Researchers find out cause of mutations which are not in genetic material

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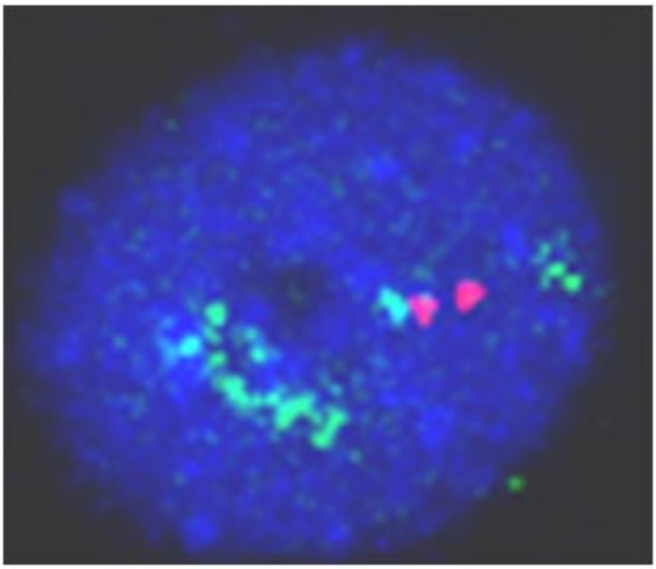

Lung cancer cell, ADAR1 extra copies of the gene are shown in green. In red the two normal copies of a control gene. Credit: IDIBELL

Proteins are like bricks that form our cells and they are built by the orders given by our genetic material, DNA. In human diseases, eventually DNA alterations modify proteins and they don't do their normal function, either by excess or defect. But recently we have started to find alterations of proteins without an obvious damage of the gene that produces them.

An article published in *Oncogene* led by Manel Esteller, director of the Epigenetics and Cancer Biology Program of the Bellvitge Biomedical Research Institute (IDIBELL), ICREA researcher and Professor of Genetics at the University of Barcelona, ??provides an explanation for this phenomenon: existence of alterations in an intermediate molecule (RNA) which transfers the information contained in the DNA to protein.

"We found that 5-10% of lung tumors, instead of having the normal dose of a gene (two copies, one on the maternal chromosome and another in his father) have an overdose of the same, around 10 extra copies of the gene, "says Manel Esteller, director of the study.

"The gene identified (referred ADAR1) regulates the level of mutations in RNA, and it is a publisher gene. People with an excess of this gene have an imbalance in the composition of this molecule just causing abnormal proteins that contribute to tumor growth. If we study these altered target genes we would not see mutations in their DNA but we will see alterated proteins because of these sequence alterations of the intermediate molecule, RNA.

"Graphically we could say that there has been a problem of 'Lost in Translation'" explains Esteller and he ends: "Now it will be important to know whether this type of alteration is common in the rest of human tumors, if it occurs significantly in other diseases and if there is any way to use this knowledge to better treatment."

More information: C Anadón et al. Gene amplification-associated overexpression of the RNA editing enzyme ADAR1 enhances human lung tumorigenesis, *Oncogene* (2015). DOI: 10.1038/onc.2015.469

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