

**HIVAMAT® (DEEP OSCILLATION®) IN THE TREATMENT
OF EXCISIONAL WOUNDS
(EXPERIMENTAL STUDY)**

Wound Healing Effects of Deep Electrical Stimulation": Mikhailchik E., Titkova S., Anurov. M., Suprun M.,
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SPLIT THICKNESS EXCISIONAL WOUND MODEL
(The model, regime of DEEP OSCILLATION® exposure, and photographs see in the Power Point files)

Wound healing effect.

Planimetry results (mm², Mean±SD).

	Intraoperative wound size	4 days after operation	8 days after operation
DEEP OSCILLATION®	856.78±43.57	528.47±82.71*;**	37.55±27.21*;**
CONTROL	851.20±62.87	619.62±69.62*	140.67±79.12*

*- p<0.05 vs. Intraoperative wound size

** - p<0.05 vs. CONTROL

Conclusions: DEEP OSCILLATION® exposure resulted in significant improvement of the wound healing process seen at the 4th and 8th days afterwounding

Biochemical effects.

CL, whole blood (mV, Mean±SD).

	Before operation	2 days after operation	4 days after operation	6 days after operation	8 days after operation
DEEP OSCILLATION®	8.2±2.5	13.8±3.3*	12.5±4.4*	14.7±3.9*	13.8±2.3*
CONTROL	8.6±2.3	17.7±7.7*	14.1±5.4*	14.9±4.8*	15.1±5.3*

*- p<0.05 vs. Before operation

Conclusions: DEEP OSCILLATION® exposure did not affect significantly the free radical production in the circulating blood. Therefore we could suggest it did not have **generalized effects** on the biochemical processes

MPO, granulation tissue (mkmol/g prot, Mean±SD).

	4 days after operation	8 days after operation
DEEP OSCILLATION®	225.1±78.0	196.3±2.3
CONTROL	243.9±65.1	197.6±3.7

Conclusions: DEEP OSCILLATION® exposure neither increase nor decrease the recruitment of granulocytes into the granulation tissue. Therefore DEEP OSCILLATION® did not affect the normal process of tissue regeneration.

MPO, new epidermis (mkmol/g prot, Mean±SD).

	8 days after operation
DEEP OSCILLATION®	60.2±6.5*
CONTROL	90.7±9.3

*- $p < 0.005$ vs. CONTROL

Conclusions: DEEP OSCILLATION® exposure resulted in the significant inhibition of myeloperoxidase activity in the new epidermis. Therefore we concluded that DEEP OSCILLATION® possessed the anti-inflammatory effect.

GPx, granulation tissue (un/mg prot, Mean±SD).

	4 days after operation	8 days after operation
DEEP OSCILLATION®	0.75±0.15	0.82±0.03*
CONTROL	0.75±0.11	1.03±0.07

*- p<0.05 vs. CONTROL

Conclusions: DEEP OSCILLATION® exposure resulted in significant inhibition of the glutathione peroxidase activity in the granulation tissue that reflected its anti-oxidant and anti-inflammatory action

GPx, new epidermis (un/mg prot, Mean±SD).

	Before operation	8 days after operation
NORMAL EPIDERMIS	0.35±0.11	
DEEP OSCILLATION®		1.09±0.15*
CONTROL		0.98±0.17*

*- p<0.05 vs. NORMAL EPIDERMIS

Catalase, granulation tissue (mkg/mg prot, Mean±SD).

	4 days after operation	8 days after operation
DEEP OSCILLATION®	9.02±5.67	9.76±3.32
CONTROL	10.26±2.85	5.55±2.71

Catalase, new epidermis (mkg/mg prot, Mean±SD).

	Before operation	8 days after operation
NORMAL EPIDERMIS	22.03±5.09	

DEEP OSCILLATION®		19.81±5.06**
CONTROL		11.47±5.26*

*- p<0.05 vs. NORMAL EPIDERMIS

** - p<0.05 vs. CONTROL

SOD, granulation tissue (un/mg prot, Mean±SD).

	4 days after operation
DEEP OSCILLATION®	2.99±0.04
CONTROL	3.46±0.66

SOD, new epidermis (un/mg prot, Mean±SD).

	Before operation	8 days after operation
NORMAL EPIDERMIS	2.44±1.32	
DEEP OSCILLATION®		2.76±0.78
CONTROL		2.68±1.39

Antiedematous effect.

Ratio of tissue weight to dry tissue weight, granulation tissue (g/g, Mean±SD).

	4 days after operation
DEEP OSCILLATION®	1.977±0.213*
CONTROL	2.398±0.266

*- p<0.05 vs. CONTROL

Conclusions: DEEP OSCILLATION® exposure significantly decreased swelling in the wounded area therefore the ratio of dry to wet tissue weight dropped statistically significant

FULL THICKNESS EXCISIONAL WOUND MODEL

Wound healing effect.

Planimetry results (mm², Mean±SD).

	Intraoperative wound size	4 days after operation	8 days after operation
DEEP OSCILLATION®	418.42±22.23	178.43±20.54*;**	50.9±11.45*;**
CONTROL	418.61±17.17	241.11±42.31*	82.93±14.09*

*- p<0.05 vs. Intraoperative wound size

** - p<0.05 vs. CONTROL

Conclusions: DEEP OSCILLATION® exposure resulted in significant improvement of the wound healing process seen at the 4th and 8th days after wounding

Biochemical effects.

CL, whole blood (un, Mean±SD).

	Before operation	2 days after operation (before procedure)	2 days after operation (after procedure)
DEEP OSCILLATION®	8.7±4.5	15.5±5.8	32.7±9.4*,**
CONTROL	8.7±4.5	19.7±5.3*	37.6±9.6*,**

*- p<0.05 vs. Before operation

** - p<0.05 vs. Before procedure

Conclusions: DEEP OSCILLATION® exposure did not affect significantly the free radical production in the circulating blood. Therefore we could suggest it did not have **generalized effects** on the biochemical processes

MPO, edge of wound (mkmol/g prot, Mean±SD).

	Before operation	4 days after operation	8 days after operation
NORMAL SKIN	110.6±55.4		
DEEP OSCILLATION®		180.9±42.3**	201.7±94.8**
CONTROL		293.8±32.9*	360.5±146.8*

*- p<0.05 vs. NORMAL SKIN

** - p<0.05 vs. CONTROL

Conclusions: DEEP OSCILLATION® exposure resulted in the significant inhibition of myeloperoxidase activity in the wound. Therefore we concluded that DEEP OSCILLATION® possessed evident anti-inflammatory effect.

MDA, edge of wound (mkmol/g prot, Mean±SD).

	Before operation	4 days after operation	8 days after operation
NORMAL SKIN	0.47±0.07		
DEEP OSCILLATION®		0.52±0.11**	0.58±0.13
CONTROL		0.86±0.19*	0.54±0.12

*- p<0.05 vs. NORMAL SKIN

** - p<0.05 vs. CONTROL

Conclusions: DEEP OSCILLATION® exposure resulted in the significant inhibition of lipid peroxidation in the wound at the 4th day. Therefore we concluded that DEEP OSCILLATION® possessed both antioxidant and anti-inflammatory effect.

Antiedematous effect.

Ratio of tissue weight to dry tissue weight, edge of wound (g/g, Mean±SD).

	Before operation	4 days after operation	8 days after operation
NORMAL SKIN	1.908±0.097		
DEEP OSCILLATION®		1.767±0.142**	1.921±0.192**
CONTROL		2.205±0.271*	2.190±0.147*

*- p<0.05 vs. NORMAL SKIN

** - p<0.05 vs. CONTROL

Conclusions: DEEP OSCILLATION® exposure significantly decreased swelling in the wounded area therefore the ratio of dry to wet tissue weight dropped statistically significant