

The effect of low intensity laser irradiation of inflamed udders on the efficacy of antibiotic treatment of clinical mastitis in dairy cows

Malinowski, Edward & Krumrych, Wiesław & Markiewicz, Hanna. (2019).

Abstract

The aim of the study was to evaluate the effect of STP-99 laser irradiation applied locally to inflamed cow udders on the efficacy of clinical mastitis treatment with either intramammary infusions of antibiotic products or systemic injections of antibiotics. Examinations were carried out on 124 milking dairy cows suffering from clinical, bacterial mastitis. Cows with signs of local acute inflammation were treated with approved intramammary antibiotic products at labeled doses as control. The exposed cows received the same antibiotic treatment but were also subjected to irradiation of the inflamed udders with a laser for 5 consecutive days (2 minutes a day). Cows with local and systemic signs of mastitis were treated with either intramuscular injections of approved antibiotics in label doses alone (controls), or with the same intramuscular treatment protocol and laser irradiation of inflamed glands for 5 consecutive days (2 minutes a day). The recovery rate after intramammary treatment with antibiotics was 43.7%. Irradiation with laser significantly ($P < 0.05$) increased the recovery rate by 31.2%. The recovery rate in the cow cohort receiving systemic treatment with antibiotics was 46.7%. The laser irradiation resulted in a 16.6% increase in recovery. Supportive treatment with laser irradiation increased recovery rates by 24.2%.

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Low-Level Laser Therapy Attenuates LPS-Induced Rats Mastitis by Inhibiting Polymorphonuclear Neutrophil Adhesion

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ABSTRACT

The aim of this study was to investigate the effects of low-level laser therapy (LLLT) on a rat model of lipopolysaccharide (LPS)-induced mastitis and its underlying molecular mechanisms. The rat model of mastitis was induced by inoculation of LPS through the canals of the mammary gland. The results showed that LPS-induced secretion of IL-1 β and IL-8 significantly decreased after LLLT (650 nm, 2.5 mW, 30 mW/cm²). LLLT also inhibited intercellular adhesion molecule-1 (ICAM-1) expression and attenuated the LPS-induced decrease of the expression of CD62L and increase of the expression of CD11b. Moreover, LLLT also suppressed LPS-induced polymorphonuclear neutrophils (PMNs) entering the alveoli of the mammary gland. The number of PMNs in the mammary alveolus and the myeloperoxidase (MPO) activity were decreased after LLLT. These results suggested that LLLT therapy is beneficial in decreasing the somatic cell count and improving milk nutritional quality in cows with an intramammary infection.

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Use of a low power laser in the treatment of bovine mastitis

Hoedemaker, Martina & Hackenfort, E.-M. (2003). University of Veterinary Medicine Hannover

Abstract

In the following study, the efficacy of low power laser application in the treatment of chronic and mild acute clinical mastitis was evaluated. Udder quarters of the laser group (n=32) received an external treatment with an impulse diode laser for the duration of 5-8 min on days 1, 2, 3, 5 and 7. Control udder quarters (n=33) were subjected to conventional antibiotic treatment on 3 days. Milk samples for culturing were taken before treatment and 3 and 4 weeks following treatment. Samples at 3 and 4 weeks were also evaluated for somatic cell count (SCC). Affected udder quarters were checked for clinical symptoms. Clinical cure was defined as the disappearance of clinical symptoms by week 3 following treatment. Udder quarters were considered as bacteriologically cured, when the etiologic pathogen could not be isolated at 3 and 4 weeks following treatment. Clinical cure was 84.4 % and 97.0 % in the laser and antibiotic group, respectively ($P>0.05$). In the laser and antibiotic group, 75.0 % and 97.0 % of udder quarters had macroscopic normal secretion by day 10 following the begin of treatment ($P>0.05$). Pathogens were isolated in 50.0 % of the milk samples taken before treatment in the laser group and in 48.5% of milk samples of the antibiotic group. Bacteriological cure occurred in 25.0% and 68.8% of positive udder quarters in the experimental and control group, respectively ($P<0.01$). Mean log₁₀ SCC at 3 and 4 weeks did not differ between groups ($P>0.05$). However, in the control group, statistically significantly more udder quarters had SCC of $\leq 100,000/\text{ml}$ at week 3 ($P<0.01$) and $< 400,000/\text{ml}$ at week 3 and 4 ($P<0.05$) than udder quarters of the laser group. In conclusion, laser therapy resulted in lower bacteriological cure rates and a delayed clinical and cytological healing compared with antibiotic treatment. However, its value in mastitis therapy, e.g. in combination with antibiotics or homeopathic remedies, should be explored in further studies.

58. 457-467.

Effect of low intensity laser radiation on cow's milk microflora and somatic cell count

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The aim of the study was to monitor the effects of radiation emitted by a low energy laser on the growth of microorganisms in vitro from milk of cows with elevated SCC, microorganism diversification, and SCC after the laser treatment in vivo by the laser. Laser irradiated microorganism cultures exhibited a weaker incidence of environmental microorganisms, especially fungi and Streptococci sp. No laser light effect was noted on *S. aureus* culture development. Our data shows that after laser treatment the variety of micro-organism species immediately decreases 64.28% and this indicator remains unchanged after 21 days. 21 days after completion of the therapy course the SCC decreased 20.11%. 70 days after treatment the SCC increase compared to the 21 day period increased by 20.3%, which can be associated with factors unrelated to the method of therapy. It is advisable to treat increases in SCC with low intensity laser rays conditional to environmental mastitis causative agents. Moreover, since due to the effect of laser radiation certain irradiated micro-organism cultures become more susceptible to antibiotics, it is advisable to coordinate laser therapy with antibiotic therapy.

<http://www.medycynawet.edu.pl/images/stories/pdf/pdf2008/012008/2008100490052.pdf>

Histopathological effect of low-level laser therapy on sutured wounds of the teat in dairy cattle

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Summary

Perforating wounds were made on the cranial surface of 32 teats in eight dairy cattle. The teats were distributed into eight groups with four kinds of suture patterns. The used suture patterns were Gambee in Groups A and E, continuous 2-layer (Cushing for submucosal layer, continuous horizontal mattress for intermediate layer and skin) in Groups B and F, separated 2-layer (simple continuous for mucosal layer, vertical mattress for intermediate layer and skin) in Groups C and G, and 3-layer (simple continuous for mucosa] and intermediate layers, simple interrupted for skin) in Groups D and H. The wounds of Groups E, F, G and H were subjected to 3.64 J/cm² dose of low-level laser, using a helium-neon system with an output of 8.5 mW, continuous wave at 632.8 nm. Histopathologically, healing was different between various suture patterns and between low level laser therapy (LLLT) and non-LLLT-groups. The results suggest that the 3-layer pattern was the best and LLLT could accelerate healing of perforating wounds of the teat in dairy cattle.

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