CLAIMS

1. A method for producing an anti-C1q antibody, comprising:

(a) culturing a host cell comprising a nucleic acid sequence encoding the anti-C1q antibody under conditions suitable for the expression of the anti-C1q antibody, and

(b) optionally recovering the anti-C1q antibody from the host cell or host cell culture medium,

wherein the anti-C1q antibody comprises:

a light chain variable domain and a heavy chain variable domain, wherein the light chain variable domain comprises the HVR-L1, HVR-L2, and HVR-L3 of the monoclonal antibody M1 produced by a hybridoma cell line with ATCC Accession Number PTA-120399 or progeny thereof; and wherein the heavy chain variable domain comprises the HVR-H1, HVR-H2, and HVR-H3 of the monoclonal antibody M1 produced by a hybridoma cell line with ATCC Accession Number PTA-120399 or progeny thereof.

2. A method for producing an anti-C1q antibody, comprising:

(a) culturing a host cell comprising a nucleic acid sequence encoding the anti-C1q antibody under conditions suitable for the expression of the anti-C1q antibody, and

(b) optionally recovering the anti-C1q antibody from the host cell or host cell culture medium,

wherein the anti-C1q antibody comprises:

HVR-L1 comprising the amino acid sequence of SEQ ID NO:5, HVR-L2 comprising the amino acid sequence of SEQ ID NO:6, and HVR-L3 comprising the amino acid sequence of SEQ ID NO:7; and

HVR-H1 comprising the amino acid sequence of SEQ ID NO:9, HVR-H2 comprising the amino acid sequence of SEQ ID NO:10, and HVR-H3 comprising the amino acid sequence of SEQ ID NO:11.

3. The method of claim 1 or claim 2, wherein the antibody comprises a light chain variable domain comprising the amino acid sequence of SEQ ID NO:4.

4. The method of any one of claims 1-3, wherein the antibody comprises a heavy chain variable domain comprising the amino acid sequence of SEQ ID NO:8.

5. The method of any one of claims 1-4, wherein the antibody binds specifically to both human C1q and mouse C1q; or rat C1q; or human C1q, mouse C1q, and rat C1q.

6. The method of any one of claims 1-5, wherein the antibody has dissociation constant (K_D) for human C1q and mouse C1q that ranges from less than about 30 nM to less than about 100 pM; or has dissociation constant (K_D) for human C1q and mouse C1q of less than about 30 nM; or has dissociation constant (KD) for human C1q and mouse C1q of less than about 20 nM; or has dissociation constant (KD) for human C1q and mouse C1q of less than about 10 nM; or has dissociation constant (KD) for human C1q and mouse C1q of less than about 5 nM; or has dissociation constant (KD) for human C1q and mouse C1q of less than about 1 nM; or has dissociation constant (KD) for human C1q and mouse C1q of less than about 100 pM.

7. The method of any one of claims 1-6, wherein the antibody specifically binds to and neutralizes a biological activity of C1q, wherein said biological activity is

(1) C1q binding to an autoantibody,
(2) C1q binding to C1r,
(3) C1q binding to C1s,
(4) C1q binding to phosphatidylserine,
(5) C1q binding to pentraxin-3,
(6) C1q binding to C-reactive protein (CRP),
(7) C1q binding to globular C1q receptor (gC1qR),
(8) C1q binding to complement receptor 1 (CR1),
(9) C1q binding to beta-amyloid, or
(10) C1q binding to calreticulin; and/or

(11) activation of the classical complement activation pathway,

(12) activation of antibody and complement dependent cytotoxicity,

(13) CH50 hemolysis for example, human, mouse, and/or rat CH50 hemolysis,

(14) synapse loss,

(15) B-cell antibody production,

(16) dendritic cell maturation,

(17) T-cell proliferation,

(18) cytokine production,

(19) microglia activation,

(20) Arthus reaction,

(21) phagocytosis of synapses or nerve endings, or

(22) activation of complement receptor 3 (CR3/C3) expressing cells.

8. The method of claim 7, wherein the antibody is capable of neutralizing at least 50%, at least 80%, or at least 90% of CH50 hemolysis.

9. The method of claim 7 or claim 8, wherein the antibody is capable of neutralizing at least 50% of CH50 hemolysis at a dose of less than 200 ng/ml, less than 100 ng/ml, less than 50 ng/ml, or less than 20 ng/ml.

10. The method of any one of claims 1-9, wherein the antibody is a murine antibody or humanized or chimeric antibody.

11. The method of any one of claims 1-10, wherein the antibody is of the IgG class.

12. The method of claim 11, wherein the antibody has an IgG_1, IgG_2, IgG_3, or IgG_4 isotype.

13. The method of any one of claims 1-10, wherein the antibody is an antibody fragment.

14. The method of claim 13, wherein the antibody is a Fab, $F(ab')_2$ or Fab' fragment.

15. The method of claim 13 or claim 14, wherein the antibody fragment specifically binds to and neutralizes a biological activity of C1q.

16. The method of claim 1 or claim 2, comprising prior to (a)

(1) isolating and inserting a nucleic acid sequence encoding the anti-C1q antibody into one or more vectors, and

(2) introducing the one or more vectors into the host cell.

17. The method of any one of claims 1-2 or 16, wherein the host cell is a prokaryotic cell or a eukaryotic cell, optionally wherein the prokaryotic cell is a yeast cell or *E. coli* or the eukaryotic cell is a mammalian cell, optionally wherein the mammalian cell is a Chinese hamster ovary (CHO) cell.

18. A vector comprising a nucleic acid sequence that encodes an anti-C1q antibody, wherein the anti-C1q antibody comprises:

a heavy chain variable domain comprising an amino acid sequence of SEQ ID NO: 8 and a light chain variable domain comprising an amino acid sequence of SEQ ID NO: 4.

19. The vector of claim 18, wherein the vector is an expression vector.