Serum protein relative percentages for mice exposed to parallel (E_{II}) and perpendicular ($E_{\perp}$) electrostatic fields

Electrostatic field (volts/m)	Albumin	α	β	γ
7 Days				
$E_{II} = 2.7 \times 10^3$	65.3 ± 1.7	10.0 ± 2.3	18.5 ± 1.2	6.2 ± 0.7
$E_{II} = 10.7 \times 10^3$	59.1 ± 5.3	11.4 ± 2.0	22.0 ± 2.0 [a]	6.9 ± 1.4
$E_{\perp} = 5.7 \times 10^3$	62.2 ± 2.3	12.1 ± 1.0	17.3 ± 0.8	8.5 ± 1.0 [a]
Control	63.9 ± 3.8	12.6 ± 0.6	17.6 ± 0.6	6.0 ± 1.0
14 Days				
Electrostatic field (volts/m)	Albumin	α	β	γ
$E_{II} = 2.7 \times 10^3$	58.6 ± 3.4	14.0 ± 2.5	20.3 ± 2.3	7.7 ± 1.3
$E_{II} = 10.7 \times 10^3$	56.2 ± 2.6	13.9 ± 1.4	22.7 ± 1.4 [a]	7.2 ± 1.4
$E_{\perp} = 5.7 \times 10^3$	57.9 ± 3.3	16.0 ± 1.2	20.7 ± 1.8	5.3 ± 1.4
Control	56.3 ± 4.0	17.4 ± 3.9	19.8 ± 1.8	6.3 ± 2.0
21 Days				
Electrostatic field (volts/m)	Albumin	α	β	γ
$E_{II} = 2.7 \times 10^3$	57.7 ± 2.0	13.3 ± 1.0	23.3 ± 1.1 [a]	6.0 ± 1.2
$E_{II} = 10.7 \times 10^3$	54.6 ± 2.8 [a]	15.0 ± 1.4	24.1 ± 1.0 [a]	6.4 ± 1.5
$E_{\perp} = 5.7 \times 10^3$	61.8 ± 1.5 [a]	13.1 ± 0.6	19.0 ± 1.4 [a]	5.9 ± 0.7
Control	58.6 ± 1.5	13.4 ± 1.2	21.6 ± 1.1	6.2 ± 1.5

[a] $P < 0.05$ for a two-tailed t-test.

Résumé. Chez des souris ayant été exposée sur tout leurs corps aux champs électrostatiques parallèles à la surface de la terre, le pourcentage relatif des β-protéines de leur sérum s'élève. Nos calculs montrent que l'énergie délivrée par ces champs est négligeable. Son effet sur les β-protéines ne paraît donc pas être le résultat d'un transfer d'énergie, mais plutôt un effet informationnel.

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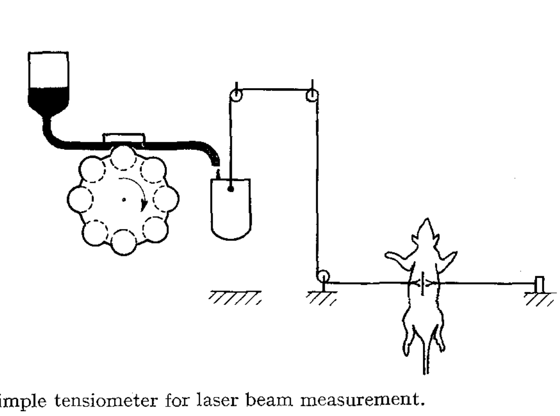
Stimulation of Wound Healing with Laser Beam in the Rat

In the preceding works it was demonstrated that the healing of surgical wounds induced in laboratory animals was enhanced by laser irradiation[1,2]. The promoting effect of laser beam on wound healing has been confirmed in the clinics: so far 26 cases of clinical healing have been reported[3]. The wounds healed by laser beam had previously failed to respond to usually applied methods, included plastic surgery. The aim of the present experiment was to study the effect of laser beam on wound healing by the simple method of determining tensile strength (TS).



Simple tensiometer for laser beam measurement.

Sprague-Dawley (CFY) male rats of 150 + 10 g were used. Depilation along the dorso-lumbar region was performed with an electric clipper and depilatory cream. A slit (2.5 cm long) was cut into the skin of the central line, whereafter the edges of the wound were closed with 2 Michel wound clips. The wound surface of 1 cm length between the two clips was exposed to laser beam twice for 3 min, daily. The source of radiation was an He-Ne gas-laser (Hungarian Optical Works, 5 mW energy output power). For the time of irradiation, the animals were anaesthetized with nembutal (40 mg/kg, i.p.), the controls being given similar treatment. The first dose of laser beam was timed for 4 h after incision of the wound. 3, 5, 8 and 12 days after having been wounded, respective groups of

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Effect of laser beam on wound healing: tensile strength measurement

Days after wounding	Tensile strength (g)	Mean ± S.E.	Difference from the controls	
	Laser-irradiated	Control	%	P
3	120.1 ± 8.8[a]	123.5 ± 7.9	− 2.8	
5	361.8 ± 34.8	281.6 ± 25.8	+ 28.5	$0.1 > P > 0.05$
8	644.0 ± 38.8	438.1 ± 17.1	+ 47.0	$P < 0.001$
12	748.6 ± 26.2	618.3 ± 16.2	+ 26.2	$0.01 > P > 0.001$

[a] 12 rats/group.

rats were killed with chloroform, the two clips were removed and TS were determined with a simple tensiometer, as illustrated in the Figure. Measurement was performed in situ, 2 alligator clips were placed to 1 cm distance from the wound margins opposite each other. A peristaltic pump working at constrant rate dropped 2.32 g mercury in even rhythm into a vessel which pulled apart the wound margins by sheer weight. The time from starting the pump to the moment when the wound was disrupted was recorded and was considered proportional to the TS of the wound. The results are presented in the Table.

On daily irradiation with laser beam, TS increased considerably. Slight increase was demonstrable on the 5th day, on the 8th day difference from the controls was highly significant; on the 12th day increase of TS was of lesser degree but still significant.

As evidenced by the results obtained, wound healing was promoted by laser beam particularly in the early stage. The healing of wounds is known to ensue in several consecutive, fairly distinguishable phases. The first, i.e. 'lag phase', is one of typical acute inflammatory reaction, indicated by microcirculatory disorder, plasma-protein leakage, thrombus formation, leukocyte emigration, the development of new capillaries with deposits of thin reticular fibres. The next, proliferative phase is decisive in the vascularization of the 'dead space' between the two margins of the wound[4]. Proliferative vascular activity is followed by fibroplasia and the accumulation of collagen fibres. In this last stage of cicatrization, reticular fibres are replaced by collagen ones and granulation tissue develops, containing fully formed blood vessels and plenty of fibroblasts.

According to our results, the effect of laser beam is the most marked in the phase of proliferative vascular activity. It has been shown in another study that the development of new blood vessels in the rabbit's ear-chamber was strongly enhanced by laser irradiation[3,5]. It seems probable that in the increased TS a decisive role is played by the larger number of vessels developed, as a result of laser irradiation. Besides richer vascularisation, the protein-biosynthesis-increasing effect of laser irradiation (observed in fibroblasts) may also have a hand in augmenting TS[6]. Collagen formation and accumulation play a decisive role in wound healing, and by stimulation of fibroblast-metabolism, laser beam may promote these processes.

Zusammenfassung. Die Laser-Wirkung auf die Zugfestigkeit geschnittener und mit Klammern vereinigter Hautwunden wurde in Ratten-Versuchen geprüft. Täglich wiederholte Bestrahlungen mit Helium-Neon-Gas-Laser ergaben eine wesentliche Steigerung der Zugfestigkeit.

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Variations de l'excitabilité et de la conduction nerveuse sous l'influence des micro-ondes

Nous nous sommes intéressés à l'étude des variations du fonctionnement du système nerveux sous l'influence des micro-ondes pour plusieurs raisons. D'une part, de nombreux rapports font état de l'apparition, chez des sujets apparemment sains, de troubles nerveux: fatigabilité, asthénie, perturbation du sommeil, hyper-excitabilité neuromusculaire, à la suite d'une exposition fréquente et prolongée aux ondes électro-magnétiques émises par les radars. D'autre part, des études expérimentales laissent supposer une perturbation de la pompe à Na^+ lors d'irradiation par les micro-ondes.

Fleming[1], ainsi que MacApee[2] observèrent des effets neurologiques par micro-échauffement à une fréquence de 3 GHz (puissance: 156 mW/cm²). Par la suite, Kamenski[3] a pu mettre en évidence une modification de la propagation de l'influx nerveux, indépendante de l'effet thermique, à la seule longueur d'onde étudiée (2,4 GHz).

En ce qui nous concerne, nous avons étudié les effets spécifiques des micro-ondes sur le nerf sciatique de grenouille. L'originalité de notre travail réside dans l'exploration systématique de la gamme de fréquence de 1 à 11 GHz, avec une puissance absorbée de 100 mW. Cette

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