Finding E. coli's Achilles heel

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(PhysOrg.com) -- Thanks to the work of a Simon Fraser University researcher and two of his students, science is closer to finding a new way of combatting infections caused by Escherichia coli (E. coli) and other related bacteria.

E. coli bacteria are found naturally in human intestines and perform some important digestive duties. But a potentially deadly version is commonly found in spoiled or rotten food and attacks the human digestive system, causing food poisoning.

SFU molecular biology and biochemistry (MBB) associate professor Mark Paetzel and his students Kelly Kim and Suraaj Aulakh have discovered how two proteins bind together in the outer membrane of E. coli.

The Journal of Biological Chemistry has just published their findings on-line in the paper Crystal structure of the β-barrel assembly machinery BamCD complex.

Like many disease-causing forms of bacteria, E. coli bacteria are becoming increasingly resistant to conventional antibiotics. However, Paetzel, Kim (doctoral candidate) and Aulakh (master's candidate) believe E. coli's dependence on a factory-like machine in its outer membrane to keep it alive provides science with an untapped Achilles heel.

The trio has discovered how two proteins (BamC and BamD) in E. coli's

outer membrane bind together to help form what is known as the β-barrel assembly machinery (BAM) complex.

Once up and running the complex ensures proper formation of proteins in the outer membrane, which serves as a protective barrier for E. coli. These outer membrane proteins can function as foot soldiers that ensure E. coli's survival by helping it to penetrate and attack its hosts, fight antibiotics and accomplish other tasks.

If Paetzel and his team isolate how the BAM complex's other proteins bind together and collectively kick start the complex's protein-assembly-mechanism they'll have cornered E. coli's Achilles heel.

"Being able to see and understand how this happens would enable us to design inhibitors to stymie the complex's formation and startup," adds Kim.

Says Aulakh: "It would be like watching a molecular movie in real time and designing a monkey wrench, effectively a new form of antibiotics, to shut down or cripple the complex before it starts functioning."

The researchers hope the BAM complex could be a potential new drug target to help fight many diseases, such as meningitis and gonorrhea, which are also caused by BAM-containing bacteria.

Provided by Simon Fraser University