

MEGA 2000® Patient Return Electrode Electrosurgery and the Antenna Effect

The antenna effect is often demonstrated by Megadyne's competitors to scare potential users away from the safe, innovative, cost saving technology of the MEGA 2000® Family of Products. The purpose of this bulletin is to explain the antenna effect and the clinical relevance for nurses and surgeons.

The antenna effect is demonstrated by placing the MEGA 2000 on a table or stand. A person holding an orange and the active electrode, stands at a distance from the MEGA 2000 and activates the active electrode and causes an arc to the orange. The reason the person is able to arc to the orange has to do with the high radiofrequency nature of the electrosurgical current. The MEGA 2000 becomes an antenna for the radiofrequency current. The current will capacitively couple from the "transmitter" (i.e. active electrode, orange, and person) with the MEGA 2000 through the air and return to the generator via the MEGA 2000 completing the circuit.

The antenna effect is not limited to the MEGA 2000. It can also be demonstrated using a REM™ type return electrode pad. The REM pad is stuck to a person acting as the "patient". Another person, standing apart from the "patient", holds an orange and activates the active electrode to arc to the orange. Since patients are conductive the REM pad now assumes the size of the patient, creating a very large antenna for the radiofrequency current. This "REM antenna" is very similar to the antenna created by the MEGA 2000. The current capacitively couples with the "patient"/antenna and returns to the generator via the REM pad.

With the antenna effect the ability for the current to return to the generator, and the corresponding electrosurgical arc at the active electrode, depends on two things; the size of the antenna (the patient and return electrode) and the distance between the antenna and the active electrode. These two factors will determine the strength of the electrosurgical arc at the active electrode. The relationship between the electrosurgical arc at the active electrode and the "receiving" antenna (REM pad and Patient or MEGA 2000) is similar to the antenna in your car and the reception for your radio. The farther you are from the radio station the worse your reception will be, unless you increase the size of your antenna.

While it provides for a startling parlor trick, the antenna effect has little clinical relevance if basic proper procedures are followed. Any time you activate the active electrode outside of the surgical site there is a risk for an unintended burn. Thus the active electrode should never be activated away from the surgical site. The instructions for use for the MEGA 2000, which indicate that it is to be placed underneath the patient with minimal materials between the patient and the pad, should be followed without exception. To neglect these important instructions could increase the likelihood for alternate site burns. By abiding by the instructions for use for all electrosurgical devices safety should prevail for both the patient and the staff, and the potential dangers from the antenna effect should be eliminated.