DNA damage-triggered cellular reprogramming in the moss *Physcomitrium patens*

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Genomic DNA constantly faces damage by environmental stresses and cellular activities. DNA damage threatens genome integrity and cell viability. Notably, stem cells exhibit higher sensitivity to DNA damage compared to differentiated cells, and even lower levels of DNA damage can result in stem cell death. However, our research reveals that transiently induced DNA strand breaks can trigger the reprogramming of differentiated leaf cells into stem cells without inducing cell death in the moss *Physcomitrium* (*Physcomitrella*) *patens*. Stem cells induced by DNA strand breaks are able to develop healthy leafy shoots, known as gametophores. *STEM CELL INDUCING FACTORs* (*STEMINs*), which encode AP2/ERF transcription factors and facilitate wounding-triggered reprogramming, were indispensable for DNA strand break-triggered reprogramming. Furthermore, among the DNA damage signal transducers, ATM and ATR, only ATR was essential for the activation of the *STEMIN1* expression and the initiation of reprogramming. These results demonstrate that DNA strand breaks are a novel trigger of cellular reprogramming, which requires the activity of ATR and STEMINs. Here, I will present our current results on the effects of gamma-ray irradiation on the reprogramming of leaf cells in *P. patens* and discuss the molecular mechanisms underpinning DNA damage-triggered reprogramming.

Short biography:

Nan Gu earned her PhD from Huazhong Agricultural University, China in August 2020. Currently, she serves as a postdoctoral researcher at Utsunomiya University, starting from October 2020. Specializing in plant cell research, she is dedicated to unraveling the mechanism of DNA damage-triggered cellular reprogramming and exploring its universality. She holds membership of the Botanical Society of Japan.