

Opinion

by

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Subject: Dissertation defense of Dr. Julian Zlatkov Penev, a doctoral student at the Department of Infectious Diseases, Parasitology and Dermatovenereology on the topic of: "**Laser Resources for Facial Rejuvenation and Aestheticization**", supervisor Assoc. Prof. Dr. Ilko Bakardzhiev, M.D. Ph.D., in the field of higher education: 7. Healthcare and sports, professional field 7.1. Medicine, scientific specialty "Skin and Venereal Diseases". The dissertation was approved, as well as directed to a public defense, after hearing a meeting of the Department Council - №14 / 15.03.2022.

Brief data on career development, and qualification of the Ph.D. student:

Dr. Julian Penev completed his graduate studies in medicine in 1986, at The MU-Varna with very good grades. His interest in laser technology was awarded in 1979 with a gold medal for the construction of a "pulsed nitrogen laser and pumped tunable dye lasers in the entire visible spectrum" at the National Exhibition for Technical and Scientific Creativity of Youth (TNTM), Plovdiv, 1979. As a medical student, he developed a copper halide laser based on a laser tube, and a power supply constructed

by himself, under TNTM. Preliminary clinical trials were conducted on a control group of 17 volunteer patients several months post completion of the first stable prototype. Trials were performed in a team at the Department of Skin and Venereal Diseases MU-Varna, led by Prof. Dr. Zlatko Penev, MD. Those are considered to be the first cases of pigmented dermatoses and hemangiomas treated with copper bromide laser worldwide, according to literature data. Results were reported in 1984 at the National Conference on Optics and Laser Equipment.

During 1986-1987 Dr. Julian Penev is a resident radiologist in the town of Silistra. In 1987, after winning a competition he was appointed a research associate at the Biotechnical Institute BIOTECH - Varna. Until 1990, he headed the Department of Laser Application for Medical and Biotechnological Purposes at the Biotechnical Institute BIOTECH-Varna, as a research associate II degree. During this period, Dr. Julian Penev developed an industrial prototype of a dermatological laser, used for clinical trials commissioned by the Biotechnical Institute at the Clinic of Skin and Venereal Diseases, MU-Varna in 1988. The developed industrial prototype under the brand "Triton" took part in two scientific exhibitions in Plovdiv, in 1987 and 1988. The prototype was approved for clinical testing in Adelaide, Australia - at The Queen Elizabeth Hospital. Dr. Julian Penev constructed two new, and improved industrial prototypes of dermatological laser systems based on copper bromide, effectively affecting vascular and pigmented dermatoses after the year of 1990. He has also created an original treatment method with this particular laser. The copper bromide laser system was awarded a gold medal at the World Exhibition of the Intellectual Property Organization "EXPO-91". The second advanced prototype model of a dermatological copper bromide laser, designed by Dr. Julian Penev in 1991 has been implemented in clinical practice from 1991 until 200, at the Clinic of Skin and Venereal Diseases, Medical University of Varna. Developed prototypes based on copper bromide lasers were successfully applied, and functioned with no interruption from 1988 to 2006 at the Clinic of Skin and Venereal Diseases, MU-Varna. During this period Dr. Julian Penev introduced and optimized his own methods for clinical application of dermatologically focused lasers, defining criteria for therapeutic behavior. The prototypes receive an agreed and registered technical specification from the Ministry of Health under "№ 02261-99" in

1999. The third prototype of the advanced dermatological laser system based on copper bromide laser, built entirely independently in 2000 was applied in clinical practice until 2015. Since the year of 2000 Dr. Julian Penev works in the "Outpatient clinic for individual practice for specialized medical care - Prof. Dr. Zlatko Penev, MD." The Ph.D. student introduces for the first time in Bulgaria a method for facial skin rejuvenation with a CO₂ deep ablative laser resurfacing in 2004. The original author's "know-how" methodology is registered as a trademark "FasetLift" - 103448 / 22.10.2018 of the Patent Office of the Republic of Bulgaria. During the period of 2007-2011 the Ph.D. student constructs three prototypes of fractionated CO₂ laser systems designed for "deep ablative laser resurfacing" with optimized laser pulse parameters to further increase procedure efficiency.

Dr. Julian Penev has gained over 30 years of clinical experience, and developed a number of methods and techniques for laser treatment of various dermatoses, as well as for erasing scars due to injuries, burns, and acne. His extensive clinical experience is combined with unique engineering and design work in the field of laser technology that allows him to model laser equipment in regards to therapeutic goals.

Structure of the scientific work

The dissertation contains 233 standard typewritten pages. It is illustrated with 188 figures, 2 graphics, 7 tables, 6 appendices containing additional photographic documentation, references to previous authorial contributions, publications, and scientific forums participation. Literature reference includes a total of 105 literary sources, of which 20 are in Cyrillic, and 85 are in Latin.

Evaluation of structural parts of the dissertation

Review of literature (4-31 p.) is written with a comprehensive knowledge of terminology and understanding of the scientific material, as and consistently supports the relevance of the developed topic. The object of the dissertation of Dr. Julian Penev is facial skin laser aestheticization and

rejuvenation using specific techniques, some of which are innovative and introduced into clinical practice by the doctoral student himself. The literature review describes and covers in detail the topic, retrospectively examines the evolution of laser technology over the years that led to the use of different types of lasers in dermatological practice. Social significance of laser skin aestheticization that is directly related to both quality of life, and personal self-esteem, is substantiated. Scholarly publications on therapeutic results of CO₂ laser treatment of various dermatoses are analyzed.

The aim of the dissertation is to analyze, summarize and optimize therapeutic laser techniques directed at aestheticizing and rejuvenating facial skin. Typical clinical cases of laser treatment on sensitive anatomical areas - capillary, eyelids, ears, lips, nose and neck are selectively chosen. **Formulated tasks** (seven in number) logically lead to the fulfillment of the scientific work goal, set by the doctoral student. **Methods** used include various therapeutic laser techniques: rapid laser ablation (LFDA - LaserFastDrawAblation); one-shot ablation (OSA-OneShotAblation); laser excision and incision; laser thermolysis; fractional ablative laser resurfacing. The Ph.D. student compares therapeutic effectiveness of the listed techniques to the effectiveness of other methods known so far. Developed approaches "for achieving maximum aesthetics without compromising with therapeutic radicalism" are discussed. Presented high-quality photo illustrative material is impressive in describing applied laser techniques for the treatment of dermatoses such as seborrheic keratosis, acne vulgaris, scars, etc., tracking over time the clinical effect and aesthetic result of the applied laser therapy. One hundred (100) subjects of the Caucasian race, with skin types 2, 3, and 4 according to Fitzpatrick were treated using these methods. Participants included in the study had multiple benign non-aesthetic lesions on the face and pronounced age-related skin changes. Patients with single and small lesions were not included in the group. The age of the subjects varied between 18 and 72 years ($M = 46.17$, $SD = 13.16$). Therapeutic results are summarized with the use of two psychological self-

assessment modules: 1. Appearance related self-esteem: a self-assessment scale measuring subjective satisfaction with one's bodily appearance. The subjects were self-assessed on a scale from 1 to 5, as 1 corresponds to the lowest degree of the measured characteristic, and 5 to the highest degree. 2. Overall self-esteem assessment: with 10 questions from the scales "Attitude towards yourself" and "Social confidence". Correlation analysis demonstrates that scales for appearance related self-esteem and overall self-esteem are strongly related both before and after aesthetic procedures (respectively $r = 0.62$, $p < 0.01$; $r = 0.49$, $p < 0.01$). These results demonstrate a positive effect of aesthetic procedures on appearance related self-esteem, as well as on overall self-esteem, expressed in their increase. Analysis of these results clearly demonstrates that the increase in overall self-esteem is most significant in those patients with the lowest level of appearance related self-esteem initially. **Conclusions** are 4 in number, and support the therapeutic effectiveness of ablative CO2 laser application. The effectiveness of the methodology introduced by the Ph.D. student when treating juvenile acne, and erasurement of prolonged acne scars was also noted.

I fully accept **the contributions** of the scientific work, summarized by Dr. Julian Penev, as scientific theoretical - 5 in number and scientifically applied - 8 in number. The scientific and theoretical contributions are characterized by the definition of laser ablation as "thermoradiational self-limiting ablation" - contribution N^o1 and the interpretation of laser ablation at 10600 nm as "controllable physical process for ablative destruction of bulky pathological lesions" - contribution N^o2. Scientific and applied contributions, N^oN^o1,2,4,5,6, can find a place in dermatological practice, and are a summary of the accumulated and analyzed extensive clinical experience by Dr. Julian Penev in the field of laser therapy of skin diseases. Abstract structure, presented by the doctoral student meets the generally accepted requirements and reflects the dissertation in a synthesized version. Dr. Julian Penev has presented 8 publications on the topic of the dissertation in English, in international scientific journals, as a leading

author. In addition, the doctoral student has presented 18 scientific papers in Bulgarian (participation with presentations in scientific conferences, publications in proceedings of scientific conferences, monographs) also as the lead author.

Conclusion:

Presented dissertation is a completed and well-structured scientific work that fully covers the requirements for a scientific work for acquiring ONS - "Doctor". This gives me a reason to vote positively and to propose to the esteemed members of the Scientific Jury to award Dr. Julian Zlatkov Penev the scientific degree "Doctor" in the field of higher education: 7. Health and Sports; Professional field: 7.1 Medicine; Doctoral program "Dermatology and Venereology".

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