OPINION

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REGARDING: dissertation work for the acquisition of the educational and scientific degree "Doctor" in area 7. Health care and sports, professional direction 7.1. Medicine, in the scientific specialty "Physiotherapy, resort science and rehabilitation", prepared by **Dr. Lili Yordanova Yosifova** – PhD student at the department of Physiotherapy, Rehabilitation, Thalassotherapy and Occupational diseases, Faculty of Public Health, Medical University "Prof. Dr. Paraskev Stoyanov" – Varna

Topic of the dissertation: **"Study of the effect of high energy laser in diabetic sensorimotor neuropathy"**

Basis for drawing up the opinion: By order of the Rector of MU-Varna № P-109-357/ 19.09.2022, I am determined to participate with an opinion on the defense of Dr.Yosifova

I.Characteristic and evaluation of the content of the dissertation

Significance and relevance of the research topic. The dissertation work of Dr. Lili Yordanova Yosifova is dedicated to a topical issue regarding the conservative, non-drug treatment of diabetic neuropathy. As one of the most common complications of diabetes, affecting about 50% of patients with type 2 diabetes, diabetic polyneuropathy requires collaboration between a number of specialists, such as neurologists, endocrinologists and physiotherapists, in order to provide comprehensive and adequate treatment and prevention. The modern physical therapy has new modern equipment with significant therapeutic abilities and their study and validation in practice is of high importance for the further development of the development of the specialty, as well as in terms of increasing the effectiveness of the treatment process and improving the quality of life of patients. The high-energy laser radiation (MLS-laser) as a representation of this new generation of equipment, has new abilities for adequate and timely treatment of series of socially significant diseases. For that reason, the dissertation topic of Dr. Yosifova – "Study of the effect of high energy laser in diabetic sensorimotor neuropathy" is relevant and significant.

In the dissertation work of Dr. Yosifova is conducted a comparative analysis and evaluation of the effects of the high-energy laser radiation treatment and placebo procedures in patients suffering from diabetic neuropathy. The long-term effects of high-energy laser radiation (MLS-laser) treatment on the electroneurographic parameters of the peripheral sensory and motor nerves of the lower limbs in diabetic neuropathy were traced. The significant effect of the MLS-laser on neuropathic pain was reported and based on the gained practical experience, a therapeutic algorithm with optimal parameters of the laser and course of treatment of diabetic neuropathy was developed.

Structure of the dissertation work: The dissertation work of Dr. Lili Yordanova Yosifova consists of 99 standard pages, including 11 section in adequate proportion, 25 figures, 11 tables and 3 appendices.

Literary awareness of the PhD candidate: The literature review consists of 31 pages, where the author demonstrates considerable knowledge of the issues discussed in the

dissertation. The bibliography includes 129 sources, of which 11 in Cyrillic and 118 in Latin with around 40% of the sources dating from the last ten years, 16% published in the last five years.

Methodology and design of the research: The research is placebo-controlled, longitudinal. An experimental group of 41 patients were treated with high-energy laser radiation. In the control group of 28 patients a laser treatment was imitated by aiming the robotic device and the light guide without releasing the beam. The data was processed using the statistical package IBM SPSS, version 26.0 (Chicago, IL, USA), while the graphical analysis was done by MS Office Excel 2007. The chosen statistical methods give complete and reliable evaluation of the data, according to the purpose of the presented study.

Review of the dissertation work and analysis of the results: Dr. Lili Yordanova Yosifova has a thorough understanding of the issue of conservative non-drug treatment of diabetic polyneuropathy. The presented dissertation work is own work of the PhD candidate. The **goal of the dissertation work** is clearly stated. The stated goal and objectives logically follow the literature review, which summarizes the main literature data of the last fifteen years related to the application of physical factors and treatment of diabetic polyneuropathy.

The results are adequately interpreted, discussed and concrete conclusions were drawn, corresponding to the set objectives. The detailed, analytical and detailed description of the results and the discussion show that the PhD candidate has a good comprehension of the subject. The conclusion follows logically the structure of the dissertation and is formulated clearly and exhaustively.

II. Contributions and practical relevance of the research

The contributions are logically formulated in two groups: with theoretical and applied nature.

With theoretical nature:

1. For the first time in Bulgaria a wide placebo-controlled research was conducted, regarding the effect of high-energy laser radiation, combining two wavelengths (MLS-laser), in treating diabetic sensorimotor neuropathy;
2. Proves the efficiency of high-energy laser radiation as monotherapy for impacting pain, sensitivity and electroneurographic parameters in patients with diabetic sensorimotor neuropathy;
3. Proves the short-term and long-term efficiency of the treatment of with diabetic neuropathy MLS-laser

With applied nature:

1. Proposes a new, non-invasive method for impacting the pain and the electroneurographic parameters of the peripheral nerves of the lower limbs;
2. Creates a protocol for conducting therapy with high-energy laser radiation

It has to be emphasized, that the created own protocol for conducting therapy with high-energy laser radiation in patients suffering from diabetic polyneuropathy, will be of great use in the practice of physical and rehabilitative medicine.

III. Abstract and publications

The abstract reflects the content of the dissertation work and emphasizes the main results and conclusions of the research.

The PhD candidate Dr. Lili Yordanova Yosifova has presented 3 full-text publications, related to the dissertation work, which fulfills the quantitative requirements.

IV. Critical notes and remarks

I have no critical remarks. I recommend Dr. Lili Yordanova Yosifova to publish the protocol, developed by her, for conducting therapy with high-energy laser radiation in diabetic polyneuropathy in the national journal "Physical Medicine, Rehabilitation and Health", in order to increase the exposure of her findings to a wider audience.

V. Personal impressions of the PhD candidate

Dr. Lili Yordanova Yosifova is part of the team of the Physiotherapy and Rehabilitation Clinic and the Department of Physiotherapy, Rehabilitation and Thalassotherapy. I highly value her theoretical and applied knowledge and skills. Very hardworking, goal-oriented and striving for self-improvement, she's emerging into very prospective scientist and professional.

VI. Conclusion

The presented dissertation work of Dr. Lili Yordanova Yosifova includes original and scientifically proven applied contributions, which are own work of the author. The presented materials, related to the procedure fulfill the requirements of the Law for the Development of Academic Staff of the Republic of Bulgaria and the Regulations and the order for acquiring scientific degrees and holding academic positions in the Medical University "Prof. Dr. Paraskev Stoyanov" – Varna for awarding the scientific degree – "Doctor".

Based on all of the above, I do give my positive assessment of the conducted scientific research and do recommend to the members of the highly respected scientific jury to award the educational and scientific degree "Doctor" in area 7. Health care and sports, professional direction 7.1. Medicine, in the scientific specialty "Physiotherapy, resort science and rehabilitation"

Varna 1.11.2022 Assoc. Prof. Mariyana Mihaylova Krasteva-Ruseva, MD, PhD