

Structural features of TALEs

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Mak, A.N., Bradley, P., Cernadas, R.A., Bogdanove, A.J., & Stoddard, B.L. The crystal structure of TAL effector PthXo1 bound to its DNA target. *Science*, 2012, **335**, 716-719.

Deng, D., Yan, C., Pan, X., Mahfouz, M., Wang, J., Zhu, J.K., Shi, Y., & Yan, N. Structural basis for sequence-specific recognition of DNA by TAL effectors. *Science*, 2012, **335**, 720-723.

Gao, H., Wu, X., Chai, J., & Han, Z. Crystal structure of a TALE protein reveals an extended N-terminal DNA binding region. *Cell Res.*, 2012, **22**, 1716-1720.

Abstract:

Transcription activator-like effector nucleases (TALENs) have rapidly emerged as a new genome editing tool. TALENs are composed of the non-specific FokI domain as the DNA cleavage module and a series of tandem repeats in TALEs of the plant pathogenic bacteria as the specific DNA recognition module. Recently, the crystal structures of the consecutive DNA binding repeats of the TALE proteins with/without DNA were published. These structures demonstrated that each TAL repeats adopts a two-helix bundle, that the consecutive TAL repeats form a right-handed superhelix around the DNA major groove, and that the sequence specific contacts to target DNA are made by the 13th residue of each TAL repeat.

In this Journal Club, I will introduce the above 3 published papers. The first paper showed the overall structure of the consecutive TAL repeat region of the PthXo1 protein with the target DNA and the specific contacts between the TAL repeat and the DNA base. The second one also showed the overall structure of TAL repeats of dHax3 protein and the specific contacts with the DNA. Furthermore, it demonstrated the global structural difference between the DNA bound form and the free form. The third one showed the structure of the N terminal region preceding the central TAL repeat region and the binding features using structure-based mutagenesis and isothermal titration calorimetry (ITC).

References:

1. Moscou, M.J. & Bogdanove, A.J. A simple cipher governs DNA recognition by TAL effectors. *Science*, 2009, **326**, 1501.
2. Filipovska, A. & Rackham, O. Modular recognition of nucleic acids by PUF, TALE and PPR proteins. *Mol. Biosyst.*, 2012, **8**, 699-708.