This faster-growing E. coli strain's a good thing

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A University of Illinois metabolic engineer has improved a strain of E. coli, making it grow faster. Don't worry, he believes his efforts will benefit human health, not decimate it.

"The average person hears E. coli and thinks of E. coli 0157:H7, a microorganism that causes horrific food poisoning, but we've developed a strain of E. coli that is suitable for mass production of high-quality DNA that could be used in vaccines or gene therapy," said Yong-Su Jin, a U of I assistant professor of microbial genomics and a faculty member in its Institute for Genomic Biology.

According to Jin, industrial strains of E. coli have already been used to produce such diverse products as insulin for diabetics, enzymes used in laundry detergent, and polymer substitutes in carpets and plastic.

"E. coli bacteria have contributed vastly to our scientific understanding of genes, proteins, and the genome as a model system of biology research," he added.

Jin worked with E. coli DH5?, a laboratory strain that had excellent potential but grew very slowly.

When scientists began to use E. coli DH5? in biotechnological research years ago, they handicapped it, causing some of the genes to mutate so it would meet the requirements of molecular biology experiments. There was a trade-off, though-the strain's slow growth in minimal media, commonly used in laboratory and industrial fermentations.

"E. coli DH5? has been so popular that scientists have used it to perform most recombinant DNA techniques. But its slow growth has been a critical weakness," Jin noted.

Because scientists had used random mutagenesis, they weren't sure where the mutation that caused the slow growth had occurred. Jin and his colleagues were able to locate and fix the problem.

"We learned that the scientists had unintentionally weakened a key enzyme in a gene in the nucleotide biosynthesis pathway. When we reversed this mutation, the modified strain grew as quickly as other types of E. coli used in industry while retaining the traits that make it useful in scientific experiments," he said.

The beauty of the new strain lies in the purity and abundance of the DNA that it contains, which makes it a candidate for use in important biotechnological applications, he said.

"For example, to make DNA vaccines and perform gene therapy, we need DNA that is extremely clean and pure. The E. coli strain we have developed is an excellent candidate to deliver this high-quality genetic material in large quantities," he said.

Provided by University of Illinois at Urbana-Champaign