The microbial war around us

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All around the globe rages a constant, to us invisible, war. A war between bacteria and viruses. This war has led to a constant development of different attack systems in the viruses, as well as defence systems in the bacteria. These bacterial defence systems are what most of the bacterial immune system consist of. By manipulating these systems and the machinery regulating them, scientists have been able to use these systems to help us in the development in medicine, genetics and agriculture.

Attack of the viruses

As for animals, viruses are one of the major threats for a bacterium. Viruses are extremely small beings that can attack and infect the bacterial cells and turn the cell into a zombie-bacterium. This virus turns off the bacterium's own will and the only purpose of the bacterium becomes to produce new viruses, that can infect more bacteria. This is certainly no pleasant experience for the bacterium and therefore it does everything in its power to prevent this from happening.

The bacterium strikes back – BREX

There are a lot of different ways for the bacterium to defend itself. It can try to shut the viruses out of the cell or prevent the viruses to even getting close to the cell. If the virus infects the bacterial cell it is however not without defences inside the cell either. The bacteria can mark out the infecting virus and then cut the virus into small harmless pieces. It can even save some of these pieces and use them as a template to identify the viruses if the bacterium is ever to be infected by the same sort of virus once more. The bacteria can also commit suicide to prevent itself from becoming a zombie, in order to save the surrounding bacterial cells from the fate itself have suffered.

By carefully studying bacteria infected by virus, scientists are sometimes able to discover new defence systems against viruses in the bacteria. One of these newly discovered systems is the BREX-system. The BREX-system seems to be a potent defence against a lot of different viruses. The BREX-system works by marking out the bacterium's own DNA but not the virus' and in that manner distinguish between the viral DNA and the bacterial DNA. The BREX-system then integrates with the processes that the virus uses to hijack the bacterial cell and stops it completely. This renders the virus helpless, unable to do anything to harm the bacterium or the cells nearby.

A new hope?

The newly discovered BREX-system may be one of many undiscovered defence systems in bacteria. By unravelling the machinery behind the BREX-system it may serve as a key in finding many novel processes in bacteria. Identifying and characterizing these processes as well as BREX may lead to developments in for example medicine or the food industry.

More information

Ljungberg M. 2016. Nyupptäckta försvarssystem mot fager – mekanismer, funktioner och

möjliga utvecklingar.