Computational Approach to RNA-Protein Binding

Phoebe Dillon, Emily Oldani, Jake McGuire, Erich Chapman

Trans active response DNA Binding Protein 43 kDa (TDP-43)

References

Shenberg, A., Morris, M. R., Surette, E., & Rosalia, F. E. (2015). Characterizing TDP-43 — Interaction with its RNA targets. Nucleic Acids Research, 4109, 4067–4079. https://doi.org/10.1093/nar/gkv.1.1

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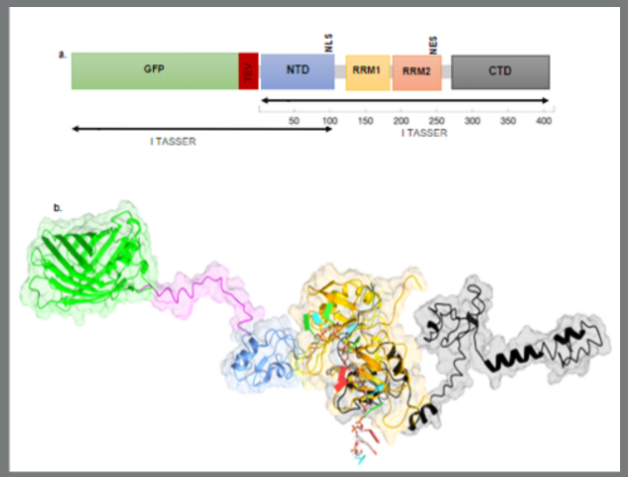
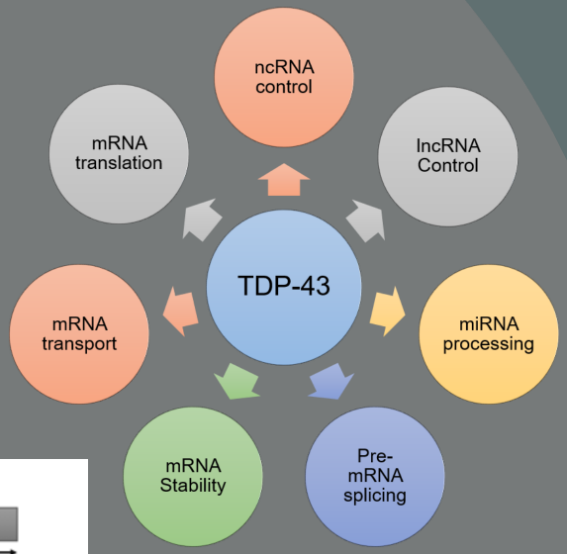
TDP-43





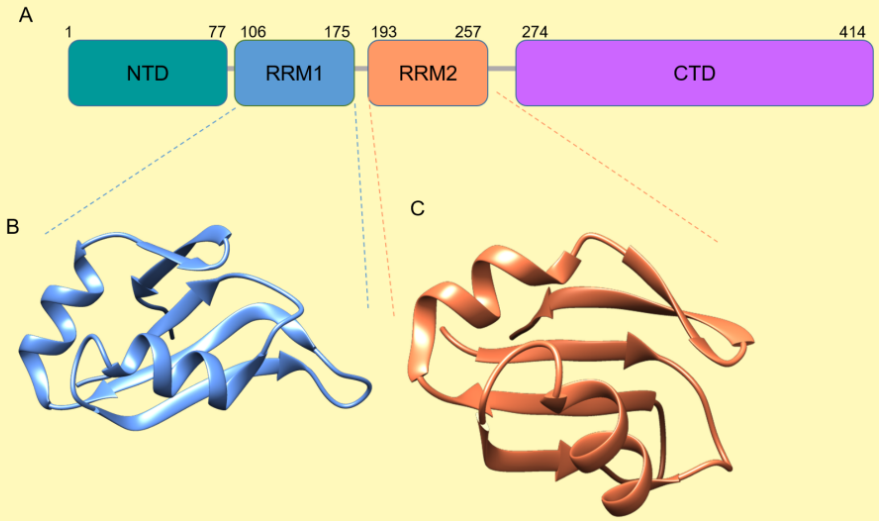
RNA Recognition Motifs (RRMs)

Important Amino Acids

Methods

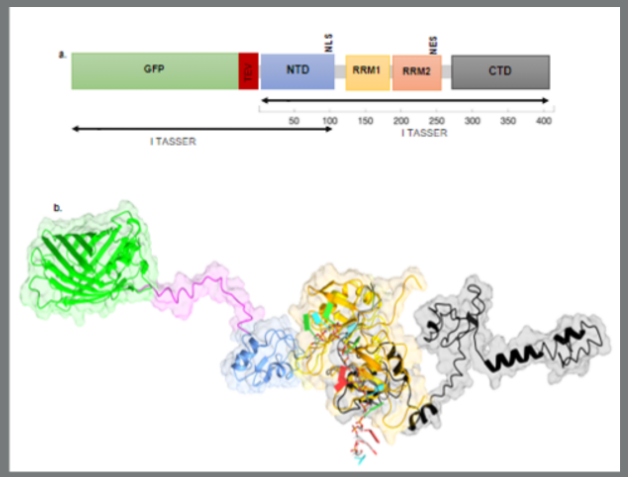
Results

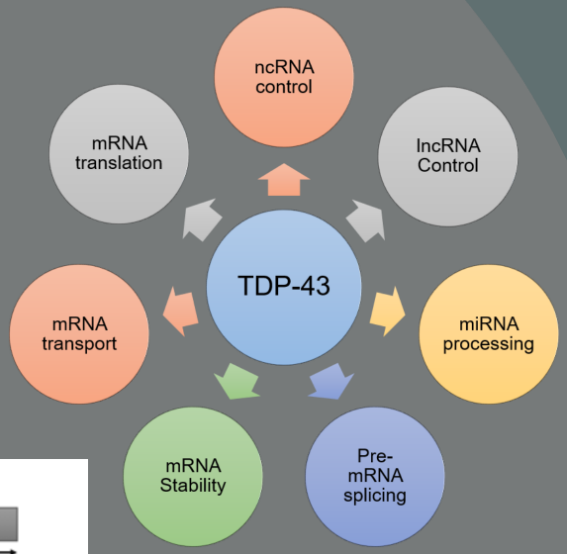
RRMS



- RRM1 (106-175)
- RRM2 (193-257)
  - RRM2 acts as a hinge to increase binding specificity

TDP-43





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Important Amino Acids

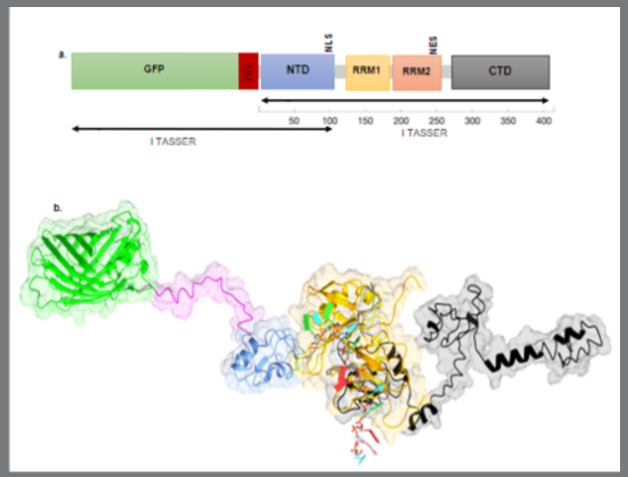
231, 147, 149, 229, 194

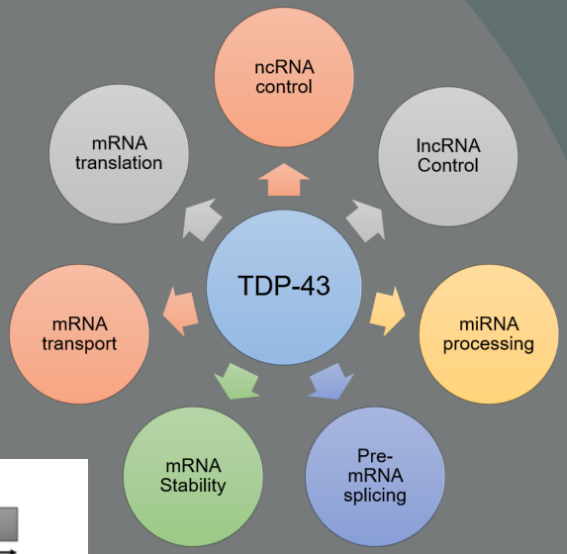
Phenylalanine (F)

- RRM1
  - F147, F149
- RRM2
  - F194, 229, 231

Serine 248

TDP-43





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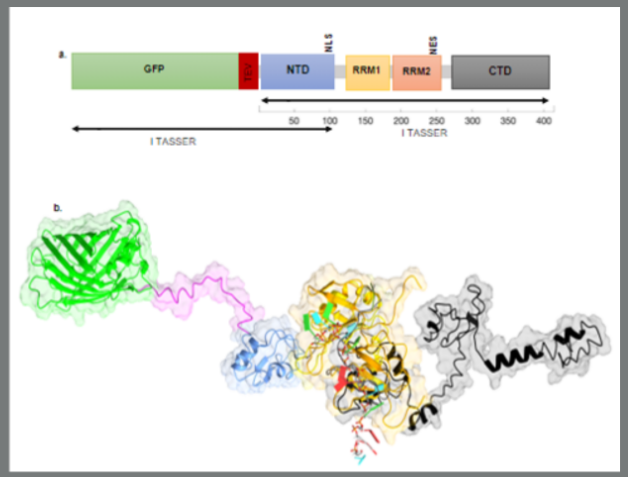
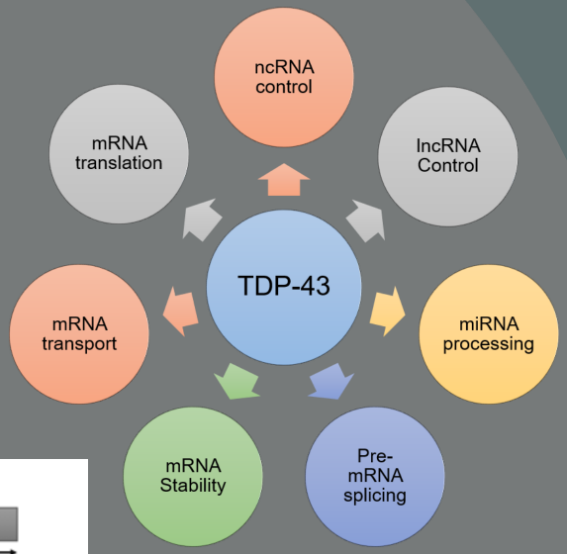
Modeling and Docking

- RNA 3-D Modeling
  - Find RNAs that are known to bind to the RRMs
  - 3-D rendering of the RNAs
- Docking on the Protein
  - Isolate one conformation of the RRM NMR structure (4BS2)
  - Dock using HDOCK

TDP-43





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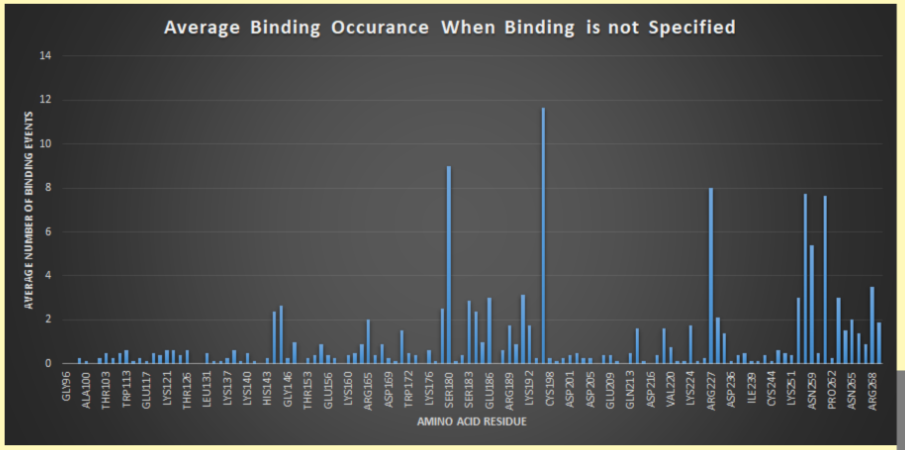
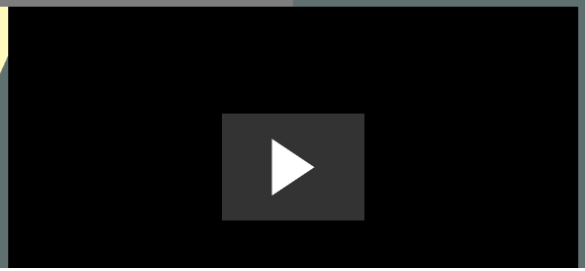
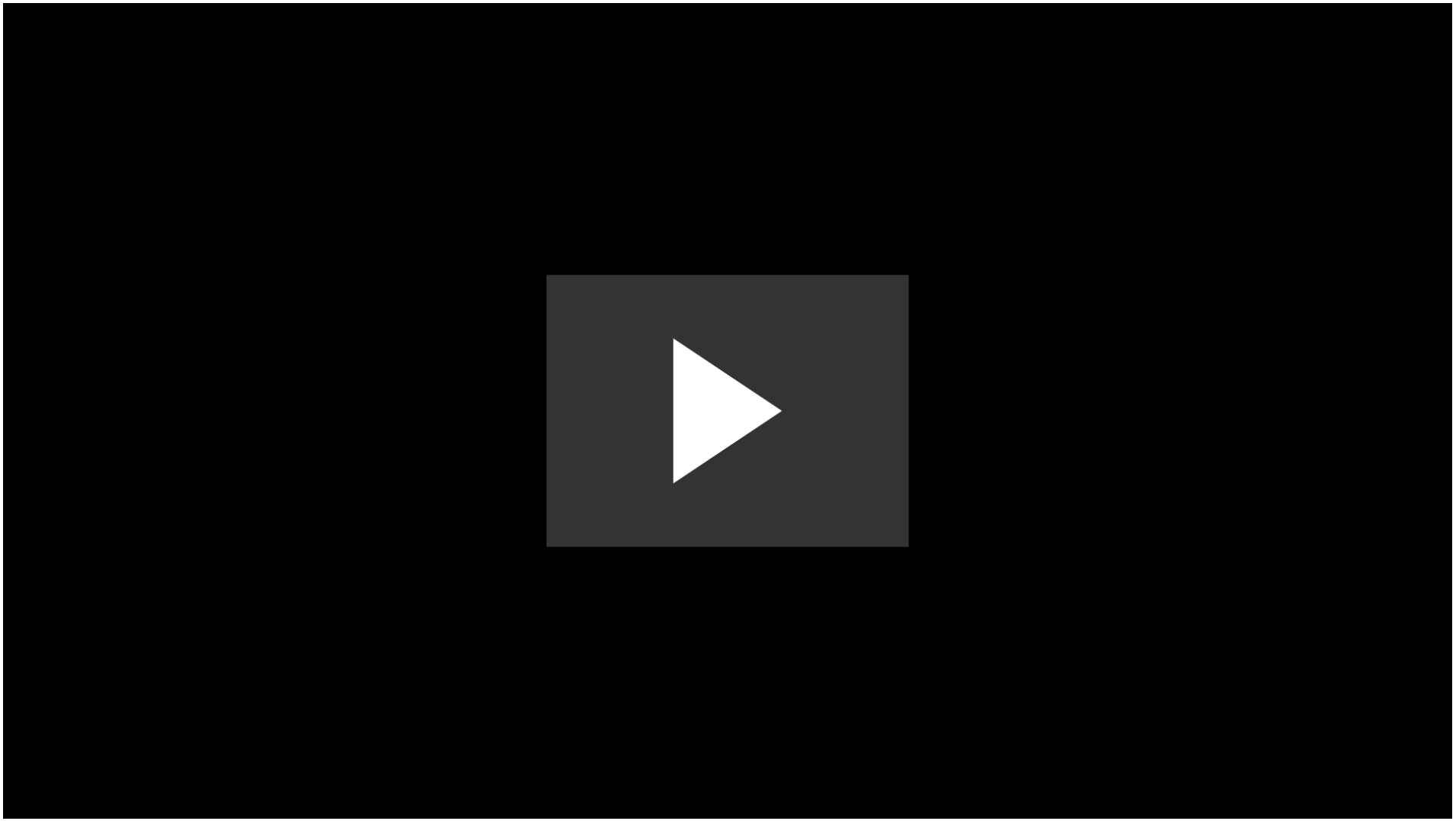


When the binding site was specified:





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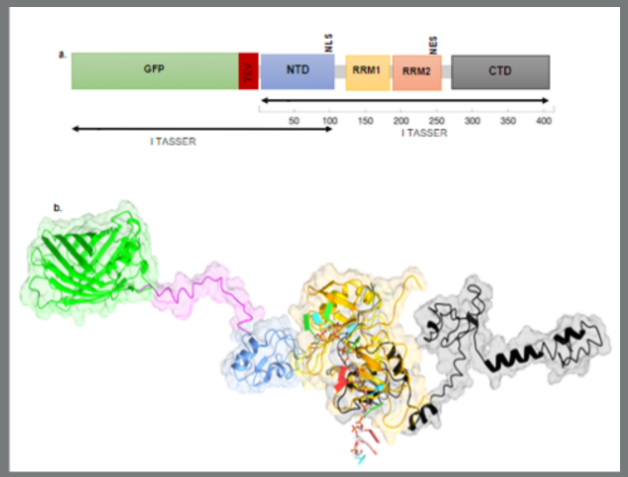

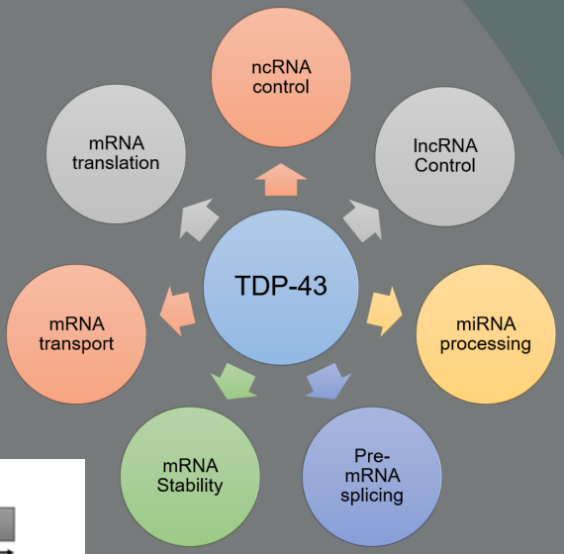

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