

**"VICTOR BABEȘ" UNIVERSITY OF
MEDICINE AND PHARMACY TIMIȘOARA
DOCTORAL SCHOOL
MEDICINE DOMAIN**



**REVOLUTIONARY ORTHOPEDIC TREATMENTS: FROM
TECHNOLOGY TO CLINICAL PRACTICE**

ABSTRACT

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The habilitation thesis titled **"Revolutionary Orthopedic Treatments: From Technology to Clinical Practice"** represents the synthesis of my academic and professional efforts, highlighting my contributions to the field of orthopedics and traumatology. My work has focused on improving existing treatments, developing innovative techniques, and implementing modern technologies in medical practice. I have had the opportunity to explore multiple research directions, all oriented toward a common goal: enhancing patients' quality of life through personalized and efficient medical solutions.

My scientific career began with doctoral studies at the "Victor Babeș" University of Medicine and Pharmacy in Timișoara. My doctoral thesis, titled **"Considerations on Repair and Reconstructive Procedures of Knee Joint Menisci"**, marked the starting point of my academic activity, laying the foundation for subsequent research. Completing this thesis in 2005 strengthened my research skills and allowed me to contribute to the development of innovative surgical techniques for the treatment of meniscal injuries.

The publication of my results in prestigious journals and participation in numerous international conferences facilitated the dissemination of my findings and collaboration with experts from various related fields.

From a research perspective, I have chosen to divide some of my most significant publications into several specific research directions to which I have dedicated considerable time.

1. The Knee Joint: Biomechanics, Innovative Treatments, and Rehabilitation

Research on the knee joint, one of the most complex and stressed joints, aimed to improve treatments for ligament, meniscal, and cartilage injuries. I addressed several topics, including:

- **Anterior cruciate ligament (ACL) reconstruction:** I evaluated the use of tranexamic acid in reducing postoperative bleeding, confirming its efficacy in preventing hemarthrosis and improving functional recovery.
- **Cartilage regeneration:** I explored the use of biological treatments, such as platelet-rich plasma (PRP) therapy, to stimulate the regeneration of articular tissue.
- **Prevention and rehabilitation:** I developed rehabilitation protocols tailored for athletes, aiming to prevent recurrences and restore optimal knee function.

2. The Ankle Joint: Minimally Invasive Techniques and Treatment Optimization

Research on the ankle joint focused on modern solutions for complex injuries and degenerative conditions. This direction includes:

- **Distal tibiofibular diastasis:** I evaluated the impact of syndesmotic screw removal on patients' mobility and satisfaction, observing significant functional improvements.
- **Achilles tendon repair:** The augmentation technique using the plantaris tendon demonstrated comparable results to classic methods, proving to be a safe solution for acute tendon ruptures.
- **Advanced imaging:** I used imaging technologies for the precise diagnosis of injuries and monitoring postoperative outcomes.

3. Integration of Advanced Technologies in Orthopedics

A central aspect of my research has been the use of cutting-edge technologies in medical practice. Key areas include:

- **Robotic guidance:** I demonstrated the utility of this technology in complex interventions, reducing complications and optimizing patients' recovery.
- **Cellular therapies:** Using stem cells and biomaterials has opened promising perspectives for the regeneration of bone and cartilage tissue.
- **Artificial intelligence (AI):** I collaborated on the development of algorithms for diagnosing musculoskeletal diseases, integrating these solutions into clinical practice.

4. The Relationship Between Metal Toxicity and Bone Health

Another essential research direction focused on the impact of toxic metals on the mineral composition of bone tissue.

- I investigated the effects of aluminum on bone metabolism, demonstrating the imbalances caused by its accumulation and its negative impact on bone structural health.
- Studies suggested therapeutic solutions, such as the administration of mineral supplements to counteract harmful effects.

5. Treatment of Periprosthetic Infections and Management of Nosocomial Infections

In this context, I contributed to the development of protocols for preventing and treating periprosthetic infections, emphasizing the use of locally released antibiotics through absorbable materials. My research in this area demonstrated the potential of new technologies to improve therapeutic outcomes.

To disseminate the scientific results of my studies, I have published over 10 articles in international ISI-indexed journals. My participation in over 60 national and international conferences has facilitated knowledge exchange and interdisciplinary collaborations. Additionally, I have developed postgraduate courses and continuous medical education programs, contributing to the training of a new generation of doctors.

My medical activity has focused on orthopedics and traumatology, emphasizing the implementation of modern and innovative techniques in clinical practice and managing complex cases. Throughout my career, I have coordinated medical teams and been actively involved in the professional training of residents, fostering a culture of medical excellence.

As Head of the Orthopedics and Traumatology Department I at the “Pius Brînzeu” County Emergency Clinical Hospital (2011–2018), I managed complex cases and introduced standardized protocols to improve medical practice. Since 2018, I have continued this work at Premiere Hospital in the Regina Maria Health Network, where I have developed advanced techniques for treating musculoskeletal conditions using state-of-the-art technologies. I have maintained a balance between clinical activity, research, and professional training, which has allowed me to integrate recent research findings into clinical treatments.

I have been involved in treating complex orthopedic pathologies, including ACL reconstruction, using regenerative therapy for cartilage injuries, and managing complex fractures. Additionally, I coordinated international studies evaluating new biomaterials and medical devices, demonstrating my commitment to innovation and excellence in this field.

Development Plan

My professional and academic development plan focuses on consolidating existing research directions and exploring new opportunities to address challenges in orthopedics and traumatology. The main objectives of this plan include:

1. Expanding Clinical and Experimental Research

- Developing standardized protocols for personalized treatment of musculoskeletal injuries, utilizing new minimally invasive techniques and regenerative therapies.

- Engaging in international research projects to test and implement advanced biomaterials for reconstructing bone and cartilage tissues.

2. Integrating Artificial Intelligence and Advanced Imaging Technologies

- Developing AI algorithms for diagnosis and preoperative planning in complex cases.
- Utilizing high-resolution imaging to improve clinical evaluation and treatment personalization.

3. Promoting Continuous Medical Education

- Creating educational programs to train future orthopedic specialists, focusing on modern technologies and multidisciplinary approaches.
- Organizing workshops and conferences to disseminate knowledge and research results.

4. Strengthening Interdisciplinary Collaborations

- Expanding collaborations with experts from related fields, such as medical imaging, rehabilitation, and biomedical engineering, to develop innovative therapeutic solutions.
- Integrating clinical research results into medical practice to ensure the best possible outcomes for patients.

5. Developing Medical and Research Infrastructure

- Continuing efforts to modernize equipment and technologies in the medical units where I practice.
- Creating a favorable environment for research and innovation to support medical and educational excellence.

My habilitation thesis reflects my commitment to advancing modern orthopedics, integrating academic knowledge and advanced technologies into effective clinical solutions. By addressing diverse research directions, I have contributed to the progress of this field and established a solid foundation for future collaborations and innovative projects. My ultimate goal remains improving patients' quality of life through a multidisciplinary and personalized approach.