

Antibiotic use in early life disrupt normal gut microbiota development

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The use of antibiotics in early childhood interferes with normal development of the intestinal microbiota, shows research conducted at the University of Helsinki. Particularly the broad-spectrum macrolide antibiotics, commonly used to treat respiratory tract infections, have adverse effects. Macrolides appear also to contribute to the development of antibiotic-resistant strains of bacteria.

It is already known that early-life use of [antibiotics](#) is connected to increased risk of immune-mediated diseases such as [inflammatory bowel disease](#), and asthma, as well as obesity. The effect is thought to be mediated by the intestinal microbes, since antibiotics in animal studies has been found to change the composition of the intestinal microbiota and reduce biodiversity. However, to date there is no information on the long-term effects of antibiotics on children's microbiota.

The study, conducted at the University of Helsinki and led by Professor Willem de Vos, included 142 Finnish children, aged 2 to 7 years. Researchers investigated how many courses of antibiotics the children had received in their lifetime and how the use of antibiotics was reflected in their intestinal microbiota. In addition, they investigated the association between use of antibiotics and asthma and body mass index. The study is published in the scientific journal *Nature Communications*.

The results showed that children's intestinal microbiota composition clearly reflected the use of antibiotics. Antibiotics reduced the bacterial species richness and slowed the age-driven microbiota development. Particularly the microbiota of the children who had received macrolide antibiotics, such as azithromycin or clarithromycin, within the past two years differed from normal. The less time had passed since the macrolide course, the larger were the anomalies in the microbiota.

"In general, it seems that the gut microbiota

recovery from antibiotic treatment lasts more than a year. If a child gets repeated courses of antibiotics during their first years, the microbiota may not have time to fully recover", says the researcher, Katri Korpela, whose doctoral thesis project includes the newly published research.

The use of macrolides was associated with microbiota features, which have previously been associated with obesity and metabolic diseases. The use of macrolides during the first two years of life was associated with increased [body mass index](#).

Heavy use of macrolides in the first two years of life was also associated with an increased risk of asthma later in life.

Macrolides appear to promote also the development of antibiotic resistance, as the resistance to these antibiotics was elevated in the microbiota of children who had used them.

"Penicillin-type antibiotics seemed to have a weaker impact on the composition and functioning of the microbiome than macrolides", Korpela says.

The results support the recommendation to avoid macrolides as the primary antibiotic, and generally restrict the use of antibiotics to genuine need. Antibiotics should not be used to treat self-limiting infections and never 'just in case', the researchers emphasize.

More information: Katri Korpela, Anne Salonen, Lauri J. Virta, Riina A. Kekkonen, Kristoffer Forslund, Peer Bork, Willem M. de Vos: Intestinal microbiome is related to lifetime antibiotic use in Finnish pre-school children. *Nature Communications*, 26 Jan 2016
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