

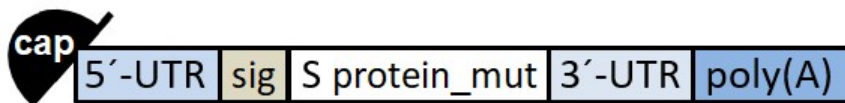


## 11889

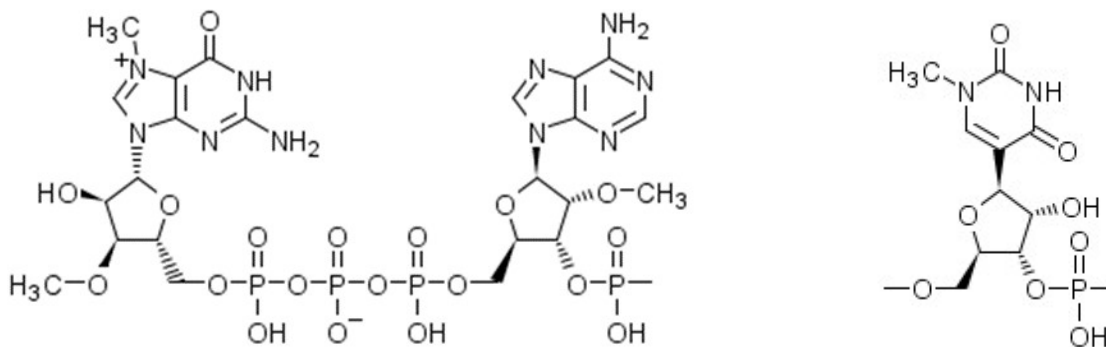
### Description

Messenger RNA encoding the full-length SARS-CoV-2 spike glycoprotein.

### Schematic



UTR = Untranslated region; sig = extended signal sequence of the S glycoprotein; S protein\_mut = S glycoprotein sequence containing mutations K986P and V987P; poly(A) = polyadenylate signal tail.



### 5'- capping structure

cap G<sup>1</sup>A<sup>2</sup> = m<sup>7</sup>G<sup>+</sup>m<sup>3'</sup>-5'-ppp-5'-Am<sup>2'</sup>-3'-p-  
[m<sup>7</sup> = 7-CH<sub>3</sub>; m<sup>3'</sup> = 3'-O-CH<sub>3</sub>; m<sup>2'</sup> = 2'-O-CH<sub>3</sub>;  
-ppp- = -PO<sub>2</sub>H-O-PO<sub>2</sub>H-O-PO<sub>2</sub>H-; -p- = -PO<sub>2</sub>H-]

m<sup>1</sup>Ψ = 1-methyl-3'-pseudouridylyl

### Table of features

Element	Description	Position
cap	A modified 5'-cap1 structure (m <sup>7</sup> G <sup>+</sup> m <sup>3'</sup> -5'-ppp-5'-Am)	1-2
5'-UTR	5'-untranslated region derived from human alpha-globin RNA with an optimized Kozak sequence	3-54



sig	S glycoprotein signal peptide (extended leader sequence), which guides translocation of the nascent polypeptide chain into the endoplasmic reticulum.	55-102
S protein_mut	Codon-optimized sequence encoding full-length SARS-CoV-2 spike (S) glycoprotein containing mutations K986P and V987P to ensure the S glycoprotein remains in an antigenically optimal pre-fusion conformation; stop codons: 3874-3879 (underlined)	103-3879
3'-UTR	The 3' untranslated region comprises two sequence elements derived from the amino-terminal enhancer of split (AES) mRNA and the mitochondrial encoded 12S ribosomal RNA to confer RNA stability and high total protein expression.	3880-4174
poly(A)	A 110-nucleotide poly(A)-tail consisting of a stretch of 30 adenosine residues, followed by a 10-nucleotide linker sequence and another 70 adenosine residues.	4175-4284

Sequence / Séquence / Secuencia

GAGAAΨAAAC ΨAGΨAΨΨCΨΨ CΨGGΨCCCCA CAGACΨCAGA GAGAACCCGC 50  
CACCAΨGΨΨC GΨGΨΨCCΨGG ΨGCΨGCΨGCC ΨCΨGGΨGΨCC AGCCAGΨGΨG 100  
ΨGAACCΨGAC CACCAGAACA CAGCΨGCCΨC CAGCCΨACAC CAACAGCΨΨΨ 150  
ACCAGAGGCG ΨGΨACΨACCC CGACAAGGΨG ΨΨCAGAΨCCA GCGΨGCΨGCA 200  
CΨCΨACCCAG GACCΨGΨΨCC ΨGCCΨΨCΨΨ CAGCAACGΨG ACCΨGGΨΨCC 250  
ACGCCAΨCCA CGΨGΨCCGGC ACCAAΨGGCA CCAAGAGAΨΨ CGACAACCCC 300  
GΨGCΨGCCCΨ ΨCAACGACGG GGΨGΨACΨΨΨ GCCAGCACCG AGAAGΨCCAA 350  
CAΨCAΨCAGA GGCΨGGAΨCΨ ΨCGGCACCAC ACΨGGACAGC AAGACCCAGA 400  
GCCΨGCΨGAΨ CGΨGAACAAC GCCACCAACG ΨGGΨCAΨCAA AGΨGΨGCGAG 450  
ΨΨCCAGΨΨCΨ GCAACGACCC CΨΨCCΨGGGC GΨCΨACΨACC ACAAGAACAA 500  
CAAGAGCΨGG AΨGGAAAGCG AGΨΨCCGGGΨ GΨACAGCAGC GCCAACAAΨΨ 550  
GCACCΨΨCGA GΨACGΨGΨCC CAGCCΨΨΨCC ΨGAΨGGACCΨ GGAAGGCAAG 600  
CAGGGCAACΨ ΨCAAGAACCΨ GCGCGAGΨΨC GΨGΨΨΨAAGA ACAΨCGACGG 650  
CΨACΨΨCAAG AΨCΨACAGCA AGCACACCCC ΨAΨCAACCΨC GΨGCGGGAΨC 700  
ΨGCCΨCAGGG CΨΨCΨCΨGCΨ CΨGGAAACCCC ΨGGΨGGAΨCΨ GCCCAΨCGGC 750  
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GACACCΨGGC GAVAGCAGCA GCGGAΨGGAC AGCΨGGΨGCC GCCGCΨΨACΨ 850  
AΨGΨGGGCΨA CCΨGCAGCCΨ AGAACCΨΨCC ΨGCΨGAAGΨA CAACGAGAAC 900  
GGCACCAΨCA CCGACGCCGΨ GGAΨΨGΨGCΨ CΨGGAΨCCΨC ΨGAGCGAGAC 950  
AAAGΨGCACC CΨGAAGΨCCΨ ΨCACCGΨGGA AAAGGGCAΨC ΨACCAGACCA 1000  
GCAACΨΨCCG GGΨGCAGCCC ACCGAAΨCCA ΨCGΨGCGGΨΨ CCCCAAΨAΨC 1050  
ACCAAΨCΨGΨ GCCCΨΨCΨGG CGAGGΨGΨΨC AAΨGCCACCA GAΨΨCGCCΨC 1100  
ΨGΨGΨACGCC ΨGGAACCGGA AGCGGAΨCAG CAAΨΨGCGΨG GCCGACΨACΨ 1150  
CCGΨGCΨGΨA CAACΨCCGCC AGCΨΨCAGCA CCΨΨCAAGΨG CΨACGGCGΨG 1200  
ΨCCCCΨACCA AGCΨGAACGA CCΨGΨGCΨΨC ACAAACGΨGΨ ACGCCGACAG 1250  
CΨΨCGΨGAΨC CGGGGAGAΨG AAGΨGCGGCA GAΨΨGCCCCΨ GGACAGACAG 1300  
GCAAGAΨCGC CGACΨACAAC ΨACAAGCΨGC CCGACGACΨΨ CACCGGCΨGΨ 1350



GΨGAΨΨGCCΨ	GGAACAGCAA	CAACCΨGGAC	ΨCCAAAGΨCG	GCGGCAACΨA	1400
CAAΨΨACCΨG	ΨACCGGCΨGΨ	ΨCCGGAAGΨC	CAAΨCΨGAAG	CCCΨΨCGAGC	1450
GGGACAΨCΨC	CACCGAGAΨC	ΨAΨCAGGCCG	GCAGCACCCC	ΨΨGΨAACGGC	1500
GΨGGAAGGCΨ	ΨCAACΨGCΨA	CΨΨCCCACΨG	CAGΨCCΨACG	GCΨΨΨCAGCC	1550
CACAAAΨGGC	GΨGGGCΨAΨC	AGCCCΨACAG	AGΨGGΨGGΨG	CΨGAGCΨΨCG	1600
AACΨGCΨGCA	ΨGCCCCΨGCC	ACAGΨGΨGCG	GCCCΨAAGAA	AAGCACCAAΨ	1650
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CGGCGΨGCΨG	ACAGAGAGCA	ACAAGAAGΨΨ	CCΨGCCAΨΨC	CAGCAGΨΨΨG	1750
GCCGGGAWAΨ	CGCCGAWACC	ACAGACGCCG	ΨΨAGAGAΨCC	CCAGACACΨG	1800
GAAAΨCCΨGG	ACAΨCACCCC	ΨΨGCAGCΨΨC	GGCGGAGΨGΨ	CΨGΨGAΨCAC	1850
CCCΨGGCACC	AACACCAGCA	AΨCAGGΨGGC	AGΨGCΨGΨAC	CAGGACGΨGA	1900
ACΨGΨACCGA	AGΨGCCCGΨG	GCCAΨΨCACG	CCGAWCAGCΨ	GACACCΨACA	1950
ΨGGCGGGΨGΨ	ACΨCCACCGG	CAGCAAΨGΨG	ΨΨΨCAGACCA	GAGCCGGCΨG	2000
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CΨΨCAAΨΨΨC	AGCCAGAWΨC	ΨGCCCGAWCC	ΨAGCAAGCCC	AGCAAGCGGA	2500
GCΨΨCAΨCGA	GGACCΨGCΨG	ΨΨCAACAAAG	ΨGACACΨGGC	CGACGCCGGC	2550
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<b>AGGGCGΨGAA</b>	<b>ACΨGCACΨAC</b>	<b>ACAΨGAΨGAC</b>	ΨCGAGCΨGGΨ	ACΨGCAΨGCA	3900
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AAAAGCAΨAΨ	GACΨAAAAAA	AAAAAAAAAA	AAAAAAAAAA	AAAAAAAAAA	4250
AAAAAAAAAA	AAAAAAAAAA	AAAAAAAAAA	AAAA		4284

Ψ = 1-methyl-3'-pseudouridylyl

Nombre de archivo: 11889  
Directorio: C:\Users\PC\Documents  
Plantilla: C:\Users\PC\AppData\Roaming\Microsoft\Plantillas\Normal.d  
otm  
Título:  
Asunto:  
Autor: Jim Robertson  
Palabras clave:  
Comentarios:  
Fecha de creación: 16/04/2021 10:24:00  
Cambio número: 2  
Guardado el: 16/04/2021 10:24:00  
Guardado por: PC  
Tiempo de edición: 1 minuto  
Impreso el: 16/04/2021 10:33:00  
Última impresión completa  
Número de páginas: 4  
Número de palabras: 1.046 (aprox.)  
Número de caracteres: 5.757 (aprox.)