

Micreos' Staphefekt is the world's first bacteria-killing enzyme for human use in MRSA

13-11-2014

The breakthrough achieved by Dutch bacterial specialist Micreos is the most promising development the sector has seen in decades, as the company has this week launched the first bacteria-killing enzyme for human use against MRSA. Micreos is not a pharma company, instead coming from a background in food safety, and takes a holistic approach to solving the problems posed by bacteria and phages across both healthcare and food services.

It is no exaggeration to say that the threat of multi-drug resistant bacteria is looming over the contemporary public health landscape like a dark cloud. Bacterial infections are becoming harder and harder to treat, and modern society is at risk of being set back to where we were 100 years ago, before the discovery and wide application of the range of antibiotics we have come to rely on.

Mark Offerhaus, chief executive of Micreos, in a telephone interview with The Pharma Letter, explains the rationale behind the company's approach: "At one time it was easy to give a broad spectrum of antibiotics, but now science is showing us that 99% of the bacteria on our skin and in our gut should be there and should be left alone. This is a very new insight." He cites the sharp increase in gut-related problems and skin conditions such as eczema. "It's not unlikely that this is a side effect and the collateral damage

of the overuse of antibiotics. We've wiped out the diversity of bacteria on our skin and in our gut."

PHAGES AND BACTERIA

Half of the bacteria that exist in the world are destroyed by phages every two days, and different phages kill different bacteria. This specificity is at the heart of the solution developed by Microeos. In the face of antibiotic resistance, phage technology presents the most promising solution in terms of preventing and treating infections.

A radical approach was needed. "We could reduce the use of antibiotics in the food chain," says Mr Offerhaus. "We could start looking in all kinds of new places, like the way penicillin was discovered by accident. But that's just more of the same, and bacteria have developed a working mechanism in the billions of years they've existed that allows them to mutate. This is a part of their metabolism, and all existing antibiotics use this metabolism so all variants will fall into the same trap," he says.

STAPHEFEKT SELECTIVELY KILLS MRSA

Microeos' Staphitekt is the first product to come to market that selectively kills *Staphylococcus aureus*, including MRSA, and is available for use on intact skin. It is an endolysin, an enzyme that rapidly kills the target bacteria, and an enzyme produced by phages, the natural enemy of bacteria.

What sets Staphitekt apart is bacterial species specificity, with the therapy targeting only the species that is unwanted and leaving the others alone. This will be particularly beneficial for those suffering from skin conditions with an infectious component, such as eczema, rosacea and acne, as there will now be a tool available to deal with the bacteria on the outside that are causing the condition, and leaving the beneficial dermatological bacteria

unharmful. It is believed to be highly unlikely that resistance will emerge against this approach, and is completely independent of antibiotic resistance as it works independently of the bacterial metabolism that harbors the resistance mechanism. It targets a region of the bacterial cell wall less susceptible to mutation.

CHALLENGES STILL REMAIN TO ENDOLYSINS

One challenge that still remains with StaphEkt is the fact that endolysins need to physically encounter the bacteria and if they don't meet then there will be no effect, though this is also a limitation of antibiotics. This problem is not present in topical applications, but can occur when trying to treat the brain or bones, for example. "This is a challenge we have to overcome. StaphEkt is not a panacea for all bacterial problems," says Mr Offerhaus. He adds that infection usually starts topically and when the skin barrier is no longer intact, the bacteria can cause an infection and make its way deeper into the body, especially during surgery.

STAPHEFEKT FREE FOR RESEARCH PURPOSES

The company is going to make the drug available for research purposes, for free. "We're not going to do everything on our own. Let's accelerate things by having different applications tested by different people. We've been literally flooded by requests today, so we're going to design a policy and put it on our site to explain the basic system and people can do it as efficiently as possible," he added.

Being independent has allowed Microeos to work in a way and at a pace that would potentially not be available to or suitable for larger pharma companies. Mr Offerhaus says: "We want to help people, and we want to do it as fast as possible. We're completely independent from other pharmaceutical companies, we have our own production facilities, and we want to bring this technology to mankind. I think we're fast because we're

small and independent, and sometimes you have to make these choices without large committees and just have the mentality and the eagerness to get to the next level. That's easier with an infrastructure that's not too bureaucratic.”