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INSTITUT COCHIN ENTITY DMP - METABOL'IC Core Facility

Raphael Denis, Thomas Guilbert

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INSTITUT COCHIN ENTITY DMP - METABOL'IC

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 Science Europe.

Plan Details

Plan title	INSTITUT COCHIN ENTITY DMP - METABOL'IC	
Deliverable		
Version	First version	
Plan purpose/scope	<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>	
Fields of science and technology (from OECD classification)	1.6 Biological sciences	
Language	eng	
Creation date	2024-07-18	
Last modification date	2024-07-23	
Identifier		
Identifier type	DOI	
License	Name	Creative Commons Attribution 4.0 International
	URL	http://spdx.org/licenses/CC-BY-4.0.json

Structure Details

Entity's name	Institut Cochin Core Facility - METABOL'IC
Acronym	METABOL'IC
Identifiant	https://institutcochin.fr/plateformes/metabolic
Identifiant type	URL
Description	<p>L'homéostasie énergétique chez l'être vivant peut se définir au travers du principe de conservation de la matière : « Rien ne se perd, rien ne se crée, tout se transforme » (Lavoisier, Traité élémentaire de chimie, 1789). La vocation de la plateforme d'analyse METABOL'IC est d'offrir aux scientifiques une caractérisation exhaustive des composantes de l'homéostasie énergétique, en particulier l'analyse du métabolisme de la cellule chez le petit animal.</p> <p>À ce jour, nous sommes équipés d'un module de cages de calorimétrie indirecte (Promethion-Core©), permettant de quantifier les différentes composantes de la balance énergétique et les comportements attenants, ainsi que d'un analyseur de composition corporelle (RMN Bruker©), d'un système SeaHorse XF Pro (Agilent©) et d'un Cytation 1 pour la normalisation, qui permettent une caractérisation du profil bioénergétique des cellules et un phénotypage cellulaire.</p> <p>Nos outils s'inscrivent dans la compréhension de la physiopathologie des maladies métaboliques (diabète, syndrome métabolique, troubles du comportement alimentaire, cancer, etc.).</p>

Creation date 2021-10-21

Research outputs :

1. PHENOTYPES (Dataset)

Contributors

Name	Affiliation	Roles
Denis Raphael - 0000-0002-7677-7460	Institut Cochin - 051sk4035	<ul style="list-style-type: none"> • Contact Person • Entity's Manager • Entity's Manager • Entity's Manager • Entity's Manager • Entity's Manager • Entity's Manager • Entity's Manager • Entity's Manager • Entity's Manager • Entity's manager
Guilbert Thomas		<ul style="list-style-type: none"> • DMP manager

INSTITUT COCHIN ENTITY DMP - METABOL'IC

Data description and collection or re-use of existing data

Research output description

Name	PHENOTYPES
Description	<p>The core-facility is composed of two poles: Cellular and Animal. The objective of each is to offer a phenotyping of energy metabolism.</p> <p>For in vitro cell analysis: glycolytic and mitochondrial function, including basal respiration parameters, acute response, and maximal respiration in the oxidative stress test depending on different substrates.</p> <p>For in vivo animal analysis, we capture energy balance parameters, energy intake (both quantitative and qualitative), energy expenditure (at rest and overall), a profile of substrate utilization, and a set of locomotor and behavioral parameters, all tracked over time.</p> <p>The core-facility offers comprehensive energy metabolism exploration services: from the design, implementation, and execution of an experimental protocol to the analysis and interpretation of data with regard to the model used and the scientific question posed. Protocol development is carried out in accordance with ethical and health regulations. We will assist you in preparing the necessary files for animal model use requests for scientific purposes.</p>
Type	Dataset
Workpackage	
Keywords (free-text)	Metabolism, Phenotype, Physiopathology
Language	eng
Issued Date	
Persistent identifier	{metabo}-{year}-{project_number}
Identifier type	Identifiant local
May contain personal data?	No
May contain sensible data?	No
May take ethical issues into account?	Yes

Will existing data be reused?

Justification	All data generated for publication, in agreement with the requester and in line with editorial policies, are accessible and can be reanalyzed. The core-facility reserves the right, with the requester's consent and after anonymizing the data, to use them for the purpose of improving analysis tools and/or for educational communication purposes.
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How new data will be collected or produced?

Name of the method	Phenotyping
Description	<p>Animal pole:</p> <p>The Promethion system, depending on its configuration, allows for longitudinal animal studies (up to 2 weeks) and can simultaneously collect data from up to 16 mice. It captures a range of environmental and metabolic parameters such as O2 consumption, CO2 production, food and water intake, and a comprehensive set of locomotor activities using infrared beam breaks. The system provides an interface and data storage module for real-time data acquisition and visualization of pre-analyzed data for preliminary assessment.</p> <p>Post hoc analysis software (Expedata) enables the extraction of metabolic data, including energy expenditure, energy intake, substrate utilization, and the quantification of various behaviors (e.g., speed, locomotion, sleep, resting). Users can explore the data in a rich graphical environment, with all system parameters recorded. All data is stored in its raw form, ensuring traceability and compliance with peer-review standards. Raw data storage also allows for future reanalysis of previous experimental runs, offering flexibility and maximizing the value of your experimental data and time.</p> <p>Cellular pole:</p> <p>Metabolic cellular exploration is performed using an Agilent Seahorse XF Pro analyzer, which enables the measurement of oxygen consumption rate (OCR), proton efflux rate (PER), extracellular acidification rate (ECAR), and ATP production rates in live cells using a 96-well format. OCR, PER, and ATP production rates are critical indicators of energy metabolism and provide insights into mitochondrial health, toxicity, glycolysis, and overall cellular (dys)function. Together, these measurements offer a systems-level view of cellular metabolic function in cultured cells and ex vivo samples.</p> <p>The analyzer is equipped with advanced software, standardized workflows, and enhanced data analytics, which generate comprehensive reports for users. The XF report generator converts raw kinetic data into summary reports on mitochondrial function, streamlining data analysis and interpretation while eliminating manual, error-prone methods. These features simplify the entire XF assay process, from experimental design to data quality control and interpretation</p>
Data Nature	Experimental Data
Equipments, technical platforms used	<ul style="list-style-type: none">• METABOL'IC : https://cat.opidor.fr/index.php/METABOL'IC
Related references	<ul style="list-style-type: none">• A guide to analysis of mouse energy metabolism : https://doi.org/10.1038/nmeth.1806

Documentation and data quality

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

Description

The raw data collected from the Promethion system for animal metabolic phenotyping are stored on the machine's computer and the connected device in binary SCCF (ExpeData) file format. These data are accessible by the provider and the core-facility manager. The data resulting from analysis and interpretation are stored in spreadsheet formats (.xml or .csv), and can easily be exported to common statistical analysis software (GraphPad, R, or Minitab, etc.). At the end of the analysis, the requester receives several documents: a file summarizing all the data (spreadsheet), a file for analysis and interpretation (spreadsheet), along with an analysis report (.doc) supported by a presentation file (.pwt).

The Seahorse XF Cell Mito Stress Test Report Generator is a macro-enabled Microsoft Excel template compatible with Microsoft® Excel™ versions 2010, 2013, and 2016 for Windows PCs, and versions 2011 and 2015 for Mac.

The Report Generator displays results and assay-related information, including:

1. **Summary Printout:** A one-page summary of the test results, presented as a kinetic graph and bar charts for key assay parameters.
2. **Bar Charts:** Assay data displayed in bar chart format.
3. **Normalize:** A plate map of the normalization values from the imported result file.
4. **Measures Sheet:** A table of assay parameters and kinetic data for OCR and ECAR.
5. **Assay Parameter per Well:** A data table of assay parameters for each well in the imported file.
6. **Sample Calculations:** Example calculations based on sample data.

All documentation can be provided by the core-facility or accessible via the website of the manufacturer.

Related references

- "Report Scientific_MetabolIC X-Y" "Presentation_MetabolIC X-Y" "Data_MetabolIC X-Y" "Analyse MetabolIC X-Y" :

Metadata language code

eng

What methods will be used to ensure their scientific quality?

Description

Metabolic phenotyping of animals, due to intrinsic variations between individual animals within the same group and between experimental groups, requires a minimum of 6 animals per group and a series of measurements over several days. The system collects data every 5 minutes for all parameters. The data are then aggregated by hour and by day, and subsequently by group, in order to minimize the impact of intrinsic variations in individual animals and groups. In basic longitudinal studies, interpreting data collected every 5 minutes is not particularly relevant. However, in acute behavioral studies involving changes in environmental parameters and/or pharmacological treatments, it becomes important to examine data with high frequency iterations

A detailed analysis of standard variations helps identify any atypical behavior or abnormalities, ensuring the accuracy of the data.

Legal and ethical requirements, codes of conduct

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

legislation is applicable?

Description

Policy: prior to any project, the requester must agree to the core-facility's service usage policy, including data management and ethical criteria. The core facility users retains ownership of the data until their publication.

Related references

- PRMET_F_003_2_Charte des plateformes_Metabolic :
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What ethical issues and codes of conduct are there, and how will they be taken into account?

Description

Any establishment that uses animals for scientific purposes must hold an accreditation. This is issued by a prefectural decree, following inspections by veterinary inspectors from the Departmental Directorate for Social Cohesion and Population Protection (DDPP or DDCSPP). To begin, any research project involving animals must obtain authorization from the Ministry of Research. The authorization is granted for a maximum duration of 5 years, provided that the project has received a favorable evaluation from the ethics committee of the establishment where it will be carried out.

The core facility manager must ensure that the applicant complies with the legislation (Decree No. 2013-118 of February 1, 2013, concerning the protection of animals used for scientific purposes). The core facility manager can assist in drafting the project authorization request (APAFiS Platform on the website of the French Ministry of Higher Education and Research).

Related references

- <https://www.legifrance.gouv.fr/loda/id/JORFTEXT000027038013> : JORF n°0032 du 7 février 2013
-

Data processing and analysis

How and with what resources will the data be processed / analyzed?

Description

Procedure for data extraction and management from the Promethion system. Data extraction is carried out on the platform's computer located in the experimental area, and the data is stored on the system's dedicated space. Files are saved in the form of a raw data file (.exp), a backup file (.exd) used for recovery, an spreadsheet file containing organized data, and a metafile containing information about the system, useful for troubleshooting.

Access to the Expedata software is required for visualizing and processing the data, and Macro Interpreter is needed to automate certain analyses. These software tools, which are regularly updated, are provided by the manufacturer.

The procedure for data extraction is as follows: at the end of the experiment, data recording is stopped, and the .exp and .exd files are downloaded and stored in a download folder. A copy is always available on the system.

Data analysis and management involve opening the .exp file in Expedata, with the .exd file being required in the same directory to properly restore the data. The macro interpreter allows the files to be loaded and generates an .xml file, which can be automatically opened in spreadsheet viewer software for analysis.

Once the analysis is complete, it is recommended to save the files in .xlsx format (compressed file) for size and efficiency reasons, as the .xml format is more voluminous. The main technical reference for data analysis is the Data Analysis Guide 2021 (Promethion), which explains the measured parameters and the methods for processing the results. This technical process ensures effective management of experimental data and guarantees the traceability of information in a secure and structured framework.

Equipments, technical platforms

- METABOL'IC : <https://cat.opidor.fr/index.php/METABOL'IC>

Storage and backup during the research process

How will data be stored and backed up during the research?

Storage needs

Description of data transfer procedures.

Data is stored in different locations. Raw data is stored on the machine, which has its own storage space, as well as on the adjacent computer. Subsequently processed data is deposited on the core facility's storage space.

Extracted and analyzed data is stored on the core facility manager's computer and automatically backed up on the Institute's platform storage space and on the OneDrive space provided by INSERM.

Open CID is also a solution that will be implemented as a storage and archiving solution.

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

Estimated volume of data

10

Unit

GB

Equipments, technical platforms

- CID : <https://cat.opidor.fr/index.php/CID>
- Inserm Cloud : [https://cat.opidor.fr/index.php/Inserm Cloud](https://cat.opidor.fr/index.php/Inserm%20Cloud)

Measures taken for data security

The measures taken for data protection are as follows:

- All machines are connected to the University and Institute's local network. The digital site is secured in accordance with the University's information systems security policy.
- Each machine is identified on the network and protected by a login and a password. Each user has a unique identification, thus enabling the anonymization of recorded data and work documents.

Data sharing and long-term preservation

How will data be shared?

Modalities of sharing

Université Paris Cité provides staff with an online service for secure storage and sharing of professional data (NextCloud: <https://cloud.parisdescartes.fr/>).

Each employee has a personal storage space, accessible via the web, allowing them to share files with:

- other members of the university community;
- anyone outside the university, via a public link (**with or without a password and expiration date**).

The shared data is stored and made available to users, and will be archived after 6 months.

Open CID is also a solution that will be implemented as a sharing modality.

Reusability

Yes, on demand.

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

Justification

Raw data are stored without interruption. Analysis data are kept by the platform until the requester publishes the data, after which it is archived. Shared data and accessible via the University's sharing space remained available for up to 6 months. Most of data are also locally preserved on local hard drives.

Estimated volume of data

10

Unit

GB

Start date**End date****Final dispositions**