FIGURE 1


domain 1
1 MHLLGPWLLLLVLEYLAFSDSSKWVFEHPETLYAWEGACVWIPC
45 TYRALDGDLESFILFHNPEYNKNTSKFDGTRLYESTKDGKVPSEQKRVQF
95 LGDKNKNCTLSIHPVHLNDSGQLGLRMESKTEKWM
domain 1
domain 2
130 ERIHLNVSE RPFPPHIQLPPEIQESQEVTLTCLLNFSCYGYPIQL
175 QWLLEGVPMRQAAVTSTSLTIKSVFTRSELKFSPQWSHHGKIVTC
domain 2
domain 3
220 QLQDADGKFLSNDTVQLNVKH TPKLEIKVTPSDAIVREGDSVTMT
265 CEVSSSNPEYTTVSWLKDGTSLKKQNTFTLNLREVTKDQSGKYCC
domain 3
domain 4
310 QVSNDVGPGRSEEVFLQVQY APEPSTVQILHSPAVEGSQVEFLCM
355 SLANPLPTNYTWYHNGKEMQGRTEEKVHIPKILPWHAGTYSCVAE
domain 4
domain 5
400 NILGTGQRGPGAELDVQY PPKKVTTVIQNPMPIREGDTVTLSCNY
445 NSSNPSVTRYEWKPHGAWEEPSLGVLKIQNVGWDNTTIACARCNS
domain 5
domain 6
490 WCSWASPVALNVQY APRDVRVRKIKPLSEIHSGNSVSLQCDFSSS
535 HPKEVQFFWEKNGRLLGKESQLNFDSISPEDAGSYSCWVNNSIGQ
domain 6
domain 7
580 TASKAWTLEVLY APRRLRVSMSPGDQVMEGKSATLTCESDANPPV
625 SHYTWFDWNNQSLPHHSQKLRLEPVKVQHSGAYWCQGTNSVGKGR
domain 7
670 SPLSTLTVYY SPETIGRRVAVGLGSCLAILILAICGLKLQRRWKR
715 TQSQQGLQENSSGQSFFVRNKKVRRAPLSEGPHSLGCYNPMMEDG
760 ISYTTLRFPEMNIPRTGDAESSEMQRPPRTCDDTVTYSALHKRQV
805 GDYENVIPDFPEDEGIHYSELIQFGVGERPQAQENVDYVILKH"

Figure 2

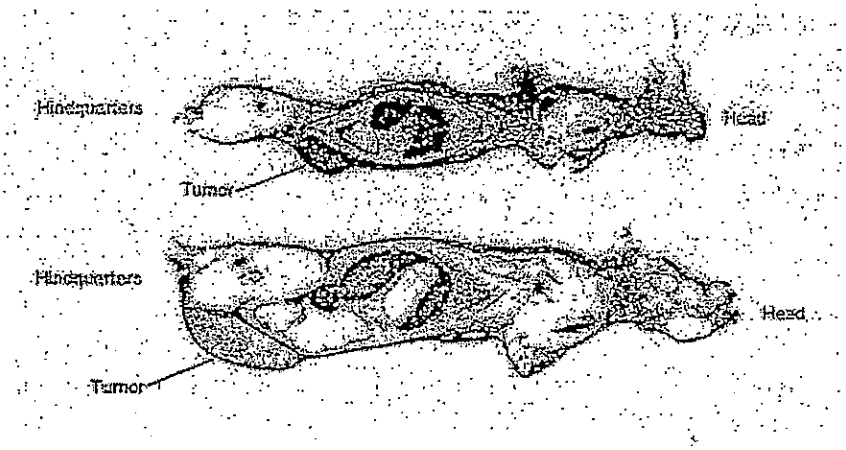


Figure 3

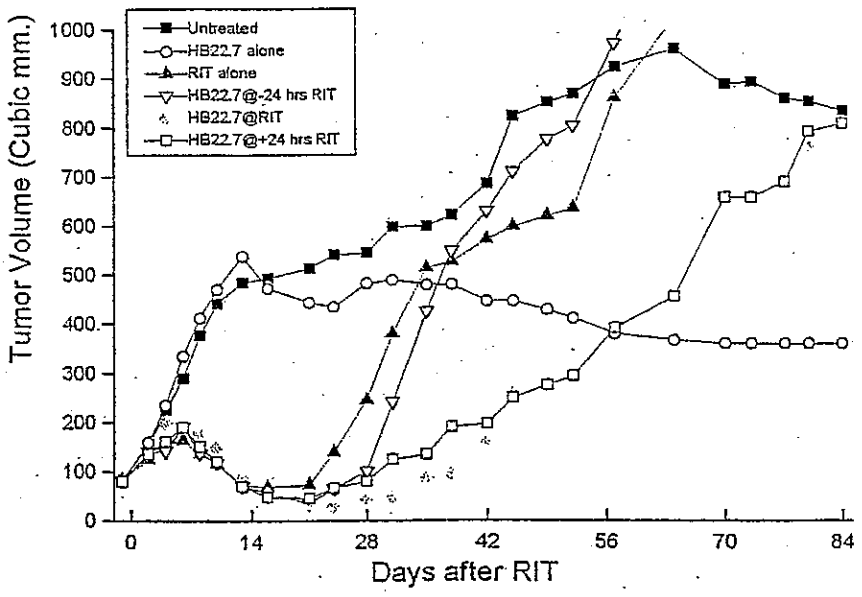
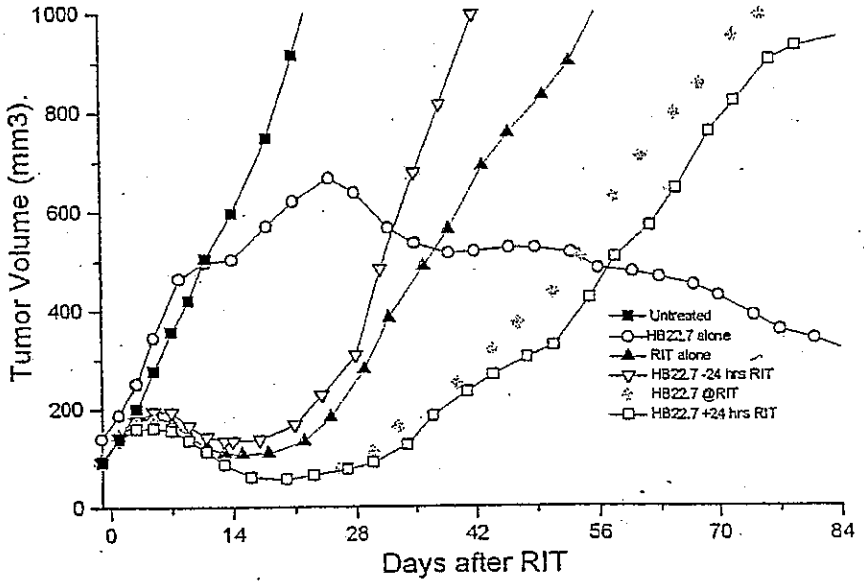

Untreated
HB22.7 alone
RIT alone
HB22.7@-24 hrs RIT
HB22.7@RIT
HB22.7@+24 hrs RIT
Tumor Volume (Cubic mm.)
0
100
200
300
400
500
600
700
800
900
1000
0
14
28
42
56
70
84
Days after RIT

Figure 4


Tumor Volume (mm3).
1000
800
600
400
200
0
0
14
28
42
56
70
84
Days after RIT
Untreated
HB22.7 alone
RIT alone
HB22.7 -24 hrs RIT
HB22.7 @RIT
HB22.7 +24 hrs RIT

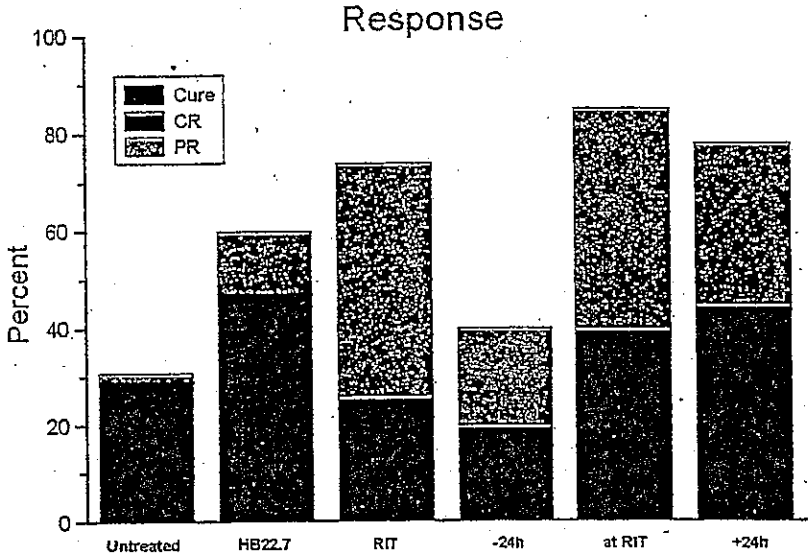

Response
Cure
CR
PR
Percent
100
80
60
40
20
0
Untreated
HB22.7
RIT
-24h
at RIT
+24h

Figure 5

Figure 6

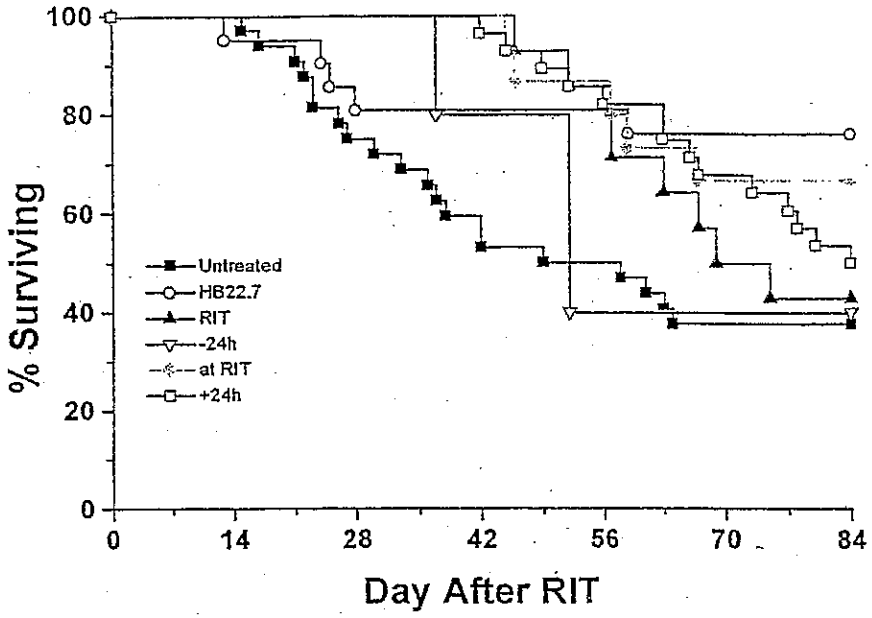
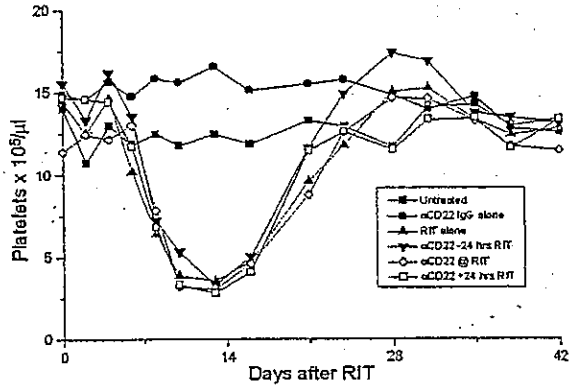

100
80
60
40
20
0
% Surviving
0
14
28
42
56
70
84
Day After RIT
Untreated
HB22.7
RIT
-24h
at RIT
+24h

Figure 7


Platelets x 10⁵/µl
20
15
10
5
0
0
14
28
42
Days after RIT
Untreated
αCD22 IgG alone
RIT alone
αCD22 -24 hrs RIT
αCD22 @ RIT
αCD22 +24 hrs RIT

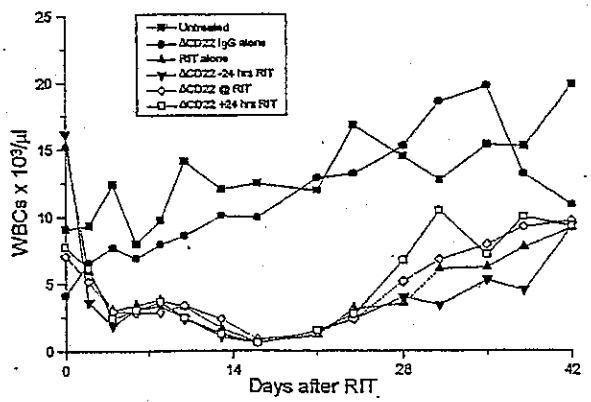

WBCs x 10³/µl
25
20
15
10
5
0
0
14
28
42
Days after RIT
Untreated
ΔCD22 IgG alone
RIT alone
ΔCD22 -24 hrs RIT
ΔCD22 @ RIT
ΔCD22 +24 hrs RIT

Figure 8

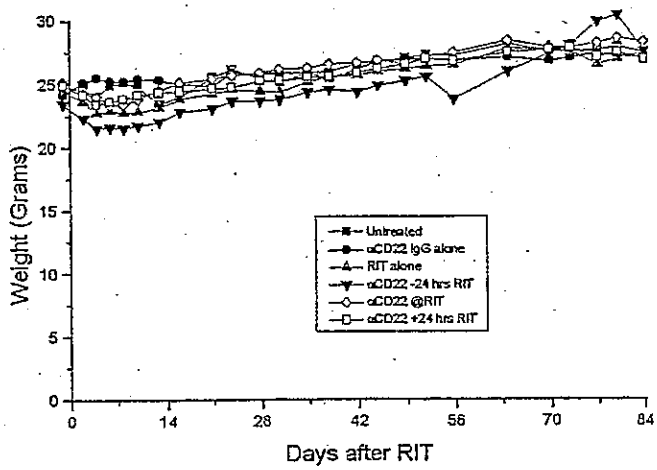

Weight (Grams)
Days after RIT
0
5
10
15
20
25
30
0
14
28
42
56
70
84
Untreated
αCD22 IgG alone
RIT alone
αCD22 -24 hrs RIT
αCD22 @RIT
αCD22 +24 hrs RIT

Figure 9

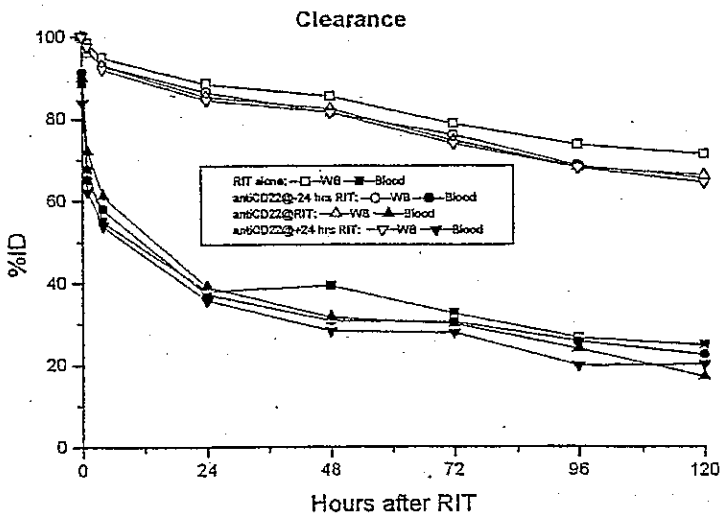

Clearance
100
80
60
40
20
0
%ID
0
24
48
72
96
120
Hours after RIT
RIT alone; —□—WB —■—Blood
antiCD22@-24 hrs RIT: —○—WB —●—Blood
antiCD22@RIT: —△—WB —▲—Blood
antiCD22@+24 hrs RIT: —▽—WB —▼—Blood

Figure 10

HB22 Hybridoma Antibody Heavy Chain Sequences

Residue	10	20	30 CDR1	40	50 CDR2	60	70	80	90	94	CDR3	
HB22-5	GPELVKPGASMKISCKASGYSF.		TDYTMNWVKQSHGKNLEWIGLLN.		PFNG.GTSYNQKFKGKATLSVDKSSSTAFMELLSLTSEDSAVYFCAR						GTGRN	YAMDYWGQGTSVTVSS
HB22-196	GPDLVKPGASVKISCKASGYSF.		IGYYMHWLKQSHGKSLEWIGRVN.		PNTA.GLTYNQRFKDKAILTVDKSSNTAYMELRSLTSEDSAVYYCSR						VDYDDYG	YWFFDVWGAGTTVTVSS
HB22-7	GPGLVAPSQSLSITCTVSGFSL.		SDYGVNWVRQIPGKGLEWLGIIN.		.GDG.RTDYNSALKSRLNISKDNSKSQVFLKMNSLKADDTARYYCAR						APGNR	AMEYWGQGTSVTVSS
HB22-33	GPGLVKPSQSLSLTCSVTGYSITSGYYWNWIRQFPGNKLEWMGYIR.				.YDG.SNNYNPSLKNRISITRDTSKNQFFLKLNSVTTEDTATYYCAR						GGITV	AMDYWGQGTSVTVSS
HB22-13	GGGLVQPGGSLRLSCATSGFTF.		IDYYMNWVRQPPGKALEWLGFIKNKFNGYTTEYNTSVKGRFTISRDNSQSILYLQNNTLRAEDSATYYCAR								GLGRS	YAMDYWGQGTSVTVSS
HB22-23	GGGLGATWRSMKLSCVASGFTF.		SYYWNWVRQSPEKGLEWIAEIRLKSNNYATHYAESVKGRFTISRDDSKSSVYLQMNNLRAEDTGIYYCTR								YDGSSR	DYWGQGTTLTVSS
					V_H Sequences						D Region	J Sequences

Figure 11

HB22-5 VH Sequence

```
 1                                  10                                  20
 E   V   Q   L   Q   E   S   G   P   E   L   V   K   P   G   A   S   M   K   I
GAG GTG CAG CTG CAG GAG TCT GGA CCT GAG CTG GTG AAG CCT GGA GCT TCA ATG AAG ATA   60

 21                                 30                                  40
 S   C   K   A   S   G   Y   S   F   T   D   Y   T   M   N   W   V   K   Q   S
TCC TGC AAG GCT TCT GGT TAC TCA TTC ACT GAC TAC ACC ATG AAC TGG GTG AAG CAG AGC  120

 41                                 50                                  60
 H   G   K   N   L   E   W   I   G   L   L   H   P   F   N   G   G   T   S   Y
CAT GGA AAG AAC CTT GAG TGG ATT GGA CTT CTT CAT CCT TTC AAT GGT GGT ACT AGC TAC  180

 61                                 70                                  80
 N   Q   K   F   K   G   K   A   T   L   S   V   D   K   S   S   S   T   A   F
AAC CAG AAG TTC AAG GGC AAG GCC ACA TTA TCT GTA GAC AAG TCA TCC AGC ACA GCC TTC  240

 81                                 90                                  100
 M   E   L   L   S   L   T   S   E   D   S   A   V   Y   F   C   A   R   G   T
ATG GAG CTC CTC AGT CTG ACA TCT GAG GAC TCT GCA GTC TAT TTC TGT GCA AGA GGG ACA  300

101                                110                                 120
 G   R   N   Y   A   M   D   Y   W   G   Q   G   T   S   V   T   V   S   S
GGT CGG AAC TAT GCT ATG GAC TAC TGG GGT CAA GGA ACC TCA GTC ACC GTC TCC TCA      357
```

Figure 12

HB22-7 VH Sequence

```
 1                                   10                                                  20
 E   V   Q   L   Q   E   S   G   P   G   L   V   A   P   S   Q   S   L   S   I
GAG GTG CAG CTG CAG GAG TCT GGA CCT GGC CTG GTG GCG CCC TCA CAG AGC CTG TCC ATC   60

 21                                  30                                                  40
 T   C   T   V   S   G   F   S   L   S   D   Y   G   V   N   W   V   R   Q   I
ACA TGC ACC GTC TCA GGG TTC TCA TTA AGC GAC TAT GGT GTA AAC TGG GTT CGC CAG ATT  120

 41                                  50                                                  60
 P   G   K   G   L   E   W   L   G   I   I   W   G   D   G   R   T   D   Y   N
CCA GGA AAG GGT CTG GAG TGG CTG GGA ATA ATA TGG GGT GAT GGA AGG ACA GAC TAT AAT  180

 61                                  70                                                  80
 S   A   L   K   S   R   L   N   I   S   K   D   N   S   K   S   Q   V   F   L
TCA GCT CTC AAA TCC AGA CTG AAC ATC AGC AAG GAC AAC TCC AAG AGC CAA GTT TTC TTG  240

 81                                  90                                                 100
 K   M   N   S   L   K   A   D   D   T   A   R   Y   Y   C   A   R   A   P   G
AAA ATG AAC AGT CTG AAA GCT GAT GAC ACA GCC AGG TAC TAC TGT GCC AGA GCC CCC GGT  300

101                                 110                                 117
 N   R   A   M   E   Y   W   G   Q   G   T   S   V   T   V   S   S
AAT AGG GCT ATG GAG TAC TGG GGT CAA GGA ACC TCA GTC ACC GTC TCC TCA              351
```

Figure 13

HB22-13.VH Sequence

```
1                                                  10                                                  20
E   V   Q   L   Q   E   S   G   G   G   L   V   Q   P   G   G   S   L   R   L
GAG GTG CAG CTG CAG GAG TCT GGA GGA GGC TTG GTA CAG CCT GGG GGT TCT CTG AGA CTC    60

21                                                 30                                                  40
S   C   A   T   S   G   F   T   F   I   D   Y   Y   M   N   W   V   R   Q   P
TCC TGT GCA ACT TCT GGG TTC ACC TTC ATT GAT TAC TAC ATG AAC TGG GTC CGC CAG CCT   120

41                                                 50                                                  60
P   G   K   A   L   E   W   L   G   F   I   K   N   K   F   N   G   Y   T   T
CCA GGA AAG GCA CTT GAG TGG TTG GGT TTT ATT AAA AAC AAA TTT AAT GGT TAC ACA ACA   180

61                                                 70                                                  80
E   Y   N   T   S   V   K   G   R   F   T   I   S   R   D   N   S   Q   S   I
GAA TAC AAT ACA TCT GTG AAG GGT CGG TTC ACC ATC TCC AGA GAT AAT TCC CAA AGC ATC   240

81                                                 90                                                  100
L   Y   L   Q   M   N   T   L   R   A   E   D   S   A   T   Y   Y   C   A   R
CTC TAT CTT CAA ATG AAC ACC CTG AGA GCT GAG GAC AGT GCC ACT TAT TAC TGT GCA AGA   300

101                                                110                                                 120
G   L   G   R   S   Y   A   M   D   Y   W   G   Q   G   T   S   V   T   V   S
GGG CTG GGA CGT AGC TAT GCT ATG GAC TAC TGG GGT CAA GGA ACC TCA GTC ACC GTC TCC   360

121
S
TCA                                                                                                 363
```

Figure 14

HB22-23 VH Sequence

```
1                                   10                                  20
E   V   Q   L   Q   E   S   G   G   G   L   G   A   T   W   R   S   M   K   L
GAG GTG CAG CTG CAG GAG TCT GGA GGA GGG CTT GGT GCA ACC TGG AGA TCC ATG AAA CTC   60

21                                  30                                  40
S   C   V   A   S   G   F   T   F   S   Y   Y   W   M   N   W   V   R   Q   S
TCC TGT GTT GCC TCT GGA TTC ACT TTC AGT TAC TAC TGG ATG AAC TGG GTC CGC CAG TCT  120

41                                  50                                  60
P   E   K   G   L   E   W   I   A   E   I   R   L   K   S   N   N   Y   A   T
CCA GAG AAG GGG CTT GAG TGG ATT GCT GAA ATT AGA TTG AAA TCT AAT AAT TAT GCA ACA  180

61                                  70                                  80
H   Y   A   E   S   V   K   G   R   F   T   I   S   R   D   D   S   K   S   S
CAT TAT GCG GAG TCT GTG AAA GGG AGG TTC ACC ATC TCA AGA GAT GAT TCC AAA AGT AGT  240

81                                  90                                  100
V   Y   L   Q   M   N   N   L   R   A   E   D   T   G   I   Y   Y   C   T   R
GTC TAC CTG CAA ATG AAC AAC TTA AGA GCT GAA GAC ACT GGC ATT TAT TAC TGT ACC AGG  300

101                                 110                                 120
Y   D   G   S   S   R   D   Y   W   G   Q   G   T   T   L   T   V   S   S
TAT GAT GGT TCC TCC CGG GAC TAC TGG GGC CAA GGC ACC ACT CTC ACA GTC TCC TCA      357
```

Figure 15

HB22-33 VH Sequence

```
1                                   10                                  20
E   V   Q   L   Q   E   S   G   P   G   L   V   K   P   S   Q   S   L   S   L
GAG GTG CAG CTG CAG GAG TCT GGA CCT GGC CTC GTG AAA CCT TCT CAG TCT CTG TCT CTC   60

21                                  30                                  40
T   C   S   V   T   G   Y   S   I   T   S   G   Y   Y   W   N   W   I   R   Q
ACC TGC TCT GTC ACT GGC TAC TCC ATC ACC AGT GGT TAT TAC TGG AAC TGG ATC CGG CAG  120

41                                  50                                  60
F   P   G   N   K   L   E   W   M   G   Y   I   R   Y   D   G   S   N   N   Y
TTT CCA GGA AAC AAA CTG GAA TGG ATG GGC TAC ATT AGG TAC GAC GGT AGC AAT AAC TAC  180

61                                  70                                  80
N   P   S   L   K   N   R   I   S   I   T   R   D   T   S   K   N   Q   F   F
AAC CCA TCT CTC AAA AAT CGA ATC TCC ATC ACT CGT GAC ACA TCT AAG AAC CAG TTT TTC  240

81                                  90                                  100
L   K   L   N   S   V   T   T   E   D   T   A   T   Y   Y   C   A   R   G   G
CTG AAG TTG AAT TCT GTG ACT ACT GAG GAC ACA GCT ACA TAT TAC TGT GCA AGA GGG GGG  300

101                                 110                 118
I   T   V   A   M   D   Y   W   G   Q   G   T   S   V   T   V   S   S
ATT ACG GTT GCT ATG GAC TAC TGG GGT CAA GGA ACC TCA GTC ACC GTC TCC TCA          360
```

Figure 16

HB22-196 VH Sequence

```
 1                                  10                                  20
 E   V   Q   L   Q   E   S   G   P   D   L   V   K   P   G   A   S   V   K   I
GAG GTG CAG CTG CAG GAG TCT GGA CCT GAC CTG GTG AAG CCT GGG GCT TCA GTG AAG ATA   60

 21                                 30                                  40
 S   C   K   A   S   G   Y   S   F   I   G   Y   Y   M   H   W   L   K   Q   S
TCC TGT AAG GCT TCT GGT TAC TCA TTC ATT GGC TAT TAC ATG CAC TGG CTG AAG CAG AGC  120

 41                                 50                                  60
 H   G   K   S   L   E   W   I   G   R   V   N   P   N   T   A   G   L   T   Y
CAT GGA AAG AGC CTT GAG TGG ATT GGA GCT GTT AAT CCT AAC ACT GCT GGT CTT ACC TAC  180

 61                                 70                                  80
 N   Q   R   F   K   D   K   A   I   L   T   V   D   K   S   S   N   T   A   Y
AAC CAG AGG TTC AAG GAC AAG GCC ATA TTA ACT GTA GAC AAG TCA TCC AAC ACA GCC TAT  240

 81                                 90                                  100
 M   E   L   R   S   L   T   S   E   D   S   A   V   Y   Y   C   S   R   V   D
ATG GAG CTC CGC AGC CTG ACA TCT GAG GAC TCT GCG GTC TAT TAC TGT TCA AGA GTG GAC  300

101                                110                                 120
 Y   D   D   Y   G   Y   W   F   F   D   V   W   G   A   G   T   T   V   T   V
TAT GAT GAC TAC GGG TAC TGG TTC TTC GAT GTC TGG GGC GCA GGG ACC ACG GTC ACC GTC  360

121
 S   S
TCC TCA                                                                    366
```

Figure 17

HB22 Hybridoma Antibody V kappa light chain sequences

Antibody	-20	-10	1	10	20 CDR1 ABCDEFG	35	40	50 CDR2	60	70	80	90 CDR3	J Segment	Constant
HB22-5	MESQTQVFVFLLLCVSGAHGSIVMTQTPKFLLVSTGDRVTITCKASQTVT					NDLAWYQQKPGQSPKLLIYYASNRYTGVPDRFTGSGYGTDFTFTINTVQAEDLAVYFCQQDYSSP							LTFGAGTKLELK	RADAAPTV
HB22-7	MESQTQVFVFLLLCVSGAHGSIVMTQTPKFLLVSAGDRITLTCKASQSVT					NDVAWYQQKPGQSPKLLIYYASNRYTGVPDRFTGSGYGTDFTFTISTVQAEDLAVYFCQQDYRSP							WTFGGGTKLEIK	RADAAPTV
HB22-13	MESQTQVFVFLLLCVSGAHGSIVMTQTPKFLLVSAGDRVSITCKASQSVT					NDVTWYQQKPGQSPKLLIYFASNRYTGVPDRFTGSGYGTDFTFTISTVQAEDLAVYFCQQDYSSP							LTFGAGTKLELK	RADAAPTV
HB22-23	MESQTQVFVFLLLCVSGAHGSIVMTQTPKFLLVSAGDRVSITCKASQSVT					NDVTWYQQKPGQSPKLLIYFASNRYTGVPDRFTGSGYGTDFTFTISTVQAEDLAVYFCQQDYSSP							LTFGAGTKLELK	RADAAPTV
HB22-33	MKLPVRLLVLMFWIPASSSDVVMTQTPLSLPVSLGDQASISCRSSQSLVHSNGNTYLHWYLQKPGQSPKLLIYKVSNRFSGVPDRFSGSGSGTDFTLKISRVEAEDLGVYFCSQSTHVP												YTFGGGTKLEIK	RADAAPTV
HB22-196	MESQTQVFISILLWLYGADGNIVMTQSPKSMSMSVGERVTLTCKASENVV					TYVSWYQQKPEQSPKLLIYGASNRYTGVPDRFTGSGSATDFTLTISSVQAEDLADYHCGQGYSYP							YTFGGGTKLEIK	RADAAPTV

Figure 18

HB22-5 Vk Sequence

```
     M   E   S   Q   T   Q   V   F   V   F   L   L   L   C   V   S   G   A   H
AAG ATG GAG TCA CAG ACC CAG GTC TTC GTA TTT CTA CTG CTC TGT GTG TCT GGT GCT CAT      60

 G   S   I   V   M   T   Q   T   P   K   F   L   L   V   S   T   G   D   R   V
GGG AGT ATT GTG ATG ACC CAG ACT CCC AAA TTC CTG CTT GTA TCA ACA GGA GAC AGG GTT     120

 T   I   T   C   K   A   S   Q   T   V   T   N   D   L   A   W   Y   Q   Q   K
ACC ATT ACC TGC AAG GCC AGT CAG ACT GTG ACT AAT GAT TTA GCT TGG TAC CAA CAG AAG     180

 P   G   Q   S   P   K   L   L   I   Y   Y   A   S   N   R   Y   T   G   V   P
CCA GGG CAG TCT CCT AAA CTG CTG ATA TAC TAT GCA TCC AAT CGC TAC ACT GGA GTC CCT     240

 D   R   F   T   G   S   G   Y   G   T   D   F   T   F   T   I   N   T   V   Q
GAT CGC TTC ACT GGC AGT GGA TAT GGG ACG GAC TTC ACT TTC ACC ATC AAC ACT GTG CAG     300

 A   E   D   L   A   V   Y   F   C   Q   Q   D   Y   S   S   P   L   T   F   G
GCT GAA GAC CTG GCA GTT TAT TTC TGT CAG CAG GAT TAT AGC TCT CCT CTC ACG TTC GGT     360

 A   G   T   K   L   E   L   K   R   A   D   A   A   P   T   V
GCT GGG ACC AAG CTG GAA CTG AAA CGG GCT GAT GCT GCA CCA ACT GTA TC                  410
```

Figure 19

HB22-7 Vk Sequence

```
    M   E   S   Q   T   Q   V   F   V   F   L   L   L   C   V   S   G   A   H
AAG ATG GAG TCA CAG ACC CAG GTC TTC GTA TTT CTA CTG CTC TGT GTG TCT GGT GCT CAT      60

 G   S   I   V   M   T   Q   T   P   K   F   L   L   V   S   A   G   D   R   I
GGG AGT ATT GTG ATG ACC CAG ACT CCC AAA TTC CTG CTT GTA TCA GCA GGA GAC AGG ATT     120

 T   L   T   C   K   A   S   Q   S   V   T   N   D   V   A   W   Y   Q   Q   K
ACC TTA ACC TGC AAG GCC AGT CAG AGT GTG ACT AAT GAT GTA GCT TGG TAC CAA CAG AAG     180

 P   G   Q   S   P   K   L   L   I   Y   Y   A   S   N   R   Y   T   G   V   P
CCA GGG CAG TCT CCT AAA CTG CTG ATA TAC TAT GCA TCC AAT CGC TAC ACT GGA GTC CCT     240

 D   R   F   T   G   S   G   Y   G   T   D   F   T   F   T   I   S   T   V   Q
GAT CGC TTC ACT GGC AGT GGA TAT GGG ACG GAT TTC ACT TTC ACC ATC AGC ACT GTG CAG     300

 A   E   D   L   A   V   Y   F   C   Q   Q   D   Y   R   S   P   W   T   F   G
GCT GAA GAC CTG GCA GTT TAT TTC TGT CAG CAG GAT TAT AGG TCT CCG TGG ACG TTC GGT     360

 G   G   T   K   L   E   I   K   R   A   D   A   A   P   T   V
GGA GGC ACC AAG CTG GAA ATC AAA CGG GCT GAT GCT GCA CCA ACT GTA TC                  410
```

Figure 20

HB22-13 Vk Sequence

```
    M   E   S   Q   T   Q   V   F   V   F   L   L   L   C   V   S   G   A   H
AAG ATG GAG TCA CAG ACC CAG GTC TTC GTA TTT CTA CTG CTC TGT GTG TCT GGT GCT CAT      60

  G   S   I   V   M   T   Q   T   P   K   F   L   L   V   S   A   G   D   R   V
GGG AGT ATT GTG ATG ACC CAG ACT CCC AAA TTC CTG CTT GTA TCA GCA GGA GAC AGG GTT     120

  S   I   T   C   K   A   S   Q   S   V   T   N   D   V   T   W   Y   Q   Q   K
TCC ATA ACC TGC AAG GCC AGT CAG AGT GTG ACT AAT GAT GTA ACT TGG TAC CAA CAG AAG     180

  P   G   Q   S   P   K   L   L   I   Y   F   A   S   N   R   Y   T   G   V   P
CCA GGG CAG TCT CCT AAA TTG CTG ATA TAC TTT GCA TCC AAT CGC TAC ACT GGA GTC CCT     240

  D   R   F   T   G   S   G   Y   G   T   D   F   T   F   T   I   S   T   V   Q
GAT CGC TTC ACT GGC AGT GGA TAT GGG ACG GAT TTC ACT TTC ACC ATC AGC ACT GTG CAG     300

  A   E   D   L   A   V   Y   F   C   Q   Q   D   Y   S   S   P   L   T   F   G
GCT GAA GAC CTG GCA GTT TAT TTC TGT CAG CAG GAT TAT AGC TCT CCG CTC ACG TTC GGT     360

  A   G   T   K   L   E   L   K   R   A   D   A   A   P   T   V
GCT GGG ACC AAG CTG GAG CTG AAA CGG GCT GAT GCT GCA CCA ACT GTA TC                  410
```

Figure 21

HB22-23 Vk Sequence

```
    M   E   S   Q   T   Q   V   F   V   F   L   L   L   C   V   S   G   A   H
AAG ATG GAG TCA CAG ACC CAG GTC TTC GTA TTT CTA CTG CTC TGT GTG TCT GGT GCT CAT      50

 G   S   I   V   M   T   Q   T   P   K   F   L   L   V   S   A   G   D   R   V
GGG AGT ATT GTG ATG ACC CAG ACT CCC AAA TTC CTG CTT GTA TCA GCA GGA GAC AGG GTC     100

 T   I   S   C   K   A   S   Q   S   V   S   N   D   V   A   W   Y   Q   Q   K
ACC ATA AGC TGC AAG GCC AGT CAG AGT GTG AGT AAT GAT GTA GCT TGG TAC CAA CAG AAG     150

 P   G   Q   S   P   K   L   L   I   Y   Y   A   S   K   R   Y   T   G   V   P
CCA GGG CAG TCT CCT AAA CTG CTG ATA TAC TAT GCA TCC AAG CGC TAT ACT GGA GTC CCT     200

 D   R   L   T   G   S   G   Y   G   T   D   F   T   F   T   I   S   T   V   Q
GAT CGC CTC ACT GGC AGT GGA TAT GGG ACG GAT TTC ACT TTC ACC ATC AGC ACT GTG CAG     250

 A   E   D   L   A   V   Y   F   C   Q   Q   D   H   S   Y   P   W   T   F   G
GCT GAA GAC CTG GCA GTT TAT TTC TGT CAG CAG GAT CAT AGC TAT CCG TGG ACG TTC GGT     300

 G   G   T   K   L   E   I   K   R   A   D   A   A   P   T   V
GGA GGC ACC AAG CTG GAG ATC AAA CGG GCT GAT GCT GCA CCA ACT GTA TC                  350
```

Figure 22

HB22-33 Vk Sequence

```
 M   K   L   P   V   R   L   L   V   L   M   F   W   I   P   A   S   S   S   D
ATG AAG TTG CCT GTT AGG CTG TTG GTG CTG ATG TTC TGG ATT CCT GCT TCC AGC AGT GAT    60

 V   V   M   T   Q   T   P   L   S   L   P   V   S   L   G   D   Q   A   S   I
GTT GTG ATG ACC CAA ACT CCA CTC TCC CTG CCT GTC AGT CTT GGA GAT CAA GCC TCC ATC   120

 S   C   R   S   S   Q   S   L   V   H   S   N   G   N   T   Y   L   H   W   Y
TCT TGC AGA TCT AGT CAG AGC CTT GTA CAC AGT AAT GGA AAC ACC TAT TTA CAT TGG TAC   180

 L   Q   K   P   G   Q   S   P   K   L   L   I   Y   K   V   S   N   R   F   S
CTG CAG AAG CCA GGC CAG TCT CCA AAG CTC CTG ATC TAC AAA GTT TCC AAC CGA TTT TCT   240

 G   V   P   D   R   F   S   G   S   G   S   G   T   D   F   T   L   K   I   S
GGG GTC CCA GAT AGG TTC AGT GGC AGT GGA TCA GGG ACA GAT TTC ACA CTC AAG ATC AGC   300

 R   V   E   A   E   D   L   G   V   Y   F   C   S   Q   S   T   H   V   P   Y
AGA GTG GAG GCT GAG GAT CTG GGA GTT TAT TTC TGC TCT CAA AGT ACA CAT GTT CCG TAC   360

 T   F   G   G   G   T   K   L   E   I   K   R   A   D   A   A   P   T   V
ACG TTC GGA GGG GGG ACC AAG CTG GAA ATA AAA CGG GCT GAT GCT GCA CCA ACT GTA TC    419
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Figure 23

HB22-196 Vk Sequence

```
     M   E   S   Q   T   Q   V   F   I   S   I   L   L   W   L   Y   G   A   D
AAG ATG GAG TCA CAG ACC CAG GTC TTC ATA TCC ATA CTG CTC TGG TTA TAT GGA GCT GAT      60

 G   N   I   V   M   T   Q   S   P   K   S   M   S   M   S   V   G   E   R   V
GGG AAC ATT GTA ATG ACC CAA TCT CCC AAA TCC ATG TCC ATG TCA GTA GGA GAG AGG GTC     120

 T   L   T   C   K   A   S   E   N   V   V   T   Y   V   S   W   Y   Q   Q   K
ACC TTG ACC TGC AAG GCC AGT GAG AAT GTG GTT ACT TAT GTT TCC TGG TAT CAA CAG AAA     180

 P   E   Q   S   P   K   L   L   I   Y   G   A   S   N   R   Y   T   G   V   P
CCA GAG CAG TCT CCT AAA CTG CTG ATA TAC GGG GCA TCC AAC CGG TAC ACT GGG GTC CCC     240

 D   R   F   T   G   S   G   S   A   T   D   F   T   L   T   I   S   S   V   Q
GAT CGC TTC ACA GGC AGT GGA TCT GCA ACA GAT TTC ACT CTG ACC ATC AGC AGT GTG CAG     300

 A   E   D   L   A   D   Y   H   C   G   Q   G   Y   S   Y   P   Y   T   F   G
GCT GAA GAC CTT GCA GAT TAT CAC TGT GGA CAG GGT TAC AGC TAT CCG TAC ACG TTC GGA     360

 G   G   T   K   L   E   I   K   R   A   D   A   A   P   T   V
GGG GGG ACC AAG CTG GAA ATA AAA CGG GCT GAT GCT GCA CCA ACT GTA TC                  410
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