Research finds enzymes essential for DNA repair

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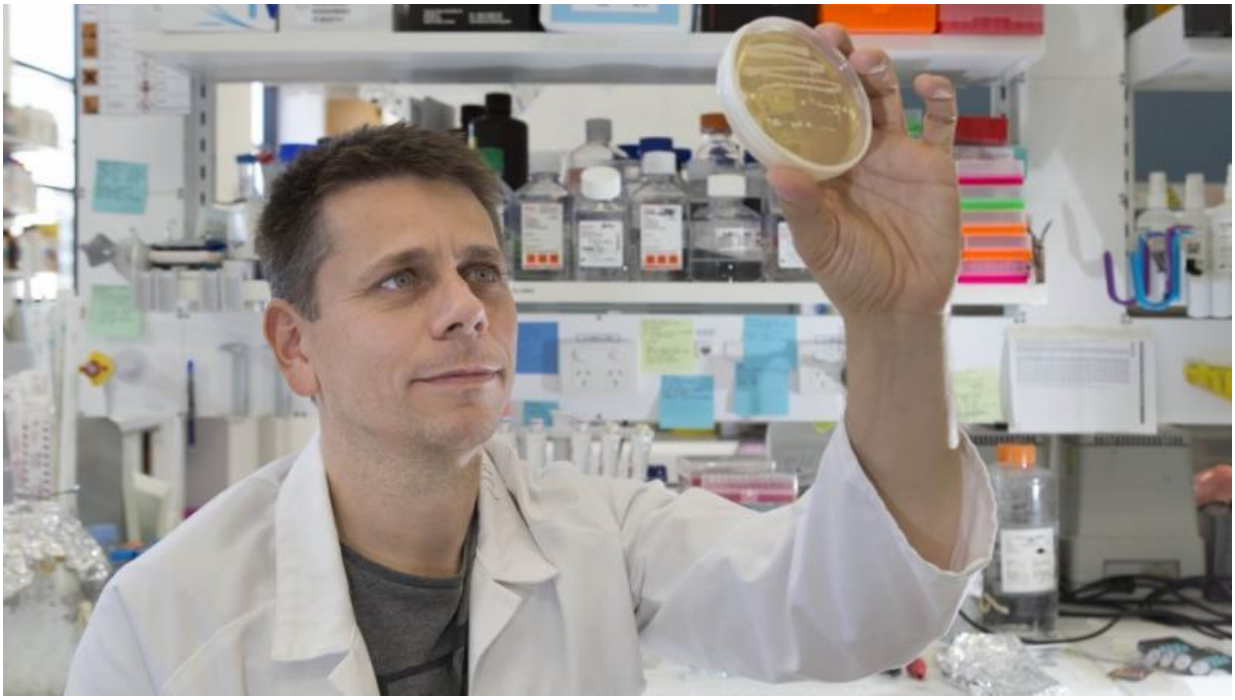

Credit: Stuart Hay, ANU

Scientists at ANU and Heidelberg University in Germany have found an essential component in the DNA repair process which could open the door to the development of new cancer drugs.

Lead researcher Associate Professor Tamás Fischer from ANU said the research found hybrid structures composed of DNA and RNA play an

important role in restoring the genetic information after the DNA is damaged. RNAs are short-lived copies of the genetic information stored in DNA.

The study also discovered that RNase H enzymes that target these hybrid structures are also essential for the efficient and precise repair of damaged DNA.

"This discovery opens the possibility for the development of new drugs that can target these enzymes, modulate their activity and block or enhance the efficiency of this important DNA repair pathway," Dr Fischer said.

He said the accumulation of mutations in the human genome was the main driving force behind ageing-related diseases and cancer development.

"The better we understand these repair pathways, the more potential we have to modulate them and possibly develop some preventative methods to decrease the rate of the accumulation of various mutations," he said.

"RNase H enzymes have been studied and used in molecular biology for many years but their biological function was not entirely clear until now.

"Our study reveals that these enzymes are essential for DNA repair and this is probably one of their most important functions and the reason that they are present in every living cell."

Dr Fischer said one of the most surprising findings was that RNA - DNA hybrids, which were previously thought to only negatively affect the integrity of the human genome - are actually also involved in protecting the DNA.

The research has been published in *Cell*.

More information: Corina Ohle et al. Transient RNA-DNA Hybrids Are Required for Efficient Double-Strand Break Repair, *Cell* (2016). DOI: 10.1016/j.cell.2016.10.001

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