Transilvania University of Brașov
INTERDISCIPLINARY DOCTORAL SCHOOL

ADMISSION TO DOCTORAL STUDIES Session September 2025

Field of doctoral studies: MEDICINE
Doctoral supervisor: Prof. dr. Diana Țînț

TOPICS FOR THE ADMISSION TO DOCTORAL STUDIES

TOPIC 1: *Unraveling the Cardiometabolic Axis: Linking MAFLD to Heart Failure Progression*

Contents / Main aspects to be considered - *to be adapted/ completed/ deleted*

Metabolic Dysfunction-Associated Fatty Liver Disease (MAFLD), reflects the central role of metabolic dysfunction in hepatic steatosis. Heart failure (HF), particularly heart failure with preserved ejection fraction (HFpEF), has increasingly been associated with metabolic comorbidities, including obesity, insulin resistance, and systemic inflammation—hallmarks shared with MAFLD. This convergence of hepatic and cardiac pathologies underscores the need to explore the **cardiometabolic axis**, a complex interface where liver disease may directly or indirectly influence cardiac function.

Key Aspects to Be Considered

1. Epidemiological Correlation

- Prevalence and incidence of heart failure among patients with MAFLD in different populations.
- Longitudinal studies to establish **temporal associations** and potential causality.
- Subgroup analyses based on age, sex, diabetes status, and obesity.

2. Pathophysiological Mechanisms

- **Systemic inflammation**: Elevated cytokines (e.g., IL-6, TNF-α) in MAFLD contribute to endothelial dysfunction and myocardial fibrosis.
- **Insulin resistance**: A shared driver of both hepatic steatosis and cardiomyopathy.
- **Lipotoxicity and oxidative stress**: Accumulation of free fatty acids and reactive oxygen species in both hepatocytes and cardiomyocytes.
- **Fibrosis as a common endpoint**: The role of liver stiffness and myocardial stiffness in disease progression.

3. Cardiac Phenotyping in MAFLD

- Assessment of cardiac structure and function (e.g., echocardiography, cardiac MRI) in MAFLD patients.
- Early markers of diastolic dysfunction or subclinical heart failure.
- Differentiating between HF with reduced vs preserved ejection fraction (HFrEF vs HFpEF).

4. Biomarkers and Risk Stratification

- Identification of **shared biomarkers** (e.g., NT-proBNP, high-sensitivity CRP, FGF21) to assess risk and monitor progression.
- Potential role of **liver-derived exosomes** and non-coding RNAs in cardiac remodeling.
- Use of **imaging-based scores** (e.g., FibroScan, transient elastography) in conjunction with cardiac risk models.

5. Therapeutic Implications

- Impact of lifestyle interventions and pharmacologic treatments (e.g., GLP-1 receptor agonists, SGLT2 inhibitors) on both liver health and cardiac outcomes.
- Evaluation of MAFLD-targeted therapies as **preventive strategies** for heart failure.
- Role of **multidisciplinary care models** in managing patients at the liver-heart intersection.

Recommended bibliography:

Badmus OO, Hinds TD Jr, Stec DE. Mechanisms Linking Metabolic-Associated Fatty Liver Disease (MAFLD) to Cardiovascular Disease. Curr Hypertens Rep. 2023 Aug;25(8):151-162.

Mantovani A, Byrne CD, Benfari G, Bonapace S, Simon TG, Targher G. Risk of Heart Failure in Patients With Nonalcoholic Fatty Liver Disease: JACC Review Topic of the Week. J Am Coll Cardiol. 2022 Jan 18;79(2):180-191.
Lee J, Shin MS. Nonalcoholic fatty liver disease and heart failure with preserved ejection fraction: a focus on risk factors and management. Cardiovasc Prev Pharmacother. 2025;7(1):1-8.
Zhang Y, Feng L, Guan X, Zhu Z, He Y, Li X. Non-alcoholic fatty liver disease and heart failure: A comprehensive bioinformatics and Mendelian randomization analysis. ESC Heart Fail. 2024 Dec;11(6):4185-4200.
Inciardi, R.M., Mantovani, A. & Targher, G. Non-Alcoholic Fatty Liver Disease as an Emerging Risk Factor for Heart Failure. *Curr Heart Fail Rep* **20**, 308–319 (2023). https://doi.org/10.1007/s11897-023-00613-1

Prerequisites / Remarks: *to be adapted/ completed/ deleted*

☐ Scientific Doctorate (full-time only)
X Professional Doctorate (full-time or part-time)

X without tuition fee (state budget funded)
☐ with tuition fee or with funding from other sources than the state budget

Doctoral supervisor,

Prof. Dr. Diana Țînț

Signature

Coordinator of the field of doctoral studies,

Prof. Dr. Petru-Iulian Ifteni

Signature