

# Magnetism and Cardiac Arrhythmias

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## BACKGROUND

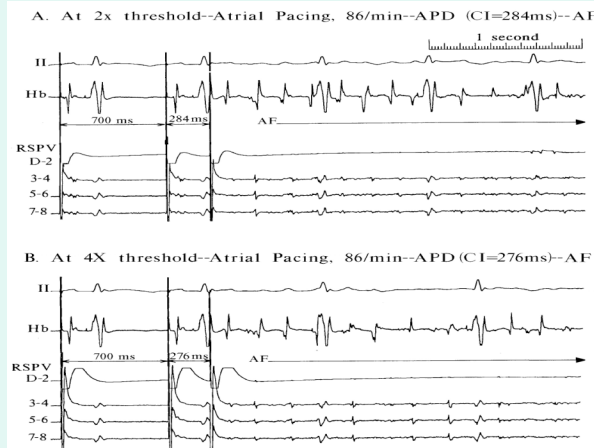
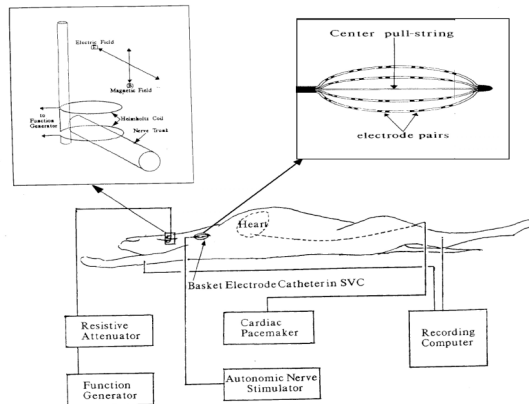
Small case series with adult male mongrel dogs to test electromagnetic fields (EMF) in cardiac arrhythmias.

## RATIONALE

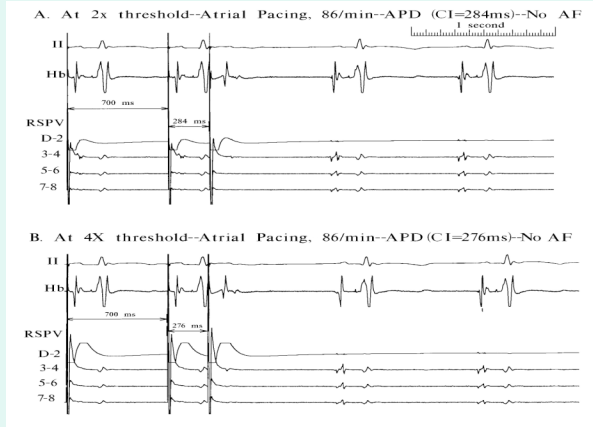
Since electrical stimulation of autonomic nerves can produce significant changes in heart rate and rhythm, it was hypothesized that electromagnetic fields could act on nerves, i.e., conductors to alter heart rhythm, specifically, atrial fibrillation.

## METHODS

- 4 groups dogs
- EMFs applied either to vagosympathetic nerve trunks, dissected in neck, or across the chest



Associated with the increase in neuronal firing provocative cardiac pacing of the heart by delivering an electrically paced beat with a short coupling interval (CI) at two different strengths (2X&4X) causes atrial premature depolarizations (APD) leading to atrial fibrillation (AF) which was not induced in the baseline state, that is, prior to EMF application. The atrial fibrillation is shown by the rapid and irregular atrial activity (best seen in the trace labeled Hb) and the slower, irregular recording in the ECG, (labeled II).

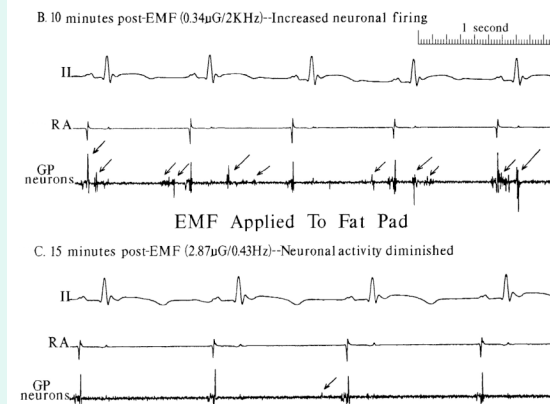


The same provocative pacing protocol now fails to induce atrial fibrillation (AF) when the neuronal firing was attenuated by application of the different EMF to the neurons in the fat pad.

## CONCLUSIONS

Specific amplitude and frequency EMFs applied to the vagosympathetic trunks with ANS induces a significant increase in atrial arrhythmias (APD/AT (atrial tachycardia)/AF). In those showing ANS (autonomic nerve stimulation) induced AF, parasympathetic and sympathetic blockade suggests that specific EMFs act via their effects on the ANS.

These preliminary findings raise many questions that need to be addressed in future studies plus, future studies need to address a noninvasive application of EMFs to the heart.



By the application of a different EMF to the fat pad for 15 minutes, the increased neuronal firing seen in panel A (arrows) could be markedly attenuated (panel B).