

## **CHD7 combines with ATM protein to prevent fetal abnormalities from radiation exposure**

Exposure to radiation can sometimes result in unrepaired DNA double-strand breaks (DSBs).<sup>1</sup> Such DSBs are thought to be involved in health effects that arise following radiation exposure. In this study, as one characteristic of cells containing unrepaired DSBs, CHD7<sup>2</sup> (chromodomain helicase DNA binding protein 7) was found to collect in regions with unrepaired DSBs and to undergo phosphorylation through the action of ATM<sup>3</sup> protein. Phosphorylation is one of several chemical reactions that can lead to changes in protein function. This study suggests that phosphorylation of CHD7 could be involved in the repair of DNA damage after exposure to radiation.

Until now, the main role of CHD7 was thought to be in the process by which organisms with a spinal column, in other words vertebrates, develop into a fetus from a fertilized egg (the process involves populations of neural crest cells<sup>4</sup> changing shape into cells that form the foundation for brain and nerve development). The reason for that interpretation was that when CHD7 gene action weakens, multiple developmental defects occur in the fetus. With the findings in this study, however, we came to understand that CHD7 might play two different roles: in the development of fetuses, and in the repair of DSBs in the cells of fetuses, providing insight into CHD7's effectiveness in ensuring healthy fetal development.

The above example shows how living organisms can make effective use of such tools as enzymes and proteins that have become available through the evolutionary process to maintain life and continue survival of the species.

### Notes

<sup>1</sup> Double-strand breaks (DSBs):

The result of splits in the double-helix structure of DNA in cells.

<sup>2</sup> CHD7:

One of the proteins that function when a fetus transforms from a fertilized egg into a human body. Humans with abnormalities in this gene protein can develop malformations in the eyes and heart as well as in physical growth.

<sup>3</sup> ATM:

The ATM gene is an important signal protein that communicates stress from radiation inside cells, and is known to cause phosphorylation in several proteins.

<sup>4</sup> Neural crest cells:

Cells with the ability to transform into different parts of the body, not merely one specific part, depending on conditions in the stage at which the body develops from a fertilized egg. Only vertebrates possess such cell populations.

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RERF's objective with this brief outline is to succinctly explain our research for the lay public. Much of the technical content of the original paper has been omitted. For further details about the study, please refer to the full paper published by the journal.