

A formalization of one of the main claims of “TDP-43 represses cryptic exon inclusion in FTD/ALS gene UNC13A” by Rosa Ma et al. 2021¹

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Abstract. Rosa Ma et al. claimed in previous work that the protein TDP-43 represses cryptic exon inclusion in the gene UNC13A. We present here a formalization of that claim, stating that all things of class “TAR DNA binding protein” that are in the context of a thing of class “UNC13A” generally have a relation of type “inhibits” to a thing of class “inclusion of cryptic exon” in the same context.

Keywords: UNC13A, TAR DNA binding protein, inclusion of cryptic exon

1. Introduction

Rosa Ma et al. [2] state that “Here we show that TDP-43 represses a cryptic exon splicing event in UNC13A.”. We present here a formalization of the main scientific claim from this quote by using a semantic template called the super-pattern [1].

2. Formalization

Our formalization looks as follows:

¹As RDF/nanopublication: http://purl.org/np/RAXkuXJ4IK10Ai9F39_tOFDy6ewi7znau6OQhUEXP4nPc

CONTEXT-CLASS (“in the context of all...”):	UNC13A
SUBJECT-CLASS (“things of type...”):	TAR DNA binding protein
QUALIFIER:	generally
RELATION-TYPE (“have a relation of type...”):	inhibits
OBJECT-CLASS (“to things of type...”):	inclusion of cryptic exon

In the context class we use the “UNC13A” (Q18036664) class from Wikipedia. In subject class, we use the “TAR DNA binding protein” (Q21133247) from Wikidata. In the object class we used the “inclusion of cryptic exon” (VariO_0504) class from OBO ontology.

3. RDF code

This is our formalization as a nanopublication in TriG format:

```
@prefix this: <http://purl.org/np/RAXkuXJ4IK10Ai9F39_tOFDy6ewi7znau6OQhUEXP4nPc> .
@prefix sub: <http://purl.org/np/RAXkuXJ4IK10Ai9F39_tOFDy6ewi7znau6OQhUEXP4nPc#> .
@prefix np: <http://www.nanopub.org/nschema#> .
@prefix dct: <http://purl.org/dc/terms/> .
@prefix nt: <https://w3id.org/np/o/ntemplate/> .
@prefix npx: <http://purl.org/nanopub/x/> .
@prefix xsd: <http://www.w3.org/2001/XMLSchema#> .
@prefix rdfs: <http://www.w3.org/2000/01/rdf-schema#> .
@prefix orcid: <https://orcid.org/> .
@prefix prov: <http://www.w3.org/ns/prov#> .
@prefix sp: <https://w3id.org/linkflows/superpattern/terms/> .

sub:Head {
  this: np:hasAssertion sub:assertion ;
  np:hasProvenance sub:provenance ;
  np:hasPublicationInfo sub:pubinfo ;
  a np:Nanopublication .
}
sub:assertion {
  sub:spi a <https://w3id.org/linkflows/superpattern/terms/SuperPatternInstance> ;
  rdfs:label "The protein TDP-43 represses cryptic exon inclusion in the gene UNC13A." ;
  sp:hasContextClass <http://www.wikidata.org/entity/Q18036664> ;
  sp:hasSubjectClass <http://www.wikidata.org/entity/Q21133247> ;
  sp:hasQualifier sp:generallyQualifier ;
  sp:hasRelation sp:inhibits ;
  sp:hasObjectClass <http://purl.obolibrary.org/obo/VariO_0504> .
}
sub:provenance {
  sub:activity a sp:FormalizationActivity ;
  prov:used sub:quote , <https://www.biorxiv.org/content/10.1101/2021.04.02.438213v1> ;
  prov:wasAssociatedWith orcid:0000-0003-2310-3013 .
  sub:assertion prov:wasGeneratedBy sub:activity .
  sub:quote prov:value "Here we show that TDP-43 represses a cryptic exon splicing event in UNC13A." ;
  prov:wasQuotedFrom <https://www.biorxiv.org/content/10.1101/2021.04.02.438213v1> .
}
sub:pubinfo {
  sub:sig npx:hasAlgorithm "RSA" ;
  npx:hasPublicKey
  "MIGfMA0GCSqGSIb3DQEBAQUAA4GNADCBiQKBgQCKr8mDKqduV4sU41G1CvB3R8Hrv3cdc+FxyCD0iONSayErC8oLDfaMBKZSLMkPBapyXeAjWbYmhuety7COxiakp
  TqSGKzy8AnMKNZ7tgd3KATKBPLQiawisIxx0BFpxw50yA2spZhv2bEpdni9wUOGalMG+0sKC6bo2DnjxxeA/wIDAQAB" ;
  npx:hasSignature
  "PBzoLld6dCDC9ZgLLKNNOL2bEih1Z7MpIHnpG1hKKV7YqsrlFL9pS6z6mtMTrdfZwSqupg1o2pwWluWqIzindCa8rTEVzcQAOrEvFP/Xg0yef/E71DeVrvyVZDxh
  hgWULWH8hesWGqhwgY0cLlmGsXts4ft5GVU7o60AO5HMCAM=" ;
  npx:hasSignatureTarget this: .
  this: dct:created "2021-10-26T13:03:28.286Z"^^xsd:dateTime ;
  dct:creator orcid:0000-0003-2310-3013 ;
  npx:introduces sub:spi ;
  <https://w3id.org/linkflows/reviews/isUpdateOf> <http://purl.org/np/RAIwvdnjqm0L2VP_eR2oFBxk97A_dw_FeusMzuRE9SIY> ;
  nt:wasCreatedFromProvenanceTemplate <http://purl.org/np/RAE1wm1Oy0y039PlK9QkQ-wqbC3q-R2nXraP5huu8W39k> ;
  nt:wasCreatedFromPubinfoTemplate <http://purl.org/np/RAA2MfqdBcZmz9yVWjKLXNbyfBNcwsMmOqcNUxkk1maIM> ,
  <http://purl.org/np/RAOGu9Lh0BD4tbIRB9RG6RGRA_ObDh75NTbIqaWgxxs8M> ;
  nt:wasCreatedFromTemplate <http://purl.org/np/RAv68imZrEjfcP2rnEglhzoBqEvc0cQMtp9_1Za0BxNM4> .
}
```

References

- [1] C.I. Bucur, T. Kuhn, D. Ceolin and J. van Ossenbruggen, Expressing high-level scientific claims with formal semantics, in: *Proceedings of the 11th Knowledge Capture Conference*, 2021. doi:[10.1145/3460210.3493561](https://doi.org/10.1145/3460210.3493561).
- [2] X. Rosa Ma, M. Prudencio, Y. Koike, S.C. Vatsavayai, G. Kim, F. Harbinski, C.M. Rodriguez, H.B. Schmidt, B.B. Cummings, D.W. Wyatt, K. Kurylo, G. Miller, S. Mekhoubad, N. Sallee, K. Jansen-West, C.N. Cook, S. Pickles, B. Oskarsson, N.R. Graff-Radford, B.F. Boeve, D.S. Knopman, R.C. Petersen, D.W. Dickson, E.M. Green, W.W. Seeley, L. Petrucelli and A.D. Gitler, TDP-43 represses cryptic exon inclusion in FTD/ALS gene UNC13A, *bioRxiv*. doi:[10.1101/2021.04.02.438213](https://doi.org/10.1101/2021.04.02.438213).