

Computational Identification of the Antibody Recognition Regions of Dengue NS1 proteins

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Supplementary Materials

A)

DSGC**vvwknkel**KCGSGIFITDNVH**twteqykfq**PESPSKLASAIQKAHEEGICGIRSVTRLEN**lmwk**
qitpelnhilsENEVKLTIMTGIKG**mqagkrslrpqptelkyswk**TWGKAKML**steshnqtfli**I
DG**PETAEcpntnrawnS**LEVEDYGFVFTTNIWL**klrekqdvf**CDSKLMSA**aikdnrvhvADMGYW**
IESALNDTWKMEKASFIEVKSCHWPKSHTLWSNGVLESEMIIPKSFA**gpvsqhnyrpgyytqt**AGP
WHLGKLEMDFDFCEGTTVVVT**edcgnrgps**LRTTASGKLITEWCCRSCT**lpplryrged**GCWYGM
EIRPLKEKEENLVNSLVTA

B)

Summary of the binder peptides (as listed above) of DENV2 for the antibody 1H7.4 predicted from sequence search only. The peptides can be considered as epitopes are highlighted in bold and colored in magenta.

Peptides	Regions	Sequence	Length (mer)	Secondary Structure	Surface Accessibility	Epitopes
1H7.4-P1	5-13	vvwknkel	9	Turn	Exposed ^a	
1H7.4-P2	27-35	twteqykfq	9	Loop	exposed	1
1H7.4-P3	65-80	nlmwkqitpelnhils	16	Helix	exposed	
1H7.4-P4	97-116	mqagkrslrpqptelkyswk	19	Loop	exposed	2
1H7.4-P5	125-133	steshnqtfli	10	Loop	exposed	3
1H7.4-P6	143-151	cptnrawn	9	Loop	exposed	4
1H7.4-P7	170-178	klrekqdvf	9	Loop	exposed	5
1H7.4-P8	187-195	aikdnrvhv	9	2β stands	buried	
1H7.4-P9	249-264	gpvsqhnyrpgyytqt	16	Loop	dimer interface ^b	
1H7.4-P10	289-297	edcgnrgps	9	Loop	exposed	6
1H7.4-P11	318-327	lpplryrged	10	β stand	buried	

^a peptide is exposed and close to membrane surface.

^b peptide is located on the dimer interface.

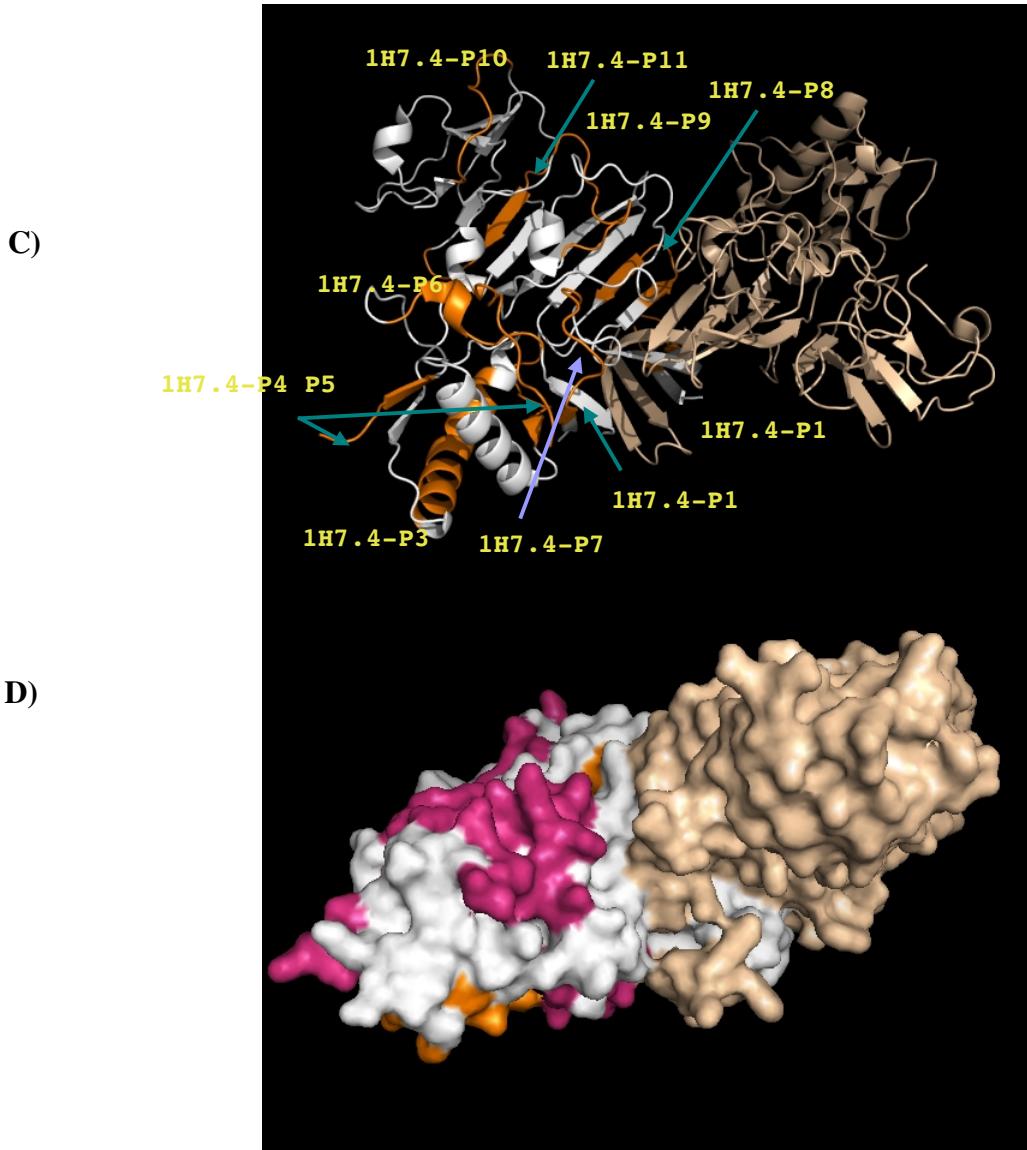


Figure S1: Predicted Binder peptides of DENV2 to the antibody 1H7.4. A) the sequence of DENV2 NS1 protein with the binder peptides highlighted in lower case and colored in orange. The final epitopes are colored in magenta. B) Summary of the binder peptides according to the secondary structure and surface accessibility. C) Illustration of the binder peptides in the crystal structure of dimer form of DENV2 NS1 protein. D) the location of the binder peptides on the surface of dimer form of DENV2 NS1 protein. The final epitopes selected based on secondary structure and surface accessibility are colored in magenta.

A)

DS**gcvvswk**NKELKGCGSGIF**itdnvhtwt**EQYKFQPESPSKLASAIQKAHEEGICGIRSVTRLENL
mwkqitpelnhilsenEVKLTIMTGDIKGIMQAGKRSLRPQPTE**1kyswktwgkakmlstes**HNQT
FLIDGPETAECPTNR**awnslevedyg**FGVFTTNIWLKLRe**kqdvfcds**KLMSAAIK**dnravhadm**
gywiesalndt**wkmekASFIEVKSCWPKSHTLW**sngvlesemIIPKSFAGPVSQHNYRPGYYTQT
AGPW**hlgklemdf**DFCE**gttvvvtedc**GNRGPSLRTTT**asgklitewc**CRSCTL**pplryrgedgcw**
ygmeiRPLKEKEENLVNSLVTA

B)

Summary of the binder peptides of DENV2 (shown in above) for the antibody 1G5.3 predicted from sequence search only. The peptides can be considered as epitopes are highlighted in bold and colored in magenta.

Peptides	Regions	Sequence	Length (mer)	Secondary Structure	Surface Accessibility	Epitopes
1G5.3-P1	2-9	gcvvswk	7	β stand	exposed ^a	
1G5.3-P2	21-29	itdnvhtwt	9	loop	buried	
1G5.3-P3	67-82	mwkqitpelnhilsen	16	helix	exposed	
1G5.3-P4	111-128	1kyswktwgkakmlstes	18	loop	exposed	I
1G5.3-P5	149-159	awnslevedyg	10	β stand	buried	
1G5.3-P6	173-181	ekqdvfcds	9	loop	buried ^b	
1G5.3-P7	190-214	dnravhadmgywiesalndtw kmek	24	2 β stands	buried	
1G5.3-P8	233-241	sngvlesem	9	loop	exposed	II
1G5.3-P9	269-277	hlgklemdf	9	β stand	buried	
1G5.3-P10	282-291	gttvvvtedc	10	loop	exposed	III
1G5.3-P11	303-312	asgklitewc	10	loop	exposed	IV
1G5.3-P12	319-335	pplryrgedgcwygmei	17	2 β stands	buried	

^a peptide is exposed and close to membrane surface (Panel B).

^b peptide is buried in the dimer form (Panel B)

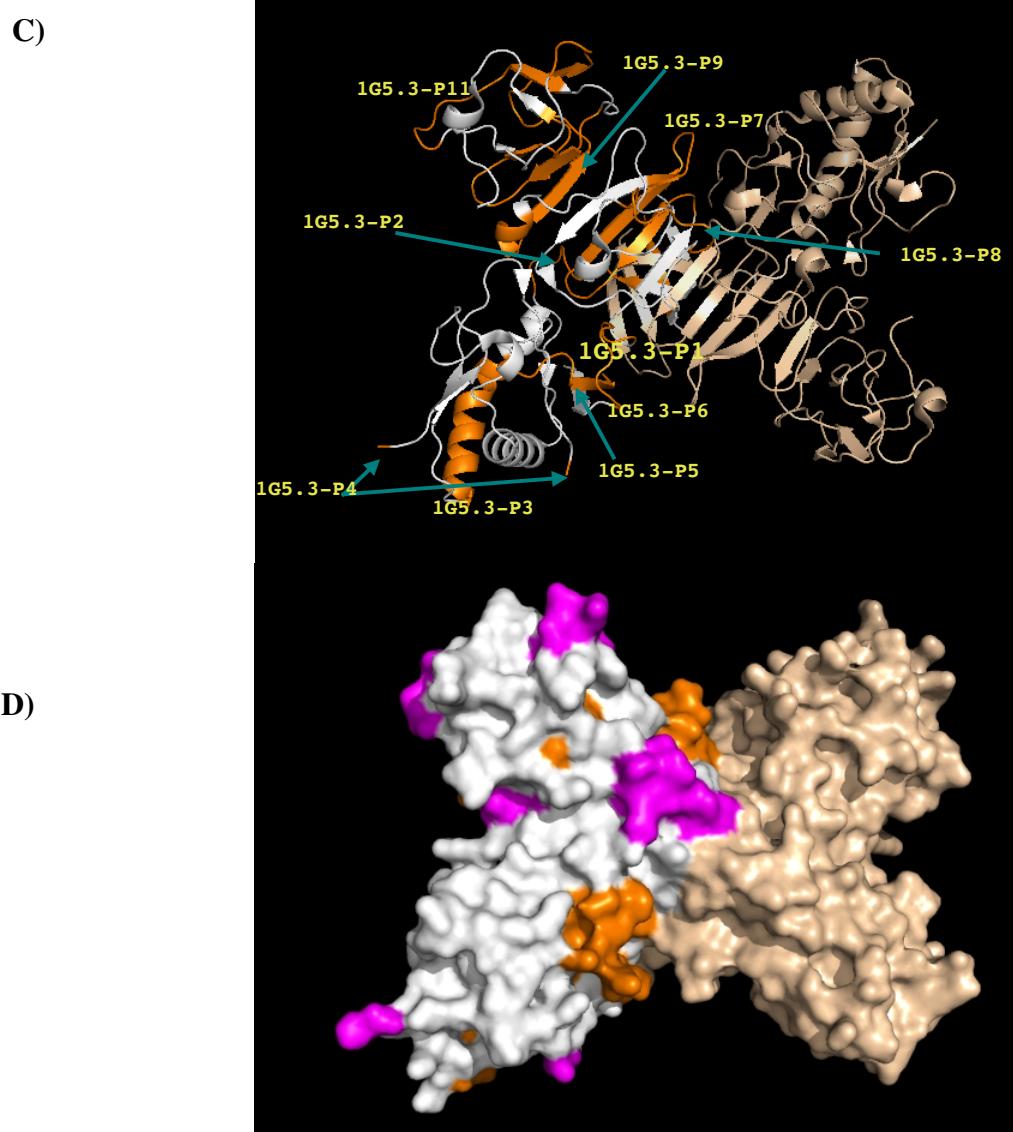


Figure S2: Predicted Binder peptides of DENV2 to the antibody 1G5.3. A) the sequence of DENV2 NS1 protein with the binder peptides highlighted in lower case and colored in orange. The final epitopes are colored in magenta. B) Summary of the binder peptides according to the secondary structure and surface accessibility. C) Illustration of the binder peptides in the crystal structure of dimer form of DENV2 NS1 protein. D) the location of the binder peptides on the surface of dimer form of DENV2 NS1 protein. The final epitopes selected based on secondary structure and surface accessibility are colored in magenta.

A)

DSgcvvswknkelKCGSGIFITDNVH**twteqykfp**ESPSK**lasaiqkahe**EGICGIRSVTR**len1**
mwkqiTPELNHILSENEVKLTIMTGDIKGIMQAGKRSLRPQPT**elkyswktw**GKAKM**lsteshnqt**
FLIDGPETAECPntnrawns1EVEDYGFGVFTTNIWLKLREKQDVFCDSLMSAAIKDNRAVHadm
gywiesalndtwkme**KASFIEVKSCHWPKSHTLWSNGVLESEMIIPKSFA**gpvsqhnyrpgyytqt
AGPWHLGKLEMDFDFCEGTTVVVTEDCGNRGPSLRTTASGKLITEWCCRSCT**lpplryrged**GCW
YGMEIRPLKEKEENLVNSLVTA

B)

Summary of the binder peptides of DENV2 (shown in above) for the antibody GUS2 predicted from sequence search only. The peptides can be considered as epitopes are highlighted in bold and colored in magenta.

Peptides	Regions	Sequence	Length (mer)	Secondary Structure	Surface Accessibility	Epitopes
GUS2-P1	3-13	gcvvswknkel	11	2 β stands	exposed ^a	
GUS2-P2	27-36	twteqykfp	10	loop	exposed	A
GUS2-P3	42-51	lasaiqkahe	10	helix	buried	
GUS2-P4	63-71	len1mwkqi	9	helix	exposed	
GUS2-P5	110-118	elkyswktw	9	loop	exposed	B
GUS2-P6	124-132	lsteshnqt	9	loop	exposed	C
GUS2-P7	145-153	ntnrawns1	9	loop	buried	
GUS2-P8	196-213	admgwywiesalndtwkme	18	2 β stands	Buried ^b	
GUS2-P9	249-264	gpvsqhnyrpgyytqt	16	loop	exposed	D
GUS2-P10	318-327	lpplryrged	10	β stand	buried	

^a peptide is exposed and close to membrane surface (Panel B).

^b peptide is located on the dimer interface (Panel B)

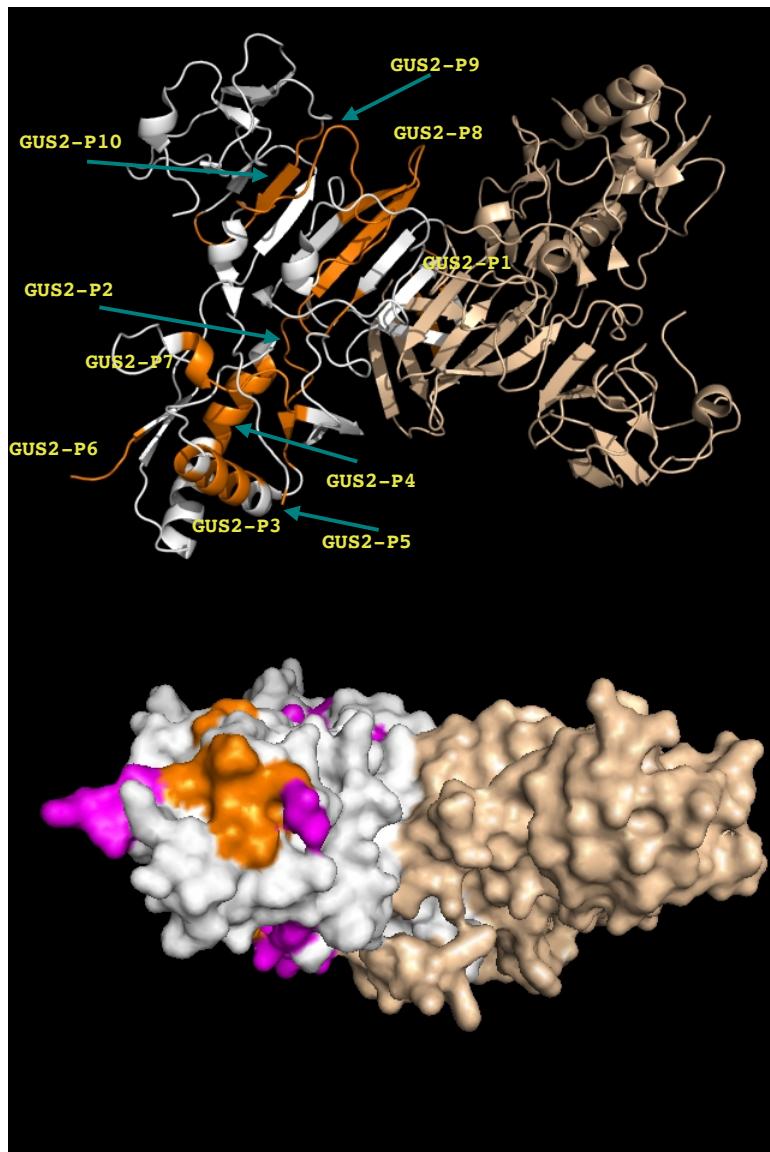


Figure S3: Predicted Binder peptides of DENV2 to the antibody GUS2. A) the sequence of DENV2 NS1 protein with the binder peptides highlighted in lower case and colored in orange. The final epitopes are colored in magenta. B) Summary of the binder peptides according to the secondary structure and surface accessibility. C) Illustration of the binder peptides in the crystal structure of dimer form of DENV2 NS1 protein. D) the location of the binder peptides on the surface of dimer form of DENV2 NS1 protein. The final epitopes selected based on secondary structure and surface accessibility are colored in magenta.

Appendix S1: peptide libraries of NS1 proteins of DENV serotypes bind to antibody 1H7.4

DENV1

1 DSGCVINWKGRELKCGSGIFVTNEVHTWteqykfqadspkr1SAAIGKAWEEGVCGIRSATRLenimwkqisnelnhILLENDMKFTVVVGDVSGILA
2 DSGCVINWKGRELKCGSGIFVTNEVHTWteqykfqadspkr1sAAIGKAWEEGVCGIRSATRLENimwkqisnelnhILLENDMKFTVVVGDVSGILA
3 DSGCVINWKGRELKCGSGIFVTNEVHTWTEqykfqadspkr1saAIGKAWEEGVCGIRSATRLENImwkqisnelnhillLENDMKFTVVVGDVSGILA
4 DSGCVINWKGRELKCGSGIFVTNEvhtwteqYKFQADSPkrlsaaIGKAWEEGVCGIRSATRLENIMmwkqisnelnhillENDMKFTVVVGDVSGILA
5 DSGCVINWKGRELKCGSGIFVTNEVhtwteqyKFQADSPkrlsaaIGKAWEEGVCGIRSATRLENIMwkqisnelnhilleNDMKFTVVVGDVSGILA
6 DSGCVINWKGRELKCGSGIFVTNEVhtwteqykfqadspkRLSAAIGKAWEEGVCGIRSATRLENIMWkqisnelnhillENDMKFTVVVGDVSGILA
7 DSGCVINWKGRELKCGSGIFVTNEVHTwteqykfqadspkrLSAAIGKAWEEGVCGIRSATRLENimwkqisnelnHILLENDMKFTVVVGDVSGILA

1 QGKKMIRpqpmehkYSWWSWGAKIIGAdvqnttfIIDGPNTpecpdnqRAWNIWEVEDYGF GIFT TNIWLKL RD SYtqvcdhrLMSAAIKDSKAVHA
2 QGKKMIRPqpmehykSwWSWGAKIIGADvqnttfiIDGPNTpecpdnqrAWNIWEVEDYGF GIFT TNIWLKL RD SYTQqvcdhr1LMSAAIKDSKAVHA
3 QGKKMIRPQpmehkysWSWGAKIIGADVqnttfiIDGPNTpecpdnqrawNIWEVEDYGF GIFT TNIWLKL RD SYTQqvcdhr1msAAIKDSKAVHA
4 QGKKMIRPQPmehkyswKSWGAKIigadvqNTTFIIDGPNTPECPdnqrawNIWEVEDYGF GIFT TNIWLKL RD SYTQVcdhr1msAAIKDSKAVHA
5 QGKKMIRPQPMehkyswkSWGAKIigadvqnTTFIIDGPNTPECPdnqrawnIWEVEDYGF GIFT TNIWLKL RD SYTQVcdhr1msaAIKDSKAVHA
6 QGKKMIRPQPMEhkyswksWGAKIIgadvqntTFIIDGPNTPECPdnqrawnIWEVEDYGF GIFT TNIWLKL RD SYTQVcdhr1msaaIKDSKAVHA
7 QGKKMIRPQPMEhkyswksWGAKIIGadvqnttFIIDGPNTpecpdnqrawnIWEVEDYGF GIFT TNIWLKL RD SYtqvcdhRLMSAAIKDSKAVHA

1 DMGYWIEseknetwKLARASFIEVKTCIWPKSHTLWSNGVLESEMIIPK1YGGPISqhnyrpgYFTQTAGPWHLGKLELDFDLCEGTTVVVdehcgnr
2 DMGYWIEseknetwkLARASFIEVKTCIWPKSHTLWSNGVLESEMIIPK1yggpisqhnyrpgyFTQTAGPWHLGKLELDFDLCEGTTVVVdehcgnr
3 DMGYWIESEknetwk1LARASFIEVKTCIWPKSHTLWSNGVLESEMIIPK1YggpisqhnyrpgyFTQTAGPWHLGKLELDFDLCEGTTVVVDEhcgnr
4 DMGywiesekNETKLARASFIEVKTCIWPKSHTLWSNGVLESEMIIPK1YGGppisqhnyrpgyftQTAGPWHLGKLELDFDLCEGTTVVVDEhcgnr
5 DMGYwieseknETWKLARASFIEVKTCIWPKSHTLWSNGVLESEMIIPK1YGGpisqhnyRPGYFTQTAGPWHLGKLELDFDLCEGTTVVVDEHCgnr
6 DMGYwieseknetWKLARASFIEVKTCIWPKSHTLWSNGVLESEMIIPK1YGGPisqhnyRPGYFTQTAGPWHLGKLELDFDLCEGTTVVVDEHCgnr
7 DMGYWIeseknetwKLARASFIEVKTCIWPKSHTLWSNGVLESEMIIPK1YGGPisqhnyrpGYFTQTAGPWHLGKLELDFDLCEGTTVVVdehcgnR

1 GPSLRTTVTGKTIHEWCCRSTLPPLRFKGEDGCWYGM EIRPVKEKEENLVKSMVSA
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3 gpSLRTTVTGKTIHEWCCRSTLPPLRFKGEDGCWYGM EIRPVKEKEENLVKSMVSA
4 gpsLRTTVTGKTIHEWCCRSTLPPLRFKGEDGCWYGM EIRPVKEKEENLVKSMVSA
5 gps1RTTGTGKTIHEWCCRSTLPPLRFKGEDGCWYGM EIRPVKEKEENLVKSMVSA
6 gps1rTTVTGKTIHEWCCRSTLPPLRFKGEDGCWYGM EIRPVKEKEENLVKSMVSA
7 GPSLRTTVTGKTIHEWCCRSTLPPLRFKGEDGCWYGM EIRPVKEKEENLVKSMVSA

DENV2

1 DSGCVVSwknke1kCGSGIFITDNVHTWteqykfqPESPSKLASAIQKAHEEGICGIRSVTRLenlmwkqitpelnhILSENEVKLTIMTGDIKGIMQ
2 DSGCVVSWknke1kcGSGIFITDNVHTWTeqykfqpESPSSKLASAIQKAHEEGICGIRSVTRLENlmwkqitpelnhilLSENEVKLTIMTGDIKGIMQ
3 DsgcvvswkNKEKGCGSIFITDNVHTWeqykfqpeSPSKLASAIQKAHEEGICGIRSVTRLENlmwkqitpelnhilSENEVKLTIMTGDIKGIMQ
4 DSGcvvswknKELKGCGSIFITDNvhtwteqYKFQPESPSSKLASAIQKAHEEGICGIRSVTRLENlmwkqitpelnhilsENEVKLTIMTGDIKgimq
5 DSGCvvswknkELKGCGSIFITDNVhtwteqyKFQPESPSSKLASAIQKAHEEGICGIRSVTRLENLMwkqitpelnhilseNEVKLTIMTGDIKGimq
6 DSGCVvswknkelKGCGSIFITDNVHTwteqykFQPESPSSKLASAIQKAHEEGICGIRSVTRLENLMwkqitpelnhilseneVKLTIMTGDIKGimq
7 DSGCVvswknke1KGCGSIFITDNVHTwteqykfQPESPSSKLASAIQKAHEEGICGIRSVTRlenlmwkqitpelnhHILSENEVKLTIMTGDIKGIMQ

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2 AgkrslrpqptelkySWWTWGAKMLSTeshnqtfLIDGPETaecpntrnRAWNSLEVEDYGFGVFTTNIWLkrekqdVFCDSKLMSAAIKdnravha
3 AGkrslrpqptelkysWWTWGAKMLSTeshnqtfliDGPETAEcpntrnraWNSLEVEDYGFGVFTTNIWLkrekqdVFCDSKLMSaaikdnRAVHA
4 agkRSLRPQPtelkyswTWGAKM1steshnqTFLIDGPETAECPntnrawNSLEVEDYGFGVFTTNIWLKLrekqdqvfcDSKLMSaaikdnRAVHA
5 agkrSLRPQPtelkyswkTWGAKM1steshnqTFLIDGPETAECPntnrawnsLEVEDYGFGVFTTNIWLKLREkqdvcfdSKLMSAAikdnravHA
6 agkrsLRPQPTElkyswktWGAKMLsteshnqTFLIDGPETAECPntnrawnsLEVEDYGFGVFTTNIWLKLREkqdvcfdSKLMSAAikdnravHA
7 agkrsLRPQPTElkyswktWGAKMLsteshnqTFLIDGPETAECPNTnrawnsLEVEDYGFGVFTTNIWLrekQDVFCDSKLMSAAikdnravHA

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3 DMGYWIESALNDTWMKMEKASFIEVKSCHWPKSHTLWSNGVLESEMIIPKSfagpvshnyrpgyyTQTAGPWHLGKLEMDFDCEGTTVVVTEdcgnr
4 DMGYWIESALNDTWMKMEKASFIEVKSCHWPKSHTLWSNGVLESEMIIPKSFaagpvshnyrpgyyQTAGPWHLGKLEMDFDCEGTTVVVtedcgnr
5 DMGYWIESALNDTWMKMEKASFIEVKSCHWPKSHTLWSNGVLESEMIIPKSFAGpvsqhnrypgyytqTAGPWHLGKLEMDFDCEGTTVVVTEDCgnr
6 DMGYWIESALNDTWMKMEKASFIEVKSCHWPKSHTLWSNGVLESEMIIPKSFAGPvsqhnrypgyytqAGPWHLGKLEMDFDCEGTTVVVTEDCgnr
7 DMGYWIESALNDTWMKMEKASFIEVKSCHWPKSHTLWSNGVLESEMIIPKSFAGPVsqhnrypgyytqtaGPWHLGKLEMDFDCEGTTVVVtedcgnR

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3 gpSLRTTASGKLITEWCCRSCTLpplryrGEDGCWYGMEMIRPLKEKEENLVNSLVTA
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5 gpslRTTASGKLITEWCCRSCTLpplryrgeDGCWYGMEMIRPLKEKEENLVNSLVTA
6 gpslrrTTASGKLITEWCCRSCTLPP1ryrgedGCWYGMEMIRPLKEKEENLVNSLVTA
7 GPSLRTTASGKLITEWCCRSCTLPP1ryrgedCNYGMEMIRPLKEKEENLVNSLVTA

DENV3

1 DMGCVINWKGKELKCGSGIFVTNEVHTWteqykfqadspkr1ATAIAGAWENGVCIRSTTRMennllwkqianelyilwenniKLTVVVGDITGVLE
2 DMGCVINWKGKELKCGSGIFVTNEVHTWteqykfqadspkr1ATAIAGAWENGVCIRSTTRMennllwkqianelyilwennikLTVVVGDITGVLE
3 DMGCVINWKGKELKCGSGIFVTNEVHTWteqykfqadspkr1ataIAIAGAWENGVCIRSTTRMENllwkqianelyilwenniklTVVGDITGVLE
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6 DMGCVINWKGKELKCGSGIFVTNEVhtwteqykfqadspkrRLATAIAGAWENGVCIRSTTRMENLLwkqianelyilwenNIKLTVVGDITGVle
7 DMGCVINWKGKELKCGSGIFVTNEVHTwteqykfqadspkrLATAIAGAWENGVCIRSTTRmenllwkqianelyilwennIKLTVVVGDITGVle

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2 QgkrtltpqpmelkySWWTWGAKIVTAETqnssfIIDGPSTPECPASASRAWNVWEVEDYGFGVFTTNIWLKLREVYTqlcdhr1LMSAAVKDERAVHA
3 QQkrtltpqpmelkysWWTWGAKIVTAETqnssfIIDGPSTPECPASASRAWNVWEVEDYGFGVFTTNIWLKLREVYTQlcdhr1msAAVKDERAVHA
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5 qgkrtLTLPQPMPmelkyswTWGAKAKivtaetqNSSFIIDGPSTPECPASASRAWNVWEVEDYGFGVFTTNIWLKLREVYTQLcdhr1msaaAVKDERAVHA
6 qgkrtLTPQPMElkyswktWGAKIVtaetqnsSFIIDGPSTPECPASASRAWNVWEVEDYGFGVFTTNIWLKLREVYTQLCDhrlmsaaVKDERAVHA
7 qgkrtlTPQPMElkyswktWGAKIVTaetqnsFIIDGPSTPECPASASRAWNVWEVEDYGFGVFTTNIWLKLREVytqlcdhRLMSAAVKDERAVHA

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3 DMGYWIESQkngswk1EKLASLIEVKTCTWPKSHTLWSNGVLESMDIIPKSLagpisqhnhrpgyhTQTAGPWHLGKLE1dfnycegtTTVISENCGTR
4 DMGYwiesqkNGSWKLEASLIEVKTCTWPKSHTLWSNGVLESMDIIPKSLAgpisqhnhrpgyhtQTAGPWHLGKLEDFnycegtTTVISENCGTR
5 DMGYwiesqknGSWKLEASLIEVKTCTWPKSHTLWSNGVLESMDIIPKSLAGpisqhnhrpgyhtTAGPWHLGKLEDFnycegtTTVISENCGTR
6 DMGYWiesqkngSWKLEASLIEVKTCTWPKSHTLWSNGVLESMDIIPKSLAGPisqhnhrpgyhtqAGPWHLGk1e1dfnycegtTTVISENCGTR
7 DMGYWIesqkngswKLEASLIEVKTCTWPKSHTLWSNGVLESMDIIPKSLAGPIsqhnhrpgyhtqtaGPWHLGK1e1dfnyceGTTVVISENCGTR

1 GPSLRTTVSGKLIHEWCCRSctlpp1rYMGEDGCWYGMEIRPINEKEENMVKSLASA
2 GPSLRTTVSGKLIHEWCCRSctlpp1rymgEDGCWYGMEIRPINEKEENMVKSLASA
3 GPSLRTTVSGKLIHEWCCRSCTLpp1rymGEDGCWYGMEIRPINEKEENMVKSLASA
4 GPSLRTTVSGKLIHEWCCRSCTLpp1rymgeEDGCWYGMEIRPINEKEENMVKSLASA
5 GPSLRTTVSGKLIHEWCCRSCTLpp1rymgeDGCWYGMEIRPINEKEENMVKSLASA
6 GPSLRTTVSGKLIHEWCCRSCTLPP1rymgedGCWYGMEIRPINEKEENMVKSLASA
7 GPSLRTTVSGKLIHEWCCRSCTLPP1rymgedCNYGMEMIRPINEKEENMVKSLASA

DENV4

1 DMGCVVWSGKELKGSGIFVADNVHTWteqykfqPESPARLASAILNAHKDGVCIRSTTRLenvwkqitnelnyVLWEGGHDLTVVAGDVKGVLT
2 DMGCVVWSGKELKGSGIFVADNVHTWteqykfqPESPARLASAILNAHKDGVCIRSTTRLENvnmwkqitnelnyvLWEGGHDLTVVAGDVKGVLT
3 DMGCVVWSGKELKGSGIFVADNVHTWeqykfqpeSPARLASAILNAHKDGVCIRSTTRLENvnmwkqitnelnyv1WEGGHDLTVVAGDVKGVLT
4 DMGCVVWSGKELKGSGIFVADNVhtwteqYKFQPESPARLASAILNAHKDGVCIRSTTRLENVmwkqitnelnyv1wEGGHDLTVVAGDVKGVLt
5 DMGCVVWSGKELKGSGIFVADNVhtwteqyKFQPESPARLASAILNAHKDGVCIRSTTRLENVmwkqitnelnyv1weGGHDLTVVAGDVKGVLt
6 DMGCVVWSGKELKGSGIFVADNVHtwteqykFQPESPARLASAILNAHKDGVCIRSTTRLENVmwkqitnelnyv1wegGHDLTVVAGDVKGVLt
7 DMGCVVWSGKELKGSGIFVADNVHTwteqykfQPESPARLASAILNAHKDGVCIRSTTRlenvwkqitnelnYVLWEGGHDLTVVAGDVKGVLt

1 kgkraltpvvndlkySWKTWGAKAKIFTpearnstfLIDGPDTsecpnerRAWNFLEVEDYGFGMFTTNIWMKFREGSsevcdhrLMSAAIKDQKAVHA
2 KgkraltpvvndlkySWKTWGAKAKIFTPEARNSTFLIDGPDTsecpnerrAWNFLEVEDYGFGMFTTNIWMKFREGSSevcdhrLMSAAIKDQKAVHA
3 KGkraltpvvndlkySwKTWGAKAKIFTPEARNSTFLIDGPDTsecpnerraWNFLEVEDYGFGMFTTNIWMKFREGSSevcdhrLMSAAIKDQKAVHA
4 kgkRALTPPVndlkySwKTWGAKAKIFTpearNSTFLIDGPDTSECpnerrawNFLEVEDYGFGMFTTNIWMKFREGSSEVcdhrLmsAAIKDQKAVHA
5 kgkrALTPPVndlkySwKTWGAKAKIFTpearNSTFLIDGPDTSECpnerrawnFLEVEDYGFGMFTTNIWMKFREGSSEVcdhrLmsaaIKDQKAVHA
6 kgkraLTPPVNDLkySwktWGAKAKIFTpearntsTFLIDGPDTSECpnerrawnfLEVEDYGFGMFTTNIWMKFREGSSEVcdhrLmsaaIKDQKAVHA
7 kgkralTPPVNDLkySwktWGAKAKIFTpearnstFLIDGPDTSECpnerrawnfLEVEDYGFGMFTTNIWMKFREGSsevcdhRLMSAAIKDQKAVHA

1 DMGYWIEssknqtWQIEKASLIEVKTCLWPKTHTLWSNGVLESQMLIPKSYAGPFSqhnyrqgyATQTVGPWHLGKLEIDFGECPGTTVTIqedcdhr
2 DMGYWIessknqtWQIEKASLIEVKTCLWPKTHTLWSNGVLESQMLIPKSyagpfssqhnryrqgyATQTVGPWHLGKLEIDFGECPGTTVTIqedcdhr
3 DMGYWIessknqtWQIEKASLIEVKTCLWPKTHTLWSNGVLESQMLIPKSyagpfssqhnryrqgyaTQTVGPWHLGKLEIDFGECPGTTVTIQedcdhr
4 DMGYwiessknqtWQIEKASLIEVKTCLWPKTHTLWSNGVLESQMLIPKSyagpfssqhnryrqgyatQTVGPWHLGKLEIDFGECPGTTVTIQedcdhr
5 DMGYwiessknQTWQIEKASLIEVKTCLWPKTHTLWSNGVLESQMLIPKSyagpfssqhnryrqgyatQTVGPWHLGKLEIDFGECPGTTVTIQedcdhr
6 DMGYWiessknqtWQIEKASLIEVKTCLWPKTHTLWSNGVLESQMLIPKSyagpfssqhnryrqgyatQGYATQTVGPWHLGKLEIDFGECPGTTVTIQedcdhr
7 DMGYWIessknqtWQIEKASLIEVKTCLWPKTHTLWSNGVLESQMLIPKSYAGPFsqhnryrqgyATQTVGPWHLGKLEIDFGECPGTTVTIqedcdhR

1 GPSLRTTASGKLVTQWCCRSCTMPPLRFLGEDGCWYGMEIRPLSEKEENMVKSQVA
2 gPSLRTTASGKLVTQWCCRSCTMPPLRFLGEDGCWYGMEIRPLSEKEENMVKSQVA
3 gpSLRTTASGKLVTQWCCRSCTMPPLRFLGEDGCWYGMEIRPLSEKEENMVKSQVA
4 gpsLRTTASGKLVTQWCCRSCTMPPLRFLGEDGCWYGMEIRPLSEKEENMVKSQVA
5 gpslRTTASGKLVTQWCCRSCTMPPLRFLGEDGCWYGMEIRPLSEKEENMVKSQVA
6 gpslrrTTASGKLVTQWCCRSCTMPPLRFLGEDGCWYGMEIRPLSEKEENMVKSQVA
7 GPSLRTTASGKLVTQWCCRSCTMPPLRFLGEDGCWYGMEIRPLSEKEENMVKSQVA

Appendix S2: peptide libraries of NS1 proteins of DENV serotypes bind to antibody 1G5.3

DENV1

1 dsgcvinWKGRELKcgsgifvtnevhtwTEQYKFQADSPKRSLAAIGKAWEVGCGIRSATRLENIMWKQisnelnhillendmkftvvvgDVSGILA
2 DsgcvinwKGRELKCgsgifvtnevhtwtEQYKFQADSPKRSLAAIGKAWEVGCGIRSATRLEnimwkqisnelnhillendmkftvvvgdVSGILA
3 DSgcvinwkGRELKCGsgifvtnevhtweQYKFQADSPKRSLAAIGKAWEVGCGIRSATRLENimwkqisnelnhillendmkftvvvgdVSGILA
4 DSGCvinwkgRELKCGSgifvtnevhtwteYKFQADSPKRSLAAIGKAWEVGCGIRSATRLENImwkqisnelnhillENDMKFTvvvgdvsGILA
5 DSGCvinwkgrELKCGSGifvtnevHTWEQYKFQADSPKRSLAAIGKAWEVGCGIRSATRLENIMwkqisnelnhilleNDMKFTVvvgdvsGILA
6 DSGCVINWKGRELKCGSGIfvtnevhtTWTEQYKFQADSPKRSLAAIGKAWEVGCGIRSATRLENIMWkqisnelnhillendmkftvvVGDSGILA
7 DSGCVINWKGRELKCGSGIFvtnevhtWTEQYKFQADSPKRSLAAIGKAWEVGCGIRSATRLENIMWKqisnelnhillendmkftvvVGDSGILA

1 QGKKMIRPQPMEHKyswkswgkakiigaDVQNTTIIIDGPNTPECPDNQrawniwevedygfIFTTNIWLKLRLDSYTQVCDHRLMSAAIKdskavha
2 QGKKMIRPQPMEHKYswkswgkakiigadVQNTTIIIDGPNTPECPDNQRawniwevEDYGFEGIFTTNIWLKLRLDSYTQVCDHRLMSAAIKdskavha
3 QGKKMIRPQPMEHKYSwkswgkakiigadvQNTTIIIDGPNTPECPDNQRAwniwevDYGFEGIFTTNIWLKLRLDSYTQVCDHRLMSAAIKDSkavha
4 QGKKMIRPQPmehkyswKSWGKAKiigadvqNTTIIIDGPNTPECpdnqrawniwevedYGFEGIFTTNIWLKLRLDSYTQVCDHRLMSAAIKDSkavha
5 QGKKMIRPQPMehkyswksWGKAKIigadvqnttFIIDGPNTPECPdnqrawniwevedyGFGIFTTNIWLKLRLDSYTQVCDHRLMSAAIKDSKAvh
6 QGKKMIRPQPMEhkyswkswgkakiiGADVQNTTIIIDGPNTPECPDNqrawniwevedyFGIFTTNIWLKLRLDSYTQVCDHRLMSAAikdskavha
7 QGKKMIRPQPMEhkyswkswgkakiigADVQNTTIIIDGPNTPECPDNqrawniwevedygfGIFTTNIWLKLRLDSYTQVCDHRLMSAAIkdskavha

1 dmgywieSEKNETWKLARASFIEVKTCIWPKSHTLwsngvleSEMIIPKIYGGPISQHNYRPGYFTQTAGpwhlgkleldfdlceggtvvvDEHGNR
2 dmgywiesEKNETWKLARASFIEVKTCIWPKSHTLwsngvlesEMIIPKIYGGPISQHNYRPGYFTQTAGPwhlgkleldfdlceggtvvvDEHGNR
3 dmgywieseKNETWKLARASFIEVKTCIWPKSHTLwsngvleseMIIPKIYGGPISQHNYRPGYFTQTAGPwhlgkleldFDLCEGttvvvdeHGNR
4 dmgywiesekekNETWKLARASFIEVKTCIWPKSHTLwsngvlesemIIPKIYGGPISQHNYRPGYFTQTAGPWHlgkleldFDLCEGTTvvvdehCGNR
5 dmgywiesekeknETWKLARASFIEVKTCIWPKSHTLwsngvlesesemiIPKIYGGPISQHNYRPGYFTQTAGPWHlgkleldfdLCEGTTvvvdehcGNR
6 dmgywiesekeknETWKLARASFIEVKTCIWPKSHTLwsngvlesesemiIPKIYGGPISQHNYRPGYFTQTAGPWHLGkleldfdlceggtvvvdehcgNR
7 dmgywiESEKNETWKLARASFIEVKTCIWPKSHTlwsngvleSEMIIPKIYGGPISQHNYRPGYFTQTAGPWHLGkleldfdlceggtvvvVDEHGNR

1 GPSLRTTtvtktiHEWCCRSCTLPPPLRFKGEDGCwygmeirPVKEKEENLVKSMVSA
2 GPSLRTTTvtgktihEWCCRSCTLPPPLRFKGEDGCwygmeirPVKEKEENLVKSMVSA
3 GPSLRTTTVtgktiheWCCRSCTLPPPLRFKGedgcwyGMEIRPVKEKEENLVKSMVSA
4 GPSLRTTTVTgktihewCCRSTLPPPLRFKGedgcwygMEIRPVKEKEENLVKSMVSA
5 GPSLRTTTVTGktihewcCRSCTLPPPLRFKGEdgcwygmEIRPVKEKEENLVKSMVSA
6 GPSLRTTTVTGKtihewccRSCTLPPPLRFKGEDgcwygmeIRPVKEKEENLVKSMVSA
7 GPSLRTTTVTGKTihewccSCTLPPPLRFKGEDGcwygmeIRPVKEKEENLVKSMVSA

DENV2

1 **dsgcvvs**WKNKELKGSGIFITdnvhtwTEQYKFQPESPSKLASAIQKAHEEGICGIRSVTRLENLMWKQ**itpeinhilsene**VLTIMTGDIGIMQ
2 **Dsgcvws**KNKELKGSGIFITdnvhtwEQYKFQPESPSKLASAIQKAHEEGICGIRSVTRLENlmwkq**itpeinhil**LSNEVKLTIMTGDIGIMQ
3 **DSgcvswk**NKELKGSGIFITDnvhtweEQYKFQPESPSKLASAIQKAHEEGICGIRSVTRLENlmwkq**itpeinhil**SENEVKLTIMTGDIGIMQ
4 **DSGcvswkn**KELKGSGIFITDNvhtweEQYKFQPESPSKLASAIQKAHEEGICGIRSVTRLENmwkq**itpeinhil**ENEVKLTIMTGDIGIMQ
5 **DSGCvvswknk**ELKGSGIfitdnvHTWTEQYKFQPESPSKLASAIQKAHEEGICGIRSVTRLENLMwkq**itpeinhil**SENVKLTIMTGDIGIMQ
6 **DSGCvvswkn**KELKGSGIFitdnvHTWTEQYKFQPESPSKLASAIQKAHEEGICGIRSVTRLENLMwkq**itpeinhil**SENVKLTIMTGDIGIMQ
7 **DSGCvvswkn**KELKGSGIFitdnvhtwTEQYKFQPESPSKLASAIQKAHEEGICGIRSVTRLENLMWK**itpeinhilsene**VKLTIMTGDIGIMQ

1 AGKRSLRPQPTELK**y**swktwgakmlst~~te~~SHNQTFLIDGPETAECPTN~~rawnslevedygfg~~VFTTN~~I~~WLKLREKQdvfc~~ds~~kLMSAAIKdnravha
2 AGKRSLRPQPTELK**y**swktwgakmlst~~te~~SHNQTFLIDGPETAECPTN~~R~~awslev~~EDYGF~~GVT~~T~~NIWLKLREKQd~~v~~fc~~s~~kLMSAAIKdnravha
3 AGKRSLRPQPTELK**y**swktwgakmlst~~sh~~HNTFLIDGPETAECPTN~~R~~awslev~~DYGF~~GVT~~T~~NIWLKLrekqd~~v~~FCDSKLMSAAIKDNravha
4 AGKRSLRPQPTelkyswKTWGAKM**l**stesh~~N~~QTFLIDGPETAECPTN~~R~~aw~~s~~leved~~Y~~GFGVFT~~T~~NIWLKLrekqd~~v~~CD~~S~~KLMSAAIKDNravha
5 AGKRSLRPQPTelkysw**T**WGAKM**l**stesh~~N~~QTFLIDGPETAECPTN~~R~~aw~~s~~leved~~Y~~GFGVFT~~T~~NIWLKLrekqd~~v~~CD~~S~~KLMSAAIKDNravha
6 AGKRSLRPQPTelkysw**T**WGAKM**l**stesh~~N~~QTFLIDGPETAECPTN~~R~~aw~~s~~leved~~Y~~GFGVFT~~T~~NIWLKLREkqd~~v~~cd~~S~~KLMSAAikdnravha
7 AGKRSLRPQPTELkysw**T**WGAKM**l**stesh~~N~~QTFLIDGPETAECPTN~~R~~aw~~s~~leved~~Y~~GFGVFT~~T~~NIWLKLREkqd~~v~~cd~~S~~KLMSAAikdnravha

1 **dmgywiesalndtw**KMEASFIEVKSCHWPKSHTLwsngvle~~SE~~MIIPKSFAGPVSQHNYRPGYYTQ~~A~~GPwhlgk**1**EMDFDFCegttvvvTEDCNR
2 **dmgywiesalndtwk**MEASFIEVKSCHWPKSHTLwsngvles~~EM~~IIIPKSFAGPVSQHNYRPGYYTQ~~A~~GPwhlgk**1**EMDFDFCEg~~t~~vvvtedCNR
3 **dmgywiesalndtwkm**EASFIEVKSCHWPKSHTLwsngvle~~SE~~MIIPKSFAGPVSQHNYRPGYYTQ~~A~~GPwhlgk**1**emdfDFDFCEGTTvvvtedCNR
4 **dmgywiesalndtwkme**KASFIEVKSCHWPKSHTLwsngvlesem~~II~~IPKSFAGPVSQHNYRPGYYTQ~~A~~GPwhlgk**1**emd~~F~~DFCEGTTvvvtedCNR
5 **dmgywIESALNdtwkme**KASFIEVKSCHWPKSHTLwsngvlesem~~II~~IPKSFAGPVSQHNYRPGYYTQ~~A~~GPwhlgk**1**emd~~F~~DFCEGTTvvvtedcGNR
6 **dmgywIESALNDtwkme**KASFIEVKSCHWPKSHTLwsngvlesem~~II~~IPKSFAGPVSQHNYRPGYYTQ~~A~~GPwhlgk**1**emd~~F~~DFCEGTTvvvtedcGNR
7 **dmgywIESALNDtwkme**KASFIEVKSCHWPKSHTLwsngvlesem~~II~~IPKSFAGPVSQHNYRPGYYTQ~~A~~GPwhlgk**1**emd~~f~~cegtvvvtedcgnR

1 GPSLRTT~~t~~asgkli~~t~~EWCCR~~S~~CTL~~P~~PLRyrgedgcwygmeirPLKEKEENLVNSLVTA
2 GPSLRTT~~t~~asgkli~~t~~EWCCR~~S~~CTL~~P~~PLRyrgedgcwygmeirLKEKEENLVNSLVTA
3 GPSLRTT~~t~~asgkli~~t~~EWCCR~~S~~CTL~~P~~PLRyrgedgcwyGMEIRPLKEKEENLVNSLVTA
4 GPSLRTT~~t~~asgkli~~t~~EWCCR~~S~~CTL~~P~~PLRyrgedgcwygMEIRPLKEKEENLVNSLVTA
5 GPSLRTT~~t~~asgkli~~t~~ewCCR~~S~~CTL~~P~~PLRyrgedgcwygEIRPLKEKEENLVNSLVTA
6 GPSLRTT~~t~~asgkli~~t~~ewCCR~~S~~CTL~~P~~PLRyrgedgcwygEIRPLKEKEENLVNSLVTA
7 GPSLRT~~t~~asgkli~~t~~ewCCR~~S~~CTL~~P~~PLRyrgedgcwygmeiRPLKEKEENLVNSLVTA

DENV3

1 dmvcvinWKGKELKcgsgifvtnevhtwTEQYKFQADSPKRATAIAGAWENGVC GIRSTTRMENLLWKQianelnyilwennikltvvvgDITGVLE
2 DmfcvinwKGKELKCGsgifvtnevhtwtEQYKFQADSPKRATAIAGAWENGVC GIRSTTRMEnllwkqianelnyiLWENNKLt vvvvgdITGVLE
3 DMgcvnwkgKELKCGSg ifvtnevhtwteQYKFQADSPKRATAIAGAWENGVC GIRSTTRMEnllwkqianelnyiWENNKLt vvvvgdiTGVLE
4 DMGcvinwkgKELKCGSg ifvtnevhtwteQYKFQADSPKRATAIAGAWENGVC GIRSTTRMENllwkqianelnyiLWENNKLt vvvvgditGVLE
5 DMGCvinwkgkELKCGSGifvtnevHTWEQYKFQADSPKRATAIAGAWENGVC GIRSTTRMENLLwkqianelnyiLWENNKLTVvgdigtVLE
6 DMGCVINWKGKELKCGSGIfvtnevhtwTEQYKFQADSPKRATAIAGAWENGVC GIRSTTRMENLLWkqianelnyilwennikltvvVGDTGVLE
7 DMGCVINWKGKELKCGSGIFvtnevhtwTEQYKFQADSPKRATAIAGAWENGVC GIRSTTRMENLLWkqianelnyilwennikltvvVGDTGVLE

1 QGKRTLTPQPMELKyswktwgakivtaETQNSSFIIIDGPSTPECPASrawnvwevedygf gVFTTNIWLKLREVYTQLCDHRLmsaavkderavha
2 QGKRTLTPQPMELKYswktwgakivtaeTNSSFIIDGPSTPECPASRAwnvwevEDYGF GVFTTNIWLKLREVYTQLCDHRLmsaavkderavha
3 QGKRTLTPQPMELKYSwktwgakivtaetQNSSFIIIDGPSTPECPASRAwnvwevDYGF GVFTTNIWLKLREVYTQLCDHRLMSaavkderavha
4 QGKRTLTPQPmelkyswKTWGAKIvtaetqNSSFIIDGPSTPECpsasrawnvwevedYGF GVFTTNIWLKLREVYTQLCDHRLMSaavkderavha
5 QGKRTLTPQPmelkyswTWGAKIvtaetqNSSFIIDGPSTPECpsasrawnvwevedYGF GVFTTNIWLKLREVYTQLCDHRLMSAvkderavha
6 QGKRTLTPQPMElkyswktwgakivTAETQNSSFIIIDGPSTPECPASrawnvwevedygFGVFTTNIWLKLREVYTQLCDHRLMSAAvkderavha
7 QGKRTLTPQPMELkyswktwgakivtaETQNSSFIIIDGPSTPECPASrawnvwevedygf GVFTTNIWLKLREVYTQLCDHrlmsaavkderavha

1 dmgywiesqkngswKLEASLIEVKTCTWPKSHTLwsngvleSDMIIPKSLAGPISQHNHRPGYHTQTAGpwhlgk1ELDFNYCegettviISENCGR
2 dmgywiesqkngswkLEASLIEVKTCTWPKSHTLwsngvlesDMIIPKSLAGPISQHNHRPGYHTQTAGPwhlgk1LDFNYCEgettviISENCGR
3 dmgywiesqkngswk1EKASLIEVKTCTWPKSHTLwsngvlesdMIIPKSLAGPISQHNHRPGYHTQTAGPwhlgk1elDFNYCEGttvviseNCGR
4 dmgywiesqkngswk1EASLIEVKTCTWPKSHTLwsngvlesdmIIPKSLAGPISQHNHRPGYHTQTAGPwhlgk1elDFNYCEGTTvvisenCGTR
5 dmgywIESQKNGSwk1ekASLIEVKTCTWPKSHTLwsngvlesdmiIPKSLAGPISQHNHRPGYHTQTAGPwhlgk1elDFNYCEGTTvvisencGTR
6 dmgywIESQKNGSwk1ekaSIEVKTCTWPKSHTLwsngvlesdmiiPKSLAGPISQHNHRPGYHTQTAGPwhlgk1elDFNYCEGTTvvisencGTR
7 dmgywiESQKNGSwk1ekasSIEVKTCTWPKSHTLwsngv1ESDMIIPKSLAGPISQHNHRPGYHTQTAGPwhlgk1elDFNYCEGTTvvisencGTR

1 GPSLRTTtvsgk1iHEWCCRSCTLPPLymgedgcwygmeirPINEKEENMVKSLASA
2 GPSLRTTTvsgk1ihEWCCRSCTLpplyrMGEDGCWygmeirPINEKEENMVKSLASA
3 GPSLRTTTVsgk1iheWCCRSCTLpplyrmygedgcwyGMEIRPINEKEENMVKSLASA
4 GPSLRTTTVSgk1ihewCCRSCTLpplyrmygedgcwygMEIRPINEKEENMVKSLASA
5 GPSLRTTTVSGk1ihewcCRSCTLpplyrmygedgcwygEIRPINEKEENMVKSLASA
6 GPSLRTTTVSGK1ihewccRSCTLPP1rymgedgcwygmeIRPINEKEENMVKSLASA
7 GPSLRTTtvsgk1ihewccSCTLPP1rymgedgcwygmeiRPINEKEENMVKSLASA

DENV4

1 **dmgcvvsw**SGKELKGCGSIFVADnvhtwTEQYKFQPESPARLASAILNAHKDGVCIRSTTRLENVMWKQ**itnelnyvlwegghdltvvagDVGVLT**
2 **Dmgcvvsw**SGKELKGCGSIFVADnvhtwtEQYKFQPESPARLASAILNAHKDGVCIRSTTRLENvmwkqitnelnyvLWEGGHD**ltvvagdvKGVLT**
3 **DMgcvvsws**GKELKGCGSIFVADnvhtweEQYKFQPESPARLASAILNAHKDGVCIRSTTRLENvmwkqitnelnyvLWEGGHDL**tvvagdvKGVLT**
4 **DMGcvvswsg**KELKGCGSIFVADnvhtweEQYKFQPESPARLASAILNAHKDGVCIRSTTRLENmwkqitnelnyvLEGGHDL**tvvagdvKGVLT**
5 **DMGCvvws**gELKGCGSifvadnvHTWEQYKFQPESPARLASAILNAHKDGVCIRSTTRLENVmwkqitnelnyvLWEGHDL**tvvagdvKGVLT**
6 **DMGCvvws**gELKGCGSifvadnvHTWEQYKFQPESPARLASAILNAHKDGVCIRSTTRLENVmwkqitnelnyvLWEGHDL**tvvagdvKGVLT**
7 **DMGCvvws**gELKGCGSifvadnvhtwTEQYKFQPESPARLASAILNAHKDGVCIRSTTRLENVMWKqitnelnyvLwegghdltvvAGDVGVLT

1 KGKRALTPPVNDLKy**swktwg**KAKIFTPEARNSTFLIDGPDTSECPNER**rawnflevedygf**MFTTNIWMKFREGSSEVCDHRLMSAAIKdqkavha
2 KGKRALTPPVNDLK**y****swktwg**KAKIFTPEARNSTFLIDGPDTSECPNERR**awnflev**EDYGFGMFTTNIWMKFREGSSEVCDHRLMSAAIKdqkavha
3 KGKRALTPPVNDLK**y****swktwg**kaKIFTPEARNSTFLIDGPDTSECPNERRA**wnfleve**DYGFGMFTTNIWMKFREGSSEVCDHRLMSAAIKDQkavha
4 KGKRALTPPV**ndlkysw**KTWGKAKIFTPEARNSTFLIDGPDTSECPNERRAW**n****fleved**YFGFMFTTNIWMKFREGSSEVCDHRLMSAAIKDQKavha
5 KGKRALTPPV**ndlkysw**KTWGKAKIFTPEARNSTFLIDGPDTSECPNERRAW**n****flevedy**GFGFMFTTNIWMKFREGSSEVCDHRLMSAAIKDQKavha
6 KGKRALTPPV**ndlkysw**KTWGKAKIFTPEARNSTFLIDGPDTSECPNERRAW**N****levedy**FGMFTTNIWMKFREGSSEVCDHRLMSAAikdqkavha
7 KGKRALTPPVND**lkysw**tw**g**KAKIFTPEARNSTFLIDGPDTSECPNE**r****rawnflevedygf**GMFTTNIWMKFREGSSEVCDHRLMSAAIKdqkavha

1 **dmgywiessknqt**w**QIEKASLIEVKTCLWPKTHTLWSNGVLESQMLIPKSYAGPFSQHNYRQGyatqtvgpwhlgk1**EIDFECpgttvtiQEDCDHR
2 **dmgywiessknqt**w**QIEKASLIEVKTCLWPKTHTLWSNGVLESQMLIPKSYAGPFSQHNYRQGYatqtvgpwhlgk1**IDFECpgttvtiQEDCDHR
3 **dmgywiessknqt**w**QIEKASLIEVKTCLWPKTHTLWSNGVLESQMLIPKSYAGPFSQHNYRQGYAtqtvgpwhlgk1**DFGECPGttvtiqedCDHR
4 **dmgywiessknqt**w**QIEKASLIEVKTCLWPKTHTLWSNGVLESQMLIPKSYAGPFSQHNYRQGYAtqtvgpwhlgk1**DFGECPGttvtiqedCDHR
5 **dmgyWIESSKNqt**w**QIEKASLIEVKTCLWPKTHTLWSNGVLESQMLIPKSYAGPFSQHNYRQGYAtqtvgpwhlgk1**DFGECPGTTvtiqedcDHR
6 **dmgyWIESSKNqt**w**QIEKASLIEVKTCLWPKTHTLWSNGVLESQMLIPKSYAGPFSQHNYRQGYAtqtvgpwhlgk1**DFGECPGTTvtiqedcdHR
7 **dmgyWIESSKNqt**w**QIEKASLIEVKTCLWPKTHTLWSNGVLESQMLIPKSYAGPFSQHNYRQGyatqtvGPWHLGK1**leidfgecpgttvtiqedcdhR

1 GPSLRTT**tasgk1v**TQWCCRSCTMPPLRF1gedgcwygmeirPLSEKEENMVKSQVTA
2 GPSLRTT**tasgk1v**tQWCCRSCTMPPLRF1gedgcwygmeirLSEKEENMVKSQVTA
3 GPSLRTT**tasgk1vtq**WCCRSCTmpplrf1gedgcwyGMEIRPLSEKEENMVKSQVTA
4 GPSLRTT**tasgk1vtq**wCCRSCTMpp1rlf1gedgcwyGMEIRPLSEKEENMVKSQVTA
5 GPSLRTT**tasgk1vtq**wCCRSCTMpp1rlf1gedgcwygEIRPLSEKEENMVKSQVTA
6 GPSLRTT**tasgk1vtq**wCCRSCTMPP1rf1gedgcwygmeIRPLSEKEENMVKSQVTA
7 GPSLRTT**tasgk1vtq**wCCRSCTMPP1rf1gedgcwygmeiRPLSEKEENMVKSQVTA

Appendix S3: peptide libraries of NS1 proteins of DENV serotypes bind to antibody GUS2

DENV1

1 dsgcvinwKGRELKCGSGIFVTNEVHTWteqykfqADSPKRSLAAIGKAWEVGCGIRSATRLenimwkqISNELNHILLENDMKFTVVVGDSGILA
2 DsgcvinwKGRELKCGSGIFVTNEVHTWteqykfqaDSPKRSLAAIGKAWEVGCGIRSATRLenimwkqiSNELNHILLENDMKFTVVVGDSGILA
3 DsgcvinwkGRELKCGSGIFVTNEVHTWteqykfqadSPKRSLAAIGKAWEVGCGIRSATRLENimwkqisNELNHILLENDMKFTVVVGDSgila
4 DSGCvinwkgRELKCGSGIFVTNEvhtwteqykfqadsPKRLSLAAIGKAWEVGCGIRSATRLENimwkqisNELNHILLENDMKFTVVVGDSgila
5 DSGCvinwkgrELKCGSGIFVTNEVhtwteqyKFQADSPKRSLAAIGKAWEVGCGIRSATrlenimWKQISNELNHILLENDMKFTVVVGDSgila
6 DSGCVInwkgreLKCGSGIFVTNEVHTwteqykFQADSPKRSLAAIGKAWEVGCGIRSATrlenimWKQISNELNHILLENDMKFTVVVGDSgila
7 DSGCVInwkgre1KCGSGIFVTNEVHTwteqykFQADSPKRSLAAIGKAWEVGCGIRSATRlenimwkQISNELNHILLENDMKFTVVVGDSgila

1 qgkkmirpqpmehkyswkgAKIIGAdvqnttfIIDGPNTpecpdnqrawniewVEDYGFIFTNIWLKLRSYTQVCDHRLMSAAIKDSKAVHA
2 QgkkmirpqpmehkyswkgAKIIGAdvqnttfiIDGPNTpecpdnqrawniewVEDYGFIFTNIWLKLRSYTQVCDHRLMSAAIKDSKAVHA
3 qgKKMIRPQpmehkyswksWGKAKAiiigadvqnttfiiDGPNTPEcpdnqraWNIWEVEDYGFIFTNIWLKLRSYTQVCDHRLMSAAIKDSKAVHA
4 qgkKMIRPQPmehkyswKSWGKAKAiiigadvqNTTFIIDGPNTPECpdnqrawNIWEVEDYGFIFTNIWLKLRSYTQVCDHRLMSAAIKDSKAVHA
5 qgkkMIRPQPMehkyswksWGKAKAiiigadvqNTTFIIDGPNTPECpdnqrawNIWEVEDYGFIFTNIWLKLRSYTQVCDHRLMSAAIKDSKAVha
6 qgkkmirpqpmehkyswksWGKAKIIgadvqntTFIIDGPNTPECPDnqrawnWEVEDYGFIFTNIWLKLRSYTQVCDHRLMSAAIKDSKAVha
7 qgkkmirpqpmehkyswksWGKAKIIGadvqnttfIIDGPNTPECPDNqrawnweiEVEDYGFIFTNIWLKLRSYTQVCDHRLMSAAIKDSKAVha

1 dmgywieseknetwKLARASFIEVKTCIWPKSHTLWSNGVLESEMIIPKIYGGPISqhnyrpgyftqtagPWHLGKLELDFDLCEGTTVVDEHGNR
2 DmgywieseknetwkLARASFIEVKTCIWPKSHTLWSNGVLESEMIIPKIyggpisqhnyrpgyFTQTAGPWHLGKLELDFDLCEGTTVVDEHGNR
3 DMgywieseknetwk1LARASFIEVKTCIWPKSHTLWSNGVLESEMIIPKIYggpisqhnyrpgyfTQTAGPWHLGKLELDFDLCEGTTVVDEHGNR
4 DMgywieseknetwk1aRASFIEVKTCIWPKSHTLWSNGVLESEMIIPKIYGGpisqhnyrpgyftQTAGPWHLGKLELDFDLCEGTTVVDEHGNR
5 dmgywieseknetwk1arASFIEVKTCIWPKSHTLWSNGVLESEMIIPKIYGGpisqhnyrpgyftqTAGPWHLGKLELDFDLCEGTTVVDEHGNR
6 dmgywieseknetwk1araSFIEVKTCIWPKSHTLWSNGVLESEMIIPKIYGGPisqhnyrpgyftqAGPWHLGKLELDFDLCEGTTVVDEHGNR
7 dmgywieseknetwKLARASFIEVKTCIWPKSHTLWSNGVLESEMIIPKIYGGPisqhnyrpgyftqtaGPWHLGKLELDFDLCEGTTVVDEHGNR

1 GPSLRTTVTGTIHEWCCRSctlppplrFKGEDGCWYGMEIRPVKEKEENLVKSMVSA
2 GPSLRTTVTGTIHEWCCRSctlppplrfKGEDGCWYGMEIRPVKEKEENLVKSMVSA
3 GPSLRTTVTGTIHEWCCRSCTlppplrfkKGEDGCWYGMEIRPVKEKEENLVKSMVSA
4 GPSLRTTVTGTIHEWCCRSCTLpplrfkgEDGCWYGMEIRPVKEKEENLVKSMVSA
5 GPSLRTTVTGTIHEWCCRSCTLpplrfkgeDGCWYGMEIRPVKEKEENLVKSMVSA
6 GPSLRTTVTGTIHEWCCRSCTLPP1rfkgedGCWYGMEIRPVKEKEENLVKSMVSA
7 GPSLRTTVTGTIHEWCCRSCTLPP1rfkgedCwYGMEIRPVKEKEENLVKSMVSA

DENV2

1 dsgcvvswknke1kCGSGIFITDNVHTWteqykfqPESPSKLasaiqkaHEEGICGIRSVTRLen1mwkqITPELNHILSENEVKLTIMTDIKGIMQ
2 Dsgcvvswknke1kcGSGIFITDNVHTWTeqykfqpESPsklaSaiqkahEEGICGIRSVTRLEN1mwkqiTPELNHILSENEVKLTIMTDIKGIMQ
3 DSgcvvswkNKEKCGSGIFITDNVHTWeqykfqpeSPSKLASaiqkaheEGICGIRSVTRLEN1mwkqitPELNHILSENEVKLTIMTDIKGIMQ
4 DSGcvvswknKELKCGSGIFITDNvhtweqykfqpesPSKLASAiqaheeGICGIRSVTRLEN1mwkqitPELNHILSENEVKLTIMTDIKGIMQ
5 DSGCvvswknkELKCGSGIFITDNVhtwteqyKFQPESPsklasaiqkaheegICGIRSVtrlen1mwkqitPELNHILSENEVKLTIMTDIKGIMQ
6 DSGCVvswknkELKCGSGIFITDNVhtwteqyKFQPESPsklasaiqKAHEEGICGIRSVTrlen1mwkqitPELNHILSENEVKLTIMTDIKGIMQ
7 DSGCVvswknke1KCGSGIFITDNVHTwteqykfqPESPSKlasaiqKAHEEGICGIRSVTrlen1mwkqitPELNHILSENEVKLTIMTDIKGIMQ

1 AGKRSLRPQPTELKywkTwgAKMLSTeshnqtfLIDGPETAECPTNrawnsleVEDYGFGVFTTNIWLKLREKQDVFCDSKLMSAAIKDNRAVHA
2 AGKRSLRPQPTELKYswkTwgAKMLSTeshnqtfLIDGPETAECPTNrawnslevEDYGFGVFTTNIWLKLREKQDVFCDSKLMSAAIKDNRAVHA
3 AGKRSLRPQptelkyswKTWGAKmlsteshnqtfLIDGPETAECpntnraawnsLEVEDYGFGVFTTNIWLKLREKQDVFCDSKLMSAAIKDNRAVHA
4 AGKRSLRPQptelkyswKTWGAKmlsteshnqtfLIDGPETAECpntnrawnsLEVEDYGFGVFTTNIWLKLREKQDVFCDSKLMSAAIKDNRAVHA
5 AGKRSLRPQptelkyswTWGAKMlsteshnqtfLIDGPETAECpntnrawnsLEVEDYGFGVFTTNIWLKLREKQDVFCDSKLMSAAIKDNRAVha
6 AGKRSLRPQptelkyswktWGAKMLsteshnqtfLIDGPETAECPTNrawnsLEVEDYGFGVFTTNIWLKLREKQDVFCDSKLMSAAIKDNRAVha
7 AGKRSLRPQPTELkyswktWGAKMLSteshnqtfLIDGPETAECPTNrawnsLEVEDYGFGVFTTNIWLKLREKQDVFCDSKLMSAAIKDNRAVHa

1 dmgywiesalndtwKMEASFIEVKSCHWPKSHTLWSNGVLESEMIIPKSFAGPVSqhnyrpgyytqtagPWHLGKLEMDFDCEGTTVVTEDCGNR
2 DmgywiesalndtwkMEASFIEVKSCHWPKSHTLWSNGVLESEMIIPKSfagpvshnyrpgyYTQTAGPWHLGKLEMDFDCEGTTVVTEDCGNR
3 DMgywiesalndtwkmEKASFIEVKSCHWPKSHTLWSNGVLESEMIIPKSfagpvshnyrpgyyTQTAGPWHLGKLEMDFDCEGTTVVTEDCGNR
4 DMGywiesalndtwkmeKASFIEVKSCHWPKSHTLWSNGVLESEMIIPKSFaagpvshnyrpgyytQTAGPWHLGKLEMDFDCEGTTVVTEDCGNR
5 dmgyWIESALNdtwkmeKASFIEVKSCHWPKSHTLWSNGVLESEMIIPKSFAGPvsqhnrypgyytqTAGPWHLGKLEMDFDCEGTTVVTEDCGNR
6 dmgyIESALNDtwkmeKaSFIIEVKSCHWPKSHTLWSNGVLESEMIIPKSFAGPvsqhnrypgyytqAGPWHLGKLEMDFDCEGTTVVTEDCGNR
7 dmgywiesalndtwKMEASFIEVKSCHWPKSHTLWSNGVLESEMIIPKSFAGPVsqhnrypgyytqtaGPWHLGKLEMDFDCEGTTVVTEDCGNR

1 GPSLRTTASGKLITEWCCRSctlppirygedgcWYGMEIRPLKEKEENLVNSLVTA
2 GPSLRTTASGKLITEWCCRSctlppiryRGEDGCWYGMEMIRPLKEKEENLVNSLVTA
3 GPSLRTTASGKLITEWCCRSCTLppiryrgEDGCWYGMEMIRPLKEKEENLVNSLVTA
4 GPSLRTTASGKLITEWCCRSCTLppiryrgDGCWYGMEMIRPLKEKEENLVNSLVTA
5 GPSLRTTASGKLITEWCCRSCTLppiryrgDGCWYGMEMIRPLKEKEENLVNSLVTA
6 GPSLRTTASGKLITEWCCRSCTLPP1ryrgedGCWYGMEMIRPLKEKEENLVNSLVTA
7 GPSLRTTASGKLITEWCCRSCTLPP1ryrgedGCWYGMEMIRPLKEKEENLVNSLVTA

DENV3

1 **dmgcvinw**KKGKELKGSGIFVTNEVHTW**teqykfq**ADSPKRATAIAGAWENGVCGIRSTTRM**enllwkq**IANELNY*ilwenni*KLTVVVGDITGVLE
2 **Dmgcvinw**KKGKELKGSGIFVTNEVHTW**teqykfqa**DSPKRATAIAGAWENGVCGIRSTTRM**enllwkqi**IANELNY*ilwennik*LTVVGDITGVLE
3 **DMgcvinwk**GKELKGSGIFVTNEVHTW**teqykfqad**SPKRATAIAGAWENGVCGIRSTTRM**enllwkqia**NELNYIL*wennikl*TVVVGDITGVLE
4 **DMGcvinwkg**KELKGSGIFVTNE**vhtwteqykfqads**SPKRATAIAGAWENGVCGIRSTTRM**enllwkqian**ELNYIL*wenniklt*VVGDITGVLE
5 **DMGCvinwkgk**ELKGSGIFVTNEV**htwteqy**KFQADSPKRATAIAGAWENGVCGIRST**trmenll**WKQIANE*nyilwe*NNIKLTVVGDITGVLE
6 **DMGCVinwkgkel**LKGSGIFVTNEV**htwteqyk**FQADSPKRATAIAGAWENGVCGIRST**trmenllw**KQIANE*nyilwen*NNIKLTVVGDITGVLE
7 **DMGCVInwkgkel**KCGSGIFVTNEVHT**wteqykf**QADSPKRATAIAGAWENGVCGIRSTTR**menllwk**QIANELN*yilwenn*IKLTVVVGDITGVLE

1 QGKRTLTPQPMELK**yswktwg**KAKIVTA**etqnssf**IIDGPSTPECPAS**rawnvwe**VEDYGFGVFTTNIWLKLREVYTQLCDHRLMSAAVKDERAVHA
2 QGKRTLTPQPMELKY**swktwg**KAKIVTA**etqnssfi**IDGPSTPECPAS**rawnvwev**EDYGFGVFTTNIWLKLREVYTQLCDHRLMSAAVKDERAVHA
3 QGKRTLTPQ**pme1kysw**WTWGKA**kivtaetqnssfii**DGPSTPE**cpasrasra**WNVWEVEDYGFGVFTTNIWLKLREVYTQLCDHRLMSAAVKDERAVHA
4 QGKRTLTPQ**pmelkysw**WTWGAKA**kivtaetq**NSSFIIDGPSTPECP**psasraw**NVWEVEDYGFGVFTTNIWLKLREVYTQLCDHRLMSAAVKDERAVHA
5 QGKRTLTPQ**pmelkyswk**TWGAKA**vtaetqn**SFIIDGPSTPECP**sasrawn**WEVEDYGFGVFTTNIWLKLREVYTQLCDHRLMSAAVKDERAV**ha**
6 QGKRTLTPQ**pmelkyswkt**WGAKIV**taetqns**SFIIDGPSTPECP**sasrawnv**WEVEDYGFGVFTTNIWLKLREVYTQLCDHRLMSAAVKDERAV**ha**
7 QGKRTLTPQPMEL**kyswktw**GKAKIVT**aetqnss**FIIDGPSTPECPAS**rawnvw**EVEDYGFGVFTTNIWLKLREVYTQLCDHRLMSAAVKDERAV**ha**

1 **dmgywiesqkngsw**KLEASLIEVKTCTWPKSHTLWSNGVLESMDIIPKSLAGPI**ghnhrpgyhtqtag**PWHLGK**leldfnyc**EGTTVVISENCGTR
2 **Dmgywiesqkngswk**LEASLIEVKTCTWPKSHTLWSNGVLESMDIIPKS**lagpisqhnhrpgy**HTQAGPWHLGK**leldfnyc**EGTTVVISENCGTR
3 **DMgywiesqkngswk1**EKASLIEVKTCTWPKSHTLWSNGVLESMDIIPKSL**agpisqhnhrpgyh**TQAGPWHLGK**leldfnyc**egTTVVISENCGTR
4 **DMGywiesqkngswk1e**KASLIEVKTCTWPKSHTLWSNGVLESMDIIPKSLA**gpisqhnhrpgyht**QTAGPWHL**gk1e**ldFNCEGTTVVISENCGTR
5 **dmgywiesqkngswk1ek**ASLIEVKTCTWPKSHTLWSNGVLESMDIIPKSLAG**pisqhnhrpgyhtq**TAGPWHL**gk1e**ldFNCEGTTVVISENCGTR
6 **dmgywiesqkngswk1eka**SLIEVKTCTWPKSHTLWSNGVLESMDIIPKSLAGP**isqhnhrpgyhtqt**AGPWHL**gk1e**ldfnYCEGTTVVISENCGTR
7 **dmgywiesqkngswk1e**W**K**LEASLIEVKTCTWPKSHTLWSNGVLESMDIIPKSLAGPI**sqhnhrpgyhtqta**GPWHLGK**leldfnyc**EGTTVVISENCGTR

1 GPSLRTTVSGKLIHEWCCRS**ctlpp1r**YMGEDGCWYGMEIRPINEKEENMVKSLASA
2 GPSLRTTVSGKLIHEWCCRS**ctlpp1ry**MGEDGCWYGMEIRPINEKEENMVKSLASA
3 GPSLRTTVSGKLIHEWCCRS**ctlpp1rym**GEDGCWYGMEIRPINEKEENMVKSLASA
4 GPSLRTTVSGKLIHEWCCRS**ctlpp1rymg**EDGCWYGMEIRPINEKEENMVKSLASA
5 GPSLRTTVSGKLIHEWCCRS**ctlpp1rymge**DGCWYGMEIRPINEKEENMVKSLASA
6 GPSLRTTVSGKLIHEWCCRS**ctlpp1rymged**GCWYGMEIRPINEKEENMVKSLASA
7 GPSLRTTVSGKLIHEWCCRS**ctlpp1rymged**CWYGMEIRPINEKEENMVKSLASA

DENV4

1 DMGCVVWSGKELKGSGIFVADNVHTWteqykfqPESPARLAsailnaHKDGVCGIRSTTRLenvwkqiTNEINYVLWEGGHDLTVVAGDVKGVL
2 DMGCVVWSGKELKGSGIFVADNVHTWteqykfqpESPARLAsailnahKDGVCGIRSTTRLENvwkqiTNEINYVLWEGGHDLTVVAGDVKGVL
3 DMGCVVWSGKELKGSGIFVADNVHTWeqykfqpeSPARLASailnahkDGCGIRSTTRLENvwkqiTNEINYVLWEGGHDLTVVAGDVKGVL
4 DMGCVVWSGKELKGSGIFVADNVhtweqykfqpesPARLASailnahkdGVCGIRSTTRLENvwkqiTNEINYVLWEGGHDLTVVAGDVKGVL
5 DMGCVVWSGKELKGSGIFVADNVhtweqyKFQPESPARLASAIlnahkdVCGIRSTtrlenvmWKQITNEINYVLWEGGHDLTVVAGDVKGVL
6 DMGCVVWSGKELKGSGIFVADNVhtweqyKFQPESPARLASAILnahkdgvCGIRSTtrlenvmWKQITNEINYVLWEGGHDLTVVAGDVKGVL
7 DMGCVVWSGKELKGSGIFVADNVHTweqykQPESPARLASAILnahkdgvGIRSTTRlenvwkQITNEINYVLWEGGHDLTVVAGDVKGVL

1 KGKRALTPPVNDLywkwtwAKIIFTpearnstfLIDGPDTsecpnerrawnfleVEDYGFGMFTTNIWMKFREGSSEVCDHRLMSAAIKdqdqavha
2 KGKRALTPPVNDLYswkwtwAKIIFTPEARNSTFLIDGPDTsecpnerrawnfleVEDYGFGMFTTNIWMKFREGSSEVCDHRLMSAAIKdqdqavha
3 KGKRALTPPvndlkywkwktwgakiftpearnstfliDGPDTsecpnerrawnfleWNFLEVEDYGFGMFTTNIWMKFREGSSEVCDHRLMSaaikdqAVHA
4 KGKRALTPPvndlkywkwktwgakiftpearNSTFLIDGPDTSECpnerrawnfNFLEVEDYGFGMFTTNIWMKFREGSSEVCDHRLMSaaikdqAVHA
5 KGKRALTPPVNdlykswkTWGAKAIFTpearNSTFLIDGPDTSECpnerrawnfFLEVEDYGFGMFTTNIWMKFREGSSEVCDHRLMSAAikdqavha
6 KGKRALTPPVNDlykswktwgakiftpearNSTFLIDGPDTSECpnerrawnfLEVEDYGFGMFTTNIWMKFREGSSEVCDHRLMSAAikdqavha
7 KGKRALTPPVNDlykswktwgakiftpearnstFLIDGPDTSECpnerrawnfLEVEDYGFGMFTTNIWMKFREGSSEVCDHRLMSAAikdqavha

1 dmgywiessknqtWQIEKASLIEVKTCLWPKTHTLWSNGVLESQMLIPKSYAGPFSqhnyrqgYATQTVGPWHLGKLEIDFGECPGTTVTIQEDCDHR
2 dmgywiessknqtWQIEKASLIEVKTCLWPKTHTLWSNGVLESQMLIPKSyagpfssqhnyrqgyATQTVGPWHLGKLEIDFGECPGTTVTIQEDCDHR
3 DMgywiessKNQTWQIEKASLIEVKTCLWPKTHTLWSNGVLESQMLIPKSyagpfssqhnyrqgyaTQTVGPWHLGKLEIDFGECPGTTVTIQEDCDHR
4 DMGywiesskNQTWQIEKASLIEVKTCLWPKTHTLWSNGVLESQMLIPKSyagpfssqhnyrqgyatQTVGPWHLGKLEIDFGECPGTTVTIQEDCDHR
5 dmgywiessknQTWQIEKASLIEVKTCLWPKTHTLWSNGVLESQMLIPKSYAGpfsqhnyrqgyatQTVGPWHLGKLEIDFGECPGTTVTIQEDCDHR
6 dmgywiessknqtWQIEKASLIEVKTCLWPKTHTLWSNGVLESQMLIPKSYAGPfsqhnyrQGYATQTVGPWHLGKLEIDFGECPGTTVTIQEDCDHR
7 dmgywiessknqtWQIEKASLIEVKTCLWPKTHTLWSNGVLESQMLIPKSYAGPFSqhnyrqGYATQTVGPWHLGKLEIDFGECPGTTVTIQEDCDHR

1 GPSLRTTASGKLvtqwccrsctmpplirFLGEDGCWYGMEIRPLSEKEENMVKSQVA
2 GPSLRTTASGKLvtqwccrsctmpplrlfLGEDGCWYGMEIRPLSEKEENMVKSQVA
3 GPSLRTTAsgk1vtqwCCRSCTMppplrlf1GEDGCWYGMEIRPLSEKEENMVKSQVA
4 GPSLRTTASgk1vtqwCCRSCTMppplrlflgeDGCWYGMEIRPLSEKEENMVKSQVA
5 GPSLRTTASGk1vtqwccCRSCTMPplrlf1geDGCWYGMEIRPLSEKEENMVKSQVA
6 GPSLRTTASGK1vtqwccRSCTMPP1rlf1gedGCWYGMEIRPLSEKEENMVKSQVA
7 GPSLRTTASGKLvtqwccrsctmpplrlf1gedGCWYGMEIRPLSEKEENMVKSQVA