SEQUENCE LISTING

<110> JCR PHARMACEUTICALS CO., LTD.

<120> ANTI-HUMAN TRANSFERRIN RECEPTOR ANTIBODY PERMEATING BLOOD-BRAIN BARRIER

<130> FP17-0775-00

<150> P2015-144379
<151> 2015-06-24

<160> 279

<170> PatentIn version 3.5

<210> 1
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<212> PRT
<213> Homo sapiens

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Asn Ser His Val Glu Met Lys Leu Ala Val Asp Glu Glu Glu Asn Ala
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Asp Asn Asn Thr Lys Ala Asn Val Thr Lys Pro Lys Arg Cys Ser Gly
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Ser Ile Cys Tyr Gly Thr Ile Ala Val Ile Val Phe Phe Leu Ile Gly
65                  70                  75                  80

Phe Met Ile Gly Tyr Leu Gly Tyr Cys Lys Gly Val Glu Pro Lys Thr
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Glu Cys Glu Arg Leu Ala Gly Thr Glu Ser Pro Val Arg Glu Glu Pro
            100                 105                 110

Gly Glu Asp Phe Pro Ala Ala Arg Arg Leu Tyr Trp Asp Asp Leu Lys
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Arg Lys Leu Ser Glu Lys Leu Asp Ser Thr Asp Phe Thr Gly Thr Ile
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Lys Leu Leu Asn Glu Asn Ser Tyr Val Pro Arg Glu Ala Gly Ser Gln
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Lys Asp Glu Asn Leu Ala Leu Tyr Val Glu Asn Gln Phe Arg Glu Phe
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Lys Leu Ser Lys Val Trp Arg Asp Gln His Phe Val Lys Ile Gln Val
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225                 230                 235                 240

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                245                 250                 255

Val Arg Ala Gly Lys Ile Thr Phe Ala Glu Lys Val Ala Asn Ala Glu
            260                 265                 270

Ser Leu Asn Ala Ile Gly Val Leu Ile Tyr Met Asp Gln Thr Lys Phe
        275                 280                 285

Pro Ile Val Asn Ala Glu Leu Ser Phe Phe Gly His Ala His Leu Gly
    290                 295                 300

Thr Gly Asp Pro Tyr Thr Pro Gly Phe Pro Ser Phe Asn His Thr Gln
305                 310                 315                 320

Phe Pro Pro Ser Arg Ser Ser Gly Leu Pro Asn Ile Pro Val Gln Thr
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Ile Ser Arg Ala Ala Ala Glu Lys Leu Phe Gly Asn Met Glu Gly Asp
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Cys Pro Ser Asp Trp Lys Thr Asp Ser Thr Cys Arg Met Val Thr Ser
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Glu Ser Lys Asn Val Lys Leu Thr Val Ser Asn Val Leu Lys Glu Ile
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Lys Ile Leu Asn Ile Phe Gly Val Ile Lys Gly Phe Val Glu Pro Asp
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His Tyr Val Val Val Gly Ala Gln Arg Asp Ala Trp Gly Pro Gly Ala
                405                 410                 415

Ala Lys Ser Gly Val Gly Thr Ala Leu Leu Leu Lys Leu Ala Gln Met
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Ile Phe Ala Ser Trp Ser Ala Gly Asp Phe Gly Ser Val Gly Ala Thr
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485 490 495

Ser Ala Ser Pro Leu Leu Tyr Thr Leu Ile Glu Lys Thr Met Gln Asn
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Val Lys His Pro Val Thr Gly Gln Phe Leu Tyr Gln Asp Ser Asn Trp
515 520 525

Ala Ser Lys Val Glu Lys Leu Thr Leu Asp Asn Ala Ala Phe Pro Phe
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Thr Asp Tyr Pro Tyr Leu Gly Thr Thr Met Asp Thr Tyr Lys Glu Leu
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Ile Glu Arg Ile Pro Glu Leu Asn Lys Val Ala Arg Ala Ala Ala Glu
580 585 590

Val Ala Gly Gln Phe Val Ile Lys Leu Thr His Asp Val Glu Leu Asn
595 600 605

Leu Asp Tyr Glu Arg Tyr Asn Ser Gln Leu Leu Ser Phe Val Arg Asp
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Leu Asn Gln Tyr Arg Ala Asp Ile Lys Glu Met Gly Leu Ser Leu Gln
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Trp Leu Tyr Ser Ala Arg Gly Asp Phe Phe Arg Ala Thr Ser Arg Leu
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Thr Thr Asp Phe Gly Asn Ala Glu Lys Thr Asp Arg Phe Val Met Lys
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Lys Leu Asn Asp Arg Val Met Arg Val Glu Tyr His Phe Leu Ser Pro
675 680 685

Tyr Val Ser Pro Lys Glu Ser Pro Phe Arg His Val Phe Trp Gly Ser
690 695 700

Gly Ser His Thr Leu Pro Ala Leu Leu Glu Asn Leu Lys Leu Arg Lys
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Gln Asn Asn Gly Ala Phe Asn Glu Thr Leu Phe Arg Asn Gln Leu Ala

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Asn Ser His Val Glu Met Lys Leu Ala Val Asp Asp Glu Glu Asn Ala
35 40 45

Asp Asn Asn Thr Lys Ala Asn Gly Thr Lys Pro Lys Arg Cys Gly Gly
50 55 60

Asn Ile Cys Tyr Gly Thr Ile Ala Val Ile Ile Phe Phe Leu Ile Gly
65 70 75 80

Phe Met Ile Gly Tyr Leu Gly Tyr Cys Lys Gly Val Glu Pro Lys Thr
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Glu Cys Glu Arg Leu Ala Gly Thr Glu Ser Pro Ala Arg Glu Glu Pro
100 105 110

Glu Glu Asp Phe Pro Ala Ala Pro Arg Leu Tyr Trp Asp Asp Leu Lys
115 120 125

Arg Lys Leu Ser Glu Lys Leu Asp Thr Thr Asp Phe Thr Ser Thr Ile
130 135 140

Lys Leu Leu Asn Glu Asn Leu Tyr Val Pro Arg Glu Ala Gly Ser Gln
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Lys Asp Glu Asn Leu Ala Leu Tyr Ile Glu Asn Gln Phe Arg Glu Phe
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Lys Leu Ser Lys Val Trp Arg Asp Gln His Phe Val Lys Ile Gln Val
180 185 190

Lys Asp Ser Ala Gln Asn Ser Val Ile Ile Val Asp Lys Asn Gly Gly
195 200 205

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Leu Val Tyr Leu Val Glu Asn Pro Gly Gly Tyr Val Ala Tyr Ser Lys
    210                 215                 220

Ala Ala Thr Val Thr Gly Lys Leu Val His Ala Asn Phe Gly Thr Lys
225                 230                 235                 240

Lys Asp Phe Glu Asp Leu Asp Ser Pro Val Asn Gly Ser Ile Val Ile
                245                 250                 255

Val Arg Ala Gly Lys Ile Thr Phe Ala Glu Lys Val Ala Asn Ala Glu
            260                 265                 270

Ser Leu Asn Ala Ile Gly Val Leu Ile Tyr Met Asp Gln Thr Lys Phe
        275                 280                 285

Pro Ile Val Lys Ala Asp Leu Ser Phe Phe Gly His Ala His Leu Gly
    290                 295                 300

Thr Gly Asp Pro Tyr Thr Pro Gly Phe Pro Ser Phe Asn His Thr Gln
305                 310                 315                 320

Phe Pro Pro Ser Gln Ser Ser Gly Leu Pro Asn Ile Pro Val Gln Thr
                325                 330                 335

Ile Ser Arg Ala Ala Ala Glu Lys Leu Phe Gly Asn Met Glu Gly Asp
            340                 345                 350

Cys Pro Ser Asp Trp Lys Thr Asp Ser Thr Cys Lys Met Val Thr Ser
        355                 360                 365

Glu Asn Lys Ser Val Lys Leu Thr Val Ser Asn Val Leu Lys Glu Thr
    370                 375                 380

Lys Ile Leu Asn Ile Phe Gly Val Ile Lys Gly Phe Val Glu Pro Asp
385                 390                 395                 400

His Tyr Val Val Val Gly Ala Gln Arg Asp Ala Trp Gly Pro Gly Ala
                405                 410                 415

Ala Lys Ser Ser Val Gly Thr Ala Leu Leu Leu Lys Leu Ala Gln Met
            420                 425                 430

Phe Ser Asp Met Val Leu Lys Asp Gly Phe Gln Pro Ser Arg Ser Ile
        435                 440                 445

Ile Phe Ala Ser Trp Ser Ala Gly Asp Phe Gly Ser Val Gly Ala Thr
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Glu Trp Leu Glu Gly Tyr Leu Ser Ser Leu His Leu Lys Ala Phe Thr
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Tyr Ile Asn Leu Asp Lys Ala Val Leu Gly Thr Ser Asn Phe Lys Val
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Ser Ala Ser Pro Leu Leu Tyr Thr Leu Ile Glu Lys Thr Met Gln Asp
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Val Lys His Pro Val Thr Gly Arg Ser Leu Tyr Gln Asp Ser Asn Trp
        515                 520                 525

Ala Ser Lys Val Glu Lys Leu Thr Leu Asp Asn Ala Ala Phe Pro Phe
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Leu Ala Tyr Ser Gly Ile Pro Ala Val Ser Phe Cys Phe Cys Glu Asp
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Thr Asp Tyr Pro Tyr Leu Gly Thr Thr Met Asp Thr Tyr Lys Glu Leu
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Val Glu Arg Ile Pro Glu Leu Asn Lys Val Ala Arg Ala Ala Ala Glu
            580                 585                 590

Val Ala Gly Gln Phe Val Ile Lys Leu Thr His Asp Thr Glu Leu Asn
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Leu Asp Tyr Glu Arg Tyr Asn Ser Gln Leu Leu Leu Phe Leu Arg Asp
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Leu Asn Gln Tyr Arg Ala Asp Val Lys Glu Met Gly Leu Ser Leu Gln
625                 630                 635                 640

Trp Leu Tyr Ser Ala Arg Gly Asp Phe Phe Arg Ala Thr Ser Arg Leu
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Thr Thr Asp Phe Arg Asn Ala Glu Lys Arg Asp Lys Phe Val Met Lys
            660                 665                 670

Lys Leu Asn Asp Arg Val Met Arg Val Glu Tyr Tyr Phe Leu Ser Pro
        675                 680                 685

Tyr Val Ser Pro Lys Glu Ser Pro Phe Arg His Val Phe Trp Gly Ser
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Gly Ser His Thr Leu Ser Ala Leu Leu Glu Ser Leu Lys Leu Arg Arg
705                 710                 715                 720

Gln Asn Asn Ser Ala Phe Asn Glu Thr Leu Phe Arg Asn Gln Leu Ala
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<210> 6
<211> 6
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<220>
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<211> 11
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<210> 8
<211> 6
<212> PRT
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<220>
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<400> 8

Trp Thr Ser Thr Arg His
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<210> 9
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<220>
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<400> 9

Trp Thr Ser Thr Arg His Thr
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<210> 10
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<212> PRT
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<400> 10

Gln Gln His Tyr Ser Thr Pro Arg Thr
1 5

<210> 11
<211> 6
<212> PRT
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<400> 11

Gln Ser Ile Ser Asn Asn
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<210> 12
<211> 11
<212> PRT
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<220>
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<400> 12

Arg Ala Ser Gln Ser Ile Ser Asn Asn Leu Gln
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<210> 13
<211> 6
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Tyr Ala Ser Gln Ser Ile
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<210> 14
<211> 7
<212> PRT
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Tyr Ala Ser Gln Ser Ile Ser
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<210> 15
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Gln Gln Ser Asn Ser Trp Pro Arg Thr
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<210> 16
<211> 11
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Gln Ser Leu Val His Ser Asn Gly Asn Thr Tyr
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<210> 17
<211> 16
<212> PRT
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<220>
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<210> 18
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<400> 18

Lys Val Ser Asn Arg Phe
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<220>
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Lys Val Ser Asn Arg Phe Ser
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Ser Gln Ser Thr His Val Pro Trp Thr
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Ser Asn Val Asn Tyr
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Ser Ala Ser Ser Asn Val Asn Tyr Met His
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<210> 23
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<220>
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Asp Thr Ser Lys Leu Ala
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<400> 24

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<210> 25
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<220>
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Phe Gln Gly Asn Gly Asn Pro Tyr Thr
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<210> 26
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<210> 27
<211> 10
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<400> 27

Ser Ala Ser Ser Ser Ile Ser Ser Ile His
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<220>
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Asp Thr Ser Thr Leu Ala
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<210> 29
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Asp Thr Ser Thr Leu Ala Ser
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<210> 30
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<212> PRT
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<220>
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<210> 31
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<210> 32
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<220>
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<210> 33
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<220>
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Ala Ala Ser Thr Leu Asp
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<210> 34
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Ser Ser Val Asn Tyr
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<211> 9
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His Gln Trp Ser Ser Tyr Pro Trp Thr
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<211> 5
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Ser Ser Val Ser Leu
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<210> 47
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<220>
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Ser Ala Ser Ser Ser Val Ser Leu Met Phe
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<210> 48
<211> 6

<212> PRT
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Phe Thr Ser Tyr Arg Ala
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<210> 49
<211> 7
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Gln Gln Trp Thr Ser Asp Pro Pro Thr
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Gln Glu Ile Ser Gly Tyr
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<210> 52
<211> 11
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Arg Pro Ser Gln Glu Ile Ser Gly Tyr Leu Ser
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<210> 53
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Ala Ala Ser Thr Leu Asp
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Gln Ser Ile Arg Asn Tyr
1 5

<210> 57
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Arg Ala Ser Gln Ser Ile Arg Asn Tyr Leu His
1 5 10

<210> 58
<211> 6
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<220>
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<400> 58

Tyr Ala Ser Gln Ser Ile
1 5

<210> 59
<211> 7
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<220>
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Tyr Ala Ser Gln Ser Ile Ser
1 5

<210> 60
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<220>
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Gln Gln Thr Asn Ser Trp Pro Tyr Thr
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<210> 61
<211> 6
<212> PRT
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His Asp Val Lys Thr Ala
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<210> 62
<211> 11
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<400> 62

Lys Ala Ser His Asp Val Lys Thr Ala Val Ala
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<210> 63
<211> 6
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Trp Ser Ser Thr Arg His
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<210> 64
<211> 7
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Trp Ser Ser Thr Arg His Thr
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<210> 65
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of CDR 3 in the light chain of mouse anti-hTfR antibody No.12

<400> 65

Gln Gln His Phe Ser Thr Pro Leu Thr
1 5

<210> 66
<211> 6
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 1 of CDR 1 in the light chain of mouse anti-hTfR antibody No.13

<400> 66

Gln Ser Ile Arg Asn Tyr
1 5

<210> 67
<211> 11
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 2 of CDR 1 in the light chain of mouse anti-hTfR antibody No.13

<400> 67

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

<210> 68
<211> 6
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 1 of CDR 2 in the light chain of mouse anti-hTfR antibody No.13

<400> 68

Tyr Ala Ser Gln Ser Ile
1 5

<210> 69
<211> 7
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 2 of CDR 2 in the light chain of mouse anti-hTfR antibody No.13

<400> 69

Tyr Ala Ser Gln Ser Ile Ser
1 5

<210> 70
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of CDR 3 in the light chain of mouse anti-hTfR antibody No.13

<400> 70

Gln Gln Thr Asn Ser Trp Pro Tyr Thr

1 5

<210> 71
<211> 5
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 1 of CDR 1 in the light chain of mouse anti-hTfR antibody No.14

<400> 71

Ser Asn Ile Asn Ser
1 5

<210> 72
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 2 of CDR 1 in the light chain of mouse anti-hTfR antibody No.14

<400> 72

Ser Ala Ser Ser Asn Ile Asn Ser Ile His
1 5 10

<210> 73
<211> 6
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 1 of CDR 2 in the light chain of mouse anti-hTfR antibody No.14

<400> 73

Asp Thr Ser Asn Leu Ala
1 5

<210> 74
<211> 7
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 2 of CDR 2 in the light chain of mouse anti-hTfR antibody No.14

<400> 74

Asp Thr Ser Asn Leu Ala Ser
1 5

<210> 75
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of CDR 3 in the light chain of mouse anti-hTfR antibody No.14

<400> 75

His Gln Arg Ser Gly Tyr Pro Phe Thr
1 5

<210> 76
<211> 5
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 1 of CDR 1 in the heavy chain of mouse anti-hTfR antibody No.1

<400> 76

Asn Tyr Gly Met Ser
1 5

<210> 77
<211> 8
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 2 of CDR 1 in the heavy chain of mouse anti-hTfR antibody No.1

<400> 77

Gly Leu Thr Phe Ser Asn Tyr Gly
1 5

<210> 78
<211> 8
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 1 of CDR 2 in the heavy chain of mouse anti-hTfR antibody No.1

<400> 78

Ile Asn Thr Asn Gly Gly Ser Thr
1 5

<210> 79
<211> 17
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 2 of CDR 2 in the heavy chain of mouse anti-hTfR antibody No.1

<400> 79

Asn Ile Asn Thr Asn Gly Gly Ser Thr Tyr Tyr Pro Asp Ser Val Lys
1 5 10 15

Gly

<210> 80
<211> 7
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 1 of CDR 3 in the heavy chain of mouse anti-hTfR antibody No.1

<400> 80

Asn Arg Tyr Asp Glu Asp Tyr
1 5

<210> 81
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 2 of CDR 3 in the heavy chain of mouse anti-hTfR antibody No.1

<400> 81

Thr Asn Asn Arg Tyr Asp Glu Asp Tyr
1 5

<210> 82
<211> 5
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 1 of CDR 1in the heavy chain of mouse anti-hTfR antibody No.2

<400> 82

Asp Tyr Val Met His
1 5

<210> 83
<211> 8
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 2 of CDR 1 in the heavy chain of mouse anti-hTfR antibody No.2

<400> 83

Gly Tyr Thr Phe Thr Asp Tyr Val
1 5

<210> 84
<211> 8

<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 1 of CDR 2 in the heavy chain of mouse anti-hTfR antibody No.2

<400> 84

Ile Ser Thr Tyr Tyr Gly His Gly
1 5

<210> 85
<211> 17
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 2 of CDR 2 in the heavy chain of mouse anti-hTfR antibody No.2

<400> 85

Val Ile Ser Thr Tyr Tyr Gly His Gly Ser Tyr Asn Gln Arg Phe Lys
1 5 10 15

Gly

<210> 86
<211> 14
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 1 of CDR 3 in the heavy chain of mouse anti-hTfR antibody No.2

<400> 86

Gly Gly Tyr Gly Ser Ser Ser Leu Ala Gly Asn Phe Asp Val
1 5 10

<210> 87
<211> 16
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 2 of CDR 3 in the heavy chain of mouse anti-hTfR antibody No.2

<400> 87

Val Arg Gly Gly Tyr Gly Ser Ser Ser Leu Ala Gly Asn Phe Asp Val
1 5 10 15

<210> 88
<211> 5
<212> PRT
<213> Artificial Sequence

<220>

<223> Amino acid sequence 1 of CDR 1 in the heavy chain of mouse anti-hTfR antibody No.3

<400> 88

Asn Tyr Trp Leu Gly
1 5

<210> 89
<211> 8
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 2 of CDR 1 in the heavy chain of mouse anti-hTfR antibody No.3

<400> 89

Gly Tyr Ser Phe Thr Asn Tyr Trp
1 5

<210> 90
<211> 8
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 1 of CDR 2 in the heavy chain of mouse anti-hTfR antibody No.3

<400> 90

Ile Tyr Pro Gly Gly Asp Tyr Pro
1 5

<210> 91
<211> 17
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 2 of CDR 2 in the heavy chain of mouse anti-hTfR antibody No.3

<400> 91

Asp Ile Tyr Pro Gly Gly Asp Tyr Pro Thr Tyr Ser Glu Lys Phe Lys
1 5 10 15

Val

<210> 92
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 1 of CDR 3 in the heavy chain of mouse anti-hTfR antibody No.3

<400> 92

Ser Gly Asn Tyr Asp Glu Val Ala Tyr
1 5

<210> 93
<211> 11
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 2 of CDR 3 in the heavy chain of mouse anti-hTfR antibody No.3

<400> 93

Ala Arg Ser Gly Asn Tyr Asp Glu Val Ala Tyr
1 5 10

<210> 94
<211> 5
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 1 of CDR 1 in the heavy chain of mouse anti-hTfR antibody No.4

<400> 94

Asn Tyr Leu Ile Glu
1 5

<210> 95
<211> 8
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 2 of CDR 1 in the heavy chain of mouse anti-hTfR antibody No.4

<400> 95

Gly Tyr Ala Phe Thr Asn Tyr Leu
1 5

<210> 96
<211> 8
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 1 of CDR 2 in the heavy chain of mouse anti-hTfR antibody No.4

<400> 96

Ile Asn Pro Gly Ser Gly Gly Ile
1 5

<210> 97
<211> 16
<212> PRT

<213> Artificial Sequence

<220>
<223> Amino acid sequence 2 of CDR 2 in the heavy chain of mouse anti-hTfR antibody No.4

<400> 97

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

<210> 98
<211> 13
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 1 of CDR 3 in the heavy chain of mouse anti-hTfR antibody No.4

<400> 98

Ser Asn Tyr Tyr Gly Thr Thr Tyr Trp His Phe Asp Val
1 5 10

<210> 99
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 2 of CDR 3 in the heavy chain of mouse anti-hTfR antibody No.4

<400> 99

Ala Arg Ser Asn Tyr Tyr Gly Thr Thr Tyr Trp His Phe Asp Val
1 5 10 15

<210> 100
<211> 5
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 1 of CDR 1 in the heavy chain of mouse anti-hTfR antibody No.5

<400> 100

Asn Phe Val Ile His
1 5

<210> 101
<211> 8
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 2 of CDR 1 in the heavy chain of mouse anti-hTfR antibody No.5

<400> 101

Gly Tyr Thr Phe Thr Asn Phe Val
1 5

<210> 102
<211> 8
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 1 of CDR 2 in the heavy chain of mouse anti-hTfR antibody No.5

<400> 102

Phe Asn Pro His Lys Asn Gly Ala
1 5

<210> 103
<211> 16
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 2 of CDR 2 in the heavy chain of mouse anti-hTfR antibody No.5

<400> 103

Phe Asn Pro His Lys Asn Gly Ala Glu Tyr Asn Glu Lys Phe Gln Val
1 5 10 15

<210> 104
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 1 of CDR 3 in the heavy chain of mouse anti-hTfR antibody No.5

<400> 104

Ser Phe Tyr Tyr Tyr Ser Met Asp Tyr
1 5

<210> 105
<211> 11
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 2 of CDR 3 in the heavy chain of mouse anti-hTfR antibody No.5

<400> 105

Ala Arg Ser Phe Tyr Tyr Tyr Ser Met Asp Tyr
1 5 10

<210> 106
<211> 5
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 1 of CDR 1 in the heavy chain of mouse anti-hTfR antibody No.6

<400> 106

Thr Tyr Gly Val Tyr
1 5

<210> 107
<211> 8
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 2 of CDR 1 in the heavy chain of mouse anti-hTfR antibody No.6

<400> 107

Gly Phe Ser Leu Ser Thr Tyr Gly
1 5

<210> 108
<211> 7
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of CDR 2 in the heavy chain of mouse anti-hTfR antibody No.6

<400> 108

Ile Trp Gly Asp Gly Ser Thr
1 5

<210> 109
<211> 4
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 1 of CDR 3 in the heavy chain of mouse anti-hTfR antibody No.6

<400> 109

Pro Asp Asp Val
1

<210> 110
<211> 6
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 2 of CDR 3 in the heavy chain of mouse anti-hTfR antibody No.6

<400> 110

Ala Lys Pro Asp Asp Val

1 5

<210> 111
<211> 5
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 1 of CDR 1 in the heavy chain of mouse anti-hTfR antibody No.7

<400> 111

Asn Tyr Phe Met Ser
1 5

<210> 112
<211> 8
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 2 of CDR 1 in the heavy chain of mouse anti-hTfR antibody No.7

<400> 112

Gly Ile Thr Phe Arg Asn Tyr Phe
1 5

<210> 113
<211> 8
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 1 of CDR 2 in the heavy chain of mouse anti-hTfR antibody No.7

<400> 113

Ile Ser Ser Ala Gly Gly Tyr Thr
1 5

<210> 114
<211> 16
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 2 of CDR 2 in the heavy chain of mouse anti-hTfR antibody No.7

<400> 114

Ile Ser Ser Ala Gly Gly Tyr Thr Tyr Tyr Ala Asp Ser Val Lys Gly
1 5 10 15

<210> 115
<211> 11
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 1 of CDR 3 in the heavy chain of mouse anti-hTfR antibody No.7

<400> 115

Gln Glu Val Pro Tyr Pro Tyr Ala Met Asp Tyr
1 5 10

<210> 116
<211> 13
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 2 of CDR 3 in the heavy chain of mouse anti-hTfR antibody No.7

<400> 116

Ala Arg Gln Glu Val Pro Tyr Pro Tyr Ala Met Asp Tyr
1 5 10

<210> 117
<211> 5
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 1 of CDR 1 in the heavy chain of mouse anti-hTfR antibody No.8

<400> 117

Thr Tyr Gly Val Ser
1 5

<210> 118
<211> 8
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 2 of CDR 1 in the heavy chain of mouse anti-hTfR antibody No.8

<400> 118

Gly Phe Ser Leu Thr Thr Tyr Gly
1 5

<210> 119
<211> 7
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of CDR 2 in the heavy chain of mouse anti-hTfR antibody No.8

<400> 119

Ile Trp Gly Asp Gly Ser Thr
1 5

<210> 120
<211> 4
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 1 of CDR 3 in the heavy chain of mouse anti-hTfR antibody No.8

<400> 120

Pro Asp Asp Tyr
1

<210> 121
<211> 6
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 2 of CDR 3 in the heavy chain of mouse anti-hTfR antibody No.8

<400> 121

Ala Lys Pro Asp Asp Tyr
1 5

<210> 122
<211> 5
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 1 of CDR 1 in the heavy chain of mouse anti-hTfR antibody No.9

<400> 122

Asn Tyr Gly Val Ser
1 5

<210> 123
<211> 8
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 2 of CDR 1 in the heavy chain of mouse anti-hTfR antibody No.9

<400> 123

Gly Tyr Thr Phe Thr Asn Tyr Gly
1 5

<210> 124
<211> 8
<212> PRT
<213> Artificial Sequence

<220>

<223> Amino acid sequence 1 of CDR 2 in the heavy chain of mouse anti-hTfR antibody No.9

<400> 124

Ile Tyr Thr Phe Thr Gly Glu Ala
1 5

<210> 125
<211> 16
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 2 of CDR 2 in the heavy chain of mouse anti-hTfR antibody No.9

<400> 125

Ile Tyr Thr Phe Thr Gly Glu Ala Thr Tyr Ile Asp Asp Phe Arg Gly
1 5 10 15

<210> 126
<211> 8
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 1 of CDR 3 in the heavy chain of mouse anti-hTfR antibody No.9

<400> 126

Arg Asn Gly Ala Trp Phe Glu Asp
1 5

<210> 127
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 2 of CDR 3 in the heavy chain of mouse anti-hTfR antibody No.9

<400> 127

Ser Arg Arg Asn Gly Ala Trp Phe Glu Asp
1 5 10

<210> 128
<211> 5
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 1 of CDR 1 in the heavy chain of mouse anti-hTfR antibody No.10

<400> 128

Asn Tyr Ala Met Ser
1 5

<210> 129
<211> 8
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 2 of CDR 1 in the heavy chain of mouse anti-hTfR antibody No.10

<400> 129

Gly Ile Thr Phe Arg Asn Tyr Ala
1 5

<210> 130
<211> 8
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 1 of CDR 2 in the heavy chain of mouse anti-hTfR antibody No.10

<400> 130

Ile Ser Ser Tyr Gly Gly Tyr Thr
1 5

<210> 131
<211> 16
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 2 of CDR 2 in the heavy chain of mouse anti-hTfR antibody No.10

<400> 131

Ile Ser Ser Tyr Gly Gly Tyr Thr Tyr Tyr Ala Asp Ser Val Lys Gly
1 5 10 15

<210> 132
<211> 11
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 1 of CDR 3 in the heavy chain of mouse anti-hTfR antibody No.10

<400> 132

Gln Glu Val Pro Tyr Pro Tyr Pro Met Asp Asn
1 5 10

<210> 133
<211> 13
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 2 of CDR 3 in the heavy chain of mouse

anti-hTfR antibody No.10

<400> 133

Ala Arg Gln Glu Val Pro Tyr Pro Tyr Pro Met Asp Asn
1 5 10

<210> 134
<211> 5
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 1 of CDR 1 in the heavy chain of mouse anti-hTfR antibody No.11

<400> 134

Ile Tyr Trp Ile Asn
1 5

<210> 135
<211> 8
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 2 of CDR 1 in the heavy chain of mouse anti-hTfR antibody No.11

<400> 135

Gly Tyr Ala Phe Ser Ile Tyr Trp
1 5

<210> 136
<211> 8
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 1 of CDR 2 in the heavy chain of mouse anti-hTfR antibody No.11

<400> 136

Ile Tyr Pro Gly Asn Gly Asp Thr
1 5

<210> 137
<211> 16
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 2 of CDR 2 in the heavy chain of mouse anti-hTfR antibody No.11

<400> 137

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

<210> 138
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 1 of CDR 3 in the heavy chain of mouse anti-hTfR antibody No.11

<400> 138

Trp Gly Asp Asp Tyr Ala Met Asp Phe
1 5

<210> 139
<211> 11
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 2 of CDR 3 in the heavy chain of mouse anti-hTfR antibody No.11

<400> 139

Gly Arg Trp Gly Asp Asp Tyr Ala Met Asp Phe
1 5 10

<210> 140
<211> 5
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 1 of CDR 1 in the heavy chain of mouse anti-hTfR antibody No.12

<400> 140

Asn Tyr Leu Ile Glu
1 5

<210> 141
<211> 8
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 2 of CDR 1 in the heavy chain of mouse anti-hTfR antibody No.12

<400> 141

Gly Tyr Val Phe Ile Asn Tyr Leu
1 5

<210> 142
<211> 8
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 1 of CDR 2 in the heavy chain of mouse anti-hTfR antibody No.12

<400> 142

Ile His Ser Gly Ser Gly Gly Thr
1 5

<210> 143
<211> 16
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 2 of CDR 2 in the heavy chain of mouse anti-hTfR antibody No.12

<400> 143

Ile His Ser Gly Ser Gly Gly Thr Asn Tyr Asn Asp Asn Phe Lys Asp
1 5 10 15

<210> 144
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 1 of CDR 3 in the heavy chain of mouse anti-hTfR antibody No.12

<400> 144

Arg Asn Phe Gly Asn Tyr Tyr Phe Asp Tyr
1 5 10

<210> 145
<211> 12
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 2 of CDR 3 in the heavy chain of mouse anti-hTfR antibody No.12

<400> 145

Ala Arg Arg Asn Phe Gly Asn Tyr Tyr Phe Asp Tyr
1 5 10

<210> 146
<211> 5
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 1 of CDR 1 in the heavy chain of mouse anti-hTfR antibody No.13

<400> 146

Ile Tyr Trp Ile Asn
1 5

<210> 147

<211> 8
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 2 of CDR 1 in the heavy chain of mouse anti-hTfR antibody No.13

<400> 147

Gly Tyr Ala Phe Ser Ile Tyr Trp
1 5

<210> 148
<211> 8
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 1 of CDR 2 in the heavy chain of mouse anti-hTfR antibody No.13

<400> 148

Ile Tyr Pro Gly Asn Gly Asp Thr
1 5

<210> 149
<211> 16
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 2 of CDR 2 in the heavy chain of mouse anti-hTfR antibody No.13

<400> 149

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

<210> 150
<211> 9
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 1 of CDR 3 in the heavy chain of mouse anti-hTfR antibody No.13

<400> 150

Trp Gly Asp Asp Tyr Ala Met Asp Phe
1 5

<210> 151
<211> 11
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 2 of CDR 3 in the heavy chain of mouse anti-hTfR antibody No.13

<400> 151

Gly Arg Trp Gly Asp Asp Tyr Ala Met Asp Phe
1 5 10

<210> 152
<211> 5
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 1 of CDR 1 in the heavy chain of mouse anti-hTfR antibody No.14

<400> 152

Gly Tyr Val Ile His
1 5

<210> 153
<211> 8
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 2 of CDR 1 in the heavy chain of mouse anti-hTfR antibody No.14

<400> 153

Gly Tyr Ala Phe Thr Gly Tyr Val
1 5

<210> 154
<211> 8
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 1 of CDR 2 in the heavy chain of mouse anti-hTfR antibody No.14

<400> 154

Leu Asn Pro His Lys Asp Asp Ser
1 5

<210> 155
<211> 16
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 2 of CDR 2 in the heavy chain of mouse anti-hTfR antibody No.14

<400> 155

Leu Asn Pro His Lys Asp Asp Ser Glu Tyr Asn Glu Lys Phe Arg Gly
1 5 10 15

<210> 156
<211> 9

<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 1 of CDR 3 in the heavy chain of mouse anti-hTfR antibody No.14

<400> 156

Gly Tyr Tyr Tyr Tyr Ser Met Asp Tyr
1 5

<210> 157
<211> 11
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 2 of CDR 3 in the heavy chain of mouse anti-hTfR antibody No.14

<400> 157

Ala Arg Gly Tyr Tyr Tyr Tyr Ser Met Asp Tyr
1 5 10

<210> 158
<211> 107
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 1 of the variable region of light chain of humanized anti-hTfR antibody No.1

<400> 158

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

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

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

Tyr Trp Thr Ser Thr Arg His Thr Gly Val Pro Asp Arg Phe Ser Gly
50 55 60

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

Glu Asp Val Ala Val Tyr Tyr Cys Gln Gln His Tyr Ser Thr Pro Arg
85 90 95

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

<210> 159

<211> 107
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 2 of the variable region of light chain of humanized anti-hTfR antibody No.1

<400> 159

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


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


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


Tyr Trp Thr Ser Thr Arg His Thr Gly Val Pro Ser Arg Phe Ser Gly
    50                  55                  60


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


Glu Asp Phe Ala Thr Tyr Tyr Cys Gln Gln His Tyr Ser Thr Pro Arg
                85                  90                  95


Thr Phe Gly Gly Gly Thr Lys Val Glu Ile Lys
            100                 105
```

<210> 160
<211> 107
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 3 of the variable region of light chain of humanized anti-hTfR antibody No.1

<400> 160

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


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


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


Tyr Trp Thr Ser Thr Arg His Thr Gly Val Pro Ser Arg Phe Ser Gly
    50                  55                  60


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

Glu Asp Phe Ala Thr Tyr Tyr Cys Gln Gln His Tyr Ser Thr Pro Arg
85 90 95

Thr Phe Gly Gly Gly Thr Lys Val Glu Ile Lys
100 105

<210> 161
<211> 107
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 4 of the variable region of light chain of humanized anti-hTfR antibody No.1

<400> 161

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

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

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

Tyr Trp Thr Ser Thr Arg His Thr Gly Val Pro Ser Arg Phe Ser Gly
50 55 60

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

Glu Asp Phe Ala Thr Tyr Tyr Cys Gln Gln His Tyr Ser Thr Pro Arg
85 90 95

Thr Phe Gly Gly Gly Thr Lys Val Glu Ile Lys
100 105

<210> 162
<211> 107
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 5 of the variable region of light chain of humanized anti-hTfR antibody No.1

<400> 162

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

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

Val Ala Trp Tyr Gln Gln Lys Pro Gly Lys Ala Pro Lys Leu Leu Ile

35 40 45

Tyr Trp Thr Ser Thr Arg His Thr Gly Val Pro Ser Arg Phe Ser Gly
50 55 60

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

Glu Asp Phe Ala Thr Tyr Tyr Cys Gln Gln His Tyr Ser Thr Pro Arg
85 90 95

Thr Phe Gly Gln Gly Thr Lys Val Glu Ile Lys
100 105

<210> 163
<211> 107
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 6 of the variable region of light chain of humanized anti-hTfR antibody No.1

<400> 163

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

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

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

Tyr Trp Thr Ser Thr Arg His Thr Gly Val Pro Ser Arg Phe Ser Gly
50 55 60

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

Glu Asp Phe Ala Thr Tyr Tyr Cys Gln Gln His Tyr Ser Thr Pro Arg
85 90 95

Thr Phe Gly Gln Gly Thr Lys Val Glu Ile Lys
100 105

<210> 164
<211> 214
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of the light chain of humanized anti-hTfR antibody No.1 containing amino acid sequence 6 as the variable region

<400> 164

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

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

Val Ala Trp Phe Gln Gln Lys Pro Gly Lys Ala Pro Lys Leu Leu Ile
35 40 45

Tyr Trp Thr Ser Thr Arg His Thr Gly Val Pro Asp Arg Phe Ser Gly
50 55 60

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

Glu Asp Phe Ala Thr Tyr Tyr Cys Gln Gln His Tyr Ser Thr Pro Arg
85 90 95

Thr Phe Gly Gly Gly Thr Lys Val Glu Ile Lys Arg Thr Val Ala Ala
100 105 110

Pro Ser Val Phe Ile Phe Pro Pro Ser Asp Glu Gln Leu Lys Ser Gly
115 120 125

Thr Ala Ser Val Val Cys Leu Leu Asn Asn Phe Tyr Pro Arg Glu Ala
130 135 140

Lys Val Gln Trp Lys Val Asp Asn Ala Leu Gln Ser Gly Asn Ser Gln
145 150 155 160

Glu Ser Val Thr Glu Gln Asp Ser Lys Asp Ser Thr Tyr Ser Leu Ser
165 170 175

Ser Thr Leu Thr Leu Ser Lys Ala Asp Tyr Glu Lys His Lys Val Tyr
180 185 190

Ala Cys Glu Val Thr His Gln Gly Leu Ser Ser Pro Val Thr Lys Ser
195 200 205

Phe Asn Arg Gly Glu Cys
210

<210> 165
<211> 725
<212> DNA
<213> Artificial Sequence

<220>
<223> Nucleotide sequence encoding the amino acid sequence of the light chain of humanized anti-hTfR antibody No.1 containing amino acid sequence 6 as the variable region, synthetic sequence

<400> 165
acgcgtgccg ccaccatggg ctggagctgg attctgctgt tcctcctgag cgtgacagca 60

ggagtgcaca gcgacatcca ggtcacacag tcaccaagtt ttctgagcgc aagcgtgggc 120

gacagggtca ctatcacatg caaggcaagc caggacgtga actccgcagt ggcctggttc 180

cagcagaagc cagggaaagc acccaagctg ctgatctatt ggacctctac aaggcacacc 240

ggtgtcccag atcggttctc aggttccggc agcggaacag tgtatactct gaccatttcc 300

agcctgcagc ctgaagactt cgctacttac tattgccagc agcattactc caccccaaga 360

acatttggcg gagggactaa agtggagatc aagaggaccg tggccgctcc ctccgtcttc 420

atttttcccc ctagcgacga acagctgaag agtggcacag cctcagtggt ctgtctgctg 480

aacaatttct accctaggga ggctaaagtg cagtggaagg tcgataacgc actgcagtct 540

ggaaatagtc aggagtcagt gacagaacag gactccaaag atagcactta ttctctgtct 600

agtacactga ctctgagcaa ggccgattac gaaaagcaca aagtgtatgc ttgcgaagtc 660

acccatcagg ggctgtcatc accagtcacc aagtcattca atagaggcga gtgctaagcg 720

gccgc 725

<210> 166
<211> 116
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 1 of the variable region of the heavy chain of humanized anti-hTfR antibody No.1

<400> 166

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

Ser Leu Arg Leu Ser Cys Ala Ala Ser Gly Phe Thr Phe Ser Asn Tyr
20 25 30

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

Ser Asn Ile Asn Thr Asn Gly Gly Ser Thr Tyr Tyr Pro Asp Ser Val
50 55 60

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

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

Ala Lys Asn Arg Tyr Asp Glu Asp Tyr Trp Gly Gln Gly Thr Leu Val
100 105 110

Thr Val Ser Ser

115

<210> 167
<211> 116
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 2 of the variable region of the heavy chain of humanized anti-hTfR antibody No.1

<400> 167

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 Ala Ala Ser Gly Phe Thr Phe Ser Asn Tyr
20 25 30

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

Ser Asn Ile Asn Thr Asn Gly Gly Ser Thr Tyr Tyr Pro Asp Ser Val
50 55 60

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

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

Ala Lys Asn Arg Tyr Asp Glu Asp Tyr Trp Gly Gln Gly Thr Leu Val
100 105 110

Thr Val Ser Ser
115

<210> 168
<211> 116
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 3 of the variable region of the heavy chain of humanized anti-hTfR antibody No.1

<400> 168

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 Ser Ala Ser Gly Phe Thr Phe Ser Asn Tyr
20 25 30

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

Ser Asn Ile Asn Thr Asn Gly Gly Ser Thr Tyr Tyr Pro Asp Ser Val
50 55 60

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

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

Val Lys Asn Arg Tyr Asp Glu Asp Tyr Trp Gly Gln Gly Thr Leu Val
100 105 110

Thr Val Ser Ser
115

<210> 169
<211> 116
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 4 of the variable region of the heavy chain of humanized anti-hTfR antibody No.1

<400> 169

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 Ala Ala Ser Gly Phe Thr Phe Ser Asn Tyr
20 25 30

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

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

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

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

Ala Arg Asn Arg Tyr Asp Glu Asp Tyr Trp Gly Gln Gly Thr Leu Val
100 105 110

Thr Val Ser Ser
115

<210> 170
<211> 116
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 5 of the variable region of the heavy chain of humanized anti-hTfR antibody No.1

<400> 170

```
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 Ala Ala Ser Gly Phe Thr Phe Ser Asn Tyr
            20                  25                  30

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

Ser Asn Ile Asn Thr Asn Gly Gly Ser Thr Tyr Tyr Pro Asp Ser Val
    50                  55                  60

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

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

Ala Arg Asn Arg Tyr Asp Glu Asp Tyr Trp Gly Gln Gly Thr Leu Val
            100                 105                 110

Thr Val Ser Ser
        115
```

<210> 171
<211> 116
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 6 of the variable region of the heavy chain of humanized anti-hTfR antibody No.1

<400> 171

```
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 Ala Ala Ser Gly Leu Thr Phe Ser Asn Tyr
            20                  25                  30

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

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

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

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


Thr Asn Asn Arg Tyr Asp Glu Asp Tyr Trp Gly Gln Gly Thr Leu Val
            100                 105                 110


Thr Val Ser Ser
        115


<210>  172
<211>  446
<212>  PRT
<213>  Artificial Sequence

<220>
<223>  Amino acid sequence of the heavy chain of humanized anti-hTfR
       antibody No.1 containing amino acid sequence 6 as the variable
       region

<400>  172

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 Ala Ala Ser Gly Leu Thr Phe Ser Asn Tyr
            20                  25                  30


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


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


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


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


Thr Asn Asn Arg Tyr Asp Glu Asp Tyr Trp Gly Gln Gly Thr Leu Val
            100                 105                 110


Thr Val Ser Ser Ala Ser Thr Lys Gly Pro Ser Val Phe Pro Leu Ala
        115                 120                 125


Pro Ser Ser Lys Ser Thr Ser Gly Gly Thr Ala Ala Leu Gly Cys Leu
    130                 135                 140


Val Lys Asp Tyr Phe Pro Glu Pro Val Thr Val Ser Trp Asn Ser Gly
145                 150                 155                 160


Ala Leu Thr Ser Gly Val His Thr Phe Pro Ala Val Leu Gln Ser Ser
                165                 170                 175
```

```
Gly Leu Tyr Ser Leu Ser Ser Val Val Thr Val Pro Ser Ser Ser Leu
            180                 185                 190

Gly Thr Gln Thr Tyr Ile Cys Asn Val Asn His Lys Pro Ser Asn Thr
        195                 200                 205

Lys Val Asp Lys Lys Val Glu Pro Lys Ser Cys Asp Lys Thr His Thr
    210                 215                 220

Cys Pro Pro Cys Pro Ala Pro Glu Leu Leu Gly Gly Pro Ser Val Phe
225                 230                 235                 240

Leu Phe Pro Pro Lys Pro Lys Asp Thr Leu Met Ile Ser Arg Thr Pro
                245                 250                 255

Glu Val Thr Cys Val Val Val Asp Val Ser His Glu Asp Pro Glu Val
            260                 265                 270

Lys Phe Asn Trp Tyr Val Asp Gly Val Glu Val His Asn Ala Lys Thr
        275                 280                 285

Lys Pro Arg Glu Glu Gln Tyr Asn Ser Thr Tyr Arg Val Val Ser Val
    290                 295                 300

Leu Thr Val Leu His Gln Asp Trp Leu Asn Gly Lys Glu Tyr Lys Cys
305                 310                 315                 320

Lys Val Ser Asn Lys Ala Leu Pro Ala Pro Ile Glu Lys Thr Ile Ser
                325                 330                 335

Lys Ala Lys Gly Gln Pro Arg Glu Pro Gln Val Tyr Thr Leu Pro Pro
            340                 345                 350

Ser Arg Asp Glu Leu Thr Lys Asn Gln Val Ser Leu Thr Cys Leu Val
        355                 360                 365

Lys Gly Phe Tyr Pro Ser Asp Ile Ala Val Glu Trp Glu Ser Asn Gly
    370                 375                 380

Gln Pro Glu Asn Asn Tyr Lys Thr Thr Pro Pro Val Leu Asp Ser Asp
385                 390                 395                 400

Gly Ser Phe Phe Leu Tyr Ser Lys Leu Thr Val Asp Lys Ser Arg Trp
                405                 410                 415

Gln Gln Gly Asn Val Phe Ser Cys Ser Val Met His Glu Ala Leu His
            420                 425                 430

Asn His Tyr Thr Gln Lys Ser Leu Ser Leu Ser Pro Gly Lys
        435                 440                 445
```

<210> 173
<211> 1421
<212> DNA
<213> Artificial Sequence

<220>
<223> Nucleotide sequence encoding the amino acid sequence of the heavy chain of humanized anti-hTfR antibody No.1 containing amino acid sequence 6 as the variable region, synthetic sequence

<400> 173
acgcgtgccg ccaccatggg ctggagctgg attctgctgt tcctcctgag cgtgacagca 60

ggagtgcaca gcgaagtgca gctggtcgaa tcaggggggg ggctggtgca gcctggaggc 120

agcctgagac tgtcctgcgc cgcttctggc ttgaccttta gcaactacgg gatgtcctgg 180

gtgcggcagg ctcctggcaa gggactggag ttggtggcca acatcaatac caacggcgga 240

agtacatact atcccgattc agtgaagggc cggttcacca tcagcaggga caacgccaag 300

aacagcctgt atctgcagat gaactctctg agggccgagg atacagccgt gtactattgc 360

actaacaacc ggtacgacga ggactattgg ggccagggca ccctggtgac agtgtctagc 420

gcctctacca agggcccaag cgtgtttcct ctggctccat cctctaaatc cacctctggc 480

ggcacagccg ctctgggctg tctggtgaag gattacttcc cagagcccgt gacagtgtct 540

tggaacagcg gcgccctgac ctccggcgtg cacacatttc ctgctgtgct gcagagctcc 600

ggcctgtaca gcctgtctag cgtggtgacc gtgccatcct ctagcctggg cacccagaca 660

tatatctgca acgtgaatca caagcccagc aatacaaagg tggataagaa ggtggagcca 720

aagtcctgtg acaagaccca cacatgcccc ccttgtcctg ctccagagct gctgggagga 780

ccaagcgtgt tcctgtttcc acccaagccc aaggataccc tgatgatctc tcggacccca 840

gaggtgacat gcgtggtggt ggatgtgagc cacgaggacc ccgaggtgaa gttcaactgg 900

tatgtggacg gcgtggaggt gcacaatgct aagaccaagc ccagggagga gcagtacaac 960

tccacctata gagtggtgtc tgtgctgaca gtgctgcacc aggattggct gaacggcaag 1020

gagtataagt gcaaggtgtc caataaggcc ctgcccgctc ctatcgagaa gaccatctct 1080

aaggccaagg gccagcccag agagcctcag gtgtacacac tgcctccatc ccgggatgag 1140

ctgaccaaga accaggtgtc tctgacatgt ctggtcaagg gcttctatcc ctctgacatc 1200

gccgtggagt gggagagcaa tggccagcct gagaacaatt acaagaccac acccccctgtg 1260

ctggattccg acggctcttt ctttctgtat agcaagctga ccgtggacaa gtcccggtgg 1320

cagcagggca acgtgttcag ctgttccgtg atgcacgaag ctctgcataa tcactatact 1380

cagaaatccc tgtcactgtc acctggtaaa taagcggccg c 1421

<210> 174
<211> 107
<212> PRT
<213> Artificial Sequence

<220>

<223> Amino acid sequence 1 of the variable region of the light chain of humanized anti-hTfR antibody No.2

<400> 174

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

Glu Arg Ala Thr Leu Ser Cys Arg Ala Ser Gln Ser Ile Ser Asn Asn
            20                  25                  30

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

Tyr Tyr Ala Ser Gln Ser Ile Ser Gly Ile Pro Ala Arg Phe Ser Gly
    50                  55                  60

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

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

Thr Phe Gly Gln Gly Thr Lys Val Asp Ile Lys
            100                 105
```

<210> 175
<211> 107
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 2 of the variable region of the light chain of humanized anti-hTfR antibody No.2

<400> 175

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

Glu Arg Ala Thr Leu Ser Cys Arg Ala Ser Gln Ser Ile Ser Asn Asn
            20                  25                  30

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

Tyr Tyr Ala Ser Gln Ser Ile Ser Gly Ile Pro Ala Arg Phe Ser Gly
    50                  55                  60

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

Glu Asp Phe Ala Val Tyr Tyr Cys Gln Gln Ser Asn Ser Trp Pro Arg
                85                  90                  95
```

Thr Phe Gly Gly Gly Thr Lys Val Glu Ile Lys
100 105

<210> 176
<211> 107
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 3 of the variable region of the light chain of humanized anti-hTfR antibody No.2

<400> 176

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

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

Leu Gln Trp Tyr Gln Gln Lys Pro Asp Gln Ser Pro Lys Leu Leu Ile
35 40 45

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

Ser Gly Ser Gly Thr Asp Phe Thr Leu Thr Ile Asn Ser Leu Glu Ala
65 70 75 80

Glu Asp Ala Ala Thr Tyr Tyr Cys Gln Gln Ser Asn Ser Trp Pro Arg
85 90 95

Thr Phe Gly Gln Gly Thr Lys Val Glu Ile Lys
100 105

<210> 177
<211> 107
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 4 of the variable region of the light chain of humanized anti-hTfR antibody No.2

<400> 177

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

Glu Arg Ala Thr Leu Ser Cys Arg Ala Ser Gln Ser Ile Ser Asn Asn
20 25 30

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

Tyr Tyr Ala Ser Gln Ser Ile Ser Gly Ile Pro Ala Arg Phe Ser Gly
50 55 60

```
Ser Gly Ser Gly Thr Asp Phe Thr Leu Thr Ile Ser Ser Leu Glu Pro
65                  70                  75                  80


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


Thr Phe Gly Gln Gly Thr Lys Val Glu Ile Lys
            100                 105


<210>  178
<211>  107
<212>  PRT
<213>  Artificial Sequence

<220>
<223>  Amino acid sequence 5 of the variable region of the light chain
       of humanized anti-hTfR antibody No.2

<400>  178

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


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


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


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


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


Glu Asp Phe Ala Thr Tyr Tyr Cys Gln Gln Ser Asn Ser Trp Pro Arg
                85                  90                  95


Thr Phe Gly Gly Gly Thr Lys Val Glu Ile Lys
            100                 105


<210>  179
<211>  107
<212>  PRT
<213>  Artificial Sequence

<220>
<223>  Amino acid sequence 6 of the variable region of the light chain
       of humanized anti-hTfR antibody No.2

<400>  179

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

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

Leu Gln Trp Tyr Gln Gln Lys Pro Asp Gln Ser Pro Lys Leu Leu Ile
        35                  40                  45

Lys Tyr Ala Ser Gln Ser Ile Ser Gly Ile Pro Ser Arg Phe Ser Gly
    50                  55                  60

Ser Gly Ser Gly Thr Asp Phe Thr Leu Thr Ile Asn Ser Leu Glu Ala
65                  70                  75                  80

Glu Asp Ala Ala Thr Tyr Leu Cys Gln Gln Ser Asn Ser Trp Pro Arg
                85                  90                  95

Thr Phe Gly Gln Gly Thr Lys Val Glu Ile Lys
            100                 105
```

<210> 180
<211> 214
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of the light chain of humanized anti-hTfR antibody No.2 containing amino acid sequence 6 as the variable region

<400> 180

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

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

Leu Gln Trp Tyr Gln Gln Lys Pro Asp Gln Ser Pro Lys Leu Leu Ile
        35                  40                  45

Lys Tyr Ala Ser Gln Ser Ile Ser Gly Ile Pro Ser Arg Phe Ser Gly
    50                  55                  60

Ser Gly Ser Gly Thr Asp Phe Thr Leu Thr Ile Asn Ser Leu Glu Ala
65                  70                  75                  80

Glu Asp Ala Ala Thr Tyr Leu Cys Gln Gln Ser Asn Ser Trp Pro Arg
                85                  90                  95

Thr Phe Gly Gln Gly Thr Lys Val Glu Ile Lys Arg Thr Val Ala Ala
            100                 105                 110

Pro Ser Val Phe Ile Phe Pro Pro Ser Asp Glu Gln Leu Lys Ser Gly
        115                 120                 125
```

Thr Ala Ser Val Val Cys Leu Leu Asn Asn Phe Tyr Pro Arg Glu Ala
130 135 140

Lys Val Gln Trp Lys Val Asp Asn Ala Leu Gln Ser Gly Asn Ser Gln
145 150 155 160

Glu Ser Val Thr Glu Gln Asp Ser Lys Asp Ser Thr Tyr Ser Leu Ser
165 170 175

Ser Thr Leu Thr Leu Ser Lys Ala Asp Tyr Glu Lys His Lys Val Tyr
180 185 190

Ala Cys Glu Val Thr His Gln Gly Leu Ser Ser Pro Val Thr Lys Ser
195 200 205

Phe Asn Arg Gly Glu Cys
210

<210> 181
<211> 725
<212> DNA
<213> Artificial Sequence

<220>
<223> Nucleotide sequence encoding the amino acid sequence of the light chain of humanized anti-hTfR antibody No.2 containing amino acid sequence 6 as the variable region, synthetic sequence

<400> 181
acgcgtgccg ccaccatggg ctggagctgg attctgctgt tcctcctgag cgtgacagca 60

ggagtgcaca gcgaaattgt gctgacccag tctcccgatt tccagtccgt gacccccaag 120

gagaaagtca ccatcacatg cagagcatca cagtccatta gcaacaatct gcagtggtac 180

cagcagaagc cagaccagag ccccaagctg ctgatcaaat atgcctctca gagtatttca 240

ggcatacctt ctaggttctc cggtagcggc tctggaaccg actttactct gaccatcaac 300

agtctggagg ctgaagatgc cgctacatac ttgtgccagc agagtaattc atggcctagg 360

acctttggcc aggggacaaa ggtggagatc aaaaggactg tggcagcccc aagtgtcttc 420

atttttcccc cttcagacga acagctgaag agcggcacag catctgtggt ctgtctgctg 480

aacaatttct acccacggga ggctaaggtg cagtggaaag tcgataacgc actgcagtcc 540

ggaaatagcc aggagtctgt gactgaacag gacagtaagg attcaaccta ttccctgtcc 600

agcacactga ctctgagcaa agccgattac gagaagcaca aagtgtatgc ttgcgaagtc 660

acacatcagg ggctgtctag tcccgtgact aagtctttta ataggggtga atgttaagcg 720

gccgc 725

<210> 182
<211> 120
<212> PRT
<213> Artificial Sequence

<220>

<223> Amino acid sequence 1 of the variable region of the heavy chain of humanized anti-hTfR antibody No.2

<400> 182

```
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

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

Gly Val Ile Ser Thr Tyr Tyr Gly His Gly Ser Tyr Asn Gln Arg Phe
    50                  55                  60

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

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

Ala Arg Gly Gly Tyr Gly Ser Ser Ser Leu Ala Gly Asn Phe Asp Val
            100                 105                 110

Trp Gly Gln Gly Thr Leu Val Thr
        115                 120
```

<210> 183
<211> 120
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 2 of the variable region of the heavy chain of humanized anti-hTfR antibody No.2

<400> 183

```
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

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

Gly Val Ile Ser Thr Tyr Tyr Gly His Gly Ser Tyr Asn Gln Arg Phe
    50                  55                  60

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

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

Ala Arg Gly Gly Tyr Gly Ser Ser Ser Leu Ala Gly Asn Phe Asp Val
100 105 110

Trp Gly Gln Gly Thr Leu Val Thr
115 120

<210> 184
<211> 120
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 3 of the variable region of the heavy chain of humanized anti-hTfR antibody No.2

<400> 184

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

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

Gly Val Ile Ser Thr Tyr Tyr Gly His Gly Ser Tyr Asn Gln Arg Phe
50 55 60

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

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

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

Trp Gly Gln Gly Thr Leu Val Thr
115 120

<210> 185
<211> 120
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 4 of the variable region of the heavy chain of humanized anti-hTfR antibody No.2

<400> 185

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

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

Gly Val Ile Ser Thr Tyr Tyr Gly His Gly Ser Tyr Asn Gln Arg Phe
    50                  55                  60

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

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

Ala Arg Gly Gly Tyr Gly Ser Ser Ser Leu Ala Gly Asn Phe Asp Val
            100                 105                 110

Trp Gly Gln Gly Thr Thr Val Thr
        115                 120


<210>  186
<211>  120
<212>  PRT
<213>  Artificial Sequence

<220>
<223>  Amino acid sequence 5 of the variable region of the heavy chain
       of humanized anti-hTfR antibody No.2

<400>  186

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

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

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

Gly Val Ile Ser Thr Tyr Tyr Gly His Gly Ser Tyr Asn Gln Arg Phe
    50                  55                  60

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

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

Ala Arg Gly Gly Tyr Gly Ser Ser Ser Leu Ala Gly Asn Phe Asp Val
            100                 105                 110
```

Trp Gly Gln Gly Thr Val Val Thr
115 120

<210> 187
<211> 120
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 6 of the variable region of the heavy chain of humanized anti-hTfR antibody No.2

<400> 187

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

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

Gly Val Ile Ser Thr Tyr Tyr Gly His Gly Ser Tyr Asn Gln Arg Phe
50 55 60

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

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

Val Arg Gly Gly Tyr Gly Ser Ser Ser Leu Ala Gly Asn Phe Asp Val
100 105 110

Trp Gly Gln Gly Thr Thr Val Thr
115 120

<210> 188
<211> 453
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of the heavy chain of humanized anti-hTfR antibody No.2 containing amino acid sequence 6 as the variable region

<400> 188

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

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

Gly Val Ile Ser Thr Tyr Tyr Gly His Gly Ser Tyr Asn Gln Arg Phe
    50                  55                  60

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

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

Val Arg Gly Gly Tyr Gly Ser Ser Ser Leu Ala Gly Asn Phe Asp Val
            100                 105                 110

Trp Gly Gln Gly Thr Thr Val Thr Val Ser Ser Ala Ser Thr Lys Gly
        115                 120                 125

Pro Ser Val Phe Pro Leu Ala Pro Ser Ser Lys Ser Thr Ser Gly Gly
    130                 135                 140

Thr Ala Ala Leu Gly Cys Leu Val Lys Asp Tyr Phe Pro Glu Pro Val
145                 150                 155                 160

Thr Val Ser Trp Asn Ser Gly Ala Leu Thr Ser Gly Val His Thr Phe
                165                 170                 175

Pro Ala Val Leu Gln Ser Ser Gly Leu Tyr Ser Leu Ser Ser Val Val
            180                 185                 190

Thr Val Pro Ser Ser Ser Leu Gly Thr Gln Thr Tyr Ile Cys Asn Val
        195                 200                 205

Asn His Lys Pro Ser Asn Thr Lys Val Asp Lys Lys Val Glu Pro Lys
    210                 215                 220

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

Leu Gly Gly Pro Ser Val Phe Leu Phe Pro Pro Lys Pro Lys Asp Thr
                245                 250                 255

Leu Met Ile Ser Arg Thr Pro Glu Val Thr Cys Val Val Val Asp Val
            260                 265                 270

Ser His Glu Asp Pro Glu Val Lys Phe Asn Trp Tyr Val Asp Gly Val
        275                 280                 285

Glu Val His Asn Ala Lys Thr Lys Pro Arg Glu Glu Gln Tyr Asn Ser
    290                 295                 300
```

Thr Tyr Arg Val Val Ser Val Leu Thr Val Leu His Gln Asp Trp Leu
305 310 315 320

Asn Gly Lys Glu Tyr Lys Cys Lys Val Ser Asn Lys Ala Leu Pro Ala
325 330 335

Pro Ile Glu Lys Thr Ile Ser Lys Ala Lys Gly Gln Pro Arg Glu Pro
340 345 350

Gln Val Tyr Thr Leu Pro Pro Ser Arg Asp Glu Leu Thr Lys Asn Gln
355 360 365

Val Ser Leu Thr Cys Leu Val Lys Gly Phe Tyr Pro Ser Asp Ile Ala
370 375 380

Val Glu Trp Glu Ser Asn Gly Gln Pro Glu Asn Asn Tyr Lys Thr Thr
385 390 395 400

Pro Pro Val Leu Asp Ser Asp Gly Ser Phe Phe Leu Tyr Ser Lys Leu
405 410 415

Thr Val Asp Lys Ser Arg Trp Gln Gln Gly Asn Val Phe Ser Cys Ser
420 425 430

Val Met His Glu Ala Leu His Asn His Tyr Thr Gln Lys Ser Leu Ser
435 440 445

Leu Ser Pro Gly Lys
450

<210> 189
<211> 1442
<212> DNA
<213> Artificial Sequence

<220>
<223> Nucleotide sequence encoding the amino acid sequence of the heavy chain of humanized anti-hTfR antibody No.2 containing amino acid sequence 6 as the variable region, synthetic sequence

<400> 189
acgcgtgccg ccaccatggg ctggagctgg attctgctgt tcctcctgag cgtgacagca 60

ggagtgcaca gccaggtgca gctggtccag tcaggagccg aagtgaaaaa gcccggagcc 120

tcagtcaaag tgtcttgtaa agcatcaggt tatacattta cagactacgt catgcactgg 180

gtgaggcagg cacctggaca gggtctggaa tggatcggcg tgatctccac ttactatggc 240

catggaagct acaaccagag attcaagggc agggcgacaa tgactgtaga caaatcaatt 300

tccactgctt atatggagct ggtaaggctg cggtccgacg ataccgctgt gtactattgc 360

gtacgaggag gatacggctc cagctctctg gctggtaatt tcgatgtgtg ggggcagggt 420

accacagtca ccgtgagttc agcaagcaca aagggcccat ctgtgtttcc actggccccc 480

tccagcaaaa gcacctctgg gggtacagcc gctctgggat gtctggtgaa ggattatttc 540

ccagagccag tcaccgtgtc ctggaacagc ggagccctga catctggagt ccacactttt 600

ccagctgtgc tgcagtctag tgggctgtac tccctgtcat ccgtggtcac tgtccccagc 660

tctagtctgg gtacccagac atatatctgc aacgtgaatc acaagccatc taataccaaa 720

gtcgacaaga aagtggaacc caagtcctgt gataaaactc atacctgccc cccttgtcct 780

gcaccagagc tgctgggagg accatccgtg ttcctgtttc cacccaagcc taaagacacc 840

ctgatgatta gccgaactcc cgaagtcacc tgcgtggtcg tggacgtgtc tcacgaggac 900

cctgaagtca agtttaactg gtacgtggat ggcgtcgagg tgcataatgc taagacaaaa 960

ccccgagagg aacagtacaa cagtacatat cgtgtcgtgt cagtgctgac cgtcctgcat 1020

caggactggc tgaacgggaa ggaatataag tgcaaagtgt ccaataaggc actgcccgcc 1080

cctatcgaga aaaccattag caaggccaaa ggacagccta gggaaccaca ggtgtacaca 1140

ctgcctccat cccgggacga gctgactaag aaccaggtca gcctgacctg tctggtgaaa 1200

ggcttctatc cttcagatat cgctgtggag tgggaaagta atggacagcc agagaacaat 1260

tacaagacta ccccccctgt gctggactct gatgggagtt tctttctgta ttctaagctg 1320

accgtggata aaagtcggtg gcagcagggt aatgtcttta gttgttcagt gatgcacgaa 1380

gcactgcaca accactacac ccagaaatca ctgtcactgt caccagggaa ataagcggcc 1440

gc 1442

<210> 190
<211> 112
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 1 of the variable region of the light chain of humanized anti-hTfR antibody No.3

<400> 190

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

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

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

Pro Arg Arg 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 Ser
85 90 95

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

<210> 191
<211> 112
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 2 of the variable region of the light chain of humanized anti-hTfR antibody No.3

<400> 191

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

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

Asn Gly 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 Ser
85 90 95

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

<210> 192
<211> 112
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 3 of the variable region of the light chain of humanized anti-hTfR antibody No.3

<400> 192

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

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

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

Pro Arg Leu Leu Ile Tyr Lys Val Ser Asn Arg Phe Ser Gly Val Pro

50 55 60

Asp Arg Phe Ser Gly Ser Gly Ala 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 Ser
85 90 95

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

<210> 193
<211> 112
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 4 of the variable region of the light chain of humanized anti-hTfR antibody No.3

<400> 193

Asp Ile 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 Gly 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 Ser
85 90 95

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

<210> 194
<211> 112
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 5 of the variable region of the light chain of humanized anti-hTfR antibody No.3

<400> 194

Asp Ile Val Met Thr Gln Thr 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 Gly 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 Ser
                85                  90                  95

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

<210> 195
<211> 112
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 6 of the variable region of the light chain of humanized anti-hTfR antibody No.3

<400> 195

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

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

Asn Gly 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 Phe Phe Cys Ser Gln Ser
                85                  90                  95

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

<210> 196
<211> 219
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of the light chain of humanized anti-hTfR antibody No.3 containing amino acid sequence 2 as the variable region

<400> 196

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

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

Asn Gly 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 Ser
                85                  90                  95

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

Arg Thr Val Ala Ala Pro Ser Val Phe Ile Phe Pro Pro Ser Asp Glu
        115                 120                 125

Gln Leu Lys Ser Gly Thr Ala Ser Val Val Cys Leu Leu Asn Asn Phe
    130                 135                 140

Tyr Pro Arg Glu Ala Lys Val Gln Trp Lys Val Asp Asn Ala Leu Gln
145                 150                 155                 160

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

Thr Tyr Ser Leu Ser Ser Thr Leu Thr Leu Ser Lys Ala Asp Tyr Glu
            180                 185                 190

Lys His Lys Val Tyr Ala Cys Glu Val Thr His Gln Gly Leu Ser Ser
        195                 200                 205

Pro Val Thr Lys Ser Phe Asn Arg Gly Glu Cys
    210                 215
```

<210> 197
<211> 740
<212> DNA
<213> Artificial Sequence

<220>
<223> Nucleotide sequence encoding the amino acid sequence of the light chain of humanized anti-hTfR antibody No.3 containing amino acid sequence 2 as the variable region, synthetic sequence

<400> 197
acgcgtgccg ccaccatggg ctggagctgg attctgctgt tcctcctgag cgtgacagca 60

ggagtgcaca gcgacatcgt gatgacccag actcccctga gcctgagcgt gacacctggc 120

cagcctgcca gcatcagctg cagaagctct cagagcctgg tgcacagcaa cggcaacacc 180

tacctgcact ggtatctgca gaagcccggc cagagccctc agctgctgat ctacaaggtg 240

tccaacagat tcagcggcgt gcccgacaga ttctccggca gcggctctgg caccgacttc 300

accctgaaga tttccagagt ggaagccgag gacgtgggcg tgtactactg cagccagagc 360

acccacgtgc cctggacatt cggccagggc accaaggtgg aaatcaagag aaccgtggcc 420

gctcccagcg tgttcatctt cccacctagc gacgagcagc tgaagtccgg cacagcctct 480

gtcgtgtgcc tgctgaacaa cttctacccc cgcgaggcca aggtgcagtg gaaggtggac 540

aacgccctgc agagcggcaa cagccaggaa agcgtgaccg agcaggactc caaggacagc 600

acctacagcc tgagcagcac cctgaccctg agcaaggccg actacgagaa gcacaaggtg 660

tacgcctgcg aagtgaccca ccagggcctg tctagccccg tgaccaagag cttcaacaga 720

ggcgagtgct aagcggccgc 740

<210> 198
<211> 219
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of the light chain of humanized anti-hTfR antibody No.3 containing amino acid sequence 4 as the variable region

<400> 198

Asp Ile 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 Gly 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 Ser
85 90 95

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

Arg Thr Val Ala Ala Pro Ser Val Phe Ile Phe Pro Pro Ser Asp Glu
115 120 125

Gln Leu Lys Ser Gly Thr Ala Ser Val Val Cys Leu Leu Asn Asn Phe
130 135 140

Tyr Pro Arg Glu Ala Lys Val Gln Trp Lys Val Asp Asn Ala Leu Gln
145 150 155 160

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

Thr Tyr Ser Leu Ser Ser Thr Leu Thr Leu Ser Lys Ala Asp Tyr Glu
180 185 190

Lys His Lys Val Tyr Ala Cys Glu Val Thr His Gln Gly Leu Ser Ser
195 200 205

Pro Val Thr Lys Ser Phe Asn Arg Gly Glu Cys
210 215

<210> 199
<211> 740
<212> DNA
<213> Artificial Sequence

<220>
<223> Nucleotide sequence encoding the amino acid sequence of the light chain of humanized anti-hTfR antibody No.3 containing amino acid sequence 4 as the variable region, synthetic sequence

<400> 199
acgcgtgccg ccaccatggg ctggagctgg attctgctgt tcctcctgag cgtgacagca 60

ggagtgcaca gcgacatcgt gatgacccag agccccctga gcctgcctgt gacacctggc 120

gagcctgcca gcatcagctg cagatctagc cagagcctgg tgcacagcaa cggcaacacc 180

tacctgcact ggtatctgca gaagcccggc cagagccctc agctgctgat ctacaaggtg 240

tccaacagat tcagcggcgt gcccgacaga ttctccggca gcggctctgg caccgacttc 300

accctgaaga tctccagagt ggaagccgag gacgtgggcg tgtactactg cagccagagc 360

acccacgtgc cctggacatt cggccagggc accaaggtgg aaatcaagag aaccgtggcc 420

gctcccagcg tgttcatctt cccacctagc gacgagcagc tgaagtccgg cacagcctct 480

gtcgtgtgcc tgctgaacaa cttctacccc cgcgaggcca aggtgcagtg gaaggtggac 540

aacgccctgc agagcggcaa cagccaggaa agcgtgaccg agcaggactc caaggacagc 600

acctacagcc tgagcagcac cctgaccctg agcaaggccg actacgagaa gcacaaggtg 660

tacgcctgcg aagtgaccca ccagggcctg tctagccccg tgaccaagag cttcaacaga 720

ggcgagtgct aagcggccgc 740

<210> 200
<211> 219
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of the light chain of humanized anti-hTfR antibody No.3 containing amino acid sequence 5 as the variable region

<400> 200

Asp Ile Val Met Thr Gln Thr 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 Gly 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 Ser
85 90 95

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

Arg Thr Val Ala Ala Pro Ser Val Phe Ile Phe Pro Pro Ser Asp Glu
115 120 125

Gln Leu Lys Ser Gly Thr Ala Ser Val Val Cys Leu Leu Asn Asn Phe
130 135 140

Tyr Pro Arg Glu Ala Lys Val Gln Trp Lys Val Asp Asn Ala Leu Gln
145 150 155 160

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

Thr Tyr Ser Leu Ser Ser Thr Leu Thr Leu Ser Lys Ala Asp Tyr Glu
180 185 190

Lys His Lys Val Tyr Ala Cys Glu Val Thr His Gln Gly Leu Ser Ser
195 200 205

Pro Val Thr Lys Ser Phe Asn Arg Gly Glu Cys
210 215

<210> 201
<211> 740
<212> DNA
<213> Artificial Sequence

<220>
<223> Nucleotide sequence encoding the amino acid sequence of the light chain of humanized anti-hTfR antibody No.3 containing amino acid sequence 5 as the variable region, synthetic sequence

<400> 201
acgcgtgccg ccaccatggg ctggagctgg attctgctgt tcctcctgag cgtgacagca 60

ggagtgcaca gcgacatcgt gatgacccag acacccctga gcctgcctgt gacacctggc 120

gagcctgcca gcatcagctg cagatctagc cagagcctgg tgcacagcaa cggcaacacc 180

tacctgcact ggtatctgca gaagcccggc cagagccctc agctgctgat ctacaaggtg 240

tccaacagat tcagcggcgt gcccgacaga ttctccggca gcggctctgg caccgacttc 300

accctgaaga tctccagagt ggaagccgag gacgtgggcg tgtactactg cagccagagc 360

acccacgtgc cctggacatt cggccagggc accaggctgg aaatcaagag aaccgtggcc 420

gctcccagcg tgttcatctt cccacctagc gacgagcagc tgaagtccgg cacagcctct 480

gtcgtgtgcc tgctgaacaa cttctacccc cgcgaggcca aggtgcagtg gaaggtggac 540

aacgccctgc agagcggcaa cagccaggaa agcgtgaccg agcaggactc caaggacagc 600

acctacagcc tgagcagcac cctgaccctg agcaaggccg actacgagaa gcacaaggtg 660

tacgcctgcg aagtgaccca ccagggcctg tctagccccg tgaccaagag cttcaacaga 720

ggcgagtgct aagcggccgc 740

<210> 202
<211> 219
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of the light chain of humanized anti-hTfR antibody No.3 containing amino acid sequence 6 as the variable region

<400> 202

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

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

Asn Gly 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 Phe Phe Cys Ser Gln Ser
                85                  90                  95

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

Arg Thr Val Ala Ala Pro Ser Val Phe Ile Phe Pro Pro Ser Asp Glu
        115                 120                 125

Gln Leu Lys Ser Gly Thr Ala Ser Val Val Cys Leu Leu Asn Asn Phe
    130                 135                 140

Tyr Pro Arg Glu Ala Lys Val Gln Trp Lys Val Asp Asn Ala Leu Gln
145                 150                 155                 160

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

Thr Tyr Ser Leu Ser Ser Thr Leu Thr Leu Ser Lys Ala Asp Tyr Glu
            180                 185                 190

Lys His Lys Val Tyr Ala Cys Glu Val Thr His Gln Gly Leu Ser Ser
        195                 200                 205

Pro Val Thr Lys Ser Phe Asn Arg Gly Glu Cys
    210                 215
```

<210> 203
<211> 740
<212> DNA
<213> Artificial Sequence

<220>
<223> Nucleotide sequence encoding the amino acid sequence of the light chain of humanized anti-hTfR antibody No.3 containing amino acid sequence 6 as the variable region, synthetic sequence

<400> 203

```
acgcgtgccg ccaccatggg ctggagctgg attctgctgt tcctcctgag cgtgacagca       60

ggagtgcaca gcgacatcgt gatgacccag actcccctga gcctgagcgt gacacctggc      120

cagcctgcca gcatcagctg cagatccagc cagagcctgg tgcacagcaa cggcaacacc      180

tacctgcact ggtatctgca gaagcccggc cagagccctc agctgctgat ctacaaggtg      240

tccaacagat tcagcggcgt gcccgacaga ttctccggca gcggctctgg caccgacttc      300

accctgaaga tttccagagt ggaagccgag gacgtgggcg tgttcttctg cagccagagc      360

acccacgtgc cctggacatt cggccagggc accaaggtgg aaatcaagag aaccgtggcc      420

gctcccagcg tgttcatctt cccacctagc gacgagcagc tgaagtccgg cacagcctct      480
```

gtcgtgtgcc tgctgaacaa cttctacccc cgcgaggcca aggtgcagtg gaaggtggac 540

aacgccctgc agagcggcaa cagccaggaa agcgtgaccg agcaggactc caaggacagc 600

acctacagcc tgagcagcac cctgaccctg agcaaggccg actacgagaa gcacaaggtg 660

tacgcctgcg aagtgaccca ccagggcctg tctagccccg tgaccaagag cttcaacaga 720

ggcgagtgct aagcggccgc 740

<210> 204
<211> 118
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 1 of the variable region of the heavy chain of humanized anti-hTfR antibody No.3

<400> 204

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 Asn Tyr
20 25 30

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

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

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

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

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

Leu Val Thr Val Ser Ser
115

<210> 205
<211> 118
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 2 of the variable region of the heavy chain of humanized anti-hTfR antibody No.3

<400> 205

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

Ser Leu Lys Ile Ser Cys Lys Gly Ser Gly Tyr Ser Phe Thr Asn Tyr
20 25 30

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

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

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

Leu Gln Trp Ser Ser Leu Lys Ala Ser Asp Thr Ala Met Tyr Tyr Cys
85 90 95

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

Leu Val Thr Val Ser Ser
115

<210> 206
<211> 118
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 3 of the variable region of the heavy chain of humanized anti-hTfR antibody No.3

<400> 206

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 Asn Tyr
20 25 30

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

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

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

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

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

Thr Val Thr Val Ser Ser
115

<210> 207
<211> 118
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 4 of the variable region of the heavy chain of humanized anti-hTfR antibody No.3

<400> 207

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 Asn Tyr
20 25 30

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

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

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

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

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

Leu Val Thr Val Ser Ser
115

<210> 208
<211> 118
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 5 of the variable region of the heavy chain of humanized anti-hTfR antibody No.3

<400> 208

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

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

Trp Leu Gly Trp Val Arg Gln Ala Pro Gly Gln Gly Leu Glu Trp Met

35 40 45

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

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

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

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

Val Val Thr Val Ser Ser
115

<210> 209
<211> 118
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 6 of the variable region of the heavy chain of humanized anti-hTfR antibody No.3

<400> 209

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

Ser Leu Lys Ile Ser Cys Lys Gly Ser Gly Tyr Ser Phe Met Asn Tyr
20 25 30

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

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

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

Leu Gln Leu Ser Ser Leu Lys Ala Ser Asp Thr Ala Met Tyr Phe Cys
85 90 95

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

Leu Val Thr Val Ser Ser
115

<210> 210
<211> 448

<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of the heavy chain of humanized anti-hTfR antibody No.3 containing amino acid sequence 2 as the variable region

<400> 210

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

Ser Leu Lys Ile Ser Cys Lys Gly Ser Gly Tyr Ser Phe Thr Asn Tyr
            20                  25                  30

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

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

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

Leu Gln Trp Ser Ser Leu Lys Ala Ser Asp Thr Ala Met Tyr Tyr Cys
                85                  90                  95

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

Leu Val Thr Val Ser Ser Ala Ser Thr Lys Gly Pro Ser Val Phe Pro
        115                 120                 125

Leu Ala Pro Ser Ser Lys Ser Thr Ser Gly Gly Thr Ala Ala Leu Gly
    130                 135                 140

Cys Leu Val Lys Asp Tyr Phe Pro Glu Pro Val Thr Val Ser Trp Asn
145                 150                 155                 160

Ser Gly Ala Leu Thr Ser Gly Val His Thr Phe Pro Ala Val Leu Gln
                165                 170                 175

Ser Ser Gly Leu Tyr Ser Leu Ser Ser Val Val Thr Val Pro Ser Ser
            180                 185                 190

Ser Leu Gly Thr Gln Thr Tyr Ile Cys Asn Val Asn His Lys Pro Ser
        195                 200                 205

Asn Thr Lys Val Asp Lys Lys Val Glu Pro Lys Ser Cys Asp Lys Thr
    210                 215                 220

His Thr Cys Pro Pro Cys Pro Ala Pro Glu Leu Leu Gly Gly Pro Ser
225                 230                 235                 240
```

Val Phe Leu Phe Pro Pro Lys Pro Lys Asp Thr Leu Met Ile Ser Arg
245 250 255

Thr Pro Glu Val Thr Cys Val Val Val Asp Val Ser His Glu Asp Pro
260 265 270

Glu Val Lys Phe Asn Trp Tyr Val Asp Gly Val Glu Val His Asn Ala
275 280 285

Lys Thr Lys Pro Arg Glu Glu Gln Tyr Asn Ser Thr Tyr Arg Val Val
290 295 300

Ser Val Leu Thr Val Leu His Gln Asp Trp Leu Asn Gly Lys Glu Tyr
305 310 315 320

Lys Cys Lys Val Ser Asn Lys Ala Leu Pro Ala Pro Ile Glu Lys Thr
325 330 335

Ile Ser Lys Ala Lys Gly Gln Pro Arg Glu Pro Gln Val Tyr Thr Leu
340 345 350

Pro Pro Ser Arg Asp Glu Leu Thr Lys Asn Gln Val Ser Leu Thr Cys
355 360 365

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

Asn Gly Gln Pro Glu Asn Asn Tyr Lys Thr Thr Pro Pro Val Leu Asp
385 390 395 400

Ser Asp Gly Ser Phe Phe Leu Tyr Ser Lys Leu Thr Val Asp Lys Ser
405 410 415

Arg Trp Gln Gln Gly Asn Val Phe Ser Cys Ser Val Met His Glu Ala
420 425 430

Leu His Asn His Tyr Thr Gln Lys Ser Leu Ser Leu Ser Pro Gly Lys
435 440 445

<210> 211
<211> 1427
<212> DNA
<213> Artificial Sequence

<220>
<223> Nucleotide sequence encoding the amino acid sequence of the heavy chain of humanized anti-hTfR antibody No.3 containing amino acid sequence 2 as the variable region, synthetic sequence

<400> 211
acgcgtgccg ccaccatggg ctggagctgg attctgctgt tcctcctgag cgtgacagca 60

ggagtgcaca gcgaggtgca actagtgcag tctggagcag aggtgaaaaa gcccggggag 120

tctctgaaga tttcctgtaa gggttctgga tacagcttta ccaactactg gctgggatgg 180

gtgcgccaga tgcccgggaa aggcctggag tggatggggg acatctaccc cggcggagac 240

taccctacat acagcgagaa gttcaaggtc caggtcacca tctcagccga caagtccatc 300

agcaccgcct acctgcagtg gagcagcctg aaggcctcgg acaccgccat gtattactgt 360

gcgagatcag gcaattacga cgaagtggcc tactggggcc aaggaaccct ggtcaccgtc 420

tcctcagcta gcaccaaggg cccatcggtc ttcccctgg caccctcctc caagagcacc 480

tctgggggca cagcggccct gggctgcctg gtcaaggact acttccccga accggtgacg 540

gtgtcgtgga actcaggcgc cctgaccagc ggcgtgcaca ccttcccggc tgtcctacag 600

tcctcaggac tctactccct cagcagcgtg gtgaccgtgc cctccagcag cttgggcacc 660

cagacctaca tctgcaacgt gaatcacaag cccagcaaca ccaaggtgga caagaaagtt 720

gagcccaaat cttgtgacaa aactcacacg tgcccaccgt gcccagcacc tgaactcctg 780

ggaggtccgt cagtcttcct cttcccccca aaacccaagg acaccctcat gatctcccgg 840

acccctgagg tcacatgcgt ggtggtggac gtgagccacg aagaccctga ggtcaagttc 900

aactggtacg tggacggcgt ggaggtgcat aatgccaaga caaagccgcg ggaggagcag 960

tacaacagca cgtaccgggt ggtcagcgtc ctcaccgtcc tgcaccagga ctggctgaat 1020

ggcaaggagt acaagtgcaa ggtctccaac aaagccctcc cagccccat cgagaaaacc 1080

atctccaaag ccaaagggca gccccgagaa ccacaggtgt acaccctgcc cccatcccgg 1140

gatgagctga ccaagaacca ggtcagcctg acctgcctgg tcaaaggctt ctatcccagc 1200

gacatcgccg tggagtggga gagcaatggg cagccggaga acaactacaa gaccacgcct 1260

cccgtgctgg actccgacgg ctccttcttc ctctacagca agctcaccgt ggacaagagc 1320

aggtggcagc aggggaacgt cttctcatgc tccgtgatgc atgaggctct gcacaaccac 1380

tacacgcaga agagcctctc cctgtctccg ggtaaataag cggccgc 1427

<210> 212
<211> 445
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of the heavy chain (IgG4) of humanized anti-hTfR antibody No.3 containing amino acid sequence 2 as the variable region

<400> 212

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

Ser Leu Lys Ile Ser Cys Lys Gly Ser Gly Tyr Ser Phe Thr Asn Tyr
20 25 30

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

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

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

Leu Gln Trp Ser Ser Leu Lys Ala Ser Asp Thr Ala Met Tyr Tyr Cys
                85                  90                  95

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

Leu Val Thr Val Ser Ser Ala Ser Thr Lys Gly Pro Ser Val Phe Pro
        115                 120                 125

Leu Ala Pro Cys Ser Arg Ser Thr Ser Glu Ser Thr Ala Ala Leu Gly
    130                 135                 140

Cys Leu Val Lys Asp Tyr Phe Pro Glu Pro Val Thr Val Ser Trp Asn
145                 150                 155                 160

Ser Gly Ala Leu Thr Ser Gly Val His Thr Phe Pro Ala Val Leu Gln
                165                 170                 175

Ser Ser Gly Leu Tyr Ser Leu Ser Ser Val Val Thr Val Pro Ser Ser
            180                 185                 190

Ser Leu Gly Thr Lys Thr Tyr Thr Cys Asn Val Asp His Lys Pro Ser
        195                 200                 205

Asn Thr Lys Val Asp Lys Arg Val Glu Ser Lys Tyr Gly Pro Pro Cys
    210                 215                 220

Pro Pro Cys Pro Ala Pro Glu Phe Leu Gly Gly Pro Ser Val Phe Leu
225                 230                 235                 240

Phe Pro Pro Lys Pro Lys Asp Thr Leu Met Ile Ser Arg Thr Pro Glu
                245                 250                 255

Val Thr Cys Val Val Val Asp Val Ser Gln Glu Asp Pro Glu Val Gln
            260                 265                 270

Phe Asn Trp Tyr Val Asp Gly Val Glu Val His Asn Ala Lys Thr Lys
        275                 280                 285

Pro Arg Glu Glu Gln Phe Asn Ser Thr Tyr Arg Val Val Ser Val Leu
    290                 295                 300

Thr Val Leu His Gln Asp Trp Leu Asn Gly Lys Glu Tyr Lys Cys Lys
305                 310                 315                 320
```

Val Ser Asn Lys Gly Leu Pro Ser Ser Ile Glu Lys Thr Ile Ser Lys
325 330 335

Ala Lys Gly Gln Pro Arg Glu Pro Gln Val Tyr Thr Leu Pro Pro Ser
340 345 350

Gln Glu Glu Met Thr Lys Asn Gln Val Ser Leu Thr Cys Leu Val Lys
355 360 365

Gly Phe Tyr Pro Ser Asp Ile Ala Val Glu Trp Glu Ser Asn Gly Gln
370 375 380

Pro Glu Asn Asn Tyr Lys Thr Thr Pro Pro Val Leu Asp Ser Asp Gly
385 390 395 400

Ser Phe Phe Leu Tyr Ser Arg Leu Thr Val Asp Lys Ser Arg Trp Gln
405 410 415

Glu Gly Asn Val Phe Ser Cys Ser Val Met His Glu Ala Leu His Asn
420 425 430

His Tyr Thr Gln Lys Ser Leu Ser Leu Ser Pro Gly Lys
435 440 445

<210> 213
<211> 1418
<212> DNA
<213> Artificial Sequence

<220>
<223> Nucleotide sequence encoding the amino acid sequence of the heavy chain (IgG4) of humanized anti-hTfR antibody No.3 containing amino acid sequence 2 as the variable region, synthetic sequence

<400> 213
acgcgtgccg ccaccatggg ctggagctgg attctgctgt tcctcctgag cgtgacagca 60

ggagtgcaca gcgaggtgca actagtgcag tctggagcag aggtgaaaaa gcccggggag 120

tctctgaaga tttcctgtaa gggttctgga tacagcttta ccaactactg gctgggatgg 180

gtgcgccaga tgcccgggaa aggcctggag tggatggggg acatctaccc cggcggagac 240

taccctacat acagcgagaa gttcaaggtc caggtcacca tctcagccga caagtccatc 300

agcaccgcct acctgcagtg gagcagcctg aaggcctcgg acaccgccat gtattactgt 360

gcgagatcag gcaattacga cgaagtggcc tactggggcc aaggaaccct ggtcaccgtc 420

tcctcagcta gcaccaaggg cccatcggtc ttcccctgg cgccctgctc caggagcacc 480

tccgagagca cagccgccct gggctgcctg gtcaaggact acttccccga accggtgacg 540

gtgtcgtgga actcaggcgc cctgaccagc ggcgtgcaca ccttcccggc tgtcctacag 600

tcctcaggac tctactccct cagcagcgtg gtgaccgtgc cctccagcag cttgggcacg 660

aagacctaca cctgcaacgt agatcacaag cccagcaaca ccaaggtgga caagagagtt 720

gagtccaaat atggtccccc atgcccacca tgcccagcac ctgagttcct gggggggtcca 780

tcagtcttcc tgttcccccc aaaacccaag gacactctca tgatctcccg gacccctgag 840

gtcacgtgcg tggtggtgga cgtgagccag gaagaccccg aggtccagtt caactggtac 900

gtggatggcg tggaggtgca taatgccaag acaaagccgc gggaggagca gttcaacagc 960

acgtaccgtg tggtcagcgt cctcaccgtc ctgcaccagg actggctgaa cggcaaggag 1020

tacaagtgca aggtctccaa caaaggcctc ccgtcctcca tcgagaaaac catctccaaa 1080

gccaaagggc agccccgaga gccacaggtg tacaccctgc ccccatccca ggaggagatg 1140

accaagaacc aggtcagcct gacctgcctg gtcaaaggct tctaccccag cgacatcgcc 1200

gtggagtggg agagcaatgg gcagccggag aacaactaca agaccacgcc tcccgtgctg 1260

gactccgacg gctccttctt cctctacagc aggctcaccg tggacaagag caggtggcag 1320

gaggggaatg tcttctcatg ctccgtgatg catgaggctc tgcacaacca ctacacacag 1380

aagagcctct ccctgtctcc gggtaaataa gcggccgc 1418

<210> 214
<211> 43
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer hTfR5', synthetic sequence

<400> 214
ccgacgcgtc gccaccatga tggatcaagc tagatcagca ttc 43

<210> 215
<211> 59
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer hTfR3', synthetic sequence

<400> 215
ataatgcggc cgcttaatga tgatgatgat gatgaaactc attgtcaatg tcccaaacg 59

<210> 216
<211> 20
<212> DNA
<213> Artificial Sequence

<220>
<223> Primer Hyg-Sfi5', synthetic sequence

<400> 216
gaggccgcct cggcctctga 20

<210> 217
<211> 29
<212> DNA
<213> Artificial Sequence

<220>

<223> Primer Hyg-BstX3', synthetic sequence

<400> 217
aaccatcgtg atgggtgcta ttcctttgc 29

<210> 218
<211> 108
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of the variable region of the light chain of anti-hTfR antibody No.1

<400> 218

Asp Ile Val Leu Thr Gln Ser Ser Lys Phe Met Ser Thr Ser Val Gly
1 5 10 15

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

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

Tyr Trp Thr Ser Thr Arg His Thr Gly Val Pro Asp Arg Phe Thr Gly
50 55 60

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

Glu Asp Leu Ala Leu Tyr Tyr Cys Gln Gln His Tyr Ser Thr Pro Arg
85 90 95

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

<210> 219
<211> 116
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of the variable region of the heavy chain of anti-hTfR antibody No.1

<400> 219

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

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

Gly Met Ser Trp Ile Arg Gln Thr Pro Asp Lys Arg Leu Glu Leu Val
35 40 45

```
Ala Asn Ile Asn Thr Asn Gly Gly Ser Thr Tyr Tyr Pro Asp Ser Val
    50                  55                  60

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

Leu Gln Met Asn Ser Leu Lys Ser Glu Asp Thr Ala Ile Tyr Tyr Cys
                85                  90                  95

Thr Asn Asn Arg Tyr Asp Glu Asp Tyr Trp Gly Gln Gly Thr Ser Val
            100                 105                 110

Thr Val Ser Ser
        115
```

<210> 220
<211> 108
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of the variable region of the light chain of anti-hTfR antibody No.2

<400> 220

```
Asp Ile Val Leu Thr Gln Ser Pro Ala Thr Leu Ser Val Thr Pro Gly
1               5                   10                  15

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

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

Lys Tyr Ala Ser Gln Ser Ile Ser Gly Ile Pro Ser Arg Phe Ser Gly
    50                  55                  60

Ser Gly Ser Gly Thr Asp Phe Thr Leu Ser Ile Asn Ser Val Glu Thr
65                  70                  75                  80

Glu Asp Phe Gly Met Tyr Phe Cys Gln Gln Ser Asn Ser Trp Pro Arg
                85                  90                  95

Thr Phe Gly Ala Gly Thr Lys Leu Glu Leu Lys Arg
            100                 105
```

<210> 221
<211> 123
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of the variable region of the heavy chain of anti-hTfR antibody No.2

<400> 221

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

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

Val Met His Trp Val Arg Gln Ser His Ala Lys Ser Leu Glu Trp Ile
35 40 45

Gly Val Ile Ser Thr Tyr Tyr Gly His Gly Ser Tyr Asn Gln Arg Phe
50 55 60

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

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

Val Arg Gly Gly Tyr Gly Ser Ser Ser Leu Ala Gly Asn Phe Asp Val
100 105 110

Trp Gly Ala Gly Thr Thr Val Thr Val Ser Ser
115 120

<210> 222
<211> 113
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of the variable region of the light chain of anti-hTfR antibody No.3

<400> 222

Asp Ile Val Met Thr Gln Thr Thr 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 Ser
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 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 Leu Gly Val Phe Phe Cys Ser Gln Ser
85 90 95

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

Arg

<210> 223
<211> 118
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of the variable region of the heavy chain of anti-hTfR antibody No.3

<400> 223

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

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

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

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

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

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

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

Leu Val Thr Val Ser Thr
115

<210> 224
<211> 106
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of the variable region of the light chain of anti-hTfR antibody No.4

<400> 224

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

Glu Lys Val Thr Met Thr Cys Ser Ala Ser Ser Asn Val Asn Tyr Met

20 25 30

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

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

Gly Ser Gly Asn Ser Tyr Ser Leu Thr Ile Ser Ser Met Glu Ala Glu
65 70 75 80

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

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

<210> 225
<211> 122
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of the variable region of the heavy chain of anti-hTfR antibody No.4

<400> 225

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

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

Leu Ile Glu Trp Val Lys Gln Arg Pro Gly Gln Gly Leu Glu Trp Ile
35 40 45

Gly Leu Ile Asn Pro Gly Ser Gly Gly Ile Ile Tyr Asn Glu Lys Phe
50 55 60

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

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

Ala Arg Ser Asn Tyr Tyr Gly Thr Thr Tyr Trp His Phe Asp Val Trp
100 105 110

Gly Ala Gly Thr Thr Val Thr Val Ser Ser
115 120

<210> 226
<211> 105

<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of the variable region of the light chain of anti-hTfR antibody No.5

<400> 226

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

Glu Lys Val Thr Met Thr Cys Ser Ala Ser Ser Ser Ile Ser Ser Ile
20 25 30

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

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

Gly Ser Gly Thr Ser Tyr Ser Leu Thr Ile Ser Ser Met Glu Ala Glu
65 70 75 80

Asp Ala Ala Thr Tyr Tyr Cys His Gln Arg Ser Ser Tyr Pro Thr Phe
85 90 95

Gly Gly Gly Thr Lys Leu Glu Ile Lys
100 105

<210> 227
<211> 118
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of the variable region of the heavy chain of anti-hTfR antibody No.5

<400> 227

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

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

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

Gly Phe Phe Asn Pro His Lys Asn Gly Ala Glu Tyr Asn Glu Lys Phe
50 55 60

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

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

Ala Arg Ser Phe Tyr Tyr Tyr Ser Met Asp Tyr Trp Gly Gln Gly Thr
100 105 110

Ser Val Thr Val Ser Ser
115

<210> 228
<211> 107
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of the variable region of the light chain of anti-hTfR antibody No.6

<400> 228

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

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

Leu Ser Trp Leu Gln Gln Lys Pro Asp Gly Thr Ile Lys Arg Leu Ile
35 40 45

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

Ser Arg Ser Gly Ser Asp Tyr Ser Leu Thr Ile Ser Ser Leu Glu Ser
65 70 75 80

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

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

<210> 229
<211> 112
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of the variable region of the heavy chain of anti-hTfR antibody No.6

<400> 229

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

Ser Leu Ser Ile Thr Cys Ser Val Ser Gly Phe Ser Leu Ser Thr Tyr
20 25 30

Gly Val Tyr Trp Val Arg Gln Pro Pro Gly Lys Gly Leu Glu Trp Leu
35 40 45

Gly Ile Ile Trp Gly Asp Gly Ser Thr Asn Tyr His Ser Ala Leu Ile
50 55 60

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

Lys Leu Asn Ser Leu Gln Thr Ala Asp Thr Ala Thr Tyr Tyr Cys Ala
85 90 95

Lys Pro Asp Asp Val Trp Gly Ala Gly Thr Thr Val Thr Val Ser Ser
100 105 110

<210> 230
<211> 106
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of the variable region of the light chain of anti-hTfR antibody No.7

<400> 230

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

Glu Glu Ile Thr Leu Thr Cys Ser Ala Ser Ser Ser Val Asn Tyr Ile
20 25 30

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

Gln Thr Ser Asn Leu Ala Ser Gly Val Pro Ser Arg Phe Ser Gly Ser
50 55 60

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

Asp Ala Ala Asp Tyr Tyr Cys His Gln Trp Ser Ser Tyr Pro Trp Thr
85 90 95

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

<210> 231
<211> 120
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of the variable region of the heavy chain of

anti-hTfR antibody No.7

<400> 231

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

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

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

Ala Thr Ile Ser Ser Ala Gly Gly Tyr Thr Tyr Tyr Ala Asp Ser Val
    50                  55                  60

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

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

Ala Arg Gln Glu Val Pro Tyr Pro Tyr Ala Met Asp Tyr Trp Gly Gln
            100                 105                 110

Gly Thr Ser Val Ile Val Ser Ser
        115                 120
```

<210> 232
<211> 106
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of the variable region of the light chain of anti-hTfR antibody No.8

<400> 232

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

Glu Glu Ile Thr Leu Thr Cys Ser Ala Ser Ser Ser Val Ser Tyr Met
            20                  25                  30

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

Gly Thr Ser Asn Leu Ala Ser Glu Val Pro Ser Arg Phe Ser Gly Ser
    50                  55                  60

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

Asp Ala Ala Asp Tyr Tyr Cys His Gln Trp Ser Ser Tyr Pro Trp Thr
```

85 90 95

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

<210> 233
<211> 112
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of the variable region of the heavy chain of anti-hTfR antibody No.8

<400> 233

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

Ser Leu Ser Ile Thr Cys Thr Val Ser Gly Phe Ser Leu Thr Thr Tyr
20 25 30

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

Gly Ile Ile Trp Gly Asp Gly Ser Thr Asn Tyr Arg Ser Ala Leu Ile
50 55 60

Ser Arg Leu Ser Ile Ser Lys Asp Asn Ser Lys Asn Gln Val Phe Leu
65 70 75 80

Lys Leu Asn Ser Leu Gln Thr Asp Asp Thr Ala Thr Tyr Tyr Cys Ala
85 90 95

Lys Pro Asp Asp Tyr Trp Gly Gln Gly Thr Ser Val Thr Val Ser Ser
100 105 110

<210> 234
<211> 106
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of the variable region of the light chain of anti-hTfR antibody No.9

<400> 234

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

Glu Thr Val Thr Met Thr Cys Ser Ala Ser Ser Ser Val Ser Leu Met
20 25 30

Phe Trp Tyr Gln Gln Lys Pro Arg Ser Ser Pro Lys Pro Trp Ile Tyr
35 40 45

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

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

Asp Ala Ala Thr Tyr Tyr Cys Gln Gln Trp Thr Ser Asp Pro Pro Thr
85 90 95

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

<210> 235
<211> 117
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of the variable region of the heavy chain of anti-hTfR antibody No.9

<400> 235

Glu Val Gln Leu Gln 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 Asn Tyr
20 25 30

Gly Val Ser Trp Val Lys Gln Ala Pro Gly Lys Asp Leu Lys Trp Met
35 40 45

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

Arg Gly Arg Phe Ala Phe Ser Leu Glu Thr Ser Ala Asn Thr Ala Tyr
65 70 75 80

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

Ser Arg Arg Asn Gly Ala Trp Phe Glu Asp Trp Gly Gln Gly Thr Leu
100 105 110

Val Thr Val Ser Ala
115

<210> 236
<211> 107
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of the variable region of the light chain of anti-hTfR antibody No.10

<400> 236

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

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

Leu Ser Trp Leu Gln Gln Lys Pro Asp Gly Thr Ile Lys Arg Leu Ile
35 40 45

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

Ser Arg Ser Gly Ser Asp Tyr Ser Leu Thr Ile Ser Ser Leu Glu Ser
65 70 75 80

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

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

<210> 237
<211> 120
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of the variable region of the heavy chain of anti-hTfR antibody No.10

<400> 237

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

Ser Leu Lys Leu Ser Cys Glu Ala Ser Gly Ile Thr Phe Arg Asn Tyr
20 25 30

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

Ala Thr Ile Ser Ser Tyr Gly Gly Tyr Thr Tyr Tyr Ala Asp Ser Val
50 55 60

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

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

Ala Arg Gln Glu Val Pro Tyr Pro Tyr Pro Met Asp Asn Trp Gly Gln
100 105 110

Gly Thr Ser Val Ile Val Ser Ser
115 120

<210> 238
<211> 107
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of the variable region of the light chain of anti-hTfR antibody No.11

<400> 238

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

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

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

Lys Tyr Ala Ser Gln Ser Ile Ser Gly Ile Pro Ser Arg Phe Ser Gly
50 55 60

Ser Gly Ser Gly Thr Asp Phe Thr Leu Ser Ile Asn Ser Val Glu Thr
65 70 75 80

Glu Asp Phe Gly Met Tyr Phe Cys Gln Gln Thr Asn Ser Trp Pro Tyr
85 90 95

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

<210> 239
<211> 118
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of the variable region of the heavy chain of anti-hTfR antibody No.11

<400> 239

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

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

Trp Ile Asn Trp Leu Lys Gln Arg Pro Gly Gln Gly Leu Glu Trp Ile
35 40 45

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

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

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

Gly Arg Trp Gly Asp Asp Tyr Ala Met Asp Phe Trp Gly Gln Gly Thr
100 105 110

Ser Val Thr Val Ser Ser
115

<210> 240
<211> 107
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of the variable region of the light chain of anti-hTfR antibody No.12

<400> 240

Asp Ile Val Leu Thr Gln Ser His Lys Phe Met Ser Thr Val Ile Gly
1 5 10 15

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

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

Tyr Trp Ser Ser Thr Arg His Thr Gly Val Pro Asp Arg Phe Thr Gly
50 55 60

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

Glu Asp Leu Ala Leu Tyr Tyr Cys Gln Gln His Phe Ser Thr Pro Leu
85 90 95

Thr Phe Gly Ala Gly Thr Lys Leu Glu Leu Lys
100 105

<210> 241
<211> 119
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of the variable region of the heavy chain of anti-hTfR antibody No.12

<400> 241

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

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

Leu Ile Glu Trp Val Lys Gln Arg Pro Gly Gln Gly Leu Glu Trp Ile
35 40 45

Gly Val Ile His Ser Gly Ser Gly Gly Thr Asn Tyr Asn Asp Asn Phe
50 55 60

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

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

Ala Arg Arg Asn Phe Gly Asn Tyr Tyr Phe Asp Tyr Trp Gly Gln Gly
100 105 110

Thr Thr Leu Thr Val Ser Ser
115

<210> 242
<211> 107
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of the variable region of the light chain of anti-hTfR antibody No.13

<400> 242

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

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

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

Lys Tyr Ala Ser Gln Ser Ile Ser Gly Ile Pro Ser Arg Phe Ser Gly
50 55 60

Ser Gly Ser Gly Thr Asp Phe Thr Leu Thr Ile Asn Ser Val Glu Thr
65 70 75 80

Glu Asp Phe Gly Met Tyr Phe Cys Gln Gln Thr Asn Ser Trp Pro Tyr
85 90 95

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

<210> 243
<211> 118
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of the variable region of the heavy chain of anti-hTfR antibody No.13

<400> 243

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

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

Trp Ile Asn Trp Leu Lys Gln Arg Pro Gly Gln Gly Leu Glu Trp Ile
35 40 45

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

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

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

Gly Arg Trp Gly Asp Asp Tyr Ala Met Asp Phe Trp Gly Gln Gly Thr
100 105 110

Ser Val Thr Val Ser Ser
115

<210> 244
<211> 106
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of the variable region of the light chain of anti-hTfR antibody No.14

<400> 244

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

Glu Lys Val Thr Leu Thr Cys Ser Ala Ser Ser Asn Ile Asn Ser Ile
20 25 30

His Trp Tyr Gln Gln Lys Pro Gly Thr Ser Pro Lys Arg Trp Ile Tyr

35 40 45

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

Gly Ser Gly Thr Ser Tyr Ser Leu Thr Ile Ser Ser Met Glu Ala Glu
65 70 75 80

Asp Ala Ala Ser Tyr Tyr Cys His Gln Arg Ser Gly Tyr Pro Phe Thr
85 90 95

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

<210> 245
<211> 118
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of the variable region of the heavy chain of anti-hTfR antibody No.14

<400> 245

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

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

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

Gly Phe Leu Asn Pro His Lys Asp Asp Ser Glu Tyr Asn Glu Lys Phe
50 55 60

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

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

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

Ser Val Thr Val Ser Ser
115

<210> 246
<211> 525
<212> PRT
<213> Homo sapiens

<400> 246

```
Ser Glu Thr Gln Ala Asn Ser Thr Thr Asp Ala Leu Asn Val Leu Leu
1               5                  10                  15

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

Leu Val Arg Ser Pro Asn Ile Asp Gln Leu Ala Ser His Ser Leu Leu
        35                  40                  45

Phe Gln Asn Ala Phe Ala Gln Gln Ala Val Cys Ala Pro Ser Arg Val
    50                  55                  60

Ser Phe Leu Thr Gly Arg Arg Pro Asp Thr Thr Arg Leu Tyr Asp Phe
65                  70                  75                  80

Asn Ser Tyr Trp Arg Val His Ala Gly Asn Phe Ser Thr Ile Pro Gln
                85                  90                  95

Tyr Phe Lys Glu Asn Gly Tyr Val Thr Met Ser Val Gly Lys Val Phe
            100                 105                 110

His Pro Gly Ile Ser Ser Asn His Thr Asp Asp Ser Pro Tyr Ser Trp
        115                 120                 125

Ser Phe Pro Pro Tyr His Pro Ser Ser Glu Lys Tyr Glu Asn Thr Lys
    130                 135                 140

Thr Cys Arg Gly Pro Asp Gly Glu Leu His Ala Asn Leu Leu Cys Pro
145                 150                 155                 160

Val Asp Val Leu Asp Val Pro Glu Gly Thr Leu Pro Asp Lys Gln Ser
                165                 170                 175

Thr Glu Gln Ala Ile Gln Leu Leu Glu Lys Met Lys Thr Ser Ala Ser
            180                 185                 190

Pro Phe Phe Leu Ala Val Gly Tyr His Lys Pro His Ile Pro Phe Arg
        195                 200                 205

Tyr Pro Lys Glu Phe Gln Lys Leu Tyr Pro Leu Glu Asn Ile Thr Leu
    210                 215                 220

Ala Pro Asp Pro Glu Val Pro Asp Gly Leu Pro Pro Val Ala Tyr Asn
225                 230                 235                 240

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

Ser Val Pro Tyr Gly Pro Ile Pro Val Asp Phe Gln Arg Lys Ile Arg
            260                 265                 270
```

```
Gln Ser Tyr Phe Ala Ser Val Ser Tyr Leu Asp Thr Gln Val Gly Arg
        275                 280                 285

Leu Leu Ser Ala Leu Asp Asp Leu Gln Leu Ala Asn Ser Thr Ile Ile
    290                 295                 300

Ala Phe Thr Ser Asp His Gly Trp Ala Leu Gly Glu His Gly Glu Trp
305                 310                 315                 320

Ala Lys Tyr Ser Asn Phe Asp Val Ala Thr His Val Pro Leu Ile Phe
                325                 330                 335

Tyr Val Pro Gly Arg Thr Ala Ser Leu Pro Glu Ala Gly Glu Lys Leu
            340                 345                 350

Phe Pro Tyr Leu Asp Pro Phe Asp Ser Ala Ser Gln Leu Met Glu Pro
        355                 360                 365

Gly Arg Gln Ser Met Asp Leu Val Glu Leu Val Ser Leu Phe Pro Thr
    370                 375                 380

Leu Ala Gly Leu Ala Gly Leu Gln Val Pro Pro Arg Cys Pro Val Pro
385                 390                 395                 400

Ser Phe His Val Glu Leu Cys Arg Glu Gly Lys Asn Leu Leu Lys His
                405                 410                 415

Phe Arg Phe Arg Asp Leu Glu Glu Asp Pro Tyr Leu Pro Gly Asn Pro
            420                 425                 430

Arg Glu Leu Ile Ala Tyr Ser Gln Tyr Pro Arg Pro Ser Asp Ile Pro
        435                 440                 445

Gln Trp Asn Ser Asp Lys Pro Ser Leu Lys Asp Ile Lys Ile Met Gly
    450                 455                 460

Tyr Ser Ile Arg Thr Ile Asp Tyr Arg Tyr Thr Val Trp Val Gly Phe
465                 470                 475                 480

Asn Pro Asp Glu Phe Leu Ala Asn Phe Ser Asp Ile His Ala Gly Glu
                485                 490                 495

Leu Tyr Phe Val Asp Ser Asp Pro Leu Gln Asp His Asn Met Tyr Asn
            500                 505                 510

Asp Ser Gln Gly Gly Asp Leu Phe Gln Leu Leu Met Pro
        515                 520                 525
```

<210> 247
<211> 973
<212> PRT

<213> Artificial Sequence

<220>
<223> Amino acid sequence of the fusion protein of heavy chain of anti-hTfR antibody No.1 (humanized 6) and hI2S

<400> 247

```
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 Ala Ala Ser Gly Leu Thr Phe Ser Asn Tyr
            20                  25                  30

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

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

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

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

Thr Asn Asn Arg Tyr Asp Glu Asp Tyr Trp Gly Gln Gly Thr Leu Val
            100                 105                 110

Thr Val Ser Ser Ala Ser Thr Lys Gly Pro Ser Val Phe Pro Leu Ala
        115                 120                 125

Pro Ser Ser Lys Ser Thr Ser Gly Gly Thr Ala Ala Leu Gly Cys Leu
    130                 135                 140

Val Lys Asp Tyr Phe Pro Glu Pro Val Thr Val Ser Trp Asn Ser Gly
145                 150                 155                 160

Ala Leu Thr Ser Gly Val His Thr Phe Pro Ala Val Leu Gln Ser Ser
                165                 170                 175

Gly Leu Tyr Ser Leu Ser Ser Val Val Thr Val Pro Ser Ser Ser Leu
            180                 185                 190

Gly Thr Gln Thr Tyr Ile Cys Asn Val Asn His Lys Pro Ser Asn Thr
        195                 200                 205

Lys Val Asp Lys Lys Val Glu Pro Lys Ser Cys Asp Lys Thr His Thr
    210                 215                 220

Cys Pro Pro Cys Pro Ala Pro Glu Leu Leu Gly Gly Pro Ser Val Phe
225                 230                 235                 240
```

```
Leu Phe Pro Pro Lys Pro Lys Asp Thr Leu Met Ile Ser Arg Thr Pro
               245                 250                 255

Glu Val Thr Cys Val Val Val Asp Val Ser His Glu Asp Pro Glu Val
            260                 265                 270

Lys Phe Asn Trp Tyr Val Asp Gly Val Glu Val His Asn Ala Lys Thr
        275                 280                 285

Lys Pro Arg Glu Glu Gln Tyr Asn Ser Thr Tyr Arg Val Val Ser Val
    290                 295                 300

Leu Thr Val Leu His Gln Asp Trp Leu Asn Gly Lys Glu Tyr Lys Cys
305                 310                 315                 320

Lys Val Ser Asn Lys Ala Leu Pro Ala Pro Ile Glu Lys Thr Ile Ser
               325                 330                 335

Lys Ala Lys Gly Gln Pro Arg Glu Pro Gln Val Tyr Thr Leu Pro Pro
            340                 345                 350

Ser Arg Asp Glu Leu Thr Lys Asn Gln Val Ser Leu Thr Cys Leu Val
        355                 360                 365

Lys Gly Phe Tyr Pro Ser Asp Ile Ala Val Glu Trp Glu Ser Asn Gly
    370                 375                 380

Gln Pro Glu Asn Asn Tyr Lys Thr Thr Pro Pro Val Leu Asp Ser Asp
385                 390                 395                 400

Gly Ser Phe Phe Leu Tyr Ser Lys Leu Thr Val Asp Lys Ser Arg Trp
               405                 410                 415

Gln Gln Gly Asn Val Phe Ser Cys Ser Val Met His Glu Ala Leu His
            420                 425                 430

Asn His Tyr Thr Gln Lys Ser Leu Ser Leu Ser Pro Gly Lys Gly Ser
        435                 440                 445

Ser Glu Thr Gln Ala Asn Ser Thr Thr Asp Ala Leu Asn Val Leu Leu
    450                 455                 460

Ile Ile Val Asp Asp Leu Arg Pro Ser Leu Gly Cys Tyr Gly Asp Lys
465                 470                 475                 480

Leu Val Arg Ser Pro Asn Ile Asp Gln Leu Ala Ser His Ser Leu Leu
               485                 490                 495

Phe Gln Asn Ala Phe Ala Gln Gln Ala Val Cys Ala Pro Ser Arg Val
            500                 505                 510
```

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Ser Phe Leu Thr Gly Arg Arg Pro Asp Thr Thr Arg Leu Tyr Asp Phe
        515                 520                 525

Asn Ser Tyr Trp Arg Val His Ala Gly Asn Phe Ser Thr Ile Pro Gln
    530                 535                 540

Tyr Phe Lys Glu Asn Gly Tyr Val Thr Met Ser Val Gly Lys Val Phe
545                 550                 555                 560

His Pro Gly Ile Ser Ser Asn His Thr Asp Asp Ser Pro Tyr Ser Trp
                565                 570                 575

Ser Phe Pro Pro Tyr His Pro Ser Ser Glu Lys Tyr Glu Asn Thr Lys
            580                 585                 590

Thr Cys Arg Gly Pro Asp Gly Glu Leu His Ala Asn Leu Leu Cys Pro
        595                 600                 605

Val Asp Val Leu Asp Val Pro Glu Gly Thr Leu Pro Asp Lys Gln Ser
    610                 615                 620

Thr Glu Gln Ala Ile Gln Leu Leu Glu Lys Met Lys Thr Ser Ala Ser
625                 630                 635                 640

Pro Phe Phe Leu Ala Val Gly Tyr His Lys Pro His Ile Pro Phe Arg
                645                 650                 655

Tyr Pro Lys Glu Phe Gln Lys Leu Tyr Pro Leu Glu Asn Ile Thr Leu
            660                 665                 670

Ala Pro Asp Pro Glu Val Pro Asp Gly Leu Pro Pro Val Ala Tyr Asn
        675                 680                 685

Pro Trp Met Asp Ile Arg Gln Arg Glu Asp Val Gln Ala Leu Asn Ile
    690                 695                 700

Ser Val Pro Tyr Gly Pro Ile Pro Val Asp Phe Gln Arg Lys Ile Arg
705                 710                 715                 720

Gln Ser Tyr Phe Ala Ser Val Ser Tyr Leu Asp Thr Gln Val Gly Arg
                725                 730                 735

Leu Leu Ser Ala Leu Asp Asp Leu Gln Leu Ala Asn Ser Thr Ile Ile
            740                 745                 750

Ala Phe Thr Ser Asp His Gly Trp Ala Leu Gly Glu His Gly Glu Trp
        755                 760                 765

Ala Lys Tyr Ser Asn Phe Asp Val Ala Thr His Val Pro Leu Ile Phe
    770                 775                 780
```

Tyr Val Pro Gly Arg Thr Ala Ser Leu Pro Glu Ala Gly Glu Lys Leu
785 790 795 800

Phe Pro Tyr Leu Asp Pro Phe Asp Ser Ala Ser Gln Leu Met Glu Pro
805 810 815

Gly Arg Gln Ser Met Asp Leu Val Glu Leu Val Ser Leu Phe Pro Thr
820 825 830

Leu Ala Gly Leu Ala Gly Leu Gln Val Pro Pro Arg Cys Pro Val Pro
835 840 845

Ser Phe His Val Glu Leu Cys Arg Glu Gly Lys Asn Leu Leu Lys His
850 855 860

Phe Arg Phe Arg Asp Leu Glu Glu Asp Pro Tyr Leu Pro Gly Asn Pro
865 870 875 880

Arg Glu Leu Ile Ala Tyr Ser Gln Tyr Pro Arg Pro Ser Asp Ile Pro
885 890 895

Gln Trp Asn Ser Asp Lys Pro Ser Leu Lys Asp Ile Lys Ile Met Gly
900 905 910

Tyr Ser Ile Arg Thr Ile Asp Tyr Arg Tyr Thr Val Trp Val Gly Phe
915 920 925

Asn Pro Asp Glu Phe Leu Ala Asn Phe Ser Asp Ile His Ala Gly Glu
930 935 940

Leu Tyr Phe Val Asp Ser Asp Pro Leu Gln Asp His Asn Met Tyr Asn
945 950 955 960

Asp Ser Gln Gly Gly Asp Leu Phe Gln Leu Leu Met Pro
965 970

<210> 248
<211> 3002
<212> DNA
<213> Artificial Sequence

<220>
<223> Nucleotide sequence encoding the amino acid sequence of fusion protein of heavy chain of anti-hTfR antibody No.1 (humanized 6) and hI2S, synthetic sequence

<400> 248
acgcgtgccg ccaccatggg ctggagctgg attctgctgt tcctcctgag cgtgacagca 60

ggagtgcaca gcgaagtgca gctggtcgaa tcaggggggg ggctggtgca gcctggaggc 120

agcctgagac tgtcctgcgc cgcttctggc ttgaccttta gcaactacgg gatgtcctgg 180

gtgcggcagg ctcctggcaa gggactggag ttggtggcca acatcaatac caacggcgga 240

agtacatact atcccgattc agtgaagggc cggttcacca tcagcaggga caacgccaag 300

aacagcctgt atctgcagat gaactctctg agggccgagg atacagccgt gtactattgc 360

actaacaacc ggtacgacga ggactattgg ggccagggca ccctggtgac agtgtctagc 420

gcctctacca agggcccaag cgtgtttcct ctggctccat cctctaaatc cacctctggc 480

ggcacagccg ctctgggctg tctggtgaag gattacttcc cagagcccgt gacagtgtct 540

tggaacagcg gcgccctgac ctccggcgtg cacacatttc ctgctgtgct gcagagctcc 600

ggcctgtaca gcctgtctag cgtggtgacc gtgccatcct ctagcctggg cacccagaca 660

tatatctgca acgtgaatca caagcccagc aatacaaagg tggataagaa ggtggagcca 720

aagtcctgtg acaagaccca cacatgcccc ccttgtcctg ctccagagct gctgggagga 780

ccaagcgtgt tcctgtttcc acccaagccc aaggataccc tgatgatctc tcggacccca 840

gaggtgacat gcgtggtggt ggatgtgagc cacgaggacc ccgaggtgaa gttcaactgg 900

tatgtggacg gcgtggaggt gcacaatgct aagaccaagc ccagggagga gcagtacaac 960

tccacctata gagtggtgtc tgtgctgaca gtgctgcacc aggattggct gaacggcaag 1020

gagtataagt gcaaggtgtc caataaggcc ctgcccgctc ctatcgagaa gaccatctct 1080

aaggccaagg gccagcccag agagcctcag gtgtacacac tgcctccatc ccgggatgag 1140

ctgaccaaga accaggtgtc tctgacatgt ctggtcaagg gcttctatcc ctctgacatc 1200

gccgtggagt gggagagcaa tggccagcct gagaacaatt acaagaccac acccccctgtg 1260

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cagcagggca acgtgttcag ctgttccgtg atgcacgaag ctctgcataa tcactatact 1380

cagaaatccc tgtcactgtc acctggtaaa ggatcttccg aaacgcaggc caactcgacc 1440

acagatgctc tgaacgttct tctcatcatc gtggatgacc tgcgcccctc cctgggctgt 1500

tatggggata agctggtgag gtccccaaat attgaccaac tggcatccca cagcctcctc 1560

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ggcaggagac ctgacaccac ccgcctgtac gacttcaact cctactggag ggtgcacgct 1680

ggaaacttct ccaccatccc ccagtacttc aaggagaatg gctatgtgac catgtcggtg 1740

ggaaaagtct ttcaccctgg gatatcttct aaccataccg atgattctcc gtatagctgg 1800

tcttttccac cttatcatcc ttcctctgag aagtatgaaa acactaagac atgtcgaggg 1860

ccagatggag aactccatgc caacctgctt tgccctgtgg atgtgctgga tgttcccgag 1920

ggcaccttgc ctgacaaaca gagcactgag caagccatac agttgttgga aaagatgaaa 1980

acgtcagcca gtcctttctt cctggccgtt gggtatcata agccacacat ccccttcaga 2040

taccccaagg aatttcagaa gttgtatccc ttggagaaca tcaccctggc ccccgatccc 2100

gaggtccctg atggcctacc ccctgtggcc tacaacccct ggatggacat caggcaacgg 2160

gaagacgtcc aagccttaaa catcagtgtg ccgtatggtc caattcctgt ggactttcag 2220

cggaaaatcc gccagagcta ctttgcctct gtgtcatatt tggatacaca ggtcggccgc 2280

ctcttgagtg ctttggacga tcttcagctg gccaacagca ccatcattgc atttacctcg 2340

gatcatgggt gggctctagg tgaacatgga gaatgggcca aatacagcaa ttttgatgtt 2400

gctacccatg ttcccctgat attctatgtt cctggaagga cggcttcact tccggaggca 2460

ggcgagaagc ttttccctta cctcgaccct tttgattccg cctcacagtt gatggagcca 2520

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gaaggcaaga accttctgaa gcattttcga ttccgtgact tggaagaaga tccgtacctc 2700

cctggtaatc cccgtgaact gattgcctat agccagtatc cccggccttc agacatccct 2760

cagtggaatt ctgacaagcc gagtttaaaa gatataaaga tcatgggcta ttccatacgc 2820

accatagact ataggtatac tgtgtgggtt ggcttcaatc ctgatgaatt tctagctaac 2880

ttttctgaca tccatgcagg ggaactgtat tttgtggatt ctgacccatt gcaggatcac 2940

aatatgtata atgattccca aggtggagac cttttccagt tgttgatgcc ttaagcggcc 3000

gc 3002

<210> 249
<211> 980
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of the fusion protein of heavy chain of anti-hTfR antibody No.2 (humanized 6) and hI2S

<400> 249

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

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

Gly Val Ile Ser Thr Tyr Tyr Gly His Gly Ser Tyr Asn Gln Arg Phe
50 55 60

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

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

Val Arg Gly Gly Tyr Gly Ser Ser Ser Leu Ala Gly Asn Phe Asp Val
100 105 110

Trp Gly Gln Gly Thr Thr Val Thr Val Ser Ser Ala Ser Thr Lys Gly
115 120 125

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Pro Ser Val Phe Pro Leu Ala Pro Ser Ser Lys Ser Thr Ser Gly Gly
    130                 135                 140

Thr Ala Ala Leu Gly Cys Leu Val Lys Asp Tyr Phe Pro Glu Pro Val
145                 150                 155                 160

Thr Val Ser Trp Asn Ser Gly Ala Leu Thr Ser Gly Val His Thr Phe
                165                 170                 175

Pro Ala Val Leu Gln Ser Ser Gly Leu Tyr Ser Leu Ser Ser Val Val
            180                 185                 190

Thr Val Pro Ser Ser Ser Leu Gly Thr Gln Thr Tyr Ile Cys Asn Val
        195                 200                 205

Asn His Lys Pro Ser Asn Thr Lys Val Asp Lys Lys Val Glu Pro Lys
    210                 215                 220

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

Leu Gly Gly Pro Ser Val Phe Leu Phe Pro Pro Lys Pro Lys Asp Thr
                245                 250                 255

Leu Met Ile Ser Arg Thr Pro Glu Val Thr Cys Val Val Val Asp Val
            260                 265                 270

Ser His Glu Asp Pro Glu Val Lys Phe Asn Trp Tyr Val Asp Gly Val
        275                 280                 285

Glu Val His Asn Ala Lys Thr Lys Pro Arg Glu Glu Gln Tyr Asn Ser
    290                 295                 300

Thr Tyr Arg Val Val Ser Val Leu Thr Val Leu His Gln Asp Trp Leu
305                 310                 315                 320

Asn Gly Lys Glu Tyr Lys Cys Lys Val Ser Asn Lys Ala Leu Pro Ala
                325                 330                 335

Pro Ile Glu Lys Thr Ile Ser Lys Ala Lys Gly Gln Pro Arg Glu Pro
            340                 345                 350

Gln Val Tyr Thr Leu Pro Pro Ser Arg Asp Glu Leu Thr Lys Asn Gln
        355                 360                 365

Val Ser Leu Thr Cys Leu Val Lys Gly Phe Tyr Pro Ser Asp Ile Ala
    370                 375                 380

Val Glu Trp Glu Ser Asn Gly Gln Pro Glu Asn Asn Tyr Lys Thr Thr
385                 390                 395                 400
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Pro Pro Val Leu Asp Ser Asp Gly Ser Phe Phe Leu Tyr Ser Lys Leu
                405                 410                 415

Thr Val Asp Lys Ser Arg Trp Gln Gln Gly Asn Val Phe Ser Cys Ser
            420                 425                 430

Val Met His Glu Ala Leu His Asn His Tyr Thr Gln Lys Ser Leu Ser
        435                 440                 445

Leu Ser Pro Gly Lys Gly Ser Ser Glu Thr Gln Ala Asn Ser Thr Thr
    450                 455                 460

Asp Ala Leu Asn Val Leu Leu Ile Ile Val Asp Asp Leu Arg Pro Ser
465                 470                 475                 480

Leu Gly Cys Tyr Gly Asp Lys Leu Val Arg Ser Pro Asn Ile Asp Gln
                485                 490                 495

Leu Ala Ser His Ser Leu Leu Phe Gln Asn Ala Phe Ala Gln Gln Ala
            500                 505                 510

Val Cys Ala Pro Ser Arg Val Ser Phe Leu Thr Gly Arg Arg Pro Asp
        515                 520                 525

Thr Thr Arg Leu Tyr Asp Phe Asn Ser Tyr Trp Arg Val His Ala Gly
    530                 535                 540

Asn Phe Ser Thr Ile Pro Gln Tyr Phe Lys Glu Asn Gly Tyr Val Thr
545                 550                 555                 560

Met Ser Val Gly Lys Val Phe His Pro Gly Ile Ser Ser Asn His Thr
                565                 570                 575

Asp Asp Ser Pro Tyr Ser Trp Ser Phe Pro Pro Tyr His Pro Ser Ser
            580                 585                 590

Glu Lys Tyr Glu Asn Thr Lys Thr Cys Arg Gly Pro Asp Gly Glu Leu
        595                 600                 605

His Ala Asn Leu Leu Cys Pro Val Asp Val Leu Asp Val Pro Glu Gly
    610                 615                 620

Thr Leu Pro Asp Lys Gln Ser Thr Glu Gln Ala Ile Gln Leu Leu Glu
625                 630                 635                 640

Lys Met Lys Thr Ser Ala Ser Pro Phe Phe Leu Ala Val Gly Tyr His
                645                 650                 655

Lys Pro His Ile Pro Phe Arg Tyr Pro Lys Glu Phe Gln Lys Leu Tyr
            660                 665                 670
```

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Pro Leu Glu Asn Ile Thr Leu Ala Pro Asp Pro Glu Val Pro Asp Gly
        675                 680                 685

Leu Pro Pro Val Ala Tyr Asn Pro Trp Met Asp Ile Arg Gln Arg Glu
    690                 695                 700

Asp Val Gln Ala Leu Asn Ile Ser Val Pro Tyr Gly Pro Ile Pro Val
705                 710                 715                 720

Asp Phe Gln Arg Lys Ile Arg Gln Ser Tyr Phe Ala Ser Val Ser Tyr
                725                 730                 735

Leu Asp Thr Gln Val Gly Arg Leu Leu Ser Ala Leu Asp Asp Leu Gln
            740                 745                 750

Leu Ala Asn Ser Thr Ile Ile Ala Phe Thr Ser Asp His Gly Trp Ala
        755                 760                 765

Leu Gly Glu His Gly Glu Trp Ala Lys Tyr Ser Asn Phe Asp Val Ala
    770                 775                 780

Thr His Val Pro Leu Ile Phe Tyr Val Pro Gly Arg Thr Ala Ser Leu
785                 790                 795                 800

Pro Glu Ala Gly Glu Lys Leu Phe Pro Tyr Leu Asp Pro Phe Asp Ser
                805                 810                 815

Ala Ser Gln Leu Met Glu Pro Gly Arg Gln Ser Met Asp Leu Val Glu
            820                 825                 830

Leu Val Ser Leu Phe Pro Thr Leu Ala Gly Leu Ala Gly Leu Gln Val
        835                 840                 845

Pro Pro Arg Cys Pro Val Pro Ser Phe His Val Glu Leu Cys Arg Glu
    850                 855                 860

Gly Lys Asn Leu Leu Lys His Phe Arg Phe Arg Asp Leu Glu Glu Asp
865                 870                 875                 880

Pro Tyr Leu Pro Gly Asn Pro Arg Glu Leu Ile Ala Tyr Ser Gln Tyr
                885                 890                 895

Pro Arg Pro Ser Asp Ile Pro Gln Trp Asn Ser Asp Lys Pro Ser Leu
            900                 905                 910

Lys Asp Ile Lys Ile Met Gly Tyr Ser Ile Arg Thr Ile Asp Tyr Arg
        915                 920                 925

Tyr Thr Val Trp Val Gly Phe Asn Pro Asp Glu Phe Leu Ala Asn Phe
    930                 935                 940
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Ser Asp Ile His Ala Gly Glu Leu Tyr Phe Val Asp Ser Asp Pro Leu
945 950 955 960

Gln Asp His Asn Met Tyr Asn Asp Ser Gln Gly Gly Asp Leu Phe Gln
965 970 975

Leu Leu Met Pro
980

<210> 250
<211> 3023
<212> DNA
<213> Artificial Sequence

<220>
<223> Nucleotide sequence encoding the amino acid sequence of fusion protein of heavy chain of anti-hTfR antibody No.2 (humanized 6) and hI2S, synthetic sequence

<400> 250
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ggagtgcaca gccaggtgca gctggtccag tcaggagccg aagtgaaaaa gcccggagcc 120

tcagtcaaag tgtcttgtaa agcatcaggt tatacattta cagactacgt catgcactgg 180

gtgaggcagg cacctggaca gggtctggaa tggatcggcg tgatctccac ttactatggc 240

catggaagct acaaccagag attcaagggc agggcgacaa tgactgtaga caaatcaatt 300

tccactgctt atatggagct ggtaaggctg cggtccgacg ataccgctgt gtactattgc 360

gtacgaggag gatacggctc cagctctctg gctggtaatt tcgatgtgtg ggggcagggt 420

accacagtca ccgtgagttc agcaagcaca aagggcccat ctgtgtttcc actggccccc 480

tccagcaaaa gcacctctgg gggtacagcc gctctgggat gtctggtgaa ggattatttc 540

ccagagccag tcaccgtgtc ctggaacagc ggagccctga catctggagt ccacactttt 600

ccagctgtgc tgcagtctag tgggctgtac tccctgtcat ccgtggtcac tgtccccagc 660

tctagtctgg gtacccagac atatatctgc aacgtgaatc acaagccatc taataccaaa 720

gtcgacaaga aagtggaacc caagtcctgt gataaaactc atacctgccc cccttgtcct 780

gcaccagagc tgctgggagg accatccgtg ttcctgtttc cacccaagcc taaagacacc 840

ctgatgatta gccgaactcc cgaagtcacc tgcgtggtcg tggacgtgtc tcacgaggac 900

cctgaagtca agtttaactg gtacgtggat ggcgtcgagg tgcataatgc taagacaaaa 960

ccccgagagg aacagtacaa cagtacatat cgtgtcgtgt cagtgctgac cgtcctgcat 1020

caggactggc tgaacgggaa ggaatataag tgcaaagtgt ccaataaggc actgcccgcc 1080

cctatcgaga aaaccattag caaggccaaa ggacagccta gggaaccaca ggtgtacaca 1140

ctgcctccat cccgggacga gctgactaag aaccaggtca gcctgacctg tctggtgaaa 1200

ggcttctatc cttcagatat cgctgtggag tgggaaagta atggacagcc agagaacaat 1260

tacaagacta ccccccctgt gctggactct gatgggagtt tctttctgta ttctaagctg 1320

accgtggata aaagtcggtg gcagcagggt aatgtcttta gttgttcagt gatgcacgaa 1380

gcactgcaca accactacac ccagaaatca ctgtcactgt caccagggaa aggatcttcc 1440

gaaacgcagg ccaactcgac cacagatgct ctgaacgttc ttctcatcat cgtggatgac 1500

ctgcgccccc ccctgggctg ttatggggat aagctggtga ggtccccaaa tattgaccaa 1560

ctggcatccc acagcctcct cttccagaat gcctttgcgc agcaagcagt gtgcgccccg 1620

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aacactaaga catgtcgagg gccagatgga gaactccatg ccaacctgct ttgccctgtg 1920

gatgtgctgg atgttcccga gggcaccttg cctgacaaac agagcactga gcaagccata 1980

cagttgttgg aaaagatgaa aacgtcagcc agtcctttct tcctggccgt tgggtatcat 2040

aagccacaca tccccttcag ataccccaag gaatttcaga agttgtatcc cttggagaac 2100

atcaccctgg cccccgatcc cgaggtccct gatggcctac cccctgtggc ctacaacccc 2160

tggatggaca tcaggcaacg ggaagacgtc caagccttaa acatcagtgt gccgtatggt 2220

ccaattcctg tggactttca gcggaaaatc cgccagagct actttgcctc tgtgtcatat 2280

ttggatacac aggtcggccg cctcttgagt gctttggacg atcttcagct ggccaacagc 2340

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tttcacgttg agctgtgcag agaaggcaag aaccttctga agcattttcg attccgtgac 2700

ttggaagaag atccgtacct ccctggtaat ccccgtgaac tgattgccta tagccagtat 2760

ccccggcctt cagacatccc tcagtggaat tctgacaagc cgagtttaaa agatataaag 2820

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cctgatgaat ttctagctaa cttttctgac atccatgcag gggaactgta ttttgtggat 2940

tctgacccat tgcaggatca caatatgtat aatgattccc aaggtggaga ccttttccag 3000

ttgttgatgc cttaagcggc cgc 3023

<210> 251
<211> 975
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of fusion protein of heavy chain of anti-hTfR antibody No.3 (humanized 2) and hI2S, synthetic sequence

<400> 251

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

Ser Leu Lys Ile Ser Cys Lys Gly Ser Gly Tyr Ser Phe Thr Asn Tyr
            20                  25                  30

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

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

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

Leu Gln Trp Ser Ser Leu Lys Ala Ser Asp Thr Ala Met Tyr Tyr Cys
                85                  90                  95

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

Leu Val Thr Val Ser Ser Ala Ser Thr Lys Gly Pro Ser Val Phe Pro
        115                 120                 125

Leu Ala Pro Ser Ser Lys Ser Thr Ser Gly Gly Thr Ala Ala Leu Gly
    130                 135                 140

Cys Leu Val Lys Asp Tyr Phe Pro Glu Pro Val Thr Val Ser Trp Asn
145                 150                 155                 160

Ser Gly Ala Leu Thr Ser Gly Val His Thr Phe Pro Ala Val Leu Gln
                165                 170                 175

Ser Ser Gly Leu Tyr Ser Leu Ser Ser Val Val Thr Val Pro Ser Ser
            180                 185                 190

Ser Leu Gly Thr Gln Thr Tyr Ile Cys Asn Val Asn His Lys Pro Ser
        195                 200                 205

Asn Thr Lys Val Asp Lys Lys Val Glu Pro Lys Ser Cys Asp Lys Thr
    210                 215                 220

His Thr Cys Pro Pro Cys Pro Ala Pro Glu Leu Leu Gly Gly Pro Ser
225                 230                 235                 240

Val Phe Leu Phe Pro Pro Lys Pro Lys Asp Thr Leu Met Ile Ser Arg
                245                 250                 255

Thr Pro Glu Val Thr Cys Val Val Val Asp Val Ser His Glu Asp Pro
            260                 265                 270
```

```
Glu Val Lys Phe Asn Trp Tyr Val Asp Gly Val Glu Val His Asn Ala
        275                 280                 285

Lys Thr Lys Pro Arg Glu Glu Gln Tyr Asn Ser Thr Tyr Arg Val Val
    290                 295                 300

Ser Val Leu Thr Val Leu His Gln Asp Trp Leu Asn Gly Lys Glu Tyr
305                 310                 315                 320

Lys Cys Lys Val Ser Asn Lys Ala Leu Pro Ala Pro Ile Glu Lys Thr
                325                 330                 335

Ile Ser Lys Ala Lys Gly Gln Pro Arg Glu Pro Gln Val Tyr Thr Leu
            340                 345                 350

Pro Pro Ser Arg Asp Glu Leu Thr Lys Asn Gln Val Ser Leu Thr Cys
        355                 360                 365

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

Asn Gly Gln Pro Glu Asn Asn Tyr Lys Thr Thr Pro Pro Val Leu Asp
385                 390                 395                 400

Ser Asp Gly Ser Phe Phe Leu Tyr Ser Lys Leu Thr Val Asp Lys Ser
                405                 410                 415

Arg Trp Gln Gln Gly Asn Val Phe Ser Cys Ser Val Met His Glu Ala
            420                 425                 430

Leu His Asn His Tyr Thr Gln Lys Ser Leu Ser Leu Ser Pro Gly Lys
        435                 440                 445

Gly Ser Ser Glu Thr Gln Ala Asn Ser Thr Thr Asp Ala Leu Asn Val
    450                 455                 460

Leu Leu Ile Ile Val Asp Asp Leu Arg Pro Ser Leu Gly Cys Tyr Gly
465                 470                 475                 480

Asp Lys Leu Val Arg Ser Pro Asn Ile Asp Gln Leu Ala Ser His Ser
                485                 490                 495

Leu Leu Phe Gln Asn Ala Phe Ala Gln Gln Ala Val Cys Ala Pro Ser
            500                 505                 510

Arg Val Ser Phe Leu Thr Gly Arg Arg Pro Asp Thr Thr Arg Leu Tyr
        515                 520                 525

Asp Phe Asn Ser Tyr Trp Arg Val His Ala Gly Asn Phe Ser Thr Ile
    530                 535                 540
```

```
Pro Gln Tyr Phe Lys Glu Asn Gly Tyr Val Thr Met Ser Val Gly Lys
545                 550                 555                 560

Val Phe His Pro Gly Ile Ser Ser Asn His Thr Asp Asp Ser Pro Tyr
                565                 570                 575

Ser Trp Ser Phe Pro Pro Tyr His Pro Ser Ser Glu Lys Tyr Glu Asn
            580                 585                 590

Thr Lys Thr Cys Arg Gly Pro Asp Gly Glu Leu His Ala Asn Leu Leu
        595                 600                 605

Cys Pro Val Asp Val Leu Asp Val Pro Glu Gly Thr Leu Pro Asp Lys
    610                 615                 620

Gln Ser Thr Glu Gln Ala Ile Gln Leu Leu Glu Lys Met Lys Thr Ser
625                 630                 635                 640

Ala Ser Pro Phe Phe Leu Ala Val Gly Tyr His Lys Pro His Ile Pro
                645                 650                 655

Phe Arg Tyr Pro Lys Glu Phe Gln Lys Leu Tyr Pro Leu Glu Asn Ile
            660                 665                 670

Thr Leu Ala Pro Asp Pro Glu Val Pro Asp Gly Leu Pro Pro Val Ala
        675                 680                 685

Tyr Asn Pro Trp Met Asp Ile Arg Gln Arg Glu Asp Val Gln Ala Leu
    690                 695                 700

Asn Ile Ser Val Pro Tyr Gly Pro Ile Pro Val Asp Phe Gln Arg Lys
705                 710                 715                 720

Ile Arg Gln Ser Tyr Phe Ala Ser Val Ser Tyr Leu Asp Thr Gln Val
                725                 730                 735

Gly Arg Leu Leu Ser Ala Leu Asp Asp Leu Gln Leu Ala Asn Ser Thr
            740                 745                 750

Ile Ile Ala Phe Thr Ser Asp His Gly Trp Ala Leu Gly Glu His Gly
        755                 760                 765

Glu Trp Ala Lys Tyr Ser Asn Phe Asp Val Ala Thr His Val Pro Leu
    770                 775                 780

Ile Phe Tyr Val Pro Gly Arg Thr Ala Ser Leu Pro Glu Ala Gly Glu
785                 790                 795                 800

Lys Leu Phe Pro Tyr Leu Asp Pro Phe Asp Ser Ala Ser Gln Leu Met
                805                 810                 815
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Glu Pro Gly Arg Gln Ser Met Asp Leu Val Glu Leu Val Ser Leu Phe
820 825 830

Pro Thr Leu Ala Gly Leu Ala Gly Leu Gln Val Pro Pro Arg Cys Pro
835 840 845

Val Pro Ser Phe His Val Glu Leu Cys Arg Glu Gly Lys Asn Leu Leu
850 855 860

Lys His Phe Arg Phe Arg Asp Leu Glu Glu Asp Pro Tyr Leu Pro Gly
865 870 875 880

Asn Pro Arg Glu Leu Ile Ala Tyr Ser Gln Tyr Pro Arg Pro Ser Asp
885 890 895

Ile Pro Gln Trp Asn Ser Asp Lys Pro Ser Leu Lys Asp Ile Lys Ile
900 905 910

Met Gly Tyr Ser Ile Arg Thr Ile Asp Tyr Arg Tyr Thr Val Trp Val
915 920 925

Gly Phe Asn Pro Asp Glu Phe Leu Ala Asn Phe Ser Asp Ile His Ala
930 935 940

Gly Glu Leu Tyr Phe Val Asp Ser Asp Pro Leu Gln Asp His Asn Met
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Tyr Asn Asp Ser Gln Gly Gly Asp Leu Phe Gln Leu Leu Met Pro
965 970 975

<210> 252
<211> 3011
<212> DNA
<213> Artificial Sequence

<220>
<223> Nucleotide sequence encoding the amino acid sequence of fusion protein of heavy chain of anti-hTfR antibody No.3 (humanized 2) and hI2S, synthetic sequence

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tctctgaaga tttcctgtaa gggttctgga tacagcttta ccaactactg gctgggatgg 180

gtgcgccaga tgcccgggaa aggcctggag tggatggggg acatctaccc cggcggagac 240

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taagcggccg c 3011

<210> 253
<211> 4460
<212> DNA
<213> Artificial Sequence

<220>
<223> Nucleotide sequence of the DNA formed of a cDNA encoding chimeric hTfR and a loxP-flanked neomycin resistance gene placed on the cDNA's 3' side, synthetic sequence

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gataacagtc atgtggagat gaaactggct gcagatgaag aagaaaatgc cgacaataac 180

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ttaggagtaa gtttgatata atgacaatcc catcgtaagc cttcagtaac ctgatgcatt 4980

ggtctctgtt ttaatatcag gta 5003

<210> 255
<211> 2604
<212> DNA
<213> Artificial Sequence

<220>
<223> Nucleotide sequence of the 3'-arm of targeting vector

<400> 255
gcattctcta acttggtaag gtactttcat ctatctgaaa aaatgttcag taaaaaacaa 60

aacaaaaaca tgacttcacc cagtgagtac aagatgatac ccccaatttt ttttttttt 120

attatatgta tgtacactgt agctgtcttc agacacacca gaagagggcg tcagatctca 180

tcagatggtt gtgagccacc atgtggttgc tgggacttga acactggacc tttggaaaag 240

cagttgggta ctcttaccca ctgagctatc acaccagccc caatacccca aattttgacc 300

agccttttt ttttttttt ttttttttt aaatctgaac taatggtatt aaggtgaaac 360

agattgcaca aaagaggtac taggtttttc tttgaggcaa ggtctttcta tattgcctca 420

ggttgacctt aaactccaac ttccttttt tccccaagtg ctggagattg tagacagata 480

tatacaacac cccaaaacaa atatgtttag tttcgattaa gattcattat gtggggctag 540

agggatgact tagaggttaa gaacactgcc tgctcttcca gaggtcctga gttcaattcc 600

cagcaaccac gtggtggctc acaaccatct gtaatgggat ccgatgccct ctttctggtg 660

tgtttgaaga cagctacagt gtcctcatac ataaaaaaaa taaacaaaca gatcttttaa 720

aaaaaaaggt acagtgtact tatacattat ataaatgaat gattctttaa aaaattaatt 780

atgggaaata cttatgaaga atagggtagc tttggctgtt ttggaaacgt tatataacaa 840

ggtagaacta aaatgtatgc cagtaatccc agaggaatca ttagccagtc agggctagtc 900

tgagcaatgt ggcaagataa acccatctct ttaaaaaaaa aaaaaagtat tataaataga 960

aatgttatag gaaacaggaa atagaaaccc tcgaaaggct gaatgaaaga gtattagtgg 1020

gctggagaga tggttcagcg gttaagagca ctatctcctg agttcagttc ccagtgacca 1080

catggtggct cacagccatc tgtaatgaga tctgacgccc tcttctgggg tgtctgaaga 1140

cagcgacagt gtactcacat aaaataaata cataaagact gttagttagc cttcatctac 1200

catttacaga actgggcaca gaaaggagtt catcagttat aaagggtaac tttccatatg 1260

aatgtttgtc atattattat gcatatagta taatgaccaa actactgtaa tgtcttaata 1320

tttgtatctc ttttctcttt tttaaaaata tcagtttggt ggggaaccat tgtcatacac 1380

ccggtttagc cttgctcggc aagtagatgg agataacagt catgtggaga tgaaactggc 1440

tgcagatgaa gaagaaaatg ccgacaataa catgaaggct agtgtcagaa aacccaagag 1500

gtttaatgga agactctgct ttgcagctat tgcactagtc attttcttct tgattggtaa 1560

gaatgagtgg ccattcagaa ggatttctta tgactaacta gttcttagac tagctagttc 1620

ttagactagc tagttcttgt ttcttttgga tgaggagatg ctttgtactt taaatggcac 1680

tggggctccc tacctgccgg cagattaggt cctgcaagat gggaaacgtt tacattatgg 1740

atgttttatt agagatatgc aggacatttg gaatagtact aagaaaggct tccagtaaga 1800

caaggtgtgc acccatgtct taaacaggtc actgtaaaat atgacttagt tgtggtaatt 1860

taaattccat taaactcagg ttcataattt tctattagat tctcatagtt taattaaaag 1920

ttttcaggga taagttaaaa atgagttctg tgagtttagc tctaaaactt cctgttttta 1980

ggattcatga gtggctacct gggctattgt aagcgtgtag aacaaaaaga ggagtgtgtg 2040

aaactggctg aaacggagga gacagacaag tcagaaacca tggaaacaga ggatgttcct 2100

acatcatctc gcttatattg ggcagacctc aaaacactgt tgtcagagaa gttgaactcc 2160

atagagtttg ctgacaccat caagtaagct caacttccca agttcagtcc tgatggaaac 2220

gtttttgttg ggggggtagg gagacttgaa aggctttcag agggtcctcc tgacaatgtg 2280

gaactatgct gacaggaaat taggacttac ctggagagcc tcatagcctc ctttttcttc 2340

agaatcgttt tatcagttgt agtttagtgt gggatgtcag attttcttct gttctaatat 2400

tccttttaaa aatttttaa aattaaaatt acttttatg tattatgagt atagcctgca 2460

tatatgaatg aatgtgcatt actaattaca cttatctcct agtgcctaca taagccttat 2520

agatggttgt gagccagcat gtgggtgctg gaatccaaaa tggttcttgc aagaccaaat 2580

atgttacatc ccagagccat taca 2604

<210> 256
<211> 166
<212> PRT
<213> Homo sapiens

<400> 256

Ala Pro Pro Arg Leu Ile Cys Asp Ser Arg Val Leu Glu Arg Tyr Leu
1 5 10 15

Leu Glu Ala Lys Glu Ala Glu Asn Ile Thr Thr Gly Cys Ala Glu His
20 25 30

Cys Ser Leu Asn Glu Asn Ile Thr Val Pro Asp Thr Lys Val Asn Phe
35 40 45

```
Tyr Ala Trp Lys Arg Met Glu Val Gly Gln Gln Ala Val Glu Val Trp
    50                  55                  60

Gln Gly Leu Ala Leu Leu Ser Glu Ala Val Leu Arg Gly Gln Ala Leu
65                  70                  75                  80

Leu Val Asn Ser Ser Gln Pro Trp Glu Pro Leu Gln Leu His Val Asp
                85                  90                  95

Lys Ala Val Ser Gly Leu Arg Ser Leu Thr Thr Leu Leu Arg Ala Leu
            100                 105                 110

Gly Ala Gln Lys Glu Ala Ile Ser Pro Pro Asp Ala Ala Ser Ala Ala
        115                 120                 125

Pro Leu Arg Thr Ile Thr Ala Asp Thr Phe Arg Lys Leu Phe Arg Val
    130                 135                 140

Tyr Ser Asn Phe Leu Arg Gly Lys Leu Lys Leu Tyr Thr Gly Glu Ala
145                 150                 155                 160

Cys Arg Thr Gly Asp Arg
                165
```

<210> 257
<211> 616
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of the fusion protein of heavy chain of anti-hTfR antibody No.3 (humanized 2) and hEPO

<400> 257

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

Ser Leu Lys Ile Ser Cys Lys Gly Ser Gly Tyr Ser Phe Thr Asn Tyr
            20                  25                  30

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

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

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

Leu Gln Trp Ser Ser Leu Lys Ala Ser Asp Thr Ala Met Tyr Tyr Cys
                85                  90                  95
```

```
Ala Arg Ser Gly Asn Tyr Asp Glu Val Ala Tyr Trp Gly Gln Gly Thr
            100                 105                 110

Leu Val Thr Val Ser Ser Ala Ser Thr Lys Gly Pro Ser Val Phe Pro
        115                 120                 125

Leu Ala Pro Ser Ser Lys Ser Thr Ser Gly Gly Thr Ala Ala Leu Gly
    130                 135                 140

Cys Leu Val Lys Asp Tyr Phe Pro Glu Pro Val Thr Val Ser Trp Asn
145                 150                 155                 160

Ser Gly Ala Leu Thr Ser Gly Val His Thr Phe Pro Ala Val Leu Gln
                165                 170                 175

Ser Ser Gly Leu Tyr Ser Leu Ser Ser Val Val Thr Val Pro Ser Ser
            180                 185                 190

Ser Leu Gly Thr Gln Thr Tyr Ile Cys Asn Val Asn His Lys Pro Ser
        195                 200                 205

Asn Thr Lys Val Asp Lys Lys Val Glu Pro Lys Ser Cys Asp Lys Thr
    210                 215                 220

His Thr Cys Pro Pro Cys Pro Ala Pro Glu Leu Leu Gly Gly Pro Ser
225                 230                 235                 240

Val Phe Leu Phe Pro Pro Lys Pro Lys Asp Thr Leu Met Ile Ser Arg
                245                 250                 255

Thr Pro Glu Val Thr Cys Val Val Val Asp Val Ser His Glu Asp Pro
            260                 265                 270

Glu Val Lys Phe Asn Trp Tyr Val Asp Gly Val Glu Val His Asn Ala
        275                 280                 285

Lys Thr Lys Pro Arg Glu Glu Gln Tyr Asn Ser Thr Tyr Arg Val Val
    290                 295                 300

Ser Val Leu Thr Val Leu His Gln Asp Trp Leu Asn Gly Lys Glu Tyr
305                 310                 315                 320

Lys Cys Lys Val Ser Asn Lys Ala Leu Pro Ala Pro Ile Glu Lys Thr
                325                 330                 335

Ile Ser Lys Ala Lys Gly Gln Pro Arg Glu Pro Gln Val Tyr Thr Leu
            340                 345                 350

Pro Pro Ser Arg Asp Glu Leu Thr Lys Asn Gln Val Ser Leu Thr Cys
        355                 360                 365
```

```
Leu Val Lys Gly Phe Tyr Pro Ser Asp Ile Ala Val Glu Trp Glu Ser
    370                 375                 380

Asn Gly Gln Pro Glu Asn Asn Tyr Lys Thr Thr Pro Pro Val Leu Asp
385                 390                 395                 400

Ser Asp Gly Ser Phe Phe Leu Tyr Ser Lys Leu Thr Val Asp Lys Ser
                405                 410                 415

Arg Trp Gln Gln Gly Asn Val Phe Ser Cys Ser Val Met His Glu Ala
            420                 425                 430

Leu His Asn His Tyr Thr Gln Lys Ser Leu Ser Leu Ser Pro Gly Lys
        435                 440                 445

Gly Ser Ala Pro Pro Arg Leu Ile Cys Asp Ser Arg Val Leu Glu Arg
    450                 455                 460

Tyr Leu Leu Glu Ala Lys Glu Ala Glu Asn Ile Thr Thr Gly Cys Ala
465                 470                 475                 480

Glu His Cys Ser Leu Asn Glu Asn Ile Thr Val Pro Asp Thr Lys Val
                485                 490                 495

Asn Phe Tyr Ala Trp Lys Arg Met Glu Val Gly Gln Gln Ala Val Glu
            500                 505                 510

Val Trp Gln Gly Leu Ala Leu Leu Ser Glu Ala Val Leu Arg Gly Gln
        515                 520                 525

Ala Leu Leu Val Asn Ser Ser Gln Pro Trp Glu Pro Leu Gln Leu His
    530                 535                 540

Val Asp Lys Ala Val Ser Gly Leu Arg Ser Leu Thr Thr Leu Leu Arg
545                 550                 555                 560

Ala Leu Gly Ala Gln Lys Glu Ala Ile Ser Pro Pro Asp Ala Ala Ser
                565                 570                 575

Ala Ala Pro Leu Arg Thr Ile Thr Ala Asp Thr Phe Arg Lys Leu Phe
            580                 585                 590

Arg Val Tyr Ser Asn Phe Leu Arg Gly Lys Leu Lys Leu Tyr Thr Gly
        595                 600                 605

Glu Ala Cys Arg Thr Gly Asp Arg
    610                 615
```

<210> 258
<211> 1931
<212> DNA
<213> Artificial Sequence

<220>
<223> Nucleotide sequence encoding the amino acid sequence of fusion protein of heavy chain of anti-hTfR antibody No. 3 (humanized 2) and hEPO, synthetic sequence

<400> 258
acgcgtgccg ccaccatggg ctggagctgg attctgctgt tcctcctgag cgtgacagca 60

ggagtgcaca gcgaggtgca actagtgcag tctggagcag aggtgaaaaa gcccggggag 120

tctctgaaga tttcctgtaa gggttctgga tacagcttta ccaactactg gctgggatgg 180

gtgcgccaga tgcccgggaa aggcctggag tggatggggg acatctaccc cggcggagac 240

taccctacat acagcgagaa gttcaaggtc caggtcacca tctcagccga caagtccatc 300

agcaccgcct acctgcagtg gagcagcctg aaggcctcgg acaccgccat gtattactgt 360

gcgagatcag gcaattacga cgaagtggcc tactggggcc aaggaaccct ggtcaccgtc 420

tcctcagcta gcaccaaggg cccatcggtc ttcccctgg caccctcctc caagagcacc 480

tctgggggca cagcggccct gggctgcctg gtcaaggact acttccccga accggtgacg 540

gtgtcgtgga actcaggcgc cctgaccagc ggcgtgcaca ccttcccggc tgtcctacag 600

tcctcaggac tctactccct cagcagcgtg gtgaccgtgc cctccagcag cttgggcacc 660

cagacctaca tctgcaacgt gaatcacaag cccagcaaca ccaaggtgga caagaaagtt 720

gagcccaaat cttgtgacaa aactcacacg tgcccaccgt gcccagcacc tgaactcctg 780

ggaggtccgt cagtcttcct cttcccccca aaacccaagg acaccctcat gatctcccgg 840

acccctgagg tcacatgcgt ggtggtggac gtgagccacg aagaccctga ggtcaagttc 900

aactggtacg tggacggcgt ggaggtgcat aatgccaaga caaagccgcg ggaggagcag 960

tacaacagca cgtaccgggt ggtcagcgtc ctcaccgtcc tgcaccagga ctggctgaat 1020

ggcaaggagt acaagtgcaa ggtctccaac aaagccctcc cagccccat cgagaaaacc 1080

atctccaaag ccaaagggca gccccgagaa ccacaggtgt acaccctgcc cccatcccgg 1140

gatgagctga ccaagaacca ggtcagcctg acctgcctgg tcaaaggctt ctatcccagc 1200

gacatcgccg tggagtggga gagcaatggg cagccggaga acaactacaa gaccacgcct 1260

cccgtgctgg actccgacgg ctccttcttc ctctacagca agctcaccgt ggacaagagc 1320

aggtggcagc aggggaacgt cttctcatgc tccgtgatgc atgaggctct gcacaaccac 1380

tacacgcaga agagcctctc cctgtctccg ggtaaaggat ctgccccacc acgcctcatc 1440

tgtgacagcc gagtcctgga gaggtacctc ttggaggcca aggaggccga gaatatcacg 1500

acgggctgtg ctgaacactg cagcttgaat gagaatatca ctgtcccaga caccaaagtt 1560

aatttctatg cctggaagag gatggaggtc gggcagcagg ccgtagaagt ctggcagggc 1620

ctggccctgc tgtcggaagc tgtcctgcgg ggccaggccc tgttggtcaa ctcttcccag 1680

ccgtgggagc ccctgcagct gcatgtggat aaagccgtca gtggccttcg cagcctcacc 1740

actctgcttc gggctctggg agcccagaag gaagccatct cccctccaga tgcggcctca 1800

gctgctccac tccgaacaat cactgctgac actttccgca aactcttccg agtctactcc 1860

aatttcctcc ggggaaagct gaagctgtac acaggggagg cctgcaggac aggggacaga 1920

taagcggccg c 1931

<210> 259
<211> 489
<212> PRT
<213> Homo sapiens

<400> 259

Arg Pro Pro Asn Ile Val Leu Ile Phe Ala Asp Asp Leu Gly Tyr Gly
1 5 10 15

Asp Leu Gly Cys Tyr Gly His Pro Ser Ser Thr Thr Pro Asn Leu Asp
20 25 30

Gln Leu Ala Ala Gly Gly Leu Arg Phe Thr Asp Phe Tyr Val Pro Val
35 40 45

Ser Leu Cys Thr Pro Ser Arg Ala Ala Leu Leu Thr Gly Arg Leu Pro
50 55 60

Val Arg Met Gly Met Tyr Pro Gly Val Leu Val Pro Ser Ser Arg Gly
65 70 75 80

Gly Leu Pro Leu Glu Glu Val Thr Val Ala Glu Val Leu Ala Ala Arg
85 90 95

Gly Tyr Leu Thr Gly Met Ala Gly Lys Trp His Leu Gly Val Gly Pro
100 105 110

Glu Gly Ala Phe Leu Pro Pro His Gln Gly Phe His Arg Phe Leu Gly
115 120 125

Ile Pro Tyr Ser His Asp Gln Gly Pro Cys Gln Asn Leu Thr Cys Phe
130 135 140

Pro Pro Ala Thr Pro Cys Asp Gly Gly Cys Asp Gln Gly Leu Val Pro
145 150 155 160

Ile Pro Leu Leu Ala Asn Leu Ser Val Glu Ala Gln Pro Pro Trp Leu
165 170 175

Pro Gly Leu Glu Ala Arg Tyr Met Ala Phe Ala His Asp Leu Met Ala
180 185 190

Asp Ala Gln Arg Gln Asp Arg Pro Phe Phe Leu Tyr Tyr Ala Ser His
195 200 205

His Thr His Tyr Pro Gln Phe Ser Gly Gln Ser Phe Ala Glu Arg Ser
210 215 220

```
Gly Arg Gly Pro Phe Gly Asp Ser Leu Met Glu Leu Asp Ala Ala Val
225                 230                 235                 240

Gly Thr Leu Met Thr Ala Ile Gly Asp Leu Gly Leu Leu Glu Glu Thr
                245                 250                 255

Leu Val Ile Phe Thr Ala Asp Asn Gly Pro Glu Thr Met Arg Met Ser
            260                 265                 270

Arg Gly Gly Cys Ser Gly Leu Leu Arg Cys Gly Lys Gly Thr Thr Tyr
        275                 280                 285

Glu Gly Gly Val Arg Glu Pro Ala Leu Ala Phe Trp Pro Gly His Ile
    290                 295                 300

Ala Pro Gly Val Thr His Glu Leu Ala Ser Ser Leu Asp Leu Leu Pro
305                 310                 315                 320

Thr Leu Ala Ala Leu Ala Gly Ala Pro Leu Pro Asn Val Thr Leu Asp
                325                 330                 335

Gly Phe Asp Leu Ser Pro Leu Leu Leu Gly Thr Gly Lys Ser Pro Arg
            340                 345                 350

Gln Ser Leu Phe Phe Tyr Pro Ser Tyr Pro Asp Glu Val Arg Gly Val
        355                 360                 365

Phe Ala Val Arg Thr Gly Lys Tyr Lys Ala His Phe Phe Thr Gln Gly
    370                 375                 380

Ser Ala His Ser Asp Thr Thr Ala Asp Pro Ala Cys His Ala Ser Ser
385                 390                 395                 400

Ser Leu Thr Ala His Glu Pro Pro Leu Leu Tyr Asp Leu Ser Lys Asp
                405                 410                 415

Pro Gly Glu Asn Tyr Asn Leu Leu Gly Gly Val Ala Gly Ala Thr Pro
            420                 425                 430

Glu Val Leu Gln Ala Leu Lys Gln Leu Gln Leu Leu Lys Ala Gln Leu
        435                 440                 445

Asp Ala Ala Val Thr Phe Gly Pro Ser Gln Val Ala Arg Gly Glu Asp
    450                 455                 460

Pro Ala Leu Gln Ile Cys Cys His Pro Gly Cys Thr Pro Arg Pro Ala
465                 470                 475                 480

Cys Cys His Cys Pro Asp Pro His Ala
                485
```

<210> 260
<211> 939
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of the fusion protein of heavy chain of anti-hTfR antibody No.3 (humanized 2) and hARSA

<400> 260

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

Ser Leu Lys Ile Ser Cys Lys Gly Ser Gly Tyr Ser Phe Thr Asn Tyr
            20                  25                  30

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

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

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

Leu Gln Trp Ser Ser Leu Lys Ala Ser Asp Thr Ala Met Tyr Tyr Cys
                85                  90                  95

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

Leu Val Thr Val Ser Ser Ala Ser Thr Lys Gly Pro Ser Val Phe Pro
        115                 120                 125

Leu Ala Pro Ser Ser Lys Ser Thr Ser Gly Gly Thr Ala Ala Leu Gly
    130                 135                 140

Cys Leu Val Lys Asp Tyr Phe Pro Glu Pro Val Thr Val Ser Trp Asn
145                 150                 155                 160

Ser Gly Ala Leu Thr Ser Gly Val His Thr Phe Pro Ala Val Leu Gln
                165                 170                 175

Ser Ser Gly Leu Tyr Ser Leu Ser Ser Val Val Thr Val Pro Ser Ser
            180                 185                 190

Ser Leu Gly Thr Gln Thr Tyr Ile Cys Asn Val Asn His Lys Pro Ser
        195                 200                 205

Asn Thr Lys Val Asp Lys Lys Val Glu Pro Lys Ser Cys Asp Lys Thr
    210                 215                 220
```

```
His Thr Cys Pro Pro Cys Pro Ala Pro Glu Leu Leu Gly Gly Pro Ser
225                 230                 235                 240

Val Phe Leu Phe Pro Pro Lys Pro Lys Asp Thr Leu Met Ile Ser Arg
                245                 250                 255

Thr Pro Glu Val Thr Cys Val Val Val Asp Val Ser His Glu Asp Pro
            260                 265                 270

Glu Val Lys Phe Asn Trp Tyr Val Asp Gly Val Glu Val His Asn Ala
        275                 280                 285

Lys Thr Lys Pro Arg Glu Glu Gln Tyr Asn Ser Thr Tyr Arg Val Val
    290                 295                 300

Ser Val Leu Thr Val Leu His Gln Asp Trp Leu Asn Gly Lys Glu Tyr
305                 310                 315                 320

Lys Cys Lys Val Ser Asn Lys Ala Leu Pro Ala Pro Ile Glu Lys Thr
                325                 330                 335

Ile Ser Lys Ala Lys Gly Gln Pro Arg Glu Pro Gln Val Tyr Thr Leu
            340                 345                 350

Pro Pro Ser Arg Asp Glu Leu Thr Lys Asn Gln Val Ser Leu Thr Cys
        355                 360                 365

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

Asn Gly Gln Pro Glu Asn Asn Tyr Lys Thr Thr Pro Pro Val Leu Asp
385                 390                 395                 400

Ser Asp Gly Ser Phe Phe Leu Tyr Ser Lys Leu Thr Val Asp Lys Ser
                405                 410                 415

Arg Trp Gln Gln Gly Asn Val Phe Ser Cys Ser Val Met His Glu Ala
            420                 425                 430

Leu His Asn His Tyr Thr Gln Lys Ser Leu Ser Leu Ser Pro Gly Lys
        435                 440                 445

Gly Ser Arg Pro Pro Asn Ile Val Leu Ile Phe Ala Asp Asp Leu Gly
    450                 455                 460

Tyr Gly Asp Leu Gly Cys Tyr Gly His Pro Ser Ser Thr Thr Pro Asn
465                 470                 475                 480

Leu Asp Gln Leu Ala Ala Gly Gly Leu Arg Phe Thr Asp Phe Tyr Val
                485                 490                 495
```

```
Pro Val Ser Leu Cys Thr Pro Ser Arg Ala Ala Leu Leu Thr Gly Arg
            500                 505                 510

Leu Pro Val Arg Met Gly Met Tyr Pro Gly Val Leu Val Pro Ser Ser
        515                 520                 525

Arg Gly Gly Leu Pro Leu Glu Glu Val Thr Val Ala Glu Val Leu Ala
    530                 535                 540

Ala Arg Gly Tyr Leu Thr Gly Met Ala Gly Lys Trp His Leu Gly Val
545                 550                 555                 560

Gly Pro Glu Gly Ala Phe Leu Pro Pro His Gln Gly Phe His Arg Phe
                565                 570                 575

Leu Gly Ile Pro Tyr Ser His Asp Gln Gly Pro Cys Gln Asn Leu Thr
            580                 585                 590

Cys Phe Pro Pro Ala Thr Pro Cys Asp Gly Gly Cys Asp Gln Gly Leu
        595                 600                 605

Val Pro Ile Pro Leu Leu Ala Asn Leu Ser Val Glu Ala Gln Pro Pro
    610                 615                 620

Trp Leu Pro Gly Leu Glu Ala Arg Tyr Met Ala Phe Ala His Asp Leu
625                 630                 635                 640

Met Ala Asp Ala Gln Arg Gln Asp Arg Pro Phe Phe Leu Tyr Tyr Ala
                645                 650                 655

Ser His His Thr His Tyr Pro Gln Phe Ser Gly Gln Ser Phe Ala Glu
            660                 665                 670

Arg Ser Gly Arg Gly Pro Phe Gly Asp Ser Leu Met Glu Leu Asp Ala
        675                 680                 685

Ala Val Gly Thr Leu Met Thr Ala Ile Gly Asp Leu Gly Leu Leu Glu
    690                 695                 700

Glu Thr Leu Val Ile Phe Thr Ala Asp Asn Gly Pro Glu Thr Met Arg
705                 710                 715                 720

Met Ser Arg Gly Gly Cys Ser Gly Leu Leu Arg Cys Gly Lys Gly Thr
                725                 730                 735

Thr Tyr Glu Gly Gly Val Arg Glu Pro Ala Leu Ala Phe Trp Pro Gly
            740                 745                 750

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

```
Leu Pro Thr Leu Ala Ala Leu Ala Gly Ala Pro Leu Pro Asn Val Thr
    770                 775                 780

Leu Asp Gly Phe Asp Leu Ser Pro Leu Leu Leu Gly Thr Gly Lys Ser
785                 790                 795                 800

Pro Arg Gln Ser Leu Phe Phe Tyr Pro Ser Tyr Pro Asp Glu Val Arg
                805                 810                 815

Gly Val Phe Ala Val Arg Thr Gly Lys Tyr Lys Ala His Phe Phe Thr
            820                 825                 830

Gln Gly Ser Ala His Ser Asp Thr Thr Ala Asp Pro Ala Cys His Ala
        835                 840                 845

Ser Ser Ser Leu Thr Ala His Glu Pro Pro Leu Leu Tyr Asp Leu Ser
    850                 855                 860

Lys Asp Pro Gly Glu Asn Tyr Asn Leu Leu Gly Gly Val Ala Gly Ala
865                 870                 875                 880

Thr Pro Glu Val Leu Gln Ala Leu Lys Gln Leu Gln Leu Leu Lys Ala
                885                 890                 895

Gln Leu Asp Ala Ala Val Thr Phe Gly Pro Ser Gln Val Ala Arg Gly
            900                 905                 910

Glu Asp Pro Ala Leu Gln Ile Cys Cys His Pro Gly Cys Thr Pro Arg
        915                 920                 925

Pro Ala Cys Cys His Cys Pro Asp Pro His Ala
    930                 935
```

<210> 261
<211> 2900
<212> DNA
<213> Artificial Sequence

<220>
<223> Nucleotide sequence encoding the amino acid sequence of fusion protein of heavy chain of anti-hTfR antibody No.3 (humanized 2) and hARSA, synthetic sequence

<400> 261

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acgcgtgccg ccaccatggg ctggagctgg attctgctgt tcctcctgag cgtgacagca       60

ggagtgcaca gcgaggtgca actagtgcag tctggagcag aggtgaaaaa gcccggggag      120

tctctgaaga tttcctgtaa gggttctgga tacagcttta ccaactactg gctgggatgg      180

gtgcgccaga tgcccgggaa aggcctggag tggatggggg acatctaccc cggcggagac      240

taccctacat acagcgagaa gttcaaggtc caggtcacca tctcagccga caagtccatc      300

agcaccgcct acctgcagtg gagcagcctg aaggcctcgg acaccgccat gtattactgt      360

gcgagatcag gcaattacga cgaagtggcc tactggggcc aaggaaccct ggtcaccgtc      420
```

tcctcagcta gcaccaaggg cccatcggtc ttccccctgg caccctcctc caagagcacc 480

tctgggggca cagcggccct gggctgcctg gtcaaggact acttccccga accggtgacg 540

gtgtcgtgga actcaggcgc cctgaccagc ggcgtgcaca ccttcccggc tgtcctacag 600

tcctcaggac tctactccct cagcagcgtg gtgaccgtgc cctccagcag cttgggcacc 660

cagacctaca tctgcaacgt gaatcacaag cccagcaaca ccaaggtgga caagaaagtt 720

gagcccaaat cttgtgacaa aactcacacg tgcccaccgt gcccagcacc tgaactcctg 780

ggaggtccgt cagtcttcct cttcccccca aaacccaagg acaccctcat gatctcccgg 840

acccctgagg tcacatgcgt ggtggtggac gtgagccacg aagaccctga ggtcaagttc 900

aactggtacg tggacggcgt ggaggtgcat aatgccaaga caaagccgcg ggaggagcag 960

tacaacagca cgtaccgggt ggtcagcgtc ctcaccgtcc tgcaccagga ctggctgaat 1020

ggcaaggagt acaagtgcaa ggtctccaac aaagccctcc cagccccat cgagaaaacc 1080

atctccaaag ccaaagggca gccccgagaa ccacaggtgt acaccctgcc cccatcccgg 1140

gatgagctga ccaagaacca ggtcagcctg acctgcctgg tcaaaggctt ctatcccagc 1200

gacatcgccg tggagtggga gagcaatggg cagccggaga acaactacaa gaccacgcct 1260

cccgtgctgg actccgacgg ctccttcttc ctctacagca agctcaccgt ggacaagagc 1320

aggtggcagc aggggaacgt cttctcatgc tccgtgatgc atgaggctct gcacaaccac 1380

tacacgcaga agagcctctc cctgtctccg ggtaaaggat ctcgtccgcc caacatcgtg 1440

ctgatctttg ccgacgacct cggctatggg gacctgggct gctatgggca ccccagctct 1500

accactccca acctggacca gctggcggcg ggagggctgc ggttcacaga cttctacgtg 1560

cctgtgtctc tgtgcacacc ctctagggcc gccctcctga ccggccggct cccggttcgg 1620

atgggcatgt accctggcgt cctggtgccc agctcccggg ggggcctgcc cctggaggag 1680

gtgaccgtgg ccgaagtcct ggctgcccga ggctacctca caggaatggc cggcaagtgg 1740

caccttgggg tggggcctga gggggccttc ctgccccccc atcagggctt ccatcgattt 1800

ctaggcatcc cgtactccca cgaccagggc ccctgccaga acctgacctg cttcccgccg 1860

gccactcctt gcgacggtgg ctgtgaccag ggcctggtcc ccatcccact gttggccaac 1920

ctgtccgtgg aggcgcagcc cccctggctg cccggactag aggcccgcta catggctttc 1980

gcccatgacc tcatggccga cgcccagcgc caggatcgcc ccttcttcct gtactatgcc 2040

tctcaccaca cccactaccc tcagttcagt gggcagagct ttgcagagcg ttcaggccgc 2100

gggccatttg gggactccct gatggagctg gatgcagctg tggggaccct gatgacagcc 2160

ataggggacc tggggctgct tgaagagacg ctggtcatct tcactgcaga caatggacct 2220

gagaccatgc gtatgtcccg aggcggctgc tccggtctct tgcggtgtgg aaagggaacg 2280

acctacgagg gcggtgtccg agagcctgcc ttggccttct ggccaggtca tatcgctccc 2340

ggcgtgaccc acgagctggc cagctccctg gacctgctgc ctaccctggc agccctggct 2400

ggggccccac tgcccaatgt caccttggat ggctttgacc tcagcccccct gctgctgggc 2460

acaggcaaga gccctcggca gtctctcttc ttctacccgt cctacccaga cgaggtccgt 2520

ggggtttttg ctgtgcggac tggaaagtac aaggctcact tcttcaccca gggctctgcc 2580

cacagtgata ccactgcaga ccctgcctgc cacgcctcca gctctctgac tgctcatgag 2640

cccccgctgc tctatgacct gtccaaggac cctggtgaga actacaacct gctgggggt 2700

gtggccgggg ccaccccaga ggtgctgcaa gccctgaaac agcttcagct gctcaaggcc 2760

cagttagacg cagctgtgac cttcggcccc agccaggtgg cccggggcga ggaccccgcc 2820

ctgcaaatct gctgtcatcc tggctgcacc ccccgcccag cttgctgcca ttgcccagat 2880

ccccatgcct aagcggccgc 2900

<210> 262
<211> 279
<212> PRT
<213> Homo sapiens

<400> 262

Asp Pro Pro Ala Pro Leu Pro Leu Val Ile Trp His Gly Met Gly Asp
1 5 10 15

Ser Cys Cys Asn Pro Leu Ser Met Gly Ala Ile Lys Lys Met Val Glu
20 25 30

Lys Lys Ile Pro Gly Ile Tyr Val Leu Ser Leu Glu Ile Gly Lys Thr
35 40 45

Leu Met Glu Asp Val Glu Asn Ser Phe Phe Leu Asn Val Asn Ser Gln
50 55 60

Val Thr Thr Val Cys Gln Ala Leu Ala Lys Asp Pro Lys Leu Gln Gln
65 70 75 80

Gly Tyr Asn Ala Met Gly Phe Ser Gln Gly Gly Gln Phe Leu Arg Ala
85 90 95

Val Ala Gln Arg Cys Pro Ser Pro Pro Met Ile Asn Leu Ile Ser Val
100 105 110

Gly Gly Gln His Gln Gly Val Phe Gly Leu Pro Arg Cys Pro Gly Glu
115 120 125

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

Tyr Ser Lys Val Val Gln Glu Arg Leu Val Gln Ala Glu Tyr Trp His
145 150 155 160

Asp Pro Ile Lys Glu Asp Val Tyr Arg Asn His Ser Ile Phe Leu Ala
165 170 175

```
Asp Ile Asn Gln Glu Arg Gly Ile Asn Glu Ser Tyr Lys Lys Asn Leu
            180                 185                 190

Met Ala Leu Lys Lys Phe Val Met Val Lys Phe Leu Asn Asp Ser Ile
        195                 200                 205

Val Asp Pro Val Asp Ser Glu Trp Phe Gly Phe Tyr Arg Ser Gly Gln
    210                 215                 220

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

Arg Leu Gly Leu Lys Glu Met Asp Asn Ala Gly Gln Leu Val Phe Leu
                245                 250                 255

Ala Thr Glu Gly Asp His Leu Gln Leu Ser Glu Glu Trp Phe Tyr Ala
            260                 265                 270

His Ile Ile Pro Phe Leu Gly
        275
```

<210> 263
<211> 729
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of the fusion protein of heavy chain of anti-hTfR antibody No.3 (humanized 2) and hPPT-1

<400> 263

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

Ser Leu Lys Ile Ser Cys Lys Gly Ser Gly Tyr Ser Phe Thr Asn Tyr
            20                  25                  30

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

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

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

Leu Gln Trp Ser Ser Leu Lys Ala Ser Asp Thr Ala Met Tyr Tyr Cys
                85                  90                  95

Ala Arg Ser Gly Asn Tyr Asp Glu Val Ala Tyr Trp Gly Gln Gly Thr
            100                 105                 110
```

```
Leu Val Thr Val Ser Ser Ala Ser Thr Lys Gly Pro Ser Val Phe Pro
        115                 120                 125

Leu Ala Pro Ser Ser Lys Ser Thr Ser Gly Gly Thr Ala Ala Leu Gly
    130                 135                 140

Cys Leu Val Lys Asp Tyr Phe Pro Glu Pro Val Thr Val Ser Trp Asn
145                 150                 155                 160

Ser Gly Ala Leu Thr Ser Gly Val His Thr Phe Pro Ala Val Leu Gln
                165                 170                 175

Ser Ser Gly Leu Tyr Ser Leu Ser Ser Val Val Thr Val Pro Ser Ser
            180                 185                 190

Ser Leu Gly Thr Gln Thr Tyr Ile Cys Asn Val Asn His Lys Pro Ser
        195                 200                 205

Asn Thr Lys Val Asp Lys Lys Val Glu Pro Lys Ser Cys Asp Lys Thr
    210                 215                 220

His Thr Cys Pro Pro Cys Pro Ala Pro Glu Leu Leu Gly Gly Pro Ser
225                 230                 235                 240

Val Phe Leu Phe Pro Pro Lys Pro Lys Asp Thr Leu Met Ile Ser Arg
                245                 250                 255

Thr Pro Glu Val Thr Cys Val Val Val Asp Val Ser His Glu Asp Pro
            260                 265                 270

Glu Val Lys Phe Asn Trp Tyr Val Asp Gly Val Glu Val His Asn Ala
        275                 280                 285

Lys Thr Lys Pro Arg Glu Glu Gln Tyr Asn Ser Thr Tyr Arg Val Val
    290                 295                 300

Ser Val Leu Thr Val Leu His Gln Asp Trp Leu Asn Gly Lys Glu Tyr
305                 310                 315                 320

Lys Cys Lys Val Ser Asn Lys Ala Leu Pro Ala Pro Ile Glu Lys Thr
                325                 330                 335

Ile Ser Lys Ala Lys Gly Gln Pro Arg Glu Pro Gln Val Tyr Thr Leu
            340                 345                 350

Pro Pro Ser Arg Asp Glu Leu Thr Lys Asn Gln Val Ser Leu Thr Cys
        355                 360                 365

Leu Val Lys Gly Phe Tyr Pro Ser Asp Ile Ala Val Glu Trp Glu Ser
    370                 375                 380
```

```
Asn Gly Gln Pro Glu Asn Asn Tyr Lys Thr Thr Pro Pro Val Leu Asp
385                 390                 395                 400

Ser Asp Gly Ser Phe Phe Leu Tyr Ser Lys Leu Thr Val Asp Lys Ser
                405                 410                 415

Arg Trp Gln Gln Gly Asn Val Phe Ser Cys Ser Val Met His Glu Ala
            420                 425                 430

Leu His Asn His Tyr Thr Gln Lys Ser Leu Ser Leu Ser Pro Gly Lys
        435                 440                 445

Gly Ser Asp Pro Pro Ala Pro Leu Pro Leu Val Ile Trp His Gly Met
    450                 455                 460

Gly Asp Ser Cys Cys Asn Pro Leu Ser Met Gly Ala Ile Lys Lys Met
465                 470                 475                 480

Val Glu Lys Lys Ile Pro Gly Ile Tyr Val Leu Ser Leu Glu Ile Gly
                485                 490                 495

Lys Thr Leu Met Glu Asp Val Glu Asn Ser Phe Phe Leu Asn Val Asn
            500                 505                 510

Ser Gln Val Thr Thr Val Cys Gln Ala Leu Ala Lys Asp Pro Lys Leu
        515                 520                 525

Gln Gln Gly Tyr Asn Ala Met Gly Phe Ser Gln Gly Gly Gln Phe Leu
    530                 535                 540

Arg Ala Val Ala Gln Arg Cys Pro Ser Pro Pro Met Ile Asn Leu Ile
545                 550                 555                 560

Ser Val Gly Gly Gln His Gln Gly Val Phe Gly Leu Pro Arg Cys Pro
                565                 570                 575

Gly Glu Ser Ser His Ile Cys Asp Phe Ile Arg Lys Thr Leu Asn Ala
            580                 585                 590

Gly Ala Tyr Ser Lys Val Val Gln Glu Arg Leu Val Gln Ala Glu Tyr
        595                 600                 605

Trp His Asp Pro Ile Lys Glu Asp Val Tyr Arg Asn His Ser Ile Phe
    610                 615                 620

Leu Ala Asp Ile Asn Gln Glu Arg Gly Ile Asn Glu Ser Tyr Lys Lys
625                 630                 635                 640

Asn Leu Met Ala Leu Lys Lys Phe Val Met Val Lys Phe Leu Asn Asp
                645                 650                 655
```

Ser Ile Val Asp Pro Val Asp Ser Glu Trp Phe Gly Phe Tyr Arg Ser
660 665 670

Gly Gln Ala Lys Glu Thr Ile Pro Leu Gln Glu Thr Ser Leu Tyr Thr
675 680 685

Gln Asp Arg Leu Gly Leu Lys Glu Met Asp Asn Ala Gly Gln Leu Val
690 695 700

Phe Leu Ala Thr Glu Gly Asp His Leu Gln Leu Ser Glu Glu Trp Phe
705 710 715 720

Tyr Ala His Ile Ile Pro Phe Leu Gly
725

<210> 264
<211> 2270
<212> DNA
<213> Artificial Sequence

<220>
<223> Nucleotide sequence encoding the amino acid sequence of fusion protein of heavy chain of anti-hTfR antibody No.3 (humanized 2) and hPPT-1, synthetic sequence

<400> 264
acgcgtgccg ccaccatggg ctggagctgg attctgctgt tcctcctgag cgtgacagca 60

ggagtgcaca gcgaggtgca actagtgcag tctggagcag aggtgaaaaa gcccggggag 120

tctctgaaga tttcctgtaa gggttctgga tacagcttta ccaactactg gctgggatgg 180

gtgcgccaga tgcccgggaa aggcctggag tggatggggg acatctaccc cggcggagac 240

taccctacat acagcgagaa gttcaaggtc caggtcacca tctcagccga caagtccatc 300

agcaccgcct acctgcagtg gagcagcctg aaggcctcgg acaccgccat gtattactgt 360

gcgagatcag gcaattacga cgaagtggcc tactggggcc aaggaaccct ggtcaccgtc 420

tcctcagcta gcaccaaggg cccatcggtc ttcccctgg caccctcctc caagagcacc 480

tctgggggca cagcggccct gggctgcctg gtcaaggact acttccccga accggtgacg 540

gtgtcgtgga actcaggcgc cctgaccagc ggcgtgcaca ccttcccggc tgtcctacag 600

tcctcaggac tctactccct cagcagcgtg gtgaccgtgc cctccagcag cttgggcacc 660

cagacctaca tctgcaacgt gaatcacaag cccagcaaca ccaaggtgga caagaaagtt 720

gagcccaaat cttgtgacaa aactcacacg tgcccaccgt gcccagcacc tgaactcctg 780

ggaggtccgt cagtcttcct cttccccca aaacccaagg acaccctcat gatctcccgg 840

acccctgagg tcacatgcgt ggtggtggac gtgagccacg aagaccctga ggtcaagttc 900

aactggtacg tggacggcgt ggaggtgcat aatgccaaga caaagccgcg ggaggagcag 960

tacaacagca cgtaccgggt ggtcagcgtc ctcaccgtcc tgcaccagga ctggctgaat 1020

ggcaaggagt acaagtgcaa ggtctccaac aaagccctcc cagccccat cgagaaaacc 1080

atctccaaag ccaaagggca gccccgagaa ccacaggtgt acaccctgcc cccatcccgg 1140

gatgagctga ccaagaacca ggtcagcctg acctgcctgg tcaaaggctt ctatcccagc 1200

gacatcgccg tggagtggga gagcaatggg cagccggaga acaactacaa gaccacgcct 1260

cccgtgctgg actccgacgg ctccttcttc ctctacagca agctcaccgt ggacaagagc 1320

aggtggcagc aggggaacgt cttctcatgc tccgtgatgc atgaggctct gcacaaccac 1380

tacacgcaga agagcctctc cctgtctccg ggtaaaggat ctgacccgcc ggcgccgctg 1440

ccgttggtga tctggcatgg gatgggagac agctgttgca atcccttaag catgggtgct 1500

attaaaaaaa tggtggagaa gaaaatacct ggaatttacg tcttatcttt agagattggg 1560

aagaccctga tggaggacgt ggagaacagc ttcttcttga atgtcaattc ccaagtaaca 1620

acagtgtgtc aggcacttgc taaagatcct aaattgcagc aaggctacaa tgctatggga 1680

ttctcccagg gaggccaatt tctgagggca gtggctcaga gatgcccttc acctcccatg 1740

atcaatctga tctcggttgg gggacaacat caaggtgttt ttggactccc tcgatgccca 1800

ggagagagct ctcacatctg tgacttcatc cgaaaaacac tgaatgctgg ggcgtactcc 1860

aaagttgttc aggaacgcct cgtgcaagcc gaatactggc atgaccccat aaaggaggat 1920

gtgtatcgca accacagcat cttcttggca gatataaatc aggagcgggg tatcaatgag 1980

tcctacaaga aaaacctgat ggccctgaag aagtttgtga tggtgaaatt cctcaatgat 2040

tccattgtgg accctgtaga ttcggagtgg tttggatttt acagaagtgg ccaagccaag 2100

gaaaccattc ccttacagga gacctccctg tacacacagg accgcctggg gctaaaggaa 2160

atggacaatg caggacagct agtgtttctg gctacagaag gggaccatct tcagttgtct 2220

gaagaatggt tttatgccca catcatacca ttccttggat aagcggccgc 2270

<210> 265
<211> 544
<212> PRT
<213> Homo sapiens

<400> 265

Ser Tyr Ser Pro Glu Pro Asp Gln Arg Arg Thr Leu Pro Pro Gly Trp
1 5 10 15

Val Ser Leu Gly Arg Ala Asp Pro Glu Glu Glu Leu Ser Leu Thr Phe
20 25 30

Ala Leu Arg Gln Gln Asn Val Glu Arg Leu Ser Glu Leu Val Gln Ala
35 40 45

Val Ser Asp Pro Ser Ser Pro Gln Tyr Gly Lys Tyr Leu Thr Leu Glu
50 55 60

Asn Val Ala Asp Leu Val Arg Pro Ser Pro Leu Thr Leu His Thr Val
65 70 75 80

Gln Lys Trp Leu Leu Ala Ala Gly Ala Gln Lys Cys His Ser Val Ile

85 90 95

Thr Gln Asp Phe Leu Thr Cys Trp Leu Ser Ile Arg Gln Ala Glu Leu
100 105 110

Leu Leu Pro Gly Ala Glu Phe His His Tyr Val Gly Gly Pro Thr Glu
115 120 125

Thr His Val Val Arg Ser Pro His Pro Tyr Gln Leu Pro Gln Ala Leu
130 135 140

Ala Pro His Val Asp Phe Val Gly Gly Leu His His Phe Pro Pro Thr
145 150 155 160

Ser Ser Leu Arg Gln Arg Pro Glu Pro Gln Val Thr Gly Thr Val Gly
165 170 175

Leu His Leu Gly Val Thr Pro Ser Val Ile Arg Lys Arg Tyr Asn Leu
180 185 190

Thr Ser Gln Asp Val Gly Ser Gly Thr Ser Asn Asn Ser Gln Ala Cys
195 200 205

Ala Gln Phe Leu Glu Gln Tyr Phe His Asp Ser Asp Leu Ala Gln Phe
210 215 220

Met Arg Leu Phe Gly Gly Asn Phe Ala His Gln Ala Ser Val Ala Arg
225 230 235 240

Val Val Gly Gln Gln Gly Arg Gly Arg Ala Gly Ile Glu Ala Ser Leu
245 250 255

Asp Val Gln Tyr Leu Met Ser Ala Gly Ala Asn Ile Ser Thr Trp Val
260 265 270

Tyr Ser Ser Pro Gly Arg His Glu Gly Gln Glu Pro Phe Leu Gln Trp
275 280 285

Leu Met Leu Leu Ser Asn Glu Ser Ala Leu Pro His Val His Thr Val
290 295 300

Ser Tyr Gly Asp Asp Glu Asp Ser Leu Ser Ser Ala Tyr Ile Gln Arg
305 310 315 320

Val Asn Thr Glu Leu Met Lys Ala Ala Ala Arg Gly Leu Thr Leu Leu
325 330 335

Phe Ala Ser Gly Asp Ser Gly Ala Gly Cys Trp Ser Val Ser Gly Arg
340 345 350

His Gln Phe Arg Pro Thr Phe Pro Ala Ser Ser Pro Tyr Val Thr Thr

355 360 365

Val Gly Gly Thr Ser Phe Gln Glu Pro Phe Leu Ile Thr Asn Glu Ile
370 375 380

Val Asp Tyr Ile Ser Gly Gly Gly Phe Ser Asn Val Phe Pro Arg Pro
385 390 395 400

Ser Tyr Gln Glu Glu Ala Val Thr Lys Phe Leu Ser Ser Ser Pro His
405 410 415

Leu Pro Pro Ser Ser Tyr Phe Asn Ala Ser Gly Arg Ala Tyr Pro Asp
420 425 430

Val Ala Ala Leu Ser Asp Gly Tyr Trp Val Val Ser Asn Arg Val Pro
435 440 445

Ile Pro Trp Val Ser Gly Thr Ser Ala Ser Thr Pro Val Phe Gly Gly
450 455 460

Ile Leu Ser Leu Ile Asn Glu His Arg Ile Leu Ser Gly Arg Pro Pro
465 470 475 480

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

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

Glu Gly Gln Gly Phe Cys Ser Gly Pro Gly Trp Asp Pro Val Thr Gly
515 520 525

Trp Gly Thr Pro Asn Phe Pro Ala Leu Leu Lys Thr Leu Leu Asn Pro
530 535 540

<210> 266
<211> 994
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of the fusion protein of heavy chain of anti-hTfR antibody No.3 (humanized 2) and hTPP-1

<400> 266

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

Ser Leu Lys Ile Ser Cys Lys Gly Ser Gly Tyr Ser Phe Thr Asn Tyr
20 25 30

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

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

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

Leu Gln Trp Ser Ser Leu Lys Ala Ser Asp Thr Ala Met Tyr Tyr Cys
                85                  90                  95

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

Leu Val Thr Val Ser Ser Ala Ser Thr Lys Gly Pro Ser Val Phe Pro
        115                 120                 125

Leu Ala Pro Ser Ser Lys Ser Thr Ser Gly Gly Thr Ala Ala Leu Gly
    130                 135                 140

Cys Leu Val Lys Asp Tyr Phe Pro Glu Pro Val Thr Val Ser Trp Asn
145                 150                 155                 160

Ser Gly Ala Leu Thr Ser Gly Val His Thr Phe Pro Ala Val Leu Gln
                165                 170                 175

Ser Ser Gly Leu Tyr Ser Leu Ser Ser Val Val Thr Val Pro Ser Ser
            180                 185                 190

Ser Leu Gly Thr Gln Thr Tyr Ile Cys Asn Val Asn His Lys Pro Ser
        195                 200                 205

Asn Thr Lys Val Asp Lys Lys Val Glu Pro Lys Ser Cys Asp Lys Thr
    210                 215                 220

His Thr Cys Pro Pro Cys Pro Ala Pro Glu Leu Leu Gly Gly Pro Ser
225                 230                 235                 240

Val Phe Leu Phe Pro Pro Lys Pro Lys Asp Thr Leu Met Ile Ser Arg
                245                 250                 255

Thr Pro Glu Val Thr Cys Val Val Val Asp Val Ser His Glu Asp Pro
            260                 265                 270

Glu Val Lys Phe Asn Trp Tyr Val Asp Gly Val Glu Val His Asn Ala
        275                 280                 285

Lys Thr Lys Pro Arg Glu Glu Gln Tyr Asn Ser Thr Tyr Arg Val Val
    290                 295                 300

Ser Val Leu Thr Val Leu His Gln Asp Trp Leu Asn Gly Lys Glu Tyr
305                 310                 315                 320
```

```
Lys Cys Lys Val Ser Asn Lys Ala Leu Pro Ala Pro Ile Glu Lys Thr
                325                 330                 335

Ile Ser Lys Ala Lys Gly Gln Pro Arg Glu Pro Gln Val Tyr Thr Leu
            340                 345                 350

Pro Pro Ser Arg Asp Glu Leu Thr Lys Asn Gln Val Ser Leu Thr Cys
        355                 360                 365

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

Asn Gly Gln Pro Glu Asn Asn Tyr Lys Thr Thr Pro Pro Val Leu Asp
385                 390                 395                 400

Ser Asp Gly Ser Phe Phe Leu Tyr Ser Lys Leu Thr Val Asp Lys Ser
                405                 410                 415

Arg Trp Gln Gln Gly Asn Val Phe Ser Cys Ser Val Met His Glu Ala
            420                 425                 430

Leu His Asn His Tyr Thr Gln Lys Ser Leu Ser Leu Ser Pro Gly Lys
        435                 440                 445

Gly Ser Ser Tyr Ser Pro Glu Pro Asp Gln Arg Arg Thr Leu Pro Pro
    450                 455                 460

Gly Trp Val Ser Leu Gly Arg Ala Asp Pro Glu Glu Glu Leu Ser Leu
465                 470                 475                 480

Thr Phe Ala Leu Arg Gln Gln Asn Val Glu Arg Leu Ser Glu Leu Val
                485                 490                 495

Gln Ala Val Ser Asp Pro Ser Ser Pro Gln Tyr Gly Lys Tyr Leu Thr
            500                 505                 510

Leu Glu Asn Val Ala Asp Leu Val Arg Pro Ser Pro Leu Thr Leu His
        515                 520                 525

Thr Val Gln Lys Trp Leu Leu Ala Ala Gly Ala Gln Lys Cys His Ser
    530                 535                 540

Val Ile Thr Gln Asp Phe Leu Thr Cys Trp Leu Ser Ile Arg Gln Ala
545                 550                 555                 560

Glu Leu Leu Leu Pro Gly Ala Glu Phe His His Tyr Val Gly Gly Pro
                565                 570                 575

Thr Glu Thr His Val Val Arg Ser Pro His Pro Tyr Gln Leu Pro Gln
            580                 585                 590
```

```
Ala Leu Ala Pro His Val Asp Phe Val Gly Gly Leu His His Phe Pro
        595                 600                 605

Pro Thr Ser Ser Leu Arg Gln Arg Pro Glu Pro Gln Val Thr Gly Thr
    610                 615                 620

Val Gly Leu His Leu Gly Val Thr Pro Ser Val Ile Arg Lys Arg Tyr
625                 630                 635                 640

Asn Leu Thr Ser Gln Asp Val Gly Ser Gly Thr Ser Asn Asn Ser Gln
                645                 650                 655

Ala Cys Ala Gln Phe Leu Glu Gln Tyr Phe His Asp Ser Asp Leu Ala
            660                 665                 670

Gln Phe Met Arg Leu Phe Gly Gly Asn Phe Ala His Gln Ala Ser Val
        675                 680                 685

Ala Arg Val Val Gly Gln Gln Gly Arg Gly Arg Ala Gly Ile Glu Ala
    690                 695                 700

Ser Leu Asp Val Gln Tyr Leu Met Ser Ala Gly Ala Asn Ile Ser Thr
705                 710                 715                 720

Trp Val Tyr Ser Ser Pro Gly Arg His Glu Gly Gln Glu Pro Phe Leu
                725                 730                 735

Gln Trp Leu Met Leu Leu Ser Asn Glu Ser Ala Leu Pro His Val His
            740                 745                 750

Thr Val Ser Tyr Gly Asp Asp Glu Asp Ser Leu Ser Ser Ala Tyr Ile
        755                 760                 765

Gln Arg Val Asn Thr Glu Leu Met Lys Ala Ala Ala Arg Gly Leu Thr
    770                 775                 780

Leu Leu Phe Ala Ser Gly Asp Ser Gly Ala Gly Cys Trp Ser Val Ser
785                 790                 795                 800

Gly Arg His Gln Phe Arg Pro Thr Phe Pro Ala Ser Ser Pro Tyr Val
                805                 810                 815

Thr Thr Val Gly Gly Thr Ser Phe Gln Glu Pro Phe Leu Ile Thr Asn
            820                 825                 830

Glu Ile Val Asp Tyr Ile Ser Gly Gly Gly Phe Ser Asn Val Phe Pro
        835                 840                 845

Arg Pro Ser Tyr Gln Glu Glu Ala Val Thr Lys Phe Leu Ser Ser Ser
    850                 855                 860
```

```
Pro His Leu Pro Pro Ser Ser Tyr Phe Asn Ala Ser Gly Arg Ala Tyr
865                 870                 875                 880

Pro Asp Val Ala Ala Leu Ser Asp Gly Tyr Trp Val Val Ser Asn Arg
                885                 890                 895

Val Pro Ile Pro Trp Val Ser Gly Thr Ser Ala Ser Thr Pro Val Phe
            900                 905                 910

Gly Gly Ile Leu Ser Leu Ile Asn Glu His Arg Ile Leu Ser Gly Arg
        915                 920                 925

Pro Pro Leu Gly Phe Leu Asn Pro Arg Leu Tyr Gln Gln His Gly Ala
    930                 935                 940

Gly Leu Phe Asp Val Thr Arg Gly Cys His Glu Ser Cys Leu Asp Glu
945                 950                 955                 960

Glu Val Glu Gly Gln Gly Phe Cys Ser Gly Pro Gly Trp Asp Pro Val
                965                 970                 975

Thr Gly Trp Gly Thr Pro Asn Phe Pro Ala Leu Leu Lys Thr Leu Leu
            980                 985                 990

Asn Pro
```

<210> 267
<211> 3065
<212> DNA
<213> Artificial Sequence

<220>
<223> Nucleotide sequence encoding the amino acid sequence of fusion protein of heavy chain of anti-hTfR antibody No.3 (humanized 2) and hTPP-1, synthetic sequence

<400> 267

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acgcgtgccg ccaccatggg ctggagctgg attctgctgt tcctcctgag cgtgacagca       60

ggagtgcaca gcgaggtgca actagtgcag tctggagcag aggtgaaaaa gcccggggag      120

tctctgaaga tttcctgtaa gggttctgga tacagcttta ccaactactg gctgggatgg      180

gtgcgccaga tgcccgggaa aggcctggag tggatggggg acatctaccc cggcggagac      240

taccctacat acagcgagaa gttcaaggtc caggtcacca tctcagccga caagtccatc      300

agcaccgcct acctgcagtg gagcagcctg aaggcctcgg acaccgccat gtattactgt      360

gcgagatcag gcaattacga cgaagtggcc tactggggcc aaggaaccct ggtcaccgtc      420

tcctcagcta gcaccaaggg cccatcggtc ttcccctgg caccctcctc caagagcacc       480

tctgggggca cagcggccct gggctgcctg gtcaaggact acttccccga accggtgacg      540

gtgtcgtgga actcaggcgc cctgaccagc ggcgtgcaca ccttcccggc tgtcctacag      600
```

tcctcaggac tctactccct cagcagcgtg gtgaccgtgc cctccagcag cttgggcacc 660

cagacctaca tctgcaacgt gaatcacaag cccagcaaca ccaaggtgga caagaaagtt 720

gagcccaaat cttgtgacaa aactcacacg tgcccaccgt gcccagcacc tgaactcctg 780

ggaggtccgt cagtcttcct cttcccccca aaacccaagg acaccctcat gatctcccgg 840

acccctgagg tcacatgcgt ggtggtggac gtgagccacg aagaccctga ggtcaagttc 900

aactggtacg tggacggcgt ggaggtgcat aatgccaaga caaagccgcg ggaggagcag 960

tacaacagca cgtaccgggt ggtcagcgtc ctcaccgtcc tgcaccagga ctggctgaat 1020

ggcaaggagt acaagtgcaa ggtctccaac aaagccctcc cagccccat cgagaaaacc 1080

atctccaaag ccaaagggca gccccgagaa ccacaggtgt acaccctgcc cccatcccgg 1140

gatgagctga ccaagaacca ggtcagcctg acctgcctgg tcaaaggctt ctatcccagc 1200

gacatcgccg tggagtggga gagcaatggg cagccggaga acaactacaa gaccacgcct 1260

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gccggagccc agaagtgcca ttctgtgatc acacaggact ttctgacttg ctggctgagc 1740

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acggaaaccc atgttgtaag gtccccacat ccctaccagc ttccacaggc cttggccccc 1860

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cgtaagcgat acaacttgac ctcacaagac gtgggctctg gcaccagcaa taacagccaa 2040

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tgtctggatg aagaggtaga gggccagggt ttctgctctg gtcctggctg ggaccctgta 3000

acaggctggg gaacacccaa cttcccagct ttgctgaaga ctctactcaa cccctaagcg 3060

gccgc 3065

<210> 268
<211> 628
<212> PRT
<213> Homo sapiens

<400> 268

Ala Glu Ala Pro His Leu Val His Val Asp Ala Ala Arg Ala Leu Trp
1 5 10 15

Pro Leu Arg Arg Phe Trp Arg Ser Thr Gly Phe Cys Pro Pro Leu Pro
20 25 30

His Ser Gln Ala Asp Gln Tyr Val Leu Ser Trp Asp Gln Gln Leu Asn
35 40 45

Leu Ala Tyr Val Gly Ala Val Pro His Arg Gly Ile Lys Gln Val Arg
50 55 60

Thr His Trp Leu Leu Glu Leu Val Thr Thr Arg Gly Ser Thr Gly Arg
65 70 75 80

Gly Leu Ser Tyr Asn Phe Thr His Leu Asp Gly Tyr Leu Asp Leu Leu
85 90 95

Arg Glu Asn Gln Leu Leu Pro Gly Phe Glu Leu Met Gly Ser Ala Ser
100 105 110

Gly His Phe Thr Asp Phe Glu Asp Lys Gln Gln Val Phe Glu Trp Lys
115 120 125

Asp Leu Val Ser Ser Leu Ala Arg Arg Tyr Ile Gly Arg Tyr Gly Leu
130 135 140

Ala His Val Ser Lys Trp Asn Phe Glu Thr Trp Asn Glu Pro Asp His
145 150 155 160

His Asp Phe Asp Asn Val Ser Met Thr Met Gln Gly Phe Leu Asn Tyr
165 170 175

```
Tyr Asp Ala Cys Ser Glu Gly Leu Arg Ala Ala Ser Pro Ala Leu Arg
            180                 185                 190

Leu Gly Gly Pro Gly Asp Ser Phe His Thr Pro Pro Arg Ser Pro Leu
        195                 200                 205

Ser Trp Gly Leu Leu Arg His Cys His Asp Gly Thr Asn Phe Phe Thr
    210                 215                 220

Gly Glu Ala Gly Val Arg Leu Asp Tyr Ile Ser Leu His Arg Lys Gly
225                 230                 235                 240

Ala Arg Ser Ser Ile Ser Ile Leu Glu Gln Glu Lys Val Val Ala Gln
                245                 250                 255

Gln Ile Arg Gln Leu Phe Pro Lys Phe Ala Asp Thr Pro Ile Tyr Asn
            260                 265                 270

Asp Glu Ala Asp Pro Leu Val Gly Trp Ser Leu Pro Gln Pro Trp Arg
        275                 280                 285

Ala Asp Val Thr Tyr Ala Ala Met Val Val Lys Val Ile Ala Gln His
    290                 295                 300

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

Leu Ser Asn Asp Asn Ala Phe Leu Ser Tyr His Pro His Pro Phe Ala
                325                 330                 335

Gln Arg Thr Leu Thr Ala Arg Phe Gln Val Asn Asn Thr Arg Pro Pro
            340                 345                 350

His Val Gln Leu Leu Arg Lys Pro Val Leu Thr Ala Met Gly Leu Leu
        355                 360                 365

Ala Leu Leu Asp Glu Glu Gln Leu Trp Ala Glu Val Ser Gln Ala Gly
    370                 375                 380

Thr Val Leu Asp Ser Asn His Thr Val Gly Val Leu Ala Ser Ala His
385                 390                 395                 400

Arg Pro Gln Gly Pro Ala Asp Ala Trp Arg Ala Ala Val Leu Ile Tyr
                405                 410                 415

Ala Ser Asp Asp Thr Arg Ala His Pro Asn Arg Ser Val Ala Val Thr
            420                 425                 430

Leu Arg Leu Arg Gly Val Pro Pro Gly Pro Gly Leu Val Tyr Val Thr
        435                 440                 445
```

```
Arg Tyr Leu Asp Asn Gly Leu Cys Ser Pro Asp Gly Glu Trp Arg Arg
    450                 455                 460

Leu Gly Arg Pro Val Phe Pro Thr Ala Glu Gln Phe Arg Arg Met Arg
465                 470                 475                 480

Ala Ala Glu Asp Pro Val Ala Ala Ala Pro Arg Pro Leu Pro Ala Gly
                485                 490                 495

Gly Arg Leu Thr Leu Arg Pro Ala Leu Arg Leu Pro Ser Leu Leu Leu
            500                 505                 510

Val His Val Cys Ala Arg Pro Glu Lys Pro Pro Gly Gln Val Thr Arg
        515                 520                 525

Leu Arg Ala Leu Pro Leu Thr Gln Gly Gln Leu Val Leu Val Trp Ser
    530                 535                 540

Asp Glu His Val Gly Ser Lys Cys Leu Trp Thr Tyr Glu Ile Gln Phe
545                 550                 555                 560

Ser Gln Asp Gly Lys Ala Tyr Thr Pro Val Ser Arg Lys Pro Ser Thr
                565                 570                 575

Phe Asn Leu Phe Val Phe Ser Pro Asp Thr Gly Ala Val Ser Gly Ser
            580                 585                 590

Tyr Arg Val Arg Ala Leu Asp Tyr Trp Ala Arg Pro Gly Pro Phe Ser
        595                 600                 605

Asp Pro Val Pro Tyr Leu Glu Val Pro Val Pro Arg Gly Pro Pro Ser
    610                 615                 620

Pro Gly Asn Pro
625
```

<210> 269
<211> 1078
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of the fusion protein of heavy chain of anti-hTfR antibody No.3 (humanized 2) and hIDUA

<400> 269

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

Ser Leu Lys Ile Ser Cys Lys Gly Ser Gly Tyr Ser Phe Thr Asn Tyr
            20                  25                  30
```

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

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

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

Leu Gln Trp Ser Ser Leu Lys Ala Ser Asp Thr Ala Met Tyr Tyr Cys
                85                  90                  95

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

Leu Val Thr Val Ser Ser Ala Ser Thr Lys Gly Pro Ser Val Phe Pro
        115                 120                 125

Leu Ala Pro Ser Ser Lys Ser Thr Ser Gly Gly Thr Ala Ala Leu Gly
    130                 135                 140

Cys Leu Val Lys Asp Tyr Phe Pro Glu Pro Val Thr Val Ser Trp Asn
145                 150                 155                 160

Ser Gly Ala Leu Thr Ser Gly Val His Thr Phe Pro Ala Val Leu Gln
                165                 170                 175

Ser Ser Gly Leu Tyr Ser Leu Ser Ser Val Val Thr Val Pro Ser Ser
            180                 185                 190

Ser Leu Gly Thr Gln Thr Tyr Ile Cys Asn Val Asn His Lys Pro Ser
        195                 200                 205

Asn Thr Lys Val Asp Lys Lys Val Glu Pro Lys Ser Cys Asp Lys Thr
    210                 215                 220

His Thr Cys Pro Pro Cys Pro Ala Pro Glu Leu Leu Gly Gly Pro Ser
225                 230                 235                 240

Val Phe Leu Phe Pro Pro Lys Pro Lys Asp Thr Leu Met Ile Ser Arg
                245                 250                 255

Thr Pro Glu Val Thr Cys Val Val Val Asp Val Ser His Glu Asp Pro
            260                 265                 270

Glu Val Lys Phe Asn Trp Tyr Val Asp Gly Val Glu Val His Asn Ala
        275                 280                 285

Lys Thr Lys Pro Arg Glu Glu Gln Tyr Asn Ser Thr Tyr Arg Val Val
    290                 295                 300
```

```
Ser Val Leu Thr Val Leu His Gln Asp Trp Leu Asn Gly Lys Glu Tyr
305                 310                 315                 320

Lys Cys Lys Val Ser Asn Lys Ala Leu Pro Ala Pro Ile Glu Lys Thr
                325                 330                 335

Ile Ser Lys Ala Lys Gly Gln Pro Arg Glu Pro Gln Val Tyr Thr Leu
            340                 345                 350

Pro Pro Ser Arg Asp Glu Leu Thr Lys Asn Gln Val Ser Leu Thr Cys
        355                 360                 365

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

Asn Gly Gln Pro Glu Asn Asn Tyr Lys Thr Thr Pro Pro Val Leu Asp
385                 390                 395                 400

Ser Asp Gly Ser Phe Phe Leu Tyr Ser Lys Leu Thr Val Asp Lys Ser
                405                 410                 415

Arg Trp Gln Gln Gly Asn Val Phe Ser Cys Ser Val Met His Glu Ala
            420                 425                 430

Leu His Asn His Tyr Thr Gln Lys Ser Leu Ser Leu Ser Pro Gly Lys
        435                 440                 445

Gly Ser Ala Glu Ala Pro His Leu Val His Val Asp Ala Ala Arg Ala
    450                 455                 460

Leu Trp Pro Leu Arg Arg Phe Trp Arg Ser Thr Gly Phe Cys Pro Pro
465                 470                 475                 480

Leu Pro His Ser Gln Ala Asp Gln Tyr Val Leu Ser Trp Asp Gln Gln
                485                 490                 495

Leu Asn Leu Ala Tyr Val Gly Ala Val Pro His Arg Gly Ile Lys Gln
            500                 505                 510

Val Arg Thr His Trp Leu Leu Glu Leu Val Thr Thr Arg Gly Ser Thr
        515                 520                 525

Gly Arg Gly Leu Ser Tyr Asn Phe Thr His Leu Asp Gly Tyr Leu Asp
    530                 535                 540

Leu Leu Arg Glu Asn Gln Leu Leu Pro Gly Phe Glu Leu Met Gly Ser
545                 550                 555                 560

Ala Ser Gly His Phe Thr Asp Phe Glu Asp Lys Gln Gln Val Phe Glu
                565                 570                 575
```

```
Trp Lys Asp Leu Val Ser Ser Leu Ala Arg Arg Tyr Ile Gly Arg Tyr
            580                 585                 590

Gly Leu Ala His Val Ser Lys Trp Asn Phe Glu Thr Trp Asn Glu Pro
        595                 600                 605

Asp His His Asp Phe Asp Asn Val Ser Met Thr Met Gln Gly Phe Leu
    610                 615                 620

Asn Tyr Tyr Asp Ala Cys Ser Glu Gly Leu Arg Ala Ala Ser Pro Ala
625                 630                 635                 640

Leu Arg Leu Gly Gly Pro Gly Asp Ser Phe His Thr Pro Pro Arg Ser
                645                 650                 655

Pro Leu Ser Trp Gly Leu Leu Arg His Cys His Asp Gly Thr Asn Phe
            660                 665                 670

Phe Thr Gly Glu Ala Gly Val Arg Leu Asp Tyr Ile Ser Leu His Arg
        675                 680                 685

Lys Gly Ala Arg Ser Ser Ile Ser Ile Leu Glu Gln Glu Lys Val Val
    690                 695                 700

Ala Gln Gln Ile Arg Gln Leu Phe Pro Lys Phe Ala Asp Thr Pro Ile
705                 710                 715                 720

Tyr Asn Asp Glu Ala Asp Pro Leu Val Gly Trp Ser Leu Pro Gln Pro
                725                 730                 735

Trp Arg Ala Asp Val Thr Tyr Ala Ala Met Val Val Lys Val Ile Ala
            740                 745                 750

Gln His Gln Asn Leu Leu Leu Ala Asn Thr Thr Ser Ala Phe Pro Tyr
        755                 760                 765

Ala Leu Leu Ser Asn Asp Asn Ala Phe Leu Ser Tyr His Pro His Pro
    770                 775                 780

Phe Ala Gln Arg Thr Leu Thr Ala Arg Phe Gln Val Asn Asn Thr Arg
785                 790                 795                 800

Pro Pro His Val Gln Leu Leu Arg Lys Pro Val Leu Thr Ala Met Gly
                805                 810                 815

Leu Leu Ala Leu Leu Asp Glu Glu Gln Leu Trp Ala Glu Val Ser Gln
            820                 825                 830

Ala Gly Thr Val Leu Asp Ser Asn His Thr Val Gly Val Leu Ala Ser
        835                 840                 845
```

```
Ala His Arg Pro Gln Gly Pro Ala Asp Ala Trp Arg Ala Ala Val Leu
    850                 855                 860

Ile Tyr Ala Ser Asp Asp Thr Arg Ala His Pro Asn Arg Ser Val Ala
865                 870                 875                 880

Val Thr Leu Arg Leu Arg Gly Val Pro Pro Gly Pro Gly Leu Val Tyr
                885                 890                 895

Val Thr Arg Tyr Leu Asp Asn Gly Leu Cys Ser Pro Asp Gly Glu Trp
            900                 905                 910

Arg Arg Leu Gly Arg Pro Val Phe Pro Thr Ala Glu Gln Phe Arg Arg
        915                 920                 925

Met Arg Ala Ala Glu Asp Pro Val Ala Ala Ala Pro Arg Pro Leu Pro
    930                 935                 940

Ala Gly Gly Arg Leu Thr Leu Arg Pro Ala Leu Arg Leu Pro Ser Leu
945                 950                 955                 960

Leu Leu Val His Val Cys Ala Arg Pro Glu Lys Pro Pro Gly Gln Val
                965                 970                 975

Thr Arg Leu Arg Ala Leu Pro Leu Thr Gln Gly Gln Leu Val Leu Val
            980                 985                 990

Trp Ser Asp Glu His Val Gly Ser  Lys Cys Leu Trp Thr  Tyr Glu Ile
        995                 1000                1005

Gln Phe  Ser Gln Asp Gly Lys  Ala Tyr Thr Pro Val  Ser Arg Lys
    1010                1015                1020

Pro Ser  Thr Phe Asn Leu Phe  Val Phe Ser Pro Asp  Thr Gly Ala
    1025                1030                1035

Val Ser  Gly Ser Tyr Arg Val  Arg Ala Leu Asp Tyr  Trp Ala Arg
    1040                1045                1050

Pro Gly  Pro Phe Ser Asp Pro  Val Pro Tyr Leu Glu  Val Pro Val
    1055                1060                1065

Pro Arg  Gly Pro Pro Ser Pro  Gly Asn Pro
    1070                1075
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<210> 270
<211> 3317
<212> DNA
<213> Artificial Sequence

<220>
<223> Nucleotide sequence encoding the amino acid sequence of fusion protein of heavy chain of anti-hTfR antibody No.3 (humanized 2)

and hIDUA, synthetic sequence

<400> 270
acgcgtgccg ccaccatggg ctggagctgg attctgctgt tcctcctgag cgtgacagca 60

ggagtgcaca gcgaggtgca actagtgcag tctggagcag aggtgaaaaa gcccggggag 120

tctctgaaga tttcctgtaa gggttctgga tacagcttta ccaactactg gctgggatgg 180

gtgcgccaga tgcccgggaa aggcctggag tggatggggg acatctaccc cggcggagac 240

taccctacat acagcgagaa gttcaaggtc caggtcacca tctcagccga caagtccatc 300

agcaccgcct acctgcagtg gagcagcctg aaggcctcgg acaccgccat gtattactgt 360

gcgagatcag gcaattacga cgaagtggcc tactggggcc aaggaaccct ggtcaccgtc 420

tcctcagcta gcaccaaggg cccatcggtc ttcccctgg caccctcctc caagagcacc 480

tctgggggca cagcggccct gggctgcctg gtcaaggact acttccccga accggtgacg 540

gtgtcgtgga actcaggcgc cctgaccagc ggcgtgcaca ccttcccggc tgtcctacag 600

tcctcaggac tctactccct cagcagcgtg gtgaccgtgc cctccagcag cttgggcacc 660

cagacctaca tctgcaacgt gaatcacaag cccagcaaca ccaaggtgga caagaaagtt 720

gagcccaaat cttgtgacaa aactcacacg tgcccaccgt gcccagcacc tgaactcctg 780

ggaggtccgt cagtcttcct cttcccccca aaacccaagg acaccctcat gatctcccgg 840

acccctgagg tcacatgcgt ggtggtggac gtgagccacg aagaccctga ggtcaagttc 900

aactggtacg tggacggcgt ggaggtgcat aatgccaaga caaagccgcg ggaggagcag 960

tacaacagca cgtaccgggt ggtcagcgtc ctcaccgtcc tgcaccagga ctggctgaat 1020

ggcaaggagt acaagtgcaa ggtctccaac aaagccctcc cagccccat cgagaaaacc 1080

atctccaaag ccaaagggca gccccgagaa ccacaggtgt acaccctgcc cccatcccgg 1140

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aggtggcagc aggggaacgt cttctcatgc tccgtgatgc atgaggctct gcacaaccac 1380

tacacgcaga agagcctctc cctgtctccg ggtaaaggat ctgccgaggc cccgcacctg 1440

gtgcacgtgg acgcggcccg cgcgctgtgg cccctgcggc gcttctggag gagcacaggc 1500

ttctgccccc cgctgccaca cagccaggct gaccagtacg tcctcagctg ggaccagcag 1560

ctcaacctcg cctatgtggg cgccgtccct caccgcggca tcaagcaggt ccggacccac 1620

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ctggacagca accacacggt gggcgtcctg gccagcgccc accgccccca gggcccggcc 2640

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ggtgctgtct ctggctccta ccgagttcga gccctggact actgggcccg accaggcccc 3240

ttctcggacc ctgtgccgta cctggaggtc cctgtgccaa gagggccccc atccccgggc 3300

aatccataag cggccgc 3317

<210> 271
<211> 235
<212> PRT
<213> Homo sapiens

<400> 271

Leu Pro Ala Gln Val Ala Phe Thr Pro Tyr Ala Pro Glu Pro Gly Ser
1 5 10 15

Thr Cys Arg Leu Arg Glu Tyr Tyr Asp Gln Thr Ala Gln Met Cys Cys
20 25 30

Ser Lys Cys Ser Pro Gly Gln His Ala Lys Val Phe Cys Thr Lys Thr
35 40 45

Ser Asp Thr Val Cys Asp Ser Cys Glu Asp Ser Thr Tyr Thr Gln Leu

50 55 60

Trp Asn Trp Val Pro Glu Cys Leu Ser Cys Gly Ser Arg Cys Ser Ser
65 70 75 80

Asp Gln Val Glu Thr Gln Ala Cys Thr Arg Glu Gln Asn Arg Ile Cys
85 90 95

Thr Cys Arg Pro Gly Trp Tyr Cys Ala Leu Ser Lys Gln Glu Gly Cys
100 105 110

Arg Leu Cys Ala Pro Leu Arg Lys Cys Arg Pro Gly Phe Gly Val Ala
115 120 125

Arg Pro Gly Thr Glu Thr Ser Asp Val Val Cys Lys Pro Cys Ala Pro
130 135 140

Gly Thr Phe Ser Asn Thr Thr Ser Ser Thr Asp Ile Cys Arg Pro His
145 150 155 160

Gln Ile Cys Asn Val Val Ala Ile Pro Gly Asn Ala Ser Met Asp Ala
165 170 175

Val Cys Thr Ser Thr Ser Pro Thr Arg Ser Met Ala Pro Gly Ala Val
180 185 190

His Leu Pro Gln Pro Val Ser Thr Arg Ser Gln His Thr Gln Pro Thr
195 200 205

Pro Glu Pro Ser Thr Ala Pro Ser Thr Ser Phe Leu Leu Pro Met Gly
210 215 220

Pro Ser Pro Pro Ala Glu Gly Ser Thr Gly Asp
225 230 235

<210> 272
<211> 685
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of the fusion protein of heavy chain of anti-hTfR antibody No.3 (humanized 2) and hTNF-alpha receptor

<400> 272

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

Ser Leu Lys Ile Ser Cys Lys Gly Ser Gly Tyr Ser Phe Thr Asn Tyr
20 25 30

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

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

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

Leu Gln Trp Ser Ser Leu Lys Ala Ser Asp Thr Ala Met Tyr Tyr Cys
                85                  90                  95

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

Leu Val Thr Val Ser Ser Ala Ser Thr Lys Gly Pro Ser Val Phe Pro
        115                 120                 125

Leu Ala Pro Ser Ser Lys Ser Thr Ser Gly Gly Thr Ala Ala Leu Gly
    130                 135                 140

Cys Leu Val Lys Asp Tyr Phe Pro Glu Pro Val Thr Val Ser Trp Asn
145                 150                 155                 160

Ser Gly Ala Leu Thr Ser Gly Val His Thr Phe Pro Ala Val Leu Gln
                165                 170                 175

Ser Ser Gly Leu Tyr Ser Leu Ser Ser Val Val Thr Val Pro Ser Ser
            180                 185                 190

Ser Leu Gly Thr Gln Thr Tyr Ile Cys Asn Val Asn His Lys Pro Ser
        195                 200                 205

Asn Thr Lys Val Asp Lys Lys Val Glu Pro Lys Ser Cys Asp Lys Thr
    210                 215                 220

His Thr Cys Pro Pro Cys Pro Ala Pro Glu Leu Leu Gly Gly Pro Ser
225                 230                 235                 240

Val Phe Leu Phe Pro Pro Lys Pro Lys Asp Thr Leu Met Ile Ser Arg
                245                 250                 255

Thr Pro Glu Val Thr Cys Val Val Val Asp Val Ser His Glu Asp Pro
            260                 265                 270

Glu Val Lys Phe Asn Trp Tyr Val Asp Gly Val Glu Val His Asn Ala
        275                 280                 285

Lys Thr Lys Pro Arg Glu Glu Gln Tyr Asn Ser Thr Tyr Arg Val Val
    290                 295                 300

Ser Val Leu Thr Val Leu His Gln Asp Trp Leu Asn Gly Lys Glu Tyr
305                 310                 315                 320
```

```
Lys Cys Lys Val Ser Asn Lys Ala Leu Pro Ala Pro Ile Glu Lys Thr
                325                 330                 335

Ile Ser Lys Ala Lys Gly Gln Pro Arg Glu Pro Gln Val Tyr Thr Leu
            340                 345                 350

Pro Pro Ser Arg Asp Glu Leu Thr Lys Asn Gln Val Ser Leu Thr Cys
        355                 360                 365

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

Asn Gly Gln Pro Glu Asn Asn Tyr Lys Thr Thr Pro Pro Val Leu Asp
385                 390                 395                 400

Ser Asp Gly Ser Phe Phe Leu Tyr Ser Lys Leu Thr Val Asp Lys Ser
                405                 410                 415

Arg Trp Gln Gln Gly Asn Val Phe Ser Cys Ser Val Met His Glu Ala
            420                 425                 430

Leu His Asn His Tyr Thr Gln Lys Ser Leu Ser Leu Ser Pro Gly Lys
        435                 440                 445

Gly Ser Leu Pro Ala Gln Val Ala Phe Thr Pro Tyr Ala Pro Glu Pro
    450                 455                 460

Gly Ser Thr Cys Arg Leu Arg Glu Tyr Tyr Asp Gln Thr Ala Gln Met
465                 470                 475                 480

Cys Cys Ser Lys Cys Ser Pro Gly Gln His Ala Lys Val Phe Cys Thr
                485                 490                 495

Lys Thr Ser Asp Thr Val Cys Asp Ser Cys Glu Asp Ser Thr Tyr Thr
            500                 505                 510

Gln Leu Trp Asn Trp Val Pro Glu Cys Leu Ser Cys Gly Ser Arg Cys
        515                 520                 525

Ser Ser Asp Gln Val Glu Thr Gln Ala Cys Thr Arg Glu Gln Asn Arg
    530                 535                 540

Ile Cys Thr Cys Arg Pro Gly Trp Tyr Cys Ala Leu Ser Lys Gln Glu
545                 550                 555                 560

Gly Cys Arg Leu Cys Ala Pro Leu Arg Lys Cys Arg Pro Gly Phe Gly
                565                 570                 575

Val Ala Arg Pro Gly Thr Glu Thr Ser Asp Val Val Cys Lys Pro Cys
            580                 585                 590
```

Ala Pro Gly Thr Phe Ser Asn Thr Thr Ser Ser Thr Asp Ile Cys Arg
595 600 605

Pro His Gln Ile Cys Asn Val Val Ala Ile Pro Gly Asn Ala Ser Met
610 615 620

Asp Ala Val Cys Thr Ser Thr Ser Pro Thr Arg Ser Met Ala Pro Gly
625 630 635 640

Ala Val His Leu Pro Gln Pro Val Ser Thr Arg Ser Gln His Thr Gln
645 650 655

Pro Thr Pro Glu Pro Ser Thr Ala Pro Ser Thr Ser Phe Leu Leu Pro
660 665 670

Met Gly Pro Ser Pro Pro Ala Glu Gly Ser Thr Gly Asp
675 680 685

<210> 273
<211> 2138
<212> DNA
<213> Artificial Sequence

<220>
<223> Nucleotide sequence encoding the amino acid sequence of fusion protein of heavy chain of anti-hTfR antibody No.3 (humanized 2) and hTNF-alpha receptor, synthetic sequence

<400> 273
acgcgtgccg ccaccatggg ctggagctgg attctgctgt tcctcctgag cgtgacagca 60

ggagtgcaca gcgaggtgca actagtgcag tctggagcag aggtgaaaaa gcccggggag 120

tctctgaaga tttcctgtaa gggttctgga tacagcttta ccaactactg gctgggatgg 180

gtgcgccaga tgcccgggaa aggcctggag tggatggggg acatctaccc cggcggagac 240

taccctacat acagcgagaa gttcaaggtc caggtcacca tctcagccga caagtccatc 300

agcaccgcct acctgcagtg gagcagcctg aaggcctcgg acaccgccat gtattactgt 360

gcgagatcag gcaattacga cgaagtggcc tactggggcc aaggaaccct ggtcaccgtc 420

tcctcagcta gcaccaaggg cccatcggtc ttcccctgg caccctcctc caagagcacc 480

tctgggggca cagcggccct gggctgcctg gtcaaggact acttccccga accggtgacg 540

gtgtcgtgga actcaggcgc cctgaccagc ggcgtgcaca ccttcccggc tgtcctacag 600

tcctcaggac tctactccct cagcagcgtg gtgaccgtgc cctccagcag cttgggcacc 660

cagacctaca tctgcaacgt gaatcacaag cccagcaaca ccaaggtgga caagaaagtt 720

gagcccaaat cttgtgacaa aactcacacg tgcccaccgt gcccagcacc tgaactcctg 780

ggaggtccgt cagtcttcct cttcccccca aaacccaagg acaccctcat gatctcccgg 840

acccctgagg tcacatgcgt ggtggtggac gtgagccacg aagaccctga ggtcaagttc 900

aactggtacg tggacggcgt ggaggtgcat aatgccaaga caaagccgcg ggaggagcag 960

tacaacagca cgtaccgggt ggtcagcgtc ctcaccgtcc tgcaccagga ctggctgaat 1020

ggcaaggagt acaagtgcaa ggtctccaac aaagccctcc cagccccat cgagaaaacc 1080

atctccaaag ccaaagggca gccccgagaa ccacaggtgt acaccctgcc cccatcccgg 1140

gatgagctga ccaagaacca ggtcagcctg acctgcctgg tcaaaggctt ctatcccagc 1200

gacatcgccg tggagtggga gagcaatggg cagccggaga acaactacaa gaccacgcct 1260

cccgtgctgg actccgacgg ctccttcttc ctctacagca agctcaccgt ggacaagagc 1320

aggtggcagc aggggaacgt cttctcatgc tccgtgatgc atgaggctct gcacaaccac 1380

tacacgcaga agagcctctc cctgtctccg ggtaaaggat ctttgcccgc ccaggtggca 1440

tttacaccct acgccccgga gcccgggagc acatgccggc tcagagaata ctatgaccag 1500

acagctcaga tgtgctgcag caagtgctcg ccgggccaac atgcaaaagt cttctgtacc 1560

aagacctcgg acaccgtgtg tgactcctgt gaggacagca catacaccca gctctggaac 1620

tgggttcccg agtgcttgag ctgtggctcc cgctgtagct ctgaccaggt ggaaactcaa 1680

gcctgcactc gggaacagaa ccgcatctgc acctgcaggc ccggctggta ctgcgcgctg 1740

agcaagcagg aggggtgccg gctgtgcgcg ccgctgcgca agtgccgccc gggcttcggc 1800

gtggccagac caggaactga aacatcagac gtggtgtgca agccctgtgc cccggggacg 1860

ttctccaaca cgacttcatc cacggatatt tgcaggcccc accaaatctg taacgtggtg 1920

gccatccctg ggaatgcaag catggatgca gtctgcacgt ccacgtcccc cacccggagt 1980

atggccccag gggcagtaca cttaccccag ccagtgtcca cacgatccca acacacgcag 2040

ccaactccag aacccagcac tgctccaagc acctccttcc tgctcccaat gggccccagc 2100

cccccagctg aagggagcac tggcgactaa gcggccgc 2138

<210> 274
<211> 482
<212> PRT
<213> Homo sapiens

<400> 274

Arg Pro Arg Asn Ala Leu Leu Leu Leu Ala Asp Asp Gly Gly Phe Glu
1 5 10 15

Ser Gly Ala Tyr Asn Asn Ser Ala Ile Ala Thr Pro His Leu Asp Ala
20 25 30

Leu Ala Arg Arg Ser Leu Leu Phe Arg Asn Ala Phe Thr Ser Val Ser
35 40 45

Ser Cys Ser Pro Ser Arg Ala Ser Leu Leu Thr Gly Leu Pro Gln His
50 55 60

Gln Asn Gly Met Tyr Gly Leu His Gln Asp Val His His Phe Asn Ser
65 70 75 80

```
Phe Asp Lys Val Arg Ser Leu Pro Leu Leu Ser Gln Ala Gly Val
               85                  90                  95

Arg Thr Gly Ile Ile Gly Lys Lys His Val Gly Pro Glu Thr Val Tyr
           100                 105                 110

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

Gly Arg Asn Ile Thr Arg Ile Lys Leu Leu Val Arg Lys Phe Leu Gln
   130                 135                 140

Thr Gln Asp Asp Arg Pro Phe Phe Leu Tyr Val Ala Phe His Asp Pro
145                 150                 155                 160

His Arg Cys Gly His Ser Gln Pro Gln Tyr Gly Thr Phe Cys Glu Lys
               165                 170                 175

Phe Gly Asn Gly Glu Ser Gly Met Gly Arg Ile Pro Asp Trp Thr Pro
           180                 185                 190

Gln Ala Tyr Asp Pro Leu Asp Val Leu Val Pro Tyr Phe Val Pro Asn
       195                 200                 205

Thr Pro Ala Ala Arg Ala Asp Leu Ala Ala Gln Tyr Thr Thr Val Gly
   210                 215                 220

Arg Met Asp Gln Gly Val Gly Leu Val Leu Gln Glu Leu Arg Asp Ala
225                 230                 235                 240

Gly Val Leu Asn Asp Thr Leu Val Ile Phe Thr Ser Asp Asn Gly Ile
               245                 250                 255

Pro Phe Pro Ser Gly Arg Thr Asn Leu Tyr Trp Pro Gly Thr Ala Glu
           260                 265                 270

Pro Leu Leu Val Ser Ser Pro Glu His Pro Lys Arg Trp Gly Gln Val
       275                 280                 285

Ser Glu Ala Tyr Val Ser Leu Leu Asp Leu Thr Pro Thr Ile Leu Asp
   290                 295                 300

Trp Phe Ser Ile Pro Tyr Pro Ser Tyr Ala Ile Phe Gly Ser Lys Thr
305                 310                 315                 320

Ile His Leu Thr Gly Arg Ser Leu Leu Pro Ala Leu Glu Ala Glu Pro
               325                 330                 335

Leu Trp Ala Thr Val Phe Gly Ser Gln Ser His His Glu Val Thr Met
           340                 345                 350
```

Ser Tyr Pro Met Arg Ser Val Gln His Arg His Phe Arg Leu Val His
355 360 365

Asn Leu Asn Phe Lys Met Pro Phe Pro Ile Asp Gln Asp Phe Tyr Val
370 375 380

Ser Pro Thr Phe Gln Asp Leu Leu Asn Arg Thr Thr Ala Gly Gln Pro
385 390 395 400

Thr Gly Trp Tyr Lys Asp Leu Arg His Tyr Tyr Tyr Arg Ala Arg Trp
405 410 415

Glu Leu Tyr Asp Arg Ser Arg Asp Pro His Glu Thr Gln Asn Leu Ala
420 425 430

Thr Asp Pro Arg Phe Ala Gln Leu Leu Glu Met Leu Arg Asp Gln Leu
435 440 445

Ala Lys Trp Gln Trp Glu Thr His Asp Pro Trp Val Cys Ala Pro Asp
450 455 460

Gly Val Leu Glu Glu Lys Leu Ser Pro Gln Cys Gln Pro Leu His Asn
465 470 475 480

Glu Leu

<210> 275
<211> 932
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of the fusion protein of heavy chain of anti-hTfR antibody No.3 (humanized 2) and hSGSH

<400> 275

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

Ser Leu Lys Ile Ser Cys Lys Gly Ser Gly Tyr Ser Phe Thr Asn Tyr
20 25 30

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

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

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

```
Leu Gln Trp Ser Ser Leu Lys Ala Ser Asp Thr Ala Met Tyr Tyr Cys
                85                  90                  95

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

Leu Val Thr Val Ser Ser Ala Ser Thr Lys Gly Pro Ser Val Phe Pro
        115                 120                 125

Leu Ala Pro Ser Ser Lys Ser Thr Ser Gly Gly Thr Ala Ala Leu Gly
    130                 135                 140

Cys Leu Val Lys Asp Tyr Phe Pro Glu Pro Val Thr Val Ser Trp Asn
145                 150                 155                 160

Ser Gly Ala Leu Thr Ser Gly Val His Thr Phe Pro Ala Val Leu Gln
                165                 170                 175

Ser Ser Gly Leu Tyr Ser Leu Ser Ser Val Val Thr Val Pro Ser Ser
            180                 185                 190

Ser Leu Gly Thr Gln Thr Tyr Ile Cys Asn Val Asn His Lys Pro Ser
        195                 200                 205

Asn Thr Lys Val Asp Lys Lys Val Glu Pro Lys Ser Cys Asp Lys Thr
    210                 215                 220

His Thr Cys Pro Pro Cys Pro Ala Pro Glu Leu Leu Gly Gly Pro Ser
225                 230                 235                 240

Val Phe Leu Phe Pro Pro Lys Pro Lys Asp Thr Leu Met Ile Ser Arg
                245                 250                 255

Thr Pro Glu Val Thr Cys Val Val Val Asp Val Ser His Glu Asp Pro
            260                 265                 270

Glu Val Lys Phe Asn Trp Tyr Val Asp Gly Val Glu Val His Asn Ala
        275                 280                 285

Lys Thr Lys Pro Arg Glu Glu Gln Tyr Asn Ser Thr Tyr Arg Val Val
    290                 295                 300

Ser Val Leu Thr Val Leu His Gln Asp Trp Leu Asn Gly Lys Glu Tyr
305                 310                 315                 320

Lys Cys Lys Val Ser Asn Lys Ala Leu Pro Ala Pro Ile Glu Lys Thr
                325                 330                 335

Ile Ser Lys Ala Lys Gly Gln Pro Arg Glu Pro Gln Val Tyr Thr Leu
            340                 345                 350
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Pro Pro Ser Arg Asp Glu Leu Thr Lys Asn Gln Val Ser Leu Thr Cys
        355                 360                 365

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

Asn Gly Gln Pro Glu Asn Asn Tyr Lys Thr Thr Pro Pro Val Leu Asp
385                 390                 395                 400

Ser Asp Gly Ser Phe Phe Leu Tyr Ser Lys Leu Thr Val Asp Lys Ser
                405                 410                 415

Arg Trp Gln Gln Gly Asn Val Phe Ser Cys Ser Val Met His Glu Ala
            420                 425                 430

Leu His Asn His Tyr Thr Gln Lys Ser Leu Ser Leu Ser Pro Gly Lys
        435                 440                 445

Gly Ser Arg Pro Arg Asn Ala Leu Leu Leu Leu Ala Asp Asp Gly Gly
    450                 455                 460

Phe Glu Ser Gly Ala Tyr Asn Asn Ser Ala Ile Ala Thr Pro His Leu
465                 470                 475                 480

Asp Ala Leu Ala Arg Arg Ser Leu Leu Phe Arg Asn Ala Phe Thr Ser
                485                 490                 495

Val Ser Ser Cys Ser Pro Ser Arg Ala Ser Leu Leu Thr Gly Leu Pro
            500                 505                 510

Gln His Gln Asn Gly Met Tyr Gly Leu His Gln Asp Val His His Phe
        515                 520                 525

Asn Ser Phe Asp Lys Val Arg Ser Leu Pro Leu Leu Leu Ser Gln Ala
    530                 535                 540

Gly Val Arg Thr Gly Ile Ile Gly Lys Lys His Val Gly Pro Glu Thr
545                 550                 555                 560

Val Tyr Pro Phe Asp Phe Ala Tyr Thr Glu Glu Asn Gly Ser Val Leu
                565                 570                 575

Gln Val Gly Arg Asn Ile Thr Arg Ile Lys Leu Leu Val Arg Lys Phe
            580                 585                 590

Leu Gln Thr Gln Asp Asp Arg Pro Phe Phe Leu Tyr Val Ala Phe His
        595                 600                 605

Asp Pro His Arg Cys Gly His Ser Gln Pro Gln Tyr Gly Thr Phe Cys
    610                 615                 620
```

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Glu Lys Phe Gly Asn Gly Glu Ser Gly Met Gly Arg Ile Pro Asp Trp
625                 630                 635                 640

Thr Pro Gln Ala Tyr Asp Pro Leu Asp Val Leu Val Pro Tyr Phe Val
                645                 650                 655

Pro Asn Thr Pro Ala Ala Arg Ala Asp Leu Ala Ala Gln Tyr Thr Thr
            660                 665                 670

Val Gly Arg Met Asp Gln Gly Val Gly Leu Val Leu Gln Glu Leu Arg
        675                 680                 685

Asp Ala Gly Val Leu Asn Asp Thr Leu Val Ile Phe Thr Ser Asp Asn
    690                 695                 700

Gly Ile Pro Phe Pro Ser Gly Arg Thr Asn Leu Tyr Trp Pro Gly Thr
705                 710                 715                 720

Ala Glu Pro Leu Leu Val Ser Ser Pro Glu His Pro Lys Arg Trp Gly
                725                 730                 735

Gln Val Ser Glu Ala Tyr Val Ser Leu Leu Asp Leu Thr Pro Thr Ile
            740                 745                 750

Leu Asp Trp Phe Ser Ile Pro Tyr Pro Ser Tyr Ala Ile Phe Gly Ser
        755                 760                 765

Lys Thr Ile His Leu Thr Gly Arg Ser Leu Leu Pro Ala Leu Glu Ala
    770                 775                 780

Glu Pro Leu Trp Ala Thr Val Phe Gly Ser Gln Ser His His Glu Val
785                 790                 795                 800

Thr Met Ser Tyr Pro Met Arg Ser Val Gln His Arg His Phe Arg Leu
                805                 810                 815

Val His Asn Leu Asn Phe Lys Met Pro Phe Pro Ile Asp Gln Asp Phe
            820                 825                 830

Tyr Val Ser Pro Thr Phe Gln Asp Leu Leu Asn Arg Thr Thr Ala Gly
        835                 840                 845

Gln Pro Thr Gly Trp Tyr Lys Asp Leu Arg His Tyr Tyr Tyr Arg Ala
    850                 855                 860

Arg Trp Glu Leu Tyr Asp Arg Ser Arg Asp Pro His Glu Thr Gln Asn
865                 870                 875                 880

Leu Ala Thr Asp Pro Arg Phe Ala Gln Leu Leu Glu Met Leu Arg Asp
                885                 890                 895
```

Gln Leu Ala Lys Trp Gln Trp Glu Thr His Asp Pro Trp Val Cys Ala
900 905 910

Pro Asp Gly Val Leu Glu Glu Lys Leu Ser Pro Gln Cys Gln Pro Leu
915 920 925

His Asn Glu Leu
930

<210> 276
<211> 2879
<212> DNA
<213> Artificial Sequence

<220>
<223> Nucleotide sequence encoding the amino acid sequence of fusion protein of heavy chain of anti-hTfR antibody No.3 (humanized 2) and hSGSH, synthetic sequence

<400> 276
acgcgtgccg ccaccatggg ctggagctgg attctgctgt tcctcctgag cgtgacagca 60

ggagtgcaca gcgaggtgca actagtgcag tctggagcag aggtgaaaaa gcccggggag 120

tctctgaaga tttcctgtaa gggttctgga tacagcttta ccaactactg gctgggatgg 180

gtgcgccaga tgcccgggaa aggcctggag tggatggggg acatctaccc cggcggagac 240

taccctacat acagcgagaa gttcaaggtc caggtcacca tctcagccga caagtccatc 300

agcaccgcct acctgcagtg gagcagcctg aaggcctcgg acaccgccat gtattactgt 360

gcgagatcag gcaattacga cgaagtggcc tactggggcc aaggaaccct ggtcaccgtc 420

tcctcagcta gcaccaaggg cccatcggtc ttcccctgg caccctcctc caagagcacc 480

tctgggggca cagcggccct gggctgcctg gtcaaggact acttccccga accggtgacg 540

gtgtcgtgga actcaggcgc cctgaccagc ggcgtgcaca ccttcccggc tgtcctacag 600

tcctcaggac tctactccct cagcagcgtg gtgaccgtgc cctccagcag cttgggcacc 660

cagacctaca tctgcaacgt gaatcacaag cccagcaaca ccaaggtgga caagaaagtt 720

gagcccaaat cttgtgacaa aactcacacg tgcccaccgt gcccagcacc tgaactcctg 780

ggaggtccgt cagtcttcct cttcccccca aaacccaagg acaccctcat gatctcccgg 840

acccctgagg tcacatgcgt ggtggtggac gtgagccacg aagaccctga ggtcaagttc 900

aactggtacg tggacggcgt ggaggtgcat aatgccaaga caaagccgcg ggaggagcag 960

tacaacagca cgtaccgggt ggtcagcgtc ctcaccgtcc tgcaccagga ctggctgaat 1020

ggcaaggagt acaagtgcaa ggtctccaac aaagccctcc cagccccat cgagaaaacc 1080

atctccaaag ccaaagggca gccccgagaa ccacaggtgt acaccctgcc cccatcccgg 1140

gatgagctga ccaagaacca ggtcagcctg acctgcctgg tcaaaggctt ctatcccagc 1200

gacatcgccg tggagtggga gagcaatggg cagccggaga acaactacaa gaccacgcct 1260

cccgtgctgg actccgacgg ctccttcttc ctctacagca agctcaccgt ggacaagagc 1320

aggtggcagc aggggaacgt cttctcatgc tccgtgatgc atgaggctct gcacaaccac 1380

tacacgcaga agagcctctc cctgtctccg ggtaaaggat ctcgtccccg gaacgcactg 1440

ctgctcctcg cggatgacgg aggctttgag agtggcgcgt acaacaacag cgccatcgcc 1500

accccgcacc tggacgcctt ggcccgccgc agcctcctct ttcgcaatgc cttcacctcg 1560

gtcagcagct gctctcccag ccgcgccagc ctcctcactg gcctgcccca gcatcagaat 1620

gggatgtacg ggctgcacca ggacgtgcac cacttcaact ccttcgacaa ggtgcggagc 1680

ctgccgctgc tgctcagcca agctggtgtg cgcacaggca tcatcgggaa gaagcacgtg 1740

gggccggaga ccgtgtaccc gtttgacttt gcgtacacgg aggagaatgg ctccgtcctc 1800

caggtggggc ggaacatcac tagaattaag ctgctcgtcc ggaaattcct gcagactcag 1860

gatgaccggc ctttcttcct ctacgtcgcc ttccacgacc cccaccgctg tgggcactcc 1920

cagccccagt acggaacctt ctgtgagaag tttggcaacg gagagagcgg catgggtcgt 1980

atcccagact ggacccccca ggcctacgac ccactggacg tgctggtgcc ttacttcgtc 2040

cccaacaccc cggcagcccg agccgacctg gccgctcagt acaccaccgt cggccgcatg 2100

gaccaaggag ttggactggt gctccaggag ctgcgtgacg ccggtgtcct gaacgacaca 2160

ctggtgatct tcacgtccga caacggtatc cccttcccca gcggcaggac caacctgtac 2220

tggccgggca ctgctgaacc cttactggtg tcatccccgg agcacccaaa acgctggggc 2280

caagtcagcg aggcctacgt gagcctccta gacctcacgc ccaccatctt ggattggttc 2340

tcgatcccgt accccagcta cgccatcttt ggctcgaaga ccatccacct cactggccgg 2400

tccctcctgc cggcgctgga ggccgagccc ctctgggcca ccgtctttgg cagccagagc 2460

caccacgagg tcaccatgtc ctaccccatg cgctccgtgc agcaccggca cttccgcctc 2520

gtgcacaacc tcaacttcaa gatgcccttt cccatcgacc aggacttcta cgtctcaccc 2580

accttccagg acctcctgaa ccgcaccaca gctggtcagc ccacgggctg gtacaaggac 2640

ctccgtcatt actactaccg ggcgcgctgg gagctctacg accggagccg ggacccccac 2700

gagacccaga acctggccac cgacccgcgc tttgctcagc ttctggagat gcttcgggac 2760

cagctggcca agtggcagtg ggagacccac gacccctggg tgtgcgcccc cgacggcgtc 2820

ctggaggaga agctctctcc ccagtgccag cccctccaca atgagctgta agcggccgc 2879

<210> 277
<211> 245
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence of anti-hTfR single-chain antibody

<400> 277

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

Ser Leu Lys Ile Ser Cys Lys Gly Ser Gly Tyr Ser Phe Thr Asn Tyr
20 25 30

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

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

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

Leu Gln Trp Ser Ser Leu Lys Ala Ser Asp Thr Ala Met Tyr Tyr Cys
                85                  90                  95

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

Leu Val Thr Val Ser Ser Gly Gly Gly Gly Ser Gly Gly Gly Gly Ser
        115                 120                 125

Gly Gly Gly Gly Ser Asp Ile Val Met Thr Gln Thr Pro Leu Ser Leu
    130                 135                 140

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

Ser Leu Val His Ser Asn Gly Asn Thr Tyr Leu His Trp Tyr Leu Gln
                165                 170                 175

Lys Pro Gly Gln Ser Pro Gln Leu Leu Ile Tyr Lys Val Ser Asn Arg
            180                 185                 190

Phe Ser Gly Val Pro Asp Arg Phe Ser Gly Ser Gly Ser Gly Thr Asp
        195                 200                 205

Phe Thr Leu Lys Ile Ser Arg Val Glu Ala Glu Asp Val Gly Val Tyr
    210                 215                 220

Tyr Cys Ser Gln Ser Thr His Val Pro Trp Thr Phe Gly Gln Gly Thr
225                 230                 235                 240

Lys Val Glu Ile Lys
                245
```

<210> 278
<211> 16
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 2 of CDR 2 in the heavy chain of mouse anti-hTfR antibody No. 6

<400> 278

Ile Ile Trp Gly Asp Gly Ser Thr Asn Tyr His Ser Ala Leu Ile Ser
1 5 10 15

<210> 279
<211> 16
<212> PRT
<213> Artificial Sequence

<220>
<223> Amino acid sequence 2 of CDR 2 in the heavy chain of mouse anti-hTfR antibody No. 8

<400> 279

Ile Ile Trp Gly Asp Gly Ser Thr Asn Tyr Arg Ser Ala Leu Ile Ser
1 5 10 15