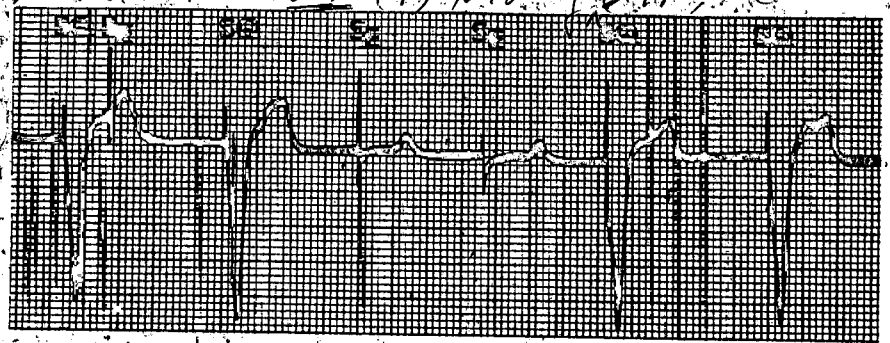


Effect of Microwave Oven on Implanted Cardiac Pacemaker

To the Editor.—Although the effects of external radio-frequency radiation on implanted cardiac pacemakers have received much attention in the literature (Lichter I, Borrie J, Miller WM: Radio-frequency hazards with cardiac pacemakers. *Brit Med J* 1:1513, 1965; Carleton RA, Sessions RW, Graettinger JS: Environmental influence on implantable cardiac pacemakers. *JAMA* 190:938, 1964; Siddons H, Sowton E: *Cardiac Pacemakers*. Springfield, Ill, Charles C Thomas Publisher, 1967, pp 99-102), to our knowledge high-frequency stimuli from microwave ovens have not previously been reported to interfere with pacemaker function. We have recently observed such an interference.

Report of a Case.—A 68-year-old white male physician developed complete A-V block during November 1969. The patient subsequently experienced dyspnea and pedal edema, but did not develop syncope. On Nov 24, 1969, a ventricular sensing pacemaker (Medtronic Corporation, Model #5841) was implanted through the left external jugular vein; the pulse generator was placed in a left subclavicular subcutaneous pocket. He was subsequently free of symptoms until Dec 31, 1969, when he experienced a syncopal episode while having dinner at a restaurant; a physician who was present found no pulse during the episode. The patient later recalled that he had been sitting near a microwave oven when the syncopal episode occurred.

The patient's physical examination was essentially unremarkable and he was found to have a regular pulse of 63 beats per minute. An electrocardiogram revealed complete A-V block and a



2. Sensing nature of pacemaker was demonstrated using stimuli applied subcutaneously from external pacemaker (indicated by S₀) to block the stimuli (S) from the implanted pacemaker.

normal paced rhythm. Chest x-ray films revealed the implanted pacemaker with the pacing catheter tip lying in the apex of the right ventricle.

Stimulation with an external pacemaker via subcutaneous chest needles readily blocked the activity of the implanted pacemaker (Fig 1), at which time the patient complained of transient light-headedness and general discomfort similar to the episode of Dec 31. To evaluate the possible effects of the microwave oven on his pacemaker, the patient was monitored by an ECG while being exposed to a microwave oven available in one of our hospital canteens. When placed in a wheelchair at a distance of five feet from the operating oven, a high-frequency artifact was noted on the ECG tracing, the pacemaker artifact disappeared and a slow idioventricular rhythm appeared (Fig 2); the patient again experienced transient symptoms as he was quickly wheeled away from the oven.

Further Studies.—In an attempt to document further the effects described above, three other patients with implanted transvenous pacemakers were exposed to the radiation from the microwave oven in a similar manner. One patient had a pacemaker identical to that of the initial patient. When placed within five feet of the microwave oven this patient also demonstrated an effective blocking of implanted pacing activity. The other two patients had implanted ventricular sensing pacemakers of a different type (Cordis Corporation, Ectacor model). Although the high-frequency artifact was again noted on the ECG, no

change in pacemaker activity was noted with exposure to the radio-frequency radiations from the oven.

Comment.—The microwave oven used in these tests (Microwave Model 500, Atherton Division, Litton Industries) operates on household current of 115 volts at 60 herz. The microwave frequency emitted is 2,450 megahertz. Similar heating devices are increasingly used in restaurants, canteens, airliners, trains, and private homes.

The increased use of microwave ovens and of pacemakers which are designed to sense cardiac electrical signals makes clear the likelihood of hazardous encounters of the two electronic devices. Patients with sensing pacemakers must be advised of this danger.

- GERALD R. KING, MD
Presbyterian-St. Luke's Hospital
Chicago
- ALBERT C. HAMBURGER, MD
Detroit
- FOROUGH FARSA, MD
- STANLEY J. HELLES, MD
- RICHARD A. CARLETON, MD
Presbyterian-St. Luke's Hospital
Chicago

Needle Biopsy of the Kidney

To the Editor.—Drs. Immergut and Plotkin (211:827, 1970) are to be commended for their courage and candor in reporting their renal biopsy complication. I agree with their conclusion that renal arteriography should be done promptly when faced with postbiopsy bleeding. However, I must take issue with their statement that renal biopsy under fluoroscopic visualization after infusion pyelography is a "blind" procedure.

The advantage of the fluoroscopic pyelographic technique is that the biopsy needle may be easily guided to a point just within the lateral margin of the lower pole of the kidney.

This extra precaution avoids large blood vessels and calyces and mini-

1. High-frequency artifact from microwave oven can be seen. P waves are designated. Paced beats are indicated by sequence of stimulus (S) and following QRS complex (Q). When within five feet of microwave oven, pacemaker stimulus disappeared and idioventricular QRS complexes (Q) appeared at a slow rate.

