Thesis Project Offer

Joint Research and Education Programme "Palestinian-German Science Bridge PGSB"
Forschungszentrum Jülich GmbH & Palestine Academy for Science and Technology

Thesis type*

☐ BSc	☒ MSc	☐ PhD	Intended starting date (approx.): July 2023

Contact details of supervisor/responsible host at Forschungszentrum Jülich

Title*	Degree	First name*	Surname*
Ms.	Dr.	Hebah	Fatafta

Phone*	E-mail*
+492461619477	h.fatafta@Fz-juelich.de

Function*	Institute and homepage of institute*
postdoctoral researcher	IBI-7: Structural Biochemistry https://www.fz-juelich.de/en/ibi/ibi-7

University affiliation in Germany*

Co-Supervisor at Palestinian university (if applicable)

Title	Degree	First name	Surname
Mr.	Prof.	Hilal	Zaid

Phone	E-mail
+970-4-2418888	Hilal.zaid@aaup.edu

University/institution	Department/faculty/institute
Arab American University, Palestine	Biochemistry, Faculty of Medicine (AAUP)

Project description*

Title: Molecular mechanisms controlling insulin signalling: Molecular, computational and bioinformatic approaches

Diabetes is a major worldwide health burden, characterized by elevated levels of blood sugar. Over the past decade, dozens of natural compounds with well known anti-diabetic characteristics were reported and tested *in vivo* and *in vitro*, with the hope of treating/curing diabetes. To the best of our knowledge, most of the research focus on testing the crude extract efficacy, identifying the extract chemical composition or separating the extract molecules by traditional chemical methods. In contrast, less attention has been paid to their effect on the insulin signaling pathway, and the translocation of glucose transporter-4 (GLUT4) to the plasma membrane. In this sense, we will focus on the molecular mechanism underlying the glucose uptake after treatment with phytochemical extracts.

In this project, we plan to combine state of the art biological, chemical, chemo- and bio-informatics tools, as well as molecular simulation approaches to study the plausible binding of the active phytochemicals to the 'hub' proteins in the insulin signaling cascade. The

knowledge gained may eventually help us reverse the defect in GLUT4 traffic that underlies insulin resistance accompanying Type 2 Diabetes. Moreover, the computational models that will be prepared and validated in this project can be applied to test the efficacy of other natural compounds in treating diabetes via the insulin signaling pathway.

The realization of this joint project will benefit from the expertise of its collaborators in manifesting the different work packages as explained. **Prof. Hilal Zaid**, from Arab American University, will identify phytochemicals that are anti-diabetic and relevant for the GLUT4 translocation to the plasma membrane in the insulin signaling pathway. Then both computational collaborators at Forschungszentrum Jülich, **Prof. Birgit Strodel** and **Dr. Hebah Fatafta**, will provide their expertise in computer-assisted drug discovery and molecular dynamics simulations systems to predict which protein dockings may increase GLUT4 translocation to the plasma membrane (PM). The identified protein bioinformatically will be validiated in wet lab at **Prof. Jörg Labhan**, Heinrich-Heine-Universität Düsseldorf, and Prof. Hilal Zaid lab. This will be further validated at **Prof. Siba Shanak** lab,from Arab American University, using tools from bioinformatics to verify the predicted protein dockings of phytochemical.

Date*	**Signature***
Jan 29th, 2023	Prof. Dr. Hilal Zaid Dr. Hebah Fatafta

* required field