NO-AIR-PLASMA CURRENTS AND OZONE THERAPY IN TREATMENT OF PATIENTS WITH DIABETIC FOOT SYNDROME

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Disclosures

Nothing to disclose

AIM OF OUR RESEARCH

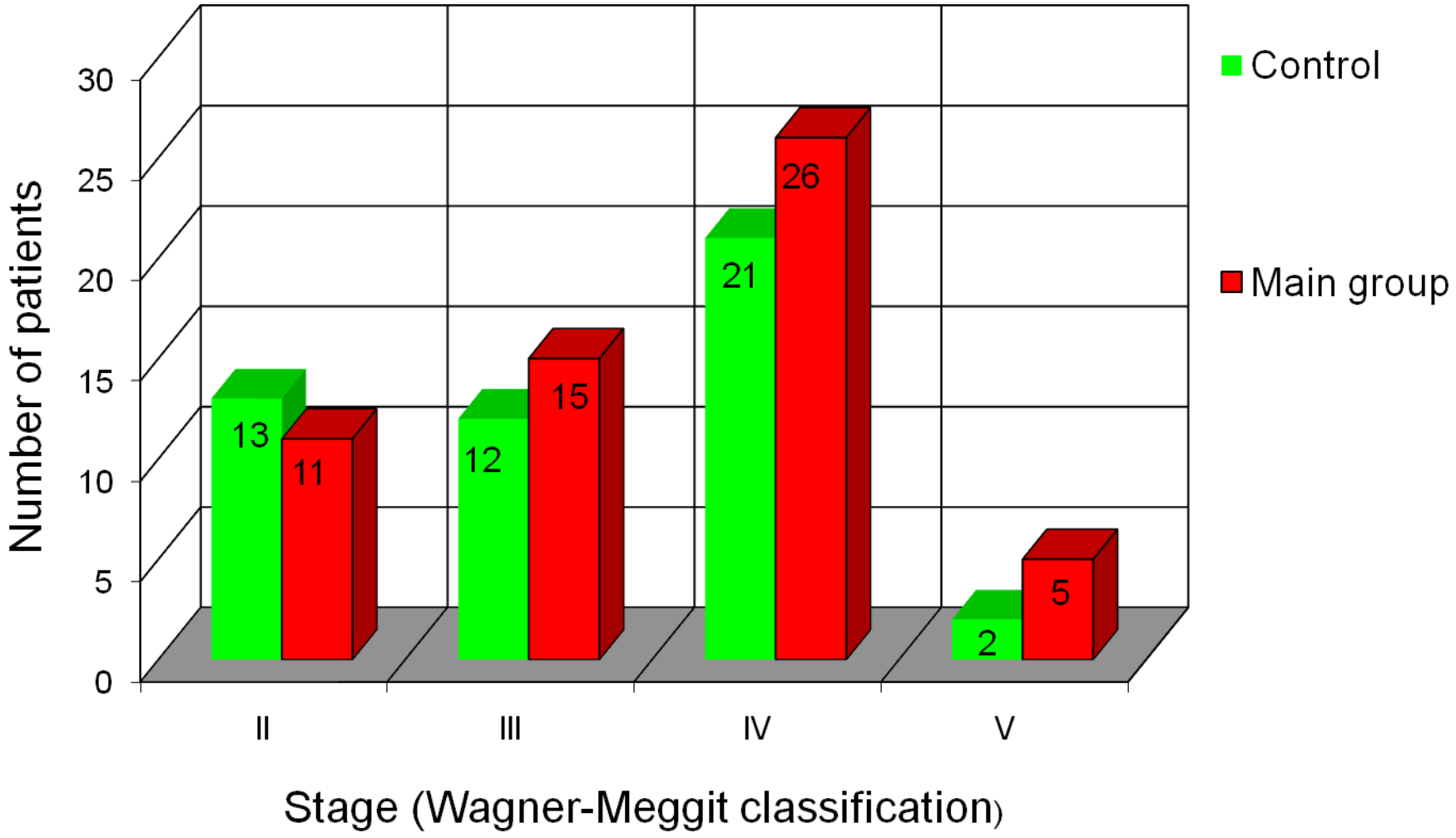
To determine the effect of joint use of NO-air-plasma currents and ozone therapy on cellular elements and the level of bacteriological contamination of wounds occurring as a result of diabetic foot syndrome.

OUR MATERIALS AND METHODS:

Outcomes of the treatment
of 105 patients that underwent corrective surgery on major vessels of lower limbs with surgical complications of the neuro-ischemic form of the diabetic foot syndrome: purulent-necrotic wounds.

60 males, 45 females;
Averege age 63,9±9,7 years

OUR MATERIALS AND METHODS



OUR MATERIALS AND METHODS

Microbiological characteristics of wounds

Mixed microflora	**83,3%**
Monoculture	**11,7%**
Growth of microorganisms is not revealed	**5%**
Staphylococcus aureus	**61%**
Staphylococcus epidermidis	**27%**
Bacteroides fragilis	**21%**
Peptococcus spp.	**17%**
Pseudomonas aeruginosa	**7%**
The degree of initial contamination of wounds	**10^7**

OUR MATERIALS AND METHODS

All patients underwent correction of glycemia, antibacterial, angioprotective and neuroprotective therapy.

Patients in the **study group** (57 – 54,3%) wounds on the feet handled consistently NO-air-plasma flows and the ozone-oxygen gas mixture.

In the **comparison group** (48 – 45,7% patients) was conducted traditional local treatment with antiseptics and water-soluble antibacterial and enzymatic ointments.

OUR MATERIALS AND METHODS

Study group: the NO-air-plasma flows and the ozone therapy.

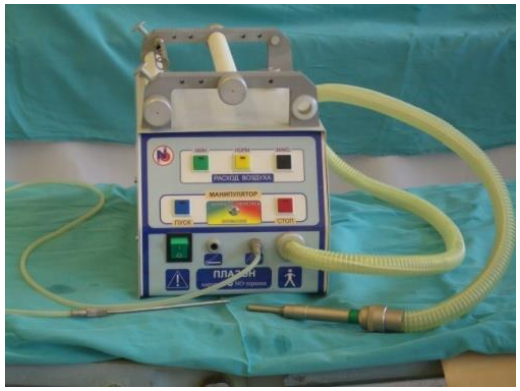








OUR MATERIALS AND METHODS



NO-air-plasma flows:

- total bactericidal effect
- “vaporization” of the necrotizing tissues
- intensification of utilization of oxygen in tissues
- endothelium-protective action
- stimulation of the connective tissue growth

OUR MATERIALS AND METHODS

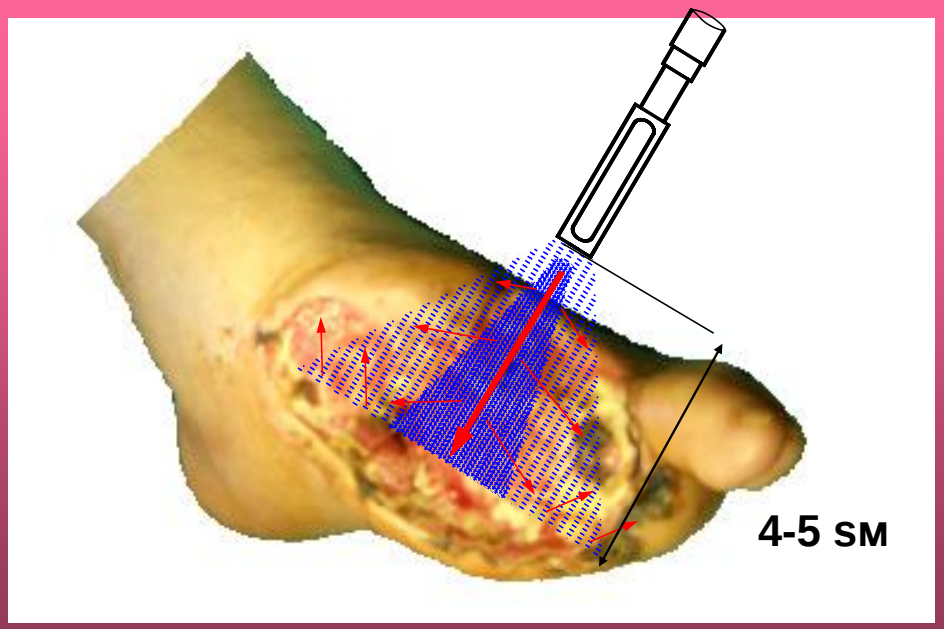


Ozone therapy:

- antimicrobial, fungicidal and antiviral effects
- immunomodulating effects
- intensification of microcirculation
- improvement of the rheological blood properties
- normalization of the processes of lipid peroxidation and antioxidant protection
- increasing of blood oxygenation and reduction of tissue hypoxia

OUR MATERIALS AND METHODS

Step I: The method of wound treatment by NO-containing air-plasma flows.



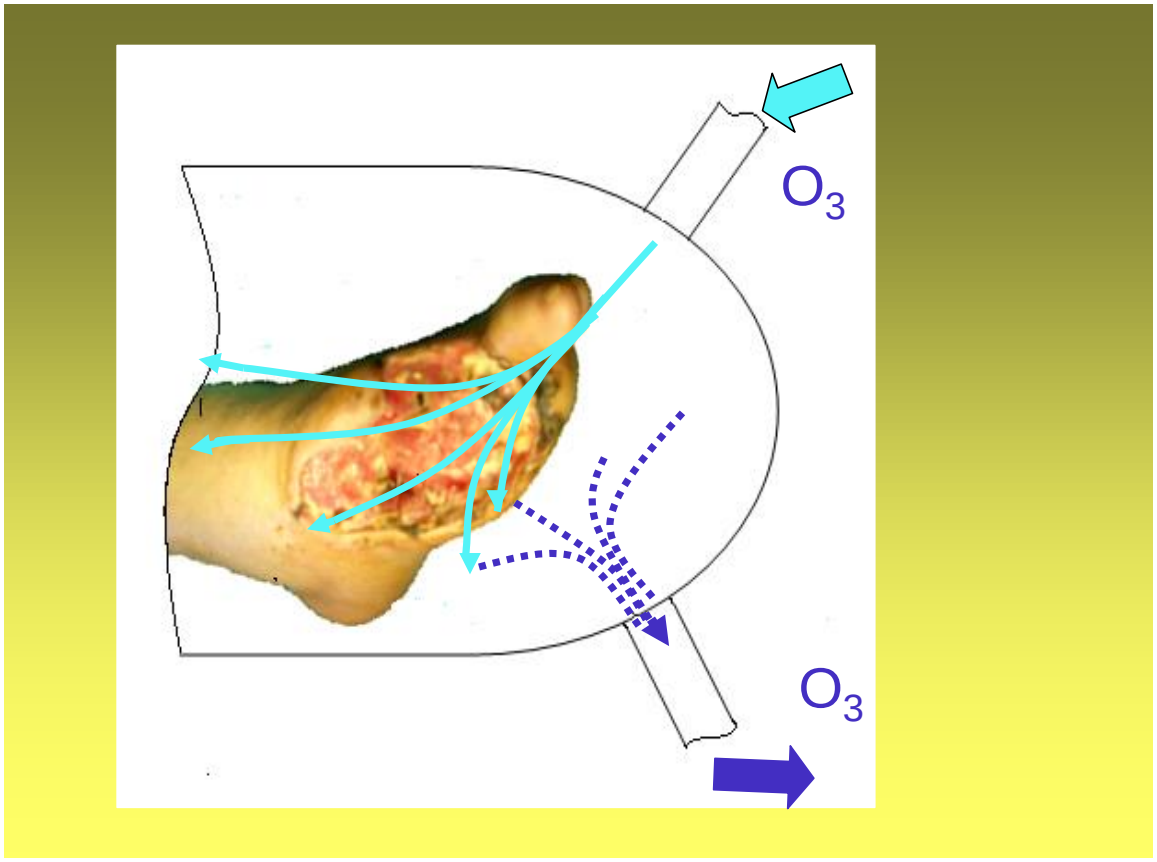
Step I

NO-therapy

3 min.

OUR MATERIALS AND METHODS

Step II: The methods of treatment the wound surface ozone-oxygen mixture in the camera outdoor irrigation.



Step II

O_3- therapy

20 min.

40 mg/l, 0,5 l/min

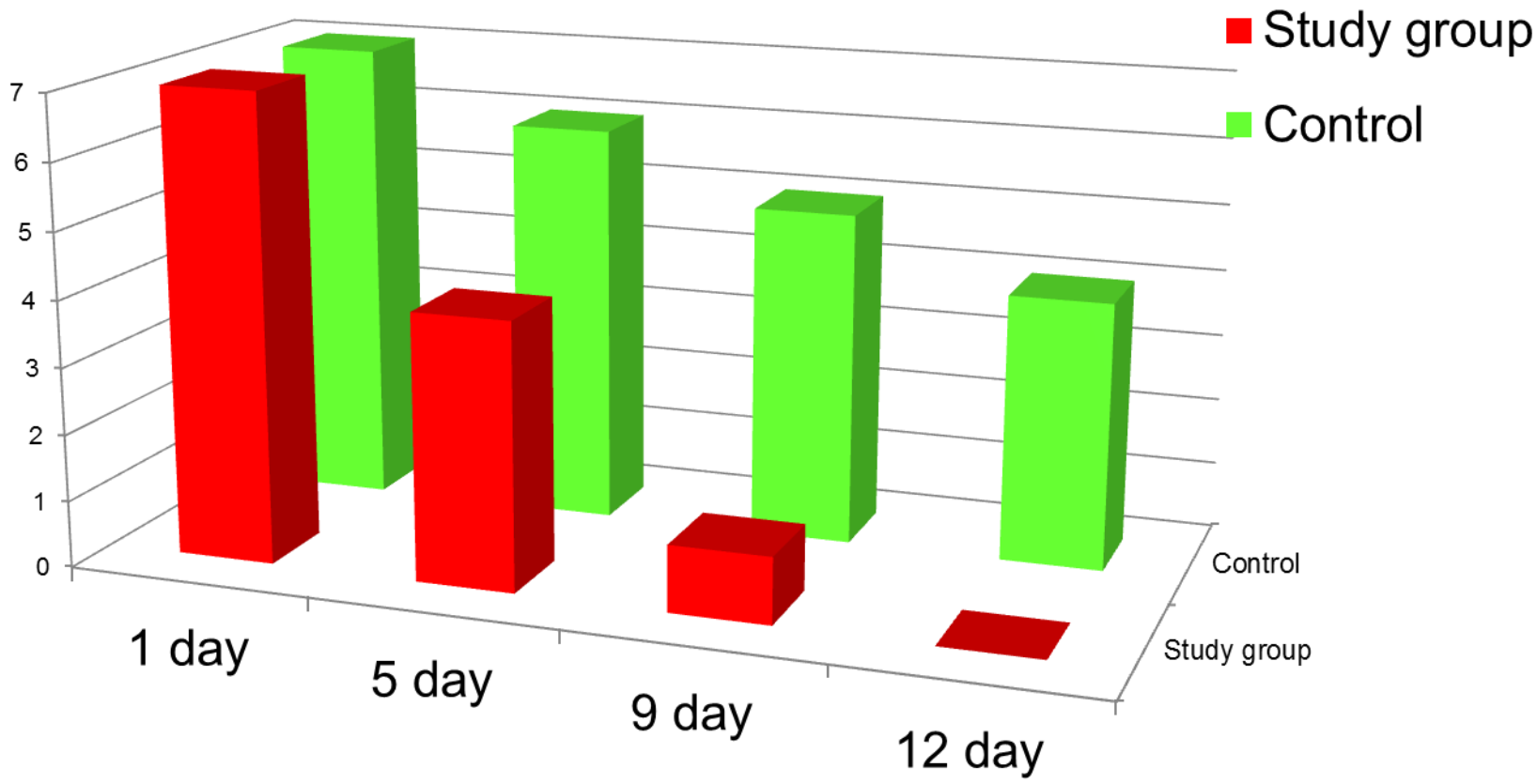
OUR MATERIALS AND METHODS

Control methods:

- bacteriological parameters on 5, 9 and 12 days;
- the proliferative activity of fibroblasts and epithelial cells on 5, 7, 9 and 12 days.

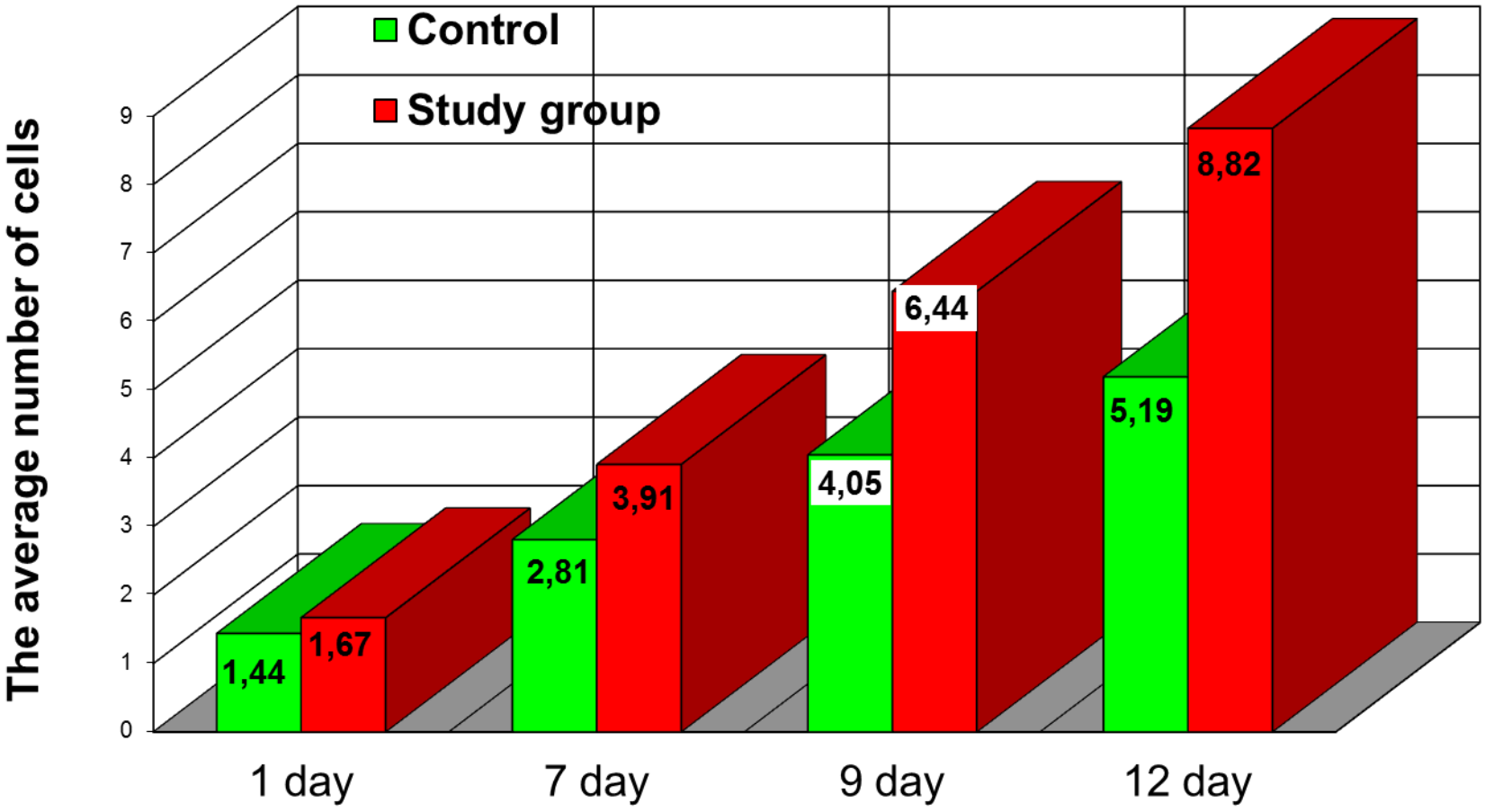
RESULTS

Microbial colonization of wounds



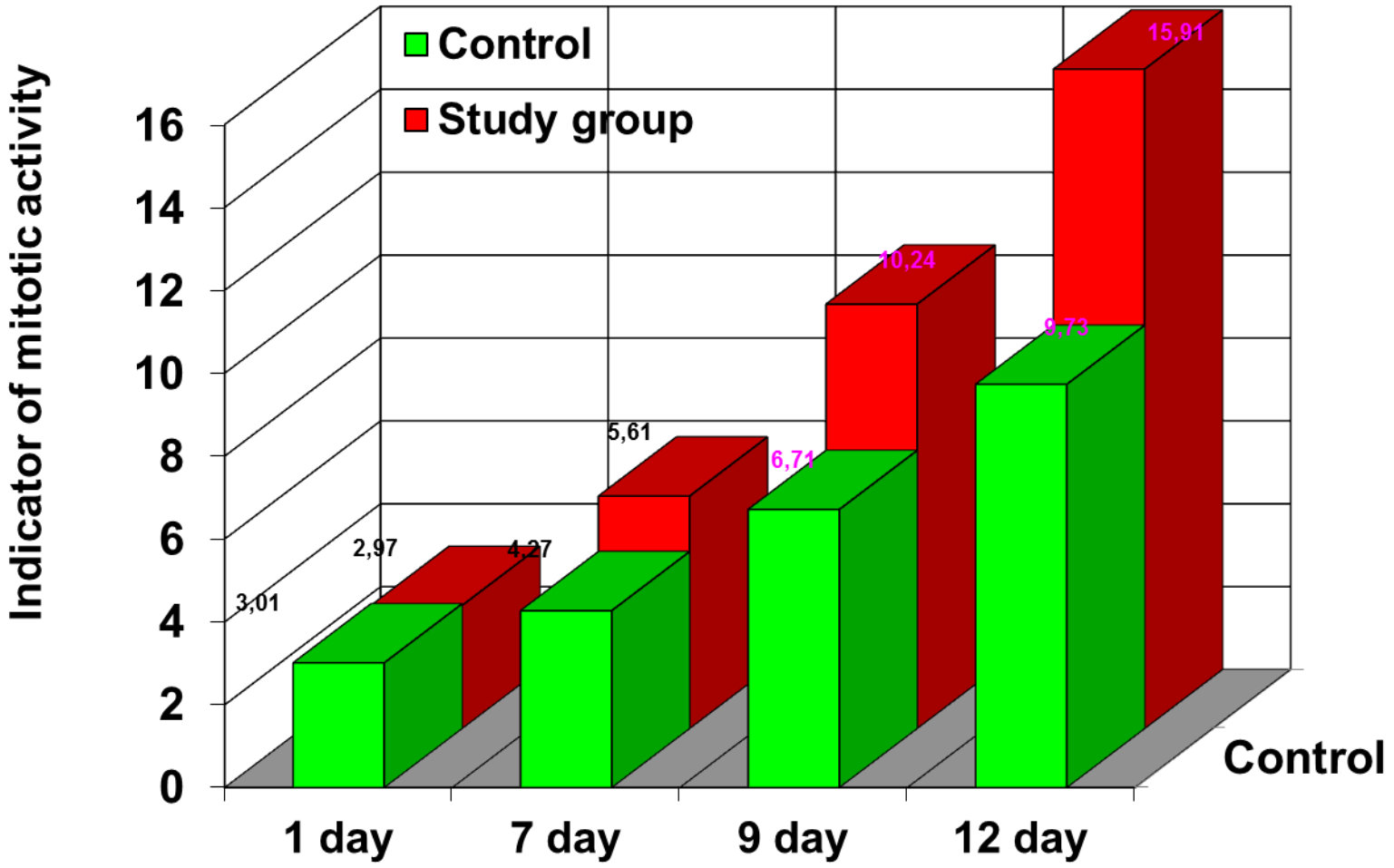
RESULTS

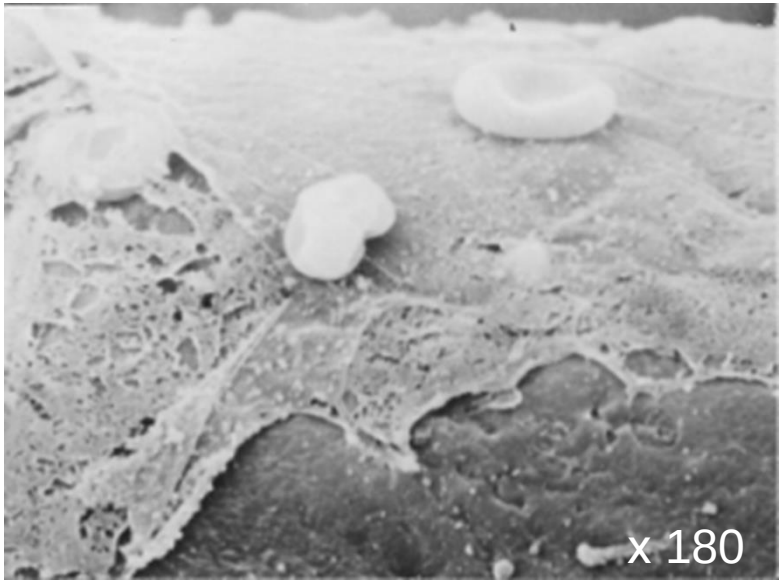
The proliferative activity of fibroblasts



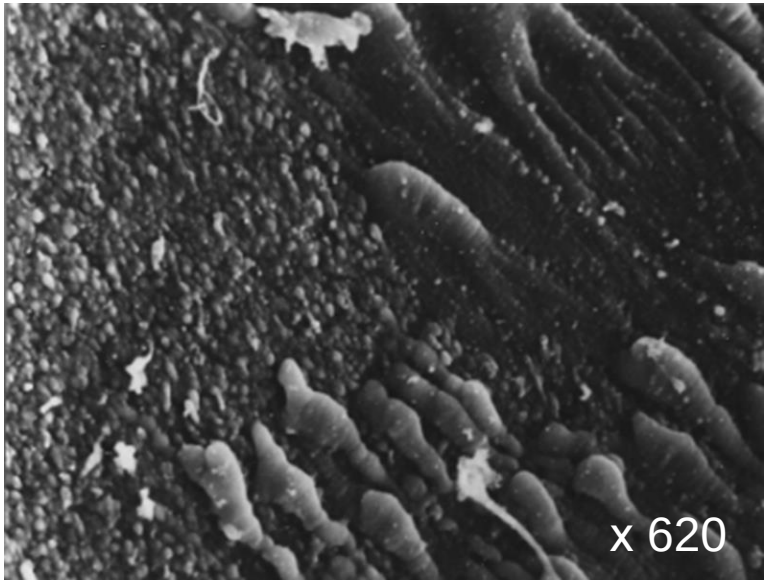
RESULTS

The proliferative activity of epithelial cells

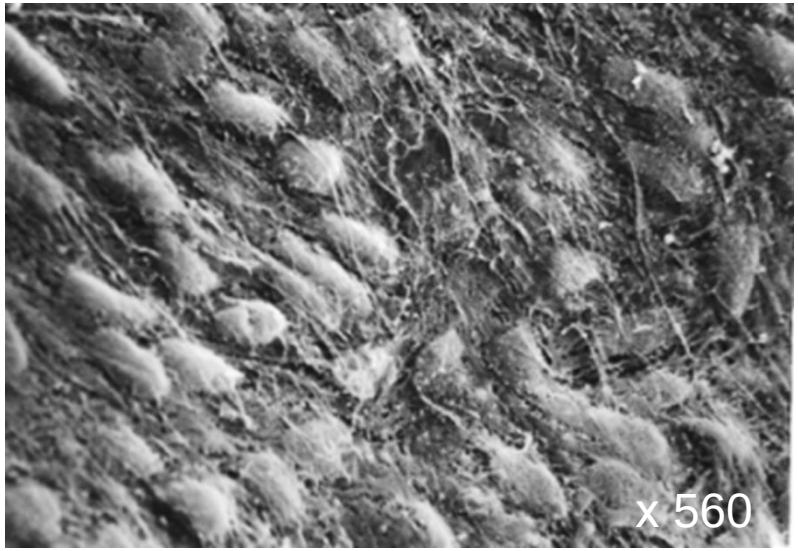




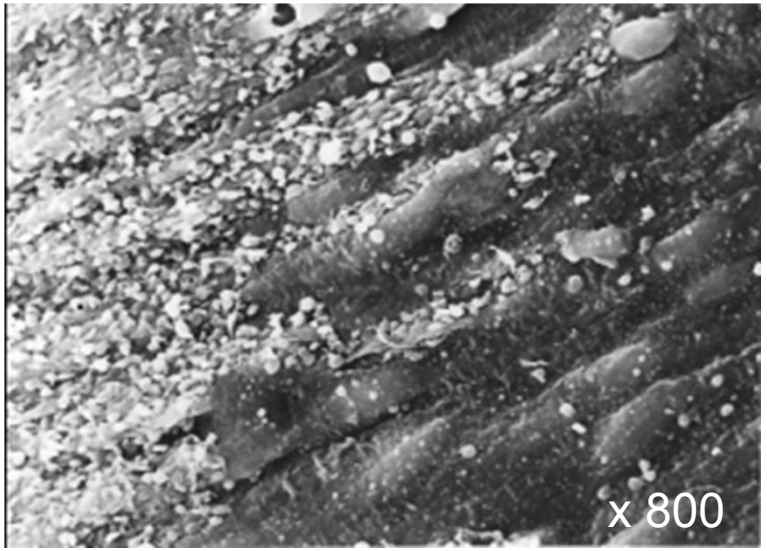
1 day



7 day



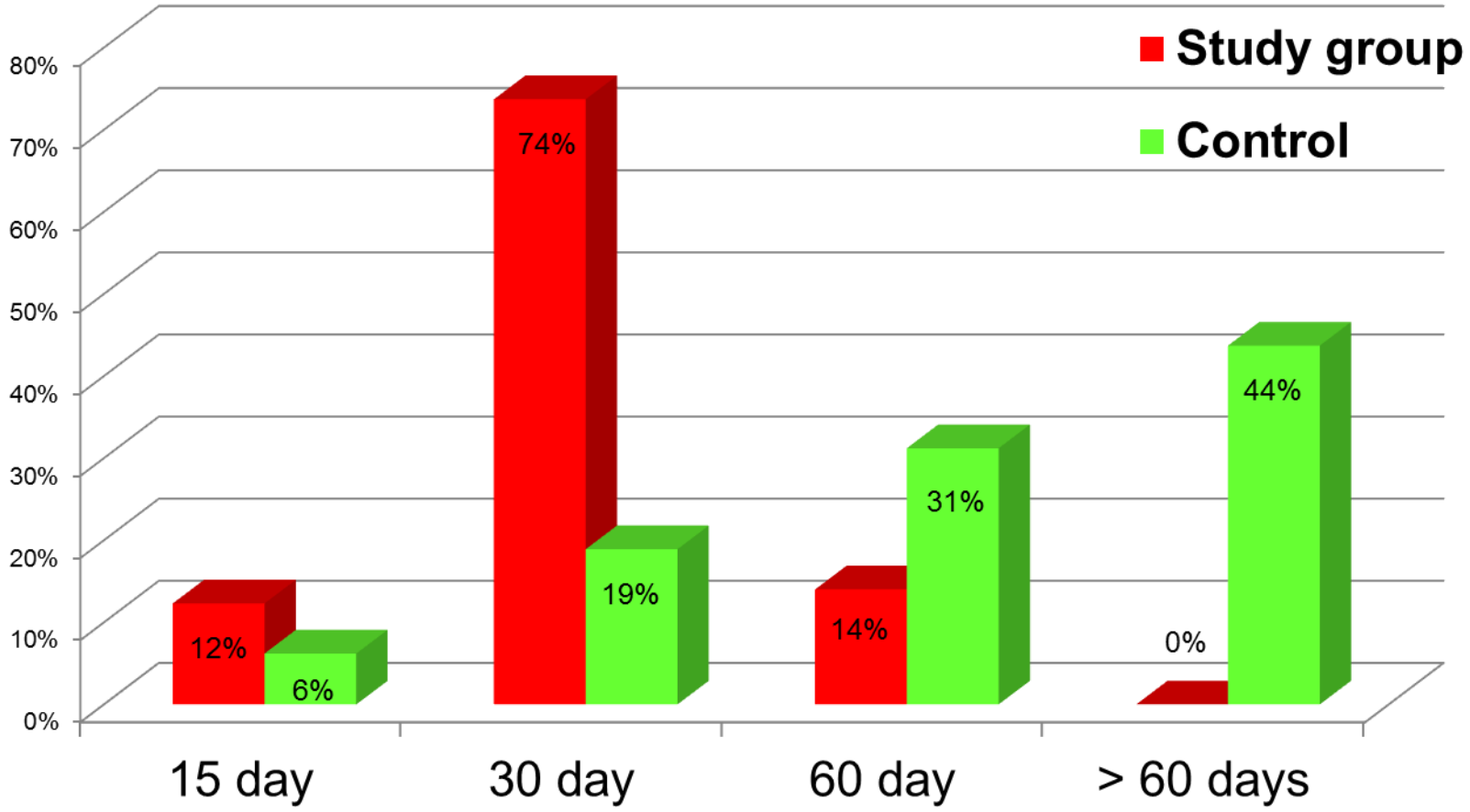
9 day



12 day

RESULTS

Terms of wound healing



RESULTS

Relapse rate of infectious complications:

Study group – 3 patients (**5,4%**)

Control group – 11 patients (**22,9%**)

Conclusion

Sequenced application of NO-air-plasma currents and ozone therapy in treatment of patients with diabetic foot syndrome is characterized with pronounced bactericidal effect and boosts epithelialization process, making it two times faster.

Acknowledgements

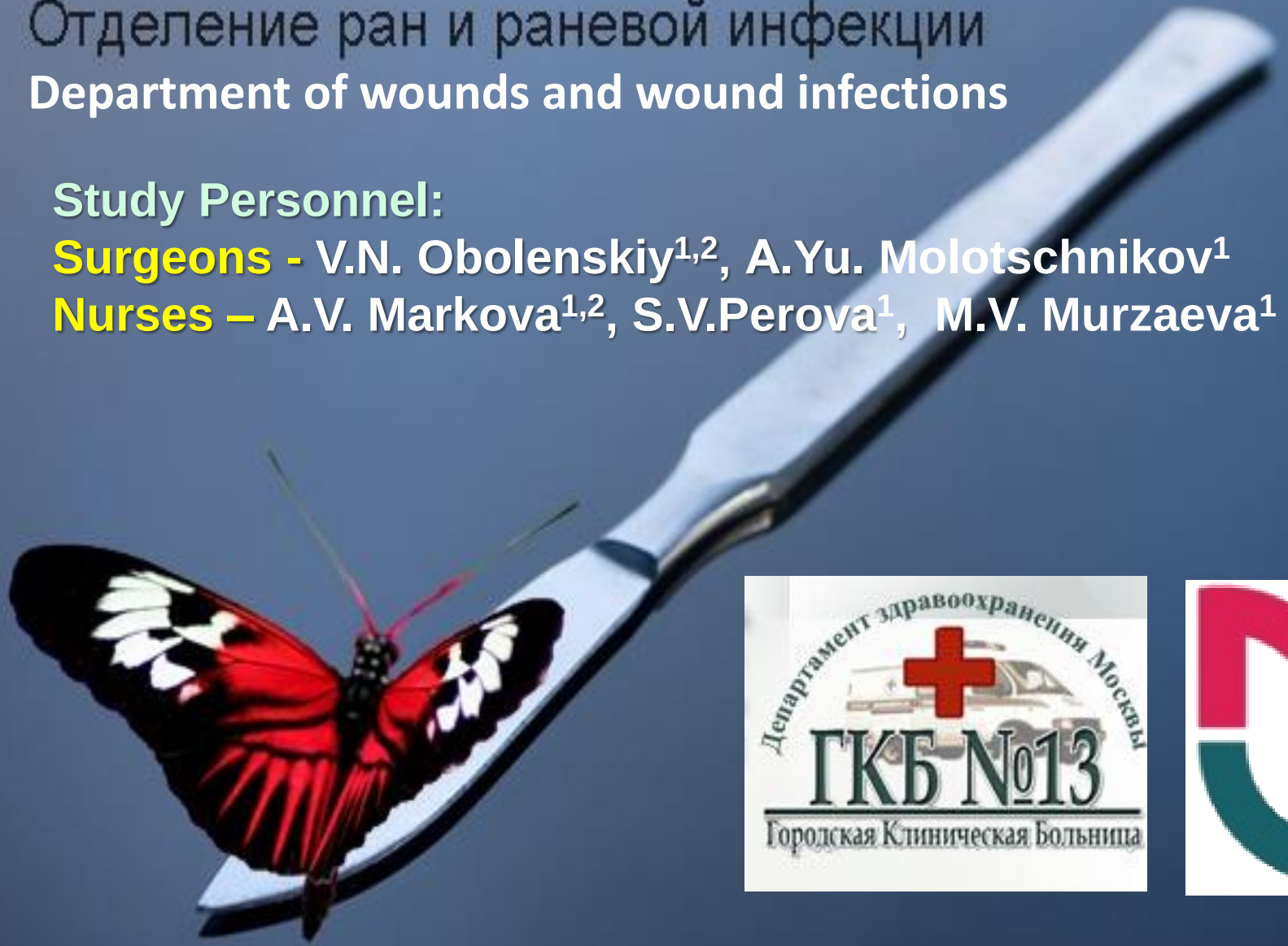
Отделение ран и раневой инфекции

Department of wounds and wound infections

Study Personnel:

Surgeons - V.N. Obolenskiy[1,2], A.Yu. Molotschnikov[1]

Nurses – A.V. Markova[1,2], S.V.Perova[1], M.V. Murzaeva[1]



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Thank you for your attention !

