New function discovered in cancer prevention protein

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Protein 53 is very important in protecting against cancer given that it prevents cancer-causing mutations from accumulating and its inactivation is closely linked to the proliferation of tumour cells. UAB (Universitat Autonoma de Barcelona, Spain) lecturer Ignasi Roig participated in the study. Formed by an international research team, the study served to discover that this protein played an unexpected physiological role: it also becomes activated during the formation process of ova and spermatozoids. The discovery, published in Science, could open the door to new approaches and ways of studying the disease.

Protein 53 is known as the guardian of the genome since it is basic for the genome's integrity by preventing the accumulation of mutations originating either by the cell's own mechanisms or by the action of external agents. The protein becomes activated in response to specific signals such as breaks in DNA. This activation implies a slowing of the cell's cycle which allows it to repair itself from the damage. If the damage is not repaired on time, the activation of p53 results in programmed cell death known as apoptosis. This causes the gene encoding the protein, which in humans is the TP53 gene, to be seen as a tumour suppressor since its inactivation can make it easier for many types of tumour cells to develop.

Scientists had long wondered about the origin and evolutionary appearance of this gene. From an evolutionary point of view it is understandable to think that p53 came into existence without necessarily acting as a tumour suppressor and, therefore, must have had other

functions which until now remained unknown.

Through the observation of genetically modified flies to determine the activation of p53, the team led by Dr John Abrams of the University of Texas Southwestern Medical Center and with the participation of Dr Ignasi Roig from the Cytology and Histology Unit of the Department of Cellular Biology, Physiology and Immunology at Universitat Autňnoma de Barcelona, discovered that p53 becomes activated during the formation of gametes (spermatozoids and ova). It becomes activated specifically during meiosis, the cell division process resulting in gametes. It is a moment in which the cell automatically breaks DNA all along its genome. Repairing these breaks, which is essential for meiosis to develop correctly, must be controlled closely in order to prevent the accumulation of mutations and the possibility of their binding to the gametes. P53 is in charge of developing this process control mechanism.

Scientists additionally discovered that the fact that p53 becomes activated during gametogenesis is something that has been conserved throughout evolution. The research team observed similar activations during the formation of spermatozoids in mice, which reaffirms the importance of this control mechanism.

The results of the study, published in *Science,* are revealing and help to understand more about the functions of this essential protein which stops the formation of tumours and therefore could open the door to new approaches in the study of cancer. The research describes for the first time the physiological role of p53 in the development of meiosis and suggests that the function of the tumour suppressor gene can be result of an evolution of primitive activities related with the progression of meiosis.

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