MODELLING INTERACTIONS IN ANTIBIOTIC RESISTANCE BETWEEN FOOD PATHOGENS AND GUT MICROBIOTA

A Data Management Plan created using DMPonline.be

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Project abstract:

Antibiotics are an essential part in the protection of risk groups against foodborne pathogens. Meanwhile, antibiotic resistance development is ever increasing. A specific form of antibiotic resistance occurs when bacteria benefit from the properties of competitors in their environment to obtain resistance. This type of resistance is less frequently studied and the underlying mechanisms are often neglected. Therefore, a better understanding of polybacterial antibiotic responses in the
human gut is required to develop antibiotic treatments that are better tailored to the real environment of the target pathogens. This project aims to obtain insight into the interactions in the
kinetics of antibiotic responses between food pathogens and gut microbiota by using a combined experimental and modelling approach. This objective will be achieved through three work packages (WP) in which mathematical models are constructed to obtain insight into these interactions. In the first WP, the individual antibiotic responses of monocultures will be modelled. These models will be extended in the second WP by including pairwise interactions between strains. The final WP will investigate the impact of increased antibiotic resistance of a strain on these pairwise interactions. The project results will contribute to understanding resistance mechanisms and therefore to better develop antibiotic strategies.

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FWO DMP (Flemish Standard DMP)

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.

				Only for digital data	Only for digital data	Only for digital data	Only for physical data
Dataset Name	Description	New or reused	Digital or Physical	Digital Data Type	Digital Data format	Digital data volume (MB/GB/TB)	Physical volume
		Please choose from the following options: • Generate new data • Reuse existing data	*Please choose from the following options:* • Digital • Physical	*Please choose from the following options:* • Observational • Experimental • Compiled/aggregated data • Simulation data • Software • Other • NA	*Please choose from the following options:* • .por, .xml, .tab, .cvs,.pdf, .txt, .rtf, .dwg, .gml, … • NA	*Please choose from the following options:* • <100MB • <1GB • <100GB • <1TB • <5TB • <10TB • <50TB • >50TB • NA	
Cell density	Microbial cell density as a function of time, quantified through viable plate counts	New	Digital	Experimental	.xlsx	< 100 MB	/
Antimicrobial concentrations	HPLC and/or GC data on the evolution of the concentration of antimicrobial substances	New	Digital	Experimental	.xlsx	< 100 MB	/
Models	Mathematical models constructed to describe the relationship between antimicrobial substances and microbial responses	New	Digital	Experimental	.m	< 1 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:

NA

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.

- No

NA

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.

- No

NA

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

The combined information of the three datatypes provides information on the interaction between bacteria in their antibiotic resistance. This information can be used to design new products or treatments.

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

NA

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

NA

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).

Each dataset will be accompanied with a file summarising how to interpret this type of data (.txt or .docx). Moreover, the datafiles themselves will be annotated with essential information (units for tabulated data in .xlsx files and comments on code in .m files).

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

Experimental protocols will be kept along with the data for a full description of the method that was used to obtain this data.

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

Where will the data be stored?

Data will be stored in a shared OneDrive folder.

How will the data be backed up?

Data will be automatically stored in the cloud through OneDrive.

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

2 TB of space is available on OneDrive. The total required space for the data of this project is limited (< 1 GB).

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

The OneDrive folder used for storing and sharing the data will only be shared internally with KU Leuven colleagues.

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

There are no costs of storing this data. The OneDrive storage is freely available.

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 data will be retained at least 5 years after the completion of this project.

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

In the same OneDrive folder as used during the project.

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

None. The data storage in OneDrive is free.

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, …)

All data that is published can be obtained through a request via email to the corresponding authors.

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

NA. All data will be made available upon request.

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.

- No

NA

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

NA

When will the data be made available?

The data will be available after being published in an international peer reviewed journal.

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

No license will be provided for the experimental data as this is not protected by copyright.
Software created to construct or simulate mathematical models that have been created within this project will be distributed under the Mozilla Public License 2.0.

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.

- No

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

None.

6. Responsibilities

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

Simen Akkermans

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

Simen Akkermans

Who will manage data preservation and sharing?

Jan Van Impe

Who will update and implement this DMP?

Simen Akkermans