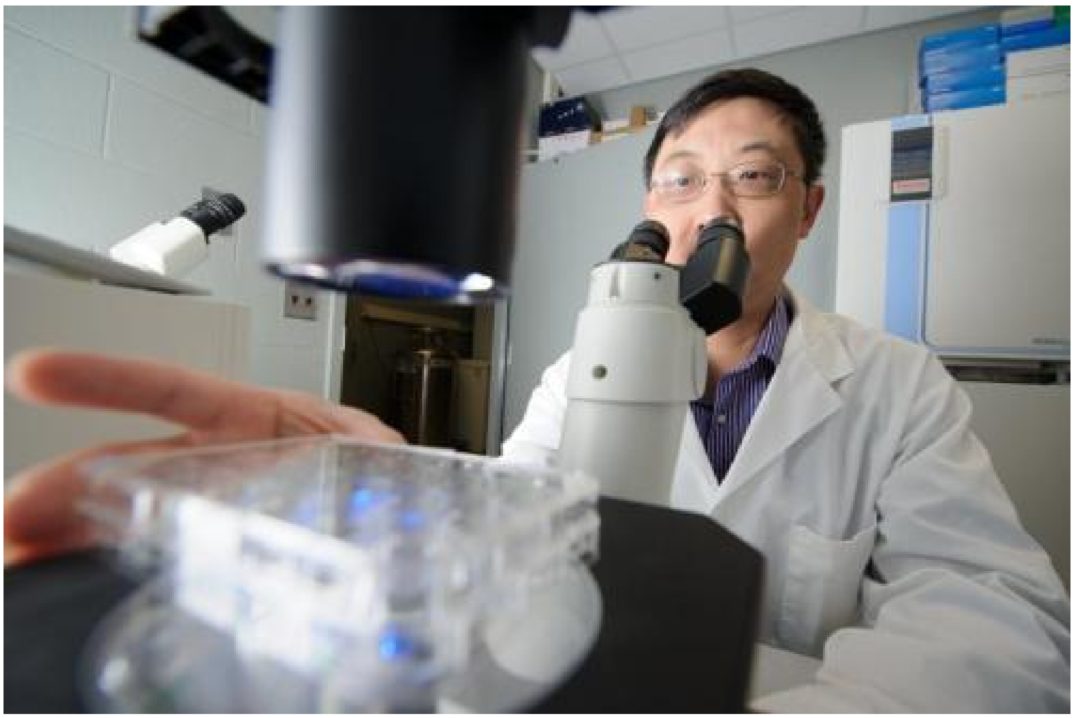
Cell resiliency surprises scientists

April 24 2014, by Anzar Abbas



A team led by Michigan State University shows that cells are more resilient in taking care of their DNA than scientists originally thought. Credit: Greg Kohuth

New research shows that cells are more resilient in taking care of their DNA than scientists originally thought. Even when missing critical components, cells can adapt and make copies of their DNA in an alternative way.

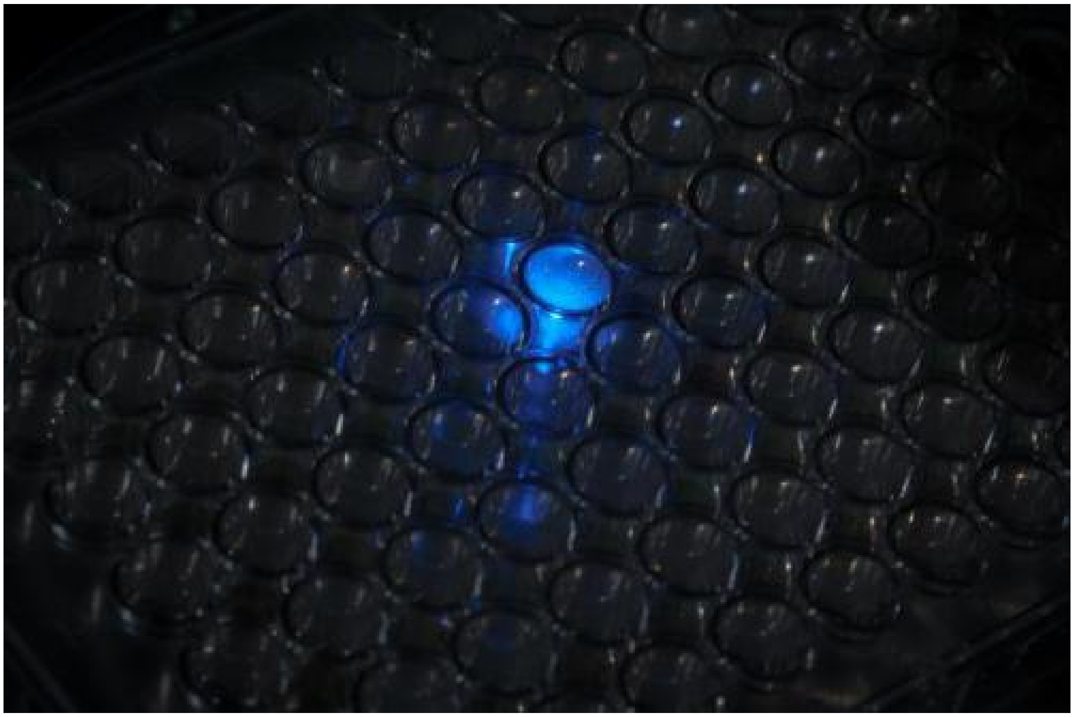
In a study published in this week's *Cell Reports*, a team of researchers at Michigan State University showed that cells can grow normally without a crucial component needed to duplicate their DNA.

"Our genetic information is stored in DNA, which has to be continuously monitored for damage and copied for growth," said Kefei Yu, MSU Professor. "If the cell is unable to make copies of its DNA or if it overlooks mistakes in its structure, it can lead to cell death or the production of cancerous cells."

But the study shows that cells are much more flexible in managing their DNA than we thought. When they lack the gadgets required to replicate DNA, they adapt and use other tools instead.

These tools are a family of proteins called DNA Ligases, which are needed for a variety of processes associated with DNA. There are several forms of these ligases, and the consensus among scientists has been that they each have specific roles that don't really overlap.

Belonging to this family of ligases is DNA Ligase I, which is thought to be critical for making copies of DNA and hence essential for growth. However, MSU researchers have shown that DNA Ligase I is actually not needed in some cells.



MSU research shows that cells can grow normally without a crucial component needed to duplicate their DNA. Credit: Greg Kohuth

"This suggests that cells are much more flexible in the way they make more of their DNA," Yu said. "It might be that these ligases can substitute for each other when one of them is missing."

Yu, along with MSU researchers Li Han and Shahnaz Masani, took out DNA Ligase I in a type of mouse cells and examined how the cells would respond to the challenge of losing a supposedly essential component for making copies of DNA.

To their surprise, they saw that these cells could grow just fine, indicating that they were still managing to make more DNA without DNA Ligase I. They even saw that these 'handicapped' cells were able to fix induced damages in the DNA as well.

"Our next question is whether this phenomenon is unique to this specific type of cell, or if it's generally true to a variety of other cells, including those of humans," Yu said. "We're interested in finding out how exactly the cell's adapting."

If the replacement of DNA Ligase I is in fact a general rule among many types of cells, then textbooks will have to be rewritten, and scientists will have to start working toward a better explanation of how DNA is maintained and copied in the cell – two processes that are essential to the viability of life.

Provided by Michigan State University

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