Claims

1. An ICOS binding protein or antigen binding portion thereof comprising one or more of: CDRH1 as set forth in SEQ ID NO:1; CDRH2 as set forth in SEQ ID NO:2; CDRH3 as set forth in SEQ ID NO:3; CDRL1 as set forth in SEQ ID NO:4; CDRL2 as set forth in SEQ ID NO:5 and/or CDRL3 as set forth in SEQ ID NO:6.

2. The ICOS binding protein or antigen binding portion thereof of claim 1 comprising a V_H domain comprising an amino acid sequence at least 90% identical to the amino acid sequence set forth in SEQ ID NO:7 and/or a V_L domain comprising an amino acid sequence at least 90% identical to the amino acid sequence as set forth in SEQ ID NO:8 wherein said ICOS binding protein specifically binds to human ICOS.

3. The ICOS binding protein or antigen binding portion thereof of claim 1 or 2, wherein said ICOS binding protein is an ICOS agonist.

4. The ICOS binding protein or antigen binding portion thereof any one of claims 1 to 3 wherein said ICOS binding protein binds to human ICOS with

   (i) an association rate constant (k_{on}) of at least $1x10^5$ $M^{-1}s^{-1}$; and a dissociation rate constant (k_{off}) of less than $6x10^{-5}$ s^{-1}; or

   (ii) a dissociation constant (K_D) of less than about 100 nM,

   wherein the affinity is measured by BIAcore.

5. The ICOS binding protein or antigen binding portion thereof of any one of claims 1 to 4 wherein the ICOS binding protein comprises a heavy chain variable region comprising SEQ ID NO:1; SEQ ID NO:2; and SEQ ID NO:3 and wherein said ICOS binding protein comprises a light chain variable region comprising SEQ ID NO:4; SEQ ID NO:5, and SEQ ID NO:6.

6. The ICOS binding protein or antigen binding portion thereof of any one of claims 1 to 5 comprising a V_H domain comprising the amino acid sequence set forth in SEQ ID NO:7 and a V_L domain comprising the amino acid sequence as set forth in SEQ ID NO:8.

7. The ICOS binding protein or antigen binding portion thereof of any one of claims 1 to 6 wherein said ICOS binding protein or antigen binding portion thereof comprises a scaffold selected from human IgG1 isotype or variant thereof and human IgG4 isotype or variant thereof.

8. The ICOS binding protein or antigen binding portion thereof of any one of claims 1 to 7 wherein said ICOS binding protein or antigen binding portion thereof comprises an hIgG4PE scaffold.

9. The ICOS binding protein or antigen binding portion thereof of any one of claims 1 to 8 wherein said ICOS binding protein is a monoclonal antibody.

10. The ICOS binding protein or antigen binding portion thereof of claim 9 wherein the monoclonal antibody is humanized.

11. The ICOS binding protein or antigen binding portion thereof of claim 9 wherein the monoclonal antibody is fully human.

12. The ICOS binding protein or antigen binding portion thereof of any one of claims 9 to 11 wherein the monoclonal antibody comprises heavy chain CDRs having the amino acid sequences set forth in SEQ ID NO:1; SEQ ID NO:2; and SEQ ID NO:3 and light chain CDRs having the amino acid sequences set forth in SEQ ID NO:4; SEQ ID NO:5; and SEQ ID NO:6.

13. The ICOS binding protein or antigen binding portion thereof of any one of claims 9 to 12 wherein the monoclonal antibody is an agonist to human ICOS and comprises an IgG4 isotype scaffold or a variant thereof.

14. The ICOS binding protein or antigen binding portion thereof of claim 13 wherein said monoclonal antibody comprises a hIgG4PE scaffold.

15. A pharmaceutical composition comprising an ICOS binding protein or antigen binding portion thereof of any one of claims 1 to 14 and a pharmaceutically acceptable carrier.

16. The pharmaceutical composition of claim 15 for use in the treatment of cancer, infectious disease and/or sepsis in a human in need thereof.

17. Use of the ICOS binding protein or antigen binding portion thereof of any one of claims 1 to 14 in the manufacture of a medicament for the treatment of a disease selected from cancer, infectious disease, or sepsis in a human in need thereof.