

Research Trip Summary Report

Task 2. Foreign mobility of WUST doctoral students

I. Data of the doctoral student

1. Full name: Natalia Pudelko-Malik
2. Year of studies: II year
3. Educational discipline: Chemical sciences

II. Foreign research trip (research visit)

1. Research institute in which the foreign research was implemented: University of Texas Southwestern Medical Center, Center for Human Nutrition and Department of Pharmacology
2. Name and surname of the host person (mentor): Dr. Shawn C. Burgess
3. Dates of the research trip: 1.06.2022 - 31.08.2022
4. Title and date of a seminar delivered during the research trip: Brain glycogen metabolism in the context of astrocyte and neurons cooperation and memory formation, 25.08.2022, 45 min presentation, and 15 min discussion led by speaker.
5. Description of work carried out during the research trip:

I successfully completed my 3 month internship supported by NAWA STER Program Internationalization of Wrocław University of Science and Technology Doctoral School. During my stay at UT Southwestern Medical Center in Dallas, I conducted research in two projects.

The main project focused on nervous cell metabolism in response to modification of glycogen content and inhibition of glycogenolysis in different nervous cell systems. The experiments were carried out using primary cultures of neurons and astrocytes isolated from mouse hippocampus. Each of these cell types was incubated with different concentration of glucose, with or without BAY U6751 (inhibitor of glycogen phosphorylase). Glucose in media should stimulate glycogen accumulation and metabolism in cells, while BAY U6751 is an inhibitor of glycogen phosphorylase (PYG – glycogen phosphorylase) that impairs glycogenolysis. Target quantitative metabolomics based on Gas-Chromatography Mass Spectrometry (GC-MS) was used to determine the influence of media glucose concentration and BAY action on the concentration of tricarboxylic acid cycle (TCA) intermediates in cells. Due to an unfortunate event, sample shipping from Poland was delayed (10 days instead of 3) and a subset of experimental samples (media) was unsuitable for analysis.

For this reason, Ph.D. student was also involved in experiment carried out at UTSW. This secondary project focused on liver-specific acetyl-CoA carboxylase (ACC) deficient mice and the influence of autophagy on stimulation of anaplerosis oxidative metabolism. Student was involved in experimental design, sample collection and sample analysis. Importantly, the analysis of samples involved use of



target analysis of amino acids based on Liquid Chromatography Mass Spectrometry (LC-MS) – a technique which aligns with students research interests and fits the scope of ongoing PhD thesis.

6. Description of the main results obtained:

During this foreign research trip, the following results have been obtained:

- Quantitative (absolute concentration) analysis of the five major TCA cycle intermediates (citrate, α -ketoglutarate, malate, fumarate, succinate), as well as lactate and pyruvate in neurons and astrocytes cells culture.
- Statistical analyses, which allowed to observe significant change between astrocytes and neurons cell culture in response to different glucose concentrations and BAY applied.
- Target analyses based of twenty-one amino acids extracted for mouse liver, based on LC-MS measurements.

7. Future collaborations (if applicable):

This InterDocSchool Project was an outstanding opportunity to learn new metabolomics techniques as well as to obtain more detailed knowledge on how to conduct functional studies of metabolism. The results of this stay will improve students ability to use targeted metabolomics methods. Importantly, this stay was also a great starting point for potential future collaboration involving stable isotope tracer studies in nervous cell systems, and should result in future scholarship applications.

8. Title and date of a seminar presenting the results of the trip delivered at Wrocław University of Science and Technology after returning from the research trip: Brain glycogen metabolism in the context of astrocyte and neurons cooperation and memory formation, 23.09.2022

III. Doctoral student's signature

15.09.2022
(Date)

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(doctoral student's signature)



IV. Confirmation and information from the host

1. Confirmation of compliance of the information contained in the report: I CONFIRM / ~~DO NOT CONFIRM~~. (In justified cases, the confirmation of the host may be sent by e-mail to the Dean's Office of the Doctoral School email: interdocschool@pwr.edu.pl)

2. Additional information and comments

Natalia is an excellent student and trainee, and she was a wonderful addition to our lab during her visit. She displayed an exceptional passion and commitment to learn new science, and she made a substantive contribution to projects here in a very short time. She is an outstanding student representative of the Wrocław University of Science and Technology and her scientific mentor.

15.09.2022
(Date)

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(signature(s) of Host)

