

41743002WOFiledSeqListing
SEQUENCE LISTING

<110> Cell Medica Switzerland AG
THE UNIVERSITY OF NORTH CAROLINA AT CHAPEL HILL

<120> MODIFIED CELLS FOR IMMUNOTHERAPY

<130> P1702WOF

<150> EP16020057.2

<151> 2016-02-25

<160> 63

<170> PatentIn version 3.5

<210> 1

<211> 114

<212> PRT

<213> Artificial Sequence

<220>

<223> VL of scFv

<400> 1

Glu Ile Val Met Thr Gln Ser Pro Ser Thr Leu Ser Ala Ser Val Gly
1 5 10 15

Asp Arg Val Ile Ile Thr Cys Gln Ala Ser Glu Asp Ile Tyr Ser Leu
20 25 30

Leu Ala Trp Tyr Gln Gln Lys Pro Gly Lys Ala Pro Lys Leu Leu Ile
35 40 45

Tyr Asp Ala Ser Asp Leu Ala Ser Gly Val Pro Ser Arg Phe Ser Gly
50 55 60

Ser Gly Ser Gly Ala Glu Phe Thr Leu Thr Ile Ser Ser Leu Gln Pro
65 70 75 80

Asp Asp Phe Ala Thr Tyr Tyr Cys Gln Gly Asn Tyr Gly Ser Ser Ser
85 90 95

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Ser Ser Ser Tyr Gly Ala Val Phe Gly Gln Gly Thr Lys Leu Thr Val
 100 105 110

Leu Gly

<210> 2
 <211> 120
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> VH of scFv

<400> 2

Glu Val Gln Leu Val Glu Ser Gly Gly Gly Leu Val Gln Pro Gly Gly
 1 5 10 15

Ser Leu Arg Leu Ser Cys Thr Val Ser Gly Ile Asp Leu Ser Ser Tyr
 20 25 30

Thr Met Gly Trp Val Arg Gln Ala Pro Gly Lys Gly Leu Glu Trp Val
 35 40 45

Gly Ile Ile Ser Ser Gly Gly Arg Thr Tyr Tyr Ala Ser Trp Ala Lys
 50 55 60

Gly Arg Phe Thr Ile Ser Arg Asp Thr Ser Lys Asn Thr Val Tyr Leu
 65 70 75 80

Gln Met Asn Ser Leu Arg Ala Glu Asp Thr Ala Val Tyr Tyr Cys Ala
 85 90 95

Arg Gly Arg Tyr Thr Gly Tyr Pro Tyr Tyr Phe Ala Leu Trp Gly Gln
 100 105 110

Gly Thr Leu Val Thr Val Ser Ser
 115 120

<210> 3
 <211> 11
 <212> PRT
 <213> Oryctolagus cuniculus

<400> 3

Gln Ala Ser Glu Asp Ile Tyr Ser Leu Leu Ala
 1 5 10

<210> 4
 <211> 7
 <212> PRT
 <213> Oryctolagus cuniculus

<400> 4

Asp Ala Ser Asp Leu Ala Ser
 1 5

<210> 5
 <211> 15
 <212> PRT
 <213> Oryctolagus cuniculus

<400> 5

Gln Gly Asn Tyr Gly Ser Ser Ser Ser Ser Ser Tyr Gly Ala Val
 1 5 10 15

<210> 6
 <211> 9
 <212> PRT
 <213> Oryctolagus cuniculus

<400> 6

Ile Asp Leu Ser Ser Tyr Thr Met Gly
 1 5

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<210> 7

<211> 16

<212> PRT

<213> Oryctolagus cuniculus

<400> 7

Ile	Ile	Ser	Ser	Gly	Gly	Arg	Thr	Tyr	Tyr	Ala	Ser	Trp	Ala	Lys	Gly
1				5				10						15	

<210> 8

<211> 12

<212> PRT

<213> Oryctolagus cuniculus

<400> 8

Gly	Arg	Tyr	Thr	Gly	Tyr	Pro	Tyr	Tyr	Phe	Ala	Leu
1				5				10			

<210> 9

<211> 254

<212> PRT

<213> Artificial Sequence

<220>

<223> scFv

<400> 9

Glu	Ile	Val	Met	Thr	Gln	Ser	Pro	Ser	Thr	Leu	Ser	Ala	Ser	Val	Gly
1				5				10						15	

Asp	Arg	Val	Ile	Ile	Thr	Cys	Gln	Ala	Ser	Glu	Asp	Ile	Tyr	Ser	Leu
			20				25					30			

Leu	Ala	Trp	Tyr	Gln	Gln	Lys	Pro	Gly	Lys	Ala	Pro	Lys	Leu	Leu	Ile
		35				40					45				

Tyr	Asp	Ala	Ser	Asp	Leu	Ala	Ser	Gly	Val	Pro	Ser	Arg	Phe	Ser	Gly
	50					55				60					

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Ser Gly Ser Gly Ala Glu Phe Thr Leu Thr Ile Ser Ser Leu Gln Pro
65 70 75 80

Asp Asp Phe Ala Thr Tyr Tyr Cys Gln Gly Asn Tyr Gly Ser Ser Ser
85 90 95

Ser Ser Ser Tyr Gly Ala Val Phe Gly Gln Gly Thr Lys Leu Thr Val
100 105 110

Leu Gly Gly Gly Gly Gly Ser Gly Gly Gly Gly Ser Gly Gly Gly Gly
115 120 125

Ser Gly Gly Gly Gly Ser Glu Val Gln Leu Val Glu Ser Gly Gly Gly
130 135 140

Leu Val Gln Pro Gly Gly Ser Leu Arg Leu Ser Cys Thr Val Ser Gly
145 150 155 160

Ile Asp Leu Ser Ser Tyr Thr Met Gly Trp Val Arg Gln Ala Pro Gly
165 170 175

Lys Gly Leu Glu Trp Val Gly Ile Ile Ser Ser Gly Gly Arg Thr Tyr
180 185 190

Tyr Ala Ser Trp Ala Lys Gly Arg Phe Thr Ile Ser Arg Asp Thr Ser
195 200 205

Lys Asn Thr Val Tyr Leu Gln Met Asn Ser Leu Arg Ala Glu Asp Thr
210 215 220

Ala Val Tyr Tyr Cys Ala Arg Gly Arg Tyr Thr Gly Tyr Pro Tyr Tyr
225 230 235 240

Phe Ala Leu Trp Gly Gln Gly Thr Leu Val Thr Val Ser Ser
245 250

41743002W0FiledSeqListing

<210> 10
 <211> 20
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> linker

<400> 10

Gly Gly Gly Gly Ser Gly Gly Gly Gly Ser Gly Gly Gly Gly Ser Gly
 1 5 10 15

Gly Gly Gly Ser
 20

<210> 11
 <211> 22
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> forward primer

<400> 11
 taaccatgga gtttgggctg ag 22

<210> 12
 <211> 28
 <212> DNA
 <213> Artificial Sequence

<220>
 <223> reverse primer

<400> 12
 gacgcatgct cagctcgaca cggtgacc 28

<210> 13
 <211> 114
 <212> PRT
 <213> Artificial Sequence

<220>

41743002W0FiledSeqListing

<223> VL sequence of 14g2a scFv

<400> 13

Asp Val Val Met Thr Gln Thr Pro Leu Ser Leu Pro Val Ser Leu Gly
1 5 10 15

Asp Gln Ala Ser Ile Ser Cys Arg Ser Ser Gln Ser Leu Val His Arg
20 25 30

Asn Gly Asn Thr Tyr Leu His Trp Tyr Leu Gln Lys Pro Gly Gln Ser
35 40 45

Pro Lys Leu Leu Ile His Lys Val Ser Asn Arg Phe Ser Gly Val Pro
50 55 60

Asp Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe Thr Leu Lys Ile
65 70 75 80

Ser Arg Val Glu Ala Glu Asp Leu Gly Val Tyr Phe Cys Ser Gln Ser
85 90 95

Thr His Val Pro Pro Leu Thr Phe Gly Ala Gly Thr Lys Leu Glu Leu
100 105 110

Lys Arg

<210> 14

<211> 113

<212> PRT

<213> Artificial Sequence

<220>

<223> VH sequence of 14g2a scFv

<400> 14

Glu Val Gln Leu Leu Gln Ser Gly Pro Glu Leu Glu Lys Pro Gly Ala
1 5 10 15

41743002WOFiledSeqListing

Ser Val Met Ile Ser Cys Lys Ala Ser Gly Ser Ser Phe Thr Gly Tyr
20 25 30

Asn Met Asn Trp Val Arg Gln Asn Ile Gly Lys Ser Leu Glu Trp Ile
35 40 45

Gly Ala Ile Asp Pro Tyr Tyr Gly Gly Thr Ser Tyr Asn Gln Lys Phe
50 55 60

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

Met His Leu Lys Ser Leu Thr Ser Glu Asp Ser Ala Val Tyr Tyr Cys
85 90 95

Val Ser Gly Met Glu Tyr Trp Gly Gln Gly Thr Ser Val Thr Val Ser
100 105 110

Ser

<210> 15

<211> 18

<212> PRT

<213> Artificial Sequence

<220>

<223> hIgG1 signal peptide

<400> 15

Met Glu Phe Gly Leu Ser Trp Leu Phe Leu Val Ala Ile Leu Lys Gly
1 5 10 15

Val Gln

41743002WOFiledSeqListing

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

<220>
 <223> CDR-L1 of anti-GD2-CAR

<400> 16

Arg	Ser	Ser	Gln	Ser	Leu	Val	His	Arg	Asn	Gly	Asn	Thr	Tyr	Leu	His
1				5					10					15	

<210> 17
 <211> 7
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> CDR-L2 of anti-GD2-CAR

<400> 17

Lys	Val	Ser	Asn	Arg	Phe	Ser
1				5		

<210> 18
 <211> 10
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> CDR-L3 of anti-GD2-CAR

<400> 18

Ser	Gln	Ser	Thr	His	Val	Pro	Pro	Leu	Thr
1				5				10	

<210> 19
 <211> 9
 <212> PRT
 <213> Artificial Sequence

<220>

<223> CDR-H1 of anti-GD2-CAR

<400> 19

Ser Ser Phe Thr Gly Tyr Asn Met Asn
1 5

<210> 20

<211> 17

<212> PRT

<213> Artificial Sequence

<220>

<223> CDR-H2 of anti-GD2-CAR

<400> 20

Ala Ile Asp Pro Tyr Tyr Gly Gly Thr Ser Tyr Asn Gln Lys Phe Lys
1 5 10 15

Gly

<210> 21

<211> 4

<212> PRT

<213> Artificial Sequence

<220>

<223> CDR-H3 of anti-GD2-CAR

<400> 21

Gly Met Glu Tyr
1

<210> 22

<211> 11

<212> PRT

<213> Artificial Sequence

<220>

<223> CDR-L1 of anti-CSPG4 CAR

41743002WOFiledSeqListing

<400> 22

Arg Ala Ser Gln Thr Ile Tyr Lys Asn Leu His
1 5 10

<210> 23

<211> 7

<212> PRT

<213> Artificial Sequence

<220>

<223> CDR-L2 of anti-CSPG4 CAR

<400> 23

Tyr Gly Ser Asp Ser Ile Ser
1 5

<210> 24

<211> 9

<212> PRT

<213> Artificial Sequence

<220>

<223> CDR-L3 of anti-CSPG4 CAR

<400> 24

Leu Gln Gly Tyr Ser Thr Pro Trp Thr
1 5

<210> 25

<211> 9

<212> PRT

<213> Artificial Sequence

<220>

<223> CDR-H1 of anti-CSPG4 CAR

<400> 25

Tyr Thr Phe Thr Asp Tyr Ser Met His
1 5

41743002WOFiledSeqListing

<210> 26
 <211> 17
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> CDR-H2 of anti-CSPG4 CAR

<400> 26

Trp Ile Asn Thr Ala Thr Gly Glu Pro Thr Tyr Ala Asp Asp Phe Lys
 1 5 10 15

Gly

<210> 27
 <211> 4
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> CDR-H3 of anti-CSPG4 CAR

<400> 27

Tyr Tyr Asp Tyr
 1

<210> 28
 <211> 109
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> VL sequence of anti-CSPG4 CAR

<400> 28

Leu Asp Ile Lys Leu Thr Gln Ser Pro Ser Ile Leu Ser Val Thr Pro
 1 5 10 15

Gly Glu Thr Val Ser Leu Ser Cys Arg Ala Ser Gln Thr Ile Tyr Lys
 20 25 30

41743002W0FiledSeqListing

Asn Leu His Trp Tyr Gln Gln Lys Ser His Arg Ser Pro Arg Leu Leu
35 40 45

Ile Lys Tyr Gly Ser Asp Ser Ile Ser Gly Ile Pro Ser Arg Phe Thr
50 55 60

Gly Ser Gly Ser Gly Thr Asp Tyr Thr Leu Asn Ile Asn Ser Val Lys
65 70 75 80

Pro Glu Asp Glu Gly Ile Tyr Tyr Cys Leu Gln Gly Tyr Ser Thr Pro
85 90 95

Trp Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys Arg
100 105

<210> 29
<211> 113
<212> PRT
<213> Artificial Sequence

<220>
<223> VH sequence of anti-CSPG4 CAR

<400> 29

Gln Val Lys Leu Lys Glu Ser Gly Pro Glu Leu Lys Lys Pro Gly Glu
1 5 10 15

Thr Val Lys Ile Ser Cys Lys Ala Ser Gly Tyr Thr Phe Thr Asp Tyr
20 25 30

Ser Met His Trp Val Lys Lys Thr Pro Gly Lys Gly Leu Lys Trp Leu
35 40 45

Gly Trp Ile Asn Thr Ala Thr Gly Glu Pro Thr Tyr Ala Asp Asp Phe
50 55 60

41743002WOFiledSeqListing

Lys Gly Arg Phe Ala Ile Ser Leu Glu Thr Ser Ala Arg Thr Val Tyr
65 70 75 80

Leu Gln Ile Asn Asn Leu Arg Asn Glu Asp Thr Ala Thr Tyr Phe Cys
85 90 95

Phe Ser Tyr Tyr Asp Tyr Trp Gly Gln Gly Thr Thr Val Thr Val Ser
100 105 110

Ser

<210> 30
<211> 16
<212> PRT
<213> Artificial Sequence

<220>
<223> CDR-L1 of anti-GPC3 CAR

<400> 30

Arg Ser Ser Gln Ser Leu Val His Ser Asn Arg Asn Thr Tyr Leu His
1 5 10 15

<210> 31
<211> 7
<212> PRT
<213> Artificial Sequence

<220>
<223> CDR-L2 of anti-GPC3 CAR

<400> 31

Lys Val Ser Asn Arg Phe Ser
1 5

<210> 32
<211> 9
<212> PRT
<213> Artificial Sequence

41743002W0FiledSeqListing

<220>

<223> CDR-L3 of anti-GPC3 CAR

<400> 32

Ser Gln Asn Thr His Val Pro Pro Thr
1 5

<210> 33

<211> 9

<212> PRT

<213> Artificial Sequence

<220>

<223> CDR-H1 of anti-GPC3 CAR

<400> 33

Tyr Thr Phe Thr Asp Tyr Glu Met His
1 5

<210> 34

<211> 17

<212> PRT

<213> Artificial Sequence

<220>

<223> CDR-H2 of anti-GPC3 CAR

<400> 34

Ala Leu Asp Pro Lys Thr Gly Asp Thr Ala Tyr Ser Gln Lys Phe Lys
1 5 10 15

Gly

<210> 35

<211> 6

<212> PRT

<213> Artificial Sequence

<220>

<223> CDR-H3 of anti-GPC3 CAR

<400> 35

Phe Tyr Ser Tyr Thr Tyr
1 5

<210> 36

<211> 113

<212> PRT

<213> Artificial Sequence

<220>

<223> VL of anti-GPC3 CAR

<400> 36

Asp Val Val Met Thr Gln Ser Pro Leu Ser Leu Pro Val Thr Pro Gly
1 5 10 15

Glu Pro Ala Ser Ile Ser Cys Arg Ser Ser Gln Ser Leu Val His Ser
20 25 30

Asn Arg Asn Thr Tyr Leu His Trp Tyr Leu Gln Lys Pro Gly Gln Ser
35 40 45

Pro Gln Leu Leu Ile Tyr Lys Val Ser Asn Arg Phe Ser Gly Val Pro
50 55 60

Asp Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp Phe Thr Leu Lys Ile
65 70 75 80

Ser Arg Val Glu Ala Glu Asp Val Gly Val Tyr Tyr Cys Ser Gln Asn
85 90 95

Thr His Val Pro Pro Thr Phe Gly Gln Gly Thr Lys Leu Glu Ile Lys
100 105 110

Arg

41743002WOFiledSeqListing

<210> 37
 <211> 115
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> VH of anti-GPC3 CAR v

<400> 37

Gln Val Gln Leu Val Gln Ser Gly Ala Glu Val Lys Lys Pro Gly Ala
 1 5 10 15

Ser Val Lys Val Ser Cys Lys Ala Ser Gly Tyr Thr Phe Thr Asp Tyr
 20 25 30

Glu Met His Trp Val Arg Gln Ala Pro Gly Gln Gly Leu Glu Trp Met
 35 40 45

Gly Ala Leu Asp Pro Lys Thr Gly Asp Thr Ala Tyr Ser Gln Lys Phe
 50 55 60

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

Met Glu Leu Ser Ser Leu Thr Ser Glu Asp Thr Ala Val Tyr Tyr Cys
 85 90 95

Thr Arg Phe Tyr Ser Tyr Thr Tyr Trp Gly Gln Gly Thr Leu Val Thr
 100 105 110

Val Ser Ser
 115

<210> 38
 <211> 115
 <212> PRT
 <213> Artificial Sequence

41743002WOFiledSeqListing

<220>

<223> VH of anti-GPC3 CAR

<400> 38

Gln Val Gln Leu Gln Gln Ser Gly Ala Glu Leu Val Arg Pro Gly Ala
1 5 10 15

Ser Val Lys Leu Ser Cys Lys Ala Ser Gly Tyr Thr Phe Thr Asp Tyr
20 25 30

Glu Met His Trp Val Lys Gln Thr Pro Val His Gly Leu Lys Trp Ile
35 40 45

Gly Ala Leu Asp Pro Lys Thr Gly Asp Thr Ala Tyr Ser Gln Lys Phe
50 55 60

Lys Gly Lys Ala Thr Leu Thr Ala Asp Lys Ser Ser Ser Thr Ala Tyr
65 70 75 80

Met Glu Leu Arg Ser Leu Thr Ser Glu Asp Ser Ala Val Tyr Tyr Cys
85 90 95

Thr Arg Phe Tyr Ser Tyr Thr Tyr Trp Gly Gln Gly Thr Leu Val Thr
100 105 110

Val Ser Ala
115

<210> 39

<211> 9

<212> PRT

<213> Artificial Sequence

<220>

<223> CDR-L1 of anti-5T4 CAR

<400> 39

Tyr Ser Phe Thr Gly Tyr Tyr Met His
 1 5

<210> 40
 <211> 17
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> CDR-L2 of anti-5T4 CAR

<400> 40

Arg Ile Asn Pro Asn Asn Gly Val Thr Leu Tyr Asn Gln Lys Phe Lys
 1 5 10 15

Asp

<210> 41
 <211> 11
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> CDR-L3 of anti-5T4 CAR

<400> 41

Ser Thr Met Ile Thr Asn Tyr Val Met Asp Tyr
 1 5 10

<210> 42
 <211> 11
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> CDR-H1 of anti-5T4 CAR

<400> 42

Lys Ala Ser Gln Ser Val Ser Asn Asp Val Ala
 1 5 10

41743002W0FiledSeqListing

<210> 43
 <211> 7
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> CDR-H2 of anti-5T4 CAR

<400> 43

Tyr Thr Ser Ser Arg Tyr Ala
 1 5

<210> 44
 <211> 9
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> CDR-H3 of anti-5T4 CAR

<400> 44

Gln Gln Asp Tyr Asn Ser Pro Pro Thr
 1 5

<210> 45
 <211> 108
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> VL of anti-5T4 CAR

<400> 45

Ser Ile Val Met Thr Gln Thr Pro Thr Phe Leu Leu Val Ser Ala Gly
 1 5 10 15

Asp Arg Val Thr Ile Thr Cys Lys Ala Ser Gln Ser Val Ser Asn Asp
 20 25 30

41743002W0FiledSeqListing

Val Ala Trp Tyr Gln Gln Lys Pro Gly Gln Ser Pro Thr Leu Leu Ile
35 40 45

Ser Tyr Thr Ser Ser Arg Tyr Ala Gly Val Pro Asp Arg Phe Ile Gly
50 55 60

Ser Gly Tyr Gly Thr Asp Phe Thr Phe Thr Ile Ser Thr Leu Gln Ala
65 70 75 80

Glu Asp Leu Ala Val Tyr Phe Cys Gln Gln Asp Tyr Asn Ser Pro Pro
85 90 95

Thr Phe Gly Gly Gly Thr Lys Leu Glu Ile Lys Arg
100 105

<210> 46
<211> 120
<212> PRT
<213> Artificial Sequence

<220>
<223> VH of anti-5T4 CAR

<400> 46

Glu Val Gln Leu Gln Gln Ser Gly Pro Asp Leu Val Lys Pro Gly Ala
1 5 10 15

Ser Val Lys Ile Ser Cys Lys Ala Ser Gly Tyr Ser Phe Thr Gly Tyr
20 25 30

Tyr Met His Trp Val Lys Gln Ser His Gly Lys Ser Leu Glu Trp Ile
35 40 45

Gly Arg Ile Asn Pro Asn Asn Gly Val Thr Leu Tyr Asn Gln Lys Phe
50 55 60

Lys Asp Lys Ala Ile Leu Thr Val Asp Lys Ser Ser Thr Thr Ala Tyr
65 70 75 80

41743002W0FiledSeqListing

Met Glu Leu Arg Ser Leu Thr Ser Glu Asp Ser Ala Val Tyr Tyr Cys
85 90 95

Ala Arg Ser Thr Met Ile Thr Asn Tyr Val Met Asp Tyr Trp Gly Gln
100 105 110

Val Thr Ser Val Thr Val Ser Ser
115 120

<210> 47
<211> 42
<212> PRT
<213> Artificial Sequence

<220>
<223> 41BB costimulatory domain

<400> 47

Lys Arg Gly Arg Lys Lys Leu Leu Tyr Ile Phe Lys Gln Pro Phe Met
1 5 10 15

Arg Pro Val Gln Thr Thr Gln Glu Glu Asp Gly Cys Ser Cys Arg Phe
20 25 30

Pro Glu Glu Glu Glu Gly Gly Cys Glu Leu
35 40

<210> 48
<211> 112
<212> PRT
<213> Artificial Sequence

<220>
<223> CD3 zeta intracellular domain

<400> 48

Arg Val Lys Phe Ser Arg Ser Ala Asp Ala Pro Ala Tyr Gln Gln Gly
1 5 10 15

41743002W0FiledSeqListing

Gln Asn Gln Leu Tyr Asn Glu Leu Asn Leu Gly Arg Arg Glu Glu Tyr
20 25 30

Asp Val Leu Asp Lys Arg Arg Gly Arg Asp Pro Glu Met Gly Gly Lys
35 40 45

Pro Arg Arg Lys Asn Pro Gln Glu Gly Leu Tyr Asn Glu Leu Gln Lys
50 55 60

Asp Lys Met Ala Glu Ala Tyr Ser Glu Ile Gly Met Lys Gly Glu Arg
65 70 75 80

Arg Arg Gly Lys Gly His Asp Gly Leu Tyr Gln Gly Leu Ser Thr Ala
85 90 95

Thr Lys Asp Thr Tyr Asp Ala Leu His Met Gln Ala Leu Pro Pro Arg
100 105 110

<210> 49

<211> 41

<212> PRT

<213> Artificial Sequence

<220>

<223> CD28 costimulatory domain

<400> 49

Arg Ser Lys Arg Ser Arg Leu Leu His Ser Asp Tyr Met Asn Met Thr
1 5 10 15

Pro Arg Arg Pro Gly Pro Thr Arg Lys His Tyr Gln Pro Tyr Ala Pro
20 25 30

Pro Arg Asp Phe Ala Ala Tyr Arg Ser
35 40

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<210> 50

<211> 114

<212> PRT

<213> Artificial Sequence

<220>

<223> Survivin specific TCR, beta chain

<400> 50

Asp Ala Met Val Ile Gln Asn Pro Arg Tyr Gln Val Thr Gln Phe Gly
1 5 10 15

Lys Pro Val Thr Leu Ser Cys Ser Gln Thr Leu Asn His Asn Val Met
20 25 30

Tyr Trp Tyr Gln Gln Lys Ser Ser Gln Ala Pro Lys Leu Leu Phe His
35 40 45

Tyr Tyr Asp Lys Asp Phe Asn Asn Glu Ala Asp Thr Pro Asp Asn Phe
50 55 60

Gln Ser Arg Arg Pro Asn Thr Ser Phe Cys Phe Leu Asp Ile Arg Ser
65 70 75 80

Pro Gly Leu Gly Asp Ala Ala Met Tyr Leu Cys Ala Thr Ser Arg Gly
85 90 95

Asp Ser Thr Ala Glu Pro Gln His Phe Gly Asp Gly Thr Arg Leu Ser
100 105 110

Ile Leu

<210> 51

<211> 114

<212> PRT

<213> Artificial Sequence

<220>

<223> Survivin specific TCR, alpha chain

<400> 51

Gly Glu Ser Val Gly Leu His Leu Pro Thr Leu Ser Val Gln Glu Gly
1 5 10 15

Asp Asn Ser Ile Ile Asn Cys Ala Tyr Ser Asn Ser Ala Ser Asp Tyr
20 25 30

Phe Ile Trp Tyr Lys Gln Glu Ser Gly Lys Gly Pro Gln Phe Ile Ile
35 40 45

Asp Ile Arg Ser Asn Met Asp Lys Arg Gln Gly Gln Arg Val Thr Val
50 55 60

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

Gln Pro Gly Asp Ser Ala Val Tyr Phe Cys Ala Glu Thr Val Thr Asp
85 90 95

Ser Trp Gly Lys Leu Gln Phe Gly Ala Gly Thr Gln Val Val Val Thr
100 105 110

Pro Asp

<210> 52

<211> 6

<212> PRT

<213> Artificial Sequence

<220>

<223> WT-1 specific TCR, CDR1 alpha

<400> 52

Ser Ser Tyr Ser Pro Ser
1 5

41743002WOFiledSeqListing

<210> 53
 <211> 7
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> WT-1 specific TCR, CDR2 alpha

<400> 53

Tyr Thr Ser Ala Ala Thr Leu
 1 5

<210> 54
 <211> 13
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> WT-1 specific TCR, CDR3 alpha

<400> 54

Trp Ser Pro Phe Ser Gly Gly Gly Ala Asp Gly Leu Thr
 1 5 10

<210> 55
 <211> 12
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> WT-1 specific TCR, CDR3 alpha v

<400> 55

Ser Pro Phe Ser Gly Gly Gly Ala Asp Gly Leu Thr
 1 5 10

<210> 56
 <211> 6
 <212> PRT
 <213> Artificial Sequence

41743002W0FiledSeqListing

<220>

<223> WT-1 specific TCR, CDR1 beta

<400> 56

Asp Phe Gln Ala Thr Thr
1 5

<210> 57

<211> 7

<212> PRT

<213> Artificial Sequence

<220>

<223> WT-1 specific TCR, CDR2 beta

<400> 57

Ser Asn Glu Gly Ser Lys Ala
1 5

<210> 58

<211> 8

<212> PRT

<213> Artificial Sequence

<220>

<223> WT-1 specific TCR, CDR3 beta

<400> 58

Ser Ala Arg Asp Gly Gly Glu Gly
1 5

<210> 59

<211> 11

<212> PRT

<213> Artificial Sequence

<220>

<223> WT-1 specific TCR, CDR3 beta v

<400> 59

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Arg Asp Gly Gly Glu Gly Ser Glu Thr Gln Tyr
1 5 10

<210> 60

<211> 124

<212> PRT

<213> Artificial Sequence

<220>

<223> WT-1 specific TCR, alpha chain

<400> 60

Met Leu Leu Leu Leu Val Pro Val Leu Glu Val Ile Phe Thr Leu Gly
1 5 10 15

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

Ser Glu Gly Thr Pro Val Leu Leu Arg Cys Asn Tyr Ser Ser Ser Tyr
35 40 45

Ser Pro Ser Leu Phe Trp Tyr Val Gln His Pro Asn Lys Gly Leu Gln
50 55 60

Leu Leu Leu Lys Tyr Thr Ser Ala Ala Thr Leu Val Lys Gly Ile Asn
65 70 75 80

Gly Phe Glu Ala Glu Phe Lys Lys Ser Glu Thr Ser Phe His Leu Thr
85 90 95

Lys Pro Ser Ala His Met Ser Asp Ala Ala Glu Tyr Phe Cys Val Val
100 105 110

Ser Pro Phe Ser Gly Gly Gly Ala Asp Gly Leu Thr
115 120

<210> 61

<211> 116

41743002WOFiledSeqListing

<212> PRT

<213> Artificial Sequence

<220>

<223> WT-1 specific TCR, beta chain

<220>

<221> misc_feature

<222> (32)..(32)

<223> Xaa can be any naturally occurring amino acid

<400> 61

Met Leu Leu Leu Leu Leu Leu Leu Gly Pro Gly Ser Gly Leu Gly Ala
1 5 10 15

Val Val Ser Gln His Pro Ser Trp Val Ile Cys Lys Ser Gly Thr Xaa
20 25 30

Val Lys Ile Glu Cys Arg Ser Leu Asp Phe Gln Ala Thr Thr Met Phe
35 40 45

Trp Tyr Arg Gln Phe Pro Lys Gln Ser Leu Met Leu Met Ala Thr Ser
50 55 60

Asn Glu Gly Ser Lys Ala Thr Tyr Glu Gln Gly Val Glu Lys Asp Lys
65 70 75 80

Phe Leu Ile Asn His Ala Ser Leu Thr Leu Ser Thr Leu Thr Val Thr
85 90 95

Ser Ala His Pro Glu Asp Ser Ser Phe Tyr Ile Cys Ser Ala Arg Asp
100 105 110

Gly Gly Glu Gly
115

<210> 62

<211> 124

41743002W0FiledSeqListing

<212> PRT

<213> Artificial Sequence

<220>

<223> WT-1 specific TCR, alpha chain v

<400> 62

Met Leu Leu Leu Leu Val Pro Val Leu Glu Val Ile Phe Thr Leu Gly
1 5 10 15

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

Ser Glu Gly Thr Pro Val Leu Leu Arg Cys Asn Tyr Ser Ser Ser Tyr
35 40 45

Ser Pro Ser Leu Phe Trp Tyr Val Gln His Pro Asn Lys Gly Leu Gln
50 55 60

Leu Leu Leu Lys Tyr Thr Ser Ala Ala Thr Leu Val Lys Gly Ile Asn
65 70 75 80

Gly Phe Glu Ala Glu Phe Lys Lys Ser Glu Thr Ser Phe His Leu Thr
85 90 95

Lys Pro Ser Ala His Met Ser Asp Ala Ala Glu Tyr Phe Cys Val Val
100 105 110

Ser Pro Phe Ser Gly Gly Gly Ala Asp Gly Leu Thr
115 120

<210> 63

<211> 121

<212> PRT

<213> Artificial Sequence

<220>

<223> WT-1 specific TCR, beta chain v

41743002W0FiledSeqListing

<400> 63

Met Leu Leu Leu Leu Leu Leu Leu Gly Pro Gly Ser Gly Leu Gly Ala
1 5 10 15

Val Val Ser Gln His Pro Ser Trp Val Ile Cys Lys Ser Gly Thr Ser
20 25 30

Val Lys Ile Glu Cys Arg Ser Leu Asp Phe Gln Ala Thr Thr Met Phe
35 40 45

Trp Tyr Arg Gln Phe Pro Lys Gln Ser Leu Met Leu Met Ala Thr Ser
50 55 60

Asn Glu Gly Ser Lys Ala Thr Tyr Glu Gln Gly Val Glu Lys Asp Lys
65 70 75 80

Phe Leu Ile Asn His Ala Ser Leu Thr Leu Ser Thr Leu Thr Val Thr
85 90 95

Ser Ala His Pro Glu Asp Ser Ser Phe Tyr Ile Cys Ser Ala Arg Asp
100 105 110

Gly Gly Glu Gly Ser Glu Thr Gln Tyr
115 120