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The response of endogenous nitric oxide synthase inhibitor ADMA to open heart surgery

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Purpose: NO metabolism can be characterized by asymmetric dimethylarginine (ADMA) which is an endogenous competitive inhibitor of nitric oxide synthase. The concentration of ADMA is increased in patients with endothelial dysfunction.
Methods: Plasma levels of ADMA, l-arginine and symmetric dimethylarginine (SDMA) were measured by liquid chromatography-tandem mass spectrometry (LC-MS-MS) in both the coronary sinus and peripheral vein of 21 patients underwent off-pump CABG surgery (OPCAB) and 20 patients underwent on-pump surgery with cardiopulmonary bypass (CPB). The measurements were performed 24 h before, 3 times during the operation, on the 1st and 5th day after surgery.
Results: ADMA levels remained constant in the OPCAB group both in the coronary sinus samples ($F=0.416$, $p<0.685$) and in the peripheral blood ($F=0.574$, $p<0.562$). However, ADMA concentration increased significantly in patients who underwent on-pump surgery with CPB in both the coronary sinus ($F=14.751$, $p<0.001$) and the peripheral vein ($F=30.738$, $p<0.001$), the intersubject time effect, therefore, proved to be markedly different between the two groups ($F=6.990$, $p<0.002$). In the present study l-arginine levels did not exhibit significant differences during OPCAB neither in the blood samples from coronary sinus ($F=1.006$, $p<0.362$) nor from the peripheral vein ($F=0.812$, $p<0.435$). By contrast, l-arginine concentration increased steadily at periphery ($F=6.226$, $p<0.012$), whereas it did not change in the coronary sinus ($F=2.050$, $p<0.161$) during CPB. The time-course of l-arginine was significantly different in the coronary sinus samples ($F=3.255$, $p<0.05$) and also in the peripheral blood ($F=3.255$, $p<0.05$).
Conclusions: Plasma levels of ADMA, SDMA and l-arginine are reliable markers of an early ischaemia-reperfusion injury. The response pattern of the new cardiovascular risk factor, ADMA was significantly different between the two groups. Its long-term follow-up may be suitable to monitor the improvement of coronary endothelial function after revascularisation.