Plan Overview

A Data Management Plan created using DMPonline.be

Title: C1 project: C14/24/142

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Project abstract:

VITAL PULP THERAPY is a dental technique used to preserve the inflammated tooth pulp, avoiding a root canal treatment, which may compromise the tooth integrity and longevity. This approach involves the application of a biocompatible and bioactive restorative material on the pulp to encourage the formation of a protective mineralized bridge. However, the clinical technique and materials used in vital pulp therapy have still many drawbacks such as low predictability, poor esthetic result and difficult handling. Therefore, the main project aims are: 1) to create a new in-vitro pulp tissue platform for testing biomaterials, 2) to assess experimental bioactive formulations for their reparative potential and, 3) ultimately develop a reliable pulp-capping technique and material for clinical trials. Additionally, using the newly developed tissue platform, we intend to investigate the underlying mechanisms of pulpal regeneration following vital pulp therapy procedures, which today remain insufficiently understood.

ID: 212629

Start date: 01-10-2024

End date: 30-09-2028

Last modified: 30-03-2025

C1 project: C14/24/142

Research Data Summary

List and describe all datasets or research materials that you plan to generate/collect or reuse during your research project. For each dataset or data type (observational, experimental etc.), provide a short name & description (sufficient for yourself to know what data it is about), indicate whether the data are newly generated/collected or reused, digital or physical, also indicate the type of the data (the kind of content), its technical format (file extension), and an estimate of the upper limit of the volume of the data.

Dataset name / ID	Description	New or reuse	Digital or Physical data	Data Type	File format	Data volume	Physical volume
		*Indicate: **N**(ew data) or **E**(xisting data)*	Indicate: **D**(igital) or **P**(hysical)	Indicate: **A**udiovisual **I**mages **S**ound **N**umerical **T**extual **M**odel **SO**ftware Other (specify)		Indicate: <1GB <100GB <1TB <5TB >5TB NA	
Experimental	Human Dental Pulp Cells (HDPSCs) from human extracted teeth; differentiation into Schwann cells and odontoblasts	New	P	Cells	Physical data	NA	40 cell-freezing tubes to be frozen and collected in liquid Nitrogen tanks (Biobank)
Experimental	Human Cells form the teeth´s apical papila (SCAPs) from human extracted teeth; differentiation into Schwann cells and odontoblasts	New	P	Cells	Physical data	NA	40 cell-freezing tubes to be frozen and collected in liquid Nitrogen tanks (Biobank)
Experimental	Ex-vivo tooth model	New	P	Extracted teeth	Physical data	NA	The ex-vivo tooth model are processed for histology. Therefore, it is not possible to store the teeth. We will store the tissue sections and images taken from them (see below, please)
Observational	Micro-Nano Ct images of the ex-vivo tooth model and 3D printed structures	New	D	I	.TIFF, .JPEG,	1-5 TB	
Observational	Light and Confocal microscopy images	New	D	I	.TIFF, .JPEG, .LSM (Light-sheet)	10-50 GB	
Observational	SEM and cryo-TEM images for structural and morphological characterization	New	D	I	.TIFF, .JPEG, .LSM (Light-sheet)	10-50 GB	
Observational	Alizarin red staining, ALP activity, XTT, BrdU	New	D	N	.CSV, .XLSX, .RTF	1-10 GB	
Observational	qRT-PCR and molecular assays: Gene expression of markers like VEGF, RUNX2, DSPP, OCN, etc.	New	D	N	.CSV, .XLSX, .RTF	1-10 GB	
Observational	Flow Cytometer Data on Cell expression and differentiation	New	D	N	.CSV, .XLSX, .RTF	1-10 GB	

Observational	Tissue sections stained for cell markers (Masson's Trichrome, DSPP, CD90, etc.)	New	D	I	.TIFF, .JPEG,	50-100 GB	
Observational	Proteomics and RNA sequencing: Expression profiles, secretome data	New	D	N	.FASTQ, .CSV, .XLSX	50-100 GB	
Experimental	Tissue sections stained for cell markers (Masson's Trichrome, DSPP, CD90, etc.)	New	P	Tissue sections	Physical Data	NA	50 tissue- storage boxes (100 slides each box) are expected to be used for the entire project
Observational	3D bioprinting design files: CAD files, G-code, bioink parameters, printing patterns	New	D	I	.STL, .GCODE, .TXT	1-10 GB	
Experimental	3D-printed models	New	P	3D printed structures	Physical Data	NA	The 3D structures are made of gel. Therefore, it is not possible to store the 3D gels. We will store the tissue sections and images taken from them (see above, please)
Observational	Material characterization: FTIR, XRD	New	D	I	.TIFF, .JPEG,	50-100 GB	
Observational	Material characterization: mechanical tests (compressive strength, bond strength)	New	D	N	.CSV, .XLSX, .RTF	1-10 GB	
Observational	Derived datasets: Processed values: mineralization %, expression levels, bond strength, image analysis	New	D	N T	.CSV, .XLSX, .RTF .DOCX, .PDF, .TXT	1 - 10 GB	
Observational	Dissemination materials: Figures, graphs, manuscripts, presentations	New	D	T I	.DOCX, .PDF, .TXT PPT, TIFF	1-10 GB	

If you reuse existing data, please specify the source, preferably by using a persistent identifier (e.g. DOI, Handle, URL etc.) per dataset or data type:

All data used will be newly generated

Are there any ethical issues concerning the creation and/or use of the data (e.g. experiments on humans or animals, dual use)? If so, refer to specific datasets or data types when appropriate and provide the relevant ethical approval number.

- Yes, human subject data (Provide SMEC or EC approval number below)

Human cells and teeth will be used. Ethical approval has been already obtained: S64350

Will you process personal data? If so, please refer to specific datasets or data types when appropriate and provide the KU Leuven or UZ Leuven privacy register number (G or S number).

- No

Does your work have potential for commercial valorization (e.g. tech transfer, for example spin-offs, commercial exploitation, …)? If so, please comment per dataset or data type where appropriate.

- No

Do existing 3rd party agreements restrict exploitation or dissemination of the data you (re)use (e.g. Material or Data transfer agreements, Research collaboration agreements)? If so, please explain in the comment section to what data they relate and what restrictions are in place.

- No

Are there any other legal issues, such as intellectual property rights and ownership, to be managed related to the data you (re)use? If so, please explain in the comment section to what data they relate and which restrictions will be asserted.

- No

Documentation and Metadata

Clearly describe what approach will be followed to capture the accompanying information necessary to keep data understandable and usable, for yourself and others, now and in the future (e.g. in terms of documentation levels and types required, procedures used, Electronic Lab Notebooks, README.txt files, codebook.tsv etc. where this information is recorded).

To ensure findability and reusability of the information, metadata will be generated according to the FAIR principles. Documentation practices include:

- Descriptive Metadata: For each dataset, include project name, date, contributors, sample ID, experimental protocol, equipment settings, file format, and version.
- Biological Metadata: For cell-based experiments: passage number, cell type, medium, differentiation protocol.
- Technical Metadata: Instrument settings (microscopy, FTIR, XRD), software versions, calibration details.
- Standards Used:
  - MIAME for gene expression data
  - OME-TIFF metadata standard for imaging
  - ISA-Tab format for assay and study-level descriptions

Metadata will be stored:

- In a structured README file alongside each dataset
- In spreadsheets for tabular data
- Using embedded metadata for image files (OME-TIFF)

Will a metadata standard be used to make it easier to find and reuse the data?
If so, please specify which metadata standard will be used.

If not, please specify which metadata will be created to make the data easier to find and reuse.

- Yes
- Descriptive Metadata: For each dataset, include project name, date, contributors, sample ID, experimental protocol,

equipment settings, file format, and version.
- Biological Metadata: For cell-based experiments: passage number, cell type, medium, differentiation protocol.
- Technical Metadata: Instrument settings (microscopy, FTIR, XRD), software versions, calibration details.
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- Using embedded metadata for image files (OME-TIFF)

Data Storage & Back-up during the Research Project

Where will the data be stored?

- Shared network drive (J-drive)

Protected KU Leuven (e-drive) or UZ Leuven e-drives (cumulus account).

How will the data be backed up?

- Standard back-up provided by KU Leuven ICTS for my storage solution

Is there currently sufficient storage & backup capacity during the project?

If no or insufficient storage or backup capacities are available, explain how this will be taken care of.

- Yes

How will you ensure that the data are securely stored and not accessed or modified by unauthorized persons?

The data will be stored and backed-up using the standard KU/UZ Leuven solutions (KU Leuven e-drive and UZ Leuven drives (cumulus account)

What are the expected costs for data storage and backup during the research project? How will these costs be covered?

There are no expected costs for data storage and back-up.

Data Preservation after the end of the Research Project

Which data will be retained for 10 years (or longer, in agreement with other retention policies that are applicable) after the end of the project?

In case some data cannot be preserved, clearly state the reasons for this (e.g. legal or contractual restrictions, storage/budget issues, institutional policies...).

- All data will be preserved for 10 years according to KU Leuven RDM policy

Where will these data be archived (stored and curated for the long-term)?

- Shared network drive (J-drive)
- Large Volume Storage (longterm for large volumes)

What are the expected costs for data preservation during the expected retention period? How will these costs be covered?

There are no expected costs for data preservation during the retention period

Data Sharing and Reuse

Will the data (or part of the data) be made available for reuse after/during the project?
Please explain per dataset or data type which data will be made available.

- Yes, as restricted data (upon approval, or institutional access only)

If access is restricted, please specify who will be able to access the data and under what conditions.

Only people directly involved in the project will have access to the data [(co)supervisors, PhD students related to the project and lab managers related to the project].

Are there any factors that restrict or prevent the sharing of (some of) the data (e.g. as defined in an agreement with a 3rd party, legal restrictions)?

Please explain per dataset or data type where appropriate.

- No

Where will the data be made available?

If already known, please provide a repository per dataset or data type.

- KU Leuven RDR (Research Data Repository)

When will the data be made available?

- Upon publication of research results

Which data usage licenses are you going to provide?

If none, please explain why.

- CC-BY 4.0 (data)

Do you intend to add a persistent identifier (PID) to your dataset(s), e.g. a DOI or accession number? If already available, please provide it here.

- No

What are the expected costs for data sharing? How will these costs be covered?

There are no expected costs for data sharing. Data sharing will be made available through existing KU Leuven repositories (Green Open Access concept).

Responsibilities

Who will manage data documentation and metadata during the research project?

The PhD researchers will manage the documentation and metadata, storage and back-up. (Co)supervisors will ensure that the PhD researchers have enough information and space for storage of data and, if not, will be made available in the lab.

Who will manage data storage and backup during the research project?

PhD researchers.

Who will manage data preservation and sharing?

PhD researchers and (co)supervisors.

Who will update and implement this DMP?

(Co)supervisors: Prof. Pedano De Piero and Prof. EzEldeen.