Caution needed when prescribing antibiotics to hypertension patients, study finds

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Individual variations in genetic makeup and gut bacteria may explain the different effects of antibiotics on blood pressure, a new rat study suggests. The findings are published ahead of print in *Physiological Genomics*.

Gut microbiota—bacteria that populate the gastrointestinal tract—are a mixture of organisms that play a role both in health and in the development of illness or disease, including high blood pressure (hypertension). Just as individuals' genes vary, each person's gut microbiota is diverse. As antibiotics kill harmful bacteria to cure infections, they may also eliminate helpful bacteria that maintain good health. Because gut microbiota are linked to an individual's high blood pressure, University of Toledo College of Medicine and Life Sciences researchers explained, "individual hypertensive responses to antibiotics may vary depending on the host and its microbiota."

The research team studied two strains of rats that have different gut microbiota but both have a genetic tendency for hypertension. Dahl salt-sensitive rats ("Dahl rats") develop high blood pressure in response to a high-salt diet, while spontaneously hypertensive rats ("SHR rats") are seen as an animal model of high blood pressure unrelated to dietary salt. The researchers treated both strains with three common antibiotics:

- vancomycin, which treats inflammation and infection of the colon (colitis);
- minocycline, which treats urinary tract infections, acne and certain types of sexually transmitted infections; and
- neomycin, which is used to prevent high cholesterol and is an active ingredient in many medicated creams, ointments and eye drops.

Antibiotic use caused different responses in the Dahl rats and SHR rats, including the way that each drug affected the rats' blood pressure. Systolic blood pressure—the force of blood pushing through the arteries while the heart beats—increased in Dahl rats when treated with minocycline and neomycin but not when given vancomycin. Minocycline also caused the diastolic blood pressure—the pressure in the arteries while the heart is at rest—to rise in the Dahl rats. SHR rats treated with any of the antibiotics experienced either a drop in systolic blood pressure, or no change, as with neomycin.

These findings suggest that "the host [genetic makeup] plays an important role in how blood pressure will be affected differentially by antibiotic treatment. This highlights the importance of further studies to determine the mechanism behind these different effects," the researchers wrote. "This raises the question of safety in the usage of antibiotics by patients with such modern ailments [as hypertension]."

More information: Sarah Galla et al, Disparate Effects of Antibiotics on Hypertension, *Physiological Genomics* (2018). DOI: 10.1152/physiolgenomics.00073.2018

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