REVIEW

of the PhD dissertation entitled: *"**Biochemical and Ultrasonographic Markers of Early Cardiovascular Damage in Patients with Spondyloarthritis**,"* submitted for public defense before the Scientific Jury for the award of the educational and scientific degree **Doctor**, professional field 7.1. Medicine, scientific specialty *Internal Medicine*.

Author of the dissertation: Dr. Miroslav Penev Markov, PhD student in the doctoral program *Internal Medicine*, professional field 7.1. Medicine, enrolled by Order № P-109-538 / 03.12.2021 of the Medical University of Varna.

Reviewer: Prof. Janeta Georgieva Tianeva, MD, PhD, Medical University of Varna, member of the Scientific Jury, appointed by Order № R-109-426 / 06.10.2025 of the Rector of MU–Varna.

Biographical Data

Dr. Markov was born in 1995. In 2014 he graduated from the Mathematics High School in Yambol. In 2020 he successfully completed his higher medical education at the Medical University of Varna. Since then, he has been an Assistant Professor at the Department of Propedeutics of Internal Medicine, teaching in English. In 2021 he was appointed as a full-time Assistant in the same department. Since 01.12.2021 he has been a PhD student at the Department of Internal Medicine (KPVB), MU–Varna. He works at St. Marina University Hospital, Department of Internal Medicine, and obtained a specialty in Rheumatology in 2025.

Research Activity

The dissertation *"Biochemical and Ultrasonographic Markers of Early Cardiovascular Damage in Patients with Spondyloarthritis"* addresses a highly relevant and contemporary topic. The literature describes structural and functional vascular abnormalities associated with accelerated

atherosclerosis in spondyloarthritis (SpA). It is emphasized that inflammation plays a key pathogenic role in endothelial injury and the development of atherosclerotic changes.

The literature review demonstrates very good knowledge of the sources and the ability to extract and synthesize in-depth information.

Structure of the Dissertation

The dissertation consists of 141 standard pages and is illustrated with 30 tables and 33 figures. The bibliography includes 363 references, 362 of which in Latin script. The dissertation was discussed and approved for public defense at a meeting of the Departmental Council of KPVB, Medical University of Varna.

The aim of the study is clearly and precisely formulated: **to evaluate vascular ultrasonographic parameters and adhesion molecules as markers of early atherosclerosis in patients with ankylosing spondylitis and psoriatic arthritis.**

The research tasks are well defined and directly related to achieving the stated aim. They include:

– comparison of vascular ultrasonographic parameters and assessment of arterial stiffness;

– analysis of adhesion molecule levels as markers of endothelial dysfunction and their relationship with disease activity;

– evaluation of lipid profile, atherogenic indices, and cardiovascular risk scores across study groups and their associations with vascular changes and adhesion molecules.

A total of **154 participants** were included and divided into three groups: ankylosing spondylitis, psoriatic arthritis, and healthy controls.

Statistical Methods

Statistical analysis was performed using IBM SPSS Statistics. Modern statistical methods were applied, allowing accurate evaluation of interactions between the studied parameters.

Results and Conclusions

The results and the derived conclusions are convincing, scientifically sound, and contribute to the field. The discussion presents a clear relationship between the obtained data and the existing literature.

The study demonstrates that patients with ankylosing spondylitis and psoriatic arthritis exhibit ultrasonographic evidence of subclinical atherosclerosis, with psoriatic arthritis showing a tendency toward more pronounced vascular changes. Significant associations were identified between arterial stiffness and major risk factors—age and arterial hypertension—despite the absence of meaningful differences in Framingham and SCORE2 risk scores between groups. This highlights the limited sensitivity of these models for detecting subclinical vascular damage in inflammatory conditions.

The author reports differences in inflammatory activity and vascular parameters between the two diseases, supporting the concept of distinct patterns of vascular involvement: predominantly inflammatory in ankylosing spondylitis and more complex in psoriatic arthritis. VCAM-1 emerges as a sensitive marker of endothelial dysfunction and an indicator of early vascular injury in spondyloarthritis.

Biologic and targeted therapies demonstrate heterogeneous effects on vascular and inflammatory markers.

Scientific Contributions of the Dissertation

– For the first time in Bulgaria, structural and functional markers of arterial stiffness are investigated simultaneously in patients with ankylosing spondylitis and psoriatic arthritis.
– A comparative evaluation of the effects of different targeted therapies on endothelial function and arterial elasticity in spondyloarthropathies is presented for the first time.
– The study confirms that echo-tracking is a non-invasive method suitable for detecting subclinical atherosclerosis in inflammatory arthropathies and can be applied in routine clinical practice.
– The importance of comprehensive assessment—including vascular indices, lipid profile, and inflammatory activity—for individualizing cardiovascular risk in AS and PsA is highlighted.
– Potential beneficial effects of JAK inhibitors on VCAM-1 levels and arterial elasticity were

identified.

– Increased arterial stiffness in AS and PsA patients compared with healthy controls was confirmed using ultrasonographic methods.

– Arterial hypertension was shown to be associated with more pronounced vascular alterations (higher CIMT, β-stiffness, AI, EP) and increased cardiovascular risk scores.

The integration of ultrasonographic measures of arterial stiffness and intima-media thickness with assessment of adhesion molecules and atherogenic indices provides valuable insight into early vascular pathology in ankylosing spondylitis and psoriatic arthritis.

I fully agree with the conclusions and the stated scientific contributions.

Conclusion

The dissertation submitted by Dr. Markov is highly relevant to contemporary rheumatology. It combines an in-depth literature review with original research and well-supported conclusions. The dissertation and the accompanying scientific publications fulfill the requirements of the Law on the Development of Academic Staff in the Republic of Bulgaria and the Regulations of the Medical University of Varna for awarding the educational and scientific degree Doctor.

I give a positive recommendation for awarding the degree Doctor to Dr. Miroslav Penev Markov.

Заличено на основание чл. 5, §1, б. „В“ от Регламент (ЕС) 2016/679

12.11.2025 **Re[illegible]va, MD,**

Varna