

Regional blood flow during periodic acceleration.

週期性加速度治療期間的局部血流量

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Objective: To determine whether a motion platform that imparts noninvasive periodic acceleration (pGz) forces to the body causes systemic vasodilation and changes local organ blood flow.

Design: Prospective paired blocked design.

Setting: Medical center research laboratory.

Subjects: Juvenile Yorkshire pigs.

Interventions: Juvenile pigs (12 kg) were anesthetized, paralyzed, and placed on a motion platform that oscillated at a frequency of 4 Hz and a force of approximately 0.4 G.

Measurements and main results: Regional blood flows, as assessed by colored microspheres, increased during pGz relative to values obtained before pGz. Blood flow (mL.min⁻¹.100 g⁻¹) significantly increased to the epicardium (71%), endocardium (93%), cerebrum (183%), brain stem (177%), renal cortex (53%), ileal mucosa (69%), gastric antral mucosa (72%), and liver (86%). Spleen and skeletal muscle blood flow increased without statistical significance, 38% and 158% with pGz, relative to paired control values. Regional blood flows returned to baseline 10 mins after discontinuation of pGz, except in the myocardial layers, where blood flow remained significantly elevated. There was no difference compared with baseline in heart rate, arterial blood gases, and blood pressure, but serum nitrite concentration was significantly higher (58%) during pGz. In another series of animals, pGz increased pulmonary artery blood flow directly proportional to the magnitude of the applied acceleration force with frequency held constant.

Conclusions: Periodic sinusoidal inertial forces in the spinal axis increase blood flow to tissues. The increased blood flow is reversible and may be caused by vasodilation secondary to local mediator release. These effects may be desirable in clinical conditions of low tissue oxygen delivery and perfusion.

結論： 在脊柱軸的周期性正弦慣性力增加血流量到組織中。所增加的血流量是可逆的，並且可能藉由血管舒張繼發局部媒介物釋放所產生。對於低組織氧運送及灌注的臨床條件，這些結果可能是令人滿意的