PROJECT SERENE: Novel bioSEnsor for REal-time in vivo NEurotransmitter monitoring

A Data Management Plan created using DMPonline.be

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Project abstract:

Neurons in the brain communicate via complex electrochemical signalling processes involving release and reuptake of neurotransmitters. This electrochemical signalling enables vast neural networks to perform complex brain functions. Advances in silicon probe technology now allow us to monitor the electrical signalling within these complex networks with high spatial and temporal resolution. However, we currently lack the technology to study neurochemical signalling with equivalent precision, leaving us unable to fully understand neurotransmitter roles across a range of key neuroscience and psychology questions. The objectives of this project are: 1) to use nanotechnology in combination with enzymatic and aptamer biorecognition methods to develop an innovative biosensor that can monitor a range of neurotransmitters with high sensitivity and fast temporal resolution, and 2) to use this biosensor in various rodent models to provide new insights into the role of these neurotransmitters in (non)invasive neuromodulation, cognitive flexibility, and fear and avoidance behavior. This interdisciplinary effort will thus deliver a breakthrough technology for sensing neurotransmitters and use it to answer unresolved questions in the fields of neuroscience and psychology.

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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)* N	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	
	Microscopy data - biosensor development (WP1)	N	D	I	TIFF, JPG, PNG	<100GB	Project folder on Network storage at the Dept of Physics and Astronomy (fysad.fys.kuleuven.be/shares)
	Electrochemistry data (WP1)	N	D	N	TXT, ASCII	<100GB	Project folder on Network storage at the Dept of Physics and Astronomy (fysad.fys.kuleuven.be/shares)
	Analysis scripts and codes for fitting echem data, and statistical analysis (WP1)	N	D	SO	.m(at), .py(w), .r, .dll	<10GB	Project folder on Network storage at the Dept of Physics and Astronomy (fysad.fys.kuleuven.be/shares)
	Processed data (WP1)	N	D	I, N, T	.xlsx, .txt,.mat,	<100GB	Project folder on Network storage at the Dept of Physics and Astronomy (fysad.fys.kuleuven.be/shares) Project folder on L-drive (L:\GBW-0046_Myles_Mc_Laughlin\)
	Presentations, Protocols, reports (WP1,WP2&3)	N	D	T	.ppt, .docx, .pdf	<100GB	Project folder on Network storage at the Dept of Physics and Astronomy (fysad.fys.kuleuven.be/shares) Project folder on L-drive (L:\GBW-0046_Myles_Mc_Laughlin\)
	Metadata (WP1)	N	D	T	.txt/.docx	<1GB	Project folder on Network storage at the Dept of Physics and Astronomy (fysad.fys.kuleuven.be/shares
	Voltammetry data (WP2&3)	N	D	N	TXT,.mat	<10GB	Project folder on L-drive (L:\GBW-0046_Myles_Mc_Laughlin\)
	Electrophysiology data (WP2&3)	N	D	N	.dat, .mat	<1TB	Project folder on L-drive (L:\GBW-0046_Myles_Mc_Laughlin\)
	Microdialysis data (WP2&3)	N	D				
	Microscopy data (WP2&3)	N	D	I	TIFF, JPG, PNG	<100GB	Project folder on L-drive (L:\GBW-0046_Myles_Mc_Laughlin\)
	Behavior data	N	D	N,T	.docx, .xlsx,	<1GB	Project folder on L-drive (L:\GBW-0046_Myles_Mc_Laughlin\)

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)? If so, refer to

specific datasets or data types when appropriate and provide the relevant ethical approval number.

- Yes, animal data (Provide ECD reference number below)

For the rodent studies (WP2-3), ethical approval is requested from the KU Leuven Ethical Committee Animal Experimentation (ECD) before the start of the experiments.

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.

- Yes

A potential outcome of the project is to patent the novel biosensor and then license this to a company to commercialise. Microscopy data, electrochemical data, electrophysiology data, voltammetry data, microdialysis data and behavioral data all serve to validate the sensor and will be useful for the commericilazation process. Therefore, all relevant data will be preserved and made available for this.

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).

Data in WP1, WP2 and WP3 will be kept on a shared secured network drive of the relevant lab and will be uploaded and updated by a member of the research team every time a new experiment takes place or data is being generated.
The names of the files will be structured in a comprehensible way: Experiment type/date/main parameters used. In addition, data will be stored in a folder per experimental setup, the type of investigated sample and the acquision/generation date. The analysis files will contain notes describing the analysis procedure and mention which original data files are included. A readme file describing the goal of the experiment and the analysis procedure will be stored in the folder where the data is saved.

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.

- No

For data in all WPs: Metadata will be manually added in the experiment folders and files to label the experimental data, acquisition protocol and context within the project.

Data Storage & Back-up during the Research Project

Where will the data be stored?

- OneDrive (KU Leuven)
- ManGO
- Large Volume Storage
- Sharepoint online
- Shared network drive (J-drive)

WP1: Time-stamped copies of the data will be kept on personal secured KU Leuven onedrive by individual users collecting the data and on shared network drive at the Dept of Physics and Astronomy.
WP2&3: Time-stamped copies of the data will be kept on personal secured KU Leuven onedrive by individual users collecting the data and on shared large volume storage network drive at the Dept of Neuroscience or Dept of Psychology.

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 KU Leuven shared network drives on which the data are stored have restircted access which will only be granted to lab members working on the project. For these lab member access is password protected.

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

Based on KU Leuven data storage costs the price is estimated to be around 1500 euros for the project duration. This will be covered by the project budget.

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)?

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

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

Each of the three participating labs will share the cost of data preservation for 10 years after the project ends.

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 open data

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

N/A

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.

- Yes, a PID will be added upon deposit in a data repository

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

The costs of data sharing are estimated to be 500 euros. These will be covered by the project budget

Responsibilities

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

WP1 biosensor data/metadata documentation will be managed by C. Bartic. PhD researchers and Postdocs in the research team generating the data are responsible for the appropriate collection, treatment and storage. They ensure that appropriate metadata is included. WP2 and 3data/metadata documentation will be managed by Prof Mc Laughlin and Prof Rudi D'hooge. Researchers and Postdocs in the research team generating the data are responsible for the appropriate collection, treatment and storage. They ensure that appropriate metadata is included.

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

WP1 biosensor data storage and back-up will be managed by C. Bartic with the support of the ICT team at the Dept. Of Physics and Astronomy. WP2 and 3 data storage and back-up will be managed by Prof Mc Laughlin and Prof D'hooge with the support of the ICT team at the Dept. Neuroscience and Psychology.

Who will manage data preservation and sharing?

As lead PI, Myles Mc Laughlin, will manage data preservation and sharing

Who will update and implement this DMP?

As lead PI, Myles Mc Laughlin, will update and implement the DMP