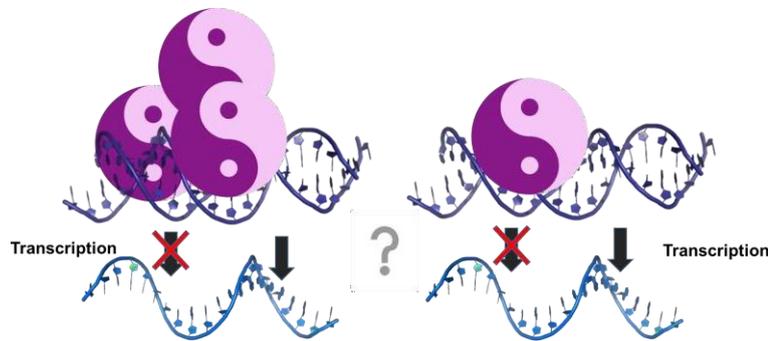


## Determining the role of the oligomerisation and dynamics of yy1 indna binding

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*Transcription factor YY1 binds to DNA in concentration-dependent oligomers of various sizes. This is likely to alter transcriptional activity.*

**Introduction:** Yin Yang 1 (YY1) is a ubiquitously expressed transcription factor involved in neural development. Depending on the conditions of its own expression, YY1 is capable of either activating or repressing transcription. The oligomeric state of YY1 is likely to alter its DNA binding and transcriptional activity. Therefore, the aim of this study was to characterise the quaternary structure of YY1 and its role in DNA binding.

**Methodology:** The quaternary structure of YY1 was characterised using spectroscopic and chromatographic techniques. Electrophoretic mobility shift assays were used to observe YY1-DNA binding. The dynamics of YY1 were then observed when bound and unbound to DNA using Hydrogen-deuterium exchange mass spectrometry (HDXMS).

**Results:** YY1 exists in a variety of oligomeric species, which are concentration dependent. Additionally, the oligomeric state of YY1 is disrupted by saturating amounts of DNA. Interestingly, YY1 has a hydrodynamic volume which is larger than expected, indicating that it is not fully globular. This finding was supported by the high level of exposure of YY1's sequence to solution (>70% deuterium uptake), shown by HDXMS. When comparing the dynamics of YY1 in the presence and absence of DNA, it was found that upon DNA binding, the N-terminal of YY1 is most affected, becoming more exposed to solution.

**Discussion:** The dynamics and oligomeric state of YY1 are dependent on concentration and DNA binding, suggesting that they are instrumental to its transcriptional regulatory function, and likely plays a large role in neurodevelopmental disorders.

### References:

- Houbavity, H.B., Usheva, A., Shenki, T. and Burley, S.K. (1996). Cocystal structure of YY1 bound to the adeno-associated virus P5 initiator. *Proceedings of the National Academy of Sciences of the United States of America*, 93: 13577-13582.
- Górecki, A., Bonarek, P., Górka, A.K., Figiel, M.W. and Dziedzicka-Wasylewska, M. (2015). Intrinsic disorder of human Yin Yang 1 protein. *Proteins*, 83: 1284-1296.
- Weintraub, A.S., Li, C.H., ZAmudio, A.V., Bradner, J.E., Gray, N.S. and Young, R.A. (2017). YY1 is a structural regulator of enhance-promoter loops. *Cell*, 172: 1573-1588.

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