CXCL9-DERIVED PEPTIDES FOR TREATMENT OF PNEUMONIA INDUCED BY MICROBIAL INFECTION

A Data Management Plan created using DMPonline.be

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Project abstract:

Inflammation is a response to harmful agents and is regulated by several control mechanisms.
Imbalances can lead to exacerbation and chronicization, which are linked to worse clinical outcome in pneumonia patients. Pneumonia, induced by micro-organisms including influenza and coronaviruses, causes numerous deaths and costs billions of euros per year. This emphasizes the need for new treatment strategies. CXCL9 is a major attractant of activated T cells and natural killer cells. However, the biological implications of proteolytic processing and activity regulation of this chemokine in patients are insufficiently understood. We will quantify individual CXCL9 proteoforms in patient samples and evaluate their agonistic or antagonistic activities. CXCL9(74-103) is a promising glycosaminoglycan (GAG)-binding peptide that inhibits inflammation in several mouse models including lung inflammation induced by Klebsiella pneumoniae. We will further develop CXCL9-based anti-inflammatory peptides as potential treatment for pneumonia patients. Additionally, we aim to improve the biodistribution and stability of these peptides in vivo and to evaluate their potential as general inhibitors of lung inflammation in mouse models of viral pneumonia. The use of GAG-binding peptides is an innovative strategy, and this study aims to investigate their therapeutic potential compared to the so far unsuccessful application of drugs targeting G protein-coupled chemokine receptors in inflammation.

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FWO DMP (Flemish Standard DMP)

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1. 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.

Several types of data will be collected during my research project, including patient characteristics (i.e., age, sex, type of infection, disease status, treatment), raw research data (mainly instrument and processed data files), and images. Patient data will be kept by our clinical partners at UZ Leuven, and we will only receive coded samples and clinical information, without any personal nor privacy-sensitive information.
An estimated 500 GB of data per year will be collected. Hence, we expect that 2 TB will be obtained after 4 years. The raw data, analysed data and protocols will be stored as digital files but also catalogued in my own personal laboratory notebooks and general laboratory notebooks.

Observational numeric data (instrument data files) will be stored as .docx, .xlsx, .fcs, .emf, .prism

Patient data will be stored as .xlsx and .prism

Images will be stored as .tif, .png, or .pptx

Synthetic peptides will be physically stored in -80 and -20 freezers until use. Tissue sections from animal experiments will be physically stored until digitalization as .tif image.

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:

Not applicable

Are there any ethical issues concerning the creation and/or use of the data (e.g. experiments on humans or animals, dual use)? Describe these issues in the comment section. Please refer to specific datasets or data types when appropriate.

- Yes, human subject data
- Yes, animal data

We will use clinical data of patients included in the studies S58685, S63881, S51577, S61168, S58418 (Approved).
Animal data will derive from animal experiments described in project P127/2023.

Will you process personal data? If so, briefly describe the kind of personal data you will use in the comment section. Please refer to specific datasets or data types when appropriate.

- Yes

Patient samples will be analysed in this project. We will only receive clinically-relevant information.
Patient identities and personal data will only be accessible to treating physicians with whom we collaborate at UZ Leuven. All patient samples will receive an anonymous code in the hospital. This code can only be linked to the individual patient by the treating physicians.

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.

- Yes

In case specific proteoforms would show potential use as biomarkers, there would be potential for commercial exploitation. In addition, eventual proteoforms with specific activities, and all CXCL9-derived peptides could lead to further drug development.
As such, data obtained during the whole project should be evaluated for potential commercial exploitation and data will be made available only after evaluation and protection of potential IP.

Do existing 3rd party agreements restrict exploitation or dissemination of the data you (re)use (e.g. Material/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.

- Yes

See comments above, regarding potential for commercial valorization.

2. 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).

- Synthetic peptides and biological smaples will be stored at -80 degrees. The exact location of tubes will be stored in the FreezerPro database of our Laboratory.
- Results related to biological interactions and activity experiments (numerical data) will be registered in lab books, with detailed description of the used protocols, and as .docx or .xlsx files. Information on quantification and experimental parameters will be embedded on the document folders and in the lab books, in order to improve reproducibility and maintenance of data.
- Microscopy imaging data is created by default with imprinted metadata.
- Flow cytometry and pulmonary function testing data will automatically be saved as .fcs and .xlsx files, respectively. Instrument acquisition parameters are automatically stored as metadata.

Will a metadata standard be used to make it easier to find and reuse the data? If so, please specify (where appropriate per dataset or data type) which metadata standard will be used. If not, please specify (where appropriate per dataset or data type) which metadata will be created to make the data easier to find and reuse.

- No

3. Data storage & back-up during the research project

Where will the data be stored?

The data will be stored in several locations, including internal SSDs, shared virtual drives (Rega J Drive), OneDrive, and KU Leuven central storage servers.
The KU Leuven data centers provide storage in multiple locations, ensuring data preservation and emergency recovery, as well as long-term storage.
The Lirias platform will be used as data repository for published material.

How will the data be backed up?

The central storage service of KU Leuven (ICTS Luna storage) provides automatic daily backup, in addition to autonomous periodical backup performed by me.

Is there currently sufficient storage & backup capacity during the project? If yes, specify concisely.
If no or insufficient storage or backup capacities are available, then explain how this will be taken care of.

- Yes

Available storage and backup capacity far exceeds my needs.

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

All research data will be secured through need for login, registration on datacenter, and use of KU Leuven u number and password. Physical data and laboratory books are stored under badge-dependant electronic access control.

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

Long-term data storage and costs will be managed by the project principal investigator, Prof. Dr. Paul Proost.
Costs for data storage are 520EUR/y/TB.

4. Data preservation after the end of the research project

Which data will be retained for at least five 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 electronic data will be preserved for 10 years, according to KU Leuven RDM project.
Physical samples will be store until eventual use for further experiments.

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

The data will be stored redundantly on PC, external hard drives, and KU Leuven data centers.

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

Long-term data storage and costs will be managed by the project principal investigator, Prof. Dr. Paul Proost.
Costs for data storage are 520EUR/y/TB.

5. Data sharing and reuse

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

- Yes, in a restricted access repository (after approval, institutional access only, …)

Available data will strictly include data which is no longer subject to potential IP protection.

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

Access by external users will be evaluated and authorized by Prof. Dr. Paul Proost.

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 in the comment section per dataset or data type where appropriate.

- Yes, Privacy aspects
- Yes, Intellectual Property Rights

Patient samples are pseudonymized. Personal data will only be made available by the treating physician, upon prior approval by the ethical committee.
All obtained data will be checked for potential IP protection before sharing.

Where will the data be made available? If already known, please provide a repository per dataset or data type.

KU Leuven Research Data Repository

When will the data be made available?

Upon protection of IP and publication of research results.

Which data usage licenses are you going to provide? If none, please explain why.

Data transfer agreement (restricted data).

Do you intend to add a PID/DOI/accession number to your dataset(s)? If already available, you have the option to provide it in the comment section.

- Yes

DOI will be used for publications.

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

Cost for transfer of animal or patient material (only after ethical approval) will be covered by the researcher requesting the material. Cost is dependant on transport needs.
Data transfer to partners will be at partner cost.

6. Responsibilities

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

I will personally manage data documentation and metadata.

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

I will personally manage data storage and backup. Automatic backup is also performed.

Who will manage data preservation and sharing?

The project coordinator Prof. Dr. Paul Proost and research expert Dr. Mieke Gouwy.

Who will update and implement this DMP?

Fabio Beretta, Paul Proost, Mieke Gouwy.