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Comparison of coronary heart disease and stroke risks attributable to vascular risk factors: results from the PRIME study

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Background and purpose: Coronary heart disease (CHD) and stroke are the leading causes of death worldwide, although these are preventable diseases. In order to set priorities for public health policies, we sought to assess and compare within a single cohort, CHD and stroke population-attributable risks (PARs) for various cardiovascular risk factors.

Methods: The PRIME study is a multicenter prospective population-based cohort of men living in France or Northern Ireland, aged 50-59 in 1991-93, and followed over 10 years to record CHD (coronary death, myocardial infarction (MI), and unstable angina) and stroke. Results: The sample comprised 9701 men, free of CHD and stroke at baseline. During the followup, 410 and 118 cases of CHD and stroke occurred. After adjustment for age, centre, antihypertensive and lipid-lowering treatments, alcohol consumption and other significant cardiovascular risk factors, PARs for CHD were 21.1% (high blood pressure), 14.8% (smoking), 11.1% (hypercholesterolaemia), 9.8% (low HDL-cholesterol), 5.4% (obesity) and 1.9% (diabetes). The overall PAR for CHD, referring to the presence of at least one of the above detailed risk factors reached 71.2% (79.1% for coronary death and MI). Adjusted PARs for stroke were 32.8% (high blood pressure), 15.8% (smoking) and 6.4% (diabetes), with no significant impact of the 5% atherogenic risk factors. The overall PAR for stroke was 43.7% (44.6% for ischemic stroke).

Conclusions: The impact of traditional cardiovascular risk factors on CHD and stroke are not the same. As prevention should primarily focus on factors exhibiting high PARs for both diseases, high blood pressure and smoking are the best targets.

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Should coronary chronic total occlusion be recalcanized in diabetic patients?

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Background: Although there are increasing data suggesting that patients could get survival advantage from the recalcanizing procedure of coronary chronic total occlusion (CTO) as compared with optimal medical treatment (OMT) alone, it still remains unclear whether diabetic patients could get similar benefits from this procedure.

Conclusions: A total of 239 diabetic patients with CTO who underwent percutaneous coronary intervention (PCI group, n=97) or OMT alone (OMT group, n=142) from Jan 2004 to Dec 2010 were enrolled into this study. All patients received OMT as per existing guidelines. Various clinical outcomes at 2 years were compared between the two groups.

Results: The baseline clinical characteristics didn’t differ significantly between the two groups. But, OMT group had a higher rate of multi-vessel disease and compared with PCI group (84.5% vs. 43.2%, P<0.001). Two-year clinical outcomes showed that PCI group had significantly lower rates of all cause death and major adverse cardiac events (composite of all cause death, myocardial infarction and revascularization) as compared with OMT alone group (Table). However, multivariable logistic analysis revealed that OMT alone (vs. PCI) was not an independent predictor for all cause death (odds ratio (OR) 2.35, confidential interval (CI) 1.44-12.4, P<0.014) or MACCE (OR 1.99, CI 0.85-4.64, P=0.119).

Conclusions: The current data failed to show significant advantages of recalcanizing coronary CTO over OMT alone in diabetic patients, suggesting this aggressive recanalization might be a thankless job in this subset of patients.

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Prediction of hemodynamic impact of the venoarterial Extracorporeal Membrane Oxygenation (ECMO)

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Background: ECMO has been the last resort and extremely useful in cardiogenic shock with respiratory failure. However, how the ECMO interacts with the native hemodynamics remains poorly understood. The aim of this study is to quantitatively predict the hemodynamic impact of ECMO.

Theoretical analysis: We developed a circulatory equilibrium framework where we represented both the cardiac output (CO) curve and the venous return surface (VRS) as functions of right (PRA) and left atrial pressure (PLA). The intersection between the CO curve and VRS defines the circulatory equilibrium. Incorporating the ECMO into this framework indicates that the ECMO shifts the VRS downward by kCOECM (k constant, COECM: ECMO flow). In contrast, the ECMO increases arterial pressure independent of left ventricular (LV) CO (COLV), thereby shifts COLV curve downward by kCOECM (k-ECMO) (EFECM). Equilibrating the downward-shifted COLV curve and VRS gives COLV, PRA, and PLA.

Method and results: In 9 dogs, we isolated the carotid sinuses and vagomized to abolish baroreflex and then created myocardial infarction. We changed COECM stepwise at 3 levels (control=30%) and derived the native CO curve. We altered COECM from 0 to 200% of baseline CO and predicted total CO (=COLV+kCOECM), PLA and PRA. The predicted values matched well with those measured (Fig. 1). ECMO universally increased the total CO and decreased PLA, while increased PLA in severe LV failure. Numerical analysis indicated that the high COECM and poor LV/RV function are prerequisite to elevate PLA (Fig. 2).

Conclusions: The current data failed to show significant advantages of recalcanizing coronary CTO over OMT alone in diabetic patients, suggesting this aggressive recanalization might be a thankless job in this subset of patients.