

# MEDICAL BIOLOGY DEPARTMENT

Linking fundamental research and clinical applications, this department includes:

- Four translational research teams providing basic research results in clinical services. These teams are developing research in the field of anti-cancer compounds, gene therapies for neuromuscular diseases and the study of the relationship between the intestinal microbiota and immunity.
- An International observatory on sickle cell disease to promote cell therapy in developing countries.
- A resource agency for the development of clinical research in the Principality.
- An environmental health unit linking environmental changes and human health.



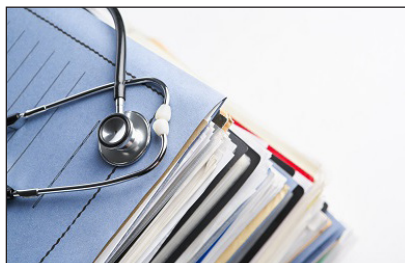
Created on the occasion of the CSM's move to its new premises at Quai Antoine Ier, this department brings together four activities in the health field: clinical research, expertise, partnerships and translational research.



The medical biology laboratories of the CSM host translational research teams.



Two internationally recognized teams are interested in tumor growth, particularly in pediatric cancers, and in the clinical transfer of fundamental research findings for better cancer management.



Many partnerships of excellence for collaborative projects with other institutions (Paoli Calmette Institute, University Hospitals) and research organizations (CNRS, INSERM, Institut Pasteur) have emerged.



Joint translational research projects between the CHPG and CSM teams provide access to tumour samples and related clinical data.

## TRANSLATIONAL RESEARCH

The teams of this Department develop both fundamental and applied research for rapid data sharing from the laboratory to the patient's bedside. The topics covered are cancer research, myopathies and the study of digestive ecosystems. The CSM also includes an International observatory on sickle cell disease, which analyses the results of stem cell transplants in sickle cell disease (Monacord project).

## PROMOTION OF CLINICAL RESEARCH

In addition to fundamental research, the CSM launches every year the financing of programmes initiated by the Principality's hospitals, and duly selected by a committee of international experts, based on the idea that "there can be no medical excellence without the involvement of doctors in research". Initiated in 2008, this program has funded more than 33 clinical research projects.



Health-Environment activities include topics such as water pollution and the impact of ocean global warming on human health.



The CSM was accredited by WHO in 2016 and became the WHO Collaborating Centre for Health and Sustainable Development.

## ENVIRONMENTAL HEALTH

Environmental health remains one of the Department's main themes. Labelled by the World Health Organization, the Department's Human health unit has thus become one of its Collaborating centres for health and sustainable development.



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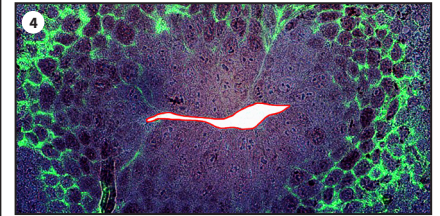
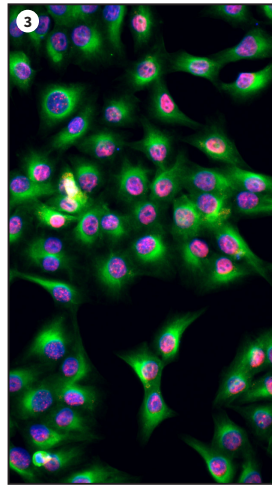
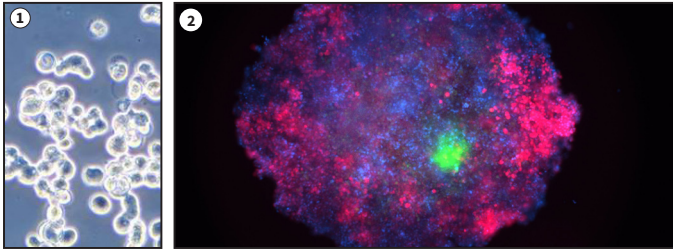
## 6 TEAMS

- **Mechanisms of resistance to targeted therapies**
- **Tumor hypoxia and metabolism**
- **Ecosystems and immunity**
- **Biotherapies applied to neuromuscular disabilities**
- **Human health and Clinical research unit**
- **International observatory on sickle cell disease**

The three research areas of this Department are: new cancer therapies targeting the cellular metabolism of cancer cells **1, 2, 3, 4, 7, 10**, the development of innovative therapies to fight Sickle Cell Disease **5**, muscle dystrophies **6** and anti-infective strategies **8, 9**

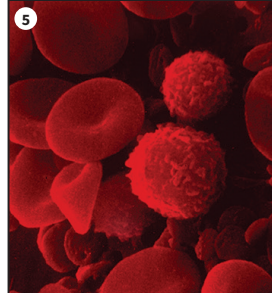
### Tumor hypoxia and metabolism

This team is working on the specific metabolism of the cancer cells from fast-growing tumours in order to fundamentally understand the aberrant energy metabolism of these tumours, to understand the failures of certain compounds, to discover predictive markers of treatment response and new prognostic markers that may also prove to be new therapeutic targets. Thus, the team develops both fundamental and applied research projects for rapid data transfer.



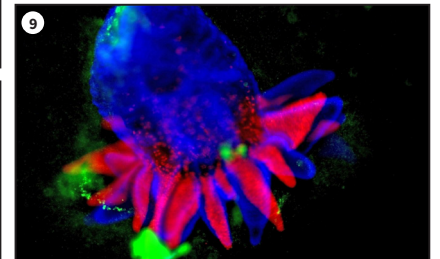
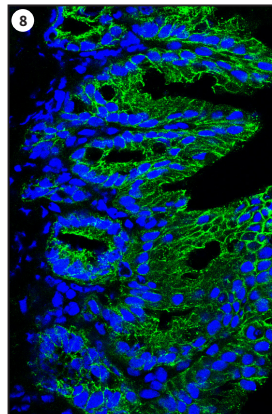
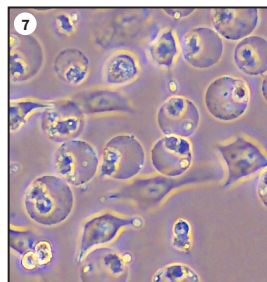
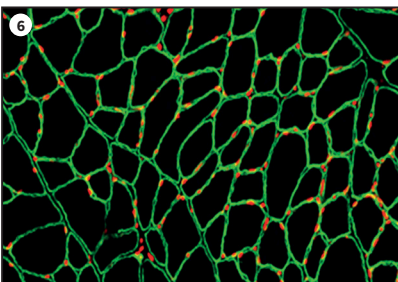
### Mechanisms of resistance to targeted therapies

This team is developing new antitumor therapies aimed at specifically inhibiting the vascularization of tumors (renal tumors, pediatric tumors) and thus the development and formation of metastases. Understanding the mechanisms of resistance of these tumours to these treatments will lead to the discovery of new markers that predict their effectiveness and the development of new treatment strategies.



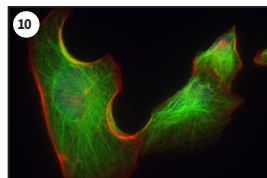
### International observatory on sickle cell disease

The CSM hosts the International Observatory on Sickle Cell Disease, which aims to coordinate research on the diagnosis and treatment of Sickle Cell Disease, a genetic blood disease that mainly affects populations from Sub-Saharan Africa.



### Biotherapies applied to neuromuscular disabilities

Created with the University of Versailles-Saint-Quentin-en-Yvelines as part of an Associated International Laboratory and supported by the Monegasque Association against Muscular Dystrophy, this team is dedicated to innovation in biotechnology and medical devices for the treatment of complications of neuromuscular, neurological and motor disabilities, and in particular Duchenne muscular dystrophy.



### Human health and Clinical research unit

The CSM has set up a resources agency to promote and finance clinical research projects within the Principality of Monaco's health establishments. The CSM is responsible for encouraging, evaluating and supporting the implementation of clinical research projects within these institutions. In addition, a Human Health Unit has been created and labelled as a Collaborating Centre for Health and Sustainable Development by the WHO.

### Ecosystems and immunity

This team conducts research on digestive ecosystems in partnership with Biocodex laboratories. The development of resistance to antibiotics is a real public health problem. In addition, climate change is causing the warming of the oceans, leading not only to their acidification but also to the emergence of new bacteria that are pathogenic to humans or corals. The team's research focuses on a better understanding of the host/pathogen relationship in various models in order to define new strategies to fight infections.