

**MEDICAL UNIVERSITY**  
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**STRATEGY FOR INNOVATIONS**  
**OF**  
**MEDICAL UNIVERSITY - VARNA**  
**for the period**  
**2015-2020**

**2015**  
**Varna**

## I. PREAMBLE

The Strategy for Innovations of the Medical University of Varna is developed in response to the strategic national policies in order to meet the challenges of the European and global economy. It is necessary to adequately meet the global requirements for enhancement of labor productivity, technological renovation of the facilities and improvement of the quality of the production. The expected outcome is the establishment of a national economy capable of producing, defending, sharing and selling knowledge on international markets.

The high requirements of the global business market towards Bulgaria provoke changes in the sectors of health services and health education. The economic growth and development, competitiveness, the need for creating jobs determine the need for improvement of the health system and modern training of health professionals. The current macroeconomic environment provides a good basis for implementation of an active policy in the field of scientific research and innovations. In the recent years, various programmes and projects related to the improvement of public health have been developed in Bulgaria. There is an evident willingness for change and a need to find a precise balance between providing access to high quality health services for everyone and compliance with budget restrictions.

There are many challenges inherent to the sector of healthcare which can be resolved through the development of new, more effective and innovative activities. The Medical University of Varna faces a similar challenge as its mission is to meet the public need for highly specialized medical and managerial staff in the healthcare and social fields as well as to improve the nation's health in partnership with the other units of the healthcare system. The University initiates cooperation with industrial establishments and scientific organizations and applies the practice of the innovative firms and their experience in the transfer and adoption of new products and technologies. The economic structure of Varna district is diverse. It is primarily related to the harbor activities, navigation, shipbuilding, ship repair, tourism, chemical industry, mechanical engineering, textile manufacturing, food industry, furniture production, building and agriculture.

The scientific potential is in the field of innovations with an emphasis on marine industry, information technologies, tourism, services and power engineering. It is exactly in these economic fields that the new high technological productions which create a high added value and attract investments in productive activities related to science are developed. In the context of these priority fields the need emerges for improvement of the current model of organization of education and science in the field of healthcare to the purpose of placing the emphasis on innovative work and realisation of the connection between science and business.

As a driving force of innovations in healthcare, MU-Varna has the potential to facilitate the intelligent specialization in the field in relation to the two thematic fields defined in the **Innovation Strategy for Smart Specialization of the Republic of Bulgaria 2014-2020** - "Industry for Healthy Life and Biotechnologies" and "New Technologies in Creative and Recreational Industries".

The development and implementation of a strategy for innovations of MU-Varna is a decisive step towards the development of a modern health system which guarantees high quality of healthcare. Knowledge-based economy creates favourable conditions for active interaction between science and business and provides opportunities for establishing new contacts for collaboration at national, regional and international levels, finding out new partnerships different in scope and interests, presenting new products, services, methodologies as well as creating scientific networks

and partnerships for participation in European programmes and initiatives. The sustainable partnership between university and business is a precondition for the functioning of the so-called “*triangle of knowledge*” - scientists, scientific research and application of the scientific results.

## **II. NATURE, AIMS AND TASKS**

The Innovation Strategy of MU-Varna combines the principles of evidence-based medicine and the values of the personalized approach in medical sciences and practice. It is developed in compliance with the priority scientific directions of MU-Varna as follows:

### **1. Food and Nutrition**

This academic field includes all faculties with the following emphases:

- Role of food in the treatment and rehabilitation of different illnesses;
- Dental health and nutrition;
- Foodstuffs under experimental conditions and markers of their effects;
- Epidemiological and social aspects of nutrition.

*Expected outcomes:* development and production of food supplements in the training facilities of the Faculty of Pharmacy. Establishment of a most modern laboratory for chromatographic analysis.

### **2. Transplantation and Implantation Medicine**

This academic field includes all departments with the following emphases:

- Cells and tissues transplantation. Allo- and auto-transplants – collection, storage and multiplication;
- Implants as a method for long-term rehabilitation;
- Investigations and preparation of substrata for transplants and implants;
- Psychological and sociological aspects of organ substitution and donation.

*Expected outcomes:* development of tissue cultures in a form suitable for direct transplantation and partial substitution of damaged structures of the human body and establishment of a tissue bank – with clinical and research department.

### **3. Disorders of the Central Nervous System**

The emphases in this field are:

- Markers, predictors, genetic and immune aspects of CNS disorders;
- Therapy and psychosocial rehabilitation of patients with nervous disorders.

*Expected outcomes:* development of a model for diagnostics and prediction of the illness outcome and neurodegeneration and its application as a therapy of last choice.

#### 4. Oncology and Rare Diseases

The emphases in this field are:

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

*Expected results:* creation of an up-to-date genetic laboratory. Mastering the technique of cyber surgery in oncological diseases.

#### 5. Disease Management

- Electronic healthcare;
- Programmes for prevention.

*Expected outcomes:* development of a model of electronic records and models for storage and transfer of medical information.

**The main aim** of the Strategy is intellectual capital building and sustainable development in the field of innovations at MU-Varna for ensuring high quality and competitive healthcare towards preserving the nation's health. One of the salient characteristics of the main aim is that it is a continuous process of introducing new technologies but at the same time, changing the organization, management and work conditions. In view of the above mentioned, MU-Varna has the following **specific aims** related to:

1. **INNOVATIONS AND STUDY ACTIVITY** - development of modern training facilities to enhance the quality of the training process and the interest of young people in scientific research.
2. **INNOVATIONS AND SCIENTIFIC RESEARCH** - scientific research based on the implementation of fundamental clinical and applied research and provided with hi-tech products and equipment.
3. **INNOVATIONS AND HEALTHCARE** - institutional development and modern healthcare at regional and national levels.

#### III. Activities within specific aim 1. INNOVATIONS AND STUDY ACTIVITY

The building of an intellectual potential requires good training facilities enabling students to develop their knowledge towards the adoption of the latest achievements in the field of medicine. In this respect, it is necessary to achieve the following:

1. Commitment of the educational process to the needs of the business and labor market;
2. Cooperation and exchange of knowledge in the different areas of interest and knowledge;
3. Training with innovative means;
4. Minimal distance between education and innovations in science;
5. Preparation of a new generation of scientists capable of meeting the needs of the business.

In view of the above, the establishment of a **hi-tech simulation centre for training and health is of imperative importance.**

The medical simulation is a branch of simulation technologies related to education and training of medical specialists, practicing physicians as well as non-medical specialists who need basic medical skills and knowledge corresponding to their responsibilities. It includes simulated patients, educational modules with detailed simulation animations, incidents and military situations related to the national security and reactions in emergency situations. Its main aim is training which would minimize the accidents in the clinical and general practice. Such training enhances the students' competence in acting in clinical conditions. The basic target groups are students, young residents, specialists, nurses, paramedics, etc. Secondary target groups are state employees who can be trained to provide first aid at schools, theatres, public transport, supermarkets, etc.

The advantages of the establishment and functioning of a simulation centre include:

- opportunity for realistic training in a variety of cases;
- simulation of untypical, high risk conditions and quick increase in the number and complexity of diagnoses and treatment;
- less medical accidents due to the limited need for living patients;
- avoidance of procedures performed by unqualified interns for the actual patients;
- reduction of the time necessary for training;
- more effective management of all types of resources;
- opportunity for integrated and interactive training;
- larger availability of standardized processes;
- improvement of the trainees' assessment;
- opportunity for development of a technical expertise;
- opportunity for storage of the implementation data.

#### **IV. Activities in specific goal 2. INNOVATIONS AND SCIENTIFIC RESEARCH**

The correlation "science-business" is a continuous process starting from the training of students and developing in the following directions:

1. Development of the available infrastructure for scientific research;
2. Improvement of the researchers' qualification with an emphasis on young scientists;
3. Application of hi-tech complexes and products and creation of new goods and technologies meeting the needs of the business;
4. Organisation of events on specific topics and scientific schools in the fields of the scientific priorities of MU-Varna;
5. Creation of conditions for qualitative, innovative scientific research with clinical application;
6. Dissemination of the scientific results, dissemination of information about the conducted scientific research and new scientific studies, presentation of successful scientific products for the society and the business;

7. Active maintenance of updated information in the national systems for science and research – Register of the scientific activities, the Bulgarian Patent Office and information about the defended theses for the data base of the National Centre for Information and Documentation;
8. Maintenance of a regular feedback with the scientific researchers of MU-Varna about their scientific, project and innovative activities through an electronic system for scientific research reporting;
9. Partnership with Bulgarian and foreign industrial enterprises and scientific organisations;
10. Recognition of intellectual property as a strategically important field of sustainable development of the scientific research at MU-Varna;

## **V. Activities in specific goal 3. INNOVATIONS AND HEALTHCARE**

The achievement of institutional development and modern healthcare at regional and national level necessitates the introduction of innovations in clinical practice. It is determined by appropriate infrastructure, modern methods for diagnostics and treatment, transfer of “good practices” from leading European and world research centres and modern healthcare management. In this respect, for the period 2015-2020, MU-Varna will work in the following fields:

### **1. Establishment of an integrated laboratory for:**

#### **1.1. Molecular diagnostics, modern biochemical and bioanalytical investigations**

Molecular diagnostics is an advanced method for prevention, diagnostics, prognosis and control of a wide spectrum of diseases and accompanying conditions in every field of medical knowledge. Bioanalysis is a recent interdisciplinary field in medical science, integrating biochemistry, medicine and pharmacy. The subject of bioanalysis is the identification and quantification both of endogenous biomolecules (metabolites, peptides, proteins) and xenobiotics (drugs and their metabolites, exogenous biologically active substances) in biological systems. The object of bioanalysis is comprised by endogenous and exogenous molecules present in biological samples and presenting interest for clinical medicine (prevention, diagnostics, treatment), forensic medicine and toxicology, pharmacology and biopharmacy, prophylaxis and prevention of diseases. The object of bioanalysis consists in both small molecules (metabolites) – metabolomics (metabolic analysis) and peptides and proteins – proteomics (proteomic analysis).

The introduction of hi-tech and innovative methods will enable the performance of:

- Metabolic analysis, including metabolic screening and profiling of small molecules in biological environments aimed at identification and quantification of 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 medication monitoring for optimal personalized drug treatment, maximum drug efficacy and minimum drug-induced toxicity through monitoring the dynamics of the plasma

levels of the applied drugs and their metabolites as well as carrying out drug phenotyping, assessment of the interactions with other drugs and/or diet components.

For pharmaceutical purposes, bioanalytical investigations are of particular importance for the determination of pharmacokinetics, pharmacodynamics, bioequivalency in the development of new drugs and drug formulations, in the study of food supplements and biologically active substances in extractions of medical plants.

For the purposes of preventive and personalized medicine, the metabolomics 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, in the risk assessment of a disease still in the earliest stage before its clinical manifestation, for the individualization of the treatment and the optimization of its effectiveness.

The complex analysis of the data from the bioanalytical investigations in combination with other diagnostic and/or prognostic parameters will enable the prediction of the response to various abiotic and biotic factors and identifying specific biomarkers for the purposes of prevention, diagnostics, prognosis and treatment of the specific disease or pathological process.

## **1.2. Centre for hi-tech therapy**

- automated and robotized surgery;
- radiosurgery;
- personalized targeted radionuclide therapy.

## **1.3. Genome centre**

- Genomic, epigenomic and transcriptomic investigations;
- Bioinformation analysis.

## **1.4. Personalised imaging diagnostics**

- Establishment of a PET-MRI Centre for experimental animals;
- Testing new radiopharmaceuticals;
- Establishment of an infrastructure for breeding genetically modified (transgenic) animals for modelling of human diseases.

## **1.5. Modern microbiology**

The methods of modern microbiology facilitate the diagnostics, treatment and prevention of diseases. The full laboratory automation (telemicrobiology) and the introduction of new molecular and genetic methods for fast identification at this diagnostic unit is part of the innovative approach to the establishment of an integrated laboratory.

The most important aspects of the microbiology lab activity are the precision of the results and the time for their obtaining. The need for faster diagnostics, standardization of the diagnostic tests and greater adaptability arises for the following reasons:

- In the manual type of work, the obtaining of the final result is postponed in time, which delays the making of the initial decisions for antibiotic treatment and affects the course of the specific infectious disease. Transplanted patients, patients from the intensive care units and other groups of immunocompromised patients are among the most susceptible.
- The studies in the field of antibiotic resistance and the measures for its restriction are among the priorities of the European health policy.
- The need for the preparedness to encounter challenges related to infectious agents and bioterrorism.

The meaning of the innovative technologies in the field of microbiology is to enhance effectiveness which presupposes better management of the laboratory activity and reduction of the total expenditure. As a result, the flow of information is improved to a maximum degree in the course of the diagnostic and treatment process.

## **1.6. Development, synthesis, quality control and pre-clinical and clinical investigation of new radiopharmaceuticals for diagnostics and treatment**

The creation of new radiopharmaceuticals will guarantee a precise and early diagnosis, a possibility for modern personalized treatment while reducing public costs for it, improvement of the patients' quality of life as well as low radiation burdening for the patient and the staff, affordable prices and competitiveness on the international market.

- Development of new and/or further development of existing methods and substances (electrophile and nucleophile substitutions) for early diagnosis, staging and personalized treatment.
- Establishment of a new hybrid cyclotron complex for the synthesis of a wide spectrum of radionuclides for diagnostic and therapeutic radiopharmaceuticals.
- Patenting and validation of the developed new radiopharmaceuticals.

## **2. Ensuring universal access to high quality health services**

### **2.1. Mobile hospitals**

The mobile hospitals offer a way of providing the necessary medical care where needed. Nowadays they are meant to serve remote or deserted regions in which the population suffers from shortage of medical care. Such an initiative can focus on the prophylaxis and treatment of socially significant diseases.

The mobile hospitals are equipped with modern compact equipment ensuring the diagnostic, rehabilitation and even surgical activity according to the specific goal. They complement and facilitate the activity of the health establishments existing in the region.

## 2.2. Telemedical consultations

Telemedical consultations provide their customers with expert medical diagnostics from a distance. They combine the physician's expertise with the most advanced technologies to propose a network of experts who can offer patients their independent opinion at every stage of the treatment. Fast and reliable feedback and information is in place for all parties.

Telemedical consultations present an alternative to the expensive visits to the emergency rooms. The patients remain at home while the physicians take care of them. They could be of particular value to the most vulnerable part of the population – the children and the elderly people. The concept is maintained that many medical conditions are indicated to be consulted from a distance while the patient remains in the comfort of his/her home.

## VI. Expected results from the fulfilment of the activities in the specific goals

### 1. *Expected results from the fulfilment of specific goal 1 “Innovations and teaching activity”:*

- Modernization of the learning process;
- Adaptation of the students to the actual practical work during the study process;
- Ensuring a motivating environment for students' development;
- Increasing the quality of training.

### 2. *Expected results from the fulfilment of specific goal 2 “Innovations and scientific research”:*

- Development of scientific research/researchers at MU-Varna at a world and European level;
- Maintenance of a high level of scientific research culture and the key competences of the PhD students and the academic staff of MU-Varna;
- Attraction and retention of young people with potential for scientific development at the University;
- Development of the *science-business* relations;
- Widening of the possibilities for professional fulfilment of the students trained at MU-Varna.

### 3. *Expected results from the fulfilment of specific goal 3 “Innovations and healthcare”:*

- Prevention, timely diagnostics, prognosis and control of a wide spectrum of diseases and accompanying conditions;
- Faster diagnostics, standardization of the diagnostic investigations and greater adaptability;
- Personalized treatment;
- Ensuring universal and equal access to high quality health services;
- Improvement of the quality of life of the Bulgarian population, including its vulnerable groups.