Dysbiosis of the gut and skin microflora has been associated with chronic inflammatory diseases, such as atopic dermatitis (AD) and inflammatory bowel disease. In AD, a disruption of the balance and diversity of the cutaneous microbial communities is associated with disease severity and may increase skin colonization with *Staphylococcus aureus* while decreasing the level of *Staphylococcus epidermidis*, a skin probiotic bacterium. In an observational, register-based, prospective cohort study, Mubanga et al found that exposure to systemic antibiotics in the prenatal period and in early childhood (first year of life) was associated with a modestly increased risk of AD in the general population. Although the use of both topical and systemic antibiotics may induce dysbiosis, the choice of antibiotic, dosing, indication, and duration of use play critical roles in outcomes.

Antibiotics are life-saving medications and have been a cornerstone of public health. Furthermore, they are the most common medications prescribed for children. Antibiotics are generally categorized as either broad-spectrum or narrow-spectrum antibiotics according to their spectrum of antimicrobial activity. Broad-spectrum antibiotics, such as doxycycline, azithromycin, amoxicillin and clavulanic acid, mupirocin, and fluoroquinolones, target a wide range of gram-positive and gram-negative bacteria, whereas narrow-spectrum antibiotics, such as vancomycin, fidaxomicin, and sarecycline, only target limited types of clinically relevant bacteria. Moreover, on the basis of their mechanism of action, antibiotics have been classified into bactericidal (ie, they kill bacteria) and bacteriostatic (ie, they only inhibit the growth or proliferation of bacteria) categories. For example, tetracyclines are generally bacteriostatic, whereas fluoroquinolones are bactericidal.

Although broad-spectrum antibiotics have a crucial role in the empirical treatment of infections and some classes of antibiotics have been widely used to treat inflammatory conditions such as acne and rosacea, because of both their antibacterial and anti-inflammatory properties, the prolonged and intermittent use of broad-spectrum antibiotics has been associated with the development of antimicrobial resistance and permanent perturbation of the microbiome. Although no causal relationship has been definitively established, the use of doxycycline in patients with acne was found to be associated with a 2.25-fold greater risk of developing Crohn disease. Narrow-spectrum antibiotics have a low propensity to induce bacterial resistance and also a reduced tendency to cause dysbiosis. The Centers for Disease Control and Prevention have stressed antibiotic stewardship. This is an initiative to promote the appropriate use of antibiotics, where patients receive the right dose of the right antibiotic at the right time for the right duration, and the use of narrow-spectrum antibiotics whenever feasible to limit off-target effects and enhance patient outcomes.

The cutaneous commensal microbiota is primarily composed of gram-positive bacteria. Treating skin conditions with broad-spectrum antibiotics is like using a bazooka to kill a mosquito and can severely harm the microbiome. Several studies have shown the negative impact of broad-spectrum antibiotic use on microbial dysbiosis in the skin and gastrointestinal tract. It is intuitive that topical antibiotics may cause more dysbiosis in the skin, whereas systemic antibiotics may cause dysbiosis in both the gut and the skin.

Although Mubanga et al found an association of exposure to antibiotics in utero and in early life with a modest increase in the risk of AD, they also point out that other studies assessing the risk of AD due to antibiotic use have had mixed results, with some showing positive associations and other showing no association. These collective findings strongly warrant additional investigation to explore the impact of antibiotics in AD and other inflammatory diseases, considering important aspects of antibiotics, including their spectrum of activity, mode of action, effect on resistance potentiation,
dosing, duration of use, and route of administration. Additionally, it will be important to investigate differences in outcomes related to specific classes of antibiotics, as well as whether monotherapy or polytherapy of antibiotics was used. It may be worthwhile to investigate how the interleukin-4 and interleukin-13 pathways, which are implicated in AD, are altered by antibiotic usage. It is important to avoid painting narrow-spectrum and broad-spectrum antibiotics with the same brush because narrow-spectrum and targeted antibiotics are among the main ways physicians will practice antibiotic stewardship in the future.

ARTICLE INFORMATION
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