

Researcher discovers antibiotic useful for localized treatment of bone wear

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Total joint replacement surgeries can help relieve joint pain common in people with conditions like osteoarthritis. But sometimes, the debris from prosthetic joints leads to aseptic loosening, or disintegration of surrounding bones. In 2009, a Wayne State University researcher determined that the anti-inflammatory antibiotic erythromycin can prevent and treat such disintegration. There was one caveat, however: there are side effects associated with long-term usage of erythromycin.

But Weiping Ren, M.D., Ph.D., associate professor of biomedical engineering in WSU's College of Engineering, has found a solution. Erythromycin can be administered directly at the site of [bone breakdown](#), rather than orally, so the whole body is not affected. The details of Ren's study are published in the August 2011 issue of *Clinical Orthopaedics and Related Research*.

"Although oral erythromycin reportedly inhibits inflammation in patients with aseptic loosening, long-term systematic (oral) erythromycin treatment is not recommended," said Ren.

Used primarily for its antimicrobial properties, erythromycin is used to treat conditions like [respiratory tract infections](#) and [whooping cough](#), both caused by [harmful bacteria](#). In addition to fighting bacteria, erythromycin reduces inflammation, making it a successful treatment for aseptic loosening.

"But long-term systemic use of erythromycin raises concerns about

various side effects, including [bacterial resistance](#), [liver damage](#) and gastrointestinal discomfort," said Ren. "We hypothesized that it may be advantageous to restrict erythromycin delivery to the inflammatory tissue around the implant to avoid these side effects."

To test his idea, Ren implanted metal pins coated with erythromycin in the inflamed tissue surrounding the prosthetic joint. He measured bone growth and implant stability, both indicators of how well the prosthesis integrates with the bone, and analyzed microscopic images of the periprosthetic tissue — the affected tissue surrounding the prosthesis.

Ren found that at very low doses – about a quarter of the dose used for killing bacteria – erythromycin effectively reduces aseptic loosening inflammation. "At the same time, we confirmed that oral erythromycin can be effectively delivered into the periprosthetic tissues, supporting our hypothesis that oral erythromycin can be used as one of the nonsurgical treatment methods to extend implant longevity," said Ren.

By extending implant longevity, localized erythromycin will safely treat aseptic loosening and reduce the likelihood that patients with the condition will need revision surgery. "Medical insurance costs will be greatly reduced, because revision surgery is much more expensive than primary surgery," said Ren.

Provided by Wayne State University - Office of the Vice President for Research

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