

eolf-seql
SEQUENCE LISTING

<110> GlaxoSmithKline Biologicals sa

<120> NOVEL METHODS FOR INDUCING AN IMMUNE RESPONSE

<130> VB65685 PCT

<150> GB1405921.6

<151> 2014-04-02

<160> 4

<170> PatentIn version 3.5

<210> 1

<211> 424

<212> PRT

<213> Artificial Sequence

<220>

<223> RTS,S

<400> 1

Met Met Ala Pro Asp Pro Asn Ala Asn Pro Asn Ala Asn Pro Asn Ala
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Asn Pro Asn Ala Asn Pro Asn Ala Asn Pro Asn Ala Asn Pro Asn Ala
20 25 30

Asn Pro Asn Ala Asn Pro Asn Ala Asn Pro Asn Ala Asn Pro Asn Ala
35 40 45

Asn Pro Asn Ala Asn Pro Asn Ala Asn Pro Asn Ala Asn Pro Asn Ala
50 55 60

Asn Pro Asn Ala Asn Pro Asn Ala Asn Pro Asn Ala Asn Pro Asn Lys
65 70 75 80

Asn Asn Gln Gly Asn Gly Gln Gly His Asn Met Pro Asn Asp Pro Asn
85 90 95

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Arg Asn Val Asp Glu Asn Ala Asn Ala Asn Ser Ala Val Lys Asn Asn
100 105 110

Asn Asn Glu Glu Pro Ser Asp Lys His Ile Lys Glu Tyr Leu Asn Lys
115 120 125

Ile Gln Asn Ser Leu Ser Thr Glu Trp Ser Pro Cys Ser Val Thr Cys
130 135 140

Gly Asn Gly Ile Gln Val Arg Ile Lys Pro Gly Ser Ala Asn Lys Pro
145 150 155 160

Lys Asp Glu Leu Asp Tyr Ala Asn Asp Ile Glu Lys Lys Ile Cys Lys
165 170 175

Met Glu Lys Cys Ser Ser Val Phe Asn Val Val Asn Ser Ser Ile Gly
180 185 190

Leu Gly Pro Val Thr Asn Met Glu Asn Ile Thr Ser Gly Phe Leu Gly
195 200 205

Pro Leu Leu Val Leu Gln Ala Gly Phe Phe Leu Leu Thr Arg Ile Leu
210 215 220

Thr Ile Pro Gln Ser Leu Asp Ser Trp Trp Thr Ser Leu Asn Phe Leu
225 230 235 240

Gly Gly Ser Pro Val Cys Leu Gly Gln Asn Ser Gln Ser Pro Thr Ser
245 250 255

Asn His Ser Pro Thr Ser Cys Pro Pro Ile Cys Pro Gly Tyr Arg Trp
260 265 270

Met Cys Leu Arg Arg Phe Ile Ile Phe Leu Phe Ile Leu Leu Leu Cys
275 280 285

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Leu Ile Phe Leu Leu Val Leu Leu Asp Tyr Gln Gly Met Leu Pro Val
290 295 300

Cys Pro Leu Ile Pro Gly Ser Thr Thr Thr Asn Thr Gly Pro Cys Lys
305 310 315 320

Thr Cys Thr Thr Pro Ala Gln Gly Asn Ser Met Phe Pro Ser Cys Cys
325 330 335

Cys Thr Lys Pro Thr Asp Gly Asn Cys Thr Cys Ile Pro Ile Pro Ser
340 345 350

Ser Trp Ala Phe Ala Lys Tyr Leu Trp Glu Trp Ala Ser Val Arg Phe
355 360 365

Ser Trp Leu Ser Leu Leu Val Pro Phe Val Gln Trp Phe Val Gly Leu
370 375 380

Ser Pro Thr Val Trp Leu Ser Ala Ile Trp Met Met Trp Tyr Trp Gly
385 390 395 400

Pro Ser Leu Tyr Ser Ile Val Ser Pro Phe Ile Pro Leu Leu Pro Ile
405 410 415

Phe Phe Cys Leu Trp Val Tyr Ile
420

<210> 2
<211> 546
<212> PRT
<213> Varicella zoster

<400> 2

Met Gly Thr Val Asn Lys Pro Val Val Gly Val Leu Met Gly Phe Gly
1 5 10 15

eolf-seq1

Ile	Ile	Thr	Gly	Thr	Leu	Arg	Ile	Thr	Asn	Pro	Val	Arg	Ala	Ser	Val
			20					25					30		
Leu	Arg	Tyr	Asp	Asp	Phe	His	Ile	Asp	Glu	Asp	Lys	Leu	Asp	Thr	Asn
		35					40					45			
Ser	Val	Tyr	Glu	Pro	Tyr	Tyr	His	Ser	Asp	His	Ala	Glu	Ser	Ser	Trp
	50					55					60				
Val	Asn	Arg	Gly	Glu	Ser	Ser	Arg	Lys	Ala	Tyr	Asp	His	Asn	Ser	Pro
65					70					75					80
Tyr	Ile	Trp	Pro	Arg	Asn	Asp	Tyr	Asp	Gly	Phe	Leu	Glu	Asn	Ala	His
				85					90					95	
Glu	His	His	Gly	Val	Tyr	Asn	Gln	Gly	Arg	Gly	Ile	Asp	Ser	Gly	Glu
			100					105					110		
Arg	Leu	Met	Gln	Pro	Thr	Gln	Met	Ser	Ala	Gln	Glu	Asp	Leu	Gly	Asp
		115					120					125			
Asp	Thr	Gly	Ile	His	Val	Ile	Pro	Thr	Leu	Asn	Gly	Asp	Asp	Arg	His
	130						135				140				
Lys	Ile	Val	Asn	Val	Asp	Gln	Arg	Gln	Tyr	Gly	Asp	Val	Phe	Lys	Gly
145					150					155					160
Asp	Leu	Asn	Pro	Lys	Pro	Gln	Gly	Gln	Arg	Leu	Ile	Glu	Val	Ser	Val
				165					170					175	
Glu	Glu	Asn	His	Pro	Phe	Thr	Leu	Arg	Ala	Pro	Ile	Gln	Arg	Ile	Tyr
			180					185					190		
Gly	Val	Arg	Tyr	Thr	Glu	Thr	Trp	Ser	Phe	Leu	Pro	Ser	Leu	Thr	Cys
	195						200					205			

ecolf-seql

Thr Gly Asp Ala Ala Pro Ala Ile Gln His Ile Cys Leu Lys His Thr
210 215 220

Thr Cys Phe Gln Asp Val Val Val Asp Val Asp Cys Ala Glu Asn Thr
225 230 235 240

Lys Glu Asp Gln Leu Ala Glu Ile Ser Tyr Arg Phe Gln Gly Lys Lys
245 250 255

Glu Ala Asp Gln Pro Trp Ile Val Val Asn Thr Ser Thr Leu Phe Asp
260 265 270

Glu Leu Glu Leu Asp Pro Pro Glu Ile Glu Pro Gly Val Leu Lys Val
275 280 285

Leu Arg Thr Glu Lys Gln Tyr Leu Gly Val Tyr Ile Trp Asn Met Arg
290 295 300

Gly Ser Asp Gly Thr Ser Thr Tyr Ala Thr Phe Leu Val Thr Trp Lys
305 310 315 320

Gly Asp Glu Lys Thr Arg Asn Pro Thr Pro Ala Val Thr Pro Gln Pro
325 330 335

Arg Gly Ala Glu Phe His Met Trp Asn Tyr His Ser His Val Phe Ser
340 345 350

Val Gly Asp Thr Phe Ser Leu Ala Met His Leu Gln Tyr Lys Ile His
355 360 365

Glu Ala Pro Phe Asp Leu Leu Leu Glu Trp Leu Tyr Val Pro Ile Asp
370 375 380

Pro Thr Cys Gln Pro Met Arg Leu Tyr Ser Thr Cys Leu Tyr His Pro
385 390 395 400

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Asn Ala Pro Gln Cys Leu Ser His Met Asn Ser Gly Cys Thr Phe Thr
405 410 415

Ser Pro His Leu Ala Gln Arg Val Ala Ser Thr Val Tyr Gln Asn Cys
420 425 430

Glu His Ala Asp Asn Tyr Thr Ala Tyr Cys Leu Gly Ile Ser His Met
435 440 445

Glu Pro Ser Phe Gly Leu Ile Leu His Asp Gly Gly Thr Thr Leu Lys
450 455 460

Phe Val Asp Thr Pro Glu Ser Leu Ser Gly Leu Tyr Val Phe Val Val
465 470 475 480

Tyr Phe Asn Gly His Val Glu Ala Val Ala Tyr Thr Val Val Ser Thr
485 490 495

Val Asp His Phe Val Asn Ala Ile Glu Glu Arg Gly Phe Pro Pro Thr
500 505 510

Ala Gly Gln Pro Pro Ala Thr Thr Lys Pro Lys Glu Ile Thr Pro Val
515 520 525

Asn Pro Gly Thr Ser Pro Leu Ile Arg Tyr Ala Ala Trp Thr Gly Gly
530 535 540

Leu Ala
545

<210> 3
<211> 723
<212> PRT
<213> Artificial Sequence

<220>
<223> M72 fusion protein

eolf-seql

<400> 3

Met Thr Ala Ala Ser Asp Asn Phe Gln Leu Ser Gln Gly Gly Gln Gly
1 5 10 15

Phe Ala Ile Pro Ile Gly Gln Ala Met Ala Ile Ala Gly Gln Ile Arg
20 25 30

Ser Gly Gly Gly Ser Pro Thr Val His Ile Gly Pro Thr Ala Phe Leu
35 40 45

Gly Leu Gly Val Val Asp Asn Asn Gly Asn Gly Ala Arg Val Gln Arg
50 55 60

Val Val Gly Ser Ala Pro Ala Ala Ser Leu Gly Ile Ser Thr Gly Asp
65 70 75 80

Val Ile Thr Ala Val Asp Gly Ala Pro Ile Asn Ser Ala Thr Ala Met
85 90 95

Ala Asp Ala Leu Asn Gly His His Pro Gly Asp Val Ile Ser Val Thr
100 105 110

Trp Gln Thr Lys Ser Gly Gly Thr Arg Thr Gly Asn Val Thr Leu Ala
115 120 125

Glu Gly Pro Pro Ala Glu Phe Met Val Asp Phe Gly Ala Leu Pro Pro
130 135 140

Glu Ile Asn Ser Ala Arg Met Tyr Ala Gly Pro Gly Ser Ala Ser Leu
145 150 155 160

Val Ala Ala Ala Gln Met Trp Asp Ser Val Ala Ser Asp Leu Phe Ser
165 170 175

Ala Ala Ser Ala Phe Gln Ser Val Val Trp Gly Leu Thr Val Gly Ser
180 185 190

eolf-seq1

Trp Ile Gly Ser Ser Ala Gly Leu Met Val Ala Ala Ala Ser Pro Tyr
195 200 205

Val Ala Trp Met Ser Val Thr Ala Gly Gln Ala Glu Leu Thr Ala Ala
210 215 220

Gln Val Arg Val Ala Ala Ala Tyr Glu Thr Ala Tyr Gly Leu Thr
225 230 235 240

Val Pro Pro Pro Val Ile Ala Glu Asn Arg Ala Glu Leu Met Ile Leu
245 250 255

Ile Ala Thr Asn Leu Leu Gly Gln Asn Thr Pro Ala Ile Ala Val Asn
260 265 270

Glu Ala Glu Tyr Gly Glu Met Trp Ala Gln Asp Ala Ala Ala Met Phe
275 280 285

Gly Tyr Ala Ala Ala Thr Ala Thr Ala Thr Ala Thr Leu Leu Pro Phe
290 295 300

Glu Glu Ala Pro Glu Met Thr Ser Ala Gly Gly Leu Leu Glu Gln Ala
305 310 315 320

Ala Ala Val Glu Glu Ala Ser Asp Thr Ala Ala Ala Asn Gln Leu Met
325 330 335

Asn Asn Val Pro Gln Ala Leu Gln Gln Leu Ala Gln Pro Thr Gln Gly
340 345 350

Thr Thr Pro Ser Ser Lys Leu Gly Gly Leu Trp Lys Thr Val Ser Pro
355 360 365

His Arg Ser Pro Ile Ser Asn Met Val Ser Met Ala Asn Asn His Met
370 375 380

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Ser Met Thr Asn Ser Gly Val Ser Met Thr Asn Thr Leu Ser Ser Met
385 390 395 400

Leu Lys Gly Phe Ala Pro Ala Ala Ala Gln Ala Val Gln Thr Ala
405 410 415

Ala Gln Asn Gly Val Arg Ala Met Ser Ser Leu Gly Ser Ser Leu Gly
420 425 430

Ser Ser Gly Leu Gly Gly Gly Val Ala Ala Asn Leu Gly Arg Ala Ala
435 440 445

Ser Val Gly Ser Leu Ser Val Pro Gln Ala Trp Ala Ala Ala Asn Gln
450 455 460

Ala Val Thr Pro Ala Ala Arg Ala Leu Pro Leu Thr Ser Leu Thr Ser
465 470 475 480

Ala Ala Glu Arg Gly Pro Gly Gln Met Leu Gly Gly Leu Pro Val Gly
485 490 495

Gln Met Gly Ala Arg Ala Gly Gly Gly Leu Ser Gly Val Leu Arg Val
500 505 510

Pro Pro Arg Pro Tyr Val Met Pro His Ser Pro Ala Ala Gly Asp Ile
515 520 525

Ala Pro Pro Ala Leu Ser Gln Asp Arg Phe Ala Asp Phe Pro Ala Leu
530 535 540

Pro Leu Asp Pro Ser Ala Met Val Ala Gln Val Gly Pro Gln Val Val
545 550 555 560

Asn Ile Asn Thr Lys Leu Gly Tyr Asn Asn Ala Val Gly Ala Gly Thr
565 570 575

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Gly Ile Val Ile Asp Pro Asn Gly Val Val Leu Thr Asn Asn His Val
580 585 590

Ile Ala Gly Ala Thr Asp Ile Asn Ala Phe Ser Val Gly Ser Gly Gln
595 600 605

Thr Tyr Gly Val Asp Val Val Gly Tyr Asp Arg Thr Gln Asp Val Ala
610 615 620

Val Leu Gln Leu Arg Gly Ala Gly Gly Leu Pro Ser Ala Ala Ile Gly
625 630 635 640

Gly Gly Val Ala Val Gly Glu Pro Val Val Ala Met Gly Asn Ser Gly
645 650 655

Gly Gln Gly Gly Thr Pro Arg Ala Val Pro Gly Arg Val Val Ala Leu
660 665 670

Gly Gln Thr Val Gln Ala Ser Asp Ser Leu Thr Gly Ala Glu Glu Thr
675 680 685

Leu Asn Gly Leu Ile Gln Phe Asp Ala Ala Ile Gln Pro Gly Asp Ala
690 695 700

Gly Gly Pro Val Val Asn Gly Leu Gly Gln Val Val Gly Met Asn Thr
705 710 715 720

Ala Ala Ser

<210> 4
<211> 725
<212> PRT
<213> Artificial Sequence

<220>

eolf-seql

<223> M72 fusion protein (2-his)

<400> 4

Met His His Thr Ala Ala Ser Asp Asn Phe Gln Leu Ser Gln Gly Gly
1 5 10 15

Gln Gly Phe Ala Ile Pro Ile Gly Gln Ala Met Ala Ile Ala Gly Gln
20 25 30

Ile Arg Ser Gly Gly Gly Ser Pro Thr Val His Ile Gly Pro Thr Ala
35 40 45

Phe Leu Gly Leu Gly Val Val Asp Asn Asn Gly Asn Gly Ala Arg Val
50 55 60

Gln Arg Val Val Gly Ser Ala Pro Ala Ala Ser Leu Gly Ile Ser Thr
65 70 75 80

Gly Asp Val Ile Thr Ala Val Asp Gly Ala Pro Ile Asn Ser Ala Thr
85 90 95

Ala Met Ala Asp Ala Leu Asn Gly His His Pro Gly Asp Val Ile Ser
100 105 110

Val Thr Trp Gln Thr Lys Ser Gly Gly Thr Arg Thr Gly Asn Val Thr
115 120 125

Leu Ala Glu Gly Pro Pro Ala Glu Phe Met Val Asp Phe Gly Ala Leu
130 135 140

Pro Pro Glu Ile Asn Ser Ala Arg Met Tyr Ala Gly Pro Gly Ser Ala
145 150 155 160

Ser Leu Val Ala Ala Ala Gln Met Trp Asp Ser Val Ala Ser Asp Leu
165 170 175

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Phe Ser Ala Ala Ser Ala Phe Gln Ser Val Val Trp Gly Leu Thr Val
180 185 190

Gly Ser Trp Ile Gly Ser Ser Ala Gly Leu Met Val Ala Ala Ala Ser
195 200 205

Pro Tyr Val Ala Trp Met Ser Val Thr Ala Gly Gln Ala Glu Leu Thr
210 215 220

Ala Ala Gln Val Arg Val Ala Ala Ala Tyr Glu Thr Ala Tyr Gly
225 230 235 240

Leu Thr Val Pro Pro Pro Val Ile Ala Glu Asn Arg Ala Glu Leu Met
245 250 255

Ile Leu Ile Ala Thr Asn Leu Leu Gly Gln Asn Thr Pro Ala Ile Ala
260 265 270

Val Asn Glu Ala Glu Tyr Gly Glu Met Trp Ala Gln Asp Ala Ala Ala
275 280 285

Met Phe Gly Tyr Ala Ala Ala Thr Ala Thr Ala Thr Ala Thr Leu Leu
290 295 300

Pro Phe Glu Glu Ala Pro Glu Met Thr Ser Ala Gly Gly Leu Leu Glu
305 310 315 320

Gln Ala Ala Ala Val Glu Glu Ala Ser Asp Thr Ala Ala Ala Asn Gln
325 330 335

Leu Met Asn Asn Val Pro Gln Ala Leu Gln Gln Leu Ala Gln Pro Thr
340 345 350

Gln Gly Thr Thr Pro Ser Ser Lys Leu Gly Gly Leu Trp Lys Thr Val
355 360 365

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Ser	Pro	His	Arg	Ser	Pro	Ile	Ser	Asn	Met	Val	Ser	Met	Ala	Asn	Asn
370						375					380				
His	Met	Ser	Met	Thr	Asn	Ser	Gly	Val	Ser	Met	Thr	Asn	Thr	Leu	Ser
385					390					395					400
Ser	Met	Leu	Lys	Gly	Phe	Ala	Pro	Ala	Ala	Ala	Ala	Gln	Ala	Val	Gln
				405					410					415	
Thr	Ala	Ala	Gln	Asn	Gly	Val	Arg	Ala	Met	Ser	Ser	Leu	Gly	Ser	Ser
			420					425					430		
Leu	Gly	Ser	Ser	Gly	Leu	Gly	Gly	Gly	Val	Ala	Ala	Asn	Leu	Gly	Arg
	435					440						445			
Ala	Ala	Ser	Val	Gly	Ser	Leu	Ser	Val	Pro	Gln	Ala	Trp	Ala	Ala	Ala
450						455					460				
Asn	Gln	Ala	Val	Thr	Pro	Ala	Ala	Arg	Ala	Leu	Pro	Leu	Thr	Ser	Leu
465					470					475					480
Thr	Ser	Ala	Ala	Glu	Arg	Gly	Pro	Gly	Gln	Met	Leu	Gly	Gly	Leu	Pro
				485					490					495	
Val	Gly	Gln	Met	Gly	Ala	Arg	Ala	Gly	Gly	Gly	Leu	Ser	Gly	Val	Leu
			500					505					510		
Arg	Val	Pro	Pro	Arg	Pro	Tyr	Val	Met	Pro	His	Ser	Pro	Ala	Ala	Gly
		515					520					525			
Asp	Ile	Ala	Pro	Pro	Ala	Leu	Ser	Gln	Asp	Arg	Phe	Ala	Asp	Phe	Pro
530						535					540				
Ala	Leu	Pro	Leu	Asp	Pro	Ser	Ala	Met	Val	Ala	Gln	Val	Gly	Pro	Gln
545					550					555					560

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Val Val Asn Ile Asn Thr Lys Leu Gly Tyr Asn Asn Ala Val Gly Ala
565 570 575

Gly Thr Gly Ile Val Ile Asp Pro Asn Gly Val Val Leu Thr Asn Asn
580 585 590

His Val Ile Ala Gly Ala Thr Asp Ile Asn Ala Phe Ser Val Gly Ser
595 600 605

Gly Gln Thr Tyr Gly Val Asp Val Val Gly Tyr Asp Arg Thr Gln Asp
610 615 620

Val Ala Val Leu Gln Leu Arg Gly Ala Gly Gly Leu Pro Ser Ala Ala
625 630 635 640

Ile Gly Gly Gly Val Ala Val Gly Glu Pro Val Val Ala Met Gly Asn
645 650 655

Ser Gly Gly Gln Gly Gly Thr Pro Arg Ala Val Pro Gly Arg Val Val
660 665 670

Ala Leu Gly Gln Thr Val Gln Ala Ser Asp Ser Leu Thr Gly Ala Glu
675 680 685

Glu Thr Leu Asn Gly Leu Ile Gln Phe Asp Ala Ala Ile Gln Pro Gly
690 695 700

Asp Ala Gly Gly Pro Val Val Asn Gly Leu Gly Gln Val Val Gly Met
705 710 715 720

Asn Thr Ala Ala Ser
725