



UNIDADE DE INVESTIGAÇÃO EM PATOLOGIA E REABILITAÇÃO ORAL  
ORAL PATHOLOGY AND REHABILITATION RESEARCH UNIT

# UNIPRO STRATEGIC ACTIVITY PLAN FOR 2025-2029

## Index

0. UNIPRO OVERVIEW AND MISSION .....	3
1. UNIPRO Strategic Plan for 2025-2029 .....	4
A - UNIPRO RESEARCH ORGANIZATION AND THEMATIC AREAS.....	4
The new organization of R&D Unit structure.....	5
Thematic areas of Research Activity.....	6
B - INTERNATIONALIZATION.....	9
C - ADVANCED SCIENTIFIC TRAINING .....	9
D - DISSEMINATION.....	10
E - INTERINSTITUTIONAL COLLABORATION, PARTNERSHIPS, FUNDING SEARCH .....	11
F - RESEARCH EXTENSION TO THE SOCIETY.....	12

## 0. UNIPRO OVERVIEW AND MISSION

The **Research Unit in Oral Pathology and Rehabilitation (UNIPRO)**, created in 2020, is a Research and Development (R&D) Unit hosted by the University Institute of Health Sciences-CESPU (IUCS-CESPU).

It is dedicated to research focusing the promotion of knowledge creation and innovation in the areas of Oral Pathology and Oral Rehabilitation, establishing translational scientific research with a major link to education and advanced training, as also with the knowledge transfer to the scientific community and Society.

The specific objectives of research in the unit are:

- a) The production of scientific knowledge in its areas of interest;
- b) To develop its research activity in an integrated manner with teaching and training, namely in the 2nd and 3rd cycle of studies and postgraduate courses, stimulating, as far as possible, the transfer of knowledge in the area;
- c) Contribute to scientific exchange between research organizations, especially with other national and international research units, regulatory agencies and business and industrial entities;
- d) To collaborate with higher education institutions, especially with organic units and other national and international research units, in postgraduate activities and knowledge updating;
- e) To disseminate the results of the research carried out through publications in national and international reference journals with scientific arbitration; in books and/or book chapters; or other forms of publication;
- f) Participate in congresses, colloquia, conferences, workshops and other national and international meetings, presenting the research produced;

g) Developing community service activities, without prejudice to the activities mentioned above.

## 1. UNIPRO Strategic Plan for 2025-2029

Considering the UNIPRO mission and according to its statutes, the strategic plan for 2025-2029 is directed to the following major objectives:

a) to strengthen the human resources and expand the research laboratories facilities and activities to foster high-quality research in an international, competitive and innovative environment. This includes the implementation of a strategic organization of research Unit dedicated to the thematic areas of Oral Pathology and Oral Rehabilitation.

b) To increase the internationalization of the unit with external collaboration networks seeking an increase in research funding;

c) To strengthen and increase the link between research and advanced education/training.

d) To increase research dissemination with higher visibility to scientific community as well as to the population and stakeholders' communities;

e) To increase and strengthen the link between research and its application to the community and society, accelerating translational research with a strong impact on the community. Knowing the oral health status and care needs of the Portuguese population, this is one of the main objectives of the Unit's strategic plan.

## A - UNIPRO RESEARCH ORGANIZATION AND THEMATIC AREAS

Taking advantage of the potential of the human resources and technological and clinical support available at IUCS, the UNIPRO intends to strengthen its organization, namely its

members, laboratories and clinical facilities, in order to provide clear research scopes and an attractive research environment in the unit, to promote the participation of more researchers, collaboration between multidisciplinary teams, creation, innovation and technological development, and to boost high-level research results.

### **A1. The new organization of R&D Unit structure**

UNIPRO is organized following the rules of the FCT and governing bodies are constituted by The Director, the Coordinating Committee (CC), the Scientific Council (SC), and the External Advisory Committee (EAC) according to the official UNIPRO bylaws published in *Diário da República* (1368/2023).

The Director of UNIPRO is appointed by the Rector and chairs the Coordinating Committee and the Scientific Council. The CC is made up of the director and by other 4 coordinators and are responsible for supervising and defining the unit's scientific and technical policies, as well as supervising day-to-day management, following the best practices of internal quality assurance systems.

The UNIPRO's SC, is composed by all the PhD integrated investigators of the unit and are responsible of analyse, discuss and approve the strategic plan, the annual activity report; also issue an opinion on UNIPRO's budget, proposed by the CC. They meets at least once a year (and whenever necessary).

The EAC is made up of a minimum of three national and/or international individuals, external to UNIPRO, of recognized scientific merit; the members of the EAC are appointed by the CC; It meets annually to provide independent evaluation and advice on the scientific activity and unit organization.

UNIPRO members constitute the Human resource of the production of the activity of UNIPRO research and is made up of integrated members and collaborating members. Integrated members of UNIPRO are PhD researchers from IUCS-CESPU or other institutions who develop and collaborate on research projects at/with UNIPRO, dedicating at least 20% of their working time to the unit's research activities with significant scientific outputs.

Monitoring of the unit is primarily performed by CC, in collaboration with Pi's or lead researchers of the projects, with heads of UNIPRO labs and other Unit facilities, monitoring the

strategic plan proposed and deal with the potential difficulties. Annual Reports, issued by the CC, will be discussed and approved by the SC, and made public in the unit web-page. The unit will also be monitored by EAC whose annual report with recommendations for improvement of Unit activity.

## A2. Thematic areas of Research Activity

The unit is specifically focused on two thematic areas of research: Oral Pathology and Oral Rehabilitation.

### 1- Oral Pathology

Is constituted by a multidisciplinary researcher's having as main objectives:

- i) understanding the aetiology, pathogenesis, and progression of oral diseases, focusing oral cancer (OC), periodontal diseases, and other oral diseases/ disorders;
- ii) creation and development of new diagnostic and therapeutic approaches for the prevention, early diagnosis, and treatment of oral diseases, with an emphasis on personalized medicine, precision dentistry and innovative dentistry.

Specifically, the primary research interests include:

#### a) Oral Cancer (OC) and Oral Potentially Malignant Disorders (OPMD)

- i) Exploring strategies to enhance the tumor cell-killing effectiveness of second-generation antimitotics. The goal is to offer a fresh opportunity for these antimitotics to undergo further clinical trials and, ideally, become part of cancer therapy protocols.
- ii) Targeting mitosis for enhancing immunotherapy in OC. This chemo-immunotherapy strategy aims to overcome resistance to immune checkpoint blockade, providing a pioneering approach to oral cancer treatment.
- iii) Studying the effect of compounds with antitumor activity in the cell bioenergetics status, and in the reverse of the multidrug resistance phenotype. We intend to use different metabolic modulators, targeting cell energetic metabolism in different steps. Their potential to be used in combined treatments will be assessed.

iv) Screening and determining the antitumor activity of derivatives of natural compounds like flavonoids. Namely, their ability to overcome the resistance of cancer to therapies will be addressed, a major drawback for cancer cure. At the end, we hope to identify promising compounds to use in the fight against cancer.

v) Discover and implement predictive and prognostic Biomarkers in early diagnosis of OPMD and OC. We aim to evaluate of multiple biomarkers panels assisted by AI for automatized predictive/prognostic score results. This will benefit from comparative pathology research using animal models in collaboration researchers from CECAV/UTAD.

vi) Evaluation of epidemiological aspects of Oral Cancer in Portugal with a focus on trends on incidence and survival of patients with this disease in last decades, a project with association with the WHO Collaborative Centre of Oral Cancer and the National Cancer Registry (RON);

vii) Development of innovative adjunct diagnostic technologies on OPMD and early OC. This includes 3 important projects:

- Involving populational OC screenings in communities of the north of Portugal) we aim to validate the BlueStain® diagnostic tool, combining the speed and innovation of staining with digital pathology and IA algorithm.
- The *Use of Contact endoscopy and NBI in early diagnosis of OPMD and OC*, a multicentric project collaborating with the AORN "A. Cardarelli" Hospital (Italy); and industry partners (Olympus/Storz), and using AI for an automatized diagnosis result in real time in a non-invasive way. This would potentiate a new imaging tool for early diagnosis of these diseases.
- *AI-enabled rapid oral cancer assay* project, aiming the evaluation of the rapid PCR genetic test in a multicentric collaboration including KCL London and the Clinical Research HUB (UNIPRO).

## b) Periodontal diseases

Our main interests are focusing on:

i) Role of metalloproteinases in periodontal disease. This study, involves the detection of 13 cytokines with a multiplex kit, and by flow cytometry, which could help define other biomarkers (collaboration with Minho U.).

- ii) Identifying periodontopathogens in the Portuguese population and relating them to systemic diseases. The group (in collaboration with USC) intends to evaluate new bacterial associations with the 16S rDNA gene amplification sequence.
- iii) Integrate periodontal health metrics with indicators of other systemic diseases to create predictive models, through statistical and AI techniques in collaboration with the ALGORITMI Centre (Minho U.), using advanced analysis of metagenomic and multiplex inflammatory markers.
- iv) Development of innovative and disruptive periodontal diagnostic tool, in partnership with *CESPU Diagnóstico*.

Other topics and projects includes the study of the Preventive and therapeutic potential of plants extracts in oral candidiasis; and the study of the L-PRF (Leukocyte and Platelet Rich Fibrin): Bridging Biology and Microbiology (BBM-LPRF).

## 2- Oral Rehabilitation

This is the major dedication area of researchers of the LIROP Lab and researchers form oral facial disorders with the main objectives:

- Investigate the fatigue resistance behaviour of dental reconstruction devices, particularly prosthetic components used in implantology, focusing on their physical and mechanical nature.
- Assess the wear of materials supporting implant-supported rehabilitations and evaluate material behaviours under conditions of high cyclic loads, especially compressive loads.
- Study biomaterials and their fracture resistance, specifically polymethylmethacrylate, composite resins, and polyetheretherketone, when subjected to masticatory forces and adverse environments such as varying pH levels and temperatures.

Specifically, the primary research interests include:

- i) studying the fatigue resistance behaviour of prosthetic component devices and components used in implant dentistry, as well as the respective influence of Saliva pH.



- ii) study of polymethyl methacrylate regarding their resistance to fatigue, including in vitro simulation model using stereolithography methodology, with collaborations of FEUP/INEGI, Barcelona University, and EUMC, Spain.
- iii) Research directed to investigate mechanical performance by comparing monolithic and additive zirconia for resin-bonded bridges from in vitro models to clinical studies;
- iv) Research on Clear Aligner Treatment for Complex Tooth Movements, evaluating predictive models of teeth movements with aligners with/without auxiliaries appliances.
- v) Evaluate CBCT integration in Clincheck® software for enhanced diagnosis and movements measurement compared planned and achieved movements.

## B - INTERNATIONALIZATION

Since UNIPRO's inception, the concept of international collaboration has driven the unit. We intend to promote more efforts by establishing more international collaborations, facilitating the mobility of researchers and facilities of the unit of international reference, increasing the participation of members in international projects and co-authored publications, participation of members in various scientific activities such as advisory and/or regulatory boards or internationally recognized knowledge development groups.

The participation in international networks and collaboration such as WHO Collaborative Centre of Oral Cancer; networks between USC; Kings college of London; Zagreb university; Bordeaux university; Milan University; and Barcelona University, Sevilha U., Oxford Brookes U., helps and stimulate more international participation of UNIPRO members in important networks to disseminate the unit internationally.

## C - ADVANCED SCIENTIFIC TRAINING

UNIPRO serves as an advanced educational platform. The promotion and attraction of students for participate in the UNIT is strategic for potentiate future research activity or even researcher careers. Several measures are design to promote this, such as the inclusion of graduate and

post-graduate students in financed internal projects, support for publications of research works, promotion of seminars to motivate and attract the interesting of students for UNIPRO research.

The PhD program in Biomedical Sciences, is a major link to the research of the Unit. UNIPRO actively constitutes part of the base for education of research of this Post-graduation PhD course using the researchers and Unit facilities into the context of Laboratory curricular units. UNIPRO is also the principal host research unit of the student's research work. UNIPRO also hosts PhD students from external PhD programs. This also potentiate the possibility to contract young researchers for the unit, also a strategic measure to strength this link of education and research of the unit.

Additionally UNIPRO, is involved as a partner in establishing a new and international PhD program on Oral Pathology and Rehabilitation in collaboration with UECM (Spain) to be evaluated into 2025. This program will also benefit from UNIPRO facilities by promoting more PhD students, especially international students, who will carry out their work in our Unit, increasing collaborative projects between universities and R&D units.

Members of the research team also actively collaborate in teaching, mentoring PhD students at the institution and collaborating with other institutions/units. Our goal of hiring high-quality researchers will strengthen this collaborative link between research and teaching.

## D - DISSEMINATION

We aim to strength UNIPRO dissemination including the promotion of publication of open access articles in high-quality/impact journals (with periodic publication funding applications, and annual merit researcher prize (based and directed to research activity), the organization and active participation of seminars, congresses, or workshops.

The organization of UNIPRO's International Congress is one of the ways of disseminating the creation of knowledge, which is of enormous scientific interest at the institution today. We intend to continue and increase the active participation of the unit's members in the presentation of their results, as well as increasing team collaborations with other national and international groups, boosting multi-collaboration and international projects using this Congress platform. We also will promote the publication of the meeting's abstracts in an open-access, peer-reviewed journal with high impact factor to encourage the interest among participants and disseminate the results internationally.

Additionally to already established dissemination instruments, we are developing a series of periodic seminars "to communicate science" (5 per year), to enable researchers and students to disseminate their results and discuss their ideas with their peers.

UNIPRO is also focused on the transfer of knowledge in other organizations or units, such as to the APOMED-SP and participation in the training on "early diagnosis of OC" of Family Doctors (GP) of the SNS. UNIPRO is planning to take part in several important future congresses such as APOMED, EAOM, APMO, Intelligent Dentistry Congress, and others.

It is in the Unit's strategic plan to develop a new website and innovate ways of communicating science, resulting in various media appearances, activities that are supported by the IUCS Communications and Marketing Office in collaboration with UNIPRO.

## **E - INTERINSTITUTIONAL COLLABORATION, PARTNERSHIPS, FUNDING SEARCH**

In addition to the international networks already mentioned, UNIPRO is promoting national partnerships and cooperation protocols to increase research collaborations, increase the number and quality of research projects and attract financial support. Researchers are stimulated to seeking co-financing (European Projects, FCT, and other sources of funding. In this context, we will implement a new internal grant project call's, with strict criteria depending on the previous high competitive grant applications.

We would highlight the collaborations (protocols or collaboration of research members) with various universities and research units (UTAD; University of Minho; I3S; AJPU/INEGI-University of Porto; Mechanical Eng. depart. University of Porto; Barcelona University; Centre for Biomedical Research/CBMR, University of Algarve; ULS Matosinhos, Centro Hospitalar Tâmega e Sousa, Centro Hospitalar do Alto Ave) to increase and strength research.

UNIPRO also seeks to collaborate with the industry, promoting meetings with industry to establish collaborations to carrying out original research into devices or applications of methods of using technology in oral health (FOTONA; Olympus; Storz; INSTRON; DIO Implant; Klockner; Straumann) and development of technology and innovation promoted by the start-up *CESPU Diagnóstico* Lda, with a focus on methods of diagnosing oral infectious agents, oral cancer and other diseases.

The dynamization and creation of new startups or spinoff's is also a programmed task not only directed to allocate new developed technologies of diagnosis or treatment by UNIPRO researchers but also to potentiate a strong funding search specially to international projects calls.

## F - RESEARCH EXTENSION TO THE SOCIETY

UNIPRO strategically supports and stimulates population-oriented projects using UNIPRO/IUCS facilities, such as the laboratories that provide health services to the community (advanced Histopathology, Microbiology and Clinical laboratories) or the IUCS university dental clinics and CESPU hospital dental services at SNS/ULS. In terms of strategy, we intend to strengthen research (observational/RCT) directed to diagnostic aids using the new laboratory facilities (Clinical Research Hub) in the Portuguese population, promoting the early diagnosis of oral diseases (OC, periodontal diseases, genetic syndromes), the use of new and innovative technologies available for the benefit of the population, as well as other activities for society such as OC screening and oral health screenings.

Our new UNIPRO task force observatory for oral health is a platform to perform the diagnosis of the need of oral health status of Portuguese population and also a platform to disseminate the translation of new knowledge for the population.