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Low-level transcutaneous electrical vagus nerve stimulation suppresses atrial fibrillation.

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BACKGROUND: Transcutaneous low-level tragus electrical stimulation (LLTS) suppresses atrial fibrillation (AF) in canines.

OBJECTIVES: This study examined the antiarrhythmic and anti-inflammatory effects of LLTS in humans.

METHODS: Patients with paroxysmal AF who presented for AF ablation were randomized to either 1 h of LLTS (n = 20) or sham control (n = 20). Attaching a flat metal clip onto the tragus produced LLTS (20 Hz) in the right ear (50% lower than the voltage slowing the sinus rate). Under general anesthesia, AF was induced by burst atrial pacing at baseline and after 1 h of LLTS or sham treatment. Blood samples from the coronary sinus and the femoral vein were collected at those time points and then analyzed for inflammatory cytokines, including tumor necrosis factor alpha and C-reactive protein, using a multiplex immunoassay.

RESULTS: There were no differences in baseline characteristics between the 2 groups. Pacing-induced AF duration decreased significantly by 6.3 ± 1.9 min compared with baseline in the LLTS group, but not in the control subjects ($p = 0.002$ for comparison between groups). AF cycle length increased significantly from baseline by 28.8 ± 6.5 ms in the LLTS group, but not in control subjects ($p = 0.0002$ for comparison between groups). Systemic (femoral vein) but not coronary sinus tumor necrosis factor (TNF)-alpha and C-reactive protein levels decreased significantly only in the LLTS group.

CONCLUSIONS: LLTS suppresses AF and decreases inflammatory cytokines in patients with paroxysmal AF. Our results support the emerging paradigm of neuromodulation to treat AF.

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