Ischemic Conditioning Focus Group

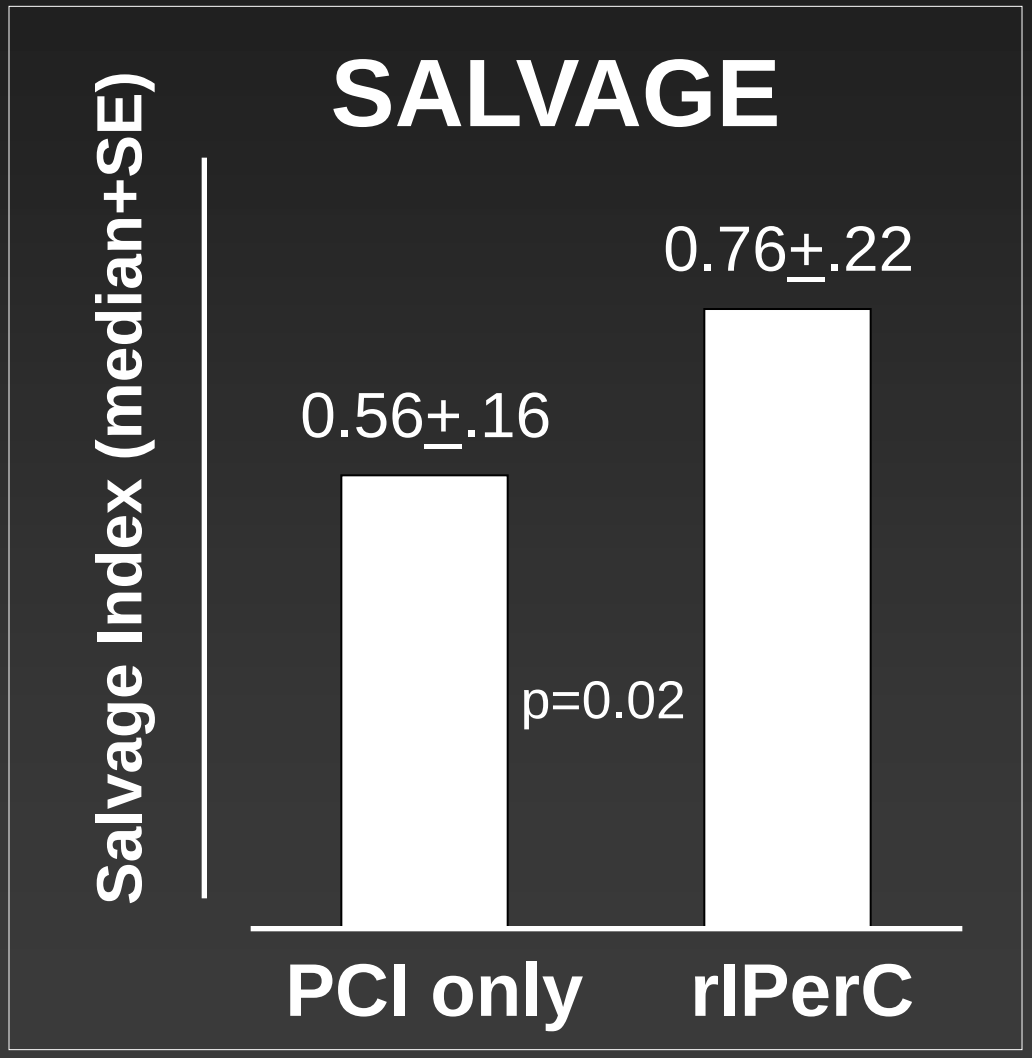
AHA 2011

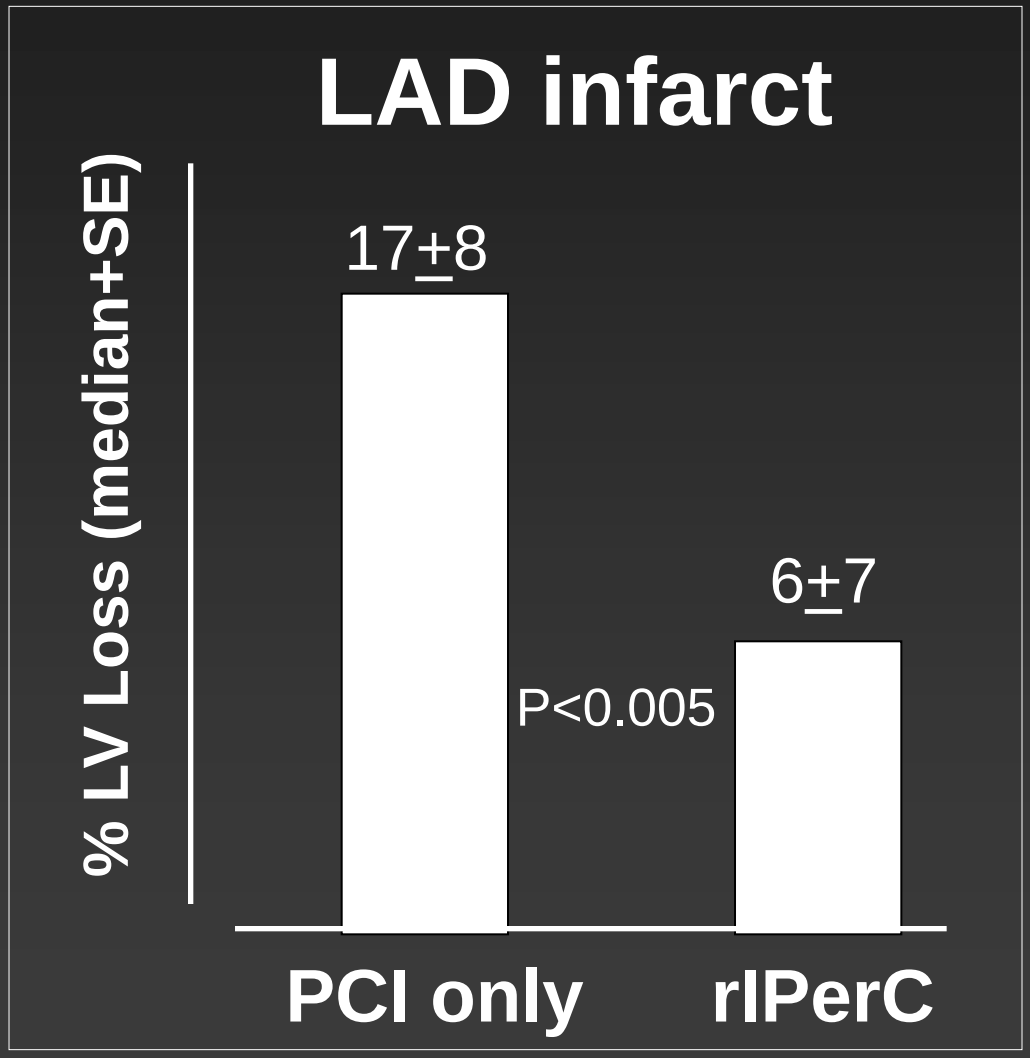
SickKids
The Labatt Family Heart Centre

Fondation Leducq

Applications: Evolving MI

Fondation Leducq



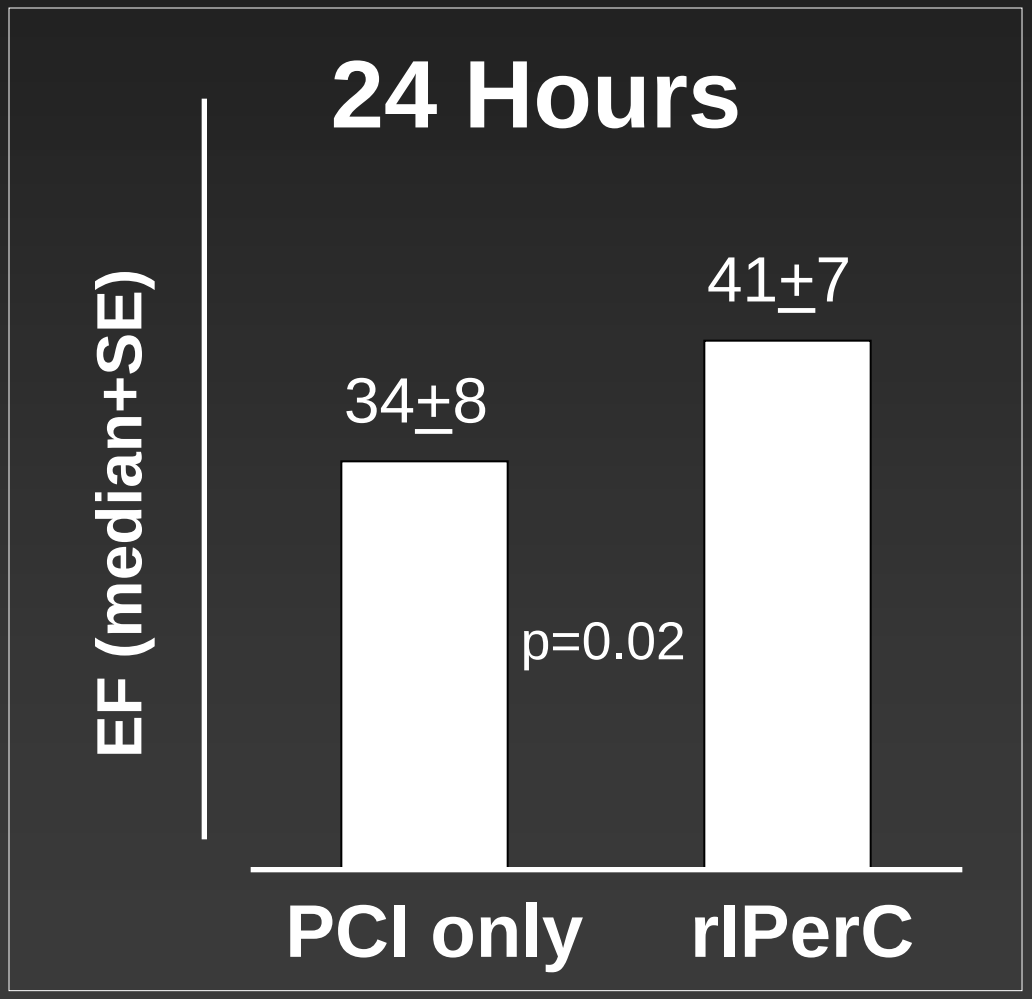


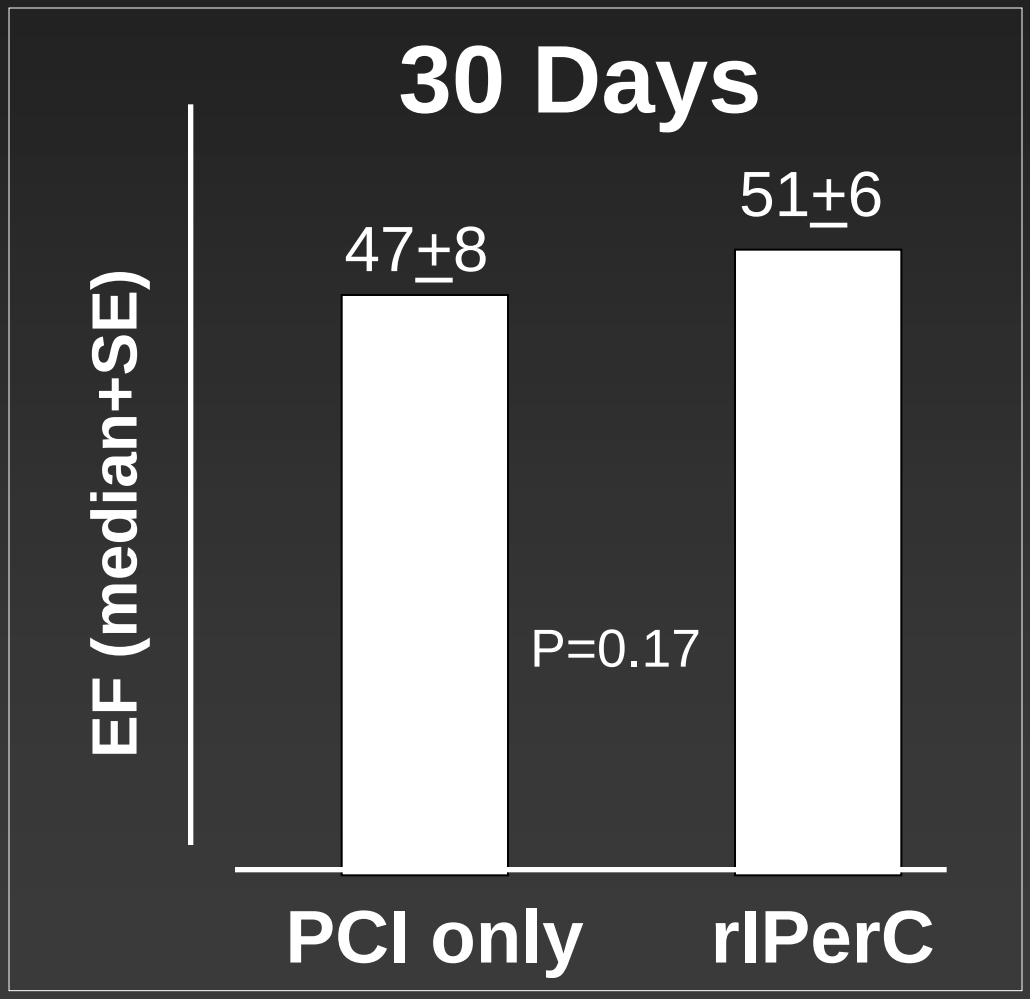
Botker et al. Lancet 2010

Applications: Evolving MI

Fondation Leducq

Ejection Fraction: LAD infarcts





Botker et al. Lancet 2010

Outcomes: Myocardial salvage

Improved outcomes of coronary syndromes with early reperfusion

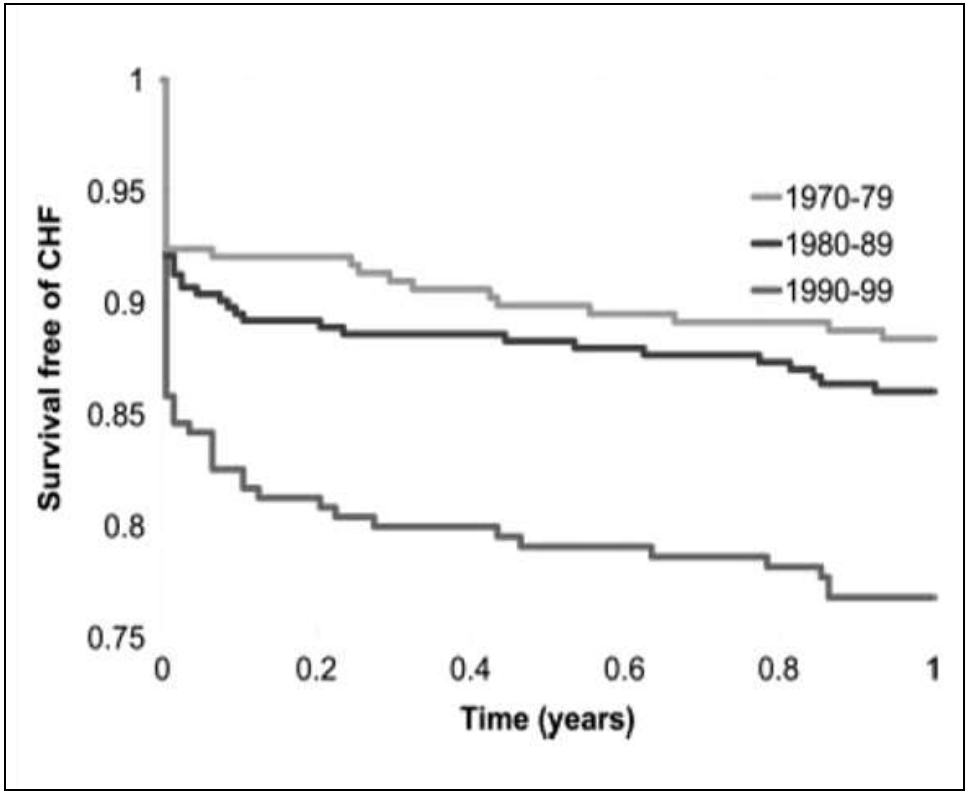
Long-Term Trends in the Incidence of Heart Failure After Myocardial Infarction

Raghava S. Velagaleti, MD; Michael J. Pencina, PhD; Joanne M. Murabito, MD; Thomas J. Wang, MD; Nisha I. Parikh, MD; Ralph B. D'Agostino, PhD; Daniel Levy, MD; William B. Kannel, MD; Ramachandran S. Vasan, MD

Background—Although mortality after myocardial infarction (MI) has declined in the United States in recent decades, there have been few community-based investigations of the long-term trends in the incidence of heart failure after MI, and their results appear to be conflicting.

Methods and Results—We evaluated 676 Framingham Heart Study participants between 45 and 85 years of age (mean age 67 years, 34% women) who developed a first MI between 1970 and 1999. We assessed the incidence rates of heart failure and of death without heart failure in each of 3 decades (1970 to 1979, 1980 to 1989, and 1990 to 1999). We estimated the multivariable-adjusted risk of events in the latter 2 decades, with the period 1970 to 1979 serving as the referent. The 30-day incidence of heart failure after MI rose from 10% in 1970 to 1979 to 23.1% in 1990 to 1999 (*P* for trend 0.003), whereas 30-day mortality after MI declined from 12.2% (1970 to 1979) to 4.1% (1990 to 1999). The 5-year incidence of heart failure after MI rose from 27.6% in 1970 to 1979 to 31.9% in 1990 to 1999 (*P* for trend 0.02), whereas 5-year mortality after MI declined from 41.1% (1970 to 1979) to 17.3% (1990 to 1999). In multivariable analyses, compared with the period 1970 to 1979, we observed higher 30-day (risk ratio 2.05, 95% confidence interval 1.25 to 3.36) and 5-year (risk ratio 1.74, 95% confidence interval 1.07 to 2.84) risks of heart failure in the decade 1990 to 1999. These trends were accompanied by lower 30-day (risk ratio 0.21, 95% confidence interval 0.09 to 0.47) and 5-year (risk ratio 0.31, 95% confidence interval 0.18 to 0.54) mortality rates in 1990 to 1999.

Conclusions—In the present community-based sample, we observed an increase in the incidence of heart failure in recent decades that paralleled the decrease in mortality after MI. (*Circulation*. **2008;118:2057-2062.**)



Circulation 2008;118:2057-62

Outcomes: Post-MI remodeling

ELSEVIER

Cardiovascular Research 53 (2002) 31–47

Cardiovascular Research

www.elsevier.com/locate/cardiores

Review

The inflammatory response in myocardial infarction

Nikolaos G. Frangogiannis[a], C. Wayne Smith[b], Mark L. Entman[a,*]

[a]*Section of Cardiovascular Sciences, Department of Medicine, Baylor College of Medicine and the DeBakey Heart Center, One Baylor Plaza M/S F-602, Houston, TX 77030, USA*

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Received 20 April 2001; accepted 18 July 2001

Abstract

One of the major therapeutic goals of modern cardiology is to design strategies aimed at minimizing myocardial necrosis and optimizing cardiac repair following myocardial infarction. However, a sound understanding of the biology is necessary before a specific intervention is pursued on a therapeutic basis. This review summarizes our current understanding of the cellular and molecular mechanisms regulating the inflammatory response following myocardial ischemia and reperfusion. Myocardial necrosis induces complement activation and free radical generation, triggering a cytokine cascade initiated by Tumor Necrosis Factor (TNF)-α release. If

Remote IPC – Biologically inclusive?

Acta Physiol 2007, **190**, 103–109

Effects of intermittent lower limb ischaemia on coronary blood flow and coronary resistance in pigs

M. Shimizu,[1] I. E. Konstantinov,[2] R. K. Kharbanda,[1] M. H. Cheung[1] and A. N. Redington[1]

1 Division of Cardiology, Hospital for Sick Children, Toronto, ON, Canada

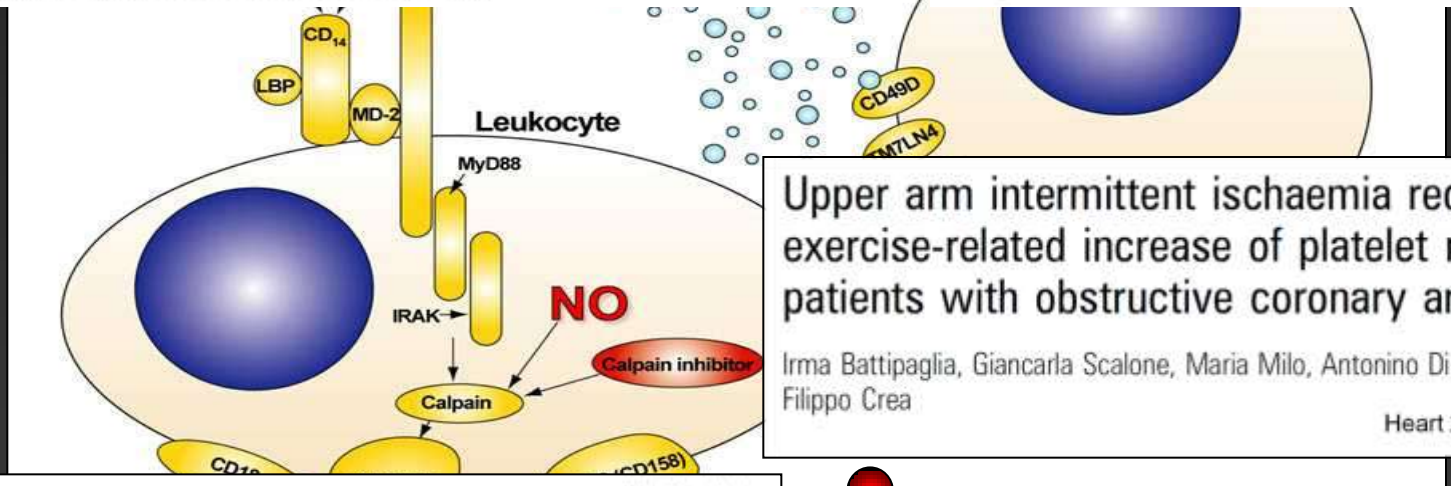
2 Division of Cardiovascular Surgery, Hospital for Sick Children, Toronto, ON, Canada

J Physiol Sci
DOI 10.1007/s12576-011-0172-9

ORIGINAL PAPER

Intermittent arm ischemia induces vasodilatation of the contralateral upper limb

Kenki Enko · Kazufumi Nakamura · Kei Yunoki · Toru Miyoshi · Satoshi Akagi · Masashi Yoshida · Norihisa Toh · Mutsuko Sangawa · Nobuhiro Nishii · Satoshi Nagase · Kunihisa Kohno · Hiroshi Morita · Kengo F. Kusano · Hiroshi Ito



Upper arm intermittent ischaemia reduces exercise-related increase of platelet reactivity in patients with obstructive coronary artery disease

Irma Battipaglia, Giancarla Scalone, Maria Milo, Antonino Di Franco, Gaetano A Lanza, Filippo Crea

Heart 2011;97:1298-1303.

Journal of the American College of Cardiology
© 2005 by the American College of Cardiology Foundation
Published by Elsevier Inc.

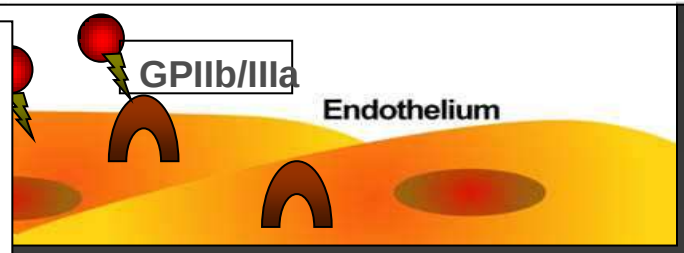
Vol. 46, No. 3, 2005
ISSN 0735-1097/05/$30.00
doi:10.1016/j.jacc.2005.04.044

Remote Ischemic Preconditioning Provides Early and Late Protection Against Endothelial Ischemia-Reperfusion Injury in Humans

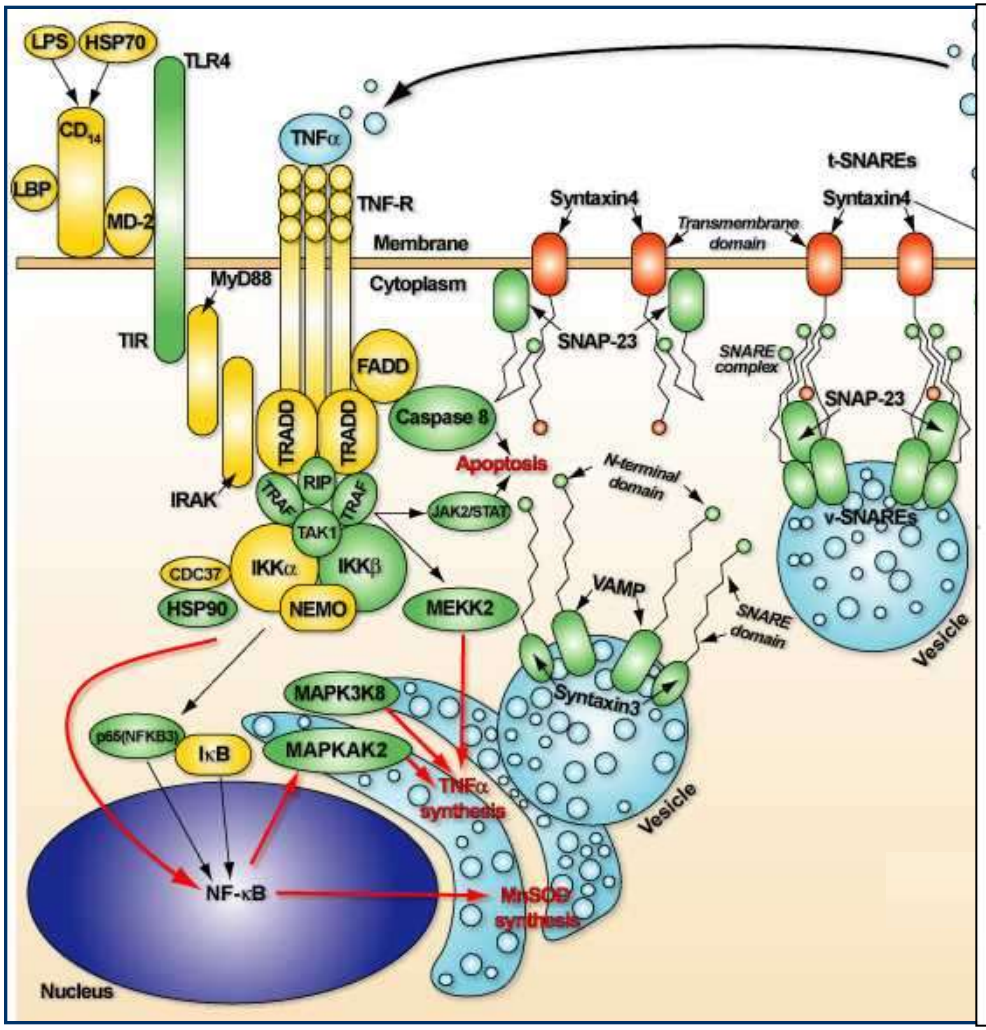
Role of the Autonomic Nervous System

Stavros P. Loukogeorgakis, BSc,*‡ Anna T. Panagiotidou, BSc,*‡
Michael W. Broadhead, BSc, MRCP, FRCA,†‡ Ann Donald, AVS,*
John E. Deanfield, BA, BCHIR, MB, FRCP,* Raymond J. MacAllister, MA, MD, FRCP‡

London, United Kingdom



Human neutrophil function



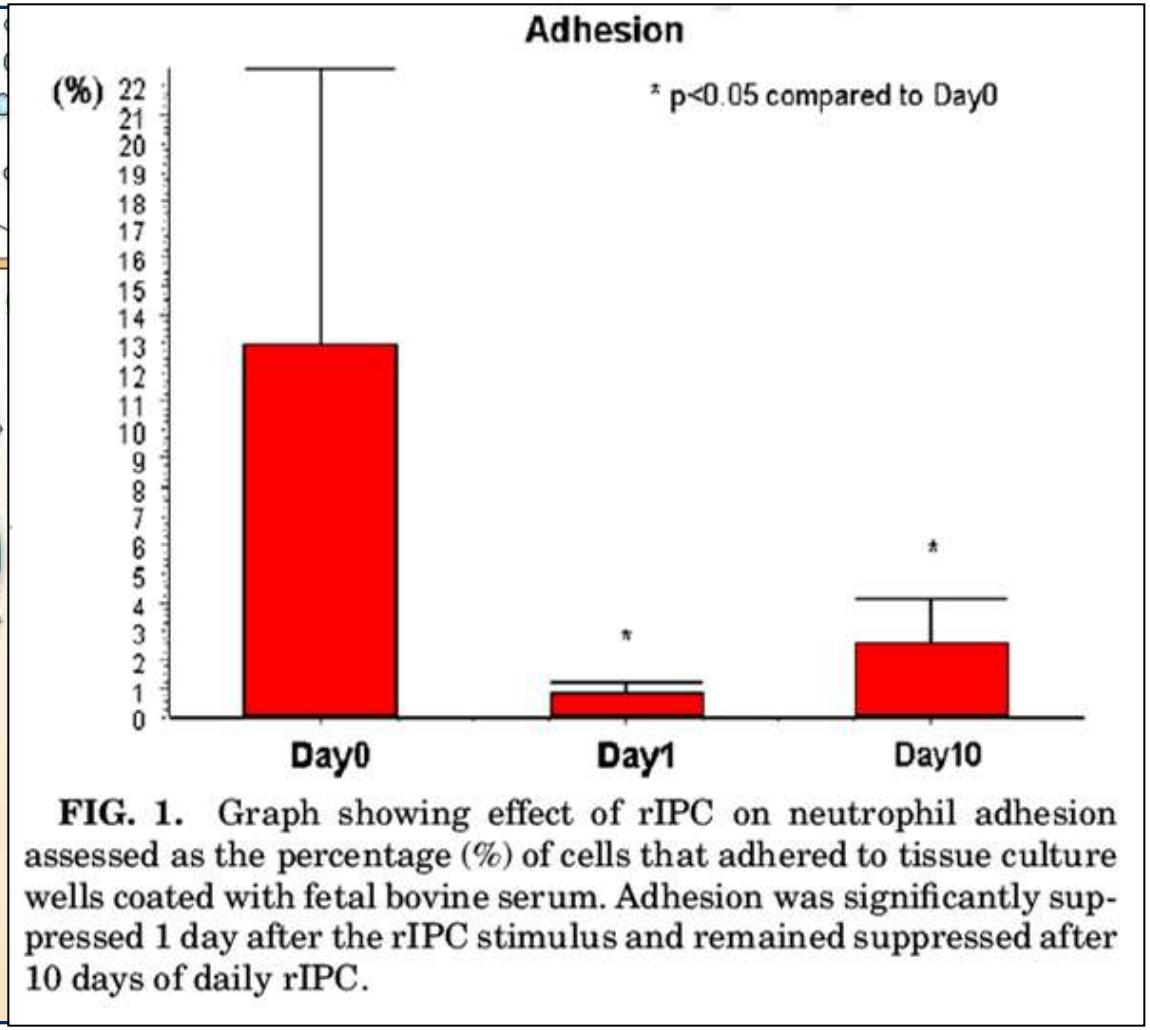


FIG. 1. Graph showing effect of rIPC on neutrophil adhesion assessed as the percentage (%) of cells that adhered to tissue culture wells coated with fetal bovine serum. Adhesion was significantly suppressed 1 day after the rIPC stimulus and remained suppressed after 10 days of daily rIPC.

Konstantinov et al. Physiol Genom 2004

Shimizu et al. J Surg Res: 2009

Applications: Evolving MI

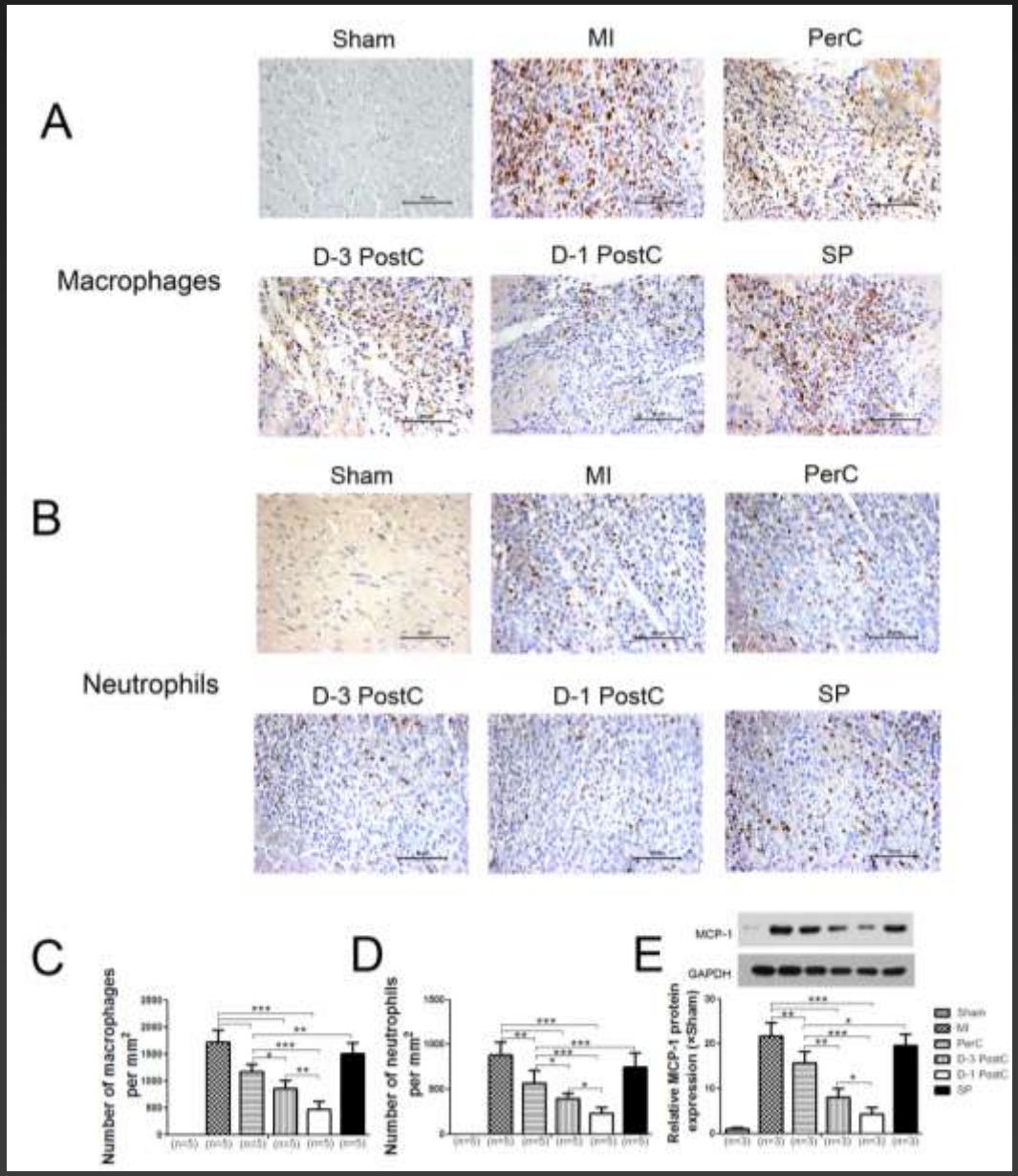
Fondation Leducq

'*Chronic Pre*conditioning':

6 Groups:

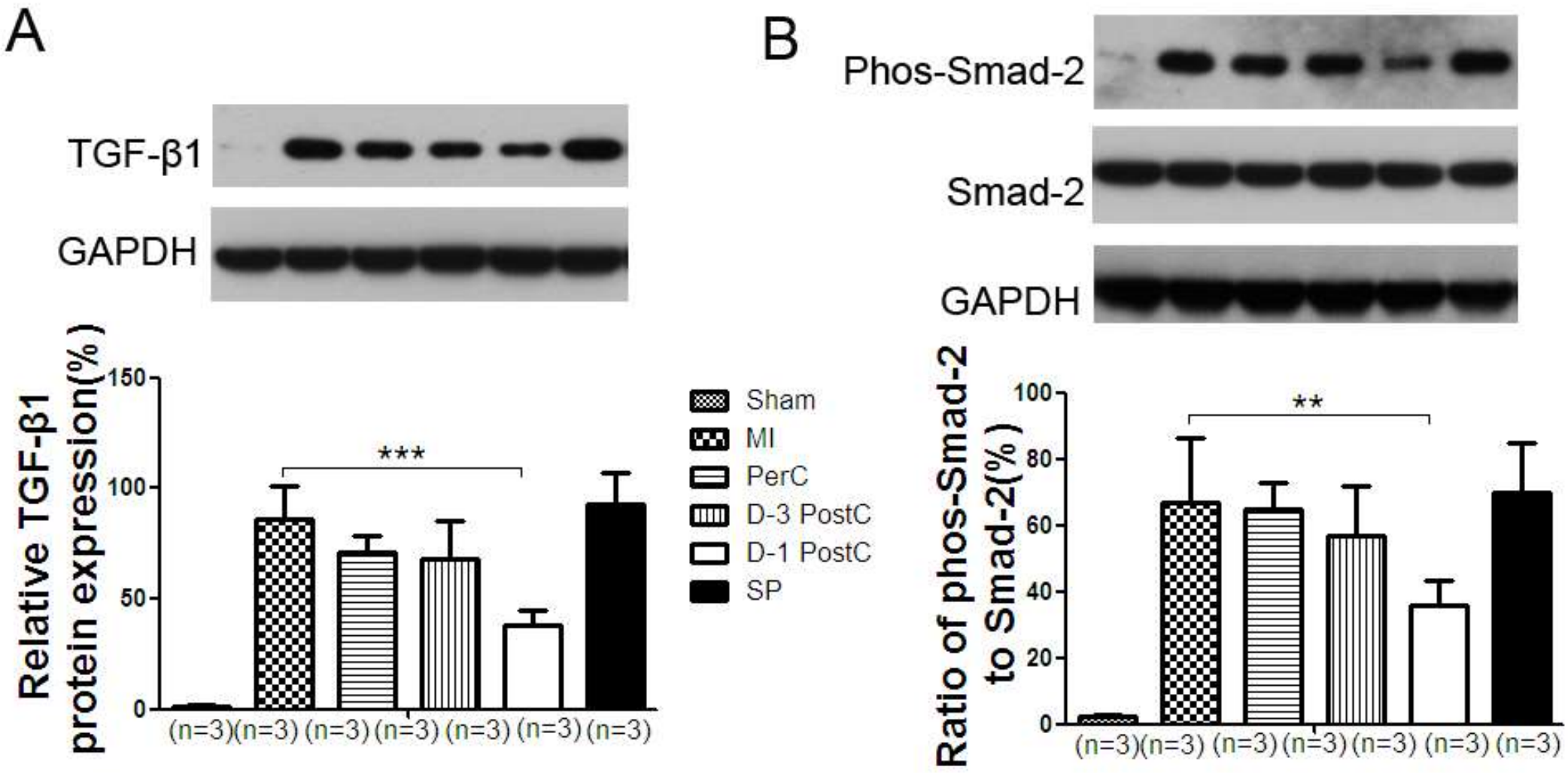
- Sham
- Infarct (45' LAD infarct)
- PerC (4x5' hindlimb)
- RIPC every 3 days
- RIPC daily for 28 days
- SP control

Wei et al. Circ Res – 2011



Applications: Evolving MI

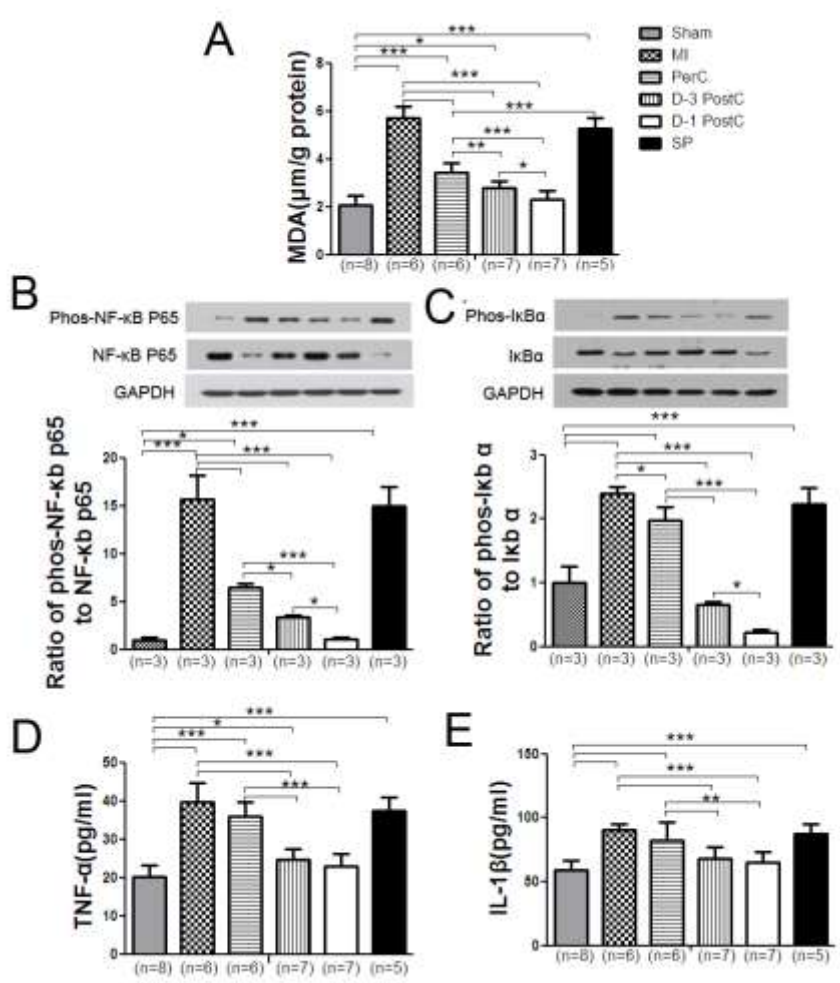
Fondation Leducq

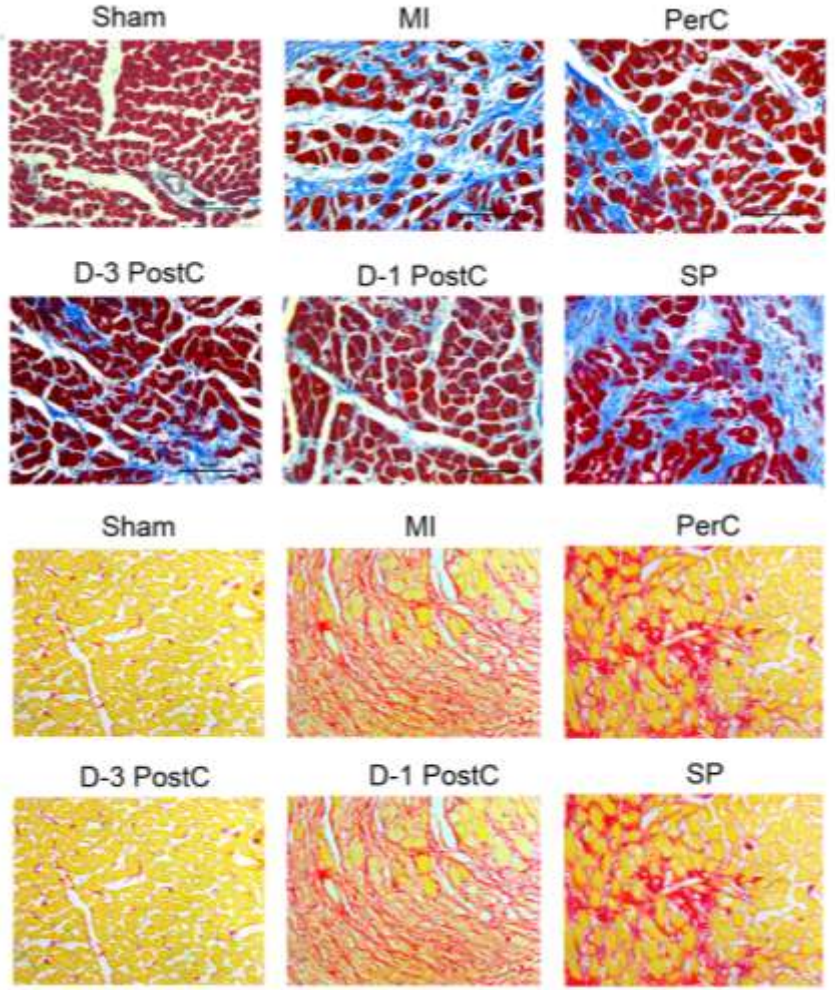


Wei et al. Circ Res – 2011

Applications: Evolving MI

Fondation Leducq

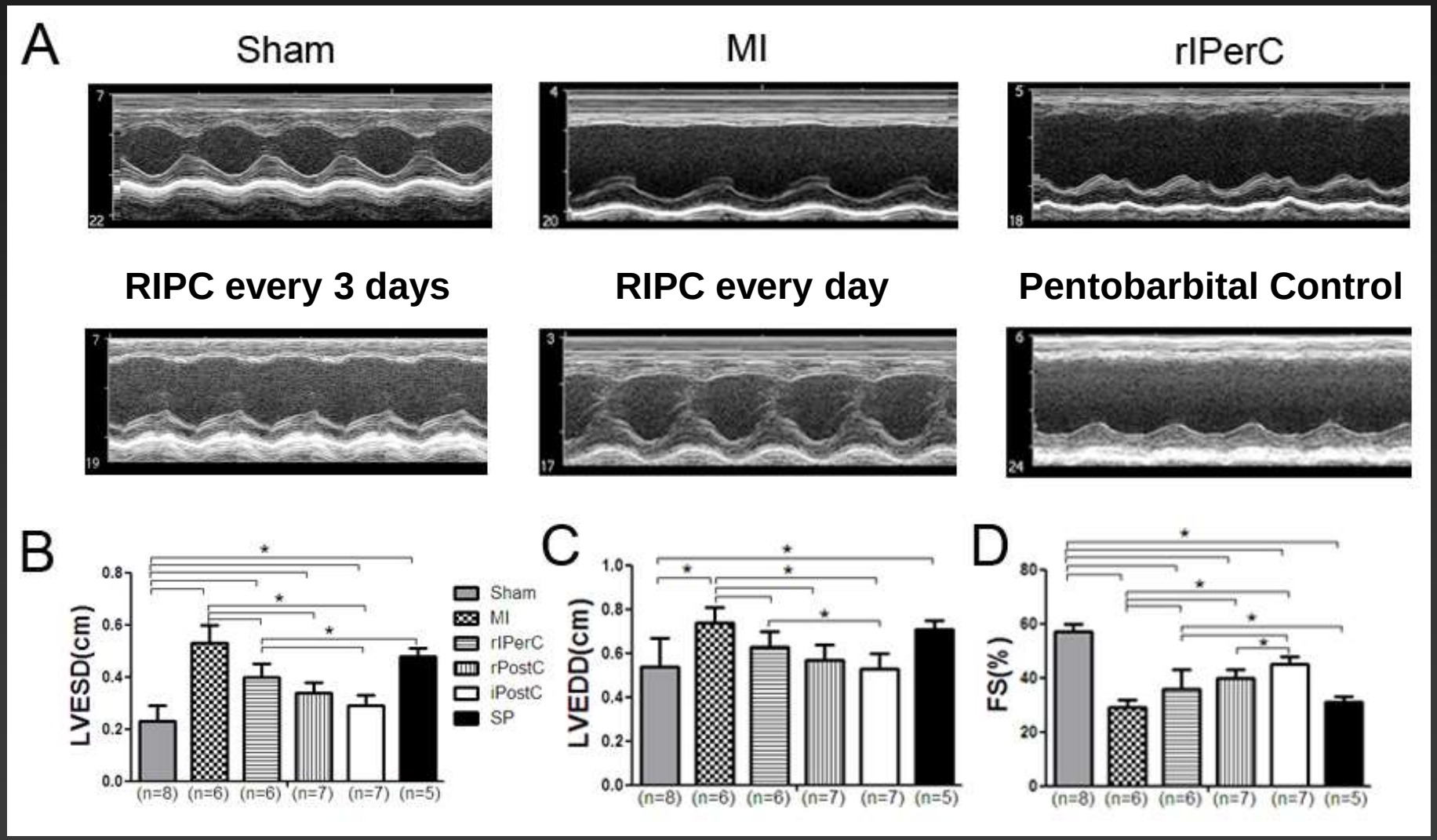




Wei et al. Circ Res – 2011

Applications: Evolving MI

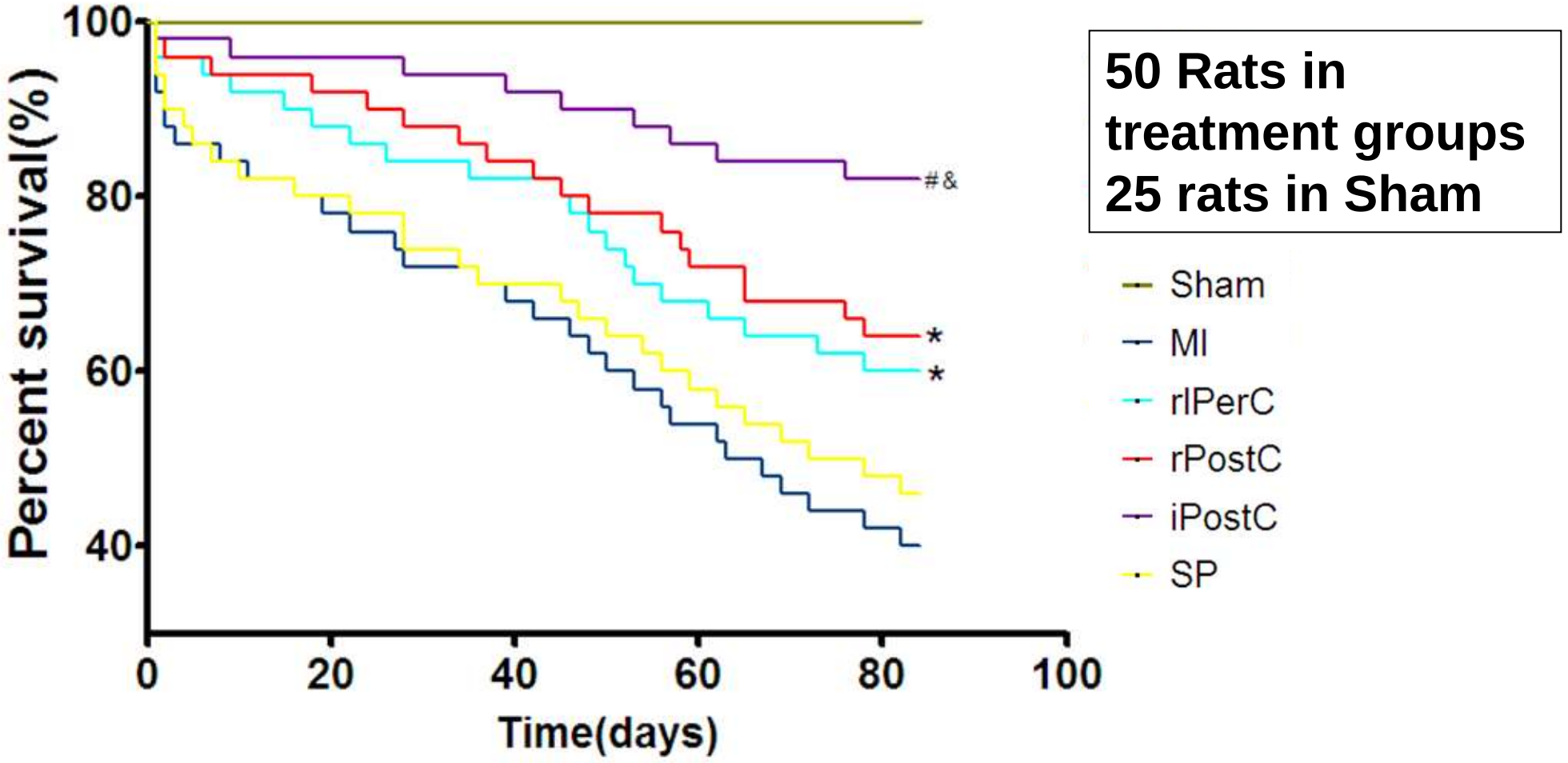
Fondation Leducq



Wei et al. Circ Res – 2011

Applications: Evolving MI

Fondation Leducq



Wei et al. Circ Res – 2011

Inflammatory response: Restenosis

Cardiovasc Drugs Ther (2009) 23:103–105
DOI 10.1007/s10557-008-6158-z

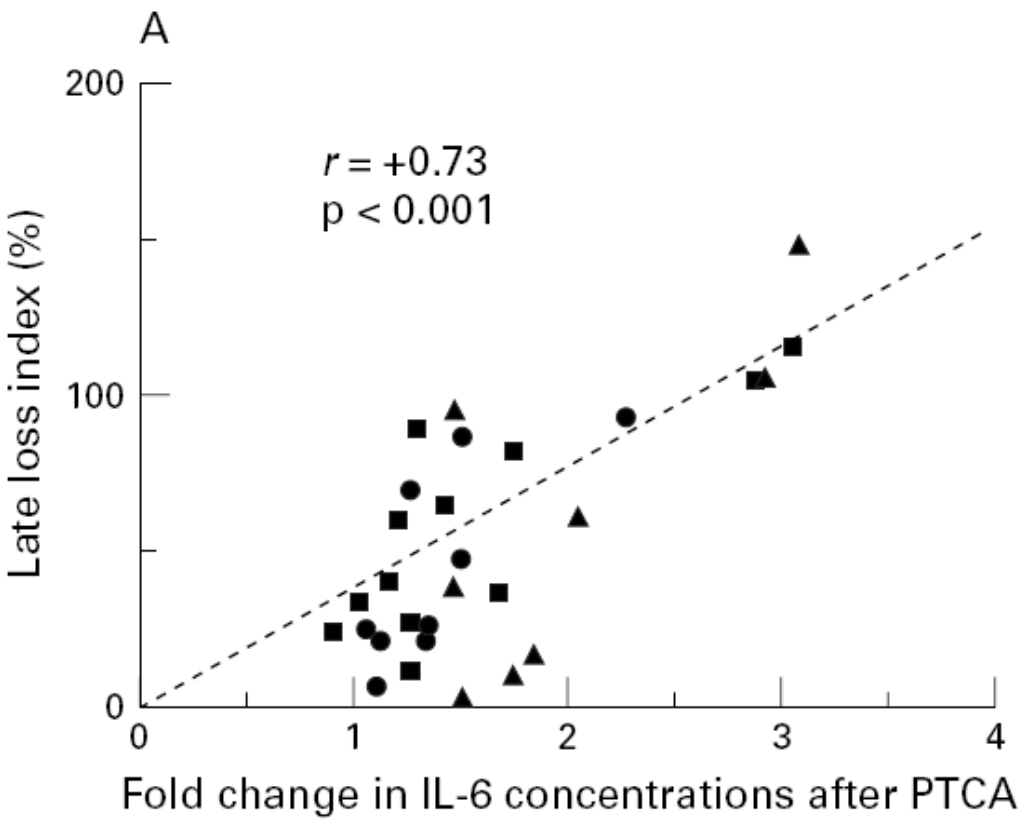
EDITORIAL

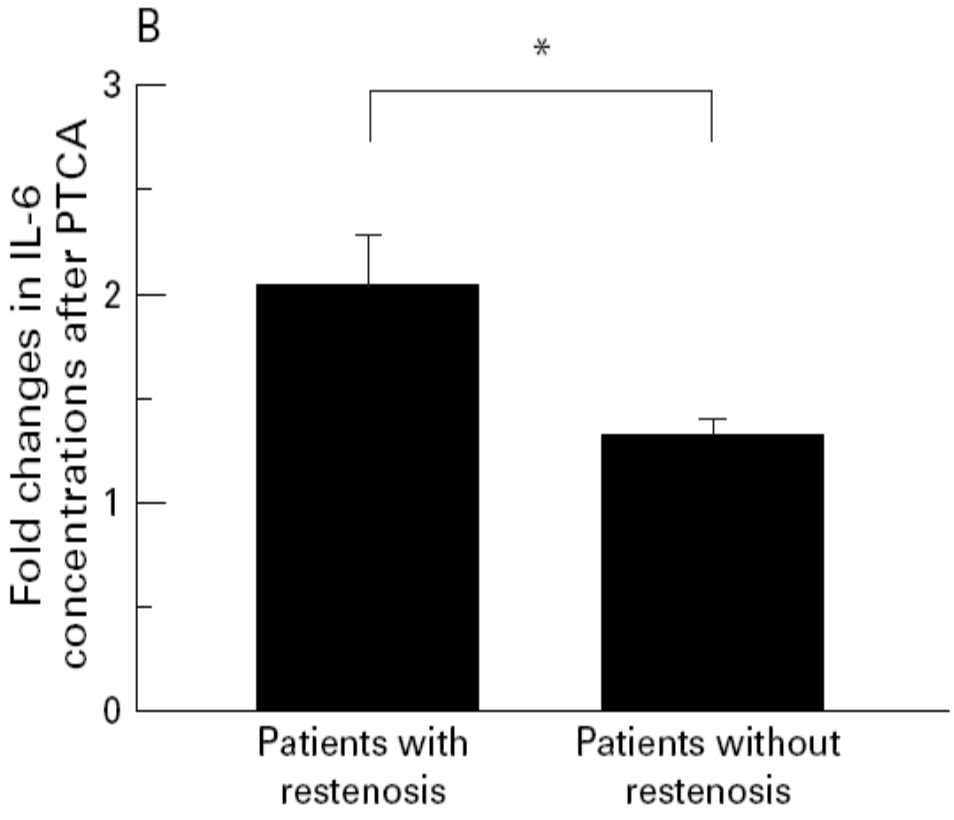
Early Systemic Inflammatory Response to Drug-Eluting Stents Implantation: The Heart of the Difference?

Editorial to: "Comparison of Changes in Early Inflammatory Markers Between Sirolimus- and Paclitaxel-Eluting Stent Implantation" by Li et al.

Nuno M. Pires · J. Wouter Jukema

Inflammatory response: Restenosis





Hojo et al. Ann Heart 2000; 84:83-7

Applications: Exercise

Fondation Leducq

High-intensity interval training may reduce in-stent restenosis following percutaneous coronary intervention with stent implantation: A randomized controlled trial evaluating the relationship to endothelial function and inflammation

Peter S. Munk, MD,[a,b] Eva M. Staal, MD, PHD,[a,b] Noreen Butt, MD,[a] Kjetil Isaksen, MD,[a] and Alf I. Larsen, MD, PHD[a,b] *Stavanger and Bergen, Norway*

Background High-intensity interval training has been shown to be superior to moderate continuous exercise training in improving exercise capacity and endothelial function in patients with coronary artery disease. The objective of this study was to evaluate this training model on in-stent restenosis following percutaneous coronary intervention for stable or unstable angina.

Methods and Results We prospectively randomized 40 patients after percutaneous coronary intervention with implantation of a bare metal stent (n = 30) or drug eluting stent (n = 32) to a 6-month supervised high-intensity interval exercise training program (n = 20) or to a control group (n = 20). At six months, restenosis, measured as in-segment late luminal loss of the stented coronary area, was smaller in the training group 0.10 (0.52) mm compared to the control group 0.39 (0.38) mm ($P = .01$). Reduction of late luminal loss in the training group was consistent with both stent types. Peak oxygen uptake increased in the training and control group by 16.8% and 7.8%, respectively ($P < .01$). Flow-mediated dilation improved 5.2% (7.6) in the training group and decreased -0.1% (8.1) in the control group ($P = .01$). Levels of high-sensitivity C-reactive protein decreased by -0.4 (1.1) mg/L in the training group and increased by 0.1 (1.2) mg/L in the control group ($P = .03$ for trend).

Conclusions Regular high-intensity interval exercise training was associated with a significant reduction in late luminal loss in the stented coronary segment. This effect was associated with increased aerobic capacity, improved endothelium function, and attenuated inflammation. (Am Heart J 2009;158:734-41.)

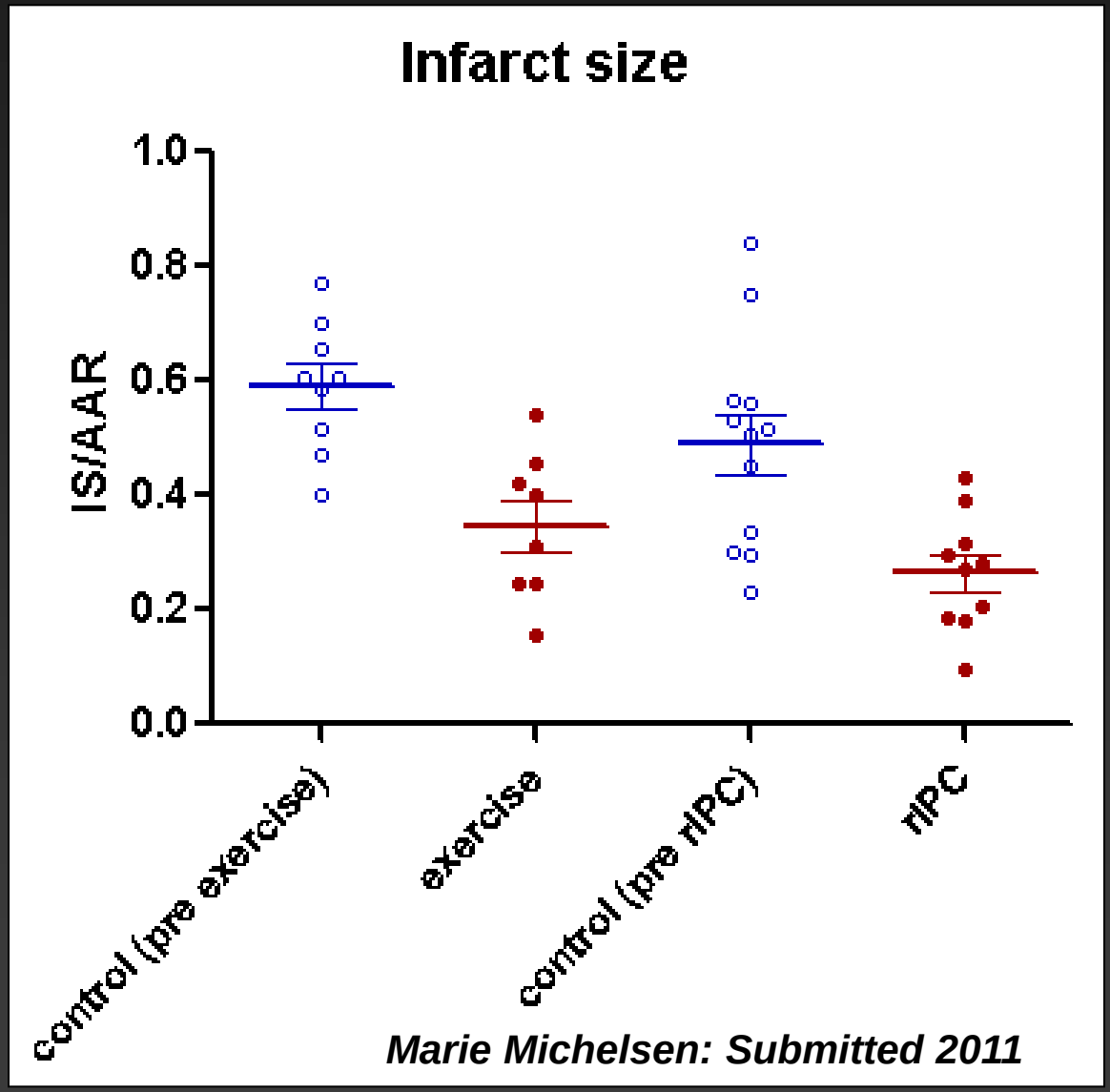
The beneficial effects of exercise training (ET) in primary and secondary prevention of cardiovascular disease are well known,[1,2] but it is currently remarkably underused.[3]

Percutaneous coronary intervention (PCI) with stent implantation is the therapy of choice in most patients with symptomatic coronary artery disease (CAD) related to significant stenosis not eligible to coronary artery bypass grafting (CABG). The benefits of this treatment are diminished by the relatively high rate of recurrent disease and restenosis.[4]

In stented arteries late luminal loss (LLL) correlates primarily with intimal hyperplasia,[5] which can lead to restenosis. The formation of neointimal hyperplasia after PCI has been linked to persistent low local shear stress[6] and to an inflammatory response to the vessel injury with increased levels of C-reactive protein (CRP).[7]

The use of drug eluting stents (DES) has markedly reduced the restenosis rate,[8] but safety issues with regard to late stent thrombosis have questioned the frequent use of these devices.[9]

Guidelines recommend all patients with CAD to

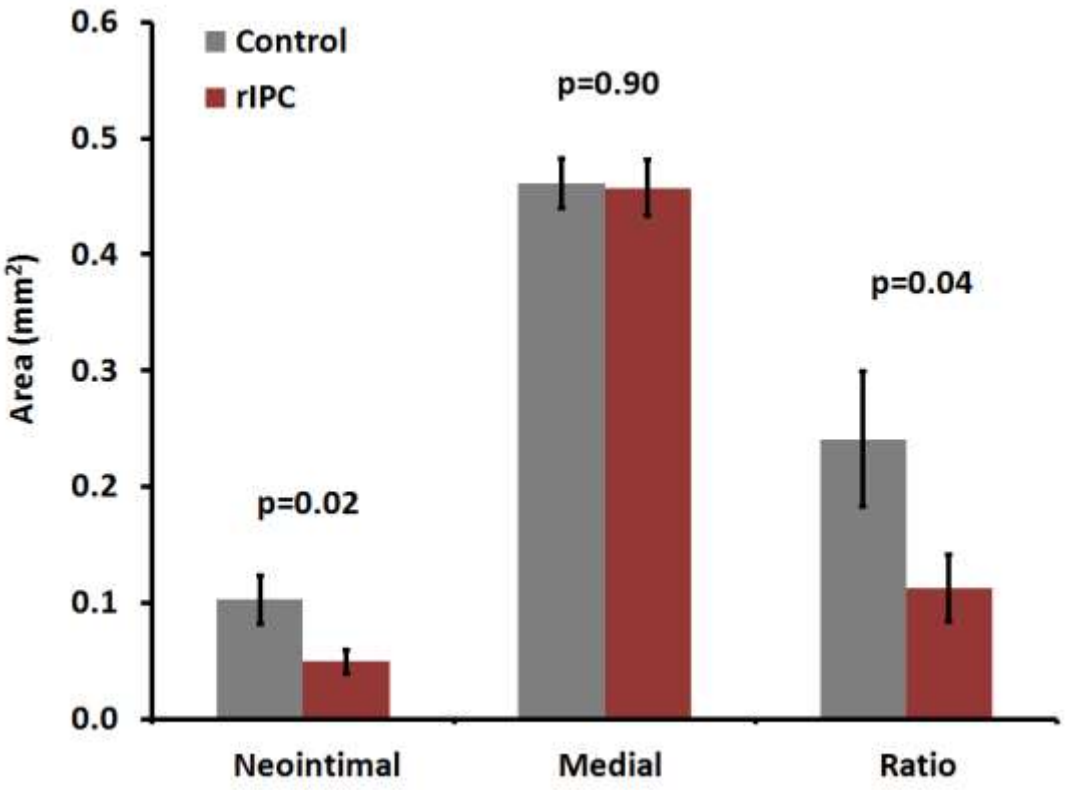


Marie Michelsen: Submitted 2011

Applications: ISR

Fondation Leducq

- **Rabbit iliac artery model**
- **Balloon Injury**
- **Daily RIPC for 7 days**
- **Harvest 28 days**



Chris Overgaard, Greg Wilson

Conclusions

- **Remote conditioning has actions beyond ischemia tolerance**
- **Easy translation tor RCT's**
- **Role of 'chronic conditioning' remains to be determined**