# Narrow spectrum antibiotic kills pathogens without killing good bacteria

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The problem with broad spectrum antibiotics is that they kill good bacteria along with the bad. But a new antibiotic, Debio 1452, which is narrowly targeted at Staphilococcal pathogens, caused almost no harm to the gut microbiome of mouse models, while conventional broad spectrum antibiotics caused major damage. The research is published in *Antimicrobial Agents and Chemotherapy*, a journal of the American Society for Microbiology.

In the study, the investigators treated groups of five mice with either Debio 1452, or one of various commonly used, broad spectrum antibiotics, said corresponding author Charles O. Rock, PhD, Director of the Protein Production Facility in the Infectious Diseases Department, St. Jude Children's Research Hospital, Memphis, TN. Treatment lasted 10 days, followed by a 27 day recovery period, during which times feces—proxies for the gut microbiome—were collected to analyze diversity and abundance of bacterial species. The investigators used next generation sequencing technology to identify the bacterial species, and real-time PCR to determine abundance.

Abundance and diversity remained nearly stable under treatment with Debio 1452. In contrast, "Linezolid, clindamycin, and amoxicillin treatment all caused a ~4,000-fold decrease in the gut bacterial abundance at the second day of treatment that persisted until the end of the treatment," according to the report. (Moxifloxacin caused a much smaller, but still significant reduction in abundance, and recovery was much faster.) Additionally, major changes in species composition of the

gut microbiome occurred during treatment with the broad spectrum antibiotics, said Rock.

"These results demonstrate that the pathogen-selective approach to antibiotic development is an effective way to minimize collateral damage to the microbiome," said Rock.

Motivating the research, Rock said that "The patients at St. Jude Children's Research Hospital are often on extended antibiotic therapy during their cancer treatment. Children with developing immune systems and patients on long-term antibiotic regimes are most susceptible to the adverse consequences arising from a devastated gut microbiome."

"Broad spectrum antibiotic treatments save countless lives every year, but also contribute to the modern plagues of metabolic and autoimmune diseases," said Rock. "Our research shows that a pathogen selective approach to antibiotic development results in drugs that fight bacterial infections without promoting these adverse side effects."

**More information:** *Antimicrobial Agents and Chemotherapy*, DOI: 10.1128/AAC.00535-16

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