

4699968_1
SEQUENCE LISTING

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<120> Integral Membrane Protein Display on Poxvirus Extracellular
Enveloped Virions

<130> 58008-165443

<140> PCT/US2017/028787
<141> 2017-04-21

<160> 17

<170> PatentIn version 3.5

<210> 1
<211> 372
<212> PRT
<213> Artificial Sequence

<220>
<223> F13L

<400> 1

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

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Arg Arg Arg Phe Asp Thr Phe Lys Ala Phe Asn Ser Ala Lys Asn Ser
165 170 175

Trp Leu Asn Leu Cys Ser Ala Ala Cys Cys Leu Pro Val Ser Thr Ala
180 185 190

Tyr His Ile Lys Asn Pro Ile Gly Gly Val Phe Phe Thr Asp Ser Pro
195 200 205

Glu His Leu Leu Gly Tyr Ser Arg Asp Leu Asp Thr Asp Val Val Ile
210 215 220

Asp Lys Leu Lys Ser Ala Lys Thr Ser Ile Asp Ile Glu His Leu Ala
225 230 235 240

Ile Val Pro Thr Thr Arg Val Asp Gly Asn Ser Tyr Tyr Trp Pro Asp
245 250 255

Ile Tyr Asn Ser Ile Ile Glu Ala Ala Ile Asn Arg Gly Val Lys Ile
260 265 270

Arg Leu Leu Val Gly Asn Trp Asp Lys Asn Asp Val Tyr Ser Met Ala
275 280 285

Thr Ala Arg Ser Leu Asp Ala Leu Cys Val Gln Asn Asp Leu Ser Val
290 295 300

Lys Val Phe Thr Ile Gln Asn Asn Thr Lys Leu Leu Ile Val Asp Asp
305 310 315 320

Glu Tyr Val His Ile Thr Ser Ala Asn Phe Asp Gly Thr His Tyr Gln
325 330 335

Asn His Gly Phe Val Ser Phe Asn Ser Ile Asp Lys Gln Leu Val Ser
340 345 350

Glu Ala Lys Lys Ile Phe Glu Arg Asp Trp Val Ser Ser His Ser Lys
355 360 365

Ser Leu Lys Ile
370

<210> 2
<211> 892
<212> PRT
<213> Artificial Sequence

<220>
<223> FZD (FL) - F13L Fusion Protein

<400> 2

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Ala His Ser Phe Gly Asp Glu Glu Glu Arg Arg Cys Asp Pro Ile Arg
20 25 30

Ile Ser Met Cys Gln Asn Leu Gly Tyr Asn Val Thr Lys Met Pro Asn
35 40 45

Leu Val Gly His Glu Leu Gln Thr Asp Ala Glu Leu Gln Leu Thr Thr
50 55 60

Phe Thr Pro Leu Ile Gln Tyr Gly Cys Ser Ser Gln Leu Gln Phe Phe
65 70 75 80

Leu Cys Ser Val Tyr Val Pro Met Cys Thr Glu Lys Ile Asn Ile Pro
85 90 95

Ile Gly Pro Cys Gly Gly Met Cys Leu Ser Val Lys Arg Arg Cys Glu
100 105 110

Pro Val Leu Lys Glu Phe Gly Phe Ala Trp Pro Glu Ser Leu Asn Cys
115 120 125

Ser Lys Phe Pro Pro Gln Asn Asp His Asn His Met Cys Met Glu Gly
130 135 140

Pro Gly Asp Glu Glu Val Pro Leu Pro His Lys Thr Pro Ile Gln Pro
145 150 155 160

Gly Glu Glu Cys His Ser Val Gly Thr Asn Ser Asp Gln Tyr Ile Trp
165 170 175

Val Lys Arg Ser Leu Asn Cys Val Leu Lys Cys Gly Tyr Asp Ala Gly
180 185 190

Leu Tyr Ser Arg Ser Ala Lys Glu Phe Thr Asp Ile Trp Met Ala Val
195 200 205

Trp Ala Ser Leu Cys Phe Ile Ser Thr Ala Phe Thr Val Leu Thr Phe
210 215 220

Leu Ile Asp Ser Ser Arg Phe Ser Tyr Pro Glu Arg Pro Ile Ile Phe
225 230 235 240

Leu Ser Met Cys Tyr Asn Ile Tyr Ser Ile Ala Tyr Ile Val Arg Leu
245 250 255

Thr Val Gly Arg Glu Arg Ile Ser Cys Asp Phe Glu Glu Ala Ala Glu
260 265 270

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Pro Val Leu Ile Gln Glu Gly Leu Lys Asn Thr Gly Cys Ala Ile Ile
275 280 285

Phe Leu Leu Met Tyr Phe Phe Gly Met Ala Ser Ser Ile Trp Trp Val
290 295 300

Ile Leu Thr Leu Thr Trp Phe Leu Ala Ala Gly Leu Lys Trp Gly His
305 310 315 320

Glu Ala Ile Glu Met His Ser Ser Tyr Phe His Ile Ala Ala Trp Ala
325 330 335

Ile Pro Ala Val Lys Thr Ile Val Ile Leu Ile Met Arg Leu Val Asp
340 345 350

Ala Asp Glu Leu Thr Gly Leu Cys Tyr Val Gly Asn Gln Asn Leu Asp
355 360 365

Ala Leu Thr Gly Phe Val Val Ala Pro Leu Phe Thr Tyr Leu Val Ile
370 375 380

Gly Thr Leu Phe Ile Ala Ala Gly Leu Val Ala Leu Phe Lys Ile Arg
385 390 395 400

Ser Asn Leu Gln Lys Asp Gly Thr Lys Thr Asp Lys Leu Glu Arg Leu
405 410 415

Met Val Lys Ile Gly Val Phe Ser Val Leu Tyr Thr Val Pro Ala Thr
420 425 430

Cys Val Ile Ala Cys Tyr Phe Tyr Glu Ile Ser Asn Trp Ala Leu Phe
435 440 445

Arg Tyr Ser Ala Asp Asp Ser Asn Met Ala Val Glu Met Leu Lys Ile
450 455 460

Phe Met Ser Leu Leu Val Gly Ile Thr Ser Gly Met Trp Ile Trp Ser
465 470 475 480

Ala Lys Thr Leu His Thr Trp Gln Lys Cys Ser Asn Arg Leu Val Asn
485 490 495

Ser Gly Lys Val Lys Arg Glu Lys Arg Gly Asn Gly Trp Val Lys Pro
500 505 510

Gly Lys Gly Ser Glu Thr Val Val Met Trp Pro Phe Ala Ser Val Pro
515 520 525

Ala Gly Ala Lys Cys Arg Leu Val Glu Thr Leu Pro Glu Asn Met Asp
530 535 540

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Phe	Arg	Ser	Asp	His	Leu	Thr	Thr	Phe	Glu	Cys	Phe	Asn	Glu	Ile	Ile
545					550					555					560
Thr	Leu	Ala	Lys	Lys	Tyr	Ile	Tyr	Ile	Ala	Ser	Phe	Cys	Cys	Asn	Pro
				565					570					575	
Leu	Ser	Thr	Thr	Arg	Gly	Ala	Leu	Ile	Phe	Asp	Lys	Leu	Lys	Glu	Ala
			580					585					590		
Ser	Glu	Lys	Gly	Ile	Lys	Ile	Ile	Val	Leu	Leu	Asp	Glu	Arg	Gly	Lys
		595					600					605			
Arg	Asn	Leu	Gly	Glu	Leu	Gln	Ser	His	Cys	Pro	Asp	Ile	Asn	Phe	Ile
	610					615					620				
Thr	Val	Asn	Ile	Asp	Lys	Lys	Asn	Asn	Val	Gly	Leu	Leu	Leu	Gly	Cys
625					630					635					640
Phe	Trp	Val	Ser	Asp	Asp	Glu	Arg	Cys	Tyr	Val	Gly	Asn	Ala	Ser	Phe
				645					650					655	
Thr	Gly	Gly	Ser	Ile	His	Thr	Ile	Lys	Thr	Leu	Gly	Val	Tyr	Ser	Asp
			660					665					670		
Tyr	Pro	Pro	Leu	Ala	Thr	Asp	Leu	Arg	Arg	Arg	Phe	Asp	Thr	Phe	Lys
		675					680					685			
Ala	Phe	Asn	Ser	Ala	Lys	Asn	Ser	Trp	Leu	Asn	Leu	Cys	Ser	Ala	Ala
	690					695					700				
Cys	Cys	Leu	Pro	Val	Ser	Thr	Ala	Tyr	His	Ile	Lys	Asn	Pro	Ile	Gly
705					710					715					720
Gly	Val	Phe	Phe	Thr	Asp	Ser	Pro	Glu	His	Leu	Leu	Gly	Tyr	Ser	Arg
				725					730					735	
Asp	Leu	Asp	Thr	Asp	Val	Val	Ile	Asp	Lys	Leu	Lys	Ser	Ala	Lys	Thr
			740					745					750		
Ser	Ile	Asp	Ile	Glu	His	Leu	Ala	Ile	Val	Pro	Thr	Thr	Arg	Val	Asp
		755					760					765			
Gly	Asn	Ser	Tyr	Tyr	Trp	Pro	Asp	Ile	Tyr	Asn	Ser	Ile	Ile	Glu	Ala
	770					775					780				
Ala	Ile	Asn	Arg	Gly	Val	Lys	Ile	Arg	Leu	Leu	Val	Gly	Asn	Trp	Asp
785					790					795					800
Lys	Asn	Asp	Val	Tyr	Ser	Met	Ala	Thr	Ala	Arg	Ser	Leu	Asp	Ala	Leu
				805					810					815	

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Cys Val Gln Asn Asp Leu Ser Val Lys Val Phe Thr Ile Gln Asn Asn
820 825 830

Thr Lys Leu Leu Ile Val Asp Asp Glu Tyr Val His Ile Thr Ser Ala
835 840 845

Asn Phe Asp Gly Thr His Tyr Gln Asn His Gly Phe Val Ser Phe Asn
850 855 860

Ser Ile Asp Lys Gln Leu Val Ser Glu Ala Lys Lys Ile Phe Glu Arg
865 870 875 880

Asp Trp Val Ser Ser His Ser Lys Ser Leu Lys Ile
885 890

<210> 3
<211> 728
<212> PRT
<213> Artificial Sequence

<220>
<223> CXCR4-F13L Fusion Protein

<400> 3

Met Ala Ile Pro Leu Pro Leu Leu Gln Ile Tyr Thr Ser Asp Asn Tyr
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Thr Glu Glu Met Gly Ser Gly Asp Tyr Asp Ser Met Lys Glu Pro Cys
20 25 30

Phe Arg Glu Glu Asn Ala Asn Phe Asn Lys Ile Phe Leu Pro Thr Ile
35 40 45

Tyr Ser Ile Ile Phe Leu Thr Gly Ile Val Gly Asn Gly Leu Val Ile
50 55 60

Leu Val Met Gly Tyr Gln Lys Lys Leu Arg Ser Met Thr Asp Lys Tyr
65 70 75 80

Arg Leu His Leu Ser Val Ala Asp Leu Leu Phe Val Ile Thr Leu Pro
85 90 95

Phe Trp Ala Val Asp Ala Val Ala Asn Trp Tyr Phe Gly Asn Phe Leu
100 105 110

Cys Lys Ala Val His Val Ile Tyr Thr Val Asn Leu Tyr Ser Ser Val
115 120 125

Leu Ile Leu Ala Phe Ile Ser Leu Asp Arg Tyr Leu Ala Ile Val His
130 135 140

Ala Thr Asn Ser Gln Arg Pro Arg Lys Leu Leu Ala Glu Lys Val Val
145 150 155 160

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Tyr Val Gly Val Trp Ile Pro Ala Leu Leu Leu Thr Ile Pro Asp Phe
 165 170 175
 Ile Phe Ala Asn Val Ser Glu Ala Asp Asp Arg Tyr Ile Cys Asp Arg
 180 185 190
 Phe Tyr Pro Asn Asp Leu Trp Val Val Val Phe Gln Phe Gln His Ile
 195 200 205
 Met Val Gly Leu Ile Leu Pro Gly Ile Val Ile Leu Ser Cys Tyr Cys
 210 215 220
 Ile Ile Ile Ser Lys Leu Ser His Ser Lys Gly His Gln Lys Arg Lys
 225 230 235 240
 Ala Leu Lys Thr Thr Val Ile Leu Ile Leu Ala Phe Phe Ala Cys Trp
 245 250 255
 Leu Pro Tyr Tyr Ile Gly Ile Ser Ile Asp Ser Phe Ile Leu Leu Glu
 260 265 270
 Ile Ile Lys Gln Gly Cys Glu Phe Glu Asn Thr Val His Lys Trp Ile
 275 280 285
 Ser Ile Thr Glu Ala Leu Ala Phe Phe His Cys Cys Leu Asn Pro Ile
 290 295 300
 Leu Tyr Ala Phe Leu Gly Ala Lys Phe Lys Thr Ser Ala Gln His Ala
 305 310 315 320
 Leu Thr Ser Val Ser Arg Gly Ser Ser Leu Lys Ile Leu Ser Lys Gly
 325 330 335
 Lys Arg Gly Gly His Ser Ser Val Ser Thr Glu Ser Glu Ser Ser Ser
 340 345 350
 Phe His Ser Ser Met Trp Pro Phe Ala Ser Val Pro Ala Gly Ala Lys
 355 360 365
 Cys Arg Leu Val Glu Thr Leu Pro Glu Asn Met Asp Phe Arg Ser Asp
 370 375 380
 His Leu Thr Thr Phe Glu Cys Phe Asn Glu Ile Ile Thr Leu Ala Lys
 385 390 395 400
 Lys Tyr Ile Tyr Ile Ala Ser Phe Cys Cys Asn Pro Leu Ser Thr Thr
 405 410 415
 Arg Gly Ala Leu Ile Phe Asp Lys Leu Lys Glu Ala Ser Glu Lys Gly
 420 425 430

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Ile Lys Ile Ile Val Leu Leu Asp Glu Arg Gly Lys Arg Asn Leu Gly
 435 440 445
 Glu Leu Gln Ser His Cys Pro Asp Ile Asn Phe Ile Thr Val Asn Ile
 450 455 460
 Asp Lys Lys Asn Asn Val Gly Leu Leu Leu Gly Cys Phe Trp Val Ser
 465 470 475 480
 Asp Asp Glu Arg Cys Tyr Val Gly Asn Ala Ser Phe Thr Gly Gly Ser
 485 490 495
 Ile His Thr Ile Lys Thr Leu Gly Val Tyr Ser Asp Tyr Pro Pro Leu
 500 505 510
 Ala Thr Asp Leu Arg Arg Arg Phe Asp Thr Phe Lys Ala Phe Asn Ser
 515 520 525
 Ala Lys Asn Ser Trp Leu Asn Leu Cys Ser Ala Ala Cys Cys Leu Pro
 530 535 540
 Val Ser Thr Ala Tyr His Ile Lys Asn Pro Ile Gly Gly Val Phe Phe
 545 550 555 560
 Thr Asp Ser Pro Glu His Leu Leu Gly Tyr Ser Arg Asp Leu Asp Thr
 565 570 575
 Asp Val Val Ile Asp Lys Leu Lys Ser Ala Lys Thr Ser Ile Asp Ile
 580 585 590
 Glu His Leu Ala Ile Val Pro Thr Thr Arg Val Asp Gly Asn Ser Tyr
 595 600 605
 Tyr Trp Pro Asp Ile Tyr Asn Ser Ile Ile Glu Ala Ala Ile Asn Arg
 610 615 620
 Gly Val Lys Ile Arg Leu Leu Val Gly Asn Trp Asp Lys Asn Asp Val
 625 630 635 640
 Tyr Ser Met Ala Thr Ala Arg Ser Leu Asp Ala Leu Cys Val Gln Asn
 645 650 655
 Asp Leu Ser Val Lys Val Phe Thr Ile Gln Asn Asn Thr Lys Leu Leu
 660 665 670
 Ile Val Asp Asp Glu Tyr Val His Ile Thr Ser Ala Asn Phe Asp Gly
 675 680 685
 Thr His Tyr Gln Asn His Gly Phe Val Ser Phe Asn Ser Ile Asp Lys
 690 695 700

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Gln Leu Val Ser Glu Ala Lys Lys Ile Phe Glu Arg Asp Trp Val Ser
705 710 715 720

Ser His Ser Lys Ser Leu Lys Ile
725

<210> 4
<211> 669
<212> PRT
<213> Artificial Sequence

<220>
<223> CD20-F13L Fusion Protein

<400> 4

Met Ala Thr Pro Arg Asn Ser Val Asn Gly Thr Phe Pro Ala Glu Pro
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Met Lys Gly Pro Ile Ala Met Gln Ser Gly Pro Lys Pro Leu Phe Arg
20 25 30

Arg Met Ser Ser Leu Val Gly Pro Thr Gln Ser Phe Phe Met Arg Glu
35 40 45

Ser Lys Thr Leu Gly Ala Val Gln Ile Met Asn Gly Leu Phe His Ile
50 55 60

Ala Leu Gly Gly Leu Leu Met Ile Pro Ala Gly Ile Tyr Ala Pro Ile
65 70 75 80

Cys Val Thr Val Trp Tyr Pro Leu Trp Gly Gly Ile Met Tyr Ile Ile
85 90 95

Ser Gly Ser Leu Leu Ala Ala Thr Glu Lys Asn Ser Arg Lys Cys Leu
100 105 110

Val Lys Gly Lys Met Ile Met Asn Ser Leu Ser Leu Phe Ala Ala Ile
115 120 125

Ser Gly Met Ile Leu Ser Ile Met Asp Ile Leu Asn Ile Lys Ile Ser
130 135 140

His Phe Leu Lys Met Glu Ser Leu Asn Phe Ile Arg Ala His Thr Pro
145 150 155 160

Tyr Ile Asn Ile Tyr Asn Cys Glu Pro Ala Asn Pro Ser Glu Lys Asn
165 170 175

Ser Pro Ser Thr Gln Tyr Cys Tyr Ser Ile Gln Ser Leu Phe Leu Gly
180 185 190

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Ile Leu Ser Val Met Leu Ile Phe Ala Phe Phe Gln Glu Leu Val Ile
195 200 205

Ala Gly Ile Val Glu Asn Glu Trp Lys Arg Thr Cys Ser Arg Pro Lys
210 215 220

Ser Asn Ile Val Leu Leu Ser Ala Glu Glu Lys Lys Glu Gln Thr Ile
225 230 235 240

Glu Ile Lys Glu Glu Val Val Gly Leu Thr Glu Thr Ser Ser Gln Pro
245 250 255

Lys Asn Glu Glu Asp Ile Glu Ile Ile Pro Ile Gln Glu Glu Glu
260 265 270

Glu Glu Thr Glu Thr Asn Phe Pro Glu Pro Pro Gln Asp Gln Glu Ser
275 280 285

Ser Pro Ile Glu Asn Asp Ser Ser Pro Met Trp Pro Phe Ala Ser Val
290 295 300

Pro Ala Gly Ala Lys Cys Arg Leu Val Glu Thr Leu Pro Glu Asn Met
305 310 315 320

Asp Phe Arg Ser Asp His Leu Thr Thr Phe Glu Cys Phe Asn Glu Ile
325 330 335

Ile Thr Leu Ala Lys Lys Tyr Ile Tyr Ile Ala Ser Phe Cys Cys Asn
340 345 350

Pro Leu Ser Thr Thr Arg Gly Ala Leu Ile Phe Asp Lys Leu Lys Glu
355 360 365

Ala Ser Glu Lys Gly Ile Lys Ile Ile Val Leu Leu Asp Glu Arg Gly
370 375 380

Lys Arg Asn Leu Gly Glu Leu Gln Ser His Cys Pro Asp Ile Asn Phe
385 390 395 400

Ile Thr Val Asn Ile Asp Lys Lys Asn Asn Val Gly Leu Leu Leu Gly
405 410 415

Cys Phe Trp Val Ser Asp Asp Glu Arg Cys Tyr Val Gly Asn Ala Ser
420 425 430

Phe Thr Gly Gly Ser Ile His Thr Ile Lys Thr Leu Gly Val Tyr Ser
435 440 445

Asp Tyr Pro Pro Leu Ala Thr Asp Leu Arg Arg Arg Phe Asp Thr Phe
450 455 460

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Lys Ala Phe Asn Ser Ala Lys Asn Ser Trp Leu Asn Leu Cys Ser Ala
465 470 475 480

Ala Cys Cys Leu Pro Val Ser Thr Ala Tyr His Ile Lys Asn Pro Ile
485 490 495

Gly Gly Val Phe Phe Thr Asp Ser Pro Glu His Leu Leu Gly Tyr Ser
500 505 510

Arg Asp Leu Asp Thr Asp Val Val Ile Asp Lys Leu Lys Ser Ala Lys
515 520 525

Thr Ser Ile Asp Ile Glu His Leu Ala Ile Val Pro Thr Thr Arg Val
530 535 540

Asp Gly Asn Ser Tyr Tyr Trp Pro Asp Ile Tyr Asn Ser Ile Ile Glu
545 550 555 560

Ala Ala Ile Asn Arg Gly Val Lys Ile Arg Leu Leu Val Gly Asn Trp
565 570 575

Asp Lys Asn Asp Val Tyr Ser Met Ala Thr Ala Arg Ser Leu Asp Ala
580 585 590

Leu Cys Val Gln Asn Asp Leu Ser Val Lys Val Phe Thr Ile Gln Asn
595 600 605

Asn Thr Lys Leu Leu Ile Val Asp Asp Glu Tyr Val His Ile Thr Ser
610 615 620

Ala Asn Phe Asp Gly Thr His Tyr Gln Asn His Gly Phe Val Ser Phe
625 630 635 640

Asn Ser Ile Asp Lys Gln Leu Val Ser Glu Ala Lys Lys Ile Phe Glu
645 650 655

Arg Asp Trp Val Ser Ser His Ser Lys Ser Leu Lys Ile
660 665

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<212> PRT
<213> Artificial Sequence

<220>
<223> A56R

<400> 5

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Thr Pro Phe Pro Gln Thr Ser Lys Lys Ile Gly Asp Asp Ala Thr Leu
20 25 30

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Ser Cys Asn Arg Asn Asn Thr Asn Asp Tyr Val Val Met Ser Ala Trp
 35 40 45
 Tyr Lys Glu Pro Asn Ser Ile Ile Leu Leu Ala Ala Lys Ser Asp Val
 50 55 60
 Leu Tyr Phe Asp Asn Tyr Thr Lys Asp Lys Ile Ser Tyr Asp Ser Pro
 65 70 75 80
 Tyr Asp Asp Leu Val Thr Thr Ile Thr Ile Lys Ser Leu Thr Ala Arg
 85 90 95
 Asp Ala Gly Thr Tyr Val Cys Ala Phe Phe Met Thr Ser Thr Thr Asn
 100 105 110
 Asp Thr Asp Lys Val Asp Tyr Glu Glu Tyr Ser Thr Glu Leu Ile Val
 115 120 125
 Asn Thr Asp Ser Glu Ser Thr Ile Asp Ile Ile Leu Ser Gly Ser Thr
 130 135 140
 His Ser Pro Glu Thr Ser Ser Lys Lys Pro Asp Tyr Ile Asp Asn Ser
 145 150 155 160
 Asn Cys Ser Ser Val Phe Glu Ile Ala Thr Pro Glu Pro Ile Thr Asp
 165 170 175
 Asn Val Glu Asp His Thr Asp Thr Val Thr Tyr Thr Ser Asp Ser Ile
 180 185 190
 Asn Thr Val Ser Ala Ser Ser Gly Glu Ser Thr Thr Asp Glu Thr Pro
 195 200 205
 Glu Pro Ile Thr Asp Lys Glu Asp His Thr Val Thr Asp Thr Val Ser
 210 215 220
 Tyr Thr Thr Val Ser Thr Ser Ser Gly Ile Val Thr Thr Lys Ser Thr
 225 230 235 240
 Thr Asp Asp Ala Asp Leu Tyr Asp Thr Tyr Asn Asp Asn Asp Thr Val
 245 250 255
 Pro Pro Thr Thr Val Gly Gly Ser Thr Thr Ser Ile Ser Asn Tyr Lys
 260 265 270
 Thr Lys Asp Phe Val Glu Ile Phe Gly Ile Thr Ala Leu Ile Ile Leu
 275 280 285
 Ser Ala Val Ala Ile Phe Cys Ile Thr Tyr Tyr Ile Tyr Asn Lys Arg
 290 295 300

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Ser Arg Lys Tyr Lys Thr Glu Asn Lys Val
305 310

<210> 6
<211> 370
<212> PRT
<213> Artificial Sequence

<220>
<223> FZD-ECD-A56R Fusion Protein

<400> 6

Met Gly Trp Ser Cys Ile Ile Leu Phe Leu Val Ala Thr Ala Thr Gly
1 5 10 15

Ala His Ser Phe Gly Asp Glu Glu Glu Arg Arg Cys Asp Pro Ile Arg
20 25 30

Ile Ser Met Cys Gln Asn Leu Gly Tyr Asn Val Thr Lys Met Pro Asn
35 40 45

Leu Val Gly His Glu Leu Gln Thr Asp Ala Glu Leu Gln Leu Thr Thr
50 55 60

Phe Thr Pro Leu Ile Gln Tyr Gly Cys Ser Ser Gln Leu Gln Phe Phe
65 70 75 80

Leu Cys Ser Val Tyr Val Pro Met Cys Thr Glu Lys Ile Asn Ile Pro
85 90 95

Ile Gly Pro Cys Gly Gly Met Cys Leu Ser Val Lys Arg Arg Cys Glu
100 105 110

Pro Val Leu Lys Glu Phe Gly Phe Ala Trp Pro Glu Ser Leu Asn Cys
115 120 125

Ser Lys Phe Pro Pro Gln Asn Asp His Asn His Met Cys Met Glu Gly
130 135 140

Pro Gly Asp Glu Glu Val Pro Leu Pro His Lys Thr Pro Ile Gln Pro
145 150 155 160

Gly Glu Glu Thr Ser Thr Thr Asn Asp Thr Asp Lys Val Asp Tyr Glu
165 170 175

Glu Tyr Ser Thr Glu Leu Ile Val Asn Thr Asp Ser Glu Ser Thr Ile
180 185 190

Asp Ile Ile Leu Ser Gly Ser Thr His Ser Pro Glu Thr Ser Ser Lys
195 200 205

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Lys Pro Asp Tyr Ile Asp Asn Ser Asn Cys Ser Ser Val Phe Glu Ile
210 215 220

Ala Thr Pro Glu Pro Ile Thr Asp Asn Val Glu Asp His Thr Asp Thr
225 230 235 240

Val Thr Tyr Thr Ser Asp Ser Ile Asn Thr Val Ser Ala Ser Ser Gly
245 250 255

Glu Ser Thr Thr Asp Glu Thr Pro Glu Pro Ile Thr Asp Lys Glu Asp
260 265 270

His Thr Val Thr Asp Thr Val Ser Tyr Thr Thr Val Ser Thr Ser Ser
275 280 285

Gly Ile Val Thr Thr Lys Ser Thr Thr Asp Asp Ala Asp Leu Tyr Asp
290 295 300

Thr Tyr Asn Asp Asn Asp Thr Val Pro Pro Thr Thr Val Gly Gly Ser
305 310 315 320

Thr Thr Ser Ile Ser Asn Tyr Lys Thr Lys Asp Phe Val Glu Ile Phe
325 330 335

Gly Ile Thr Ala Leu Ile Ile Leu Ser Ala Val Ala Ile Phe Cys Ile
340 345 350

Thr Tyr Tyr Ile Tyr Asn Lys Arg Ser Arg Lys Tyr Lys Thr Glu Asn
355 360 365

Lys Val
370

<210> 7
<211> 855
<212> PRT
<213> Artificial Sequence

<220>
<223> Her2-A56R Fusion Protein

<400> 7

Met Gly Trp Ser Cys Ile Ile Leu Phe Leu Val Ala Thr Ala Thr Gly
1 5 10 15

Ala His Ser Ser Thr Gln Val Cys Thr Gly Thr Asp Met Lys Leu Arg
20 25 30

Leu Pro Ala Ser Pro Glu Thr His Leu Asp Met Leu Arg His Leu Tyr
35 40 45

Gln Gly Cys Gln Val Val Gln Gly Asn Leu Glu Leu Thr Tyr Leu Pro
50 55 60

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Thr Asn Ala Ser Leu Ser Phe Leu Gln Asp Ile Gln Glu Val Gln Gly
 65 70 75 80
 Tyr Val Leu Ile Ala His Asn Gln Val Arg Gln Val Pro Leu Gln Arg
 85 90 95
 Leu Arg Ile Val Arg Gly Thr Gln Leu Phe Glu Asp Asn Tyr Ala Leu
 100 105 110
 Ala Val Leu Asp Asn Gly Asp Pro Leu Asn Asn Thr Thr Pro Val Thr
 115 120 125
 Gly Ala Ser Pro Gly Gly Leu Arg Glu Leu Gln Leu Arg Ser Leu Thr
 130 135 140
 Glu Ile Leu Lys Gly Gly Val Leu Ile Gln Arg Asn Pro Gln Leu Cys
 145 150 155 160
 Tyr Gln Asp Thr Ile Leu Trp Lys Asp Ile Phe His Lys Asn Asn Gln
 165 170 175
 Leu Ala Leu Thr Leu Ile Asp Thr Asn Arg Ser Arg Ala Cys His Pro
 180 185 190
 Cys Ser Pro Met Cys Lys Gly Ser Arg Cys Trp Gly Glu Ser Ser Glu
 195 200 205
 Asp Cys Gln Ser Leu Thr Arg Thr Val Cys Ala Gly Gly Cys Ala Arg
 210 215 220
 Cys Lys Gly Pro Leu Pro Thr Asp Cys Cys His Glu Gln Cys Ala Ala
 225 230 235 240
 Gly Cys Thr Gly Pro Lys His Ser Asp Cys Leu Ala Cys Leu His Phe
 245 250 255
 Asn His Ser Gly Ile Cys Glu Leu His Cys Pro Ala Leu Val Thr Tyr
 260 265 270
 Asn Thr Asp Thr Phe Glu Ser Met Pro Asn Pro Glu Gly Arg Tyr Thr
 275 280 285
 Phe Gly Ala Ser Cys Val Thr Ala Cys Pro Tyr Asn Tyr Leu Ser Thr
 290 295 300
 Asp Val Gly Ser Cys Thr Leu Val Cys Pro Leu His Asn Gln Glu Val
 305 310 315 320
 Thr Ala Glu Asp Gly Thr Gln Arg Cys Glu Lys Cys Ser Lys Pro Cys
 325 330 335

Ala Arg Val Cys Tyr Gly Leu Gly Met Glu His Leu Arg Glu Val Arg
 340 345 350
 Ala Val Thr Ser Ala Asn Ile Gln Glu Phe Ala Gly Cys Lys Lys Ile
 355 360 365
 Phe Gly Ser Leu Ala Phe Leu Pro Glu Ser Phe Asp Gly Asp Pro Ala
 370 375 380
 Ser Asn Thr Ala Pro Leu Gln Pro Glu Gln Leu Gln Val Phe Glu Thr
 385 390 395 400
 Leu Glu Glu Ile Thr Gly Tyr Leu Tyr Ile Ser Ala Trp Pro Asp Ser
 405 410 415
 Leu Pro Asp Leu Ser Val Phe Gln Asn Leu Gln Val Ile Arg Gly Arg
 420 425 430
 Ile Leu His Asn Gly Ala Tyr Ser Leu Thr Leu Gln Gly Leu Gly Ile
 435 440 445
 Ser Trp Leu Gly Leu Arg Ser Leu Arg Glu Leu Gly Ser Gly Leu Ala
 450 455 460
 Leu Ile His His Asn Thr His Leu Cys Phe Val His Thr Val Pro Trp
 465 470 475 480
 Asp Gln Leu Phe Arg Asn Pro His Gln Ala Leu Leu His Thr Ala Asn
 485 490 495
 Arg Pro Glu Asp Glu Cys Val Gly Glu Gly Leu Ala Cys His Gln Leu
 500 505 510
 Cys Ala Arg Gly His Cys Trp Gly Pro Gly Pro Thr Gln Cys Val Asn
 515 520 525
 Cys Ser Gln Phe Leu Arg Gly Gln Glu Cys Val Glu Glu Cys Arg Val
 530 535 540
 Leu Gln Gly Leu Pro Arg Glu Tyr Val Asn Ala Arg His Cys Leu Pro
 545 550 555 560
 Cys His Pro Glu Cys Gln Pro Gln Asn Gly Ser Val Thr Cys Phe Gly
 565 570 575
 Pro Glu Ala Asp Gln Cys Val Ala Cys Ala His Tyr Lys Asp Pro Pro
 580 585 590
 Phe Cys Val Ala Arg Cys Pro Ser Gly Val Lys Pro Asp Leu Ser Tyr
 595 600 605

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Met Pro Ile Trp Lys Phe Pro Asp Glu Glu Gly Ala Cys Gln Pro Cys
 610 615 620
 Pro Ile Asn Cys Thr His Ser Cys Val Asp Leu Asp Asp Lys Gly Cys
 625 630 635 640
 Pro Ala Glu Gln Arg Ala Ser Pro Thr Ser Thr Thr Asn Asp Thr Asp
 645 650 655
 Lys Val Asp Tyr Glu Glu Tyr Ser Thr Glu Leu Ile Val Asn Thr Asp
 660 665 670
 Ser Glu Ser Thr Ile Asp Ile Ile Leu Ser Gly Ser Thr His Ser Pro
 675 680 685
 Glu Thr Ser Ser Lys Lys Pro Asp Tyr Ile Asp Asn Ser Asn Cys Ser
 690 695 700
 Ser Val Phe Glu Ile Ala Thr Pro Glu Pro Ile Thr Asp Asn Val Glu
 705 710 715 720
 Asp His Thr Asp Thr Val Thr Tyr Thr Ser Asp Ser Ile Asn Thr Val
 725 730 735
 Ser Ala Ser Ser Gly Glu Ser Thr Thr Asp Glu Thr Pro Glu Pro Ile
 740 745 750
 Thr Asp Lys Glu Asp His Thr Val Thr Asp Thr Val Ser Tyr Thr Thr
 755 760 765
 Val Ser Thr Ser Ser Gly Ile Val Thr Thr Lys Ser Thr Thr Asp Asp
 770 775 780
 Ala Asp Leu Tyr Asp Thr Tyr Asn Asp Asn Asp Thr Val Pro Pro Thr
 785 790 795 800
 Thr Val Gly Gly Ser Thr Thr Ser Ile Ser Asn Tyr Lys Thr Lys Asp
 805 810 815
 Phe Val Glu Ile Phe Gly Ile Thr Ala Leu Ile Ile Leu Ser Ala Val
 820 825 830
 Ala Ile Phe Cys Ile Thr Tyr Tyr Ile Tyr Asn Lys Arg Ser Arg Lys
 835 840 845
 Tyr Lys Thr Glu Asn Lys Val
 850 855

<210> 8
 <211> 935

4699968_1

<212> PRT

<213> Artificial Sequence

<220>

<223> CD100-A56R Fusion Protein

<400> 8

Met Gly Trp Ser Cys Ile Ile Leu Phe Leu Val Ala Thr Ala Thr Gly
1 5 10 15

Ala His Ser Phe Ala Pro Ile Pro Arg Ile Thr Trp Glu His Arg Glu
20 25 30

Val His Leu Val Gln Phe His Glu Pro Asp Ile Tyr Asn Tyr Ser Ala
35 40 45

Leu Leu Leu Ser Glu Asp Lys Asp Thr Leu Tyr Ile Gly Ala Arg Glu
50 55 60

Ala Val Phe Ala Val Asn Ala Leu Asn Ile Ser Glu Lys Gln His Glu
65 70 75 80

Val Tyr Trp Lys Val Ser Glu Asp Lys Lys Ala Lys Cys Ala Glu Lys
85 90 95

Gly Lys Ser Lys Gln Thr Glu Cys Leu Asn Tyr Ile Arg Val Leu Gln
100 105 110

Pro Leu Ser Ala Thr Ser Leu Tyr Val Cys Gly Thr Asn Ala Phe Gln
115 120 125

Pro Ala Cys Asp His Leu Asn Leu Thr Ser Phe Lys Phe Leu Gly Lys
130 135 140

Asn Glu Asp Gly Lys Gly Arg Cys Pro Phe Asp Pro Ala His Ser Tyr
145 150 155 160

Thr Ser Val Met Val Asp Gly Glu Leu Tyr Ser Gly Thr Ser Tyr Asn
165 170 175

Phe Leu Gly Ser Glu Pro Ile Ile Ser Arg Asn Ser Ser His Ser Pro
180 185 190

Leu Arg Thr Glu Tyr Ala Ile Pro Trp Leu Asn Glu Pro Ser Phe Val
195 200 205

Phe Ala Asp Val Ile Arg Lys Ser Pro Asp Ser Pro Asp Gly Glu Asp
210 215 220

Asp Arg Val Tyr Phe Phe Phe Thr Glu Val Ser Val Glu Tyr Glu Phe
225 230 235 240

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Val Phe Arg Val Leu Ile Pro Arg Ile Ala Arg Val Cys Lys Gly Asp
245 250 255

Gln Gly Gly Leu Arg Thr Leu Gln Lys Lys Trp Thr Ser Phe Leu Lys
260 265 270

Ala Arg Leu Ile Cys Ser Arg Pro Asp Ser Gly Leu Val Phe Asn Val
275 280 285

Leu Arg Asp Val Phe Val Leu Arg Ser Pro Gly Leu Lys Val Pro Val
290 295 300

Phe Tyr Ala Leu Phe Thr Pro Gln Leu Asn Asn Val Gly Leu Ser Ala
305 310 315 320

Val Cys Ala Tyr Asn Leu Ser Thr Ala Glu Glu Val Phe Ser His Gly
325 330 335

Lys Tyr Met Gln Ser Thr Thr Val Glu Gln Ser His Thr Lys Trp Val
340 345 350

Arg Tyr Asn Gly Pro Val Pro Lys Pro Arg Pro Gly Ala Cys Ile Asp
355 360 365

Ser Glu Ala Arg Ala Ala Asn Tyr Thr Ser Ser Leu Asn Leu Pro Asp
370 375 380

Lys Thr Leu Gln Phe Val Lys Asp His Pro Leu Met Asp Asp Ser Val
385 390 395 400

Thr Pro Ile Asp Asn Arg Pro Arg Leu Ile Lys Lys Asp Val Asn Tyr
405 410 415

Thr Gln Ile Val Val Asp Arg Thr Gln Ala Leu Asp Gly Thr Val Tyr
420 425 430

Asp Val Met Phe Val Ser Thr Asp Arg Gly Ala Leu His Lys Ala Ile
435 440 445

Ser Leu Glu His Ala Val His Ile Ile Glu Glu Thr Gln Leu Phe Gln
450 455 460

Asp Phe Glu Pro Val Gln Thr Leu Leu Leu Ser Ser Lys Lys Gly Asn
465 470 475 480

Arg Phe Val Tyr Ala Gly Ser Asn Ser Gly Val Val Gln Ala Pro Leu
485 490 495

Ala Phe Cys Gly Lys His Gly Thr Cys Glu Asp Cys Val Leu Ala Arg
500 505 510

4699968_1

Asp Pro Tyr Cys Ala Trp Ser Pro Pro Thr Ala Thr Cys Val Ala Leu
 515 520 525

His Gln Thr Glu Ser Pro Ser Arg Gly Leu Ile Gln Glu Met Ser Gly
 530 535 540

Asp Ala Ser Val Cys Pro Asp Lys Ser Lys Gly Ser Tyr Arg Gln His
 545 550 555 560

Phe Phe Lys His Gly Gly Thr Ala Glu Leu Lys Cys Ser Gln Lys Ser
 565 570 575

Asn Leu Ala Arg Val Phe Trp Lys Phe Gln Asn Gly Val Leu Lys Ala
 580 585 590

Glu Ser Pro Lys Tyr Gly Leu Met Gly Arg Lys Asn Leu Leu Ile Phe
 595 600 605

Asn Leu Ser Glu Gly Asp Ser Gly Val Tyr Gln Cys Leu Ser Glu Glu
 610 615 620

Arg Val Lys Asn Lys Thr Val Phe Gln Val Val Ala Lys His Val Leu
 625 630 635 640

Glu Val Lys Val Val Pro Lys Pro Val Val Ala Pro Thr Leu Ser Val
 645 650 655

Val Gln Thr Glu Gly Ser Arg Ile Ala Thr Lys Val Leu Val Ala Ser
 660 665 670

Thr Gln Gly Ser Ser Pro Pro Thr Pro Ala Val Gln Ala Thr Ser Ser
 675 680 685

Gly Ala Ile Thr Leu Pro Pro Lys Pro Ala Pro Thr Gly Thr Ser Cys
 690 695 700

Glu Pro Lys Ile Val Ile Asn Thr Val Pro Gln Leu His Ser Glu Lys
 705 710 715 720

Thr Met Tyr Leu Lys Ser Ser Asp Thr Ser Thr Thr Asn Asp Thr Asp
 725 730 735

Lys Val Asp Tyr Glu Glu Tyr Ser Thr Glu Leu Ile Val Asn Thr Asp
 740 745 750

Ser Glu Ser Thr Ile Asp Ile Ile Leu Ser Gly Ser Thr His Ser Pro
 755 760 765

Glu Thr Ser Ser Lys Lys Pro Asp Tyr Ile Asp Asn Ser Asn Cys Ser
 770 775 780

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Ser Val Phe Glu Ile Ala Thr Pro Glu Pro Ile Thr Asp Asn Val Glu
785 790 795 800

Asp His Thr Asp Thr Val Thr Tyr Thr Ser Asp Ser Ile Asn Thr Val
805 810 815

Ser Ala Ser Ser Gly Glu Ser Thr Thr Asp Glu Thr Pro Glu Pro Ile
820 825 830

Thr Asp Lys Glu Asp His Thr Val Thr Asp Thr Val Ser Tyr Thr Thr
835 840 845

Val Ser Thr Ser Ser Gly Ile Val Thr Thr Lys Ser Thr Thr Asp Asp
850 855 860

Ala Asp Leu Tyr Asp Thr Tyr Asn Asp Asn Asp Thr Val Pro Pro Thr
865 870 875 880

Thr Val Gly Gly Ser Thr Thr Ser Ile Ser Asn Tyr Lys Thr Lys Asp
885 890 895

Phe Val Glu Ile Phe Gly Ile Thr Ala Leu Ile Ile Leu Ser Ala Val
900 905 910

Ala Ile Phe Cys Ile Thr Tyr Tyr Ile Tyr Asn Lys Arg Ser Arg Lys
915 920 925

Tyr Lys Thr Glu Asn Lys Val
930 935

<210> 9
<211> 317
<212> PRT
<213> Artificial Sequence

<220>
<223> WR B5R Protein

<400> 9

Met Lys Thr Ile Ser Val Val Thr Leu Leu Cys Val Leu Pro Ala Val
1 5 10 15

Val Tyr Ser Thr Cys Thr Val Pro Thr Met Asn Asn Ala Lys Leu Thr
20 25 30

Ser Thr Glu Thr Ser Phe Asn Asp Lys Gln Lys Val Thr Phe Thr Cys
35 40 45

Asp Gln Gly Tyr His Ser Ser Asp Pro Asn Ala Val Cys Glu Thr Asp
50 55 60

Lys Trp Lys Tyr Glu Asn Pro Cys Lys Lys Met Cys Thr Val Ser Asp
65 70 75 80

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Tyr Ile Ser Glu Leu Tyr Asn Lys Pro Leu Tyr Glu Val Asn Ser Thr
 85 90 95
 Met Thr Leu Ser Cys Asn Gly Glu Thr Lys Tyr Phe Arg Cys Glu Glu
 100 105 110
 Lys Asn Gly Asn Thr Ser Trp Asn Asp Thr Val Thr Cys Pro Asn Ala
 115 120 125
 Glu Cys Gln Pro Leu Gln Leu Glu His Gly Ser Cys Gln Pro Val Lys
 130 135 140
 Glu Lys Tyr Ser Phe Gly Glu Tyr Met Thr Ile Asn Cys Asp Val Gly
 145 150 155 160
 Tyr Glu Val Ile Gly Ala Ser Tyr Ile Ser Cys Thr Ala Asn Ser Trp
 165 170 175
 Asn Val Ile Pro Ser Cys Gln Gln Lys Cys Asp Met Pro Ser Leu Ser
 180 185 190
 Asn Gly Leu Ile Ser Gly Ser Thr Phe Ser Ile Gly Gly Val Ile His
 195 200 205
 Leu Ser Cys Lys Ser Gly Phe Thr Leu Thr Gly Ser Pro Ser Ser Thr
 210 215 220
 Cys Ile Asp Gly Lys Trp Asn Pro Val Leu Pro Ile Cys Val Arg Thr
 225 230 235 240
 Asn Glu Glu Phe Asp Pro Val Asp Asp Gly Pro Asp Asp Glu Thr Asp
 245 250 255
 Leu Ser Lys Leu Ser Lys Asp Val Val Gln Tyr Glu Gln Glu Ile Glu
 260 265 270
 Ser Leu Glu Ala Thr Tyr His Ile Ile Ile Val Ala Leu Thr Ile Met
 275 280 285
 Gly Val Ile Phe Leu Ile Ser Val Ile Val Leu Val Cys Ser Cys Asp
 290 295 300
 Lys Asn Asn Asp Gln Tyr Lys Phe His Lys Leu Leu Pro
 305 310 315

<210> 10
 <211> 243
 <212> PRT
 <213> Artificial Sequence

<220>

<223> FZD-B5R (short)

<400> 10

Met Gly Trp Ser Cys Ile Ile Leu Phe Leu Val Ala Thr Ala Thr Gly
 1 5 10 15

Ala Tyr Ala Phe Gly Asp Glu Glu Glu Arg Arg Cys Asp Pro Ile Arg
 20 25 30

Ile Ser Met Cys Gln Asn Leu Gly Tyr Asn Val Thr Lys Met Pro Asn
 35 40 45

Leu Val Gly His Glu Leu Gln Thr Asp Ala Glu Leu Gln Leu Thr Thr
 50 55 60

Phe Thr Pro Leu Ile Gln Tyr Gly Cys Ser Ser Gln Leu Gln Phe Phe
 65 70 75 80

Leu Cys Ser Val Tyr Val Pro Met Cys Thr Glu Lys Ile Asn Ile Pro
 85 90 95

Ile Gly Pro Cys Gly Gly Met Cys Leu Ser Val Lys Arg Arg Cys Glu
 100 105 110

Pro Val Leu Lys Glu Phe Gly Phe Ala Trp Pro Glu Ser Leu Asn Cys
 115 120 125

Ser Lys Phe Pro Pro Gln Asn Asp His Asn His Met Cys Met Glu Gly
 130 135 140

Pro Gly Asp Glu Glu Val Pro Leu Pro His Lys Thr Pro Ile Gln Pro
 145 150 155 160

Gly Glu Glu Cys His Ser Val Gly Thr Asn Ser Asp Gln Tyr Ile Trp
 165 170 175

Val Lys Arg Ser Leu Asn Cys Val Leu Lys Cys Gly Tyr Asp Ala Gly
 180 185 190

Leu Tyr Ser Arg Ser Ala Lys Glu Cys Ala Thr Tyr His Ile Ile Ile
 195 200 205

Val Ala Leu Thr Ile Met Gly Val Ile Phe Leu Ile Ser Val Ile Val
 210 215 220

Leu Val Cys Ser Cys Asp Lys Asn Asn Asp Gln Tyr Lys Phe His Lys
 225 230 235 240

Leu Leu Pro

4699968_1

<210> 11
<211> 281
<212> PRT
<213> Artificial Sequence

<220>
<223> FZD-B5R (long)

<400> 11

Met Gly Trp Ser Cys Ile Ile Leu Phe Leu Val Ala Thr Ala Thr Gly
1 5 10 15

Ala Tyr Ala Phe Gly Asp Glu Glu Glu Arg Arg Cys Asp Pro Ile Arg
20 25 30

Ile Ser Met Cys Gln Asn Leu Gly Tyr Asn Val Thr Lys Met Pro Asn
35 40 45

Leu Val Gly His Glu Leu Gln Thr Asp Ala Glu Leu Gln Leu Thr Thr
50 55 60

Phe Thr Pro Leu Ile Gln Tyr Gly Cys Ser Ser Gln Leu Gln Phe Phe
65 70 75 80

Leu Cys Ser Val Tyr Val Pro Met Cys Thr Glu Lys Ile Asn Ile Pro
85 90 95

Ile Gly Pro Cys Gly Gly Met Cys Leu Ser Val Lys Arg Arg Cys Glu
100 105 110

Pro Val Leu Lys Glu Phe Gly Phe Ala Trp Pro Glu Ser Leu Asn Cys
115 120 125

Ser Lys Phe Pro Pro Gln Asn Asp His Asn His Met Cys Met Glu Gly
130 135 140

Pro Gly Asp Glu Glu Val Pro Leu Pro His Lys Thr Pro Ile Gln Pro
145 150 155 160

Gly Glu Glu Cys His Ser Val Gly Thr Asn Ser Asp Gln Tyr Ile Trp
165 170 175

Val Lys Arg Ser Leu Asn Cys Val Leu Lys Cys Gly Tyr Asp Ala Gly
180 185 190

Leu Tyr Ser Arg Ser Ala Lys Glu Tyr Val Arg Thr Asn Glu Glu Phe
195 200 205

Asp Pro Val Asp Asp Gly Pro Asp Asp Glu Thr Asp Leu Ser Lys Leu
210 215 220

Ser Lys Asp Val Val Gln Tyr Glu Gln Glu Ile Glu Ser Leu Glu Ala
225 230 235 240

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Thr Tyr His Ile Ile Ile Val Ala Leu Thr Ile Met Gly Val Ile Phe
245 250 255

Leu Ile Ser Val Ile Val Leu Val Cys Ser Cys Asp Lys Asn Asn Asp
260 265 270

Gln Tyr Lys Phe His Lys Leu Leu Pro
275 280

<210> 12
<211> 34
<212> DNA
<213> Artificial Sequence

<220>
<223> MS4A1S

<400> 12
tataccatgg caacaccag aaattcagta aatg 34

<210> 13
<211> 47
<212> DNA
<213> Artificial Sequence

<220>
<223> MS4A1AS

<400> 13
ggtaccgatg caaatggcca cataggagag ctgtcatttt ctattgg 47

<210> 14
<211> 47
<212> DNA
<213> Artificial Sequence

<220>
<223> F13S

<400> 14
ccaatagaaa atgacagctc tcctatgtgg ccatttgcac cggtacc 47

<210> 15
<211> 52
<212> DNA
<213> Artificial Sequence

<220>
<223> F13AS

<400> 15
tatacgtacg ttaatggtga tggatgatga gaatttttaa cgatttactg tg 52

<210> 16
<211> 506
<212> PRT
<213> Artificial Sequence

<220>

<223> CD20-A56R Fusion Protein

<400> 16

Met Gly Trp Ser Cys Ile Ile Leu Phe Leu Val Ala Thr Ala Thr Gly
 1 5 10 15

Ala His Thr Glu Leu Ile Val Asn Thr Asp Ser Glu Ser Thr Ile Asp
 20 25 30

Ile Ile Leu Ser Gly Ser Thr His Ser Pro Glu Thr Ser Ser Lys Lys
 35 40 45

Pro Asp Tyr Ile Asp Asn Ser Asn Cys Ser Ser Val Phe Glu Ile Ala
 50 55 60

Thr Pro Glu Pro Ile Thr Asp Asn Val Glu Asp His Thr Asp Thr Val
 65 70 75 80

Thr Tyr Thr Ser Asp Ser Ile Asn Thr Val Ser Ala Ser Ser Gly Glu
 85 90 95

Ser Thr Thr Asp Glu Thr Pro Glu Pro Ile Thr Asp Lys Glu Asp His
 100 105 110

Thr Val Thr Asp Thr Val Ser Tyr Thr Thr Val Ser Thr Ser Ser Gly
 115 120 125

Ile Val Thr Thr Lys Ser Thr Thr Asp Asp Ala Asp Leu Tyr Asp Thr
 130 135 140

Tyr Asn Asp Asn Asp Thr Val Pro Pro Thr Thr Val Gly Gly Ser Thr
 145 150 155 160

Thr Ser Ile Ser Asn Tyr Lys Thr Lys Asp Phe Val Glu Ile Phe Gly
 165 170 175

Ile Thr Ala Leu Ile Ile Leu Ser Ala Val Ala Ile Phe Cys Ile Thr
 180 185 190

Tyr Tyr Ile Tyr Asn Lys Arg Ser Arg Lys Tyr Lys Thr Glu Asn Lys
 195 200 205

Val Met Thr Thr Pro Arg Asn Ser Val Asn Gly Thr Phe Pro Ala Glu
 210 215 220

Pro Met Lys Gly Pro Ile Ala Met Gln Ser Gly Pro Lys Pro Leu Phe
 225 230 235 240

Arg Arg Met Ser Ser Leu Val Gly Pro Thr Gln Ser Phe Phe Met Arg
 245 250 255

4699968_1

Glu Ser Lys Thr Leu Gly Ala Val Gln Ile Met Asn Gly Leu Phe His
260 265 270

Ile Ala Leu Gly Gly Leu Leu Met Ile Pro Ala Gly Ile Tyr Ala Pro
275 280 285

Ile Cys Val Thr Val Trp Tyr Pro Leu Trp Gly Gly Ile Met Tyr Ile
290 295 300

Ile Ser Gly Ser Leu Leu Ala Ala Thr Glu Lys Asn Ser Arg Lys Cys
305 310 315 320

Leu Val Lys Gly Lys Met Ile Met Asn Ser Leu Ser Leu Phe Ala Ala
325 330 335

Ile Ser Gly Met Ile Leu Ser Ile Met Asp Ile Leu Asn Ile Lys Ile
340 345 350

Ser His Phe Leu Lys Met Glu Ser Leu Asn Phe Ile Arg Ala His Thr
355 360 365

Pro Tyr Ile Asn Ile Tyr Asn Cys Glu Pro Ala Asn Pro Ser Glu Lys
370 375 380

Asn Ser Pro Ser Thr Gln Tyr Cys Tyr Ser Ile Gln Ser Leu Phe Leu
385 390 395 400

Gly Ile Leu Ser Val Met Leu Ile Phe Ala Phe Phe Gln Glu Leu Val
405 410 415

Ile Ala Gly Ile Val Glu Asn Glu Trp Lys Arg Thr Cys Ser Arg Pro
420 425 430

Lys Ser Asn Ile Val Leu Leu Ser Ala Glu Glu Lys Lys Glu Gln Thr
435 440 445

Ile Glu Ile Lys Glu Glu Val Val Gly Leu Thr Glu Thr Ser Ser Gln
450 455 460

Pro Lys Asn Glu Glu Asp Ile Glu Ile Ile Pro Ile Gln Glu Glu Glu
465 470 475 480

Glu Glu Glu Thr Glu Thr Asn Phe Pro Glu Pro Pro Gln Asp Gln Glu
485 490 495

Ser Ser Pro Ile Glu Asn Asp Ser Ser Pro
500 505

<210> 17
<211> 235
<212> PRT
<213> Artificial Sequence

4699968_1

<220>

<223> HA-A56R Fusion Protein

<400> 17

Met Gly Trp Ser Cys Ile Ile Leu Phe Leu Val Ala Thr Ala Thr Gly
1 5 10 15

Ala His Ser Tyr Pro Tyr Asp Val Pro Asp Tyr Ala Thr Ser Thr Thr
20 25 30

Asn Asp Thr Asp Lys Val Asp Tyr Glu Glu Tyr Ser Thr Glu Leu Ile
35 40 45

Val Asn Thr Asp Ser Glu Ser Thr Ile Asp Ile Ile Leu Ser Gly Ser
50 55 60

Thr His Ser Pro Glu Thr Ser Ser Lys Lys Pro Asp Tyr Ile Asp Asn
65 70 75 80

Ser Asn Cys Ser Ser Val Phe Glu Ile Ala Thr Pro Glu Pro Ile Thr
85 90 95

Asp Asn Val Glu Asp His Thr Asp Thr Val Thr Tyr Thr Ser Asp Ser
100 105 110

Ile Asn Thr Val Ser Ala Ser Ser Gly Glu Ser Thr Thr Asp Glu Thr
115 120 125

Pro Glu Pro Ile Thr Asp Lys Glu Asp His Thr Val Thr Asp Thr Val
130 135 140

Ser Tyr Thr Thr Val Ser Thr Ser Ser Gly Ile Val Thr Thr Lys Ser
145 150 155 160

Thr Thr Asp Asp Ala Asp Leu Tyr Asp Thr Tyr Asn Asp Asn Asp Thr
165 170 175

Val Pro Pro Thr Thr Val Gly Gly Ser Thr Thr Ser Ile Ser Asn Tyr
180 185 190

Lys Thr Lys Asp Phe Val Glu Ile Phe Gly Ile Thr Ala Leu Ile Ile
195 200 205

Leu Ser Ala Val Ala Ile Phe Cys Ile Thr Tyr Tyr Ile Tyr Asn Lys
210 215 220

Arg Ser Arg Lys Tyr Lys Thr Glu Asn Lys Val
225 230 235