

INNOVATION STRATEGY
of the Medical University
"Prof. Dr. Paraskev Stoyanov" – Varna
for the period
2021 – 2025

I. INTRODUCTION

The Innovation Strategy of the Medical University of Varna is a reflection of the strategic national policies related to meeting the challenges of the European and world economy. It is necessary to adequately meet the global requirements for increasing labor productivity, technological renewal of the production facilities and improving the qualitative characteristics of the products. The end result is expected to build a national economy capable of generating, protecting, sharing and selling knowledge in international markets.

MU - Varna is an integral part of the new European Research Area, maintaining and developing an open environment based on high scientific achievements and talents. The current macroeconomic environment provides a good basis for pursuing an active policy in the field of research and innovation. In recent years, a number of programs and projects related to the improvement of public health have been prepared and created in Bulgaria. There is a desire to improve the institutional environment for research in the fields of medicine, public health, bioengineering and research related to studying and improvement of health in general.

There are many challenges inherent in the health care sector that can be addressed through the development of new, more effective and innovative activities. Such a challenge stands in front of the Medical University of Varna, the mission of which is to meet the public needs of highly qualified medical and managerial staff in the health and social spheres, as well as to improve the nation's health in partnership with the other units in the health care system. The University initiates cooperation with industrial enterprises and scientific organizations and applies the practice of innovative companies and their experience in the transfer and development of new products and technologies. The economic structure of the region of Varna district is diverse. It is primarily related to port activities, shipping, shipbuilding, ship repair, tourism, chemical industry, mechanical engineering, textile production, food industry, production of furniture, construction and agriculture, offering wide opportunities for partnerships between business and scientific circles, for development through synergistic innovations for both parties.

The established scientific potential in the field of innovation is focused on the maritime industry, information technology, tourism, services and energy. It is in these economic activities that new high-tech productions are developed, which create high added value and attract investments in production activities related to science. In the context of these priority areas, there is a need to improve the current model of organization of education and science in the field of health care in order to focus on innovations and the implementation of the Science-to-Business link.

As an engine of innovation in medicine and health care, MU - Varna has the potential to

support the smart specialization of the field in relation to the already identified two thematic areas of the Innovation Strategy for Smart Specialization of the Republic of Bulgaria (ISSS) 2014-2020 -

Healthy Living Industry and Biotechnologies and New Technologies in Creative and Recreative Industries. This strategy also reflects the public debate related to ISSS for the next programming period - 2021- 2027, where the main priority areas are maintained and digitalization is developed. The Innovation Strategy of MU - Varna is also consistent with a number of national and European documents.

The development and following of a strategy for the development of innovations by MU - Varna is a decisive institutional step towards the development of a modern health care system, which offers and guarantees high quality health care. The knowledge-based economy creates a favorable environment for active interaction between science and business and provides an opportunity to establish new contacts for cooperation at regional, national and international level, to open new partnerships of different scope and interest, to present new products, services, methodologies, as well as to build scientific networks and partnerships with which to participate in European programs and initiatives. The sustainable partnership between university and business is a prerequisite for the functioning of the so-called Knowledge Triangle - scientists, research and transfer of scientific results.

II. NATURE, PURPOSE AND TASKS

The innovation strategy of MU - Varna combines the principles of medicine - based on the evidence and values of the personalized approach in the medical science and practice. The innovation strategy has been developed in accordance with the strategic objectives of the European Research Area (prioritizing the investments in innovative scientific research; improving the access to high quality facilities and infrastructures; transfer of scientific results; enhancing the mobility of researchers and the free movement of knowledge and technology). The innovation strategy of MU - Varna also reflects the priority research areas of MU - Varna for the period 2021-2025 as follows:

1. Food and nutrition

All scientific units are included in this direction with the following accents:

- The role of food in the prevention at all levels and the treatment and rehabilitation of various diseases with an emphasis on those with a high disease burden for the community;
- Dental health and nutrition;
- Foods in experimental conditions and markers for their effects;
- Epidemiological and social aspects of food and nutrition.

Expected results: development and a model of manufacturing of food supplements in the training workshop of the Faculty of Pharmacy. Creating of a state-of-the-art laboratory for chromatographic analysis.

2. Regenerative medicine and implantology

All scientific units are included in this direction with the following accents:

- Stem cells - fundamental and applied aspects;
- Transplantation of tissues and cells. Allotransplants and autotransplants (collection, storage and multiplication);
- Implants as a method for long-term rehabilitation;
- Psychological and social aspects of organ replacement and donation.

Expected results: development of tissue cultures in the form of direct transplantation and partial replacement of damaged structures of the human body and creation of a tissue bank - with a clinical and research department.

3. Neuroscience and diseases of the central nervous system

The accents in this direction are:

- Neurobiology of diseases of the central nervous system (CNS);
- Markers, predictors, radiopharmaceuticals, genetic and immune aspects of the NS diseases;
- Therapy and psychosocial rehabilitation of patients with NS diseases.

Expected results: development of a model for diagnosis, prediction of diseases and outcome and neurodegeneration and its application as a last resort therapy.

4. Oncology and rare diseases

The accents in this direction are:

- New diagnostic and therapeutic opportunities in the field of nuclear medicine;
- Therapeutic options for the treatment of cancer;
- Genetic analyses of cancer and rare diseases;
- Social rehabilitation of patients with cancer.

Expected results: creation of a modern genetic laboratory. Mastering the technique of cyber surgery for cancer.

5. Prevention, management of diseases and health systems.

- Disease prevention programs.
- COVID-19 - epidemiological, clinical and managerial aspects;
- Innovative integrative approaches in the disease management and health care systems;
- eHealth.

Expected results: development and a model of electronic files, registers (hospital and population) and models for telemonitoring, storage and transfer of medical information; construction of a center for assessment of the health care system functioning.

The main goal of the strategy is the cultivation of intellectual capital and sustainable development in the field of innovation at MU - Varna to ensure quality and competitive health care in the direction of preserving the health of the nation. One of the most distinct characteristics of the main goal is that it is a continuous process not only of the introduction of new technologies, but also of changes in the organization, management and working conditions. In the context of the above, MU - Varna supports the policies related to the following **specific objectives**:

1. **INNOVATION AND EDUCATION** against the six dimensions outlining the European Education Area, one of which is the development of higher education related to quality, inclusion and gender equality, environmental and digital transition, and the development of human resources (lecturers and researchers). Maintaining young people's interest in research.
2. **INNOVATION AND RESEARCH** – against the needs for improvement and competitiveness set out in the new European Research Area for research and innovation. Support for research development based on the implementation of fundamental and clinical applied research and provided with high-tech products and equipment.
3. **INNOVATION AND HEALTH CARE** - institutional development and modern health care at a regional and national level.

III. Activities under Specific Objective 1. INNOVATION AND EDUCATION

The creation of intellectual potential implies a good learning base that will enable the students to develop their knowledge in the direction of mastering the most recent achievements in medicine. In this regard, it is necessary to achieve:

1. Linking the educational process with the needs of the business and the labor market and the community.
2. Cooperation and exchange of knowledge in different areas of interest and knowledge.
3. Training with innovative tools.
4. Minimum distance between education and innovation in science.
5. Building a new generation of scientists to meet the needs of the business.

In this regard, the development of high-tech simulation laboratories for training and health is an imperative.

Medical simulation is a branch of the simulation technologies related to the education and training of medical professionals, medical practitioners, as well as non-medical professionals who, in accordance with their responsibilities, need basic medical skills and knowledge. It includes simulated patients, educational modules with detailed simulation animations, accidents and military

situations related to the national security and flexibility in emergencies of various kinds. Its main goal is training that would reduce accidents in the clinical and general practice. Such training increases the competence of the trainees when performing in a clinical setting. The main target groups are students, young graduates, specialists, nurses, paramedics, etc. Secondary target groups are civil servants who can be trained to provide first aid in places such as schools, theaters, public transport, supermarkets, etc.

The advantages in the construction and operation of the simulation center are:

- ✓ opportunity for realistic training in a variety of cases;
- ✓ simulation of atypical, high-risk conditions and rapid progress in the number and complexity of diagnoses and treatments;
- ✓ fewer medical accidents due to the limited need for living patients;
- ✓ protection of the real patients from procedures performed by inexperienced trainees;
- ✓ reducing the time required for training;
- ✓ more efficient management of all types of resources;
- ✓ an opportunity for integrated and interactive training;
- ✓ higher availability of standardized processes;
- ✓ improving the assessment among learners;
- ✓ opportunities for development of technical expertise;
- ✓ ability to store performance data.

IV. Activities under Specific Objective 2. INNOVATION AND RESEARCH

The Science-to-Business link is a continuous process that begins with the training of students and continues its development in the following directions:

1. Development of the available research infrastructure.
2. Improving the qualification of scientists, with a focus on young scientists.
3. Application of high-tech complexes and products and creation of new products and technologies that meet the needs of the business.
4. Conducting thematic events and scientific schools in the field of the scientific priorities of MU - Varna.
5. Creating conditions for the implementation of quality, innovative research with clinical applicability.
6. Promotion of scientific results, dissemination of information about ongoing research and new scientific developments, presentation of successfully implemented scientific products for the community and the business.
7. Active maintenance of up-to-date information in the national systems related to science and research - Register of Scientific Activities, Bulgarian Patent Office and information on protected dissertations for the database of the National Center for Information and Documentation.
8. Maintaining periodic feedback with MU – Varna researchers in terms of their scientific, project and innovation activity through an electronic system for research reporting.

9. Partnership with Bulgarian and foreign industrial enterprises and scientific organizations.
10. Recognition of intellectual property as a strategically important area for the sustainable development of research at MU - Varna.

V. Activities under Specific Objective 3. INNOVATION AND HEALTH CARE

Achieving institutional development and modern health care at a regional and national level requires the introduction of innovations in the clinical practice. This is determined by appropriate infrastructure, modern methods of diagnosis and treatment, transfer of "good practices" from leading European and world research centers and modern health management. In this regard, for the period of 2021-2025, MU - Varna continues to work in the following directions:

1. Building of an integrated laboratory for:

1.1. Molecular diagnostics, modern biochemical and bioanalytical research.

Molecular diagnostics is a modern method for prevention, diagnosis, prognosis and control of a wide range of diseases and concomitant conditions in every field of the medical knowledge. Bioanalysis is a modern interdisciplinary field in the medical science, integrating biochemistry, medicine and pharmacy. The subject of the bioanalysis is the identification and quantification of both endogenous biomolecules (metabolites, peptides, proteins) and xenobiotics (drugs and their metabolites, exogenous biologically active substances) in biological systems. The object of bioanalysis are endogenous and exogenous molecules present in biological samples being of interest for the clinical medicine (prevention, diagnosis, therapy), forensic medicine and toxicology, pharmacology and biopharmacy, disease prophylaxis and prevention. The bioanalysis deals with both small molecules (metabolites) - metabolomics (metabolomic analysis) and peptides and proteins - proteomics (proteomic analysis).

The introduction of high-tech and innovative methods will allow the implementation of:

- Metabolic analysis, including metabolic screening and profiling of small molecules in biological media to identify and quantify both biomarkers of clinical significance and new biomarkers;
- Proteomic screening of biological samples for identification of new and/or post-translationally modified proteins as new biomarkers (untargeted analysis) and absolute quantitative analysis of known proteins and peptides of clinical significance in biological samples (targeted analysis);
- Therapeutic drug monitoring to achieve optimal personalized drug therapy, maximum drug efficacy and minimum drug-induced toxicity by monitoring the plasma levels of administered drugs and their metabolites in dynamics and performing drug phenotyping, assessing the interactions with other drugs and/or components of the diet.

For pharmaceutical purposes, the bioanalytical studies are particularly important for determining the pharmacokinetics, pharmacodynamics, bioequivalence in the development of new drugs and drug formulations, in the study of dietary supplements and biologically active substances in extracts of medicinal plants.

For the purposes of the preventive and personalized medicine, the metabolomic and proteomic analysis play an important role in defining the metabolic phenotype of the individual and its changes depending on various genetic and epigenetic factors, assessing the risk of disease in the earliest stage before its clinical manifestation, customizing the therapy and optimizing its effectiveness.

The comprehensive analysis of data from the bioanalytical studies in combination with other diagnostic and/or prognostic parameters will allow to predict the response to various abiotic and biotic factors and to identify specific biomarkers for the prevention, diagnosis, prognosis and treatment of a particular disease or a pathological process.

1.2. Center for high-tech therapy:

- automated and robotic surgery;
- radiosurgery;
- customized targeted radionuclide therapy.

1.3. Genome center:

- Genomic, epigenomic and transcriptomic studies;
- Bioinformatics analysis.

1.4. Customized diagnostic imaging: testing of new radiopharmaceuticals. Artificial intelligence in diagnostic imaging.

1.5. Modern microbiology

The methods of modern microbiology support the diagnosis, the treatment process and the prevention of diseases. The complete laboratory automation (telemicrobiology) and the introduction of new molecular genetic methods for quick identification of this diagnostic structure is part of an innovative approach to creating an integrated laboratory.

The most important aspects of the microbiological laboratory operation are the accuracy of the results and the time of receiving them. The need for quicker diagnostics, standardization of diagnostic tests and greater adaptability occurs for the following reasons:

- In the manual type of work, the final result is delayed in time and this slows down the initial decisions regarding the antibiotic therapy, affecting the course of the specific infectious disease. Particularly vulnerable are transplant patients, those in intensive care units and other immunocompromised groups.

- Research on antibiotic resistance and the measures to reduce it are among the priorities of European health policy.
- The need to be prepared to meet the challenges of infectious agents of bioterrorism.

The purport of innovative technologies in the field of microbiology is in increasing the efficiency, which presupposes a better management of the laboratory operations and reduction of the total costs. As a result, the flow of information is maximized during the diagnostic and treatment process.

1.6. Development, synthesis, quality control and preclinical and clinical research of new radiopharmaceuticals for diagnosis and treatment.

The creation of new radiopharmaceuticals will ensure accurate and timely diagnosis, an opportunity of modern customized treatment while reducing the public costs, improving patient's quality of life as well as low radiation exposure for patients and staff, affordable prices and competitiveness in international markets.

- Development of new methods and/or further development of existing methods and substances (electrophilic and nucleophilic substitutions) for early diagnosis, staging and customized treatment.
- The creation of a new hybrid cyclotron complex for the synthesis of a wide range of radionuclides for diagnostic and therapeutic radiopharmaceuticals.
- Patenting and validation of new developed radiopharmaceuticals.

2. Providing universal access to high quality health services.

2.1. Mobile hospitals

The mobile hospitals are a means of delivering the necessary medical care where it is needed. Today, they are intended to serve hard-to-reach and depopulated areas where the population suffers from a lack of medical care. Such an initiative could focus on disease prevention and treatment, with a focus on those with high and increasing disease burdens.

The mobile hospitals are equipped with modern compact equipment that provides diagnostics, rehabilitation and even surgery, according to the specific purpose. They complement and support the activities of the existing medical establishments in the area of residence.

2.2. Telemedical consultations

The telemedical consultations provide their users with expert medical diagnostics from a distance, especially necessary for transient, as well as for chronically progressive, slowly changing conditions. They combine medical expertise with the state-of-the-art technologies to offer a network of specialists who can give patients an independent opinion at each stage of the treatment. There is fast and reliable feedback and information for all parties.

The telemedical consultations are an alternative to the expensive visits to emergency rooms. The patients stay at their home while the physicians take care of them. They would be especially useful for the most vulnerable part of the population: the children and the elderly, as well as for individual groups of patients (with devices, after an acute cardiovascular accident, heart failure, etc.). The concept is supported that many medical conditions are indicated to be consulted remotely while the patient is in the comfort of his or her home.

VI. Expected results from the implementation of the activities under the specific objectives

- 1. *Expected results from the implementation of specific objective 1: Innovation and Education:***
 - modernization of the educational process;
 - adaptation of the students in the educational process to the real practical work;
 - provision of stimulating environment for student development;
 - improvement of the quality of training.
- 2. *Expected results from the implementation of a specific goal 2: Innovation and Research:***
 - development of research / researchers of MU - Varna at a high global and European level;
 - maintaining a high level of research culture and the key competencies of the PhD students and the academic staff of MU - Varna;
 - attracting and retaining young people with potential for scientific development at the University;
 - development of science-to-business relations;
 - expanded opportunities for professional realization of the students at MU - Varna students.
- 3. *Expected results from the implementation of a specific goal 3: Innovation and Health Care:***
 - prevention, timely diagnosis, prognosis and control of a wide range of diseases and concomitant conditions;
 - quicker diagnostics, standardization of diagnostic tests and greater adaptability;
 - customized treatment;
 - ensuring a universal and equitable access to high-quality health care services;
 - improving the quality of life of the Bulgarian population, including its vulnerable groups.

This strategy was adopted by decision of the Academic Council according to Minutes No. 13 of 11.12.2020 and will be into force from 01.01.2021 to 31.12.2025.