Low-level laser therapy for the prevention of disease and treatment of patients with coronavirus (Sergey V. Moskvin)

Numerous studies have shown that low-intensity laser illumination (LILI) is capable to activate:

1. Cytokines, including interferons (IFN), which play a key role in the first line of defense against viruses, and adaptive immunity arises.

(IFNα and IFNβ release lymphocytes, macrophages, fibroblasts, some epithelial cells, have antiviral and antitumor activity, stimulate macrophages and natural killers (NK); IFNγ releases T cells and NK, regulates the immune response, and has antiviral and antitumor effects.)

2. Phagocytes that are cells of the immune system that protect the body by absorbing (phagocytosis) harmful foreign particles (bacteria, viruses), as well as dead or dying cells.
3. Micro and macrocirculation, as well as trophic support of tissues, increasing their resistance to external negative influences.
4. Oxygen saturation of tissues, increased metabolism and cell proliferation, restoration of damaged tissues.

These properties of LILI allow fighting against a viral infection effectively, both as a means of prevention and as a treatment factor, preventing the development of pulmonary fibrosis.

LLLT is an absolutely safe, highly effective, simple and inexpensive method of treatment and prevention of diseases caused by viral infection that is confirmed by scientific publications.

The positive results of the use of LLLT in the treatment of atypical pneumonia (SARS) caused by various coronaviruses also suggest high efficiency in the case of infection with COVID-19, due to the common pathogenesis of the disease[1], and the mechanisms of biomodulating and therapeutic effect of LILI [Moskvin S.V., 2008, 2014].

[1] Thevarajan I., Nguyen T.H.O., Koutsakos, M. et al. Breadth of concomitant immune responses prior to patient recovery: a case report of non-severe COVID-19 // Nature Medicine. – 2020. doi: 10.1038/s41591-020-0819-2

Suppression of virus replication & LLLT

Laser light activates the synthesis of IFN by cells [Funk J.O. et al., 1992; Maldaner D.R. et al., 2019; Safavi S.M. et al., 2008; Wang X.-Y. et al., 2014].	Освечивание НИЛИ активирует синтез интерферонов клетками [Funk J.O. et al., 1992; Maldaner D.R. et al., 2019; Safavi S.M. et al., 2008; Wang X.-Y. et al., 2014].
Endogenous IFN is many times more effective than exogenous [Huang T.J. et al., 1999; Karpov A.V., 2001].	Эндогенный интерферон во много раз эффективнее экзогенного [Huang T.J. et al., 1999; Karpov A.V., 2001].
The binding of IFN to the receptor induces three simultaneously occurring processes in the cell that result in [Schroder K. et al., 2004; Tau G., Rothman P., 1999; Hall A., Yates C., 2010]: – activation of latent endoribonuclease, leading to the destruction of viral RNA; – suppression of the synthesis of viral messenger RNA; – suppression of the synthesis of viral coat proteins. These mechanisms integrally realize the antiviral effect, leading to suppression of virus replication.	Связывание IFN с рецептором индуцирует в клетке три одновременно протекающих процесса, которые заканчиваются [Schroder K. et al., 2004; Tau G., Rothman P., 1999; Hall A., Yates C., 2010]: – активацией латентной эндорибонуклеазы, приводящей к разрушению вирусной РНК; – подавлением синтеза вирусной матричной РНК; – подавлением синтеза белков вирусной оболочки. Эти механизмы интегрально реализуют противовирусный эффект, приводя к подавлению репликации вируса.

References

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Safavi S.M., Kazemi B., Esmaeili M. et al. Effects of low-level He–Ne laser irradiation on the gene expression of IL-1β, TNF-α, IFN-γ, TGF-β, bFGF, and PDGF in rat's gingiva // Lasers in Medical Science. – 2008, 23 (3): 331-335. doi: 10.1007/s10103-007-0491-5.

Schroder K., Hertzog P.J., Ravasi T., Hume D.A. Interferon-gamma: an overview of signals, mechanisms and functions // J Leukoc Biol. – 2004, 75 (2): 163–189. doi:10.1189/jlb.0603252.

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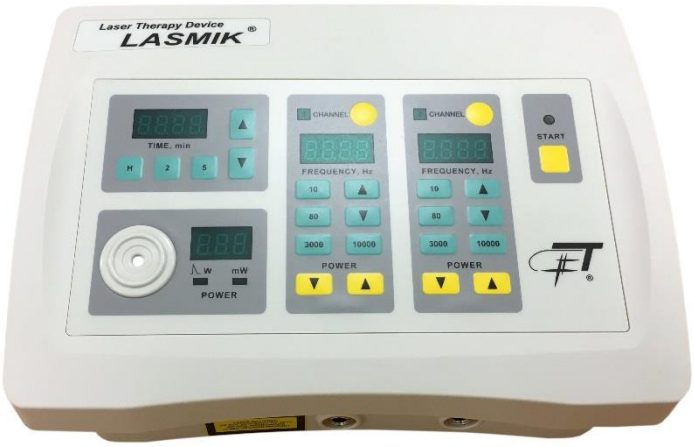
For the effective implementation of LLLT techniques, it is necessary to use special equipment (Table 1) and strictly follow the treatment protocol (see below).

Table 1

The necessary minimum equipment kit

Item	Design
Laser therapy device Lasmik-01 (2 laser channels)	
Laser head ML-904-80	

Laser head ML-635-40	
Optical attachment IPC	
Laser head KL-ILBI-365-2 (UV, wavelength 365 nm)	
Laser head KL-ILBI-525-2 (green, wavelength 525 nm)	
Sterile light guides KIVL-01	

The kit includes specialized literature and detailed instructions for the use of LLLT in various fields of medicine (treatment protocols).

Prevention of the disease

Anyone who was in contact with an ill person or arrived from areas with an unfavorable epidemiological situation needs to conduct 2-3 LLLT procedures.

Before starting the procedure, it is necessary to remove the protective cover and install a special optical attachment IPC, which preliminary should be chemically sterilized (disinfected).

Zones (points) of illumination are shown in Fig. 1, type of emitting head and exposure time in Table 2. The parameters of laser light are shown in Table 3, the appearance and a brief description of the technical parameters of the emitting heads used for laser illumination are shown in Fig. 2.

Table 2

Exposure zones for the prevention of coronavirus disease

Type of emitting head	Exposure zone (Fig. 1)	Exposure, min
ML-635-40	1 – left supraclavicular area	2
ML-904-80	2 – thymus	1
ML-904-80	3 – spleen	1

Table 3

Parameters of the LLLT technique for the prevention of coronavirus disease

Parameter	Value	Notes
Laser light wavelength, nm (spectrum)	635 (red)	–
	904 (IR)	
Laser operational mode	Pulsed	Matrix emitting head, surface area 10 cm^2
Duration of the light pulse, ns	100–150	–
Power, W	35–40	635 nm
	60–80	904 nm
Power density, W/cm^2	4–5	635 nm
	8–10	904 nm
Frequency, Hz	80	
Exposure per one zone, minutes	See Table 2	–
Number of the exposed zones	3	–
Localization	See Table 2	–
Technique	Contact	Through a transparent optical attachment IPC
Number of procedures per course	2-3	Daily

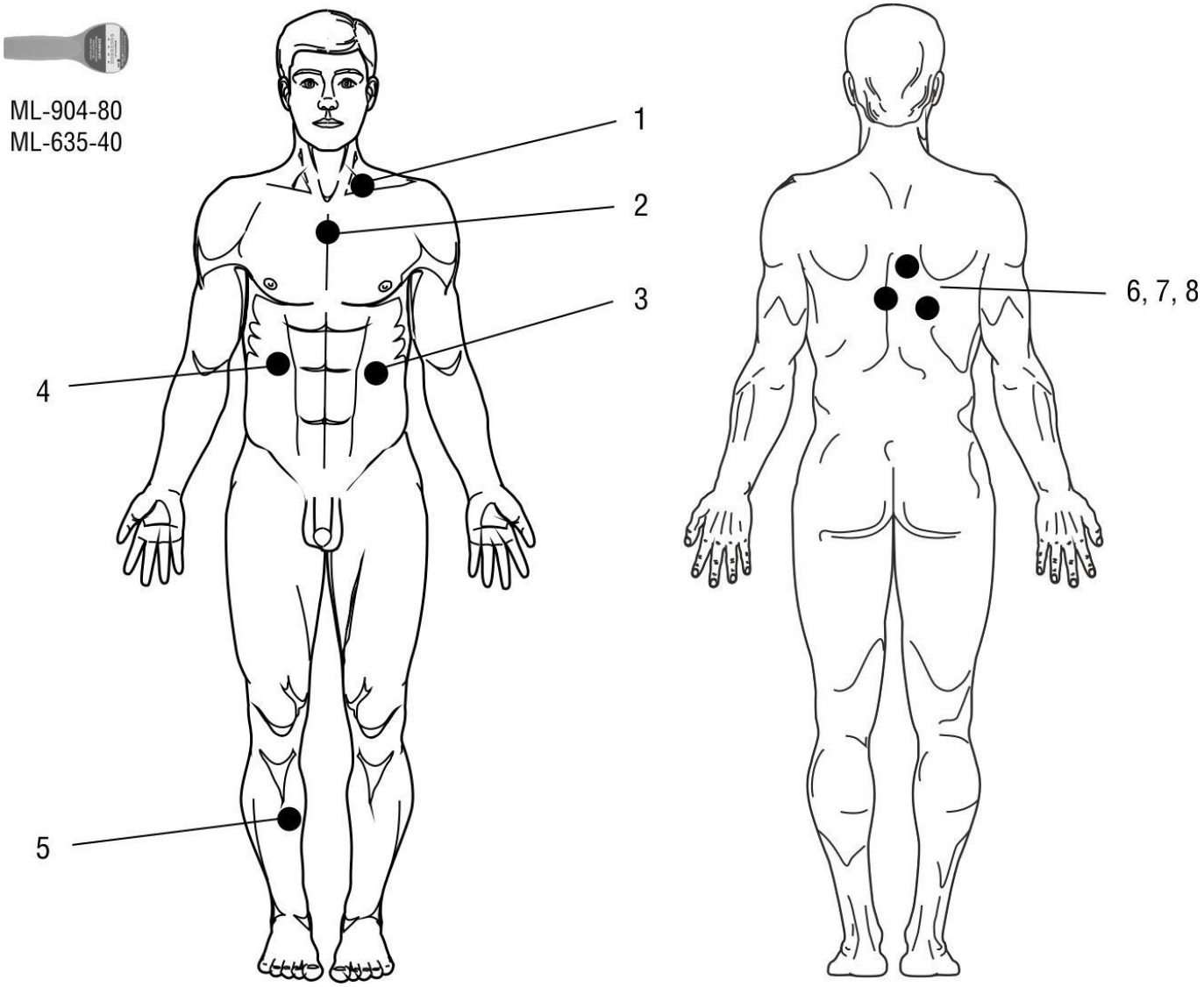


Fig. 1. Exposure zones for atypical pneumonia

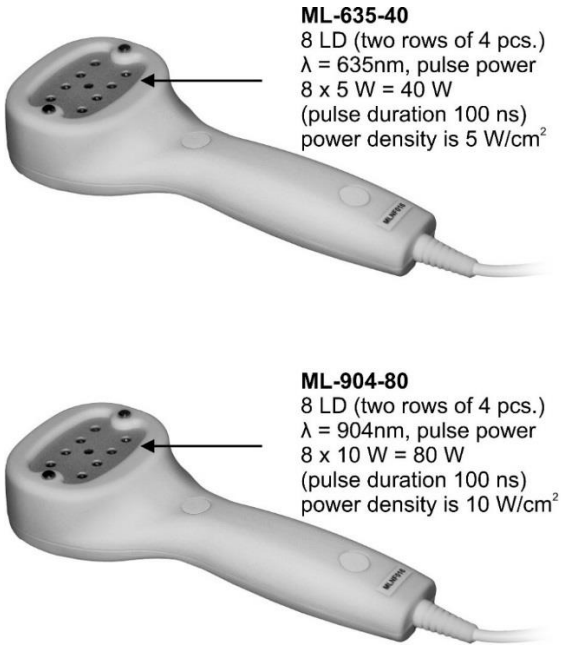


Fig. 2. Appearance and parameters of matrix pulsed laser emitting heads ML-635-40 and ML-904-80

Treatment of patients with coronavirus (SARS)

Patients are treated in a hospital, the course consists of up to 10-12 daily LLLT procedures.

Two variants of LLLT techniques are proposed – using only non-invasive techniques (external illumination), and a more effective combined variant – intravenous laser blood illumination (ILBI).

Technique 1. Before starting the procedure, it is necessary to remove the protective cover and install a special optical attachment IPC, which preliminary should be chemically sterilized (disinfected).

Zones (points) of illumination are shown in Fig. 1, type of emitting head and exposure time in Table 4. The parameters of laser light are shown in Table 5, the appearance and a brief description of the technical parameters of the emitting heads used for laser illumination are shown in Fig. 2.

Table 4

Exposure zones for treating coronavirus disease

Type of emitting head	Exposure zone (Fig. 1)	Exposure, min
ML-635-40	1 –left supraclavicular area	2
ML-904-80	2 –thymus	1
ML-904-80	3 –spleen	1
ML-904-80	4 – liver	2
ML-635-40	5 – E36 (Zu San Li) – symmetrically	0.5 per 1 zone
ML-904-80	6-8 – projection of the area of lung damage (in Fig. 1 as an example of localization)	1.5 min per zone

Table 5

Parameters of the LLLT technique for treating coronavirus disease

Parameter	Value	Notes
Laser light wavelength, nm (spectrum)	635 (red)	–
	904 (IR)	
Laser operational mode	Pulsed	Matrix emitting head, surface area 10 cm^2
Duration of the light pulse, ns	100–150	–
Power, W	35–40	635 nm
	60–80	904 nm
Power density, W/cm^2	4–5	635 nm
	8–10	904 nm
Frequency, Hz	80	Zones 1-5
	80-1500	Zones 6-8 – it is possible to vary the frequency depending on the symptoms and condition of the patient
Exposure per one zone, minutes	See table 4	–
Number of the exposed zones	8	–
Localization	See table 4	–
Technique	Contact	Through a transparent optical attachment IPC
Number of procedures per course	10-12	Daily

Technique 2. Combined technique, on zones 6-8 (Tables 4, 5), then ILBI-525 + LUVBI® (Table 6, Fig. 3).

Table 6

Parameters of ILBI-525 + LUVBI® technique (basic)

Parameter	Value	Notes
Laser light wavelength, nm (spectrum)	365–405 (UV)	LUVBI®
	520–525 (green)	ILBI-525
Continuous	Continuous	–
Power*, mW	1,5–2	At the output of a disposable light guide
Exposure, minutes	3–5	LUVBI®
	7–8	ILBI-525
Localization	Median cubital vein (*v. mediana cubiti*)	–
Technique	Intravenously	Through a disposable sterile KIVL-01 light guide, produced by Research Center "Matrix" (TU 9444-005-72085060-2008)
Number of procedures per course	10–12	Daily, alternating ILBI-525 and LUVBI® every other day

Note. * – at the output of a disposable sterile KIVL-01 light guide, produced by Research Center "Matrix" (TU 9444-005-72085060-2008).

Instructions for the ILBI procedure

Checking the efficiency of the equipment and power of the illuminating attachment

1. Connect the laser emitting attachment to the device (base unit) by inserting the connector on the cord of the illuminating attachment into the corresponding connector of one of the channels on the front panel of the device. It is necessary to pay attention to the correspondence of the color of the strap of the illuminating attachment to the wavelength of the laser illumination chosen for carrying out the procedure.
2. Insert the **control** light guide (used **only** for measurements) **without a needle and without a cap** in the optical connector of the illuminating attachment. Use a test light guide only or a cannula with a cut-off light guide (optical fibre). **ATTENTION!** Do not measure the output of a sterile light guide and if there is a needle!
3. Close the light guide (cannula) to the power indicator window.
4. Press the START button on the base unit.
5. Set the appropriate illumination power by the corresponding buttons, controlling it by the indicator on the device. For emitting attachments with a power of 2mW, it is always maximum, only the presence of illumination and the correspondence of the parameter are controlled. A check for these attachments is usually carried out once a day before starting work.
6. Turn off the illumination by pressing the START button again.

The sequence of the ILBI procedure (Figure 3)

1. The patient is lying on his back.
2. Attach the laser emitting attachment to the patient's forearm with a cuff (or a light guide with a patch).
3. Set the required time for the procedure on the device.
4. Prepare a vein for an intravenous procedure.
5. Open the packaging, remove the disposable sterile KIVL-01 light guide. **Attention!** Measurement of illumination power by a sterile light guide with a needle is not carried out, only through a special tip (see above).
6. Remove the protective cap from the needle.
7. Slide the needle from the "butterfly" by 2–3mm (so that the light guide completely enters the needle). **Attention!** The light guide should protrude from the needle, otherwise the light will not come out of it. But

it is not possible to insert a needle with a protruding fibre, it must be “removed” inside the needle before inserting it into the vein!

8. Make a venipuncture with a needle. After the appearance of blood in the hole (confirmation of the entrance to the vein) insert the needle on the “butterfly” until it stops and fix the “butterfly” on the hand with a plaster.

9. Remove the harness. The tip of the KIVL-01 light guide (cannula) is inserted into the socket of the illuminating attachment (or the main light guide) to the stop.

10. Press the START/STOP button on the device to start the procedure.

11. At the end of the procedure (the device will automatically turn off), remove the light guide with the KIVL-01 needle from the vein and dispose of it.

12. Remove the emitting attachment or main light guide from the hands (for outdated models of apparatus). The procedure is finished.

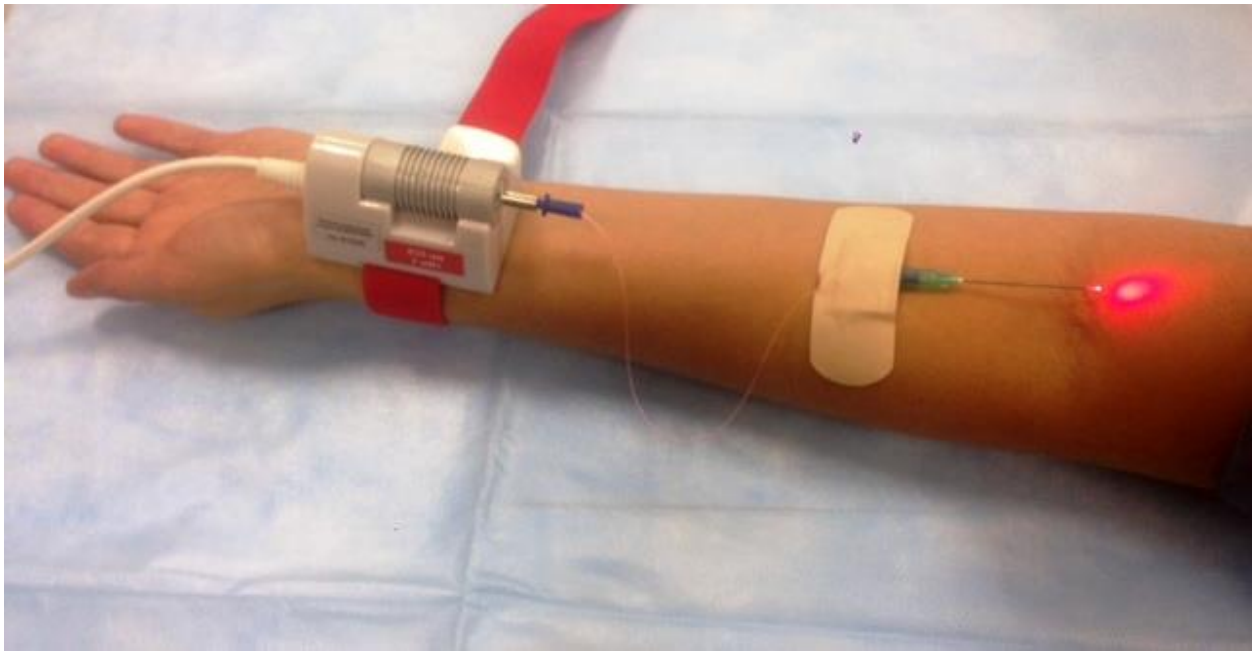


Fig. 3. ILBI procedure

According to our data (studies were carried out at the initial stage of influenza epidemics, including the coronavirus family), the likelihood of infection after 2-3 preventive LLLT procedures is reduced tenfold. The effectiveness of treatment of patients with atypical pneumonia caused by coronaviruses reaches almost 100% (no mortality, reduction of 20-40% of the time and cost of inpatient treatment).

We draw attention to the fact that all kinds of “analogs” of Russian laser therapeutic devices LASMIK® and fake “methods” (supposedly LLLT), offered by non-professionals and scammers, can lead to discrediting the method and human tragedy!