Supplementary Table 1. Oligonucleotides used to introduce mutations in the AAP coding sequence. Plus and minus strands were annealed together and cloned into *Age*I/*Spe*I, *Age*I/*Mlu*I, or *Spe*I/*Mlu*I sites as shown in Supplementary Fig. 1.

Oligo Name	Sequence (5′ - 3′)
R4* +	CCGGT**TAG**CCGTCAGTCTTCA
R4* -	CTAGTGAAGACTGACGG**CTA**A
P5* +	CCGGTCGC**TAG**TCAGTCTTCA
P5* -	CTAGTGAAGACTGA**CTA**GCGA
S6* +	CCGGTCGCCCG**TAG**GTCTTCA
S6* -	CTAGTGAAGAC**CTA**CGGGCGA
V7* +	CCGGTCGCCCGTCA**TAG**TTCA
V7* -	CTAGTGAA**CTA**TGACGGGCGA
F8* +	CCGGTCGCCCGTCAGTC**TAG**A
F8* -	CTAGT**CTA**GACTGACGGGCGA
T9* +	CCGGTCGCCCGTCAGTCTTC**TAG**AGTCAGGATTACCTCTCAGACCATCTGTG GAGAGCCCTTAACGCGTAAA
T9* -	AGCTTTTACGCGTTAAGGGCTCTCCACAGATGGTCTGAGAGGTAATCCTGAC T**CTA**GAAGACTGACGGGCGA
S10* +	CCGGTCGCCCGTCAGTCTTCACT**TAG**CAGGATTACCTCTCAGACCATCTGTG GAGAGCCCTTAACGCGTAAA
S10* -	AGCTTTTACGCGTTAAGGGCTCTCCACAGATGGTCTGAGAGGTAATCCTG**CT A**AGTGAAGACTGACGGGCGA
Q11* +	CTAGT**TAG**GATTACCTCTCAGACCATCTGTGGAGAGCCCTTAACGCGTAAA
Q11* -	AGCTTTTACGCGTTAAGGGCTCTCCACAGATGGTCTGAGAGGTAATC**CTA**A
D12* +	CTAGTCAG**TAG**TACCTCTCAGACCATCTGTGGAGAGCCCTTAACGCGTAAA
D12* -	AGCTTTTACGCGTTAAGGGCTCTCCACAGATGGTCTGAGAGGTA**CTA**CTGA
Y13* +	CTAGTCAGGAT**TAG**CTCTCAGACCATCTGTGGAGAGCCCTTAACGCGTAAA
Y13* -	AGCTTTTACGCGTTAAGGGCTCTCCACAGATGGTCTGAGAG**CTA**ATCCTGA
L14* +	CTAGTCAGGATTAC**TAG**TCAGACCATCTGTGGAGAGCCCTTAACGCGTAAA
L14* -	AGCTTTTACGCGTTAAGGGCTCTCCACAGATGGTCTGA**CTA**GTAATCCTGA
S15* +	CTAGTCAGGATTACCTC**TAG**GACCATCTGTGGAGAGCCCTTAACGCGTAAA
S15* -	AGCTTTTACGCGTTAAGGGCTCTCCACAGATGGTC**CTA**GAGGTAATCCTGA
D16* +	CTAGTCAGGATTACCTCTCA**TAG**CATCTGTGGAGAGCCCTTAACGCGTAAA
D16* -	AGCTTTTACGCGTTAAGGGCTCTCCACAGATG**CTA**TGAGAGGTAATCCTGA
H17* +	CTAGTCAGGATTACCTCTCAGAC**TAG**CTGTGGAGAGCCCTTAACGCGTAAA
H17* -	AGCTTTTACGCGTTAAGGGCTCTCCACAG**CTA**GTCTGAGAGGTAATCCTGA
L18* +	CTAGTCAGGATTACCTCTCAGACCAT**TAG**TGGAGAGCCCTTAACGCGTAAA
L18* -	AGCTTTTACGCGTTAAGGGCTCTCCA**CTA**ATGGTCTGAGAGGTAATCCTGA
W19* +	CTAGTCAGGATTACCTCTCAGACCATCTG**TAG**AGAGCCCTTAACGCGTAAA
W19* -	AGCTTTTACGCGTTAAGGGCTCT**CTA**CAGATGGTCTGAGAGGTAATCCTGA
R20* +	CTAGTCAGGATTACCTCTCAGACCATCTGTGG**TAG**GCCCTTAACGCGTAAA
R20* -	AGCTTTTACGCGTTAAGGGC**CTA**CCACAGATGGTCTGAGAGGTAATCCTGA
A21* +	CTAGTCAGGATTACCTCTCAGACCATCTGTGGAGA**TAG**CTTAACGCGTAAA
A21* -	AGCTTTTACGCGTTAAG**CTA**TCTCCACAGATGGTCTGAGAGGTAATCCTGA
L22* +	CTAGTCAGGATTACCTCTCAGACCATCTGTGGAGAGCC**TAG**AACGCGTAAA
L22* -	AGCTTTTACGCGTT**CTA**GGCTCTCCACAGATGGTCTGAGAGGTAATCCTGA

N23* +	CTAGTCAGGATTACCTCTCAGACCATCTGTGGAGAGCCCTT**TAG**GCGTAAA
N23* -	AGCTTTTACGC**CTA**AAGGGCTCTCCACAGATGGTCTGAGAGGTAATCCTGA
A24* +	CTAGTCAGGATTACCTCTCAGACCATCTGTGGAGAGCCCTTAAC**TAG**TAAA
A24* -	AGCTTTTA**CTA**GTTAAGGGCTCTCCACAGATGGTCTGAGAGGTAATCCTGA
R20K +	CTAGTCAGGATTACCTCTCAGACCATCTGTGG**AAA**GCCCTTAACGCGTAAA
R20K -	AGCTTTTACGCGTTAAGGGC**TTT**CCACAGATGGTCTGAGAGGTAATCCTGA

Supplementary Table 2. PCR primers used to amplify linear DNA fragments as templates to generate mRNAs encoding AAPs.

Oligo Name	Sequence (5′ - 3′)
T7 upstream +	AGTAGGTTGAGGCCGTTGA
21 trunc -	GGCTCTCCACAGATGGTCT
22 trunc -	AAGGGCTCTCCACAGATGG
23 trunc -	GTTAAGGGCTCTCCACAGA
24 trunc -	CGCGTTAAGGGCTCTCCAC
25 trunc -	GACCGCGTTAAGGGCTCTC
W19A 24 trunc -	CGCGTTAAGGGCTCT**CGC**CAGATGG
W19Y 24 trunc -	CGCGTTAAGGGCTCT**GTA**CAGATGG
R20* 25 trunc -	GACCGCGTTAAGGGC**CTA**C
A21* 25 trunc -	GACCGCGTTAAG**CTA**TCTC
L22* 25 trunc -	GACCGCGTT**CTA**GGCTCTC
N23* 25 trunc -	GACCGC**CTA**AAGGGCTCTC
A24* 25 trunc -	GAC**CTA**GTTAAGGGCTCTC
R20K 25 trunc -	GACCGCGTTAAGGGC**TTT**C

Supplementary Table 3. Quantitative analyses of AAP nascent chain photoadducts to ribosomal proteins. The amount of radiolabeled AAP nascent chain that formed photoadducts with ribosomal proteins rpL4 and rpL17 was determined using ImageQuant TL (GE Healthcare) and presented as the fraction of sum of radiolabeled AAP, both crosslinked and uncrosslinked.

Table S3A, related to Fig. 5a.

	WT, +Arg	WT, -Arg	D12N, +Arg	D12N, -Arg
rpL4	7.9	3.6	3.7	3.2
rpL17	1.4	2.0	1.4	1.5
AAP	90.7	94.4	94.8	95.3

Table S3B, related to Fig. 5b.

	WT, +Arg	WT, -Arg	D12N, +Arg	D12N, -Arg
rpL4	9.2	4.3	4.7	4.5
rpL17	2.4	8.0	4.6	4.7
AAP	88.4	87.7	90.7	90.8

Table S3C, related to Fig. 5c.

	WT, +Arg	WT, -Arg
rpL4	7.3	5.7
rpL17	0.6	1.9
AAP	92.1	92.4

Table S3D, related to Fig. 6a.

	A21		L22		N23		A24		V25	
	+Arg	-Arg	+Arg	-Arg	+Arg	-Arg	+Arg	-Arg	+Arg	-Arg
rpL4	11.6	13.7	17.2	11.0	12.9	14.2	11.2	5.8	9.6	6.1
rpL17	0.4	1.1	0.6	0.9	0.2	1.7	1.0	3.0	1.1	2.3
AAP	88.0	85.2	82.2	88.1	86.9	84.01	87.8	91.2	89.3	91.6

Table S3E, related to Fig. 6b.

	WT		W19A		W19Y		D12N	
	+Arg	-Arg	+Arg	-Arg	+Arg	-Arg	+Arg	-Arg
rpL4	13.9	7.4	8.9	9.5	9.0	7.1	6.5	5.3
rpL17	1.2	3.4	3.4	4.1	1.9	3.1	1.9	1.6
AAP	84.9	89.2	87.7	86.4	89.1	89.8	91.6	93.1

Table S3F, related to Fig. 6c.

	WT				D12N			
	+Arg	+D-Arg	+RGD	-	+Arg	+D-Arg	+RGD	-
rpL4	14.0	6.7	9.3	6.1	7.0	4.7	6.1	5.2
rpL17	1.1	3.2	1.4	3.3	2.0	1.5	1.8	1.7
AAP	84.9	90.1	89.3	90.6	91.0	93.8	92.1	93.1

Table S3G, related to Fig. 7.

	+Arg, +Cyh	-Arg, +Cyh	-Arg, +Cyh, +Arg	+Arg	-Arg
rpL4	15.9	10.6	15.9	10.9	10.0
rpL17	1.1	3.3	1.1	0.6	3.3
AAP	83.0	86.1	83.0	88.5	86.7

Supplementary Table 4. Quantitative analyses of AAP nascent chain photoadducts to ribosomal proteins. The amount of radiolabeled AAP nascent chain that formed photoadducts with ribosomal proteins rpL4 and rpL17 was determined using ImageQuant TL (GE Healthcare).

	L4		L17		
	+Arg	-Arg	+Arg	-Arg	
A21	0.963±0.005	0.925±0.003	0.037±0.005	0.075±0.003	N=3
L22	0.974±0.009	0.929±0.003	0.026±0.009	0.071±0.003	N=3
N23	0.983±0.004	0.900±0.008	0.017±0.004	0.100±0.008	N=3
A24	0.927±0.009	0.695±0.035	0.073±0.009	0.305±0.035	N=7
A24 D12N	0.779±0.002	0.757±0.009	0.221±0.002	0.243±0.009	N=2*
V25	0.890±0.028	0.704±0.044	0.110±0.027	0.296±0.044	N=6
V25 D12N	0.729±0.004	0.681±0.005	0.271±0.004	0.319±0.005	N=2
A24	0.671±0.005[a]		0.329±0.005[a]		N=2
A24	0.838±0.030[b]		0.162±0.030[b]		N=2
A24	0.933±0.001[c]	0.752±0.008[c]	0.067±0.001[c]	0.248±0.008[c]	N=2
A24	0.917±0.017[d]		0.083±0.017[d]		N=2
W19A	0.749±0.028	0.719±0.021	0.251±0.028	0.281±0.021	N=2
W19Y	0.836±0.011	0.707±0.013	0.164±0.011	0.293±0.013	N=2

[a], 2mM D-Arg was added instead of Arg.
[b], 2mM RGD was added instead of Arg.
[c], translation was stopped by Cyh before UV irradiation, as described in Fig. 7.
[d], 2mM Arg added after translation was stopped by Cyh, as described in Fig. 7.
*, when N=2, average deviation, not standard deviation, is calculated.