

THESIS INFORMATION

Title: RESEARCH ON LOW LEVEL SEMICONDUCTOR LASER APPLICATION IN SUPPORTING THE TREATMENT OF PULMONARY TUBERCULOSIS IN THE COMMUNITY AND CHRONIC PULMONARY OBSTRUCTIVE DISEASE

Major: Engineering Physics

Major code: 62520401

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Main contributions of the thesis

The overall goal of the thesis is to use low level semiconductor laser therapy and build a new method to support the treatment of pulmonary tuberculosis in the community and chronic obstructive pulmonary disease (COPD) with a treatment model combining photo-acupuncture, phototherapy, and intravenous laser therapy. The main contributions of the thesis are presented as follows:

- Monte Carlo simulation of the laser propagation with two wavelengths 780 nm and 940 nm from the anterior chest to the lung and from the back to the lung, confirming the appropriateness of the treatment protocol configuration of the low level semiconductor laser equipment used for mentioned treatment. To determine and verify the propagation of laser to organ sites involved in the treatment of pulmonary tuberculosis and chronic obstructive pulmonary disease (COPD), the simulation is performed with the configuration of laser beam projection of two wavelengths 780 nm and 940 nm from the front of the chest to the lungs and the back of the chest to the lungs, in which there are two states at inhalation and exhalation.
- Developing procedures using low level semiconductor lasers to support the treatment of pulmonary tuberculosis in the community in the attack stage and the post-recovery phase. Procedures are described with corresponding treatment modalities, steps to

take, and how to promote the use of equipment in therapy.

- Developing procedures using low-power semiconductor lasers in the treatment of chronic obstructive pulmonary disease with photoacupuncture, phototherapy using two simultaneous wavelengths of 780 nm and 940 nm, and intravenous laser therapy with the wavelength of 650 nm as follows:
 - On odd days such as day 1, day 3, day 5, etc. use an intravenous laser for about (45 – 60) minutes.
 - On even days such as day 2, day 4, day 6, etc. use 12-channel low level semiconductor laser acupuncture – phototherapy for about 60 minutes.
 - Use phototherapy acting directly on the affected area of the lung, photoacupuncture acting on acupressure points such as dazhu, kongzui, feishu, and zhongfu, for 20 minutes.
 - For treatment of bronchitis, use phototherapy acting directly on the damaged bronchi, photoacupuncture acting on acupressure points such as dingchuan, hegu, feizhu, and fengmen, time 20 minutes.
 - Use phototherapy acting directly on the two sides of the nose, for 20 minutes.

A course of treatment is 20 days depending on the patient pathological state. The total cycle time is 60 days.

- Experimental treatment results showed that this new combination therapy in the treatment of pulmonary tuberculosis and chronic obstructive pulmonary disease is remarkably effective and has many advantages such as ease of implementation, mass availability, low treatment cost, minimal invasiveness, and no side effects.

Advisors

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