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## INSTITUT COCHIN ENTITY DMP - HISTIM Core Facility

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# INSTITUT COCHIN ENTITY DMP - HISTIM

*Plan de gestion de données créé à l'aide de DMP OPIDoR, basé sur le modèle "Science Europe: structured template for research entities" fourni par DMP OPIDoR.*

## Plan Details

<b>Plan title</b>	INSTITUT COCHIN ENTITY DMP - HISTIM	
<b>Deliverable</b>		
<b>Version</b>	First version	
<b>Plan purpose/scope</b>	<p>The aim of this DMP is to describe as precisely as possible the various research products produced by the services offered by the core facility. This DMP is part of a wider framework, that of making available all the DMPs of the 9 Institut Cochin core facilities (MOUSET'IC, PROTEOM'IC, PIV, PIME, METABOL'IC, CYBIO, IMAG'IC, GENOM'IC and HISTIM) as well as the DMP of the CID database dedicated to the transfer, storage, consultation and sometimes processing of most of the data produced by the Institut Cochin's core facilities.</p> <p>The purpose of this DMP entity is to provide drafting assistance for researchers wishing to draw up a DMP for their research projects and wishing to call on the expertise of our core facilities.</p>	
<b>Fields of science and technology (from OECD classification)</b>	1.6 Biological sciences	
<b>Language</b>	eng	
<b>Creation date</b>	2024-07-18	
<b>Last modification date</b>	2024-12-13	
<b>Identifier type</b>	DOI	
<b>License</b>	<b>Name</b>	Creative Commons Attribution 4.0 International
	<b>URL</b>	<a href="http://spdx.org/licenses/CC-BY-4.0.json">http://spdx.org/licenses/CC-BY-4.0.json</a>

## Structure Details

<b>Entity's name</b>	Institut Cochin Core Facility - HISTIM
<b>Acronym</b>	HISTIM
<b>Identifier</b>	<a href="https://institutcochin.fr/plateformes/histim">https://institutcochin.fr/plateformes/histim</a>
<b>Identifier type</b>	URL
<b>Description</b>	<p>The HISTIM core facility is open to teams from the Institut Cochin as well as to teams from outside the institute, both institutional and private. It offers:</p> <ul style="list-style-type: none"> <li>• A technical service for animal and human anatomy and pathology. It can handle your samples at any stage of the histological process, depending on your requirements: impregnation and embedding of tissues in paraffin, assistance with the preparation of frozen tissues, microtome or cryostat sectioning, standard staining (HE, HES, etc....) or specific staining (Masson, Pearls, PAS, etc...), virtual slides</li> <li>• Immunostaining service: conventionnal immunostaining: in brightfield or fluorescence, 1 to 3 markers. Multiplex immunostaining with: OPAL, ultivue (4 to 8 markers). Hyper-plex immunostaining: MACSima technology (1 to 200 markers in the same tissue section).</li> <li>• A training service for the equipment needed for histology: microtome, cryostat, laser microdissector, fluorescence microscope and slide scanner.</li> <li>• Support at every stage of your scientific project: funding application, implementation, follow-up, results</li> </ul>

The HISTIM core facility is networked with the PARCC 'Morphology and Histology' core facility (manager: Corinne Lesaffre). The core facilities have become a single one with 2 divisions. This single CF has been accredited by the former Paris Descartes University. This merger means that skills and expertise can be pooled and equipment and services shared, making them accessible at the same rate to all teams from a Université Paris Cité entity.

The HistIM core facility is networked with Rés'Hist which which brings together 14 core facilities in the Paris region.

Since 2010, the Institut Cochin's core facilities, with the help of Youstra Lottin, Quality Engineer, have been committed to a quality approach. In 2012, they obtained ISO 9001: 2008 version certification. This certification is renewed every year after an audit, and in 2018, the platforms were certified to Iso9001: Version 2015. The HISTIM core faciity has also been awarded IBISA certification for 2022.

**Creation date** 2009-09-01

**Research outputs :**

1. Physical Slides (Physical object)
2. Photonic Microscopy Virtual Slides (Image)

**Contributors**

Name	Affiliation	Roles
Ely-Marius Fabiola	Institut Cochin - 051sk4035	<ul style="list-style-type: none"> <li>• Data Collector (Virtual Slides, Physical Slides, Physical Slides, Virtual Slides)</li> </ul>
Favier Maryline - 0000-0002-2818-3369	Institut Cochin - 051sk4035	<ul style="list-style-type: none"> <li>• Entity's Manager (Physical Slides, Physical Slides, Virtual Slides, Physical Slides, Physical Slides, Physical Slides, Virtual Slides, Physical Slides, Virtual Slides, Virtual Slides, Virtual Slides, Virtual Slides, Virtual Slides, Virtual Slides, Physical Slides, Physical Slides, Physical Slides)</li> <li>• Entity's manager</li> </ul>
Got Chloé	Institut Cochin - 051sk4035	<ul style="list-style-type: none"> <li>• Data Collector (Physical Slides, Virtual Slides, Physical Slides, Virtual Slides)</li> </ul>
Guilbert Thomas - 0000-0001-5069-0730	Institut Cochin - 051sk4035	<ul style="list-style-type: none"> <li>• DMP manager</li> </ul>
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# INSTITUT COCHIN ENTITY DMP - HISTIM

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## Data description and collection or re-use of existing data

### Physical Slides

#### Research output description

<b>Name</b>	Physical Slides
<b>Description</b>	Tissue sections are cut on a microtome for FFPE tissue (4µm thick) and on a cryostat for frozen tissue (7µm thick). They are then stained with SPECTRA, an automated staining machine that handles standard and specific morphological staining.
<b>Type</b>	Physical object
<b>Workpackage</b>	
<b>Keywords (free-text)</b>	Histology
<b>Language</b>	eng
<b>Issued Date</b>	
<b>Persistent identifier</b>	User initials, a number, the first letter of the considered tissue
<b>Identifier type</b>	Identifiant local
<b>May contain personal data?</b>	No
<b>May contain sensible data?</b>	No
<b>May take ethical issues into account?</b>	Yes

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#### Will existing data be reused?

<b>Justification</b>	FFPE blocks and frozen tissues can be stored at room temperature or at -80] respectively so that they can be reused and recut at a later date. Permanently mounted stained slides can be stored for several years at room temperature and can be analyzed again.
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#### How new data will be collected or produced?

**Name of the method**

Fixation, dehydration, impregnation and paraffin blocks embedding and cutting

**Description**

The tissues are prepared and preserved in 2 ways:

- fixation with 4% paraformaldehyde for 24 to 72 hours, followed by dehydration in growing ethanol and paraffin impregnation on a Logos One (MMF) machine, followed by inclusion in FFPE paraffin blocks,
- or frozen in nitrogen-cooled isopentane (with or without prior fixation), in a mould with OCT (cryopreserver) for preservation at -80°.

Tissue embedded in FFPE is microtome-cut into thin 4µm sections and placed on a glass slide which is stored at room temperature.

Frozen tissues were cut using a cryostat into 7µm thin sections on a glass slide stored at -20° in the medium term and -80° in the long term.

The slides can be analysed using various techniques:

- standard or specific morphological staining (Leica SPCTRA automated stainer)
- immunolabelling to reveal proteins: conventional (single or double marking in visible DAB and/or red and/or green), fluorescence (single, double or more complex OPAL or Ultivue type)
- multiplex with revelation of dozens of proteins by sequential fluorescent immunostaining (MACSima, Miltenyi)
- spatial transcriptomics (Visium technology, 10x genomics)
- laser microdissection (Arcturus XT, excilone)

The slides are then digitised using the P250 slide scanner and stored as virtual slides in the CID (Cochin Image Database).

**Data Nature**

Experimental Data

**Equipments, technical platforms used**

- HIST'IM : <https://cat.opidor.fr/index.php/HIST'IM>

**Photonic Microscopy Virtual Slides****Research output description**

<b>Name</b>	Photonic Microscopy Virtual Slides
<b>Description</b>	<p>HISTIM provides users virtual slides acquisition from samples prepared at the core facility. These images are used by the biology community for fundamental and applied research.</p> <p>The virtual slides are obtained using the Histech P250 3D (MM France), formerly the Lamina Slide Scanner (Perkin Elmer).</p> <p>Multidimensional images are available:</p> <ul style="list-style-type: none"> <li>• 2D images (x, y),</li> <li>• histological pyramidal images of tissues,</li> </ul> <p>File format is .mrxs, openable through BioFormat software, enable us to read, collect and use metadata of all experiments.</p>
<b>Type</b>	Image
<b>Workpackage</b>	
<b>Keywords (free-text)</b>	photonic microscopy, slide scanner
<b>Language</b>	eng
<b>Issued Date</b>	
<b>Persistent identifier</b>	Named after users needs
<b>Identifier type</b>	Identifiant local
<b>May contain personal data?</b>	No
<b>May contain sensible data?</b>	No
<b>May take ethical issues into account?</b>	Yes

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**Will existing data be reused?**

<b>Justification</b>	<p>Images from photonic microscopes can be reused in a number of contexts:</p> <ol style="list-style-type: none"> <li>1. analysis</li> <li>2. complementary analyses</li> <li>3. reuse by third-party researchers, provided that the image metadata are sufficiently enhanced</li> </ol>
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**How new data will be collected or produced?**

<b>Name of the method</b>	Slide canner digitalization
<b>Description</b>	The images are obtained using proprietary acquisition software. The data collected is saved locally, on the acquisition computer, on a data hard disk physically separate from the system hard disk, in a folder named after the team leader (Institut Cochin), or in a folder named after the unit external to the Institut Cochin, associated with the name of the team leader.
<b>Data Nature</b>	Experimental Data
<b>Equipments, technical platforms used</b>	<ul style="list-style-type: none"> <li>• HIST'IM : <a href="https://cat.opidor.fr/index.php/HIST'IM">https://cat.opidor.fr/index.php/HIST'IM</a></li> </ul>

## Documentation and data quality

<b>Physical Slides</b>	
<b>What metadata and documentation (for example way of organising data) will accompany the data?</b>	
<b>Description</b>	<p>The documents and software used to track and trace samples are as follows:</p> <ul style="list-style-type: none"> <li>• Open Iris: service request management website</li> <li>• Service request files</li> <li>• Core facility charter</li> <li>• Sample traceability procedures</li> <li>• Non-conformity procedures</li> <li>• e-mail communication</li> </ul> <p>Samples follow a formalised path on the platform, making it possible to identify the stage the sample has reached in the histological process.</p> <p>The nomenclature of the slides created by the platform follows that indicated in the service request file.</p>
<b>Related references</b>	<ul style="list-style-type: none"> <li>• Guide for collecting and reporting metadata on protocol variables and parameters from slide-based histotechnology assays to enhance reproducibility : <a href="https://doi.org/10.1080/01478885.2022.2134022">https://doi.org/10.1080/01478885.2022.2134022</a></li> </ul>
<b>What methods will be used to ensure their scientific quality?</b>	



## Description

We have 3 types of characterisation on the platform, using different techniques each time, and each time we have quality controls to ensure the reliability of the results:

- For standard or specific histological staining linked to tissue characterisation at morphological level, we use reference slides which are gold slides, internal control slides and positive control slides. A satisfactory morphological stain is one that is identical to the gold slide, which is the so-called 'perfect' stain in terms of contrast and colour intensity. CIQ slides are used to certify the quality of stains, because reliable staining starts with reliable stains. For specific stains, we use positive controls that are known to be positive for the stain used.
- We use positive and negative controls to characterise proteins and therefore immunolabelling. For some antibodies, we also perform a validation of the antibody prior to the experiment.
- For gene expression characterisation and spatial transcriptomics studies, a reliable result depends first and foremost on a reliable biological sample. We first carry out 2 quality controls: morphology and RNA quality. After handling, a PCR is carried out to check the quality of the RNA extracted. In addition, the reagents used for each type of experiment are monitored for change and renewal, which is done either in the monitoring notebook or directly in the machines.

## Photonic Microscopy Virtual Slides

**What metadata and documentation (for example way of organising data) will accompany the data?**

### Description

For quality, interpretation, reproducibility and sharing value, science data should be accompanied by detailed descriptions of the conditions that were used to produce them. For light microscopy, Micro-Meta App is an intuitive, highly interoperable, open-source software tool that was developed in the context of the 4D Nucleome (4DN) consortium and is designed to facilitate the extraction and collection of relevant microscopy metadata as specified by the recent 4DN-BINA-OME tiered-system of Microscopy Metadata specifications.

For the IMAG'IC core facility, when images are imported to the CID database, the machine metadata are automatically recorded as tags for archiving: [Microscope name, Acquisition software, Objectives, Lasers, Filters, Tube, Acquisition date, User name].

Users can also add sample tags: [Cell type, Tissue type, Staining, Protein, molecule, ...].

It is thus possible to retrieve any data imported into the CID by searching for these machine or sample tags.

### Metadata/data standards

- NBO-Q (4DN-BINA-OME-QUAREP Microscopy Metadata Specifications) : <https://rdamsc.bath.ac.uk/api2/m111>

### Metadata language code

eng

### Documentation software

Bio-Formats

**What methods will be used to ensure their scientific quality?**

**Description**

The data generated on the HISTIM core facility comes from a machine that is regularly checked by the constructor.

The quality metadata are automatically calculated when each data is imported.

## Legal and ethical requirements, codes of conduct

**Physical Slides**

**How will other legal issues, such as intellectual property rights and ownership, be managed? What legislation is applicable?**

**Description**

Public: the blocks belong to the platform but are returned at the end of the project.

Private: the blocks are returned at the end of the project.

**What ethical issues and codes of conduct are there, and how will they be taken into account?**

**Description**

The charter describes upstream that these ethical codes are respected:

- for animal experimentation projects, the charter requires users to have their APAFIS application in order, with validation by the ethics committees
- for GMOs, users must have their containment declaration in order and the platform undertakes to use them in suitable containment facilities
- for human samples: if patient tissue is used, it must be anonymised before it is sent to the platform. They must be fixed beforehand and frozen tissues are used exclusively in L2.

The rules of our supervisory bodies INSERM, CNRS and UPC are respected.

**Photonic Microscopy Virtual Slides**

**How will other legal issues, such as intellectual property rights and ownership, be managed? What legislation is applicable?**

**Description**

Promulgated in 2016, the Law for a Digital Republic (LRN) includes several measures on which the national open science policy is based. These measures are transposed, in particular, into the Research Code and the Code governing relations between the public and the administration (CRPA). HISTIM core facility follows these recommendations.

**Related references**

- Guide d'application de la Loi pour une République numérique pour les données de la recherche : 10.52949/31

**What ethical issues and codes of conduct are there, and how will they be taken into account?****Description**

The vast majority of samples imaged on our platform are fixed. Imaging is performed under the ethical conditions laid down by law. User are responsible about their APAFIS certification.

## Data processing and analysis

**Physical Slides****How and with what resources will the data be processed / analyzed?****Description**

The slides can be analysed using various techniques:

- standard or specific morphological staining (Leica SPCTRA automated stainer)
- immunolabelling for protein revelation: conventional (single or double marking in visible DAB and/or red and/or green), fluorescence (single, double or more complex OPAL or Ultivue type)
- multiplex with revelation of dozens of proteins by sequential fluorescent immunostaining (MACSima, Miltenyi)
- spatial transcriptomics (Visium technology, 10x genomics)
- laser microdissection (Arcturus XT, excilone)

The slides are then digitised using the P250 slide scanner and stored as virtual slides in the CID (Cochin Image Database).

**Equipments, technical platforms**

- HIST'IM : <https://cat.opidor.fr/index.php/HIST'IM>

**Photonic Microscopy Virtual Slides****How and with what resources will the data be processed / analyzed?**

**Description**

To ensure the FAIR principle, an image processing workflow is copied to allow the exact same processing to be reproduced despite the constant evolution of software and its updates.

**Online processing**

Some processing can be done directly by the CID database.

Image processings are available online and are dedicated to denoising, deblurring, upsampling and segmentation using CellPose3. Whether for conventional-sized fluorescence images or for large pyramidal coded images, the CID can process these cases with CellPose either directly or in a QuPath environment.

**Quantitative analysis**

All the methods described before are also available on personal request.

**Related references**

- QuPath : <https://qupath.github.io/>
- Cellpose3: one-click image restoration for improved cellular segmentation : 10.1101/2024.02.10.579780

**Equipments, technical platforms**

- HIST'IM : <https://cat.opidor.fr/index.php/HIST'IM>

**Storage and backup during the research process****Physical Slides****How will data be stored and backed up during the research?****Storage needs**

No need for storage, users get everything back.

**Measures taken for data security**

N/A

**Photonic Microscopy Virtual Slides****How will data be stored and backed up during the research?**

## Storage needs

For obvious security reasons, the connection of USB sticks or external hard disks is forbidden on the data acquisition machines.

As soon as the data is imported into the CID, it is archived and can be searched using the different tags accumulated during the import and the different processing and analysis. In all cases the raw data is kept intact, just as the results of processing or analysis will be new data linked to the raw data.

- Data that have been used to publish research must be accessible at any time.
- It is very important to keep the data that is usable at the state of the art of current research. The lack of short-term storage means that we must consider the notion of data quality and therefore retain only those data that have

reliable and rich metadata, and those that allow us to answer a properly posed scientific question.

- It is therefore urgent to find a solution for storing data that has not been consulted for more than two years, for example, on a medium that does not clog up the storage of useful data in common use (storage on magnetic tapes, optical disks, etc.).

One of the main purposes of the CID DB is to allow the long-term archiving of this type of data. If the WEB server is attacked, it can be rebuilt at any time by the Image server. All the data are stored on an Image server in the premises of the Institut Cochin. A complete backup is made every day in one of the 4 other buildings of the Institut Cochin. If the Image server is damaged, a restoration is launched via this copy.

To summarize, the IMAG'IC IT architecture runs on 3 servers:

- Data server (backed up every day to a storage bay in another building)
- DMZ: for the imaging website (backed up every day on a storage bay in another building)
- MZ: Database server (no backup) a solution will have to be found here

All images are saved to the Cochin Image Database.

cf. [INSTITUT COCHIN ENTITY DMP - CID](#)

Storage requirements are indicated for an average year of data generation.

## Estimated volume of data

2

## Unit

TB

## Equipments, technical platforms

- CID : <https://cat.opidor.fr/index.php/CID>

## Measures taken for data security

CID access by institutional login and personal password.

## Data sharing and long-term preservation

### Physical Slides

#### How will data be shared?

#### Modalities of sharing

As physical object, samples are directly given to the users.

#### Reusability

YES

## How will data be long-term preserved? Which data?

**Justification** The blocks keep well and can therefore be reused. No blocks are physically stored at the core facility.

**Start date**

**End date**

**Final dispositions**

## Photonic Microscopy Virtual Slides

### How will data be shared?

**Modalities of sharing** Raw data from research is increasingly in demand by publishers. Reproducibility in science is of utmost importance and providing raw data is one way to make the results of an experiment more reliable. Institut Cochin's researchers are therefore invited to deposit their raw data from a publication work on the CID (openData of Cochin Image Database). A direct download web page will then be generated and this link can be protected by a unique DOI (Digital Object Identifier). The IMAG'IC and GENOM'IC core facilities are responsible for generating this link. A contract has been signed with the OPIDoR service of the Inist-CNRS via the DataCite consortium: <https://opidor.fr/identifier/>  
Also, once the images has been used for scientific publication, they are shared through pulbic archive website BioImage Archive. The link is then identify with a DOI link that we are able to create.

**Reusability** YES, with no condition

**Data repository/catalogs**

- BioImage Archive : [https://cat.opidor.fr/index.php/BioImage Archive \(\)](https://cat.opidor.fr/index.php/BioImage%20Archive)
- CID : [https://cat.opidor.fr/index.php/CID \(\)](https://cat.opidor.fr/index.php/CID)

## How will data be long-term preserved? Which data?

**Justification** Every image is available on CID database for an amount of time which has not been defined yet.

**Estimated volume of data** 2

**Unit** TB

**Start date**

**End date**

**Final dispositions**