

**UNIVERSITY OF RIJEKA**  
**FACULTY OF DENTAL MEDICINE**

**STRATEGIC PROGRAM OF SCIENTIFIC RESEARCH**

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## **1. Introduction**

From its very foundation, in 1973, the University of Rijeka aimed to gather and unite higher education institutions. The main purpose of the establishment was to unite all components and enable their coordinated action. During the years of continuous progress in scientific and professional activity and dynamic development in all areas, the need for further development and integration of new components into a single entity emerged. Thus, in the process of establishing the Faculty of Dental Medicine, as an integrated part of the University of Rijeka, care was taken of its justification and sustainability, scientific mission and vision, as key strategic and operational elements.

### **1.1 Mission**

The mission of the Faculty of Dental Medicine is, based on the results of scientific research, to enable the acquisition of new and relevant knowledge, to improve the education of students, future teachers, researchers and clinicians, to improve dental medical practice and thereby contribute to the development of the wider social community. The faculty will systematically raise the scientific level and work to improve the quality of research and strive for European and world standards of research excellence. In this way, it will be a respectable factor in the national and European environment. It will work on networking higher education institutions at the European and world level in order to work together on research projects and innovations

### **1.2 Vision**

The Faculty of Dental Medicine will advance research and strengthen awareness of the importance of oral health and present oral health research to the public. It will work to strengthen international and inter-institutional cooperation and to create a centre for scientific research excellence in the field of dental and oral medicine. The model of higher education will be improved by introducing modern teaching methods. It will promote networking at European and at world level in order to jointly work on research projects and innovations, improve the overall global fund of knowledge and contribute to the betterment of Croatian society.

## 2. SWOT analysis

The starting point for creating the research strategy is the SWOT analysis.

### Strengths

- a significant number of employees in associate, scientific and scientific-teaching positions
- creating conditions for the development of internationally recognized researchers working in relevant scientific fields (field: dental medicine, branches: paediatric and preventive dental medicine, endodontics and restorative dental medicine, morphology of the stomatognathic system, oral surgery, oral medicine, orthodontics, periodontology, dental prosthetics )
- well-developed international cooperation and involvement in international programs and mobilities
- interdisciplinarity and multidisciplinary of the research area and the specific expertise resulting from it

### Weaknesses

- lack of work space and research equipment
- insufficient number of international scientific project grants
- insufficient number of employees of professional services
- poorly developed system of promoting and rewarding scientific excellence
- underdeveloped institutional support mechanisms for research, the development of research careers and the development of research groups
- underdeveloped administrative support for research

### Opportunities

- creating links with eminent foreign universities through joint research and development projects
- connecting with local, domestic and international business entities and partnerships with the public and private sector
- building a faculty system of science based on achievements within developed areas
- use of infrastructure funds and inclusion in international scientific flows
- connecting with successful scientists, former students (alumni)
- cooperation with other members of the University of Rijeka and the use of scientific infrastructure at the University campus
- upgrading the model of rewarding and stimulating the best scientists

### Threats

- insufficient level of funding from the state budget for research
- high competitiveness of biomedical research in the world
- difficult conditions for conducting scientific research during the pandemic
- the length of administrative procedures when applying for scientific project grants
- lack of highly qualified scientific personnel due to a better offer from the private sector

## **2.1 Strategic goals of the scientific organisation (general goals)**

The general strategic goals of the scientific organisation are:

- To encourage and reward scientific excellence and innovative research
- To evaluate research work as one of the key activities at the Faculty
- To encourage applications and management of domestic and international project grants
- Systematic and organised encouragement of inter-institutional and international networking
- To develop priority areas and support the concept of translational research
- To provide part of the funds for research from own and other sources
- To provide administrative support for applications for domestic and international project grants of the Faculty
- To increase the visibility of the best scientific publications and scientific projects of the Faculty
- To establish a system of structured reporting on the scientific achievements of faculty groups and individuals
- To initiate new research in areas that are necessary for the development of the Faculty
- To provide the most successful young researchers with the conditions for scientific independence
- To encourage innovations and their commercialization

## **2.2 Expected outcomes of the strategic program of scientific research (related to general goals)**

By implementing the strategic goals, we expect a significant shift in terms of increasing the recognition and competitiveness of the Faculty as a scientific institution. The first strategic goal is aimed at the best scientists and groups at the Faculty who can make greater progress than others. The faculty will direct part of the funds from its own budget and administrative support to the development of science. We expect an increase in the number and quality of applications for international and domestic competitive project grants. Consequently, an increase in the number of published scientific papers in relevant publications is expected. Science will be more represented and visible in the regular work of the Faculty, which should result in an increase in the interest of young doctors of dental medicine in choosing scientific research careers.

The faculty is an institution where research and clinical application of dental materials and pharmaceutical preparations in the orofacial region is already being carried out, and this type of research will continue to be encouraged in cooperation with the economic sector, in accordance with legal and ethical norms.

A large number of researches carried out at the Faculty of Dental Medicine are aimed at introducing new methods of preventive dental medicine and improving diagnostic possibilities.

The scientific public's interest in new methods of preventive dental medicine and diagnostics is constantly increasing. Detailed experimental and clinical studies are necessary to create new possibilities in preventive and diagnostic procedures that will ultimately contribute to improving the knowledge of doctors of dental medicine and lead to more successful clinical work.

By conducting scientific education at the post-graduate professional and scientific level, as well as at the level of doctoral studies, we contribute at the local level but also at the national level in the creation of highly educated and professional dental-medical personnel necessary for the development of all forms of health services. In this way, it is possible to raise the level of health services and introduce new methods of preventive dental medicine and diagnostics.

### **3. Scientific potential of the Faculty**

The scientific topics that the scientific organisation intends to research are specific goals for each topic and indicators of the success of achieving special goals.

#### **3.1 The influence of general health on oral health**

As part of the project with the financial support of the University of Rijeka Impact of general health on oral health (uniri-biomed-18-53)

Project leader: Prof Primarius Sonja Pezelj Ribarić MD PhD,

Scientists:

1. Prof Ivana Brekalo Pršo MD PhD,
2. Dr. Romana Peršić Bukmir MD PhD,
3. Dr Ema Paljević MD (PhD student),
4. Dr Vanessa Zuber MD (PhD student),
5. Dr Odri Cicvarić MD (PhD student),
6. Prof Ivone Uhač MD PhD,
7. Assoc Prof Zoran Kovač MD PhD,

**Goals**

1. To evaluate and compare periapical bone healing in smokers and non-smokers after endodontic therapy
2. To examine the connection between the intensity and duration of the smoking habit and the speed of healing of periapical lesions
3. To evaluate and compare periapical bone healing in diabetic patients and healthy patients after endodontic treatment.
4. To investigate the relationship between the concentration of glycated haemoglobin (HbA1C) and the speed of healing of periapical lesions in diabetics.
5. To confirm smoking habit and diabetes as risk factors for endodontic treatment failure.
6. To determine the relationship between the severity of eating disorders and oral pathological processes in the oral cavity (oral symptoms, appearance of oral lesions, tooth erosion, saliva secretion disorder, sialoadenosis, KEP-index, periodontal status)

**Performance indicators:**

- three doctoral theses defended
- four publications in WoS/Scopus journals
- presentation of results at international and domestic conferences

### **3.2 Orofacial disorders in patients with autoimmune and chronic inflammatory diseases**

As part of the project with the financial support of the University of Rijeka, Orofacial disorders in patients with autoimmune and chronic inflammatory diseases (uniri-biomed-18-65).

Project leader: Prof Miranda Muhvić Urek MD PhD,

Scientists:

1. Assoc Prof Irena Glažar MD PhD,
2. Dr Ivana Vidović Zdrilić MD PhD,
3. Dr Ema Saltović MD (PhD student),

## Goals

1. To determine the prevalence of oral changes in patients with inflammatory bowel diseases depending on disease activity and therapy.
2. To investigate their association with disease activity, biomarkers, laboratory findings and quality of life.

## Performance indicators:

- one doctoral thesis defended
- two publications in WoS/Scopus journals
- presentation of results at four international conferences

### 3.3 The effectiveness of olive leaf extract on the treatment of oral candidiasis

As part of the project "Variculture to secondary plant metabolites: application of mineral nutrients and elicitors to increase the concentration of phenol in the olive leaf", financed by the Croatian Science Foundation (UIP-8464).

Project leaders: Assoc Prof Sunčana Simonić-Kocijan MD PhD, Department of Dental Prosthetics, PhD student Maja Kinkela Devčić MD.

We expect that the results of the research will demonstrate the justification of using a commercially available preparation of olive leaf extract in the therapy of oral candidiasis, and that the selected olive varieties with an increased concentration of phenol in the leaf will show greater therapeutic effectiveness compared to the commercial preparation and standard therapy for fungi of the genus *Candida*.

## Goals

1. To determine the effectiveness of the application of commercially available olive leaf extract on oral candidiasis in comparison with miconazole and nystatin (in vitro).
2. To test the effectiveness of olive leaf extract as an addition to standard therapy (in vivo).
3. To determine the effectiveness of the effect of olive leaf extract of different Croatian varieties with an increased polyphenolic profile on oral candidiasis (in vitro).
4. To examine changes in the level of salivary cytokines involved in oral candidiasis depending on the applied therapy.

**Performance indicators**

- preparation of one doctoral thesis
- publication of three scientific papers in WoS/Scopus journals
- presentation of results at three international conferences

**3.4 Microbial biofilm analysis of d-PTFE membrane during guided bone regeneration**

As part of the research project led by Prof Olge Cvijanović MD PhD, from the Faculty of Medicine of the University of Rijeka "Comparison of the reparative response of bone tissue using dentin, xenogeneic biomaterial and autologous bone", funded by the Croatian Science Foundation (IP-2020-02).

Project leader: Assoc Prof Davor Kuiš MD PhD,

Scientists:

1. Assoc Prof Jelena Prpić MD PhD,
2. Robert Vukman MD,
3. Prof Tomislav Čabov MD PhD,
4. Marko Blašković MD (PhD student) ,

**Goal**

1. To determine (qualitatively and quantitatively) the microbial biofilm on two different types of d-PTFE membranes that were used during the procedure of guided alveolar bone regeneration.

**Performance indicators**

- preparation of one doctoral thesis
- two publications in WoS/Scopus journals
- presentation of the results at an international conference

### **3.5 Determinants of the effectiveness of the therapy of impaired functions and appearance of the orofacial area**

As part of the project with the financial support of the University of Rijeka (uniri biomed 18-22, support of the University of Rijeka)

Project leader: Prof Stjepan Špalj MD PhD,

Scientists:

1. Assoc Prof Vlatka Debeljak MD PhD,
2. Prof Daniela Kovačević Pavičić MD PhD,

#### **Goals**

1. To validate psychometric instruments for assessing functional limitations, pain, unhealthy habits, health competence, somatosensory enhancement and hypervigilance.
2. To create new small instruments to assess body image, perfectionism and self-esteem that would be focused on craniofacial conditions.

#### **Performance indicators**

- preparation of one doctoral thesis
- two publications in WoS/Scopus journals
- presentation of the results at an international conference

### **3.6 Environmental factors and microbiological interactions in the structure of dental biofilm**

As part of the project financed by HRZZ (IP-2020-02-4027)

Project leader: Prof Stjepan Špalj MD PhD

Scientists:

1. Assoc Prof Irena Glažar MD PhD,
2. Assoc Prof Davor Kuiš MD PhD,
3. Assoc Prof Jelena Prpić MD PhD,

4. Dr Martina Žigante MD,
5. Dr Ivana Mišković MD,
6. Dr Andrej Pavlić MD PhD,
7. Dr Magda Trinajstić Zrinski MD PhD,

Associates:

1. Dr Martina Žigante MD,
2. Dr Vjera Perković MD,
3. Dr Mia Uhač MD,

**Goals**

1. To determine the clinical characteristics of periodontal tissues and the characteristics of saliva (amount and markers of inflammation) in persons not exposed to tobacco, exposed to the smoke of burnt tobacco and exposed to aerosol heated tobacco without burning.
2. Characterization of the microbiome of dental biofilm and oral microbiome in humans not exposed to tobacco, exposed to the smoke of burnt tobacco and exposed to aerosol heated tobacco without burning.
3. To determine the connection between smoking, characteristics of saliva and the microbiome (type and number of bacteria, association with specific bacteria) in persons with periodontitis.
4. To determine the clinical characteristics of the periodontal tissues of persons not exposed to metals of dental alloys and those exposed to metals.
5. Characterization of the dental biofilm microbiome in persons not exposed to metals of dental alloys and those exposed to metals and to determine changes in the structure of the dental biofilm due to exposure to metals.
6. To examine the extent to which environmental influences modify the effectiveness of periodontal disease therapy (gingivitis and periodontitis) by mechanical removal of biofilm and biocide chlorhexidine.
7. To examine the behaviour of early and late colonisers of the dental biofilm on environmental bacteria factors (growth curves, minimum inhibitory concentrations, sensitivity to biocides, adhesion ability and biofilm formation ability).

**Performance indicators**

- preparation of three doctoral theses

Strategic program of scientific research in the period 2020-2025.

- two publications in WoS/Scopus journals
- presentation of the results at an international conference

### **3.7 Craniofacial biometry - 2D and 3D technology in identification, diagnosis and therapy**

As part of the Craniofacial biometrics project - 2D and 3D technology in identification, diagnosis and therapy with the financial support of the University of Rijeka (uniri-biomed-18-71).

Project leader: Dr Višnja Katić MD PhD, Department of Orthodontics,

Participating in the research is Dr Magda Trinajstić Zrinski MD PhD.

#### **Goals**

1. Analysis of craniofacial characteristics and degree of asymmetry.
2. Examination of the long-term stability of biometric characteristics and the impact of orthodontics therapy.
3. Analysis of the pattern of craniofacial growth and monitoring of biometric characteristics during adolescence.
4. Assessment of the influence of craniofacial biometric characteristics on post-adolescent changes.
5. Assessment of the influence of gender and skeletal growth pattern of craniofacies on changes in biometric characteristics.

#### **Performance indicators**

- two publications in WoS/Scopus journals
- presentation of the results at an international conference

## **4. Organisational development plan of the scientific organisation for 5 years**

From an organisational point of view, it is necessary to ensure a systematic and transparent monitoring of the development of all human resources while securing financial resources for the implementation of high-quality scientific research and teaching work, and to improve the spatial prerequisites. The faculty needs to develop in accordance with the highest standards of management

and quality assurance, and the necessary prerequisites for this are the adoption of a series of implementation documents that would ensure the recognition and encouragement of excellence in all organisational units. It is necessary to continuously rationalise operations and realistically plan and implement all capital investments and ensure their responsible implementation.

Competitive national projects are the basic source of funding for equipping research laboratories with capital equipment.

The Faculty of Dental Medicine conducts the post-graduate doctoral program Dental Medicine of the Doctoral School in the field of biomedicine and healthcare at the University of Rijeka, which is held by the Rijeka Faculty of Medicine. As the Doctoral School was founded before the separation of the Faculty of Dental Medicine from the Faculty of Medicine, it is necessary to define the relationship between the two components and to formalise the role of the Faculty of Dental Medicine in conducting postgraduate doctoral studies. The proposal for a new regulation on postgraduate studies at the University of Rijeka enables joint postgraduate studies in which one component would be the holder.

The scientific mission of the Faculty of Dental Medicine is, based on the results of competitive scientific research, to enable the acquisition of new and relevant knowledge, to improve the education of students, future teachers, researchers and clinicians, to improve dental medical practice and thereby contribute to the development of the wider community, while respecting the principles of scientific excellence.

A Fund for Scientific Institutional Projects was established at the Faculty, which will finance at least one project per year. The faculty intensively involves students in scientific and research work. Considering the exceptional potential of the scientific-research staff, the Faculty of Dental Medicine will systematically strengthen international and inter-institutional cooperation and insist on establishing a centre for scientific-research excellence in the field of dental and oral medicine and dental materials.

Networking at the European and global level will be promoted in order to work together on research projects and innovations, to improve the overall global fund of knowledge and to contribute to the betterment of Croatian society. Research will be improved and awareness of the importance of oral health will be strengthened, oral health research will be presented to the public and the application of scientific discoveries will be facilitated.

The scientists of the Faculty of Dental Medicine are at the same time specialists from certain scientific branches, as well as teachers in scientific and teaching professions. Scientific branches within which research is carried out are: endodontics, dental prosthetics, oral surgery, children's dental medicine, periodontology, orthodontics, oral medicine. With their scientific potential, they enable the inclusion of new researchers and groups from various Faculty Departments, their interconnection and connection with existing particularly successful research groups from other institutions. Scientists of the Faculty of Dental Medicine, in cooperation with other scientists from Croatia and abroad, deal with research on dental materials, morphological and biomechanical aspects in orthodontics, dental pulp stem cells, salivary diagnostics, craniofacial biometry, orofacial pain, laser application, soft tissue diseases of the oral cavity, temporomandibular dysfunctions, oral health as a condition for general health.

Considering the exceptional potential of the scientific-research staff, the Faculty of Dental Medicine will systematically strengthen international and inter-institutional cooperation and insist on establishing a centre for scientific-research excellence in the field of dental and oral medicine and dental materials. Part of the scientists' collaboration with other institutes, which is stated in the descriptions of scientific topics.

The disadvantage is that there is no support in the expert service due to a lack of employees, and it is planned to hire two people in the administrative professional service who would serve as administrative support for scientific projects.