

# Efficiency of Low Level Laser Therapy in Otology

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## **Abstract**

The patients with inflammatory diseases of auditory organ have been treated with Low Level Laser therapy, using "Adept" apparatus. To the patients with inflammation of external auditory meatus Laser Therapy has been used as independent method of treatment and to the patients with acute and chronic otitis media red and infrared irradiation has been carried out simultaneously with traditional therapeutic measures. Doses of Laser therapy have been selected individually, depending on the study of disease, spread of pathologic process and patients' age.

**Keywords:** *low level laser therapy, acute/chronic otitis media*

## **Introduction**

Today the interest in alternative, non drug methods of treatment, including Low Level Laser Therapy (LLLT) has been rising more and more [Egorov V. E., Moskvina S. V., Ulianov V. I.]. This great interest is conditioned by high therapeutic efficiency, wide spectrum of indications for Laser therapy and availability of its combined use with traditional treatment methods. The given method's merits are: noninvasiveness of most Laser procedures, its painlessness and convenience for patients [Illarionov V. E.]. In most works, dealing with the treatment of tubootitis, acute, subacute and chronic salpingootitis, the invasive methods of Laser therapy have been used [Mishenkin N.V., Krotov Y. A., Lopotko A. I., Boboshko M. Y., Shuster M.A., Isaev V.M., Rechitski V.I.].

Goal of this work is to study therapeutic effect of simultaneous noninvasive influence of red and infrared laser radiation in the treatment of some diseases of auditory organ and to determine the efficiency of Laser therapy as independent method as well as in complex with pharmacotherapy.

## **Materials and Methods**

196 patients with the diseases of auditory organ have been treated with Laser therapy. Among them 59 patients have had inflammation of external acoustic meatus, 68 - acute otitides media and 69 - chronic otitides media. Diagnosis and treatment regimen have been determined at the department of otorhinolaryngology at Tbilisi State Medical University.

In the treatment of inflammation of external auditory meatus Laser therapy has been carried out as independent method. It has been used the helium-neon laser radiation through the light guide, directed to external auditory meatus. And at the same time the region of the parotid gland has been irradiated with infrared rays. The wavelength of the helium-neon laser [HNL] was equal to 0,63 mcm, power - 3-4 mW, frequency - 200 hertz. As regards the infrared laser, its wavelength was equal to 0,85 mcm, power - 40-60 mW, frequency - 150-200 hertz. Duration of each seance was 5 minutes. The number of seances - 6.

In treating the acute otitides media the delivery of laser energy has been carried out by above mentioned

scheme: combined laser irradiation, tympanic membrane has been irradiated through the external auditory meatus with HNL [wave-length - 0,63 mcm, power - 3-4 mW, frequency - 200 hertz] and infrared laser [wave-length - 0,85 mcm] has been used for irradiation of following anatomic landmarks: mastoid, branches of auditory nerve, cochlea, carotid artery, parotid gland [Korepanov V.I.].

Irradiation frequency and power for each patient have been selected individually according to nature of pain, stage of the disease, patients' age. The parameters were changed daily (in case of need) depending on clinical presentation dynamics. In the early stage of disease, when the pain syndrome is in the foreground, the frequency of infrared laser for adults amounted to 300 Hz, for the children - to 120-150 Hz, while the power correspondingly was 70-80 mW and 40-50 mW. After 2-3 seances, when in has been achieved the pain relief, the frequency and power has been reduced gradually. Each seance exposure - 6-8 minutes. The course of treatment amounted to 8-10 seances.

To achieve the stoppage of otorrhea and hearing rehabilitation in case of chronic running ear, it is recommended daily procedures, 8-10 minutes each. The course of treatment comes to 10-12 days. In the above-mentioned cases LLLT has been carried out together with antibiotic therapy and ear and nasal therapeutic agents (prescribed by otorhinolaryngologist). In case of chronic purulent otitis media the Laser therapy is carried out by the same scheme: concurrently irradiation with red and infrared laser. The choice of dose depended on the extent of pathologic process in the cavity of middle ear, nature of ear microflora and patients' age. The dose averaged 25-30 joule/cm<sup>2</sup>. Accumulated dose amounted 200-250 joule/cm<sup>2</sup>.

In case of otitides adjustment of exposure time and irradiation methods of Laser therapy for each region is of great importance. So, in case of external otitides the region of outer ear has been irradiated with the red rays within the 5 minutes simultaneously with 1 minute irradiation of anatomic landmarks with infrared rays, whereas in the cases of otitides media and bradyacusia, auditory meatuses, nares and posterior regions of tonsils have been irradiated with red rays within one minute. Concurrently it has been carried out the infrared irradiation of aforesaid anatomic landmarks. Treating the otitides the affected ear has been irradiated as well as the intact.

## **Results**

59 patients with the external otitides have been treated with concurrent irradiation with the red and infrared rays

by above-mentioned regimen, which resulted in fast recovery. In these cases Laser therapy has been used as independent method of treatment. In the cases of acute and chronic otitides Laser therapy has been carried out together with antibiotic therapy and ear and nasal drops.

It has to be noted, that the most favorable results of the treatment of acute and chronic otitides media have been achieved in the young patients with the local pathologic process. The improvement of hearing has been fixed already after 4-5 seances. The chronic patients have been required to pass through repeated treatment course in two months and then in spring and in autumn (as preventive treatment). 6 patients have passed through the repeated treatment course and 4 patients, who have hadn't any symptoms of disease and felt themselves healthy, have passed through third and fourth preventive courses (in spring and in autumn). The rest 53 patients did not come for the repeated courses, so we failed to monitor their further state of health.

## **Discussions**

The method of LLLT we used is different from the formerly known methods of treatment with the red Laser [Kh. E. Karabaev, T. Kh. Nasretidinov et.al., N. V. Mishenkin, Y.M. Dashkevich], intracavitary quartz light guide [N. V. Mishenkin, Y. A. Krotov] and invasive [V. I. Talalaev] irradiation.

Cumulative dose of Laser therapy, being used by us, amounts to 200-250 joule/cm<sup>2</sup>. These indices coincide with the doses, offered by the authors [N. V. Mishenkin, Y.M. Dashkevich], who consider, that dose adjustment depends on the, of pathologic process extension and patients' age.

The results received by us have corroborated importance of exposure doses, which biological activity is determined by therapeutic effect: lack of effect - maximal effect - lack of effect [M.A. Berglezov, V.V. Velko, V. I. Ugnivenko]

Thus the following findings could be done: 1) Laser therapy for the treatment of the diseases of auditory organ is indicated as independent treatment method, as additional method together with traditional treatment methods, as organism resistance strengthening factor; 2) in the case of inflammatory diseases of auditory organ positive therapeutic effect has been achieved by concurrent irradiation with the red and infrared Laser rays

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## Эффективность низкоэнергетической лазерной терапии в отитатрии

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### РЕЗЮМЕ

У больных с воспалительными заболеваниями слухового органа проведена низкоэнергетическая лазерная терапия с помощью аппарата "Адепт". При воспалении наружного слухового прохода лазеротерапия проведена как самостоятельный метод лечения. При острых и хронических средних отитах облучение красными и инфракрасными лучами проводилось параллельно и одновременно на фоне традиционных лечебных мероприятий. Дозы лазеротерапии были подобраны индивидуально в зависимости от стадии болезни, распространения патологического процесса и возраста больного.

**Ключевые слова:** ДГПЖ, ПСА, цитокины, интерлейкина-4