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Ultrasound energy improves myocardial perfusion in the presence of coronary occlusion
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OBJECTIVES: We evaluated whether ultrasound improves myocardial tissue perfusion
in 14 animals with coronary artery occlusion. **BACKGROUND:** A recent study

demonstrated that low-frequency ultrasound improves tissue perfusion in the rabbit
ischemic limb, but there are no data on ultrasound enhancement of myocardial

perfusion. **METHODS:** Fourteen animals (9 dogs, 5 pigs) underwent thoracotomy and
occlusion of a diagonal branch of the left anterior descending coronary artery.

Myocardial tissue perfusion units (TPUs) and pH were measured before coronary
occlusion, after occlusion, and after direct exposure of the ischemic myocardium in the

presence of fixed occlusion to low-frequency ultrasound (27 kHz). **RESULTS:** The TPU
decreased from 100.9 +/- 13 at baseline to 71.1 +/- 13 ($p < 0.01$) after 60 min occlusion

but rose by 19.7% to 85.1 +/- 8 ($p < 0.01$) after ultrasound exposure for 60 min. After
60-min coronary occlusion, myocardial pH fell from 7.43 +/- 0.14 to 7.05 +/- 0.15 ($p <$

0.01) but then improved to normal (7.46 +/- 0.32) after ultrasound for 60 min.

Administration of L-Nomega-nitro-arginine methyl ester (L-NAME), an inhibitor of nitric
oxide synthase, before ultrasound exposure, blocked improvement in myocardial tissue

perfusion and pH by ultrasound. Quantitative histomorphology showed a significant
increase in the capillary area of myocardium exposed to ultrasound versus non-exposed

myocardium (16.2 +/- 7.9 vs. 8.2 +/- 2.1, $p < 0.02$). **CONCLUSIONS:** Low-frequency,
low-intensity ultrasound improves myocardial tissue perfusion and pH in the presence of

a fixed coronary artery occlusion.

http://www.ncbi.nlm.nih.gov/entrez/query.fcgi?cmd=Retrieve&db=PubMed&dopt=Citation&list_uids=15464327