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Xylose improves antibiotic activity against *K. pneumoniae* and *A. baumannii* in a murine model of skin infection

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Background: Increased resistance to antimicrobials in clinically important bacteria has been widely reported. The major mechanism causing multidrug resistance (MDR) is mediated by proteins, so called efflux pumps, located in the cytoplasmic membrane and able to exclude antimicrobial drug. Efflux pumps in some cases are capable of recognizing and expelling a variety of unrelated antimicrobial agents; in other cases only can expels one specific antibiotic. Previously, we have reported that xylose decreases the efflux-mediated antimicrobial resistance in *Salmonella* Typhimurium, *Pseudomonas aeruginosa*, *Acinetobacter baumannii* and *Klebsiella pneumoniae* *in vitro*. In this work, we assessed the effectiveness of combining xylose with antibiotics to kill resistant *Acinetobacter baumannii* and *Klebsiella pneumoniae* in a murine model of skin infection.

Material/methods: Seeding 10⁹ bacteria onto eroded skin of mice previously shaved to generate lesions established skin infections. Mice treated with the antibiotic alone or with a mixture of xylose and antibiotics were compared to a control group that was infected but received no further treatment (see Figure 1).

Results: We observed that the mixtures xylose-tetracycline and xylose-chloramphenicol produced a significant decrease of viable *Acinetobacter baumannii* and *Klebsiella pneumoniae* recovered from infected skin, compared with mice treated with the antibiotic alone.

Conclusions: Our results show that xylose improves the antibiotic activity of tetracycline and chloramphenicol against *Acinetobacter baumannii* and *Klebsiella pneumoniae* in a murine model of skin infection. Xylose is a sugar routinely administered systemically at high doses to assess intestinal absorption, so their consumption is not toxic to humans. We envision these combined formulations as an efficient treatment of skin infections in both humans and animals.

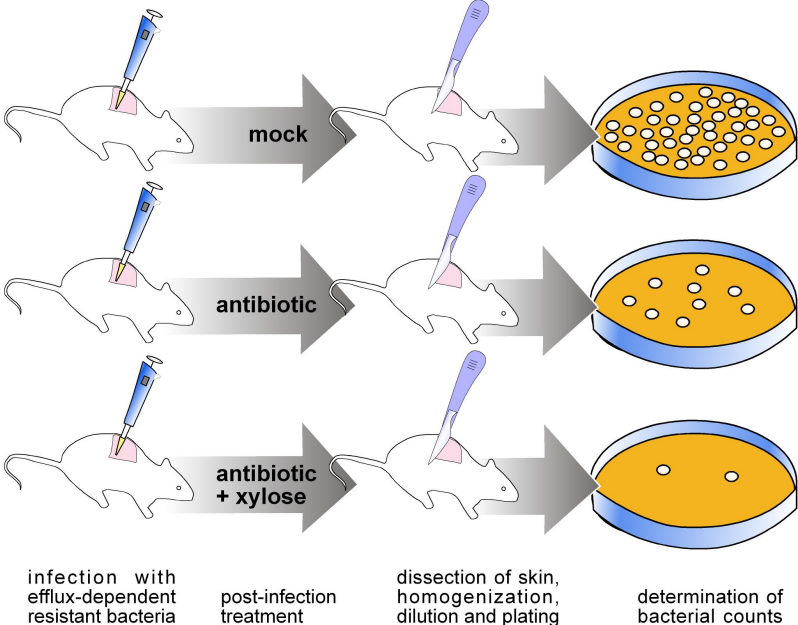


Figure 1: Graphical abstract