

## INFORMATION OF DOCTORAL DISSERTATION

Title: **STUDY ON THE APPLICATION OF LOW- LEVEL SEMICONDUCTOR LASER IN THE REHABILITATION TREATMENT OF PANCREATIC AND LIVER DYSFUNCTION FOR PATIENTS WITH TYPE 2 DIABETES**

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### **1. Abstract**

For patients with type 2 diabetes, the rehabilitation treatment of pancreatic and liver disorders is always a challenging and topical issue for current medicine. Based on of the analysis and discussion of the relationship between type 2 diabetes and different forms of pancreatic and liver dysfunction, the goal of the thesis is to develop a new therapeutical procedure for rehabilitation treatment of pancreatic and liver disorders in patients with type 2 diabetes with the following combination of methods: firstly, using a simultaneous dual-wavelength effect of two laser beams working at 780 nm and 940 nm acting directly on the pancreas and liver by on-site irradiation from the back skin to the pancreas or from the abdominal skin to the liver, and at the same time, putting laser beam on the thymus, spleen and lymph nodes to improve the patient's immune system function; secondly, using an intravenous semiconductor laser with a wavelength of 650 nm to enhance the quality of blood flow, which feeds enough energy and nutrition to the pancreas and liver for gradual recovery and strengthen the immune system through the circulatory system; and thirdly,

using semiconductor laser photoacupuncture working at 940nm for direct impact on acupuncture points to treat diabetes, hepatitis, and strengthens the immune system according to the principle of oriental acupuncture method. The treatment method has produced a synergistic regenerative therapeutic effect including improving immune system function, lowering blood sugar for patients with type 2 diabetes, and treating underlying diabetes complications, and related forms of liver dysfunction. The clinically experimental treatment results mentioned in the thesis convincingly demonstrate the possibility of good rehabilitation therapy with proper statistical significance before and after the treatment, showing the superiority of low-level semiconductor laser therapy in pancreatic and liver rehabilitation for patients with type 2 diabetes with the advantages of function conservation, ease of implementation and no side effects.

## **2. The main scientific contributions**

The method of using low-power laser in treatment is mainly based on the bio-stimulating effect, it has the effect of restoring tissue damage in the pancreas and liver to regenerate new tissues. While patients use drugs for long-term treatment, it will lead to drug dependence and in addition cause many side effects on the liver, kidneys and pancreas, stomach, some of which cause heart failure side effects.

The low-power semiconductor laser acts directly on the acupuncture points which do not cause pain, and creates a bio-stimulating effect, along with a tonic and therapeutic effect on the acupuncture point on the patient's body.

And it shows that the application of low-power semiconductor lasers in medical and biological treatment needs more attention from society to serve the community's health and recovery needs.

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