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**THE ROLE OF CAPILLAROSCOPY AND HOMOCYSTEINE
AS BIOMARKERS IN IMMUNE MEDIATED RHEUMATIC
DISEASES: CURRENT APPROACHES AND FUTURE
PERSPECTIVES**

HABILITATION THESIS

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The Role of Capillaroscopy and Homocysteine as Biomarkers in Immune Mediated Rheumatic Diseases: Current Approaches and Future Perspectives

- Summary -

My habilitation thesis, entitled *The Role of Capillaroscopy and Homocysteine as Biomarkers in Immune Mediated Rheumatic Diseases: Current Approaches and Future Perspectives*, summarizes my postdoctoral scientific work and outlines the future directions of my research activity. Patients with immune-mediated rheumatic diseases are often affected by manifestations beyond the musculoskeletal system, with complications involving multiple organ systems. This thesis explores the value of videocapillaroscopy and homocysteine levels as biomarkers that can improve patient assessment and facilitate the early identification of systemic involvement. The thesis consists of three main components. It begins with an overview of my professional and academic activity and is subsequently organized into two major sections: the first presents my postdoctoral scientific achievements across three chapters, while the second outlines my future objectives in research and teaching.

My career combines nearly thirty years of clinical practice with more than nine years of university teaching. I am an Associate Professor in the Department of Medical-Surgical and Prophylactic Disciplines at Titu Maiorescu University in Bucharest. My primary responsibility is coordinating the Rheumatology residency program. However, my academic responsibilities also include teaching undergraduate courses, coordinating bachelor's theses and supervising doctoral research.

My research centers on autoimmune diseases and their systemic effects, with particular focus on the role of videocapillaroscopy in psoriatic arthritis and rheumatoid arthritis. I have published eleven first-author and ten co-author articles in journals indexed in the Web of Science Core Collection, with more than twenty additional publications indexed in other international databases. As a principal investigator, I have led international multicentre Phase III and Phase IV clinical trials in psoriatic arthritis, systemic lupus erythematosus, rheumatoid arthritis and ankylosing spondylitis and I am a member of the Romanian Society of

Rheumatology, the Romanian Society of Internal Medicine and the Romanian Society of Clinical Research Centres.

The first chapter describes my work on nailfold videocapillaroscopy in inflammatory rheumatic diseases. Microvascular changes appear from the early stages, and through this non-invasive method, nailfold capillaries can be examined directly. I used this technique to study capillary patterns in patients with psoriatic arthritis and rheumatoid arthritis, evaluate the effects of anti-TNF- α treatment, and assess its value in detecting and monitoring interstitial lung disease in rheumatic autoimmune conditions.

The second chapter explores the role of homocysteine in rheumatoid arthritis as a simple and inexpensive biomarker that can improve risk assessment. One study examined the relationship between homocysteine levels and carotid intima-media thickness in patients treated with anti-TNF- α agents and its impact on cerebrovascular and cardiovascular risk, while another focused on the association between homocysteine and bone quality assessed through the trabecular bone score.

In the third chapter I focused on the systemic complications of autoimmune diseases and the mechanisms connecting them. The themes discussed in this chapter vary from the cardiovascular impact of chronic inflammation to the immune dysregulation affecting the nervous system and gut microbiota. I have also described concerns related to biological therapies as well as the importance of supportive care, including neurorehabilitation and the management of chronic wounds.

Section II presents my future research and academic objectives, with a focus on videocapillaroscopy, a tool that has the potential for broader clinical use that is not limited to rheumatology settings. Through future investigations supported by competitive research grants and collaborations with European centres, I aim to raise awareness of its role in patient management, risk evaluation, disease activity and prognosis. Another promising area for future research initiatives concerns the effects of hyperhomocysteinemia in immune-mediated rheumatic diseases. It is a promising biomarker of systemic vascular dysfunction that may serve as an early indicator of cardiovascular, renal and pulmonary vascular complications. My future research efforts will focus on the use of homocysteine assessment to improve risk

stratification for vascular-mediated organ damage and to identify patients who could benefit from multidisciplinary management.

In conclusion, the achievements presented in this habilitation thesis demonstrate my ability to conduct impactful research and contribute to the advancement of clinical management strategies. By establishing connections with other European centres and professionals across multiple specialties, I plan to strengthen interdisciplinary collaboration and further evaluate and validate promising clinical tools, including the broader application of videocapillaroscopy and the use of biomarkers such as homocysteine, which together constitute the foundation of my future research agenda.