CLAIMS

1. A C-X-C motif chemokine ligand 10 (CXCL10) binding protein comprising an antigen binding domain of an antibody, wherein the binding protein binds to full-length human CXCL10, N-terminally truncated CXCL10 and citrullinated CXCL10, wherein the antigen binding domain comprises:

(i) a heavy chain variable region (V_H) comprising:

a) a complementarity determining region (CDR) 1 comprising a sequence set forth in amino acids 25-34 of SEQ ID NO: 11; and

b) a CDR2 comprising a sequence set forth in amino acids 49-65 of SEQ ID NO: 11; and

c) a CDR3 comprising a sequence set forth in amino acids 98-108 of SEQ ID NO: 11; and

a light chain variable (V_L) comprising:

a) a CDR1 comprising a sequence set forth in amino acids 23-33 of SEQ ID NO: 12; and

b) a CDR2 comprising a sequence set forth in amino acids 49-55 of SEQ ID NO: 12; and

c) a CDR3 comprising a sequence set forth in amino acids 88-96 of SEQ ID NO: 12; and/or

(ii) a V_H comprising:

a) a CDR1 comprising a sequence set forth in SEQ ID NO: 13; and

b) a CDR2 comprising a sequence set forth in SEQ ID NO: 14; and

c) a CDR3 comprising a sequence set forth in SEQ ID NO: 15; and

a V_L comprising:

a) a CDR1 comprising a sequence set forth in SEQ ID NO: 16; and

b) a CDR2 comprising a sequence set forth in SEQ ID NO: 17; and

c) a CDR3 comprising a sequence set forth in SEQ ID NO: 18.

2. The CXCL10 binding protein of claim 1 which binds the epitope NH2-LSRTVRCTCISISNQPVNPRSLE-COOH (SEQ ID NO: 26) of full-length human CXCL10, N-terminally truncated CXCL10 and citrullinated CXCL10; and/or wherein the binding protein:

(i) binds to full-length human CXCL10 with a K_D of 50 nM or less; and/or

(ii) binds to N-terminally truncated human CXCL10 with a K_D of 5 nM or less.

3. The CXCL10 binding protein according to claims 1 or 2, wherein the binding protein is selected from the group consisting of:
   (i) a Fv;
   (ii) a single chain Fv fragment (scFv);
   (iii) a dimeric scFv (di-scFv);
   (iv) a minibody;
   (v) a diabody;
   (vi) a triabody;
   (vii) a tetrabody;
   (viii) a Fab;
   (ix) a $F(ab')_2$;
   (x) an antibody;
   (xi) an antibody mimetic;
   (xii) a T-cell receptor; and
   (xiii) one of (i) to (xii) linked to a constant region of an antibody, Fc or a heavy chain constant domain (C_H) 2 and/or C_H3.

4. The CXCL10 binding protein according to any one of claims 1 to 3, wherein the binding protein is an antibody or antigen binding fragment thereof comprising a V_H comprising an amino acid sequence set forth in SEQ ID NO: 11 and a V_L comprising an amino acid sequence set forth in SEQ ID NO: 12.

5. The CXCL10 binding protein according to any one of claims 1 to 4, wherein the binding protein is conjugated to a detectable label.

6. A composition comprising the binding protein of any one of claims 1 to 5 and a carrier.

7. A polynucleotide encoding the CXCL10 binding protein according to any one of claims 1 to 5.

8. An expression vector comprising the polynucleotide according to claim 7.

9. A cell comprising the expression vector of claim 8 *in vitro.*

10. Use of the cell of claim 9 for preparing a CXCL10 binding protein.

11. The use of claim 10, comprising culturing the cell of claim 9 and producing the CXCL10 binding protein therefrom; and optionally isolating and purifying the produced binding protein.

12. A method of detecting and/or diagnosing a malignant condition in a subject, the method comprising:

(i) determining a level of active CXCL10 in the subject and a level of total CXCL10 in the subject; and

(ii) determining a CXCL10 ratio of active CXLC10 to total CXCL10 in the subject;

wherein determining the level of active CXCL10 and total CXCL10 comprises determining the amount of active CXCL10 protein and the amount of total CXCL10 protein in the subject, wherein the method comprises using:

the CXCL10 binding protein according to any one of claims 1 to 5 to determine the level of total CXCL10 in the subject.

13. The method of claim 12, the method further comprises using a CXCL10 binding protein comprising:

(i) a V_H comprising:

a) a CDR1 comprising a sequence set forth in amino acids 25-34 of SEQ ID NO: 3; and

b) a CDR2 comprising a sequence set forth in amino acids 49-65 of SEQ ID NO: 3; and

c) a CDR3 comprising a sequence set forth in amino acids 98-108 of SEQ ID NO: 3; and

a V_L comprising:

a) a CDR1 comprising a sequence set forth in amino acids 23-33 of SEQ ID NO: 4; and

b) a CDR2 comprising a sequence set forth in amino acids 49-55 of SEQ ID NO: 4; and

c) a CDR3 comprising a sequence set forth in amino acids 88-96 of SEQ ID NO: 4; and/or

(ii) a V_H comprising:

a) a CDR1 comprising a sequence set forth in SEQ ID NO: 5; and

b) a CDR2 comprising a sequence set forth in SEQ ID NO: 6; and

c) a CDR3 comprising a sequence set forth in SEQ ID NO: 7; and

a V_L comprising:

a) a CDR1 comprising a sequence set forth in SEQ ID NO: 8; and

b) a CDR2 comprising a sequence set forth in SEQ ID NO: 9; and

c) a CDR3 comprising a sequence set forth in SEQ ID NO: 10,

to determine the level of active CXCL10 in the subject.

14. The method of claim 12 or 13, wherein the method further comprises comparing the CXCL10 ratio in the subject to a CXCL10 ratio in at least one reference;

wherein the method comprises determining:

a) if the CXCL10 ratio in the subject is higher than the CXCL10 ratio in the reference, or

b) if the CXCL10 ratio in the subject is lower than the CXCL10 ratio in the reference; and

wherein:

(i) a lower CXCL10 ratio in the subject compared to the CXCL10 ratio in the reference is indicative of the malignant condition; or

(ii) a higher CXCL10 ratio in the subject compared to the CXCL10 ratio in the reference is indicative of a benign condition.

15. The method of any one of claims 12 to 14, wherein:

(i) the level of total CXCL10 in the subject is determined using an antibody or antigen binding fragment thereof comprising a V_H comprising an amino acid sequence set forth in SEQ ID NO: 11 and a V_L comprising an amino acid sequence set forth in SEQ ID NO: 12; and/or

(ii) the level of active CXCL10 in the subject is determined using an antibody or antigen binding fragment thereof comprising a V_H comprising an amino acid sequence set forth in SEQ ID NO: 3 and a V_L comprising an amino acid sequence set forth in SEQ ID NO: 4.

16. The method of any one of claims 12 to 15, wherein:

(i) one or more of the CXCL10 binding proteins is conjugated to a detectable label, wherein the detectable label is selected from the group consisting of a radiolabel, an enzyme, a fluorescent label, a luminescent label, a bioluminescent label, a magnetic label, a prosthetic group and a contrast agent, and/or

(ii) the method comprises performing flow cytometry, an enzyme-linked immunosorbent assay or a western blot.

17. The method of any one of claims 12 to 16, wherein the method is performed on at least one biological sample obtained from the subject, wherein the biological sample is a biopsy, a fluid sample, a plasma sample or cellular swab.

18. The method of any one of claims 12 to 17, wherein the malignant condition is a reproductive cancer, and/or wherein the reproductive cancer is ovarian cancer.

19. The method of any one of claims 12 to 18, wherein the method further comprises:

(i) determining the level of dipeptidyl peptidase-4 (DPP4) and/or cancer antigen 125 (CA-125) in the subject; and/or

(ii) determining the level of one or more or all of granulocyte-macrophage colony-stimulating factor (GM-CSF), interleukin 6 (IL-6), tumor necrosis factor receptor II (TNF-RII), human epididymis protein 4 (HE4) and interleukin 8 (IL-8).

20. A method of monitoring tumour burden in a subject suffering from a malignant condition, and/or a method of monitoring progression of a malignant condition in a subject, and/or a method of determining tumour regression in a subject suffering from a malignant condition, and/or a method of treating a malignant condition in a subject,

wherein the method comprises:

determining a level of active CXCL10 in the subject and a level of total CXCL10 in the subject; and determining a CXCL10 ratio of active CXCL10 to total CXCL10 in the subject at one or more time points,

wherein the method comprises using the CXCL10 binding protein according to any one of claims 1 to 5 to determine the level of total CXCL10 in the subject.