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New tool to stimulate controlled suicide in human cells

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Washington, Dec 18 (ANI): Scientists from the Institute for Research in Biomedicine (IRB Barcelona) have developed a new tool to learn more about rescue signalling pathways and cell suicide.

The new method has appeared in the last issue of the specialized Journal Nucleic Acids Research, included in the group Oxford Journals.

Author of the article, Lluís Ribas de Pouplana, CREA researcher and head of the Gene Translation Laboratory at IRB Barcelona, said: “We have developed a strategy to induce controlled mutations in the cell, which allows us to gradually activate several repair systems that are triggered before the cell enters the cell death programme. Using previous methods, the effects on cells are less specific and may lead to parallel responses that hinder analysis of the results.”

Ribas recollected that Renaud Geslain, a researcher in his group and first author of the article, “had a brilliant idea to reproduce the same effect within the cell, without the help of compounds alien to the cell”.

Geslain manipulated a part of the cellular protein synthesis machinery that leads to the production of defective proteins.

“In response to the accumulation of misfolded proteins, the cellular alarm systems are switched on and stress responses are activated. Given that this approach affects all the proteins, we obtain all the reactions possible, not only responses that could be exclusive to one or a few affected proteins,” said Ribas.

Cells are bags of protein and one of the components involved in protein production is transfer RNA (tRNA). The tRNA transports the protein production machinery and the exact amino acids needed for each protein that is being built up.

Geslain developed new tRNAs, which place wrong amino acids into the protein sequences being synthesised.

Ribas explained: “When these tRNAs are introduced, the cells starts to make and accumulate defective proteins and it reacts in response. Given that the cell still conserves the healthy proteins present before the introduction of our tRNA, we can observe the extent to which the healthy part can correct the problem. We can also see when these defects are no longer correctible and how and when cells enter the suicide programme.

“Thus we can observe the whole spectra of cell responses triggered and measure when they begin and the connections between them. Finally, by means of transcriptomics studies, we can identify new components involved in this process.”

The tool designed at IRB Barcelona will make it possible to identify new components of the response mechanisms to mutations. It is hoped that these components may become targets for intervention in diseases Alzheimer’s and Parkinson’s. (ANI)

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