

Plan Overview

A Data Management Plan created using HKUL DMPTool

Title: Deciphering the role of Nidogen-1 in breast cancer tumorigenesis and metastasis

Creator: Wei yi Ooi

Affiliation: The University of Hong Kong

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Project abstract:

Nidogen-1, 140kDa extracellular matrix glycoprotein, serves as a key component that plays a crucial role in the maintenance of structural integrity and organization of the basement membrane. Also referred to as entactins, nidogens are part of the Nidogen family of proteins and play a vital role in preserving the overall architecture and homeostasis of the basement membrane in the extracellular matrix. Disruption of the basement membrane potentiates Epithelial Mesenchymal Transition (EMT), which is a critical process in cancer metastasis. Nidogen-1 is a core basement membrane (BM) protein that supports the ECM integrity, and that there is a strong association between BM proteins, EMT and cancer progression. Thus, it is essential to understand the role of Nidogen-1 in the breast tumour to clarify the mechanisms played by BM proteins in driving breast cancer development and metastasis. This is an essential piece of knowledge gap as Nidogen-1 remains largely unexplored in breast cancer. Additionally, recent findings indicate that cancer cells within the primary tumour release extracellular vesicles (EVs) that are capable of travelling through blood circulation to educate distant sites prior to metastasising, priming the microenvironment in the secondary site to support tumour growth and survival. Our goal is to elucidate the function of Nidogen-1 in EVs derived from breast cancer cells, bridging the gap between BM proteins and metastatic process of breast cancer through the EVs.

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Deciphering the role of Nidogen-1 in breast cancer tumorigenesis and metastasis

Data Collection

What data will you collect or create?

Bioinformatics Data:

Genomic and Proteomic Databases: Utilize publicly available databases (e.g., TCGA, GEO) to gather data on Nidogen-1 expression in breast cancer patients.

Experimental Data:

Cell Line Studies: Data from experiments using breast cancer cell lines with overexpressed and low level of Nidogen-1

Types of data: Proliferation rates, migration and invasion assays.

Animal Models: Data from in vivo studies using mouse models to assess tumor growth and metastasis. Types of data: Tumor size measurements, metastasis quantification

Molecular Data:

Gene Expression Profiles: Data obtained from techniques such as qPCR to evaluate the expression of Nidogen-1 and in breast cancer cell lines.

Protein Expression: Data from Western blotting to assess Nidogen-1 protein levels in breast cancer cell lines samples

How will the data be collected or created?

Data be collected through conducting in vitro cell culture and experiments in vivo mice model studies

Documentation and Metadata

What documentation and metadata will accompany the data?

Validation Data

In Vitro/In Vivo Assays:

Functional assays (e.g., migration, proliferation, tumor growth curves).

Statistical Analysis:

Software/tools that will be used (Prism, ImageJ).

Thresholds for significance (p-value, effect size).

Raw data files (Excel, .csv)

Ethics and Legal Compliance

How will you manage any ethical issues?

All mouse experiments are adhering to CULATR rules from HKU.

Use humane endpoints when conducting mice studies

How will you manage copyright and Intellectual Property Rights (IP/IPR) issues?

I will maintain a dated, witnessed hardcopy lab book to document all details of experiments and belongs to HKU.

Storage and Backup

How will the data be stored and backed up during the research? i. e. until stored in the final location (e.g. on your password protected laptop)?

All my data will be stored in password-protected laptop/desktop and use HKU Institutional network drive, and Cloud storage OneDrive/Google Drive with 2FA).

How will you manage access and security?

Lab computers/devices are password-protected

Selection and Preservation

Which data are of long-term value and should be retained, shared, and/or preserved?

The raw data of all experiments are considered long-term.

What is the long-term preservation plan for the dataset?

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Data Sharing

How will you share the data?

Data will only be kept inside the lab and within lab members, and should not be disclosed to members outside of lab.

Are any restrictions on data sharing? If yes, Why?

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Responsibilities and Resources

Who will be responsible for data management?

Primary supervisor and myself.

What resources will you require to deliver your plan?

human breast cancer cell lines

Authentication services (STR profiling) and mycoplasma testing kits.

Gene Editing/Modulation eg shRNA for gene X knockdown

Vectors for overexpression.

Ultracentrifuge + rotors (for EV pelleting) or commercial kits (e.g., ExoQuick, SEC columns).

Transmission Electron Microscopy for Nanoparticle tracking analysis (NTA)

Animal Model Resources

Immunocompromised mice
