

New studies create better understanding of cancer-spreading enzymes

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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 can malfunction, causing damage to the body or increasing cancer growth. Now, researchers at the University of Missouri have determined a detailed structural view of one of these enzymes, called MMP7, as it binds to the membranes, or surfaces, of cancer cells. Steve Van Doren, a professor in the MU Department of Biochemistry, says understanding the structure of this enzyme and how it works with partners will help create future treatments for cancer.

"MMP7 is known to make cancer cells more aggressive and likely to spread throughout the body," Van Doren said. "We now understand that MMP7 signals to cancer cells to become more aggressive when the [enzyme](#) cuts off specific proteins as it binds to those cancer cells. Knowing this, we hopefully can find ways to prevent these enzymes from binding and signaling to these cancer cells in the first place. The end result could be a way to prevent cancer cells from spreading so rapidly."

For the study, Van Doren and his research team, including lead author Stephen Prior, a postdoctoral fellow at MU, used a highly sophisticated piece of equipment called a Nuclear Magnetic Resonance (NMR) spectrometer to map the structure of assemblies containing MMP7. Functioning similarly to a [magnetic resonance](#) imaging (MRI) machine, the NMR spectrometer uses large magnets to allow scientists detect the nuclei of atoms in order to reconstruct detailed images of sub-

microscopic enzymes. The researchers then study these 3D images to determine how these enzymes work within the body.

Additionally, Van Doren and his research team published a study investigating a sister enzyme, known as MMP14. In this study, Van Doren used the same NMR spectrometer to determine how MMP14 helps cancer spread throughout the body. He says this knowledge also will inform future research into ways to prevent the spread of cancer.

"MMP14 is the most important protein-cutting enzyme in terms of how [cancer cells](#) migrate throughout the body," Van Doren said. "These enzymes essentially cut paths through the collagen meshwork of tissues in the body. By clearing paths through this collagen, the MMP14 enzyme enables tumor cells to move and spread. By understanding the structures of how these enzymes attack collagen and other proteins, we can find ways to block them from allowing cancer to spread."

These studies were published in *Structure*.

More information: Stephen H. Prior et al. Charge-Triggered Membrane Insertion of Matrix Metalloproteinase-7, Supporter of Innate Immunity and Tumors, *Structure* (2015). [DOI: 10.1016/j.str.2015.08.013](https://doi.org/10.1016/j.str.2015.08.013)

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