36 sessions of CR over the course of 1 year after CABG[1]

1- Secondary prevention after CABG. A scientific statement from the AHA. Circulation 2015; 131:927-64 ; 2- Secondfary prevention through cardiac rehabilitation. Key components of the position paper from the Cardiac Rehabilitation Section of the European Association of Cardiovascular Prevention and Rehabilitation.

Regarding Peak VO2 improvement, Exercise Training is as effective After CABG as in other Cardiac Diseases

% Peak VO2 Increase



1- Temfeno A et al. Cardiol J 2011;18:632-38 ; 2-Vanhees L. Eur J Prev Rehab 2004;11:304-12

Predictive factors for exercise capacity improvement

- **Frequency and intensity of the sessions**
  - **(No pain no gain) .**
- **Baseline exercise capacity**
  - **(The lower at baseline, the easier to improve) .**

- **Age and gender ? No consensus**
- **Atrial Fibrillation : No**
- **Cardiac Disease: No**

1- Temfeno A et al. Cardiol J 2011;18:632-38. Vanhees L. Eur J Prev Rehab 2004;11:304-12; 2-Meurin P, Iliou MC, Bendriss A. Chest 2005;128:1638-44 ; 3-Gohlke-Barwolf C et al. J Heart valve Dis 1992

Sternal Precautions ?

Sternal Risk Factors:

- Obesity, COPD, Diabetes,
- Double Internal Mammary, Smoking
- Large Breast…

Recommendations are different according to the surgical center

Table 1. Comparison of Select Sternal Precautions by Health Care Providers

Activity	OhioHealth[1]	The Ohio State Medical Center[2]	Cleveland Clinic[3]
Shoulder Movement	Do not raise your elbows higher than your shoulders	You may move your arms within a pain free range	It is okay to perform activities above shoulder level
Lifting	Do not lift greater than 5 to 10 pounds with your affected arm (for 4 weeks)	Do not lift more than 10 pounds for the 6 weeks after your surgery	Do not lift objects greater than 20 pounds for first 6-8 weeks following surgery
Reaching	Do not reach behind you when dressing your upper body	Avoid reaching backwards	Not mentioned

[1]http://www.ohiohealth.com/documents/orb/Sternal%20precautions.pdf
[2]http://medicalcenter.osu.edu/PatientEd/Materials/PDFDocs/surgery/activity-after-chest- surgery.pdf
[3]http://my.clevelandclinic.org/heart/disorders/recovery_ohs.aspx

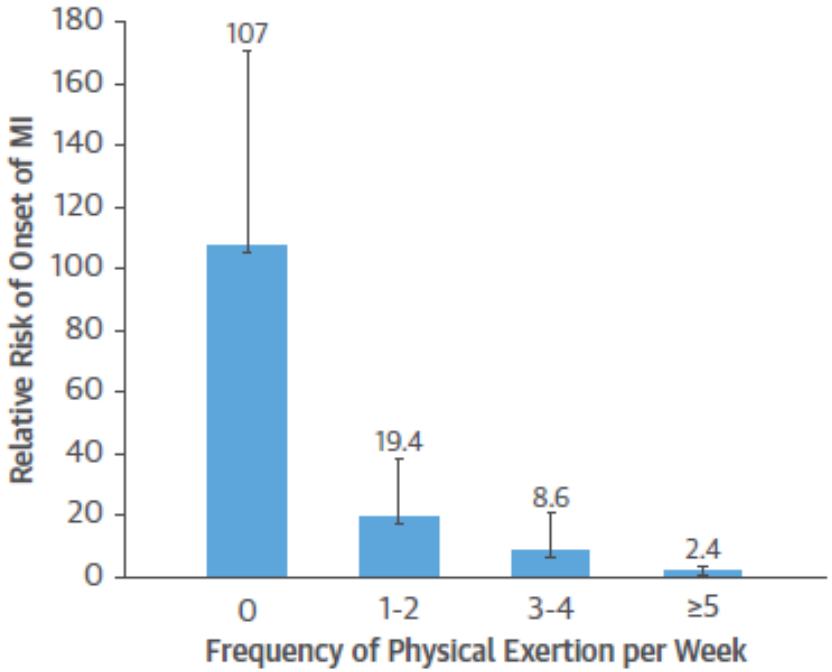
Cough and sneeze exert a quite high force on the sternum (equivalent to a moderate intensity bench press resistant exercise)

1- Cahalin l. Cardiopulm Phys Ther J 2011 ; 2-Adams J. Am J Cardiol 2014.

Long term Exercise Training and Sport after CABG

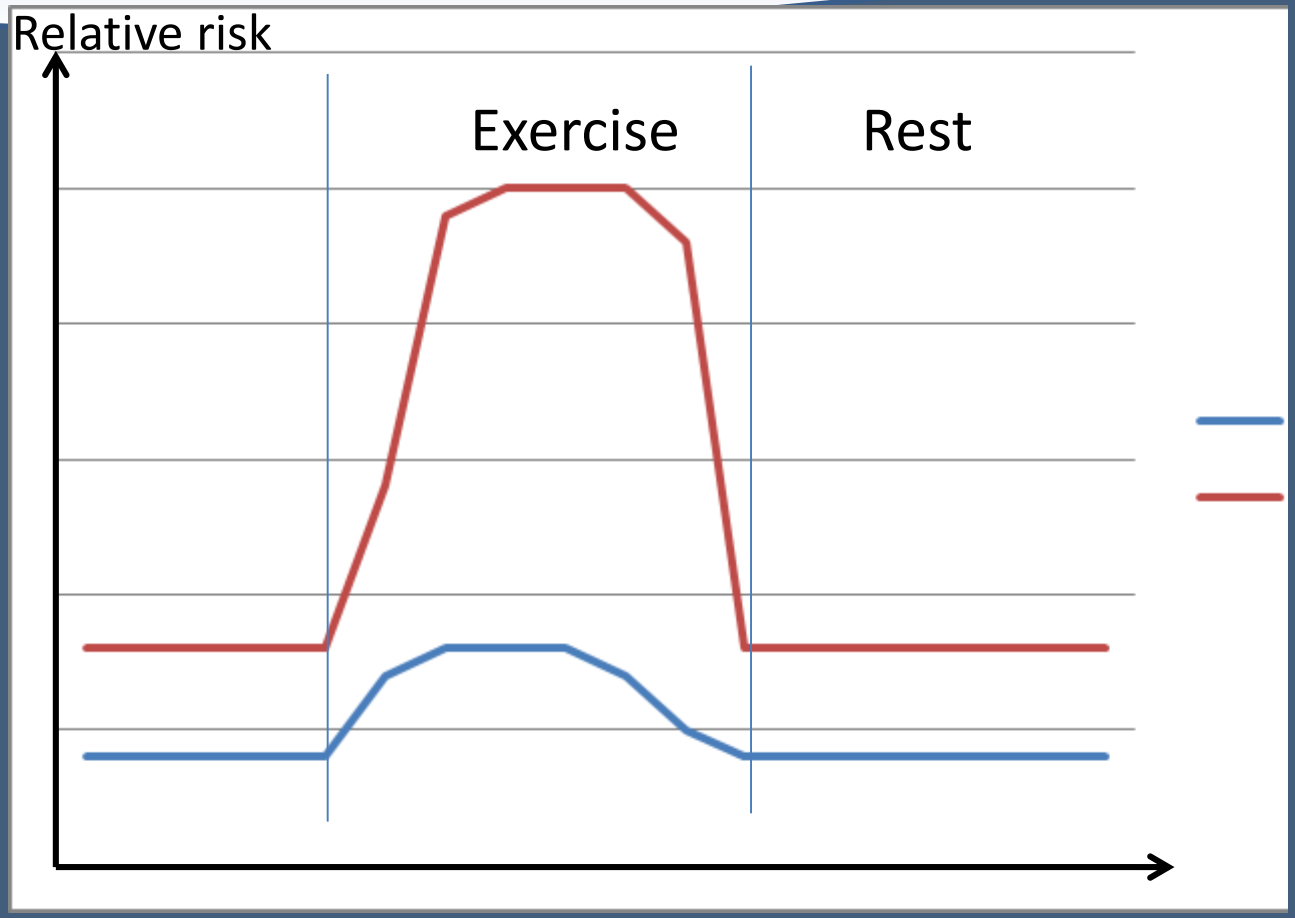
Myocardial Infarctions due to Exercise ....

FIGURE 3 The Greater the Frequency of Weekly Exertion, the Greater the Reduction in Relative Risk of MI



Chugh S. JACC 2015;65:493-501

Cardiac Risk According to Fitness



Chugh S. JACC 2015;65:493-501

Cardiac Risk Classification for Exercise Training

- Class A: Healthy individuals
- Class B: stable low risk cardiac patients
- Class C: moderate to high risk for cardiac complications
- Class D: Unstable disease

Exercise Standards for Testing and Training. A Scientific Statement from the AHA. Circulation 2013;128:873-934

Risk Classification for Exercise training

This classification includes individuals with any of the following diagnoses:

1. CAD (MI, coronary artery bypass graft, percutaneous transluminal coronary angioplasty, angina pectoris, abnormal exercise test, and abnormal coronary angiograms); includes patients whose condition is stable and who have the clinical characteristics outlined below

3. Congenital heart disease; risk stratification for patients with congenital heart disease should be guided by the 27th Bethesda Conference recommendations[145]
4. Cardiomyopathy: ejection fraction ≤30%; includes stable patients with heart failure with clinical characteristics as outlined below but not HCM or recent myocarditis
5. Exercise test abnormalities that do not meet any of the high-risk criteria outlined in Class C (Table 5)

Exercise Standards for Testing and Training. A Scientific Statement from the AHA. Circulation 2013;128:873-934.

Risk Assessment in Classes B or C

Clinical characteristics (must include all of the following):

1. New York Heart Association class I or II
2. Exercise capacity >6 METs
3. No evidence of heart failure
4. No evidence of myocardial ischemia or angina at rest or on the exercise test at or below 6 METs
5. Appropriate rise in systolic blood pressure during exercise
6. Absence of sustained or nonsustained VT at rest or with exercise
7. Ability to satisfactorily self-monitor intensity of activity

Yes: Class B: Low Risk

Exercise Training ?
Competition ?

No: Class C: Moderate to High Risk

Exercise Training ?
Competition ?

Exercise Standards for Testing and Training. A Scientific Statement from the AHA. Circulation 2013;128:873-934.

Cardiac Risk Classification for Exercise Training

Class B: stable low risk

Class C: moderate to high risk :

Medical Supervision during initial prescription session is required (= Exercise Test)

Supervision by non medical personnel until the patient understands how to monitor his activity

Supervision: medical supervision during all exercise sessions until safety is established

Electrocardiographic and BP monitoring during all exercise sessions until safety is established

Competitive Athletes: a Very Recent Update

AHA/ACC Scientific Statement: Eligibility and Disqualification Recommendations for Competitive Athletes with Cardiovascular Abnormalities:

Task Force 8: Coronary Artery Disease

J Am Coll Cardiol 2015, December 1;21:2406-11

Evaluation-Information

- **CLASS I Recommendation: Evaluation**

  - Maximal Exercise Testing with all treatments

  - LVEF evaluation

- **Class I Recommendation: Decision**

  Adults patients should participate in the decision wether the health and psychological benefits of exercise for them outweigh the risk

- **Class I Recommendation: Treatment**

  High intensity statin therapy

Decision

Class IIb C

- « It is reasonable to **prohibit patients from competitive sport participation for at least 3 months** after an AMI or coronary revascularization procedure »
- « It is reasonable for patients with clinically manifest CAD to **participate in all competitive activities** if their resting LVEF is > 50%, they are asymptomatic, and they have no inducible ischemia or electrical instability. »

Conclusion

- Exercise training is beneficial in all stable CAD patients
- Competitive Sport prohibition should be reconsiderred in many cases
- Exercise tests in asymptomatic patients: when and for whom ?