

Cardiovascular Research Unit – University and Emergency Hospital Bucharest

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The Cardiology Department has a Cardiovascular Research Unit with great experience in cardiac and vascular ultrasound, but also in interventional cardiology and electrophysiology.

Mission and research focus:

1. Screening and early diagnosis of subclinical cardiac and vascular dysfunction in populations at risk;
2. Modern ultrasonographic evaluation of subclinical cardiac and vascular dysfunction in systemic noncardiac diseases;
3. Development of a research facility focused on assessment and treatment of heart failure;
4. Development of a research facility for the invasive assessment and computer modeling of cardiac arrhythmias;
5. Management of the national registries on ST elevation infarction, percutaneous coronary interventions and on drug eluting stents.

PhD themes (currently 15 active PhD students):

- evaluation of the athletic heart through modern ultrasound techniques;
- evaluation of cardiac involvement in endocrine, respiratory, and neurological diseases;
- assessment of systolic and diastolic function in patients with diabetes mellitus;
- assessment of cardiac function and ventriculo-arterial interaction in patients with mild to moderate arterial hypertension and diabetes mellitus;
- evaluation of contractile reserve in patients with arterial hypertension;
- establishing the clinical and echocardiographical profile of subjects infero-lateral early repolarization syndrome on ECG;

- management of the national registries on acute coronary syndromes and percutaneous coronary interventions;
- comparison of drug eluting versus bare metal stents in real life;
- screening for noncardiac surgery patients at risk for perioperative cardiac events through cardio-pulmonary exercise testing;
- assessment of echocardiographic changes after a myocardial infarction on a murine model;
- establishing the role of cardio-pulmonary exercise testing in heart failure.

Methodological approach:

To **apply** in cardiology, as well as in internal medicine the **expertise** of our research team in **cardiac and vascular ultrasound, interventional cardiology and electrophysiology**:

- standard echocardiography, tissue Doppler, Speckle Tracking, 3D cardiac ultrasound, transesophageal echocardiography, vascular ultrasound (including e-tracking, wave intensity, and flow mediated dilation), cardio-pulmonary exercise testing, interventional treatment of acute coronary syndromes, interventional treatment of cardiac arrhythmias, interventional treatment of heart failure (such as cardiac resynchronization therapy), identification of diagnostic, prognostic and predictive factors for cardiac dysfunction in systemic diseases, etc.

Infrastructure:

- The echocardiography lab is one of the most prestigious in Romania (11 ultrasonographers trained in Romania and abroad for the full evaluation for clinical and research purposes of cardiac and vascular function); it has european accreditation since 2011.
- The coronary angiography and the electrophysiology laboratories are mainly clinically orientated, but developing their research facilities. They have highly trained personnel. A recently finalized project has contributed to the development of one of the most advanced laboratories in the invasive electrophysiologic studies in Romania.

The following facilities are available for research purposes:

- Several ultrasound machines, such as VIVID 7, VIVID 9 and VIVID I, GE Medical System (with 2D, 3D, and transesophageal multiplane probes, equipped with software for 2D, colour and spectral Doppler, TVI, Q analysis, 2D speckle tracking, 3D multiplane E), Aloka α 10 (with cardiac and vascular probes, equipped with customized software for cardiac and vascular assessment)';
- High capacity server to store all ultrasound data;
- Complior system to evaluate pulse wave velocity;
- Arteriograph system for determining central aortic pressure and pulse wave velocity;
- Cardiopulmonary test GE/Cortex;
- Ambulatory blood pressure/ECG monitoring machines; portable electrocardiograph;

- PC network with dedicated software for statistical analysis;
- Angiograph PHILPIS INTEGRIS 3000;
- Angiograph Siemens Artis Zee;
- Electroanatomical system for electrophysiology NavX EnSite;
- Electrophysiology system GE Prucka;

International projects:

Ongoing:

1. Since 2010: E-Tracking International Collaboration (ETIC study), for establishing reference values for indices of arterial stiffness, wave travel, and wave intensity and assessing the influence on all these indices on traditional cardiovascular risk factors.

Recently completed:

1. 2004-2009: Effects of NEbivolol on Subclinical left ventricular dYSfunction. A comparative study against metoprolol. The ENESYS study. A Phase 3, randomised, parallel, active-controlled, open label study. (Grant Menarini International, published in J Hypertens 2011).
2. 2004-2009: Euro Heart Survey on percutaneous coronary intervention (PCI Registry) (Grant European Society of Cardiology, sustained by Cordis, Johnson & Johnson, Medtronic, Boston Scientific and Abbott).

During the last 4 years the Cardiovascular Research Unit has participated in 43 contracts/grants and international multicentric studies: 3 grants financed from abroad (1 ongoing), 11 grants with internal financing (4 ongoing); 28 multicentric international studies and registries (13 ongoing). The topics of the international grants are presented above.

The completed internal grants had the aim of development the cardiac center for the early diagnosis of subclinical cardiac dysfunction in populations at risk, the echocardiographic assessment of hypertensive acute pulmonary oedema, the quantification of subclinical cardiac and vascular dysfunction in rheumatoid arthritis, the development of modern research tools for heart failure and cardiac arrhythmias, the development of a national registry on drug eluting stents, and a comparison of Indapamide SR 1.5 mg with Hydrochlorothiazide 25 mg, in combination with an ACE-inhibitor, in patients with mild to moderate hypertension and type 2 diabetes mellitus (the AISHA study).

We have several ongoing national grants: the national registry on primary percutaneous interventions (financed by the Romanian Society of Cardiology), the national registry on ST elevation acute myocardial infarction, and a CNCSIS Research Grant entitled "Diagnostic and prognostic scores for subclinical cardiac dysfunction induced by therapy with taxanes in patients with breast cancer".

The multicentric international studies concern different modern therapies for acute coronary syndromes, heart failure, cardiac arrhythmias, arterial hypertension as well as primary and secondary prevention in patients with ischemic heart disease.

Partner institutions:

1. University of Medicine and Pharmacy “Carol Davila”, Bucharest
2. “Victor Babes” National Institute
3. National Institute of Atomic Physics
4. University of Wales, Cardiff, United Kingdom
5. Duke Cardiovascular Research Unit, Durham, USA
6. Public Health Research Institute, Hamilton, Canada
7. Physiologic Institute of Cardiovascular Research, Pisa, Italy
8. Public Health Science Faculty , Wrocław University of Medicine, Poland

Publications (during the last 5 years):

- ISI publications (full papers): 44
- Other relevant publications: abstracts published in ISI indexed papers 73, articles published in other data bases (Medline, Current Contents, Medscape) 14, book chapters 14;

The main topics of our papers were the evaluation of the left ventricular function (systolic and diastolic) in connection to different physiological or pathological processes such as athletic heart, arterial hypertension, diabetes mellitus, cardiac resynchronization therapy, etc.

Development plan:

I. New research areas:

- 1. Introduction of genetical detection in the diagnosis, prognosis and therapy of cardiovascular disease.*
- 2. Introduction of 3D echocardiography in the assessment of subclinical left and right heart dysfunction.*
- 3. Creation of a new echocardiography laboratory, specialized in cardiac stress testing.*
- 4. Creation of a sleep laboratory, specialized in evaluating cardiac disease associated to sleep disorders.*

II. Development and validation of new experimental models for the evaluation of coronary ischemia and cardiac dysfunction.

III. The assessment of mechanisms of cardiac dysfunction induced by taxanes (alone or in combination with anthracyclines), as well as introducing into clinical practice of new diagnostic and predictive methods for patients at risk for developing cardiac dysfunction, consequently leading to an optimization of chemotherapy.

IV. The assessment of the extent of cardiac and vascular dysfunction in systemic diseases such as hepatic cirrhosis or multiple sclerosis.

V. Elaborating and improving stochastic/population models of the clinical expression of physiopathological processes, through analogy with chemical kinetics and the haemodynamics of irreversible physical and chemical processes.

VI. Introduction of new validated investigation methods into medical practice.

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