

| Principal Investigator BOSSI PAOLO | |
|---|---|
| Institute of Affiliation | Humanitas Mirasole S.p.A. |
| Title of the proposed project: | Translational and clinical activities related to trials for oral cancer prevention and treatment |
| Short description of the project | <p>Oral squamous cell carcinoma (OSCC) has a poor prognosis, often diagnosed late. Oral potentially malignant disorders (OPMD) carry a risk of malignant transformation. Non-invasive monitoring via oral brushing and immuno-interception strategies, like CD40 agonists, show promise in preventing cancerization. In advanced OSCC, combining chemotherapy and immunotherapy may improve outcomes, optimizing treatment selection to enhance efficacy while minimizing unnecessary toxicity. The project is expected to enhance oral cancer prevention and early detection, by using non-invasive tools like oral brushing to identify high-risk individuals and lesions needing treatment, reducing reliance on invasive biopsies. The project also will evaluate how intralesional CD40 agonist injections in premalignant lesions may boost immune response while minimizing systemic toxicity. Translational research will clarify the mechanism of activity of the drug and identify responsive patients. Moreover, the project will look for predictive biomarkers for neoadjuvant chemo-immunotherapy so as to optimize patient selection and treatment monitoring, addressing emerging challenges in neoadjuvant immunotherapy. The impact on cancer will be at the following levels: a. Development of a prognostic model that integrates clinical, pathological, and molecular data to improve risk stratification in OPMD. b. Immunological, microbiota, and LOH analysis in OPMD patients treated with CD40 agonist to enhance patient selection and uncover resistance mechanisms. c. Identifying circulating or tissue biomarkers for neoadjuvant chemo-immunotherapy response to optimize OSCC patient treatment. The project will be carried on in Humanitas Mirasole (Milan) for what concerns the clinical part and in Humanitas University Laboratories for what concerns the translational activities.</p> |
| Main research area for the project | Cancer biology |
| 5 key words for the project | Head and neck ca., Precancerous lesions, Prevention and/or chemoprevention, Chemoimmunotherapy, Transcriptome/Transcriptomics |

| LAB INFO | |
|--|---|
| Main topic/s of the lab | Translational research |
| Short description of the lab activity | The following activities are performed: Genomic and epigenomic analyses, including DNA extraction from tumor tissue and liquid biopsy samples (plasma/saliva). Circulating tumor DNA (ctDNA) analysis, including sample processing, quantification, and quality assessment. Preparation of next-generation sequencing (NGS) |

| | |
|--------------------------------|--|
| | libraries, including target enrichment and quality control workflows. The Lab has experience in head and neck cancer research, with a common background on tumor biology, biomarkers, and oncology approaches. |
| Recent bibliography | <ul style="list-style-type: none"> - Revisiting the concept of neoadjuvant and induction therapy in head and neck cancer with the advent of immunotherapy. - Biomarkers in head and neck squamous cell carcinoma: unraveling the path to precision immunotherapy. <i>Front Oncol</i> 2024; 14: 1473706 - Clinical and Histological Prognostic Factors of Recurrence and Malignant Transformation in a Large Series of Oral Potentially Malignant Disorders. <i>Front Oncol</i> 2022; 12: 886404 - The interplay of hypoxia, inflammation, and microbiota as indicators of malignant transformation in oral potentially malignant disorders. <i>ORAL ONCOL</i> 2025 Sep; 168: 107583 - A multiomic framework for predicting laryngo-esophageal dysfunction following induction chemotherapy in hypopharyngeal-laryngeal carcinoma. <i>ESMO OPEN</i> 2026 Jan; 11: 105933 |
| Group composition | Total members: 8 2 PhD 2 PostDoc 2 laboratory managers 2 researchers |
| Institutional page link | www.hunimed.eu |