PRISMAP+

Medical-Radionuclides.eu

PIPPA/CIBM PCI HUG-UNIGE, Molecular Imaging section
Geneva, Switzerland

Translational molecular imaging platform offering cell studies, multimodal preclinical imaging (PET/SPECT/CT/MRI/Optical), and animal therapy studies with radiopharmaceuticals labelled with PRISMAP+ portfolio radionuclides

PRISMAP+ Biomedical Facility UNIGE-HUG

The PIPPA/CIBM PCI HUG-UNIGE Molecular Imaging Facility is a translational platform jointly operated by the University of Geneva (UNIGE), the Geneva University Hospitals (HUG), and the Center for Biomedical Imaging (CIBM). Located on the Geneva University and Hospital precinct, about 10 km from CERN, it comprises fully licensed cyclotron and radiopharmacy units, GMP quality control laboratories, a biology/biochemistry laboratory, and multimodal imaging systems (PET, SPECT, CT, MRI, optical imaging), supported by expert technical staff. The facility supports in vitro and in vivo (rodent and alternative models) studies and is fully integrated within national and international research networks, including CIBM and PRISMAP+. For radionuclides of the PRISMAP+ portfolio, the user's compound is supplied to the facility already radiolabelled (radiolabelling synthesis is not performed on site for these isotopes; shipment logistics are arranged case by case between the facility and the user). The facility's cyclotron, radiopharmacy and GMP capabilities mentioned above support its routine clinical radiopharmaceutical activity and are not part of the preclinical PRISMAP+ offer. On site, the injectable dose is formulated (e.g. in saline), followed by in vitro/in vivo characterization and preclinical imaging. In addition, the facility offers a clinical translation pathway through the associated Nuclear Medicine and Molecular Imaging division: clinical trials with the eligible radionuclides are possible provided a GMP-grade radiolabelled product is supplied (e.g. by another PRISMAP+ facility).

The radionuclides from the PRISMAP+ portfolio that are already approved in the PIPPA/CIBM PCI HUG-UNIGE biomedical facility are listed in Table 1. The facility's radioprotection license also covers C-11, Cr-51, F-18, Ga-68, Ge-68, I-123, I-124, I-125, I-131, In-111, Lu-177, Mo-99, N-13, P-32, Rb-82, Re-186, Sr-82, Tc-99m, Tl-201, Y-86, Y-90, and Zr-89, which could be considered for addition to the PRISMAP+ portfolio upon request.

Table 1. Radionuclides from the PRISMAP+ portfolio that can be used at the PIPPA/CIBM PCI HUG-UNIGE facility.

Radionuclide	Max. Activity in work, MBq	Remarks
Ac-225	Preclinical: 80 kBq (stock 8 MBq) Clinical: 8 MBq (stock 20 MBq)	
Cu-64	60 MBq (stock 2 GBq)	Preclinical use only, clinical TBD
Tb-155	60 MBq (stock 2 GBq)	Preclinical use only, clinical TBD
Er-169	100 MBq (stock 1 GBq)	Clinical use only
Ra-223	9 MBq (Stock 25 MBq)	Clinical use only
Sm-153	3 GBq (Stock 6 GBq)	Clinical use only

Note: "Max. Activity in work" is the maximum activity that may be handled at any one time (per operation); it can be fractionated and renewed. "Preclinical" values apply to the facility's dedicated preclinical research laboratories; "Clinical" values apply to the associated Nuclear Medicine and Molecular Imaging division. Please contact the helpdesk for values relevant to a specific project.

Infrastructure and experiments available

The PIPPA/CIBM PCI HUG-UNIGE facility is fully equipped to conduct cell studies, as well as animal imaging and therapy studies with radiolabelled compounds.

As described above, the radiolabelled compound is supplied to the facility; quality control on receipt can be performed by radio-TLC and radio-HPLC. Radiolabelled compounds can then be evaluated in vitro. Imaging capabilities cover state-of-the-art PET, SPECT, CT, MRI, and optical imaging, with quantitative image analysis and post-processing support. Animal work is supported by shielded infrastructure for handling, injection, and dissection of radioactive animals, dedicated animal housing, and radiation safety oversight by two certified radiation safety officers. Staff can provide scientific consulting, assistance with ethical protocol writing

(FELASA B and C certified, EU Directive 2010/63/EU compliant), experimental design, image acquisition/analysis, and support for data processing and publications.

Details regarding the equipment available for imaging at the PIPPA/CIBM PCI HUG-UNIGE biomedical facility can be found in Table 2.

Table 2. Imaging equipment details.

Equipment	Modality	Remarks
nanoScan PET/CT 122S, Mediso Medical Imaging Systems	PET/CT	Compatible with nanoScan MRI 3T for multimodal PET/MR imaging; multi-animal acquisition (up to 4 mice or 2 rats)
Triumph PET/SPECT/CT, Trifoil Imaging	PET/SPECT/CT	Multi-animal acquisition up to 3 mice
nanoScan MRI 3T, Mediso Medical Imaging Systems	MRI	3T; compatible with nanoScan PET/CT for multimodal PET/MR imaging
Quantum GX µCT, Revvity	micro-CT	
IVIS Lumina II, Revvity	Optical (fluorescence/luminescence)	

Animal models available

All common mouse and rat strains are available, including immunocompromised (nude, SCID, NSG). Animal work can be performed under SPF-like (specific pathogen-free) conditions. Available tumor models include syngeneic and xenograft (subcutaneous and orthotopic), as well as patient-derived xenografts (PDX). Custom tumor models can be developed upon request. The alternative chorioallantoic membrane (CAM) model of fertilised chicken eggs is also available.

Support available

The support available to the users before, during and after their visit at the PIPPA/CIBM PCI HUG-UNIGE biomedical facility can be found in Table 3.

Table 3. Support available at the PIPPA/CIBM PCI HUG-UNIGE biomedical facility.

Support	Remarks
Guidance to write regulatory documents to apply for preclinical and clinical studies	
Assistance with project design	
Stability studies	
Cell studies	
Assistance with results processing and interpretation	
Assistance with publication writing	
Support to conduct clinical trials (general organization and contact with authorities)	Possible with the eligible radionuclides, provided a GMP-grade radiolabeled product is supplied (see "Short presentation of the facility" above)

Services available

The services available at the PIPPA/CIBM PCI HUG-UNIGE biomedical facility (without the presence of the user) can be found in Table 4.

Table 4. Services available at the PIPPA/CIBM PCI HUG-UNIGE biomedical facility.

Service	Remarks
Quality control of radiolabeled compound	Radio-TLC, radio-HPLC
Formulation of radiolabeled compound for cell incubation or animal injection	Available for PRISMAP+ portfolio radionuclides (e.g. in saline for injection); complexity and required equipment to be discussed with the user
Radiopharmaceutical stability in non-biological and biological media (radio-TLC, radio-HPLC)	Includes storage stability, serum stability, and in vivo stability studies
Cell studies (binding, internalization, cell-death)	Internalization and intracellular/subcellular distribution, dissociation, blocking, efficacy/functional assays, cell proliferation, metabolite analysis, non-radioactive supporting experiments. Access to common cell and molecular biology techniques in cold laboratories.
Animal preparation and model generation	
Animal handling (injection, imaging, sacrifice)	
Animal monitoring	
In vivo characterization studies	Tracer biodistribution, PET/SPECT and multimodal (CT/MRI) imaging, optical imaging, efficacy studies, metabolite analysis, radiotoxicity and dosimetry studies; performed in murine and chorioallantoic membrane (CAM) models
In vivo therapeutic studies	
Results processing	
Waste handling (radioactive and biological)	