Abstract - Human commensals producing a novel antibiotic impair pathogen colonization" by Dr Bernhard Krismer.

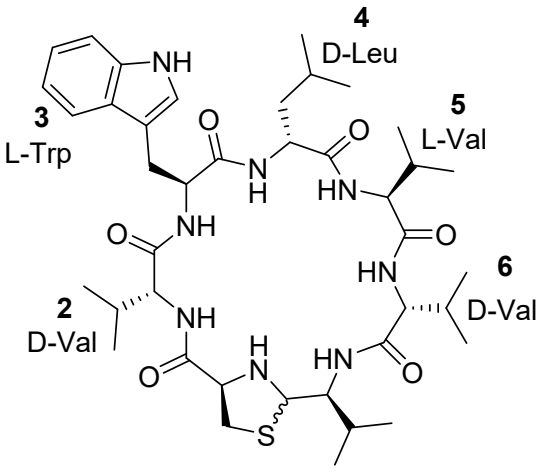
Worldwide, bacterial infections are among the most frequent diseases and according to the world health organization (WHO) among the most frequent causes of death. At present, most of these infections are still treatable by the treatment with antibiotics. Nevertheless, many experts assume that within the next decades the number of fatal casualties will significantly increase, because of the rise of antibiotic resistant pathogens and the concurrent decline in the development of new antibiotics.

Staphylococcus aureus belongs to the most frequent bacterial pathogens and especially methicillin-resistant strains (MRSA) represent a high risk for patients due to increased pathogenicity and reduced treatment options. At the same time, this bacterium colonizes asymptomatically the human nose, which is its preferred natural habitat. Carriers of *S. aureus* have a significantly enhanced risk to develop infections, because they are predominantly caused by their own nasal strain. To prevent such endogenous infections, patients at risk are treated with a nasal ointment containing the antibiotic mupirocin. Unfortunately, resistances against mupirocin are also increasing.

At their search for natural antagonists researchers from the University of Tuebingen as well as the German Center for Infection Research (DZIF) have discovered that *Staphylococcus lugdunensis*, which is closely related to *S. aureus* and is also living in the human nose, is able to produce a compound with killing capabilities against *S. aureus*. Their results have been published in the journal *Nature* in July 2016. The antibiotic, which has been designated lugdunin, showed strong killing potency against *S. aureus* in a murine skin infection model and against many more Gram-positive pathogens *in vitro*. The most remarkable feature of the novel cyclic heptapeptide lugdunin is a before unseen thiazolidine ring, which is also essential for its antibacterial activity. Due to this novel chemical composition, lugdunin represents the first member of a new class of antimicrobials. For this reason, nothing is known about how lugdunin exerts its activity against *S. aureus*. Nasal swabs of nearly 200 patients clearly showed that carriers of *S. lugdunensis* are almost never colonized by *S. aureus* and thereby have a significantly reduced risk to suffer an *S. aureus* infection. Meanwhile, this could be confirmed by a second, unpublished study including nearly 300 healthy volunteers.

"Typically, soil bacteria and fungi are the main producers of antibiotics", Professor Andreas Peschel from the Interfaculty Institute of Microbiology and Infection Medicine Tuebingen (IMIT) stated, who is primarily responsible for the study, together with his colleague Dr. Bernhard Krismer. "It is a completely new finding that also the human microbiota can be a source of antibiotics". Ongoing work will elucidate if lugdunin could in fact be a novel therapeutic molecule. A second approach will ascertain if the preventive application of harmless, lugdunin-producing bacteria might reduce the risk of MRSA infections in high-risk patients. Besides the work on lugdunin the search for new antibiotic producers within the human-associated microbiota will be continued.

Structure formula of lugdunin



Thiazolidine

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