

Scientists discover new information about how enzymes from white blood cells function

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As a part of the human immune system, white blood cells create a number of enzymes that help fight disease. Sometimes, these enzymes damage tissues in inflammatory diseases such as chronic obstructive pulmonary disease, cancer and heart disease. Now, researchers at the University of Missouri, have determined that one of these enzymes, known as MMP12, does not remain outside of cells while it fights infections, but rather it can travel all the way to the center of cells. Steven Van Doren, a professor in the MU Department of Biochemistry, says understanding how this and other enzymes function is an important step to creating treatments for inflammatory diseases.

"Scientists once believed these enzymes remained on the outside of cells," Van Doren said. "Now that we know the MMP12 enzyme can bind to cells and travel all the way to the nucleus at the center of a cell, we can begin further study of how this enzyme interacts with those cells. Ultimately, increasing this understanding may lead to the creation of treatments to turn off this enzyme, and others like it, when they are damaging the body."

The [enzyme](#) MMP12 can be found in elastin, which is an elastic tissue found in the lungs and arteries that allows organs and blood vessels to resume their shape after stretching. When there is unwanted MMP12 action in the lungs and arteries of smokers, it breaks down the elastin, causing the lungs or arteries lose their shape elasticity. This leads to inflammation in those areas, which can cause diseases like chronic [obstructive pulmonary disease](#) and diseases of the [arteries](#).

For his study, Van Doren introduced a fluorescent substance to MMP12 enzymes, which caused them to glow. Using a technique called magnetic resonance of atoms' nuclei, or NMR, which is similar to [magnetic resonance imaging](#) (MRI), Van Doren was able to study structural details of how these enzymes interacted with cells on a sub-microscopic scale.

"We know that MMP12 enzymes play important roles in fighting bacterial and viral infections and fighting arthritis," Van Doren said.

"The more we understand these enzymes, the closer we come to learning how to use these enzymes more effectively to fight diseases while preventing them from causing damage when they act inappropriately. This illustrates the importance of basic scientific research when looking to solve large, practical problems. One next step is to determine how these enzymes get through the cell. Understanding that mechanism will tell us much about how these enzymes work. "

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