

Waste from the food chain could hold the clue to treating eye infections worldwide

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A new laboratory model that can be used to test treatments for preventing and curing eye infections caused by fungi, bacteria and viruses, while also reducing the number of animals used in medical

research, has been developed by researchers at the University of Sheffield.

The breakthrough, which will be used to develop novel alternatives to antibiotics to reduce the emergence of antibiotic-resistant superbugs, has been made by engineers and scientists working together at the University of Sheffield's Collaboratorium for Antimicrobial Resistance and Biofilms (SCARAB).

In some developing countries, [eye infections](#) pose a significant threat resulting in vision impairment or even blindness. Currently, around 285 million people globally are visually impaired and seven million people lose their eyesight each year. Over 90 percent of people affected are from developing countries.

In approximately 80 percent of these people the loss of eyesight can be easily avoided with bespoke healthcare solutions that fit with the unique socio-economic conditions prevalent in developing countries.

Using the ex vivo porcine eye model—the eyes of pigs which are deemed as waste by the food industry—researchers can mimic infection in [human eyes](#).

The cornea is the transparent portion in the front of the eye that allows us to see. Using the ex vivo porcine models researchers were able to study ulcer formation and the development of opacity which leads to the loss of vision in humans.

The new model, which is being developed by Ph.D. researcher Katarzyna Okurowska, gives a better prediction of how effective the newly developed treatments are likely to be in humans. Such data is currently obtained from expensive and highly-regulated [animal research](#), which must precede any human clinical trials before the treatment can

be made available to patients.

The availability of the model will immediately help to reduce and refine the use of [animals](#) in [medical research](#), and may one day help to completely replace the use of animals in this kind of study.

The added advantage of the ex vivo porcine eye model is that it uses waste from the food chain. As the eyes are a waste product, no animals are specifically bred for the study, helping to reduce the numbers of animals needed to conduct research.

Project lead, Professor Peter Monk from the University of Sheffield's Department of Infection, Immunity and Cardiovascular Disease, said: "Eye infections are a major cause of vision loss worldwide. Loss of vision leads to a reduction in the quality of life and impairs the economic productivity of the individual and the nation. There is a need for effective and affordable treatments that can prevent its occurrence, and so we established this model to enable the treatments that we and others are developing to reach the clinic rapidly. The research demonstrates how our scientists are fully committed to finding other alternatives to research which is currently dependent on animals. The University is committed to the 3Rs: replacing the use of animals with alternative techniques, or avoiding the use of animals altogether; reducing the number of animals used to a minimum; and refining the way experiments are carried out, to make sure animals suffer as little as possible."

Dr. Esther Karunakaran, Co-Director of SCARAB from the University of Sheffield's Department of Chemical and Biological Engineering, said: "The [model](#) has been developed as part of a larger multidisciplinary project funded by the Medical Research Council Global Challenge Research Fund (MRC-GCRF), to develop a novel treatment to prevent eye infections in the developing world. We are also working with the LV

Prasad Eye Institute in India."

Provided by University of Sheffield

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