

Supplement

# Ribosome pausing at inefficient codons at the end of the replicase coding region is important for Hepatitis C Virus genome replication

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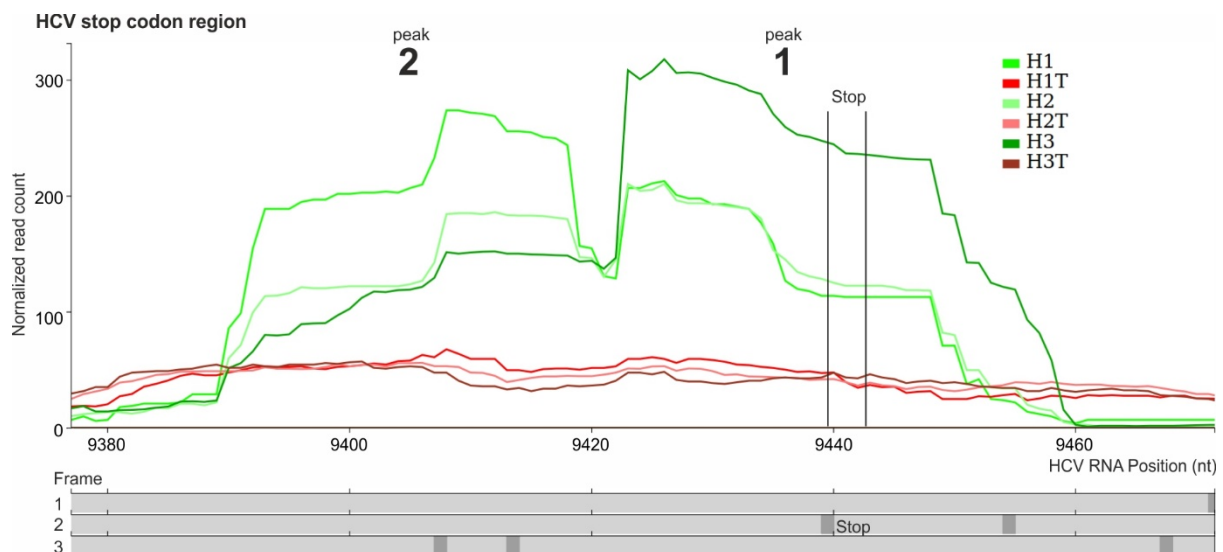
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**Supplementary Figure S1 (related to Fig 3A).** Accumulated ribosome profiling reads in the ribosome peaks 1 and 2 at the HCV stop codon, separately displayed for the three replicates of the experiment (H1, H2, H3). Accumulated transcriptome reads (H1T, H2T, H3T) are shown as control. The position of the HCV stop codon is indicated.



**Supplementary Figure S2 (related to Fig 3B).** Pausing of ribosomes upstream of the HCV RNA stop codon with sequence reads. The position of the stop codon and the most important upstream rare (low efficiency) codons are indicated by black arrows. The rare codons are indicated as in Figs. 2 and 4. The centers of the ribosomes placed in the peaks are indicated by thin vertical boxes.



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1a EF621489.1 CGGCCCGCUGGUGUUGUUUGCUAUCUCUCUCUCGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
1a AB520610.1 CGGCCCGCUGGUGUUGUUUGCUAUCUCUCUCUCGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
1b A238799.1 CGACCCCGCUGGUGUUGUUUGCUAUCUCUACUUUUCGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
1b AY460204.1 CGACCCCGCUGGUGUUGUUUGCUAUCUCUACUUUUCGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
1c AY651061.1 CGGCCCGCUGGUGUUGUUUGCUAUCUCUACUUUUCGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
1c D14853.1 CGGCCCGCUGGUGUUGUUUGCUAUCUCUACUUUUCGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
1e KC248194.1 CGGCCCGCUGGUGUUGUUUGCUAUCUCUACUUUUCGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
1g AM910652.2 CGGCCCGCUGGUGUUGUUUGCUAUCUCUACUUUUCGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
1h KC248198.1 CGGCCCGCUGGUGUUGUUUGCUAUCUCUACUUUUCGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
1h KC248199.1 CGGCCCGCUGGUGUUGUUUGCUAUCUCUACUUUUCGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
1l KC248196.1 CGGCCCGCUGGUGUUGUUUGCUAUCUCUACUUUUCGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
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2a AB047639.1 CGACCCCGCUAUAUCUUCUUGGCUAUCUCUACUUUUCGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
2b AB030907.1 CGACCCCGCUAUAUCUUCUUGGCUAUCUCUACUUUUCGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
2b J0745651.1 CGACCCCGCUAUAUCUUCUUGGCUAUCUCUACUUUUCGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
2c D50409.1 CGGCCCGCUGGUGUUGUUUGCUAUCUCUACUUUUCGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
2c JX227965.1 CGACCCCGCUAUAUCUUCUUGGCUAUCUCUACUUUUCGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
2d JF735114.1 CGACCCCGCUAUAUCUUCUUGGCUAUCUCUACUUUUCGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
2e JF735120.1 CGACCCCGCUAUAUCUUCUUGGCUAUCUCUACUUUUCGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
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6g D63822.1 CGACCCCGCUAUAUCUUCUUGGCUAUCUCUACUUUUCGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
2j JF735113.1 CGACCCCGCUAUAUCUUCUUGGCUAUCUCUACUUUUCGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
2j HM777359.1 CGACCCCGCUAUAUCUUCUUGGCUAUCUCUACUUUUCGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
2k AB031663.1 CGACCCCGCUAUAUCUUCUUGGCUAUCUCUACUUUUCGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
2k JF735118.1 CGACCCCGCUAUAUCUUCUUGGCUAUCUCUACUUUUCGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
2m JF735111.1 CGACCCCGCUAUAUCUUCUUGGCUAUCUCUACUUUUCGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
2m JX227968.1 CGACCCCGCUAUAUCUUCUUGGCUAUCUCUACUUUUCGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
2q FN666428 CGACCCCGCUAUAUCUUCUUGGCUAUCUCUACUUUUCGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
3a AB691596.1 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
3a AB792683.1 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
3b D49374.1 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
3g JF735123.1 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
3g JX227954.1 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
3h JF735121.1 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
3h JF735124.1 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
3i F407092.1 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
3i JF735125.1 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
3k D63821.1 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
3k JF735122.1 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
4a AB795432.1 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
4a Y11604 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
4b F025856 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
4b F462435.1 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
4c F462436.1 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
4d D0516083 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
4d F462437.1 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
4f EF589161 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
4g F462432.1 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
4g JX227963.1 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
4k F462438.1 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
4k EU392173 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
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4p F462431.1 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
4t F839869.1 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
4r F462439.1 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
4r JX227962.1 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
4v JX227959.1 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
5a NC 009826 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
5a AF064490 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
5a AY859526.1 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
6a D0480524.1 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
6b NC 009827.1 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
6b D87262.2 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
6c BF424629.1 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
6d D84263.2 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
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6e D0314805.1 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
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6f D0835760.1 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
6h D84265.2 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
6i D0835762.1 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
6i D0835770.1 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
6j D0835769.1 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
6j D0835761.1 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
6k JX183552.1 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
6k D84264.2 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
6l JX183554.1 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
6l EF424628.1 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
6m D0835765.1 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
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6n D0835768.1 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
6n EU246937 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
6o EF424627.1 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
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6q EF424625.1 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
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6s U408329 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
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6t EF632069.1 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
6u EU246940 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
6v F435090.1 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
6v EU798760 CGAACCCGCCAUUAUCUGCUUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA
7a EF108306 CAUCCUGCCCAUAUCUUCUUGGCUAUCUCUACUUAACGUAAGGGGUAAGGCAUCUACUUCUCCCCAACCGAUGA

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Supplementary Figure S3 (related to Fig 3D). Sequences at the 3' end of the NS5B coding region including the stop codon. Codons with moderate or high efficiency are marked in green, codons with low efficiency (rare codons) are shown in yellow.