



Development of an ORGANOid-Based Platform for CAR-T Validation Using Nanoparticles Mediated mRNA Delivery (ORGANO-CAR)

Spoke 5 - “Next-Gen Therapeutics”

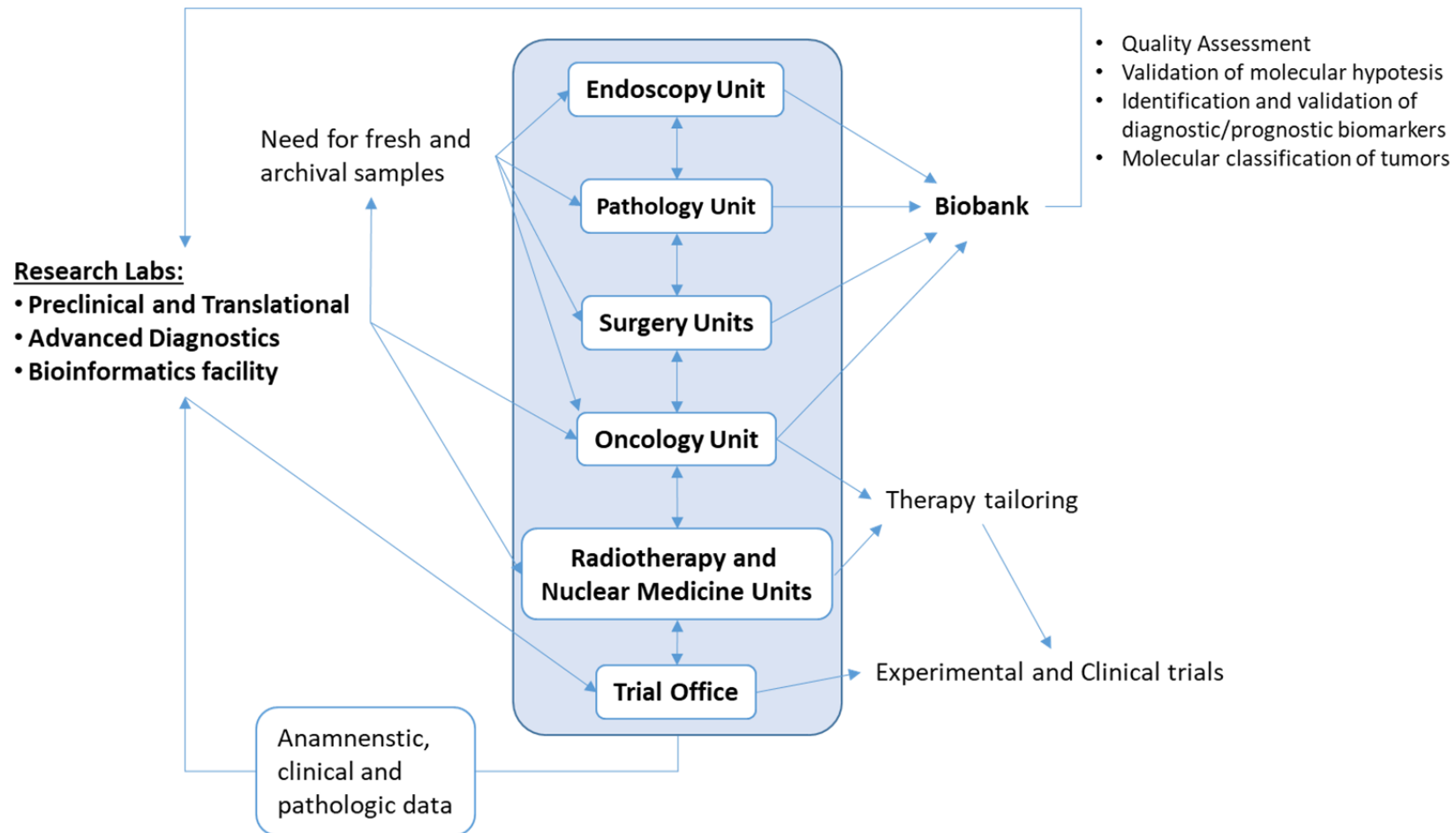
The Mission

The IRCCS CROB in Rionero in Vulture (PZ) is the third oncology center of excellence in Southern Italy, dedicated to biomedical research and the organization and management of health services aimed at innovative therapeutic applications.

In line with current legislation for IRCCS and the disciplinary areas identified through national and regional planning, IRCCS CROB pursues the following objectives:

- Provide healthcare assistance and conduct clinical and translational research in oncology.
- Promote and implement oncological screening programs for major neoplasms.
- Manage the Regional Cancer Registry.
- Participate in national and international research funding calls.
- Develop and implement professional training and healthcare education programs.
- Offer healthcare, psychological assistance, rehabilitation, and oncological follow-up in an outpatient setting for patients with major neoplasms through an interdisciplinary approach.
- Experiment with and verify innovative forms of management and organization in the health field.
- Support pre- and post-graduate education and training institutions.

Translational and multidisciplinary approach



Research Facility

The research spaces extend over approximately 1,600 m², shared by the Clinical and Advanced Diagnostics Research Labs, Pre-clinical and Translational Research Labs, and the Trials Office. Specifically, the facilities include:

3 Pre-clinical/Translational Oncological Research Labs

1 Genomics Lab

3 Clinical and Advanced Diagnostics Research Labs for Solid Tumors

3 Clinical and Advanced Diagnostics Research Labs for Onco-hematology

1 BBMRI-ERIC network Biobank

Infrastructure:

- Cell culture area
- Bright field, fluorescence, and confocal microscopy
- Automated nucleic acids extraction
- Sanger sequencing
- Flow cytometry and immunomagnetic cell sorting
- Nanoparticle Tracking Analysis
- Two next-generation sequencing platforms
- Bioinformatics and statistical analysis workstations

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Objective: Redefining CAR-T therapy for solid tumors by integrating tumor organoids and advanced nanotechnology to precisely deliver mRNA for CAR-T without traditional viral vectors, reducing off-target effects.

Contribute to Spoke’s program: The development of advanced CAR-T cell generation and optimized delivery methods are expected to address challenges related to safety, efficacy, and manufacturing processes, leading to safer and more effective therapies. Tumor organoids, as validation platform, will provide an in-depth understanding of functional differences between CAR-T cell generation methods, which will not only advance the immediate objectives of the project but will also contribute to broader cancer research.

Contribute to HEAL ITALIA’s program and to Precision Medicine: The ORGANO-CAR platform is expected to significantly improve the accuracy of *in vivo* response prediction, setting new standards in the precision medicine field. It will result in more effective therapies by tailoring treatments to the unique characteristics of each patient. This individualized approach will minimize side effects, improve treatment responses, and ultimately enhance the quality of life for cancer patients.