Role of bacterial functional amyloids in type II diabetes and neurodegenerative diseases

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Abstract

The human gut microbiome is a complex microbial community consisting of a multitude of microbial species. Recent studies showed that its composition can be directly related to the occurrence of a range of diseases including amyloid related ones such as Parkinson's and Alzheimer's diseases or type II diabetes. Despite extensive research on this topic, details of this relationship remain elusive. One of the possible explanations for this phenomenon are interactions between microbial proteins and metabolites with host cells. In particular, amyloidogenic proteins produced by bacteria and fungi can shed light on this process. It is known that the onset of type II diabetes, Alzheimer's, and Parkinson's disease are closely linked to the pathological aggregation of proteins that form amyloid fibres. Interestingly, similar structures are produced by several microbial species to perform a wide range of vital functions from biofilm formation to molecular signalling. My hypothesis is that, since different amyloid species can speed up each other's aggregation, the presence of microbial amyloids in the gut can lead to enhanced aggregation of disease related proteins, therefore leading to the development of the disease.

In my presentation, I will discuss the progress of my research on this topic performed during my NAWA Ster internship in Dr Johannes Soeding's group at the Max Planck Institute for Multidisciplinary Sciences.

About the presenter

I received a Master's degree in Bioinformatics at Wrocław University of Science and Technology. Currently, I'm a PhD student in the group of Professor Małgorzata Kotulska. From 07.2016 to 09.2016 I was working on Monte Carlo simulations of adsorption in porous materials in the Laboratoire de Charles Coulomb, Universite de Montpellier. From 07.2017 to 09.2017 and then from 07.2018 to 09.2018 I realized a project regarding molecular dynamics simulations of peptides aggregation and their interactions with lipid membranes at the Laboratoire Structure et Réactivité des Systèmes Moléculaires Complexe, Universite de Lorraine. From 07.2019 to 15.09.2019 I was developing bioinformatics tools for metagenomic bins quality control at Max Planck Institute for Biophysical Chemistry. In

2022 I received a NAWA Ster grant for the project *Role of bacterial functional amyloids in type II diabetes and neurodegenerative diseases* in collaboration with Dr Johannes Soeding from the Max Planck Institute for Multidisciplinary Sciences.