

CHROMATIN**INTERPLAY OF PTEN WITH HISTONE H1**

The tumour suppressor protein phosphatase and tensin homologue (PTEN) is most known for its cytoplasmic role in PI3K–AKT signalling, although nuclear roles for PTEN, including in the regulation of gene transcription, have emerged. Chen *et al.* now show that PTEN keeps transcription in check by interacting with histone H1 to promote chromatin condensation.

The authors observed that the distribution of heterochromatin protein 1 α (HP1 α) on heterochromatin was aberrant in PTEN-knockout mouse embryonic fibroblasts, indicating that PTEN is important for normal chromatin organization. Using several assays, they found that the PTEN C2 domain interacts with the C-terminal region of histone H1 — a stabilizer of higher-order chromatin — independently of PTEN phosphatase activity.

So, what is the function of this interaction? Loss of PTEN reduced the ability of histone H1 to bind chromatin, as well as histone H1–HP1 α interactions and the degree of chromatin condensation. Histone acetylation promotes open chromatin and the authors found that histone H4 acetylation at Lys16 (H4K16) was increased in PTEN-null cells.

These, and further experiments, support the model that PTEN maintains chromosome condensation by interacting with histone H1 and increasing the chromatin loading of HP1 α ; loss of PTEN displaces histone H1, which increases H4K16 acetylation and chromatin decondensation. Indeed, preventing PTEN–histone H1 interactions increased the level of gene transcription, as expected from open chromatin.

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ORIGINAL RESEARCH PAPER Chen, Z. H. *et al.* PTEN interacts with histone H1 and controls chromatin condensation. *Cell Rep.* <http://dx.doi.org/10.1016/j.celrep.2014.08.008> (2014)

FURTHER READING Song, M. S. *et al.* The functions and regulation of the PTEN tumour suppressor. *Nature Rev. Mol. Cell Biol.* **13**, 283–296 (2012)