

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



**ULTRASOUND BASED METHODS FOR  
DIAGNOSING CHRONIC LIVER DISEASES  
AND THEIR COMPLICATIONS**

**- A B S T R A C T -**

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The habilitation thesis entitled "Ultrasound based methods for diagnosis of chronic liver diseases and their complications" contains the most important professional achievements, obtained after receiving the title of Ph D in 2007 with the thesis entitled "Hepatocarcinoma - Diagnosis and Treatment", under the coordination of Prof. Dr. Ioan Sporea.

The habilitation thesis consists in three major sections:

- in the first section, the academic, professional and scientific achievements are presented;
- the second section presents the plans and prospects for academic, professional and scientific career development;
- the last section of the thesis contains the references used for the research and documentation work presented in the first two sections:

My post-doctoral research and professional career are closely related to the two positions I have been appointed to: senior consultant in Gastroenterology, respectively Associate Professor at the Discipline of Internal Medicine – Department of Gastroenterology and Hepatology.

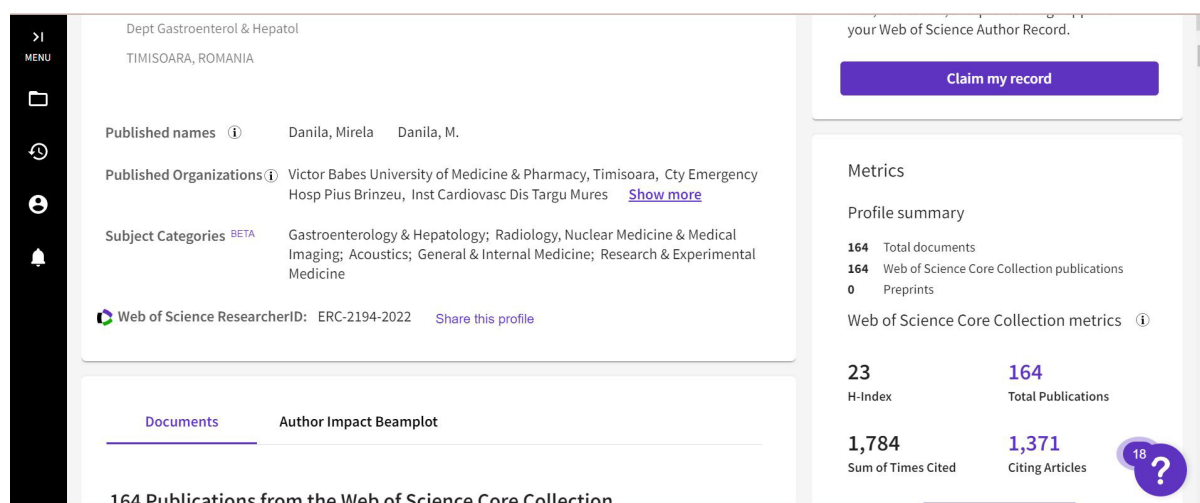
The first part of my thesis covers the postdoctoral researcher's development and main professional activities.

I had the opportunity to be part of a research team working on the newest areas of ultrasound, namely ultrasound-based elastography and contrast enhanced ultrasound. These methods are aimed at the early and non-invasive diagnosis of chronic liver disease - liver elastography- and the possibility of early diagnosis of liver tumours.

The research was published in scientific journals with an high impact factor on the research community.

The scientific achievements have been synthesised in more than 500 scientific works, 76 of them published in extenso (48 listed in the ISI Web of Science, 28 others listed in international databases).

According to Web of Science, the Hirsch index is 23. The total number of cited articles, excluding self-citations, is 1371.



I have also been involved in the publication of 10 books as author, co-author or chapter co-author.

In recent years, I have been involved as co-author in the development of teaching materials in electronic format both as course support for students and as information materials for postgraduate courses in ultrasound.

This thesis highlights my main scientific achievements by presenting the results of the most important studies in which I have participated.

The first section is dedicated to my scientific achievements so far:

The first major topic on which I focused my research was the **elastography of the liver**.

Liver elastography is an ultrasound-based technique that non-invasively assesses liver stiffness (LS) as a marker of the severity of liver fibrosis in chronic liver disease.

Despite effective antiviral therapies for chronic hepatitis B and especially C, chronic hepatitis remains a major public health problem worldwide. In addition, chronic liver disease associated with non-alcoholic steatohepatitis has become a public health problem in recent years, particularly in developed countries.

Therefore, early diagnosis of chronic liver disease is essential to prevent its complications.

Since their introduction into clinical practice, elastographic methods have proven to be effective in the staging of chronic liver disease, particularly at advanced stages of presentation.

The oldest elastographic method is transient elastography (TE) and in this thesis I present the results of several of my published studies. Subsequently, other elastographic techniques have become available and I present some of the results of my research into these: ARFI elastography using VTQ technique, 2D-SWE elastography and ElastPQ elastography.

Together with my team, we have published several studies in the field of liver elastography over the years: monocentric studies, multicentric studies and also international studies.

After proving its value in assessing the severity of liver disease, the role of elastography in assessing the complications of advanced liver disease - cirrhosis - has also been studied.

FS is now recognised and included in international guidelines as a method of assessing portal hypertension in cirrhosis. The Baveno guidelines for the management of portal hypertension recommend the use of this elastographic method in the indication of variceal bleeding prophylaxis.

Some studies suggest a role for elastography in the assessment of liver tumours. In this paper our recently published results regarding the value of elastography in HCC, another common complication of cirrhosis, will be presented.

The second major topic I focused my research on was **Contrast Enhanced Ultrasound (CEUS)**. I present several studies in this area.

The introduction of CEUS represented a major step forward in the field of ultrasound evaluation, allowing the clinician to readily characterise liver lesions right at the time of their detection, without adverse effects and with good sensitivity.

We have been involved in the evaluation of such methods since their introduction into clinical practice, by publishing various articles and presentations as a lecturer at national and international conferences.

Both benign and malignant liver tumours are common pathologies in clinical practice. The use of contrast-enhanced ultrasound often allows rapid diagnosis and reducing stress for the patient.

Benign liver tumours are often detected during a routine ultrasound scan. Unfortunately, a standard ultrasound scan cannot always answer the question of whether a tumour is benign or not. Our work has focused on the use of contrast ultrasound to differentiate between malignant and benign tumours and to reliably characterise benign tumours (hemangioma, focal nodular hyperplasia, liver

adenoma). This work has resulted in the publication of scientific material which is presented in this thesis.

Malignant liver tumours, both secondary - liver metastases - and primary - hepatocellular carcinoma - are unfortunately common pathologies. Early detection of liver metastases allows appropriate management of patients with neoplastic disease. The use of contrast-enhanced ultrasound has proven to be a very useful tool in both the detection and characterisation of liver metastases.

HCC is a malignant primary liver tumour that complicates advanced chronic liver disease, particularly cirrhosis. The use of CEUS to characterise FLL detected in cirrhotic liver is useful and safe in this patient.

International guidelines on HCC management recommend CEUS as a diagnostic imaging method in HCC other than contrast-enhanced CT and contrast-enhanced MRI.

**Multiparametric ultrasound (MPUS)** is a combination of different ultrasound examinations: standard US, colour Doppler, power Doppler and contrast-enhanced ultrasound (CEUS). It is an algorithm that allows a complex evaluation of a focal liver lesion in the same session, with a high diagnostic accuracy, as we have tried to demonstrate in one of our studies.

In recent years, another complication of cirrhosis - **malnutrition** - has been shown to play an important role in the prognosis of these patients. Our work in this area has resulted in 2 recent publications highlighting the role of early detection of patients with cirrhosis in preventing this complication.

A part of the published research studies has been carried out with the support of the "Victor Babeş" University of Medicine and Pharmacy, Timisoara, in PROGRAMUL III - C2 - PCFI - 2015/2016.

**The second section** presents my future perspectives from academic, professional and scientific perspectives.

I am currently a Consultant in Gastroenterology and a Level III (Expert) in General Ultrasound. I am Associate Professor of Gastroenterology at Victor Babeş University of Medicine and Pharmacy, Timisoara.

I am a member of the teaching staff of the UMF Training Centre in Ultrasound, recognised as a Centre of Excellence by the World Federation of Ultrasonography in Medicine and Biology (WFUMB) and as a Training Centre by EFSUMB (European Federation of Societies for Ultrasound in Medicine and Biology).

In the last part of my thesis, I present my scientific, professional and academic development plans.

My didactic activity will focus on the student. I want to align myself with the strategy of the University of Medicine and Pharmacy "Victor Babeş" in the development of highperformance human resources and in the increase of the national and international visibility of our university.

In terms of education, my intention is to develop my pedagogical skills and to implement modern, interactive teaching methods.

Postgraduate courses also represent an important component in the area of education; therefore, I would like to introduce new courses and expand existing ones in abdominal ultrasound.

From a research perspective, I plan to continue my research in the field of chronic liver disease and its complications. I will continue to promote multidisciplinary, interdisciplinary collaboration and innovative, evidence-based research. I would like to combine clinical practice and research, involving new generations of students and residents in research in gastroenterology and hepatology.

The habilitation thesis ends with a presentation of the 10 representative scientific papers.