New Laser and RF Technologies for Medical Applications

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Abstract—New laser and RF technologies for different kinds of surgery are described. The innovative medical equipment, some examples of the application of the new techniques in surgical operations together with gystological results and clinical statistics will be also presented.

Keywords—IR solid state lasers, low temperature plasma, surgery, partially stabilized zirconia, gystology

The first part of the presentation describes new techniques, based on the application of near IR solid state lasers in gynecology and heart surgery.

They are:
- the technique of light absorption contrast for elimination of oncogenic papilloma viruses of women reproductive organs;
- the technique of the synchronized transmiocardial revascularization in heart surgery;

The corresponding medical devices, the results of gystological analysis and clinical statistics are also described.

The second part of the presentation contains the description of new electrosurgical technologies. Specific feature of these technologies is the application of radio frequency currents (RF) in the 0.44-13 MHz range.

Two different modes were developed:
- RF pulsed low temperature plasma (glow discharge) technique and;
- MHz frequency current pulse technique in combination with the special surgical instruments based on innovative material – nanostructure crystals of partially stabilized zirconia.

The working elements of this material provide accomplishment of bloodless surgical operations of different kinds. Some examples of the surgical operations as well as several samples of new electro surgical equipment will be demonstrated.

The application of RF currents and corresponding instruments in different kinds of surgery is very similar to application of the short pulse laser radiation. In both cases the treatment provides high power densities in the treated biological tissues.

This was the main reason to combine these two techniques in this presentation.