FAQs about radiosurgery - radioSURG® 2200

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1. What is radiosurgery?

Radiosurgery is the use of high frequent energy for cutting, cutting with simultaneous coagulation and coagulation procedures on human tissue.

2. What is radio frequency?

Radio frequency is an electric current that is generated in the **radioSURG® 2200** with a frequency of 2.2 MHz (2 200 000 cycles per second). This energy of 2.2 million cycles/sec concentrates on the tip of the electrode. As soon as an electrode gets in contact with the tissue, the cell liquid expands, the cell explodes and evaporates, which causes the cutting or coagulation effect. Units that work in the Megahertz range produce the cutting and coagulating effect quicker, which in turn prevents thermal damage in the adjacent tissue. The electrode itself serves only as conductor and does not get hot. This can be very well demonstrated with an activated electrode being held against a blown-up balloon. As heat develops only within tissue the balloon does not burst.

3. How do the different waves / currents work?

Three wave shapes / currents are available.

Cutting current (fully filtered wave)

The cutting wave is the finest wave that produces the smoothest cut and provides for the quickest healing process. This wave produces better results than can be achieved with a scalpel, and should be your choice of wave for all fine cuts. Because this wave develops the lowest lateral heat only few layers of cells evaporate. Excisions taken with this wave can be histologically examined.

Cutting and coagulating current (fully rectified wave)

The fully rectified wave simultaneously cuts and coagulates without causing necrotic tissue changes. Since the wave produces a slightly higher lateral heat than the fully filtered wave, more cell layers evaporate. The wave produces a clean cut with a simultaneous coagulation along the cutting line. The coagulation is so fine and gentle that only a whitish layer of coagulum is visible, which does not hinter the wound healing and disappears in the course of the healing process.

Monopolar / bipolar Coagulation current (partially rectified wave)

The partially rectified wave is exclusively suited for hemostasis and has only little cutting ability. Direct hemostasis is achieved via an electrode (ball or thick needle, for example), indirect hemostasis via clamp or forceps, or bipolar via bipolar forceps. The **radioSURG® 2200** offers 4 varieties of this wave: monopolar permanent or pulse coagulation and bipolar permanent and pulse coagulation. Especially the pulse coagulation revolutionizes hemostasis. During this process high power is applied to the bleeding vessel for a limited time

(adjustable from 0.05 to 0.45 seconds), causing an immediate protein precipitation that "welds" the vessel. Unlike a necrotic vessel, a "welded" one is not likely to break open again.

What does a fulguration current do, and why does the radioSURG® 2200 not have it installed?

A fulguration current causes sparks without being in contact with tissue. The current is installed in many units, and is used for hemostasis under the term "spray coagulation". As uncontrollable deep tissue destruction with necrotic margins occurs during this process, the **radioSURG® 2200** does not have a fulguration wave installed.

4. What is the difference between monopolar and bipolar coagulation?

Monopolar electrodes have active tips (ball, thick needle etc.) on which the waves exit to enter the tissue. The wave conduction occurs through the neutral electrode. Bipolar electrodes have two tips that are simultaneously activated so that energy flows alternately from one tip to the other. For this reason a neutral electrode is not required during bipolar hemostasis. Actually it is incorrect to term a coagulation via ball- or needle electrode monopolar, as this is also a bipolar way of coagulation. The electrode represents one pole, and the neutral electrode that absorbs waves like an antenna and returns them to the unit represents the other one.

5. For which type of surgical procedures can a radiosurgical unit be used?

A radiosurgical unit can be used every time you would use a scalpel. Since operations can be performed without tension, pressure or sliding of the tissue, it is suited for any type of procedure, especially when very fine incisions are required, and if minor or major bleeding is expected. The absolute sterility of cuts along the cutting line of the electrode is a major advantage during radiosurgery, as this prevents germs from being transported (as is often the case when using a scalpel).

6. How do I select the correct electrode and intensity?

Cutting: The finer the electrode, the finer the incision! Fine wire needle electrodes are used for smooth incisions, narrow and round loop electrodes and angular electrodes are available for plastic work. If the electrode slides gently, without pull and drag and without spark formation through the tissue, the intensity setting chosen is correct. The result should be a smooth cut without any discoloration. The intensity setting varies from patient to patient, and it is irrelevant with which intensity setting the desired result is achieved. In any case it is preferable to work with a slightly higher intensity than with a setting that is too low. As high frequency waves require some dampness as conductive medium, the operation area should always be damp (not wet!). Dry skin areas should be dampened with a cotton pad that is moistened with sodium chloride solution. The selection of a larger electrode or a "coarser" wave (cut/ coagulation wave, for example) requires more energy than work with the fully

filtered wave. Experience shows that these parameters cease to be a problem after a short "training" period. The extensive instructions for use and the CD-ROM / video instructions that accompany every unit also provide detailed information. In addition we recommend practical exercises on a beef model prior to an operation on the patient.

Coagulation: An immediate hemostasis should occur during coagulation. This is achieved by gently placing the electrode (ball or thick needle) onto the bleeding vessel, followed by the activation of the unit via finger switch or foot pedal. This causes a gentle surface coagulation without damaging deeper tissue layers, and a coagulum in the shape of a whitish area. The electrode should not be pressed onto the bleeding vessel under any circumstances, which would cause a strong increase in resistance and result in delayed hemostasis and destruction of deeper cell layers, leading to necrosis in the worst case.

Important: It is not possible to coagulate if stagnant blood is present, this would "cook" the adjacent tissue. Stagnant blood must be sprayed off, aspirated or constricted prior to coagulation. We recommend the use of the pulse coagulation with high intensity and short duration, which causes an immediate hemostasis without coagulum or necrosis. As protein coagulates immediately during a contact with the electrode, the formerly bleeding area usually appears as a white spot.

7. How and where should the neutral electrode be attached?

The neutral electrode should be placed as closely to the operating area as possible, and be completely covered by the patient. A correctly placed neutral electrode causes a decreases of resistance so that operations can be carried out with lower intensity settings. Only if a grounded doctor's chair is available (in a dentist's practice, for example), may it be possible to operate without a neutral electrode. In that case the dissipation occurs via the patient into the grounding.

Remember: Lower intensity ➢ less lateral heat ➢ better operation results.

8. Is it possible to get an electric shock when working with a radio frequency unit?

There is absolutely no risk of getting an electric shock. However, a burn is possible if you touch an unprotected metal instrument with an active electrode while in physical contact with the patient. High frequency waves take the way of lowest resistance, and in this case the conduction of waves occurs through the metal instrument and your body. Such cases, however, are extremely rare and none came to our attention during the last years.

9. Is a scalpel cut comparable to a cut made with a radio surgical unit?

Tests have clearly shown that operations carried out with the fully filtered wave and a frequency in the Megahertz range result in a superior healing process when compared to operations performed with a scalpel, on condition that the correct wave, the right intensity, and a suitable unit and electrode were chosen.

10. Can hand pieces and electrodes be sterilized?

Hand pieces and electrodes can be autoclaved at a temperature of up to 134 °C (300 °F). We do recommend to purchase a second set of hand pieces and electrodes so that sterile parts are available at all times. Hand pieces, cables and electrodes should be regularly examined for wear and tear. Please observe the recommendations and comments of the instructions for use.

11. Radiosurgical contraindications

a) any surgical contraindication
b) pace makers
c) flammable vapors and liquids in presence

12. Specification radioSURG® 2200

- ✧ 3 operating modes: cut / cut with simultaneous coagulation / coagulation and bipolar coagulation
- ✧ 3 channels: mono cut / mono coag / bipolar coag
- ✧ hand piece activation automatically activates the corresponding channel, unit does not have to be manipulated
- ✧ digital display of mono cut output (1 - 100 Watt)
- ✧ digital display of mono coag-bipolar coag (1 - 90 Watt)
- ✧ Frequency: 2.2 MHz
- ✧ coagulation degree adjustable from 1 - 9
- ✧ coagulation duration adjustable from 0.05 - 0.45 seconds or permanent coagulation
- ✧ memory function saves the last settings used
- ✧ easy to operate due to comprehensible symbols
- ✧ channels can be activated through either hand piece or foot pedal, unit does not have to be manipulated
- ✧ extensive range of accessories contained in standard equipment
- ✧ hand pieces, cable, neutral electrode, bipolar forceps and electrodes autoclavable
- ✧ electrodes with color-coded shafts
- ✧ most electrode shafts bendable
- ✧ monitored neutral electrode.

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