

CLAIMS

1. A neutralising antibody that specifically binds to the receptor binding domain (RBD) of the SARS-CoV-2 spike protein, wherein the antibody competes for binding to the SARS-CoV-2 spike protein with the human ACE2 receptor.
2. An antibody according to claim 1, wherein the antibody comprises a variable heavy (VH) domain sequence comprising complementarity determining regions (CDRs) HCDR1, HCDR2 and HCDR3, and a variable light (VL) domain sequence comprising complementarity determining regions LCDR1, LCDR2 and LCDR3, and wherein HCDR3 is the HCDR3 of antibody IMPI-037 as shown in Table 1a (SEQ ID NO: 182).
3. An antibody according to claim 2, wherein the 6 CDRs are those of antibody IMPI-037 as shown in Table 1a (SEQ ID NOs: 180 to 182, 185, 18, and 186).
4. An antibody according to claim 3, wherein the variable heavy (VH) domain and variable light (VL) domain sequences respectively comprise
 - i. the variable heavy (VH) domain and variable light (VL) domain sequences of antibody IMPI-037 as shown in Table 1a (SEQ ID NOs: 179 and 184), optionally with 1, 2, 3, 4 or 5 amino acid alterations outside the complementarity determining regions (CDRs) in the variable heavy (VH) domain sequence and optionally with 1, 2, 3, 4 or 5 amino acid alterations outside the complementarity determining regions (CDRs) in the variable light (VL) domain sequence; or
 - ii. a sequence having at least 90% identity to the variable heavy (VH) and variable light (VL) domain sequences of antibody IMPI-037 as shown in Table 1a, provided that the antibody has the 6 CDRs of antibody IMPI-037 as shown in Table 1a.
5. An antibody according to any preceding claim, wherein the variable heavy (VH) domain and variable light (VL) domain sequences respectively comprise the variable heavy (VH) and variable light (VL) domain sequences of antibody IMPI-037 as shown in Table 1a.
6. An antibody which (i) competes for binding to the SARS-CoV-2 spike protein with an antibody according to any one of claims 1 to 5; or (ii) binds to the same epitope on the SARS-CoV-2 spike protein as an antibody according to any one of claims 1 to 5.
7. An antibody according to any one of claims 1 to 6, wherein

- i. the antibody is a human IgG1 antibody, optionally wherein the antibody is a human IgG1 antibody comprising a constant region sequence of SEQ ID NO: 418;
 - ii. the antibody is a human IgG4 antibody, optionally wherein the antibody is a human IgG4 antibody comprising a constant region sequence of SEQ ID NO: 436; or
 - iii. the antibody comprises kappa (κ) light chain constant regions, preferably wherein the kappa (κ) light chain constant regions sequence is SEQ ID NO: 448.
- 8. A nucleic acid comprising a sequence that encodes a VH domain and/or an VL domain of an antibody as defined in any preceding claim.
- 9. A vector comprising the nucleic acid of claim 8; optionally wherein the vector is a CHO vector.
- 10. A host cell comprising the nucleic acid of claim 8 or the vector of claim 9.
- 11. A pharmaceutical composition comprising
 - an antibody according to any one of claims 1 to 7,
 - an isolated nucleic acid encoding an antibody according to any one of claims 1 to 7, or
 - the isolated nucleic acid of claim 8,
 and a pharmaceutically acceptable excipient.
- 12. A pharmaceutical composition according to claim 11,
 - i. formulated for intravenous, intramuscular or subcutaneous administration; and/or
 - ii. further comprising at least one further therapeutic agent, optionally wherein the further therapeutic agent is at least one, preferably one or two, further antibodies, optionally wherein the at least one further antibody is selected from:
 - a. an antibody that specifically binds to the receptor binding domain (RBD) of the S1 subunit of the SARS-CoV-2 spike protein and competes for binding to the SARS-CoV-2 spike protein with the human ACE2 receptor;
 - b. an antibody that specifically binds to the receptor binding domain (RBD) of the S1 subunit of the SARS-CoV-2 spike protein and does not compete for binding to the SARS-CoV-2 spike protein with the human ACE2 receptor;
 - c. an antibody that specifically binds to the N-terminal domain (NTD) of the S1 subunit of the of SARS-CoV-2 spike protein;

- d. an antibody that specifically binds to the S2 subunit of the of SARS-CoV-2 spike protein; and
 - e. an antibody preferentially binds to the trimer form of the SARS-CoV-2 spike protein over the isolated RBD domain, S1 subunit and S2 subunit of the SARS-CoV-2 spike protein.
- 13. A kit comprising the pharmaceutical composition of claim 11 or claim 12, optionally further comprising
 - i. at least one further therapeutic agent, optionally wherein the further therapeutic agent is a further pharmaceutical composition comprising at least one, preferably one or two, further antibodies, optionally wherein the at least one further antibody is selected from:
 - a. an antibody that specifically binds to the receptor binding domain (RBD) of the S1 subunit of the SARS-CoV-2 spike protein and competes for binding to the SARS-CoV-2 spike protein with the human ACE2 receptor;
 - b. an antibody that specifically binds to the receptor binding domain (RBD) of the S1 subunit of the SARS-CoV-2 spike protein and does not compete for binding to the SARS-CoV-2 spike protein with the human ACE2 receptor;
 - c. an antibody that specifically binds to the N-terminal domain (NTD) of the S1 subunit of the of SARS-CoV-2 spike protein;
 - d. an antibody that specifically binds to the S2 subunit of the of SARS-CoV-2 spike protein; and
 - e. an antibody preferentially binds to the trimer form of the SARS-CoV-2 spike protein over the isolated RBD domain, S1 subunit and S2 subunit of the SARS-CoV-2 spike protein; and/or
 - ii. a label or instructions for use to treat and/or prevent a SARS-CoV-2-related disease or condition, such as COVID-19, in a human; optionally wherein the label or instructions comprise a marketing authorisation number (e.g., an FDA or EMA authorisation number); optionally wherein the kit comprises an IV or injection device that comprises the antibody or fragment.
- 14. An antibody according to any one of claims 1 to 7, or the composition according to claim 11 or claim 12, for use as a medicament.
- 15. Use of the antibody according to any one of claims 1 to 7, or the composition according to claim 11 or claim 12, in the manufacture of a medicament for treating or preventing a SARS-CoV-2-related disease or condition, wherein the antibody or composition is to be administered to a patient.

16. The use according to claim 15,

wherein

- i. the SARS-CoV-2-related disease or condition is COVID-19; and/or
- ii. the medicament is to be administered with at least one further therapeutic agent, optionally wherein
 - a. administration of the further therapeutic agent is simultaneous, separate or sequential;
 - b. the further therapeutic agent is at least one, preferably one or two, further antibodies, optionally wherein the at least one further antibody is selected from:
 - (i) an antibody that specifically binds to the receptor binding domain (RBD) of the S1 subunit of the SARS-CoV-2 spike protein and competes for binding to the SARS-CoV-2 spike protein with the human ACE2 receptor;
 - (ii) an antibody that specifically binds to the receptor binding domain (RBD) of the S1 subunit of the SARS-CoV-2 spike protein and does not compete for binding to the SARS-CoV-2 spike protein with the human ACE2 receptor;
 - (iii) an antibody that specifically binds to the N-terminal domain (NTD) of the S1 subunit of the of SARS-CoV-2 spike protein;
 - (iv) an antibody that specifically binds to the S2 subunit of the of SARS-CoV-2 spike protein; and
 - (v) an antibody preferentially binds to the trimer form of the SARS-CoV-2 spike protein over the isolated RBD domain, S1 subunit and S2 subunit of the SARS-CoV-2 spike protein.

17. Use of an antibody according to any of claims 1 to 7, for determining the presence or absence of SARS-CoV-2 in a sample.

18. A method of determining the presence or absence of SARS-CoV-2, in a sample, the method comprising
contacting the sample with an antibody according to any of 1 to 7; and
testing for binding between the antibody and SARS-CoV-2 in the sample;
wherein detection of binding indicates the presence of SARS-CoV-2 in the sample and
wherein absence of binding indicates the absence of SARS-CoV-2 in the sample.

19. Use according to claim 17 or a method according to claim 18, wherein

- i. the antibody comprises or is conjugated to a detectable label;

- ii. the sample has been obtained from a human who has been or is suspected of having been infected with SARS-CoV-2 and/or who exhibits one or more symptoms of a SARS-CoV-2-related disease or condition, such as COVID-19; and/or
 - iii. the sample is a serum, plasma, or whole blood sample, or an oral or nasal swab, urine, faeces, or cerebrospinal fluid (CFS), or wherein the sample is from any suspected SARS-CoV-2 infected organ or tissue.
20. A diagnostic kit for the use as set out in claim 17 or claim 19, or the method as set out in claim 18 or claim 19, comprising an antibody according to any of claims 1 to 7, and optionally one or more buffering solutions, optionally
- i. wherein the antibody comprises or is conjugated to a detectable label; or
 - ii. comprising a first reagent comprising the antibody according to any of claims 1 to 7, and a second reagent comprising a detector molecule that binds to the first reagent, optionally wherein the detector molecule is an antibody that comprises or is conjugated to a detectable label.