

# Y291\* — WFS1 Molecular Atlas Card

**Variant type:** Nonsense (premature stop codon)

**Position:** 291

**Wild-type residue:** Tyrosine (Y)

**Domain context (where the stop falls):** N-terminal cytoplasmic (intrinsically disordered)

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## SCHEMA CATEGORY: N1 — NMD-TARGETED — NULL ALLELE

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Transcript degraded by NMD; no truncated protein produced. Therapeutic options: (a) translational readthrough drugs — Ataluren/PTC124, gentamicin-class aminoglycosides — may rescue partial readthrough; (b) gene therapy — allele replacement is the higher-yield long-term path. Pharmacological chaperones do not apply since no protein is made.

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## NMD PREDICTION

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- **Status:** NMD-targeted
- **Confidence:** high
- **Reasoning:** Stop codon at position 291 is more than 50 nt upstream of the last exon-exon junction (~aa 413). The 50-nt rule predicts the transcript is degraded by nonsense-mediated decay. No truncated protein is produced; functionally a null allele.

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## TRUNCATION ANALYSIS

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- **Residues retained:** 1 – 290 (32.6% of full-length protein)
- **Residues lost:** 291 – 890 (67.4% of full-length protein)

### Retained domains

*(no domains fully retained)*

## Partially retained at truncation point

- **N-terminal cytoplasmic (intrinsically disordered)** — partial: aa 1–290 retained, aa 291–310 lost

## Lost domains

- Transmembrane helix 1 (aa 311–331)
- Cytoplasmic loop 1 (aa 332–340)
- Transmembrane helix 2 (aa 341–361)
- Luminal loop 1 (aa 362–370)
- Transmembrane helix 3 (aa 371–391)
- Cytoplasmic loop 2 (aa 392–400)
- Transmembrane helix 4 (aa 401–421)
- Luminal loop 2 (aa 422–431)
- Transmembrane helix 5 (aa 432–452)
- Cytoplasmic loop 3 (aa 453–461)
- Transmembrane helix 6 (aa 462–482)
- Luminal loop 3 (aa 483–496)
- Transmembrane helix 7 (aa 497–517)
- Cytoplasmic loop 4 (aa 518–532)
- Transmembrane helix 8 (aa 533–553)
- Luminal loop 4 (aa 554–573)
- Transmembrane helix 9 (aa 574–594)
- Cytoplasmic loop 5 / pre-luminal (aa 595–599)
- C-terminal ER-luminal (calcium binding, calmodulin, chaperone) (aa 600–890)

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## CLINICAL EVIDENCE

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- **Classification:** Pathogenic
  - **Review status:** criteria provided, multiple submitters, no conflicts
  - **Associated conditions:** Wolfram syndrome
  - **cDNA change:** c.873C>G
  - **ClinVar accession:** VCV000212616
  - **Last evaluated:** 2025/02/17 00:00
  - **Submissions:** 1
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## WHY THIS VARIANT MATTERS

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This variant is biologically silent — the transcript is degraded before any truncated protein can be made. From a therapeutic standpoint, that simplifies the problem (one null allele) and points toward two specific paths: readthrough compounds that exploit the ribosome's natural ability to bypass premature stops, or gene-level replacement therapy. The atlas surfaces this clarity directly.

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*Card generated by `wolfram-atlas-batch` skill (v1) on 2026-06-08T02:17:56.738016Z.*

*NMD rule and schema definitions: `reference/nmd` rules.md , `reference/cardschemaextension`.md .*

*WFS1 reference: UniProt O76024, AlphaFold model v6.*