

Mauser M, H Hoffmeister, C Nienaber, W Schaper. Influence of ribose, adenosine and "AICAR" on the rate of myocardial adenosine triphosphate synthesis during reperfusion after coronary artery occlusion in the dog. *Circ Res* 1985;56:220-230.

Recovery of adenosine triphosphate after myocardial ischemia is limited by the slow adenine nucleotide de novo synthesis and the availability of precursors of the nucleotide salvage pathways. We determined the adenine nucleotide de novo synthesis in the dog by infusion of [14C]glycine and the acceleration of adenine nucleotide built up by intracoronary infusion of ribose together with [14C]glycine or radiolabeled 5-amino-4-imidazolcarboxamide riboside or adenosine in the same animal model and with the same dosage of substrates (9 mmol) in postischemic and nonischemic myocardial tissue. After 45 minutes of occlusion of a side branch of the left coronary artery, the ischemic area was reperfused for 3 hours, and needle biopsies were taken for biochemical analysis. Adenine nucleotide de novo synthesis was found to be very slow (1.5 nmol/g wet weight per hour). The rate was doubled after ischemia. Adenine nucleotide synthesis was accelerated 5-fold by ribose, the basic substrate of the adenine nucleotide de novo synthesis, 9-fold by 5-amino-4-imidazolcarboxamide riboside, an intermediate of the adenine nucleotide de novo synthesis and 90-fold by adenosine, a substrate of the nucleotide salvage pathway. Therefore, only adenosine infusion resulted in a measurable increase of adenosine triphosphate levels after 3 hours of reperfusion, but over a longer time period, ribose or 5-amino-4-imidazol-carboxamide riboside also can be expected to replenish reduced myocardial adenosine triphosphate faster than adenine nucleotide de novo synthesis. Studies with radiolabeled 5-amino-4-imidazol-carboxamide riboside showed significant incorporation of radioactivity into 5-amino-4-imidazol-carboxamide ribose triphosphate which had also risen measurably during 5-amino-4-imidazol-carboxamide ribose infusion, and which is not normally found in heart muscle.