Slowing evolution to stop drug resistance

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Infectious organisms that become resistant to antibiotics are a serious threat to human society. They are also a natural part of evolution. In a new project, researchers at the University of Gothenburg are attempting to find substances that can slow the pace of evolution, in order to ensure that the drugs of today remain effective into the future.

The resistance of infectious organisms to antibiotics is particularly serious in drugs against fungi. Fungal cells are similar to human cells, which means that it is difficult to develop effective drugs that can destroy them without also damaging human cells, i.e. without causing side effects. We must therefore safeguard the effectiveness of the few antifungal drugs that are available today. Resistance to these would leave many diseases without effective treatment.

A natural phenomenon

However, drug resistance is a natural part of evolution. Evolution creates random variations in the characteristics of organisms, which results in some of them developing greater tolerance to drugs to which they are exposed. This leads eventually to completely resistant fungal strains, and the drug will become totally ineffective. The quicker these random variations appear, the greater the risk of resistance developing. One way of combating drug resistance is to slow down the pace of evolution.

Slowing down evolution

Researcher Jonas Warringer at the Department of Cell and Molecular

Biology is using advanced genetic experiments to try to find such "evolution-slowing" substances. In the first instance, this involves identifying the cell components that regulate the speed of evolution. Jonas Warringer and his colleagues are using ordinary brewer's yeast as a model for their studies. A yeast has 6,000 genes, and destroying single genes in otherwise identical organisms enables Jonas Warringer and his colleagues to use the method of exclusion.

Looking for gold dust

"We stimulate the evolution of the yeast cell and observe it in real time. As our yeasts develop resistance to a particular drug, we measure how the survivability of the different strains changes during the process. Evolution progresses more slowly in some strains when a specific component is destroyed. These strains are like gold dust to us, because they tell us that these particular components are critical to the speed of evolution," says Jonas Warringer.

"This is how we eventually found the genes that regulate evolution. If, in the next phase, we can find a substance that can attack one of these components, we will be able to delay the development of drug resistance and ensure that today's drugs remain effective into the future."

The research project is funded by the Magnus Bergwall Foundation and other benefactors. Jonas Warringer hopes that evolution-slowing drugs will become available within the next 10-15 years.

Source: University of Gothenburg (news : web)