

CLAIMS

What is claimed is:

1. A method of treating an alloimmune and/or autoimmune disorder comprising administering an antibody to a pregnant subject, wherein the antibody comprises: (1) a light chain variable region comprising a CDR L1, a CDR L2, and a CDR L3 and (2) a heavy chain variable region comprising a CDR H1, a CDR H2, and a CDR H3, wherein

the CDR L1 comprises a sequence $X_1GTGSDVGSYNX_2VS$ (SEQ ID NO: 12),

the CDR L2 comprises a sequence GDX_3X_4RPS (SEQ ID NO: 13),

the CDR L3 comprises a sequence $X_5SYX_6GSGIYV$ (SEQ ID NO: 14),

the CDR H1 comprises a sequence Z_1YAMG (SEQ ID NO: 15),

the CDR H2 comprises a sequence $Z_7IGZ_2SGZ_3QTZ_4YADS$ (SEQ ID NO: 16), and

the CDR H3 comprises a sequence LAZ_5Z_6DSY (SEQ ID NO: 17), wherein

X_1 is a polar or hydrophobic amino acid,

X_2 is a hydrophobic amino acid,

X_3 is a polar amino acid,

X_4 is a polar or acidic amino acid,

X_5 is a polar or hydrophobic amino acid,

X_6 is a hydrophobic amino acid,

Z_1 is a polar or acidic amino acid,

Z_2 is a polar or hydrophobic amino acid,

Z_3 is G, S, or A,

Z_4 is a basic amino acid,

Z_5 is a hydrophobic or basic amino acid,

Z_6 is G, S, D, Q, or H, and

Z_7 is S or T.

2. The method of claim 1, wherein the antibody comprises: (1) a light chain variable region comprising a CDR L1, a CDR L2, and a CDR L3 and (2) a heavy chain variable region comprising a CDR H1, a CDR H2, and a CDR H3, wherein

the CDR L1 comprises the sequence X₁GTGSDVGSYNLVS (SEQ ID NO: 48) or TGTGSDVGSYNX₂VS (SEQ ID NO: 49),

the CDR L2 comprises the sequence GDX₃ERPS (SEQ ID NO: 50) or GDSX₄RPS (SEQ ID NO: 51),

the CDR L3 comprises the sequence X₅SYAGSGIYV (SEQ ID NO: 52) or SSYX₆GSGIYV (SEQ ID NO: 53),

the CDR H1 comprises the sequence of TYAMG (SEQ ID NO: 4), DYAMG (SEQ ID NO: 5), or NYAMG (SEQ ID NO: 6),

the CDR H2 comprises the sequence of SIGASGSQTRYADS (SEQ ID NO: 8), SIGSSGAQTRYADS (SEQ ID NO: 7), SIGASGAQTRYADS (SEQ ID NO: 9), SIGASGGQTRYADS (SEQ ID NO: 10), TIGSSGAQTRYADS (SEQ ID NO: 41), SIGASGSQTRYADS (SEQ ID NO: 42), TIGASGAQTRYADS (SEQ ID NO: 43), or TIGASGGQTRYADS (SEQ ID NO: 46), and

the CDR H3 comprises the sequence LAZ₅GDSY (SEQ ID NO: 54) or LAIZ₆DSY (SEQ ID NO: 55).

3. The method of claim 2, wherein the antibody comprises (1) a light chain variable region comprising a CDR L1, a CDR L2, and a CDR L3 and (2) a heavy chain variable region comprising a CDR H1, a CDR H2, and a CDR H3, wherein

the CDR L1 comprises the sequence TGTGSDVGSYNLVS (SEQ ID NO: 1),

the CDR L2 comprises the sequence GDSERPS (SEQ ID NO: 2),

the CDR L3 comprises the sequence SSYAGSGIYV (SEQ ID NO: 3),

the CDR H1 comprises the sequence TYAMG (SEQ ID NO: 4),

the CDR H2 comprises the sequence SIGSSGAQTRYADS (SEQ ID NO: 7), or TIGSSGAQTRYADS (SEQ ID NO: 41), and

the CDR H3 comprises the sequence LAIGDSY (SEQ ID NO: 11).

4. The method of claim 1, wherein the light chain comprises an amino acid sequence having at least 90% identity to the sequence:

QSALTQPASVSGSPGQSITISCTGTGSDVGSYNLVSWYQQHPGKAPKLMIYGDSE
RPSGVSNRFSKSGNTASLTISGLQAEDEADYYCSSYAGSGIYVFGTGTKVTVLGQPKA

APSVTLFPPSSEELQANKATLVCLISDFYPGAVTVAWKADSSPVKAGVETTTPSKQSN
KYAASSYLSLTPEQWKSHKSYSCQVTHEGSTVEKTVAPTECS (SEQ ID NO: 19).

5. The method of claim 1, wherein the heavy chain comprises an amino acid sequence selected from the group consisting of:

a sequence having at least 90% identity to the sequence of

EVQLLES G GGLVQP G GSLRLSCAASGFTFSTYAMGWVRQAPGKGLEWVSSIGSS
GAQTRYADSVKGRFTISRDN SKNTLYLQMNSLRAEDTAVYYCARLAIGDSYWGQGT
MTVSSASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVT VSWNSGALTSGVHTFPA
VLQSSGLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKKVEPKSCDKTHTCPPCPAP
ELLGGPSVFLFPPKPKDTLMISRTPEVTCVVDVSHEDPEVKFNWYVDGVEVHNAKTKP
REEQYASTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKGQPREPQVY
TLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTTPVLDSDGSFFLYSK
LTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSLSPG (SEQ ID NO: 20);

a sequence having at least 90% identity to the sequence of

EVQLLES G GGLVQP G GSLRLSCAASGFTFSDYAMGWVRQAPGKGLEWVSSIGASGSQT
RYADSVKGRFTISRDN SKNTLYLQMNSLRAEDTAVYYCARLAIGDSYWGQGTMTVSS
ASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVT VSWNSGALTSGVHTFPAVLQSS
GLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKKVEPKSCDKTHTCPPCPAPELLGG
PSVFLFPPKPKDTLMISRTPEVTCVVDVSHEDPEVKFNWYVDGVEVHNAKTKPREEQY
ASTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKGQPREPQVYTLPPSR
DELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTTPVLDSDGSFFLYSKLTVDK
SRWQQGNVFSCSVMHEALHNHYTQKSLSLSPG (SEQ ID NO: 21);

a sequence having at least 90% identity to the sequence of

EVQLLES G GGLVQP G GSLRLSCAASGFTFSNYAMGWVRQAPGKGLEWVSSIGASGAQT
RYADSVKGRFTISRDN SKNTLYLQMNSLRAEDTAVYYCARLAIGDSYWGQGTMTVSS
ASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVT VSWNSGALTSGVHTFPAVLQSS
GLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKKVEPKSCDKTHTCPPCPAPELLGG
PSVFLFPPKPKDTLMISRTPEVTCVVDVSHEDPEVKFNWYVDGVEVHNAKTKPREEQY
ASTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKGQPREPQVYTLPPSR

EEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTPPVLDSDGSFFLYSKLTVDK
SRWQQGNVFSCSVMHEALHNHYTQKSLSLSPG (SEQ ID NO: 22);

a sequence having at least 90% identity to the sequence of

EVQLLESGGGLVQPGGSLRLSCAASGFTFSTYAMGWVRQAPGKGLEWVSSIGASGGQT
RYADSVKGRFTISRDN SKNTLYLQMNSLRAEDTAVYYCARLAIGDSYWGQGTMTVSS
ASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALTSGVHTFPAVLQSS
GLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKKVEPKSCDKTHTCPPCPAPELLGG
PSVFLFPPKPKDTLMISRTPEVTCVVDVSHEDPEVKFNWYVDGVEVHNAKTKPREEQY
ASTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKGQPREPQVYTLPPSR
EEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTPPVLDSDGSFFLYSKLTVDK
SRWQQGNVFSCSVMHEALHNHYTQKSLSLSPG (SEQ ID NO: 23); and

a sequence having at least 90% identity to the sequence of

EVQLLESGGGLVQPGGSLRLSCAASGFTFSTYAMGWVRQAPGKGLEWVSSIGASGSQT
RYADSVKGRFTISRDN SKNTLYLQMNSLRAEDTAVYYCARLAIGDSYWGQGTMTVSS
ASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALTSGVHTFPAVLQSS
GLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKKVEPKSCDKTHTCPPCPAPELLGG
PSVFLFPPKPKDTLMISRTPEVTCVVDVSHEDPEVKFNWYVDGVEVHNAKTKPREEQY
ASTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKGQPREPQVYTLPPSR
EEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTPPVLDSDGSFFLYSKLTVDK
SRWQQGNVFSCSVMHEALHNHYTQKSLSLSPG (SEQ ID NO: 24).

6. The method of claim 1, wherein the alloimmune and/or autoimmune disorder is a fetal and neonatal alloimmune and/or autoimmune disorder selected from the group consisting of fetal and neonatal alloimmune thrombocytopenia, hemolytic disease of the fetus and newborn, alloimmune pan-thrombocytopenia, congenital heart block, fetal arthrogryposis, neonatal myasthenia gravis, neonatal autoimmune hemolytic anemia, neonatal anti-phospholipid syndrome, neonatal polymyositis, dermatomyositis, neonatal lupus, neonatal scleroderma, Behcet's disease, neonatal Graves' disease, neonatal Kawasaki disease, neonatal autoimmune thyroid disease, and neonatal type I diabetes mellitus.

7. The method of claim 6, wherein fetal anemia associated with hemolytic disease of the fetus and newborn is treated.

8. The method of claim 1, wherein the autoimmune disorder is selected from the group consisting of alopecia areata, ankylosing spondylitis, antiphospholipid syndrome, Addison's disease, hemolytic anemia, warm autoimmune hemolytic anemia, anti-factor antibodies, heparin induced thrombocytopenia, sensitized transplant, autoimmune hepatitis, hepatitis, Behcet's disease, bullous pemphigoid, cardiomyopathy, celiac sprue-dermatitis, chronic fatigue immune dysfunction syndrome, chronic inflammatory demyelinating polyneuropathy, Churg-Strauss syndrome, cicatricial pemphigoid, limited scleroderma (CREST syndrome), cold agglutinin disease, Crohn's disease, dermatomyositis, discoid lupus, essential mixed cryoglobulinemia, fibromyalgia, fibromyositis, Graves' disease, Hashimoto's thyroiditis, hypothyroidism, inflammatory bowel disease, autoimmune lymphoproliferative syndrome, idiopathic pulmonary fibrosis, IgA nephropathy, insulin dependent diabetes, juvenile arthritis, lichen planus, lupus, Ménière's Disease, mixed connective tissue disease, multiple sclerosis, pernicious anemia, polyarteritis nodosa, polychondritis, polyglandular syndromes, polymyalgia rheumatica, polymyositis, primary agammaglobulinemia, primary biliary cirrhosis, psoriasis, Raynaud's phenomenon, Reiter's syndrome, rheumatic fever, rheumatoid arthritis, sarcoidosis, scleroderma, Sjögren's syndrome, stiff-man syndrome, Takayasu arteritis, temporal arteritis, ulcerative colitis, uveitis, vitiligo, and Wegener's granulomatosis.

9. The method of claim 1, wherein the pregnant subject has a history of having had a previous fetal and neonatal alloimmune and/or autoimmune disorder.

10. The method of claim 1, wherein the pregnant subject is at risk of having a fetal and neonatal alloimmune and/or autoimmune disorder.

11. The method of claim 1, wherein treatment reduces the risk of a miscarriage/loss of fetus.

12. The method of claim 1, wherein the method treats the pregnant subject.

13. The method of claim 1, wherein the method reduces autoantibodies in a pregnant subject.

14. A method of decreasing antibody transport across the placenta of a pregnant subject, the method comprising administering an antibody to the pregnant subject, wherein the antibody comprises: 1) a light chain variable region comprising a CDR L1, a CDR L2, and a CDR L3 and (2) a heavy chain variable region comprising a CDR H1, a CDR H2, and a CDR H3, wherein

the CDR L1 comprises a sequence $X_1GTGSDVGSYNX_2VS$ (SEQ ID NO: 12),

the CDR L2 comprises a sequence GDX_3X_4RPS (SEQ ID NO: 13),

the CDR L3 comprises a sequence $X_5SYX_6GSGIYV$ (SEQ ID NO: 14),

the CDR H1 comprises a sequence Z_1YAMG (SEQ ID NO: 15),

the CDR H2 comprises a sequence $Z_7IGZ_2SGZ_3QTZ_4YADS$ (SEQ ID NO: 16), and

the CDR H3 comprises a sequence LAZ_5Z_6DSY (SEQ ID NO: 17), wherein

X_1 is a polar or hydrophobic amino acid,

X_2 is a hydrophobic amino acid,

X_3 is a polar amino acid,

X_4 is a polar or acidic amino acid,

X_5 is a polar or hydrophobic amino acid,

X_6 is a hydrophobic amino acid,

Z_1 is a polar or acidic amino acid,

Z_2 is a polar or hydrophobic amino acid,

Z_3 is G, S, or A,

Z_4 is a basic amino acid,

Z_5 is a hydrophobic or basic amino acid,

Z_6 is G, S, D, Q, or H, and

Z_7 is S or T.

15. The method of claim 1, wherein the method reduces an immune complex-based activation of immune response in the pregnant subject.

16. The method of claim 15, wherein the acute immune response is activated by a medical condition selected from the group consisting of pemphigus vulgaris, lupus nephritis, myasthenia gravis, Guillain-Barré syndrome, antibody-mediated rejection, catastrophic anti-phospholipid antibody syndrome, immune complex-mediated vasculitis, glomerulitis, a channelopathy, neuromyelitis optica, autoimmune hearing loss, idiopathic thrombocytopenia purpura, autoimmune haemolytic anaemia, immune neutropenia, dilated cardiomyopathy, and serum sickness.

17. The method of claim 15, wherein the chronic immune response is activated by a medical condition selected from the group consisting of chronic inflammatory demyelinating polyneuropathy (CIDP), systemic lupus, reactive arthropathies, primary biliary cirrhosis, ulcerative colitis, and antineutrophil cytoplasmic antibody (ANCA)-associated vasculitis.

18. The method of claim 1, wherein the isolated antibody comprises: (1) a light chain variable region comprising a CDR L1, a CDR L2, and a CDR L3 and (2) a heavy chain variable region comprising a CDR H1, a CDR H2, and a CDR H3, wherein

the CDR L1 comprises a sequence having no more than two amino acid substitutions relative to the sequence of TGTGSDVGSYNLVS (SEQ ID NO: 1),

the CDR L2 comprises a sequence having no more than one amino acid substitution relative to the sequence of GDSERPS (SEQ ID NO: 2),

the CDR L3 comprises a sequence having no more than one amino acid substitution relative to the sequence of SSYAGSGIYV (SEQ ID NO: 3),

the CDR H1 comprises a sequence having no more than one amino acid substitution relative to the sequence of TYAMG (SEQ ID NO: 4), DYAMG (SEQ ID NO: 5), or NYAMG (SEQ ID NO: 6),

the CDR H2 comprises a sequence having no more than two amino acid substitutions relative to the sequence of SIGASGSQTRYADS (SEQ ID NO: 8), SIGSSGAQTRYADS (SEQ ID NO: 7), SIGASGAQTRYADS (SEQ ID NO: 9), SIGASGGQTRYADS (SEQ ID NO: 10), TIGSSGAQTRYADS (SEQ ID NO: 41), SIGASGSQTRYADS (SEQ ID NO: 42), TIGASGAQTRYADS (SEQ ID NO: 43), or TIGASGGQTRYADS (SEQ ID NO: 32), and

the CDR H3 comprises a sequence having no more than one amino acid substitution relative to the sequence of LAIGDSY (SEQ ID NO: 11).

19.) The method of claim 1, wherein

the CDR L1 of the isolated antibody comprises the sequence TGTGSDVGSYNLVS (SEQ ID NO: 1),

the CDR L2 of the isolated antibody comprises the sequence GDSEPS (SEQ ID NO: 2),

the CDR L3 of the isolated antibody comprises the sequence SSYAGSGIYV (SEQ ID NO: 3),

the CDR H1 of the isolated antibody comprises the sequence DYAMG (SEQ ID NO: 5),

the CDR H2 of the isolated antibody comprises the sequence SIGASGSQTRYADS (SEQ ID NO: 8), and

the CDR H3 of the isolated antibody comprises the sequence LAIGDSY (SEQ ID NO: 11).

20. The method of claim 2, wherein

the CDR L1 of the isolated antibody comprises the sequence TGTGSDVGSYNLVS (SEQ ID NO: 1),

the CDR L2 of the isolated antibody comprises the sequence GDSEPS (SEQ ID NO: 2),

the CDR L3 of the isolated antibody comprises the sequence SSYAGSGIYV (SEQ ID NO: 3),

the CDR H1 of the isolated antibody comprises the sequence NYAMG (SEQ ID NO: 6),

the CDR H2 of the isolated antibody comprises the sequence SIGASGAQTRYADS (SEQ ID NO: 9) or TIGASGAQTRYADS (SEQ ID NO: 43), and

the CDR H3 of the isolated antibody comprises the sequence LAIGDSY (SEQ ID NO: 11).

21. The method of claim 1, wherein

the CDR L1 of the isolated antibody comprises the sequence TGTGSDVGSYNLVS (SEQ ID NO: 1),

the CDR L2 of the isolated antibody comprises the sequence GDSEPS (SEQ ID NO: 2),
the CDR L3 of the isolated antibody comprises the sequence SSYAGSGIYV (SEQ ID
NO: 3),

the CDR H1 of the isolated antibody comprises the sequence TYAMG (SEQ ID NO: 4),
the CDR H2 of the isolated antibody comprises the sequence SIGASGGQTRYADS
(SEQ ID NO: 10) or TIGASGGQTRYADS (SEQ ID NO: 32), and

the CDR H3 of the isolated antibody comprises the sequence LAIGDSY (SEQ ID NO:
11).

22. The method of claim 1, wherein

the CDR L1 of the isolated antibody comprises the sequence TGTGSDVGSYNLVS
(SEQ ID NO: 1),

the CDR L2 of the isolated antibody comprises the sequence GDSEPS (SEQ ID NO: 2),
the CDR L3 of the isolated antibody comprises the sequence SSYAGSGIYV (SEQ ID
NO: 3),

the CDR H1 of the isolated antibody comprises the sequence TYAMG (SEQ ID NO: 4),
the CDR H2 of the isolated antibody comprises the sequence SIGASGSQTRYADS (SEQ
ID NO: 8), and

the CDR H3 of the isolated antibody comprises the sequence LAIGDSY (SEQ ID NO:
11).

23. The method of claim 5, wherein the heavy chain variable region of the isolated
antibody comprises a sequence having at least 95%, 97%, 99%, or 100% identity to the sequence
of any one of SEQ ID NOs: 20-24.

24. The method of claim 4, wherein the light chain variable region of the isolated
antibody comprises a sequence having at least 95%, 97%, 99%, or 100% identity to the sequence
of SEQ ID NO: 19.

25. The method of claim 1, wherein the method reduces an immune complex-based
activation of a chronic immune response in the pregnant subject.

26. The method of claim 14, wherein the antibody comprises: (1) a light chain variable region comprising a CDR L1, a CDR L2, and a CDR L3 and (2) a heavy chain variable region comprising a CDR H1, a CDR H2, and a CDR H3, wherein

the CDR L1 comprises the sequence X₁GTGSDVGSYNLVS (SEQ ID NO: 48) or TGTGSDVGSYNX₂VS (SEQ ID NO: 49),

the CDR L2 comprises the sequence GDX₃ERPS (SEQ ID NO: 50) or GDSX₄RPS (SEQ ID NO: 51),

the CDR L3 comprises the sequence X₅SYAGSGIYV (SEQ ID NO: 52) or SSYX₆GSGIYV (SEQ ID NO: 53),

the CDR H1 comprises the sequence of TYAMG (SEQ ID NO: 4), DYAMG (SEQ ID NO: 5), or NYAMG (SEQ ID NO: 6),

the CDR H2 comprises the sequence of SIGASGSQTRYADS (SEQ ID NO: 8), SIGSSGAQTRYADS (SEQ ID NO: 7), SIGASGAQTRYADS (SEQ ID NO: 9), SIGASGGQTRYADS (SEQ ID NO: 10), TIGSSGAQTRYADS (SEQ ID NO: 41), SIGASGSQTRYADS (SEQ ID NO: 42), TIGASGAQTRYADS (SEQ ID NO: 43), or TIGASGGQTRYADS (SEQ ID NO: 46), and

the CDR H3 comprises the sequence LAZ₅GDSY (SEQ ID NO: 54) or LAIZ₆DSY (SEQ ID NO: 55).

27. The method of claim 26, wherein the antibody comprises (1) a light chain variable region comprising a CDR L1, a CDR L2, and a CDR L3 and (2) a heavy chain variable region comprising a CDR H1, a CDR H2, and a CDR H3, wherein

the CDR L1 comprises the sequence TGTGSDVGSYNLVS (SEQ ID NO: 1),

the CDR L2 comprises the sequence GDSERPS (SEQ ID NO: 2),

the CDR L3 comprises the sequence SSYAGSGIYV (SEQ ID NO: 3),

the CDR H1 comprises the sequence TYAMG (SEQ ID NO: 4),

the CDR H2 comprises the sequence SIGSSGAQTRYADS (SEQ ID NO: 7), or TIGSSGAQTRYADS (SEQ ID NO: 41), and
the CDR H3 comprises the sequence LAIGDSY (SEQ ID NO: 11).

28. The method of claim 14, wherein the light chain comprises an amino acid sequence having at least 90% identity to the sequence:

QSALTQPASVSGSPGQSITISCTGTGSDVGSYNLVSWEYQQHPGKAPKLMIYGDSE
RPSGVSNRFSGSKSGNTASLTISGLQAEDEADYYCSSYAGSGIYVFGTGTKVTVLGQPKA
APSVTLFPPSSEELQANKATLVCLISDFYPGAVTVAWKADSSPVKAGVETTTTPSKQSNN
KYAASSYLSLTPEQWKSHKSYSCQVTHEGSTVEKTVAPTECS (SEQ ID NO: 19).

29. The method of claim 14, wherein the heavy chain comprises an amino acid sequence selected from the group consisting of:

a sequence having at least 90% identity to the sequence of

EVQLLES GGGGLVQP GGSRLRLSCAASGFTFSTYAMGWVRQAPGKGLEWVSSIGSS
GAQTRYADSVKGRFTISRDN SKNTLYLQMNSLRAEDTAVYYCARLAIGDSYWGQGT
MTVTVSSASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALTSGVHTFPA
VLQSSGLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKKVEPKSCDKTHTCPPCPAP
ELLGGPSVFLFPPKPKDTLMISRTPEVTCVVDVSHEDPEVKFNWYVDGVEVHNAKTKP
REEQYASTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKGQPREPQVY
TLPPSRDELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTTPVLDSDGSFFLYSK
LTVDKSRWQQGNVFSCSVMHEALHNHYTQKSLSLSPG (SEQ ID NO: 20);

a sequence having at least 90% identity to the sequence of

EVQLLES GGGGLVQP GGSRLRLSCAASGFTFSDYAMGWVRQAPGKGLEWVSSIGASGSQT
RYADSVKGRFTISRDN SKNTLYLQMNSLRAEDTAVYYCARLAIGDSYWGQGTMTVTVSS
ASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALTSGVHTFPAVLQSS
GLYSLSSVVTVPSSSLGTQTYICNVNHKPSNTKVDKKVEPKSCDKTHTCPPCPAPELLGG
PSVFLFPPKPKDTLMISRTPEVTCVVDVSHEDPEVKFNWYVDGVEVHNAKTKPREEQY
ASTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKGQPREPQVYTLPPSR
DELTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTTPVLDSDGSFFLYSKLTVDK
SRWQQGNVFSCSVMHEALHNHYTQKSLSLSPG (SEQ ID NO: 21);

a sequence having at least 90% identity to the sequence of

EVQLLES GGGGLVQP GGSRLRLSCAASGFTFSNYAMGWVRQAPGKGLEWVSSIGASGAQT
RYADSVKGRFTISRDN SKNTLYLQMNSLRAEDTAVYYCARLAIGDSYWGQGTMTVTVSS
ASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALTSGVHTFPAVLQSS

GLYSLSSVVTVPSSSLGTQTYICNVNHHKPSNTKVDKKVEPKSCDKTHTCPPCPAPELLGG
PSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHNAKTKPREEQY
ASTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKGQPREPQVYTLPPSR
EEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTPPVLDSDGSFFLYSKLTVDK
SRWQQGNVFSCSVMHEALHNHYTQKSLSLSPG (SEQ ID NO: 22);

a sequence having at least 90% identity to the sequence of

EVQLLESGLLVQPGGSLRLSCAASGFTFSTYAMGWVRQAPGKGLEWVSSIGASGGQT
RYADSVKGRFTISRDNKNTLYLQMNSLRAEDTAVYYCARLAIGDSYWGQGTMTVTVSS
ASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALTSGVHTFPAVLQSS
GLYSLSSVVTVPSSSLGTQTYICNVNHHKPSNTKVDKKVEPKSCDKTHTCPPCPAPELLGG
PSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHNAKTKPREEQY
ASTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKGQPREPQVYTLPPSR
EEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTPPVLDSDGSFFLYSKLTVDK
SRWQQGNVFSCSVMHEALHNHYTQKSLSLSPG (SEQ ID NO: 23); and

a sequence having at least 90% identity to the sequence of

EVQLLESGLLVQPGGSLRLSCAASGFTFSTYAMGWVRQAPGKGLEWVSSIGASGSQT
RYADSVKGRFTISRDNKNTLYLQMNSLRAEDTAVYYCARLAIGDSYWGQGTMTVTVSS
ASTKGPSVFPLAPSSKSTSGGTAALGCLVKDYFPEPVTVSWNSGALTSGVHTFPAVLQSS
GLYSLSSVVTVPSSSLGTQTYICNVNHHKPSNTKVDKKVEPKSCDKTHTCPPCPAPELLGG
PSVFLFPPKPKDTLMISRTPEVTCVVVDVSHEDPEVKFNWYVDGVEVHNAKTKPREEQY
ASTYRVVSVLTVLHQDWLNGKEYKCKVSNKALPAPIEKTISKAKGQPREPQVYTLPPSR
EEMTKNQVSLTCLVKGFYPSDIAVEWESNGQPENNYKTTPPVLDSDGSFFLYSKLTVDK
SRWQQGNVFSCSVMHEALHNHYTQKSLSLSPG (SEQ ID NO: 24).

30. The method of claim 14, wherein the isolated antibody comprises: (1) a light chain variable region comprising a CDR L1, a CDR L2, and a CDR L3 and (2) a heavy chain variable region comprising a CDR H1, a CDR H2, and a CDR H3, wherein

the CDR L1 comprises a sequence having no more than two amino acid substitutions relative to the sequence of TGTGSDVGSYNLVS (SEQ ID NO: 1),

the CDR L2 comprises a sequence having no more than one amino acid substitution relative to the sequence of GDSERPS (SEQ ID NO: 2),

the CDR L3 comprises a sequence having no more than one amino acid substitution relative to the sequence of SSYAGSGIYV (SEQ ID NO: 3),

the CDR H1 comprises a sequence having no more than one amino acid substitution relative to the sequence of TYAMG (SEQ ID NO: 4), DYAMG (SEQ ID NO: 5), or NYAMG (SEQ ID NO: 6),

the CDR H2 comprises a sequence having no more than two amino acid substitutions relative to the sequence of SIGASGSQTRYADS (SEQ ID NO: 8), SIGSSGAQTRYADS (SEQ ID NO: 7), SIGASGAQTRYADS (SEQ ID NO: 9), SIGASGGQTRYADS (SEQ ID NO: 10), TIGSSGAQTRYADS (SEQ ID NO: 41), SIGASGSQTRYADS (SEQ ID NO: 42), TIGASGAQTRYADS (SEQ ID NO: 43), or TIGASGGQTRYADS (SEQ ID NO: 32), and

the CDR H3 comprises a sequence having no more than one amino acid substitution relative to the sequence of LAIGDSY (SEQ ID NO: 11).

31. The method of claim 14, wherein

the CDR L1 of the isolated antibody comprises the sequence TGTGSDVGSYNLVS (SEQ ID NO: 1),

the CDR L2 of the isolated antibody comprises the sequence GDSERPS (SEQ ID NO: 2),

the CDR L3 of the isolated antibody comprises the sequence SSYAGSGIYV (SEQ ID NO: 3),

the CDR H1 of the isolated antibody comprises the sequence DYAMG (SEQ ID NO: 5),

the CDR H2 of the isolated antibody comprises the sequence SIGASGSQTRYADS (SEQ ID NO: 8), and

the CDR H3 of the isolated antibody comprises the sequence LAIGDSY (SEQ ID NO: 11).

32. The method of claim 26, wherein

the CDR L1 of the isolated antibody comprises the sequence TGTGSDVGSYNLVS (SEQ ID NO: 1),

the CDR L2 of the isolated antibody comprises the sequence GDSERPS (SEQ ID NO: 2),

the CDR L3 of the isolated antibody comprises the sequence SSYAGSGIYV (SEQ ID NO: 3),

the CDR H1 of the isolated antibody comprises the sequence NYAMG (SEQ ID NO: 6),

the CDR H2 of the isolated antibody comprises the sequence SIGASGAQTRYADS (SEQ ID NO: 9) or TIGASGAQTRYADS (SEQ ID NO: 43), and

the CDR H3 of the isolated antibody comprises the sequence LAIGDSY (SEQ ID NO: 11).

33. The method of claim 14, wherein

the CDR L1 of the isolated antibody comprises the sequence TGTGSDVGSYNLVS (SEQ ID NO: 1),

the CDR L2 of the isolated antibody comprises the sequence GDSEPS (SEQ ID NO: 2),

the CDR L3 of the isolated antibody comprises the sequence SSYAGSGIYV (SEQ ID NO: 3),

the CDR H1 of the isolated antibody comprises the sequence TYAMG (SEQ ID NO: 4),

the CDR H2 of the isolated antibody comprises the sequence SIGASGGQTRYADS (SEQ ID NO: 10) or TIGASGGQTRYADS (SEQ ID NO: 32), and

the CDR H3 of the isolated antibody comprises the sequence LAIGDSY (SEQ ID NO: 11).

34. The method of claim 14, wherein

the CDR L1 of the isolated antibody comprises the sequence TGTGSDVGSYNLVS (SEQ ID NO: 1),

the CDR L2 of the isolated antibody comprises the sequence GDSEPS (SEQ ID NO: 2),

the CDR L3 of the isolated antibody comprises the sequence SSYAGSGIYV (SEQ ID NO: 3),

the CDR H1 of the isolated antibody comprises the sequence TYAMG (SEQ ID NO: 4),

the CDR H2 of the isolated antibody comprises the sequence SIGASGSQTRYADS (SEQ ID NO: 8), and

the CDR H3 of the isolated antibody comprises the sequence LAIGDSY (SEQ ID NO: 11).

35. The method of claim 29, wherein the heavy chain variable region of the isolated antibody comprises a sequence having at least 95%, 97%, 99%, or 100% identity to the sequence of any one of SEQ ID NOs: 20-24.

36. The method of claim 28, wherein the light chain variable region of the isolated antibody comprises a sequence having at least 95%, 97%, 99%, or 100% identity to the sequence of SEQ ID NO: 19.

37. The method of claim 1, wherein the method treats a fetus of the pregnant subject.

38. The method of claim 1, wherein the method treats both the pregnant subject and a fetus of the pregnant subject.

39. The method of claim 1, wherein the heavy chain of the isolated antibody comprises a sequence of SEQ ID NO: 19 and the light chain of the isolated antibody comprises a sequence of SEQ ID NO: 24.

40. The method of claim 14, wherein the heavy chain of the isolated antibody comprises a sequence of SEQ ID NO: 19 and the light chain of the isolated antibody comprises a sequence of SEQ ID NO: 24.