

Cannibalistic cells may help prevent infections

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This is Dr. Beth Levine from UT Southwestern Medical Center. Credit: UT Southwestern Medical Center

Infectious-disease specialists at UT Southwestern Medical Center have demonstrated that a cannibalistic process in cells plays a key role in limiting *Salmonella* infection.

Salmonella, the causative agent of salmonellosis, causes many of the intestinal infections and food-related illnesses reported in the U.S. About 600 people die each year as a result of these infections, accounting for roughly 30 percent of all reported food-related deaths. It is particularly

dangerous among the elderly.

The new findings, available online and in an upcoming issue of the [Proceedings of the National Academy of Sciences](#), are among the first to demonstrate that a process called autophagy (pronounced "aw-TAH-fah-gee") prevents harmful bacteria such as Salmonella from becoming successful pathogens. The findings also suggest that decreases in autophagy - such as those that occur in the elderly and in certain patients with [Crohn's disease](#), an inflammatory bowel disorder - may lead to abnormalities in the way the intestinal tract deals with bacterial infections.

"It's known that as you get older you become more susceptible to infectious diseases and also that autophagy decreases," said Dr. Beth Levine, chief of the division of infectious diseases at UT Southwestern and senior author of the new study in PNAS. "In this paper, we've shown that signaling pathways that extend life and protect against bacterial invaders do so by triggering autophagy. This suggests that therapeutic strategies to increase autophagy may be effective in defeating [harmful bacteria](#) that can enter inside [cells](#)."

Autophagy is the way cells devour their own unwanted or damaged parts. It is a highly regulated and completely normal process by which cells remain healthy by performing "routine housekeeping" and "garbage disposal." Prior research has shown that the process appears to be an adaptive response that our bodies employ during times of stress or starvation, and which also helps protect our bodies against cancer and neurodegenerative diseases.

It's unclear why older people become more susceptible to infections, but research has shown that autophagy does decrease with age. Dr. Levine, a professor of internal medicine and microbiology, said it is possible that by reversing or regulating this process, researchers could prevent the

elderly and others with weakened immune systems from becoming more susceptible to infections.

For this study, the researchers studied the effects of Salmonella infections in two organisms they had genetically engineered to lack active autophagy genes. The organisms included *Caenorhabditis elegans*, a common research worm also known as a nematode, and *Dictyostelium discoideum*, a soil amoeba that functions much like certain cells in the human immune system.

In both cases, the animals with inactive autophagy genes fared far worse than those with active ones. Rather than being targeted for elimination, the Salmonella bacterium was able to invade the host cells, where it started replicating, Dr. Levine said.

She said the findings indicate that the autophagy process plays an important role in resistance to certain types of pathogens, specifically those that can enter inside our cells.

The next step, Dr. Levine said, is to begin studying the efficacy of a new autophagy-inducing molecule in treating a number of intracellular bacterial infections including salmonellosis, tuberculosis, tularemia and listeriosis.

Source: UT Southwestern Medical Center ([news](#) : [web](#))

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