

# MEDICAL USE OF RADIOFREQUENCY (RF) ENERGY

## Background

Radiofrequency (RF) is a form of electrical energy in the frequency range of 300 kilohertz (kHz) to 1 megahertz (MHz). RF has been used in medical applications for decades for such uses as sealing IV fluid bags. But it is the way RF is absorbed in the body that has made it one of today's most advanced surgical techniques, and the reason it is replacing lasers in everything from prostate cancer therapy to cardiovascular procedures.

Unlike other forms of electromagnetic frequencies that cause a "surface effect," wherein the skin feels the heat application, RF energy can penetrate the body and be absorbed in deep body organs without any heat sensation, making it virtually painless and potentially speeding patient recovery.

In application, RF medical devices transmit low frequency radio waves through electrodes, which cause ionic agitation, or friction, increasing the temperature of the tissue. Since a sharp boundary is created between the affected tissue and that surrounding it, surgeons can operate with a high level of precision and control, without much sacrifice to the adjacent normal tissue.

The lower operating temperatures of RF, as compared to traditional electrosurgical or laser surgery tools, enables surgeons to remove, shrink or sculpt soft tissue while simultaneously sealing blood vessels. RF works particularly well on connective tissue, which is primarily comprised of collagen and shrinks when contacted by heat.

### Today's Medical Applications of Radiofrequency

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Radiofrequency energy is being used in a range of new medical treatments. Among its uses are:

- **Vision Correction:** The NearVision<sup>SM</sup>CK<sup>®</sup> (Conductive Keratoplasty<sup>®</sup>) treatment utilizes the controlled release of radiofrequency energy, instead of a laser or scalpel, to reshape the cornea and correct vision in people over age 40. The minimally invasive NearVision CK treatment takes less than three minutes and is done in-office with only topical (eye drop) anesthesia. Using a tiny probe as thin as a human hair, controlled RF energy is applied in a circular pattern and causes constriction, almost like tightening a belt, which gently increases the curvature of the eye to improve near vision for Baby Boomers who want to safely see young again. There is no cutting and no removal of tissue.
- **Liver Cancer:** As an alternative to major open surgery, physicians can treat liver tumors using alternating current radiofrequency (RFA) to heat tumors to over 100 degrees Celsius, thereby destroying cancer cells.

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- **Sleep Apnea:** Physicians successfully use RF energy to reduce the volume of the tongue, one of the primary contributors to obstructive sleep apnea.
- **Snoring:** Radiofrequency energy is delivered by a thin probe through the lining of the palate into the deeper tissues, creating a lesion that reduces the volume of soft tissue and elevates the palate with stiffening. This results in minimal injury to the outer lining, very little discomfort afterwards and a complete recovery time of two or three days. RF is also used to reduce the size of large tonsils when they contribute to airway blockage and snoring.
- **Cosmetic Surgery:** RF-based systems, designed for the treatment of skin in dermatology and plastic surgery applications, can tighten and conform skin by thermal restructuring of the dermal collagen matrix.
- **Enlarged Prostate:** Transurethral needle ablation of the prostate is a procedure used to treat benign prostatic hypertrophy. RF is transmitted through a needle to the tissue at a precise rate for approximately 4 minutes per lesion, thereby killing cells and reducing tissue size.
- **Rapid Heartbeat Syndrome:** Radiofrequency ablation is used to treat some types of rapid heart beating, especially Wolff-Parkinson-White syndrome. A catheter, with an electrode at its tip, transmits RF energy through an accessory pathway to the heart muscle, causing cells in a very small area (about 1/5 of an inch) to die. That stops the area from conducting the extra impulses causing the rapid heartbeats.
- **Tightening Loose Joints:** When applied to loose connective tissue surrounding joints, RF energy tightens the collagen and creates a tighter joint.

Other procedures using RF include treatment of varicose veins, back pain, incontinence, as well as dermatology applications such as skin resurfacing.

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[www.myclarvision.com](http://www.myclarvision.com).

SOURCES: Refractec, Inc., Rita Medical, Inc., Gyrus Group, PLC, Thermage, Inc., Maloney Vision Institute.

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