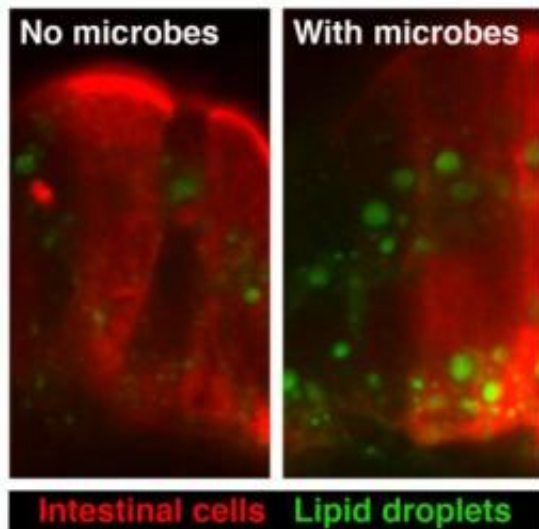


Gut bacteria increase fat absorption

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This confocal microscopy of intestinal epithelial cells (red) in zebrafish shows that the presence of microbes stimulates dietary fatty acid uptake and accumulation in epithelial lipid droplets (green). Credit: Ivana Semova, Ph.D.

You may think you have dinner all to yourself, but you're actually sharing it with a vast community of microbes waiting within your digestive tract. A new study from a team including Carnegie's Steve Farber and Juliana Carten reveals that some gut microbes increase the absorption of dietary fats, allowing the host organism to extract more calories from the same amount of food.

Previous studies showed [gut microbes](#) aid in the breakdown of complex carbohydrates, but their role in dietary fat metabolism remained a

mystery, until now. The research is published September 13 by *Cell Host & Microbe*.

"This study is the first to demonstrate that microbes can promote the [absorption](#) of [dietary fats](#) in the intestine and their subsequent metabolism in the body," said senior study author John Rawls of the University of North Carolina. "The results underscore the complex relationship between microbes, diet and host physiology."

The study was carried out in zebrafish, which are optically transparent when young. By feeding the fish fatty acids tagged with fluorescent dyes, an approach originally developed in Farber's lab, the researchers were able to directly observe the absorption and transport of fats in live animals. The Rawl's lab pioneered methods to grow zebrafish larvae in the presence or absence of gut microbes.

By combining approaches, they determined that one type of bacteria, called Firmicutes, is instrumental in increasing fat absorption. They also found that the abundance of Firmicutes in the gut was influenced by diet. Fish fed normally had more Firmicutes than fish that were denied food for several days. Other studies have linked a higher relative abundance of Firmicutes in the gut with obesity in humans.

The findings indicate that bacteria in the gut can increase the host's ability to absorb fat and thereby harvest more [calories](#) from the diet. Another implication is that a high-fat diet promotes the growth of these fat-loving Firmicutes, resulting in more fat absorption.

Although the study involved only fish, not humans, it offers insights that could help inform new approaches to treating obesity and other disorders.

"The unique properties of zebrafish larvae are helping us develop a

better understanding of how the intestine functions with the goal of contributing to ongoing efforts to reduce the impact of diseases associated with altered lipid [metabolism](#), such as diabetes, obesity, and cardiovascular disease. Our collaboration with the Rawls lab is now focused on how specific gut bacteria are able to stimulate absorption of dietary fat. We hope to use that information to develop new ways to reduce fat absorption in the context of human diseases," Farber said.

The research team also included lead author Ivana Semova and co-author Lantz Mackey, both of UNC, as well as co-authors Jesse Stombaugh and Rob Knight of the University of Colorado at Boulder.

Provided by Carnegie Institution for Science

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