Medical Xpress

Minocycline, an antibiotic, improves behavior for children with fragile X syndrome

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Minocycline, an older, broad-spectrum antibiotic in the tetracycline family, provides meaningful improvements as a therapeutic for children with fragile X syndrome, a study by researchers at the UC Davis MIND Institute has found. The finding is important, the researchers said, because minocycline is a targeted treatment for the condition that is readily available by prescription.

After three months of treatment with minocycline, children with fragile X syndrome had greater improvements in general behavior, anxiety and mood-related behaviors when compared with children with fragile X syndrome who received placebo rather than the medication. The study was led by Mary Jacena Leigh, associate clinical professor of behavioral and developmental pediatrics with the Fragile X Treatment and Research Center at the MIND Institute.

"This study provides evidence of the efficacy of this medication as targeted treatment for fragile X syndrome with a long history of use and that can currently be prescribed," Leigh said. "Further studies examining the long-term benefits and side effects are needed, perhaps in combination with other educational and medication treatments currently being developed for individuals with the condition."

The research is published online today in the *Journal of Developmental and Behavioral Pediatrics*, the official journal of the Society for Developmental and Behavioral Pediatrics. The journal is published by Lippincott Williams & Wilkins, a part of Wolters Kluwer Health.

Fragile X syndrome is the most common inherited cause of intellectual impairment, formerly termed mental retardation, and is the leading known single-gene cause of autism spectrum disorder. The United States Centers for Disease Control and Prevention (CDC) estimates that about 1 in 4,000 males and females have the disorder. The condition is caused by a mutation in a single gene, FMR1, found on the X chromosome.

For the current study, 66 children with fragile X syndrome were randomly assigned to three months of treatment with minocycline or an inactive placebo. After three months, the study participants were switched to the other treatment. Parents and doctors did not know which treatment the child received until completion of the study.

Fifty-five patients completed the study. The children had small but significant improvements in certain areas during treatment with minocycline, compared to placebo. In particular, they scored better on the Clinical Global Impression Scale, on which doctors and parents rated their overall impression of the patients' status.

Children taking minocycline also had greater improvement in anxiety and mood-related behaviors, as rated by parents. Other outcomes were not significantly better with minocycline, including behavior problems and verbal functioning.

Side effects were generally similar between groups, with no serious adverse effects. Minocycline may cause some discoloration of the teeth—a known side effect of minocycline and related antibiotics—which was seen in both treatment arms.

"Some children responded very well to minocycline; others did not, so we now are studying biomarkers that can help us determine who will be a responder," said Randi Hagerman, MIND Institute medical director and the study's senior author.

Minocycline is an older antibiotic and most commonly is used for treatment of severe acne. Studies in animal models and initial studies in humans have suggested that it might have beneficial effects in the treatment of fragile X. It also has been studied as a potential "neuroprotective" treatment for other conditions, such as multiple sclerosis.

Other treatments for the condition now under investigation include a class of drugs called mGluR5 agonists and GABA agonists, such as ganaxolone or arbaclofen, which also are studied at the MIND Institute. However, minocycline is the only targeted fragile X treatment currently available by prescription. Because of its long history of use, the side effects and safety characteristics of minocycline are well known.

Provided by UC Davis

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