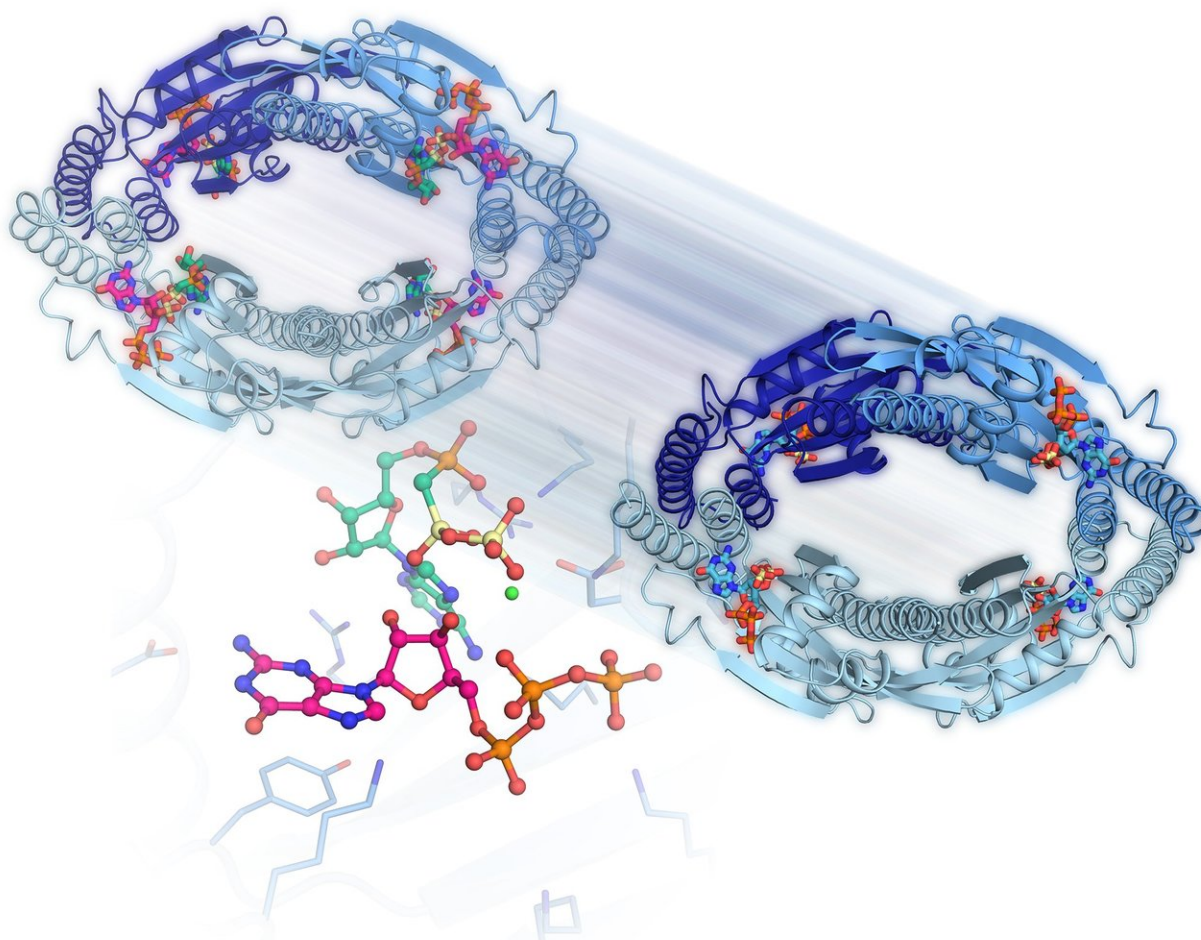


Researchers reveal how the MRSA bacterium handles stress

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An international team of researchers has revealed a fundamental mechanism responsible for handling stress in staphylococci when they are exposed to antibiotics. Credit: Ditlev E. Brodersen

An international team of researchers has revealed a fundamental mechanism responsible for handling stress in staphylococci when they are exposed to antibiotics. It is expected that the research results can eventually be used to develop new antibiotics that circumvent such stress mechanisms.

Understanding bacterial stress mechanisms is of great importance for treating bacterial infections, as these mechanisms often allow bacteria to survive [antibiotic treatment](#). A group of researchers at the Department of Molecular Biology and Genetics at Aarhus University has now (in collaboration with researchers at the University of Copenhagen, Umeå University in Sweden, and Tartu University in Estonia) determined a fundamental mechanism by which the staphylococci bacteria, which are responsible for MRSA, handle stress when exposed to antibiotics.

The new research results, just published in the U.S. *Journal of Biological Chemistry*, show how the bacteria produce a particular enzyme capable of modifying some of the building blocks commonly used for DNA to turn them into molecules that signal stress. When the bacterial cells are exposed to antibiotics, large amounts of these [signal molecules](#) are formed, halting cell growth and inducing a state of hibernation in which the cells are not susceptible to [antibiotics](#), and are thus able to survive.

The researchers from Aarhus University, who have worked under the direction of Associate Professor Ditlev E. Brodersen, have used a refined experimental technique to establish accurate, three-dimensional models for the states of the enzyme just before and just after it has formed a signal molecule. The models, which are accurate down to the atomic level, reveal how the enzyme participates in the reaction that leads to the formation of the signal molecule. At the same time, the researchers revealed that four enzymes unite to form a circle inside the [bacterial cells](#), thus being able to communicate with each other. This feature may significantly increase the formation of signal substances

during antibiotic treatment, thus increasing the overall effect. It is expected that the [research results](#) will eventually be used to develop [new antibiotics](#) that circumvent stress mechanisms.

More information: Melek Cemre Manav et al, Structural basis for (p)ppGpp synthesis by the Staphylococcus aureus small alarmone synthetase RelP, *Journal of Biological Chemistry* (2018). [DOI: 10.1074/jbc.RA117.001374](#)

Provided by Aarhus University

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