Comparaison des effets d’un champ magnétique statique de polarité nord et de polarité sud sur le rythme cardiaque et la pression sanguine sur des adultes en bonne santé.

Clinical Rehabilitation, septembre 2002

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Cette étude montre qu’il n’y a pas de différence d’action entre la polarité nord et la polarité sud d’un champ magnétique statique sur le rythme cardiaque et la tension sanguine sur des adultes en bonne santé.

Résumé de l'article original

Comparative effect of positive and negative static magnetic fields on heart rate and blood pressure in healthy adults.

OBJECTIVE: To compare changes in heart rate (HR) and blood pressure (BP) associated with short-term exposure to static magnetic fields (SMFs) of positive versus negative polarity. DESIGN: A double-blind, randomized controlled trial using a time series design. SETTING: Physical therapy laboratory in a university setting. SUBJECTS: Seventy-five adults with a mean age of 30.6 years were assigned to one of three treatment groups. No subjects had any symptoms of cardiovascular disease or cardiac irregularity. INTERVENTIONS: Fifteen-minute exposure to an SMF by lying on a mattress pad containing magnets of positive polarity, negative polarity, or none (placebo). MAIN OUTCOME MEASURES: HR and BP were monitored prior to exposure, at 1-minute, 5-minute, 10-minute and 15-minute intervals following exposure, and again 5 minutes after exposure. RESULTS: Subjects in all groups demonstrated slight decreases in HR and BP, but none of these changes were associated with the intervention (p = 0.170). CONCLUSIONS: Short-term exposure to an SMF of either positive or negative polarity does not appear to cause any clinically meaningful changes in HR or BP among asymptomatic subjects. This finding supports the safe use of unipolar SMFs that contain low-intensity magnets (< 1000 gauss) relative to the cardiovascular system.

Action du champ magnétique sur la microcirculation sanguine

Radiation and Environmental Biophysics, mai 2007

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Cette étude réalisée sur des lapins montre une corrélation entre la puissance du champ magnétique statique auquel ils sont soumis et la microcirculation sanguine.
Static magnetic field effect on the arterial baroreflex-mediated control of microcirculation: implications for cardiovascular effects due to environmental magnetic fields.

Increasing evidence suggests that time-varying and static magnetic fields in the environment might affect the cardiovascular system. To explore the underlying physiology, the effect of static magnetic fields (SMFs) on the carotid baroreflex control of microcirculation was studied. Twenty-four hemodynamic monitorings were performed in rabbits sedated by pentobarbital infusion (5 mg/kg/h) during experiments that lasted 120 min. Mean femoral artery blood pressure, heart rate, and ear lobe skin microcirculatory blood flow, measured by microphotoelectric plethysmogram (MPPG), were simultaneously recorded before and after a 40 min exposure of the sinocarotid baroreceptors to Nd(2)-Fe(14)-B alloy magnets (n = 14) or sham magnets (n = 10, control series). The local SMF field was 350 mT, at the baroreceptors’ site. Arterial baroreflex sensitivity (BRS) was estimated from heart rate/blood pressure response to intravenous bolus injections of nitroprusside and phenylephrine. A significant positive correlation was found between the SMF-induced increase in BRS (DeltaBRS = BRS(afterSMF) - BRS(priorSMF)) and the increment in microvascular blood flow (DeltaMPPG = MPPG(afterSMF) - MPPG(priorSMF)) (r = 0.66, p < 0.009). The SMF probably modulated the arterial baroreflex-mediated microcirculatory control. This could represent one possible mechanism how environmental magnetic fields act on the cardiovascular system, and a method how to complexly adjust macro- and microcirculation with potential clinical implementation.

Effet du champ magnétique statique sur le flux sanguin dans des artères multi-sténosées

Computers in Biologie and Medicine, octobre 2009

Mustapha N, Amin N, Chakravarty S, Mandal PK.

Cette étude analyse le débit d’un fluide conducteur électrique tel que le sang dans des artères de section irrégulières, présentant de multiples sténoses (rétrécissements) et soumis à un champ magnétique uniforme transversal. Le flux sanguin se sépare principalement vers l’aval de la multisténose. Cependant la zone où se produit la séparation diminue avec l’augmentation du champ magnétique et finit même par disparaître. Le champ magnétique statique améliore localement la circulation sanguine en réduisant les zones de séparation qui causent des désordre dans le flux sanguin, conduisant à la formation et à la progression des maladies artérielles.

Résumé de l'article original

Unsteady magnetohydrodynamic blood flow through irregular multi-stenosed arteries.
Flow of an electrically conducting fluid characterizing blood through the arteries having irregular shaped multi-stenoses in the environment of a uniform transverse magnetic-field is analysed. The flow is considered to be axisymmetric with an outline of the irregular stenoses obtained from a three-dimensional casting of a mild stenosed artery, so that the physical problem becomes more realistic from the physiological point of view. The marker and cell (MAC) and successive-over-relaxation (SOR) methods are respectively used to solve the governing unsteady magnetohydrodynamic (MHD) equations and pressure-Poisson equation quantitatively and to observe the flow separation. The results obtained show that the flow separates mostly towards the downstream of the multi-stenoses. However, the flow separation region keeps on shrinking with the increasing intensity of the magnetic-field which completely disappears with sufficiently large value of the Hartmann number. The present observations certainly have some clinical implications relating to magnetotherapy which help reducing the complex flow separation zones causing flow disorder leading to the formation and progression of the arterial diseases.