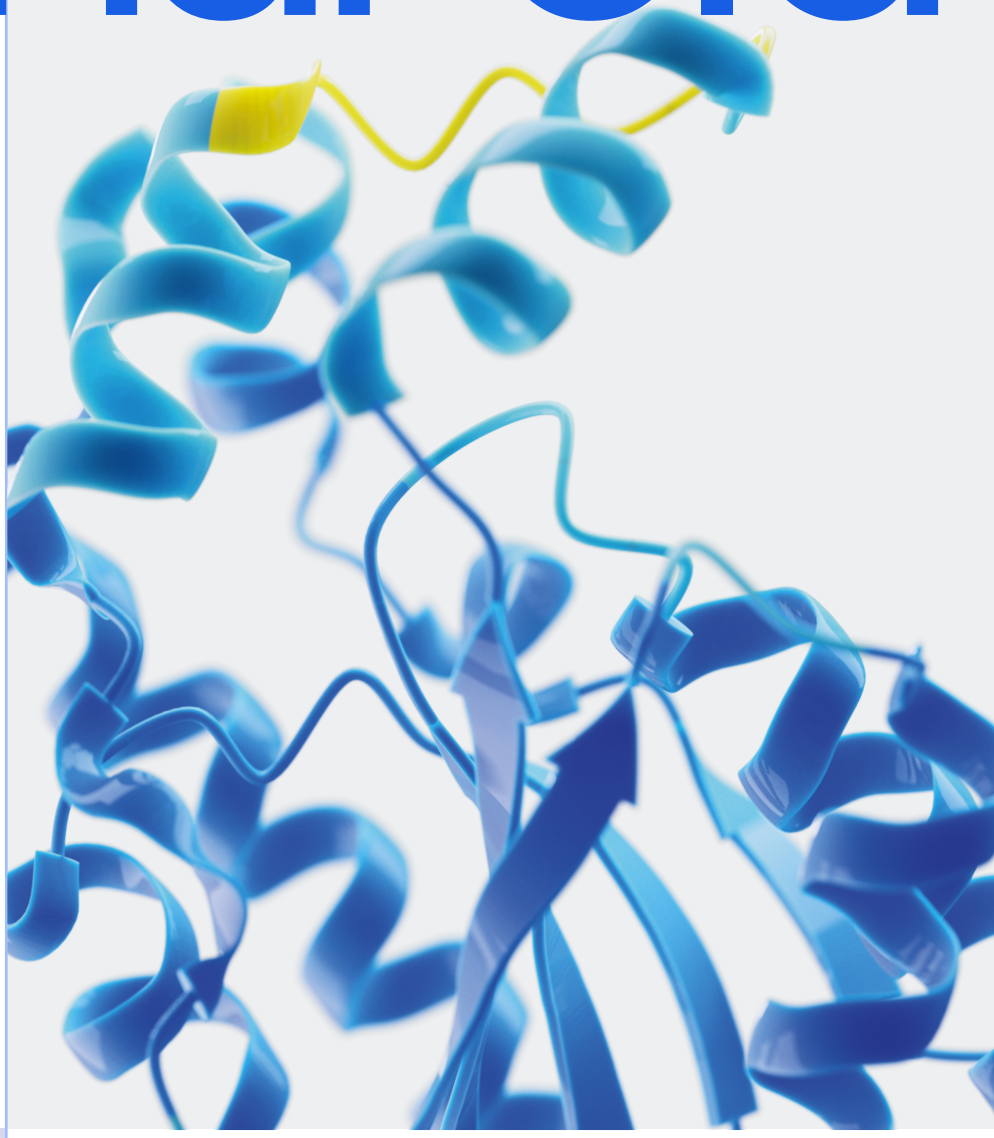
AlphaFold





AlphaFold supports Parkinson's research in Singapore

Google DeepMind

deepmind.google/alphafold



Behind the subtle tremors and stiffness caused by Parkinson's disease are a myriad of complex interactions and choreographies between neurons, cells and proteins. Understanding how they interplay and affect one another is key to helping the 10 million+ people around the world who are affected by this disease.

Dr. Jackwee Lim of A*STAR Singapore Immunology Network and Assistant Professor Dr. Yinxia Chao of the National Neuroscience Institute (NNI) have been collaborating to investigate the cells and proteins at the root of human diseases like cancer and Parkinson's. Core to their study is the adoption of cutting edge technologies, including Google DeepMind's AlphaFold.

The quest for missing pieces

Dr. Chao's latest study features an immunology emphasis in Parkinson's disease. At the heart of the study is the STIP1 protein, or the Stress-Induced Phosphoprotein 1, where STIP-1 specific autoantibodies are found elevated in a subset of Parkinson's disease patients.

It is essential to understand exactly how STIP1 and the autoantibodies interplay in contracting diseases and the factors that determine whether someone gets one disease over another. Dr. Chao and Dr. Lim's team knew that understanding both the STIP1 protein and the B cell biology would be key to furthering their research on Parkinson's disease.





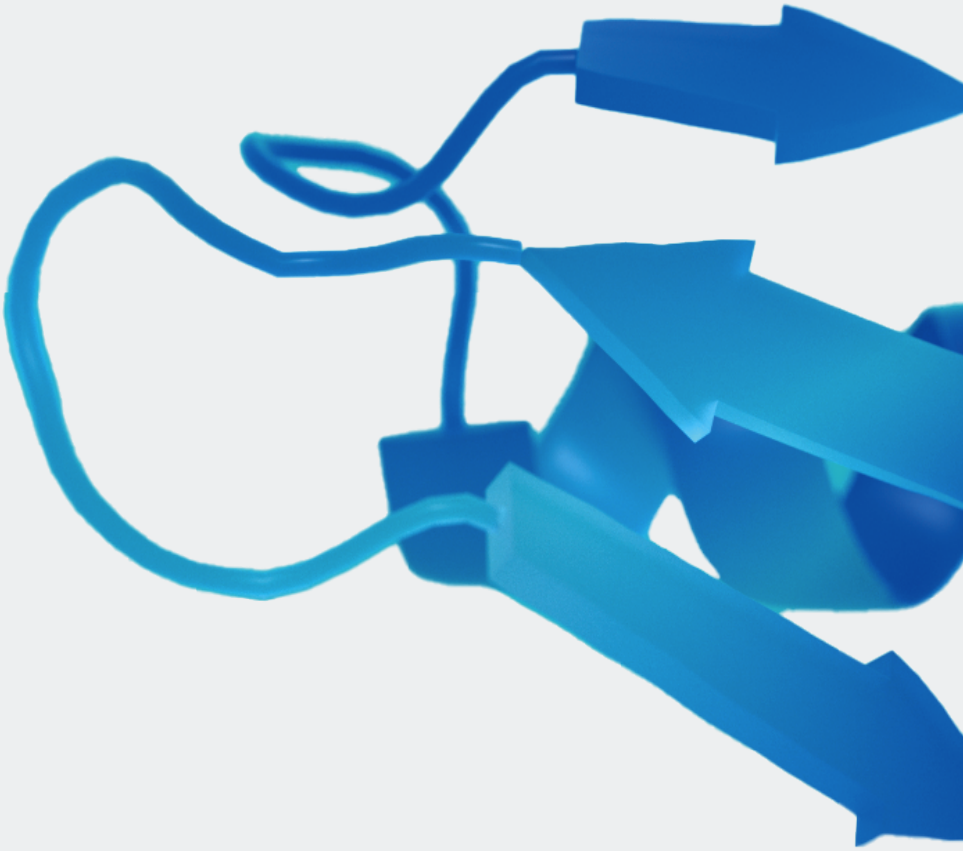
Inquiries into STIP1 have long evaded even the most sophisticated laboratories. Because the protein is dynamic and microscopic, traditional lab microscopes have only provided fragments of the protein despite years of effort — until AI-based modelling methods were introduced to complement experimental work.

AlphaFold unveils the STIP1's missing links

As an early adopter of computational approaches in the field of structural biology, Dr. Lim decided to apply AI-based structure prediction tools like AlphaFold to help model the STIP1 protein into three dimensions.

AlphaFold not only mapped the missing regions, it also indicated the spatial arrangement of different parts of the STIP1. This provided high-resolution insight into the STIP1 protein as a whole and not in parts. Dr. Lim says, "Knowing what the protein looks like means we can start piecing information together and understanding how the STIP1 functions in the body. Knowing where these parts are located enables us to pinpoint where the autoantibodies are attacking the protein, disrupting normal activity and potentially leading to new intervention strategies."

L: Dr. Yinxia Chao; R: Dr. Jackwee Lim



Findings like these are critical stepping stones towards the early detection, diagnosis and, hopefully, a cure for Parkinson's one day. "The moment scientists uncover precisely how autoantibodies disrupt a protein's normal function marks the beginning of identifying and confidently applying new strategies to inhibit, slow or even restore normal protein and cellular behaviours. That discovery would be a real game changer," says Dr. Lim.

In pursuit of better tools for biomedical research

As more technologies and tools become accessible, researchers need to stay ahead of the curve and at the forefront of their fields.

Embracing AI-computational tools like AlphaFold can help speed up certain aspects of research. Accurate AlphaFold-created 3D models are enabling scientists—even those with no background in structural biology—to perform a range of experiments guided by high-resolution protein models.

"AI-based tools such as AlphaFold offer an intuitive interface and require very little coding experience to run, making it accessible and impactful for research," Dr. Lim shares. "It is one of several computational tools that can generate realistic 3D models based on public datasets. As the field evolves, such models could generate novel synthetic proteins that emulate natural ones. This may lead to better quality proteins, such as those that can successfully bind to target molecules, furthering the future of biomedical studies."