Painkillers may decrease susceptibility to recurring urinary infections

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Women plagued by repeated urinary tract infections may be able to prevent the infections with help from over-the-counter painkillers, according to research presented at the annual meeting of the American Society for Microbiology.

Scientists at Washington University School of Medicine in St. Louis found that inhibiting COX-2, an immune protein that causes inflammation, eliminated recurrent urinary tract infections in mice. COX-2 is one of the proteins blocked by non-steroidal anti-inflammatory drugs (NSAIDs) such as ibuprofen.

"If we can confirm this link in clinical trials, many people potentially could benefit very quickly," said Thomas Hannan, who presented the research. "But for now, it's important to remember that urinary tract infections are serious, and antibiotic treatment is often necessary. Patients should not treat these infections on their own without help from a medical provider."

Scientists estimate half of all women will experience a urinary tract infection, which is the second-most common type of bacterial infection, at some point in their lives. Additional recurrent infections will affect 20 percent to 40 percent of these patients. If the infections spread to the kidneys and bloodstream, serious complications can result.

Hannan and his colleagues previously found in mouse studies that immune system overreaction to an initial infection may increase vulnerability to subsequent infections.

"We thought that the immune response was too weak in patients who kept getting urinary tract infections, but we are learning that an overly strong immune response can be just as problematic," Hannan said.

In the new study, the scientists found evidence in women and mice that immune cells, known as neutrophils, are significant contributors to repeat infections. In their eagerness to break into the bladder to fight infection, neutrophils leave tracks in the protective lining of the bladder's interior. Scientists believe that excessive damage may provide footholds that let bacteria grab hold of the bladder lining and begin to establish severe infections.

The researchers were able to manipulate the strength of the neutrophil response in mice to identify a "sweet spot" – not too much response and not too little – that eradicated urinary tract infection without increasing future infection risk.

The researchers found that mice with increased vulnerability to repeat infections had more inflammatory molecules in their bladder than mice that were resistant to repeat infections. When treated with COX-2 inhibitors, mice showed dramatically reduced susceptibility to infection.

The investigators examined the effect of COX-2 inhibition on the immune response in the bladder and found that neutrophils still came into the bladder in large numbers but caused much less damage to the protective lining. As a result, they believe COX-2 inhibitors are able to selectively target the detrimental effects of inflammation while maintaining the beneficial responses.

"These are encouraging results, and we hope to verify the potential benefits of COX-2 inhibitors soon in a large clinical trial," said senior author Scott Hultgren, who directs the Center for Women's Infectious Disease Research at Washington University.

More information: This research was presented as part of the 2014 General Meeting of the American Society for Microbiology held May 17-20, 2014 in Boston, Massachusetts.

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