

**„VICTOR BABEȘ” UNIVERSITY OF MEDICINE
AND PHARMACY FROM TIMIȘOARA
DOCTORAL SCHOOL
MEDICINE DOMAIN**



HABILITATION THESIS

CONTRIBUTIONS TO PREVENTION OF ARTERIAL FUNCTION IMPAIRMENT IN THE CARDIOVASCULAR CONTINUUM

A B S T R A C T

Assoc. Prof. IURCIUC MIRCEA-ȘTEFAN, MD PhD

Department VI – Cardiology
Discipline of Outpatient Internal Medicine,
Cardiovascular Prevention and Recovery

**Timișoara
2024**

TABLE OF CONTENTS

ABBREVIATIONS	4
REZUMAT	5
ABSTRACT	12
1. SCIENTIFIC ACHIEVEMENTS	19
1.1. Introduction to research	19
1.2. Cardiovascular rehabilitation	24
1.3. Arterial hypertension	40
1.4. Arterial stiffness	49
1.5. Other cardiovascular research	68
1.6. Secondary areas of interest	78
1.7. Books and chapters in books	86
2. ACADEMIC ACHIEVEMENTS	91
2.1. Evolution and recognition of my academic career	91
2.2. Current academic activity	95
2.3. Activity with students	98
2.4. Participation at congresses, conferences or symposia	101
3. PROFESSIONAL ACTIVITY	107
3.1. Evolution of my professional career	107
3.2. Participation in training courses	109
4. ACADEMIC AND SCIENTIFIC PERSPECTIVES	111
4.1. Professional activity future plans	113
4.2. Academic and didactic future plans	116
4.3. Research activity future perspectives	119
REFERENCES	124
LIST OF 10 REPRESENTATIVE SCIENTIFIC PAPERS	138

ABSTRACT

My name is Mircea Iurciuc, I was born in Timisoara, Romania, in 03.09.1963. In 1981 I graduated the Philology High School of Timisoara and was admitted to the “Victor Babes” University of Medicine, Faculty of Medicine, in the same year. During my studies in the field of medicine, I developed an interest in cardiology and internal medicine. I graduated the Faculty of Medicine in 1988, and began my residency in Internal Medicine. While working in the field of internal medicine during the four years of my residency training, I discovered my passion for cardiology and I decided to delve deeper in this field of medicine. Therefore, in 1994 I received my qualification as a Specialist Doctor in Internal Medicine and in the same year I started the second residency in Cardiology.

Driven by the passion I found in cardiology, I began my research activities and, subsequently, my doctoral studies, in 1996. My PhD thesis, titled “Recovery in Arterial Hypertension”, was supervised by Prof. Dr. Ioan Dorel Branea and presented in 2001, with official confirmation via the Minister of Education’s Order no. 4911/02.11.2001. The area of interest for my PhD thesis was cardiology. The pursuit of unraveling the complexities of cardiovascular disease, and the potential to improve patient outcomes through innovative treatments, fuels my dedication to this field. I am driven by the prospect of contributing to the advancement of cardiac care and making a meaningful impact on the lives of those affected by heart conditions.

Within the vast field of cardiology, my research interests converged on three pivotal areas: cardiovascular rehabilitation, atherosclerosis, and arterial stiffness. I was particularly captivated by the potential of lifestyle modifications, especially through sport and exercise, to serve as a cornerstone of cardiac rehabilitation. The prospect of empowering patients to reclaim their health and vitality through accessible and sustainable interventions was a driving force behind my work. Additionally, I delved into the intricate mechanisms of atherosclerosis, seeking to understand the factors contributing to its development and progression. This knowledge, I believe, is crucial for devising effective preventive and therapeutic strategies. Finally, my exploration of arterial stiffness shed light on its role as both a

marker of cardiovascular risk and a potential therapeutic target, offering new avenues for intervention in the fight against heart disease.

In order to further deepen my understanding in cardiology, and to expand my horizon, I participated in a Fellowships Program as a Visiting Doctor, at the University Clinic Frechen-Koln, Germany, between June 1994 and August 1994, and again between April 1995 and June 1995.

My career in Education began in 1990, when I started working at the “Victor Babes” University of Medicine and Pharmacy of Timisoara as a Preparator in the discipline of Physiology. My unwavering commitment to excellence and the consistent quality of my work quickly garnered recognition, propelling me forward in my educational career. As a result, I began working as a University Assistant within the Department of Cardiology from 1992 until 2013. During my tenure at the Department of Cardiology, I guided and mentored countless medical students, fostering their passion for the field through engaging lectures, hands-on clinical experiences, and stimulating discussions. In 2013, I assumed the role of Head of the Department of Cardiology, a position that entrusted me with the responsibility of leading and shaping the future of cardiac education and research within our university. This multifaceted role encompassed overseeing curriculum development, fostering faculty growth, and facilitating collaborative research initiatives.

My habilitation thesis synthesizes and encapsulates my research and academic activities. Titled "Contributions to the Prevention of Arterial Wall Damage and Optimizing Hemodynamic Function Across the Cardiovascular Continuum" this work highlights the achievements made since I earned my Ph.D. in 2001. Methodologically, the thesis is structured according to academic standards: (i) scientific activity, (ii) academic achievements, (iii) professional activity, and (iv) career development plan.

Chapter 1 – Scientific Activity

My scientific journey commenced with a solid foundation in internal medicine and cardiology, culminating in a doctoral thesis on cardiovascular rehabilitation for hypertensive patients. Following my PhD studies, I embarked on extensive research primarily centered around cardiovascular rehabilitation, arterial hypertension, and arterial stiffness. I explored the beneficial impact of rehabilitation programs on hypertensive patients, focusing on quality-of-life improvements through exercise.

My research delved into the complexities of cardiovascular rehabilitation, a multidisciplinary program designed to enhance cardiovascular health and well-being in individuals with heart-related conditions. My work highlighted the importance of exercise training, education, and counseling in stabilizing or reversing the progression of cardiovascular disease. I emphasized the critical role of managing modifiable risk factors such as hypertension, hyperlipidemia, smoking, diabetes, obesity, physical inactivity, and stress in cardiovascular rehabilitation.

This chapter also addresses another main interest of my research activity: arterial hypertension. I have investigated various facets of this condition, including its underlying mechanisms, diagnostic tools, and treatment strategies. My studies shed light on the effects of hypertension on different populations and organ systems, highlighting the necessity of medication adherence and addressing the challenges patients face in maintaining treatment regimens. I also explored the connection between psychological stress and cardiovascular health, emphasizing the importance of a holistic approach to managing hypertension.

My scientific curiosity extended to the study of arterial stiffness, a condition characterized by reduced arterial elasticity. I examined the clinical implications of arterial stiffness, including its association with increased pulse wave velocity and the subsequent risk of cardiovascular events. My research also focused on the concept of Early Vascular Aging, emphasizing the importance of a comprehensive approach to its definition and assessment. I further investigated the interplay between gut microbiota dysbiosis and early atherosclerosis, highlighting the potential link between gut health and vascular function. My work on arterial stiffness provides valuable insights into early detection, risk stratification, and targeted interventions for mitigating its adverse effects on cardiovascular health.

In addition to my primary research areas, I have explored various other facets of cardiovascular research and human health. My studies in CAD highlight the role of psychological factors in coronary patients, emphasizing the need for integrated psychological assessment and intervention in cardiac rehabilitation. My commitment to a multidisciplinary approach is evident in my exploration of diverse medical research areas, showcasing my dedication to understanding the complex interplay between various physiological systems and their impact on overall health.

Overall, my scientific achievements are substantial, reflecting a commitment to advancing knowledge in the field of cardiology. To date, I have authored or co-

authored over 230 papers published in both national and international journals. Among these, 16 are full-length articles where I served as the main author, with 10 of these indexed in ISI journals. I have further contributed as a co-author to 64 articles, including 5 ISI-listed publications and numerous others in national and international peer-reviewed journals. My dedication to research dissemination is evident in the 15 first-author articles and 28 co-authored articles published as abstracts in ISI-listed journals, as well as over 120 oral and poster presentations delivered at national and international conferences. Additionally, I have co-authored 14 books and courses and secured 6 research grants, underscoring my leadership and commitment to fostering academic collaboration and knowledge exchange.

Chapter 2 – Academic Achievements

My academic journey began at the University of Medicine and Pharmacy "Victor Babeș" in Timișoara, where I completed my undergraduate studies in 1981. After graduation, I gained valuable clinical experience through various roles, including participation in paper sessions and case presentations. In 1990, I secured a position as a university teaching assistant in the Department of Physiology, where my research focused on diverse areas such as exercise physiology and immunophysiology.

Throughout my career, I have consistently prioritized the integration of medical practice with theoretical knowledge. I have actively participated in designing courses and practical work for students, and have authored or co-authored 13 books related to internal medicine and ambulatory care. In 2001, I completed my doctoral thesis, exploring the relationship between hypertension, cardiovascular risk, and rehabilitation.

My academic journey has been marked by steady progress and recognition. I advanced through the academic ranks, becoming a lecturer in 2001 and serving as the Head of the Department of Cardiology from 2013 to 2019. I have supervised numerous undergraduate and postgraduate theses, fostering a culture of research and critical thinking among students. My commitment to medical education is also reflected in my involvement in various examination boards and curriculum development initiatives.

I have been actively involved in several academic societies, including the Romanian Society of Cardiology and the European Society of Cardiology. I have

also served on the editorial board of scientific journals, contributing to the dissemination of knowledge in my field. Throughout my career, I have authored and co-authored over 230 papers in national and international journals, and have received six awards for my contributions to scientific research in cardiovascular medicine.

I have actively participated in numerous clinical studies and research grants, primarily focused on cardiovascular disease prevention, rehabilitation, and diagnostic approaches. My involvement in projects such as the EUROASPIRE studies and national grants has allowed me to collaborate with renowned institutions and advance the understanding of cardiovascular health.

My current academic activities include lecturing to medical students and postgraduate students in cardiovascular rehabilitation and cardiopulmonary diseases. I have also contributed to the development of curricula for medical residents and master's courses. My leadership roles in professional organizations, such as the Romanian Society of Cardiology and the Preventive Cardiology Working Group, highlight my commitment to advancing the field of cardiology and promoting cardiovascular health. I have also actively contributed to the organization of significant medical events, facilitating the exchange of knowledge and fostering collaboration within the cardiology community.

Chapter 3 – Professional Activity

This chapter outlines the evolution of my professional achievements as a doctor. I gained valuable experience as a Trainee Doctor and through international fellowships, which enhanced my clinical skills and exposure to diverse medical practices. My career progressed with roles as a University Assistant and later as the Head of the Cardiology Department, where I contributed significantly to both education and research in the field of cardiology.

I have consistently pursued opportunities for growth, actively participating in training courses and conferences to expand my expertise. I completed courses in General Ultrasound, Cardiac Rehabilitation, and Carotid Echography, among others, to enhance my diagnostic and therapeutic skills. I also focused on refining my presentation and teaching abilities to effectively educate and mentor others in the field.

Throughout my career, I have actively contributed to the medical community through various leadership roles and teaching engagements. I served as secretary of the Commission for National Examinations, ensuring high standards in medical training. As an invited lecturer at numerous events, I shared my knowledge and expertise with a broader audience. I also held significant leadership positions, such as serving as course director for the PROVAS course and overseeing the cardiological evaluation of athletes.

In my clinical practice, I am dedicated to the diagnosis and management of patients with complex cardiovascular conditions, particularly those with hypertension, atherosclerosis, and heart failure. My approach emphasizes comprehensive rehabilitation and preventive cardiology, tailoring treatment plans to each patient's individual needs. I work collaboratively with a multidisciplinary team to provide holistic care that integrates therapeutic interventions with lifestyle modifications.

Chapter 4 – Career Development Plan

My dedication to enhancing the professional reputation of my university, my discipline, and myself is evident in my extensive contributions. I aim to continue this trajectory by actively engaging in national and international professional development opportunities. My focus is on fostering a high-performing team that contributes significantly to research and teaching, with the goal of publishing impactful research in prestigious journals and involving students in scientific endeavors.

My future objectives prioritize continuous self-improvement, active involvement in decision-making, and maintaining high standards of professionalism. I plan to stay current with medical advancements, refine my communication skills, and integrate research findings into clinical practice. By fostering a collaborative environment, leveraging technology, and promoting a patient-centered approach, I aim to further elevate the standard of care and contribute to the medical knowledge base.

I am committed to cultivating an innovative educational environment that enhances medical instruction and encourages student engagement in research and clinical practice. I will expand interdisciplinary and international collaborations while contributing to advancements in cardiovascular medicine. My strategic initiatives

focus on creating a supportive learning environment, refining teaching methods, and fostering critical thinking and clinical skills among students.

My research agenda remains focused on cardiovascular prevention and rehabilitation, particularly arterial hypertension and vascular aging. I will continue exploring these areas through large-scale epidemiological studies and collaborative projects with national and international institutions. My research aims to elucidate the effects of physical exercise on subclinical organ damage and arterial stiffness, with a specific interest in how individualized physical training can slow vascular aging. I will actively pursue funding opportunities and develop comprehensive study models to advance this work and publish findings in reputable journals.

By mentoring doctoral students and fostering their research in cardiology and internal medicine, I aspire to not only advance scientific knowledge but also nurture the next generation of well-rounded medical professionals and academics. I believe that their achievements, guided by my mentorship and disseminated effectively, will elevate the reputation of our university on both a national and global scale.

LIST OF 10 REPRESENTATIVE SCIENTIFIC PAPERS

1. **Iurciuc S**, Avram C, Turi V, Militaru A, Avram A, Cimpean AM, et al. Physical Training, Hemodynamic Parameters and Arterial Stiffness: *Friends or Foes of the Hypertensive Patient?* In Vivo. 2016;30(4):521–8.
2. Petre I, **Iurciuc S**, Buleu F, Petre I, Moleriu R, Popa D, et al. The Impact of Medical Physical Training and a Structured Personalized Exercise Training Program on Hemodynamic Parameters and Arterial Stiffness in Pregnant Women. *Biomedicines*. 2024 Apr 30;12(5):986.
3. Caraba A, Munteanu A, Iurciuc S, **Iurciuc M**. Renal Acoustic Radiation Force Impulse Elastography in Hypertensive Nephroangiosclerosis Patients. *Applied Sciences*. 2021 Nov 11;11(22):10612.
4. Iurciuc S, Cimpean AM, Mitu F, Heredea R, **Iurciuc M**. Vascular aging and subclinical atherosclerosis: why such a “never ending” and challenging story in cardiology? *CIA*. 2017 Aug;Volume 12:1339–45.
5. Georgescu D, **Iurciuc MS**, Ionita I, Dragan S, Muntean M, Ancusa OE, et al. Migraine without Aura and Subclinical Atherosclerosis in Young Females: Is Gut Microbiota to Blame? *Medicina*. 2019 Dec 16;55(12):786.
6. Juganaru I, Luca CT, Dobrescu AI, Voinescu O, Puiu M, Farcas S, et al. A Non-invasive, Easy to Use Medical Device for Arterial Stiffness. *Rev Chim*. 2019 Mar 15;70(2):642–5.
7. Caraba A, Iurciuc S, Nicolin M, **Iurciuc M**. Endothelial Dysfunction in Primary Sjögren’s Syndrome: Correlation with Serum Biomarkers of Disease Activity. *IJMS*. 2023 Sep 10;24(18):13918.
8. Caraba A, Iurciuc S, Munteanu A, **Iurciuc M**. Hyponatremia and Renal Venous Congestion in Heart Failure Patients. Thongprayoon C, editor. *Disease Markers*. 2021 Aug 12;2021:1–9.

9. **M Iurciuc**, C Avram, S Iurciuc, C Franculescu, A Vlad, S Mancas
Comprehensive rehabilitation programs may improve some of the ambulatory blood pressure parameter. Proceedings of the 17th European Congress of Physical and Rehabilitation Medicine. *Edizioni Minerva Medica* 2010. ISBN-13: 978-88-7711-616-1. pages: 253-255. Proceeding int. / ISI Web of Knowledge WOS:000288040700108
10. Jurca-Simina IE, Jugănaru I, **Iurciuc MŞ**, Iurciuc S, Ungureanu E, Dobrescu AI, et al. What if body fat percentage association with FINDRISC score leads to a better prediction of type 2 diabetes mellitus? *Rom J Morphol Embryol.* 2019;60(1):205–10.