

# Mystery solved: How bleach kills germs



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CHICAGO (Reuters) – Bleach has been killing germs for more than 200 years but U.S. scientists have just figured out how the cleaner does its dirty work.

It seems that hypochlorous acid, the active ingredient in bleach, attacks proteins in bacteria, causing them to clump up much like an egg that has been boiled, a team at the University of Michigan reported in the journal *Cell* on Thursday.

The discovery, which may better explain how humans fight off infections, came quite by accident.

"As so often happens in science, we did not set out to address this question," Ursula Jakob, who led the team, said in a statement.

The researchers had been studying a bacterial protein called heat shock protein 33, which is a kind of molecular chaperon that becomes active when cells are in distress, for example from the high temperature of a fever.

In this case, the source of the distress was hypochlorous acid or hypochlorite.

Jakob's team figured out that bleach and high temperatures have very similar effects on proteins.

When they exposed the bacteria to bleach, the heat shock protein became active in an attempt to protect other proteins in the bacteria from losing their chemical structure, forming clumps that would eventually die off.

"Many of the proteins that hypochlorite attacks are essential for bacterial growth, so inactivating those proteins likely kills the bacteria," Marianne Ilbert, a postdoctoral fellow in Jakob's lab, said in a statement.

The researchers said the human immune system produces hypochlorous acid in response to infection but the substance does not kill only the bacterial invaders. It kills human cells too, which may explain how tissue is destroyed in chronic inflammation.

"Hypochlorous acid is an important part of host defense," Jakob said. "It's not just something we use on our countertops."

(Editing by Maggie Fox and John O'Callaghan)

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