

Protein discovery may bolster antibiotic development

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Biochemistry professor Zongchao Jia's lab has discovered the 3-D structure of an elusive bacterial enzyme. Courtesy: Queens University

A team of scientists from Queen's University has discovered the first ever three-dimensional structure of a protein family that may help in developing more effective antibiotics.

Led by Biochemistry professor Zongchao Jia, an expert in protein crystallography, the team's focus is on an enzyme called tyrosine kinase derived from bacteria. "For years, bacteria were thought to have less sophisticated signaling systems than those found in mammals," says Dr. Jia, Canada Research Chair in Structural Biology. "But now we know that isn't true."

The findings are published in the prestigious journal, EMBO J, and are featured as an Editors' Choice in the current edition of Science. Also on the team from the Queen's Biochemistry Department are Daniel Lee and Jimin Zheng, and Dr. Yi-Min She from the Chemistry Department.

The Queen's team created a crystal that provided the first glimpse of the elusive kinase structure. This is considered a milestone as the bacterial enzyme shows a completely different structure from kinases found in mammals.

Kinases are enzymes responsible for regulating or controlling a protein's function, most often acting as a switch signal between "on" and "off". By adding the appropriate amount of phosphate to its own protein "tail" this particular enzyme will turn on. Using the same strategy, the enzyme regulates the assembly of the protective bacterial capsule, which also contributes to antibiotic resistance.

Finding the crystal that would explain this process proved to be a considerable challenge, the researchers acknowledge. A laboratory at the University of Michigan, pursuing the same crystal, sent a letter of congratulations when they learned the Queen's lab had succeeded first. "That doesn't always happen in our competitive world!" says Dr. Jia with a laugh.

Source: Queens University

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