
The importance of spatiotemporal control of GSK-3 β for neuronal development, function and maintenance

A Data Management Plan created using DMPonline

Creator: Ines Hahn

Affiliation: University of Manchester

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ORCID iD: 0000-0001-7703-8160

Project abstract:

GSK-3 β is a key player during the formation and maintenance of neurons and their axonal projections, providing a promising therapeutic drug target for neurode- or regeneration, i.e. two medical conditions of high societal importance. However, trials with global GSK-3 β inhibition have failed so far, crying out for more refined approaches. To this end, I will study (a) where and when GSK-3 β is active in developing and mature neurons, and (b) how such specific GSK-3 β activity patterns regulate the cytoskeletal dynamics that drive neuronal morphogenesis. I will 1) pioneer FRET-based GSK-3 β activity sensor development to study the specific GSK-3 β activity patterns in neurons. 2) develop unprecedented light-switchable GSK-3 β variants for the focussed manipulation of GSK-3 β to study the functional relevance of activity patterns. 3) unravel how specific GSK-3 β patterns orchestrate microtubule regulators to drive morphogenetic change. 4) establish whether mechanisms from 1-3 (efficiently worked out in *Drosophila* neurons) are conserved in mouse. Gaining this refined understanding of GSK-3 β will provide the foundations for improved therapeutic strategies. Furthermore, the generated tools will have important applications in many areas including cancer, inflammation, cardiovascular and diabetes research.

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Manchester Data Management Outline

1. Will this project be reviewed by any of the following bodies (please select all that apply)?

- Funder

2. Is The University of Manchester collaborating with other institutions on this project?

- Yes - Part of a collaboration and owning or handling data

3. What data will you use in this project (please select all that apply)?

- Acquire new data

4. Where will the data be stored and backed-up during the project lifetime?

- University of Manchester Research Data Storage Service (Isilon)

5. If you will be using Research Data Storage, how much storage will you require?

- > 8 TB

6. Are you going to be working with a 3rd party data provider?

- No

7. How long do you intend to keep your data for after the end of your project (in years)?

- 11 - 20 years

Questions about personal information

Personal information, also known as personal data, relates to identifiable living individuals. Special category personal data is more sensitive information such as medical records, ethnic background, religious beliefs, political opinions, sexual orientation and criminal convictions or offences information. If you are not using personal data then you can skip the rest of this section.

Please note that in line with [data protection law](#) (the General Data Protection Regulation and Data Protection Act 2018), personal information should only be stored in an identifiable form for as long as is necessary for the project; it should be pseudonymised (partially de-identified) and/or anonymised (completely de-identified) as soon as practically possible. You must obtain the appropriate [ethical approval](#) in order to use identifiable personal data.

8. What type of personal information will you be processing (please select all that apply)?

- No sensitive or personal data

9. How do you plan to store, protect and ensure confidentiality of the participants' information (please select all that apply)?

- Not applicable

10. If you are storing personal information (including contact details) will you need to keep it beyond the end of the project?

- Not applicable

11. Will the participants' information (personal and/or sensitive) be shared with or accessed by anyone outside of the University of Manchester?

- Not applicable

12. If you will be sharing personal information outside of the University of Manchester will the individual or organisation you are sharing with be outside the EEA?

- Not applicable

13. Are you planning to use the personal information for future purposes such as research?

- No

14. Who will act as the data custodian or information asset owner for this study?

Ines Hahn

15. Please provide the date on which this plan was last reviewed (dd/mm/yyyy).

2021-02-18

0. Proposal name

0. Enter the proposal name

The importance of spatiotemporal control of GSK-3 β for neuronal development, function and maintenance

1. Description of the data

1.1 Type of study

(Sub)Cellular/tissue and organismal study in Drosophila and mouse primary neurons upon manipulation of the GSK-3 β signalling pathway.

1.2 Types of data

Data will be acquired via DNA sequencing (i.e. sequences of GSK-3 β biosensors, allosteric switch GSK-3 β , genetic tools, GSK-3 β targets), Western Blotting, high-throughput mass spectrometry and image acquisition (images and movies) from fly and mouse tissues. Data and meta-data will also be generated during their quantitative and qualitative analysis, the establishment of protocols and for the description of newly generated Drosophila fly lines and peptide antibodies. Standard file formats will be used to ensure re-use by other researchers and curation for future research.

1.3 Format and scale of the data

Sequencing data will be stored in the sequencing provider's file formats (.seq, .fasta, .txt). Western Blot data will be stored in the detection system's file original file formats (.tiff, .db, .scn; Licor Image Studio & BioRad ImageLab software) or X-ray blots scanned as tif files. Original blots will be kept. Mass spec data will be stored in the original data format (as provided by e.g. MaxQuant, Proteome Discoverer, Scaffold, PhosphoRS softwares) with accompanying meta-data. Imaging data will be stored in the microscope manufacturer's generic format (softwares: Leica Metamorph, Zeiss Zen, MicroManager, 3i Slidebook) as well as in .tiff and .h5/.n5 files for data analysis. These formats allow long-term analysis, validation, data-reusage and data sharing when required. For data analysis and presentation, some data will be stored as tab-delimited text files, excel files and GraphPad/SPSS files.

2. Data collection / generation

2.1 Methodologies for data collection / generation

DNA and mass spec sequencing and analysis data will be generated by the UoM sequencing facility and will be handled by experienced in-house staff. They will routinely record detailed protocols and relevant standards and parameters. Western Blot data will be collected via Digital (and where needed Xray) imagers maintained and supervised by the UoM core research facility and will follow standardised procedures. Imaging data will be acquired at microscopes in the Manchester Bioimaging Facility under guidance of its experienced staff.

Where necessary, data will be generated at collaborators facilities under the highest standards following the same principles.

2.2 Data quality and standards

Quality of data will be ensured through use of standardised and optimised experimental methods and use of quantitative measures for outcomes wherever available.

The Faculty sequencing & mass spec facility routinely quality control samples before sequencing and automatically check sequencing/ms quality and technical artifacts of output data. Equipment used in the FBMH core research facilities are routinely maintained and calibrated. Biological replicates will be used throughout.

3. Data management, documentation and curation

3.1 Managing, storing and curating data

All data will be backed up and documented immediately after generation at the UoM's Research Data Storage Service (RDSS), which provides robust, managed, secure, replicated storage. The RDSS allows researchers to store and manage their data, as well as preserve data after project completion.

3.2 Metadata standards and data documentation

Research data will be described in lab books, CSV files and R codes. Methods used to generate all data will be described in procedures. They will refer to published information relating to the research. Metadata will provide information about data such as sample sources and collection, control measures; procedures and experimental platforms used; file formats and types; documented analyses and results.

3.3 Data preservation strategy and standards

Data will be stored in the RDSS as described above. Mass spec data will be made publicly available after journal publication where applicable. Given the expected large volume of imaging and mass spec data to be generated by this project, an additional 3Tb of space on the RDSS system, in addition to the standard 8Tb, have been requested for the duration of the project.

4. Data security and confidentiality of potentially disclosive information

4.1 Formal information/data security standards

University of Manchester Information Security Policy (<http://documents.manchester.ac.uk/display.aspx?DocID=6525>) aims to protect information through controls and responsibilities which are in line with recognized information security standards and which support compliance with relevant legislation.

4.2 Main risks to data security

By using RDSS I am removing the risk of data loss as this is a secure service that backs up my data daily. Whenever data transfer from other labs will be needed I will use securely encrypted file transfer protocols.

5. Data sharing and access

5.1 Suitability for sharing

As our data will be highly beneficial to the wider scientific community and do not contain any personal data they are suitable for sharing. I will work with Research Data Management Services as appropriate to ensure that data and metadata from this project is captured, stored and made accessible for re-use by others.

5.2 Discovery by potential users of the research/innovation data

Where applicable, the data will be made available e.g. through links in papers. Published data will be placed into public domain using my website and online databases (e.g. <http://zenodo.org/>). Published outputs will be assigned a Digital Object Identifier – which can be used to reference the data in publications. Open access data will be made available through the community repository google scholar and publications will be linked to author ORCID numbers. The personal website will be modified to include ready access to publications.

The Manchester Bioimaging Facility has extensive experience of systematically archiving large quantities of image data with appropriate metadata. This will enable reuse and timely public access to both raw data and principal results by using the Open Microscopy Environment (OME, <http://openmicroscopy.org>) and its OMERO software using the OME data model standard.

I am committed to timely release all relevant data, no later than its associated publication.

5.3 Governance of access

Data will be made publicly available and will not require managed access.

5.4 The study team's exclusive use of the data

My general policy is to release wet-lab data presented in the paper in supplementary data files. In specific cases, where data may be held back to gain appropriate intellectual property protection, this will be released as soon as patents / or high-profile publications are complete. In extreme cases this may require partial release of data or release over time.

5.5 Restrictions or delays to sharing, with planned actions to limit such restrictions

As discussed above.

5.6 Regulation of responsibilities of users

There will be no external users bound by data sharing agreements.

6. Responsibilities

6. Responsibilities

Only the PI and their team will be responsible.

7. Relevant policies

7. Relevant institutional, departmental or study policies on data sharing and data security

<u>Policy</u>	<u>URL or Reference</u>
<u>Data Management Policy & Procedures</u>	http://documents.manchester.ac.uk/display.aspx?DocID=14914
<u>Data Security Policy</u>	http://documents.manchester.ac.uk/display.aspx?DocID=6525
<u>Data Sharing Policy</u>	http://documents.manchester.ac.uk/display.aspx?DocID=14916
<u>Institutional Information Policy</u>	http://documents.manchester.ac.uk/display.aspx?DocID=14915
<u>Other</u>	
<u>Other</u>	

8. Author and contact details

8. Author of this Data Management Plan (Name) and, if different to that of the Principal Investigator, their telephone & email contact details

Ines Hahn