Claims

1. A bispecific single chain antibody molecule comprising a first binding domain capable of binding to an epitope of human and non-chimpanzee primate CD3ε (epsilon) chain, wherein the epitope is part of an amino acid sequence comprised in the group consisting of SEQ ID NOs. 2, 4, 6, and 8, and a second binding domain capable of binding to an antigen selected from the group consisting of Prostate Stem Cell Antigen (PSCA), B-Lymphocyte antigen CD19 (CD19), hepatocyte growth factor receptor (C-MET), Endosialin, the EGF-like domain 1 of EpCAM, encoded by exon 2, Fibroblast activation protein alpha (FAP alpha) and Insulin-like growth factor I receptor (IGF-IR or IGF-1R).

2. The bispecific single chain antibody molecule of claim 1, wherein at least one of said first or second binding domain is CDR-grafted, humanized or human.

3. The bispecific single chain antibody molecule according to any one of claims 1 or 2, wherein the first binding domain capable of binding to an epitope of human and non-chimpanzee primate CD3ε chain comprises a VL region comprising CDR-L1, CDR-L2 and CDR-L3 selected from:
   (a) CDR-L1 as depicted in SEQ ID NO. 27, CDR-L2 as depicted in SEQ ID NO. 28 and CDR-L3 as depicted in SEQ ID NO. 29;
   (b) CDR-L1 as depicted in SEQ ID NO. 117, CDR-L2 as depicted in SEQ ID NO. 118 and CDR-L3 as depicted in SEQ ID NO. 119; and
   (c) CDR-L1 as depicted in SEQ ID NO. 153, CDR-L2 as depicted in SEQ ID NO. 154 and CDR-L3 as depicted in SEQ ID NO. 155.

4. The bispecific single chain antibody molecule according to any one of claims 1 or 2, wherein the first binding domain capable of binding to an epitope of human and non-chimpanzee primate CD3ε chain comprises a VH region comprising CDR-H 1, CDR-H2 and CDR-H3 selected from:
   (a) CDR-H1 as depicted in SEQ ID NO. 12, CDR-H2 as depicted in SEQ ID NO. 13 and CDR-H3 as depicted in SEQ ID NO. 14;

(b) CDR-H1 as depicted in SEQ ID NO. 30, CDR-H2 as depicted in SEQ ID NO. 31 and CDR-H3 as depicted in SEQ ID NO. 32;

(c) CDR-H1 as depicted in SEQ ID NO. 48, CDR-H2 as depicted in SEQ ID NO. 49 and CDR-H3 as depicted in SEQ ID NO. 50;

(d) CDR-H1 as depicted in SEQ ID NO. 66, CDR-H2 as depicted in SEQ ID NO. 67 and CDR-H3 as depicted in SEQ ID NO. 68;

(e) CDR-H1 as depicted in SEQ ID NO. 84, CDR-H2 as depicted in SEQ ID NO. 85 and CDR-H3 as depicted in SEQ ID NO. 86;

(f) CDR-H1 as depicted in SEQ ID NO. 102, CDR-H2 as depicted in SEQ ID NO. 103 and CDR-H3 as depicted in SEQ ID NO. 104;

(g) CDR-H1 as depicted in SEQ ID NO. 120, CDR-H2 as depicted in SEQ ID NO. 121 and CDR-H3 as depicted in SEQ ID NO. 122;

(h) CDR-H1 as depicted in SEQ ID NO. 138, CDR-H2 as depicted in SEQ ID NO. 139 and CDR-H3 as depicted in SEQ ID NO. 140;

(i) CDR-H1 as depicted in SEQ ID NO. 156, CDR-H2 as depicted in SEQ ID NO. 157 and CDR-H3 as depicted in SEQ ID NO. 158; and

(j) CDR-H1 as depicted in SEQ ID NO. 174, CDR-H2 as depicted in SEQ ID NO. 175 and CDR-H3 as depicted in SEQ ID NO. 176.

5. The bispecific single chain antibody molecule according to any one of claims 1 to 3, wherein the first binding domain capable of binding to an epitope of human and non-chimpanzee primate CD3ε chain comprises a VL region selected from the group consisting of a VL region as depicted in SEQ ID NO. 35, 39, 125, 129, 161 or 165.

6. The bispecific single chain antibody molecule according to any one of claims 1 or 2 and 4, wherein the first binding domain capable of binding to an epitope of human and non-chimpanzee primate CD3ε chain comprises a VH region selected from the group consisting of a VH region as depicted in SEQ ID NO. 15, 19, 33, 37, 51, 55, 69, 73, 87, 91, 105, 109, 123, 127, 141, 145, 159, 163, 177 or 181.

7. The bispecific single chain antibody molecule according to any one of claims 1 to 6, wherein the first binding domain capable of binding to an epitope of

human and non-chimpanzee primate CD3ε chain comprises a VL region and a VH region selected from the group consisting of:

(a) a VL region as depicted in SEQ ID NO. 17 or 21 and a VH region as depicted in SEQ ID NO. 15 or 19;

(b) a VL region as depicted in SEQ ID NO. 35 or 39 and a VH region as depicted in SEQ ID NO. 33 or 37;

(c) a VL region as depicted in SEQ ID NO. 53 or 57 and a VH region as depicted in SEQ ID NO. 51 or 55;

(d) a VL region as depicted in SEQ ID NO. 71 or 75 and a VH region as depicted in SEQ ID NO. 69 or 73;

(e) a VL region as depicted in SEQ ID NO. 89 or 93 and a VH region as depicted in SEQ ID NO. 87 or 91;

(f) a VL region as depicted in SEQ ID NO. 107 or 111 and a VH region as depicted in SEQ ID NO. 105 or 109;

(g) a VL region as depicted in SEQ ID NO. 125 or 129 and a VH region as depicted in SEQ ID NO. 123 or 127;

(h) a VL region as depicted in SEQ ID NO. 143 or 147 and a VH region as depicted in SEQ ID NO. 141 or 145;

(i) a VL region as depicted in SEQ ID NO. 161 or 165 and a VH region as depicted in SEQ ID NO. 159 or 163; and

(j) a VL region as depicted in SEQ ID NO. 179 or 183 and a VH region as depicted in SEQ ID NO. 177 or 181.

8. The bispecific single chain antibody molecule according to claim 7, wherein the first binding domain capable of binding to an epitope of human and non-chimpanzee primate CD3ε chain comprises an amino acid sequence selected from the group consisting of SEQ ID NOs: 23, 25, 41, 43, 59, 61, 77, 79, 95, 97, 113, 115, 131, 133, 149, 151, 167, 169, 185 or 187.

9. The bispecific single chain antibody molecule according to any one of claims 1 to 8, wherein the second binding domain is capable of binding to human Prostate Stem Cell Antigen (PSCA) and/or a non-Chimpanzee primate PSCA.

10. The bispecific single chain antibody molecule according to claim 9, wherein the bispecific single chain antibody molecule comprises a group of the following sequences as CDR H1, CDR H2, CDR H3, CDR L1, CDR L2 and CDR L3 in the second binding domain selected from:

a) CDR H1-3 of SEQ ID NO: 382 – 384 and CDR L1-3 of SEQ ID NO: 377 – 379;

b) CDR H1-3 of SEQ ID NO: 400 – 402 and CDR L1-3 of SEQ ID NO: 395 – 397;

c) CDR H1-3 of SEQ ID NO: 414 – 416 and CDR L1-3 of SEQ ID NO: 409 – 411;

d) CDR H1-3 of SEQ ID NO: 432 – 434 and CDR L1-3 of SEQ ID NO: 427 – 429;

e) CDR H1-3 of SEQ ID NO: 1215 – 1217 and CDR L1-3 of SEQ ID NO: 1220 – 1222;

f) CDR H1-3 of SEQ ID NO: 1187 – 1189 and CDR L1-3 of SEQ ID NO: 1192 – 1194;

g) CDR H1-3 of SEQ ID NO: 1173 – 1175 and CDR L1-3 of SEQ ID NO: 1178 – 1180;

h) CDR H1-3 of SEQ ID NO: 1229 – 1231 and CDR L1-3 of SEQ ID NO: 1234 – 1236;

i) CDR H1-3 of SEQ ID NO: 1201 – 1203 and CDR L1-3 of SEQ ID NO: 1206 – 1208;

k) CDR H1-3 of SEQ ID NO: 1257 – 1259 and CDR L1-3 of SEQ ID NO: 1262 – 1264; and

l) CDR H1-3 of SEQ ID NO: 1243 – 1245 and CDR L1-3 of SEQ ID NO: 1248 – 1250.

11. The bispecific single chain antibody molecule of claim 10, wherein the binding domains are arranged in the order VH PSCA-VL PSCA-VH CD3-VL CD3 or VL PSCA-VH PSCA-VH CD3-VL CD3.

12. The bispecific single chain antibody molecule according to claim 11, wherein the bispecific single chain antibody molecule comprises a sequence selected from:

(a) an amino acid sequence as depicted in any of SEQ ID NOs: 389, 421, 439, 391, 405, 423, 441, 1226, 1198, 1184, 1240, 1212, 1268 or 1254;

(b) an amino acid sequence encoded by a nucleic acid sequence as depicted in any of SEQ ID NOs: 390, 422, 440, 392, 406, 424, 442, 1227, 1199, 1185, 1241, 1213 1269 or 1255; and

(c) an amino acid sequence at least 90 % identical, more preferred at least 95 % identical, most preferred at least 96 % identical to the amino acid sequence of (a) or (b).

13. The bispecific single chain antibody molecule according to any one of claims 1 to 8, wherein the second binding domain is capable of binding to human B-Lymphocyte antigen CD19 (CD19), and/or a non-Chimpanzee primate CD19.

14. The bispecific single chain antibody molecule according to claim 13, wherein the bispecific single chain antibody molecule comprises a group of the following sequences as CDR H1, CDR H2, CDR H3, CDR L1, CDR L2 and CDR L3 in the second binding domain selected from:

a) CDR H1-3 of SEQ ID NO: 478 - 480 and CDR L1-3 of SEQ ID NO: 473 - 475;

b) CDR H1-3 of SEQ ID NO: 530 - 532 and CDR L1-3 of SEQ ID NO: 525 - 527;

c) CDR H1-3 of SEQ ID NO: 518 - 520 and CDR L1-3 of SEQ ID NO: 513 - 515; and

d) CDR H1-3 of SEQ ID NO: 506 - 508 and CDR L1-3 of SEQ ID NO: 501 – 503;

e) CDR H1-3 of SEQ ID NO: 494 – 496 and CDR L1-3 of SEQ ID NO: 489 – 491;

f) CDR H1-3 of SEQ ID NO: 542 – 544 and CDR L1-3 of SEQ ID NO: 537 – 539;

g) CDR H1-3 of SEQ ID NO: 554 – 556 and CDR L1-3 of SEQ ID NO: 549 – 551;

h) CDR H1-3 of SEQ ID NO: 566 – 568 and CDR L1-3 of SEQ ID NO: 561 – 563;

i) CDR H1-3 of SEQ ID NO: 578 – 580 and CDR L1-3 of SEQ ID NO: 573 – 575;

j) CDR H1-3 of SEQ ID NO: 590 – 592 and CDR L1-3 of SEQ ID NO: 585 – 587;

k) CDR H1-3 of SEQ ID NO: 602 – 604 and CDR L1-3 of SEQ ID NO: 597 – 599;

l) CDR H1-3 of SEQ ID NO: 614 – 616 and CDR L1-3 of SEQ ID NO: 609 – 611;

m) CDR H1-3 of SEQ ID NO: 626 – 628 and CDR L1-3 of SEQ ID NO: 621 – 623;

n) CDR H1-3 of SEQ ID NO: 638 – 640 and CDR L1-3 of SEQ ID NO: 633 – 635;

o) CDR H1-3 of SEQ ID NO: 650 – 652 and CDR L1-3 of SEQ ID NO: 645 – 647;

p) CDR H1-3 of SEQ ID NO: 662 – 664 and CDR L1-3 of SEQ ID NO: 657 – 659;

q) CDR H1-3 of SEQ ID NO: 674 – 676 and CDR L1-3 of SEQ ID NO: 669 – 671;

r) CDR H1-3 of SEQ ID NO: 686 – 688 and CDR L1-3 of SEQ ID NO: 681 – 683;

s) CDR H1-3 of SEQ ID NO: 698 – 700 and CDR L1-3 of SEQ ID NO: 693 – 695;

t) CDR H1-3 of SEQ ID NO: 710 – 712 and CDR L1-3 of SEQ ID NO: 705 – 707;

u) CDR H1-3 of SEQ ID NO: 722 – 724 and CDR L1-3 of SEQ ID NO: 717 – 719;

v) CDR H1-3 of SEQ ID NO: 734 – 736 and CDR L1-3 of SEQ ID NO: 729 – 731;

w) CDR H1-3 of SEQ ID NO: 746 – 748 and CDR L1-3 of SEQ ID NO: 741 – 743;

x) CDR H1-3 of SEQ ID NO: 758 – 760 and CDR L1-3 of SEQ ID NO: 753 – 755;

y) CDR H1-3 of SEQ ID NO: 1271 - 1273 and CDR L1-3 of SEQ ID NO: 1276 – 1278;

z) CDR H1-3 of SEQ ID NO: 1285 – 1287 and CDR L1-3 of SEQ ID NO: 1290 – 1292;

aa) CDR H1-3 of SEQ ID NO: 1299 – 1301 and CDR L1-3 of SEQ ID NO: 1304 – 1306;

ab) CDR H1-3 of SEQ ID NO: 1313 – 1315 and CDR L1-3 of SEQ ID NO: 1318 – 1320;

ac) CDR H1-3 of SEQ ID NO: 1327 – 1329 and CDR L1-3 of SEQ ID NO: 1332 – 1334;

ad) CDR H1-3 of SEQ ID NO: 1341 – 1343 and CDR L1-3 of SEQ ID NO: 1346 – 1348;

ae) CDR H1-3 of SEQ ID NO: 1355 – 1357 and CDR L1-3 of SEQ ID NO: 1360 – 1362;

af) CDR H1-3 of SEQ ID NO: 1369 – 1371 and CDR L1-3 of SEQ ID NO: 1374 – 1376; and

ag) CDR H1-3 of SEQ ID NO: 1383 – 1385 and CDR L1-3 of SEQ ID NO: 1388 – 1390.

15. The bispecific single chain antibody molecule of claim 14, wherein the binding domains are arranged in the order VH CD19-VL CD19-VH CD3-VL CD3 or VL CD19-VH CD19-VH CD3-VL CD3.

16. The bispecific single chain antibody molecule according to claim 15, wherein the bispecific single chain antibody molecule comprises a sequence selected from:

(a) an amino acid sequence as depicted in any of SEQ ID NOs:481, 485, 483, 533, 521, 509, 497, 545, 557, 569, 581, 593, 605, 617, 629, 641, 653, 665, 677, 689, 701, 713, 725, 737, 749, 761, 1282, 1296, 1310, 1324, 1338, 1352, 1366, 1380 or 1394;

(b) an amino acid sequence encoded by a nucleic acid sequence as depicted in any of SEQ ID NOs: 482, 486, 484, 534, 522, 510, 498, 546, 558, 570, 582, 594, 606, 618, 630, 642, 654, 666, 678, 690, 702, 714, 726, 738, 750, 762, 1283, 1297, 1311, 1325, 1339, 1353, 1367, 1381 or 1395; and

(c) an amino acid sequence at least 90 % identical, more preferred at least 95 % identical, most preferred at least 96 % identical to the amino acid sequence of (a) or (b).

17. The bispecific single chain antibody molecule according to any one of claims 1 to 8, wherein the second binding domain is capable of binding to human hepatocyte growth factor receptor (C-MET), and/or a non-Chimpanzee primate C-MET.

18. The bispecific single chain antibody molecule according to claim 17, wherein the bispecific single chain antibody molecule comprises a group of the following sequences as CDR H1, CDR H2, CDR H3, CDR L1, CDR L2 and CDR L3 in the second binding domain selected from:

a) CDR H1-3 of SEQ ID NO: 821 - 823 and CDR L1-3 of SEQ ID NO: 816 - 818;

b) CDR H1-3 of SEQ ID NO: 836 - 838 and CDR L1-3 of SEQ ID NO: 833 - 835;

c) CDR H1-3 of SEQ ID NO: 845 – 847 and CDR L1-3 of SEQ ID NO: 840 - 842; and

d) CDR H1-3 of SEQ ID NO: 863 - 865 and CDR L1-3 of SEQ ID NO: 858 – 860;

e) CDR H1-3 of SEQ ID NO: 881 – 883 and CDR L1-3 of SEQ ID NO: 876 – 878;

f) CDR H1-3 of SEQ ID NO: 899 – 901 and CDR L1-3 of SEQ ID NO: 894 – 896;

g) CDR H1-3 of SEQ ID NO: 1401 – 1403 and CDR L1-3 of SEQ ID NO: 1406 – 1408;

h) CDR H1-3 of SEQ ID NO: 1415 – 1417 and CDR L1-3 of SEQ ID NO: 1420 – 1422;

i) CDR H1-3 of SEQ ID NO: 1429 – 1431 and CDR L1-3 of SEQ ID NO: 1434 – 1436;

j) CDR H1-3 of SEQ ID NO: 1443 – 1445 and CDR L1-3 of SEQ ID NO: 1448 – 1450;

k) CDR H1-3 of SEQ ID NO: 1457 – 1459 and CDR L1-3 of SEQ ID NO: 1462 – 1464;

l) CDR H1-3 of SEQ ID NO: 1471 – 1473 and CDR L1-3 of SEQ ID NO: 1476 – 1478;

m) CDR H1-3 of SEQ ID NO: 1639 – 1641 and CDR L1-3 of SEQ ID NO: 1644 – 1646;

n) CDR H1-3 of SEQ ID NO: 1625 – 1627 and CDR L1-3 of SEQ ID NO: 1630 – 1632;

o) CDR H1-3 of SEQ ID NO: 1611 – 1613 and CDR L1-3 of SEQ ID NO: 1616 – 1618;

p) CDR H1-3 of SEQ ID NO: 1597 – 1599 and CDR L1-3 of SEQ ID NO: 1602 – 1604;

q) CDR H1-3 of SEQ ID NO: 1569 – 1571 and CDR L1-3 of SEQ ID NO: 1574 – 1576;

r) CDR H1-3 of SEQ ID NO: 1555 – 1557 and CDR L1-3 of SEQ ID NO: 1560 – 1562;

s) CDR H1-3 of SEQ ID NO: 1583 – 1585 and CDR L1-3 of SEQ ID NO: 1588 – 1590;

t) CDR H1-3 of SEQ ID NO: 1541 – 1543 and CDR L1-3 of SEQ ID NO: 1546 – 1548;

u) CDR H1-3 of SEQ ID NO: 1513 – 1515 and CDR L1-3 of SEQ ID NO: 1518 – 1520;

v) CDR H1-3 of SEQ ID NO: 1527 – 1529 and CDR L1-3 of SEQ ID NO: 1532 – 1534;

w) CDR H1-3 of SEQ ID NO: 1499 – 1501 and CDR L1-3 of SEQ ID NO: 1504 – 1506; and

x) CDR H1-3 of SEQ ID NO: 1485 – 1487 and CDR L1-3 of SEQ ID NO: 1490 – 1492.

19. The bispecific single chain antibody molecule of claim 18, wherein the binding domains are arranged in the order VH C-MET-VL C-MET-VH CD3-VL CD3 or VL C-MET-VH C-MET-VH CD3-VL CD3.

20. The bispecific single chain antibody molecule according to claim 19, wherein the bispecific single chain antibody molecule comprises a sequence selected from:

(a) an amino acid sequence as depicted in any of SEQ ID NOs: 829, 853, 871, 889, 831, 855, 873, 891, 905, 1412, 1426, 1440, 1454, 1468, 1482, or;

(b) an amino acid sequence encoded by a nucleic acid sequence as depicted in any of SEQ ID NOs:830, 854, 872, 890, 832, 856, 874, 892, 906, 1413, 1427, 1441, 1455, 1469, or 1483; and

(c) an amino acid sequence at least 90 % identical, more preferred at least 95 % identical, most preferred at least 96 % identical to the amino acid sequence of (a) or (b).

21. The bispecific single chain antibody molecule according to any one of claims 1 to 8, wherein the second binding domain is capable of binding to human Endosialin, and/or a non-chimpanzee primate Endosialin.

22. The bispecific single chain antibody molecule according to claim 21, wherein the bispecific single chain antibody molecule comprises a group of the following sequences as CDR H1, CDR H2, CDR H3, CDR L1, CDR L2 and CDR L3 in the second binding domain selected from:

a) CDR H1-3 of SEQ ID NO: 1653 – 1655 and CDR L1-3 of SEQ ID NO: 1658 - 1660;

b) CDR H1-3 of SEQ ID NO: 1667 - 1669 and CDR L1-3 of SEQ ID NO: 1672 - 1674;

c) CDR H1-3 of SEQ ID NO: 1681 – 1683 and CDR L1-3 of SEQ ID NO: 1686 – 1688; and

d) CDR H1-3 of SEQ ID NO: 1695 – 1697 and CDR L1-3 of SEQ ID NO: 1700 – 1702;

e) CDR H1-3 of SEQ ID NO: 1709 – 1711 and CDR L1-3 of SEQ ID NO: 1714 – 1716; and

f) CDR H1-3 of SEQ ID NO: 1723 – 1725 and CDR L1-3 of SEQ ID NO: 1728 – 1730.

23. The bispecific single chain antibody molecule of claim 22, wherein the binding domains are arranged in the order VH Endosialin-VL Endosialin-VH CD3-VL CD3 or VL Endosialin-VH Endosialin-VH CD3-VL CD3.

24. The bispecific single chain antibody molecule according to claim 23, wherein the bispecific single chain antibody molecule comprises a sequence selected from:

(a) an amino acid sequence as depicted in any of SEQ ID NOs: 1664, 1678, 1692, 1706, 1720, or 1734;

(b) an amino acid sequence encoded by a nucleic acid sequence as depicted in any of SEQ ID NOs: 1665, 1679, 1693, 1707, 1721, or 1735; and

(c) an amino acid sequence at least 90 % identical, more preferred at least 95 % identical, most preferred at least 96 % identical to the amino acid sequence of (a) or (b).

25. The bispecific single chain antibody molecule according to any one of claims 1 to 8, wherein the second binding domain is capable of binding to human EpCAM, and/or a non-Chimpanzee primate EpCAM.

26. The bispecific single chain antibody molecule according to claim 25, wherein the bispecific single chain antibody molecule comprises a group of the following sequences as CDR H1, CDR H2, CDR H3, CDR L1, CDR L2 and CDR L3 in the second binding domain selected from:

a) CDR H1-3 of SEQ ID NO: 940 - 942 and CDR L1-3 of SEQ ID NO: 935 - 937;

b) CDR H1-3 of SEQ ID NO: 956 - 958 and CDR L1-3 of SEQ ID NO: 951 - 953;

c) CDR H1-3 of SEQ ID NO: 968 - 970 and CDR L1-3 of SEQ ID NO: 963 - 965;

d) CDR H1-3 of SEQ ID NO: 980 - 982 and CDR L1-3 of SEQ ID NO: 975-977;

e) CDR H1-3 of SEQ ID NO: 992 – 994 and CDR L1-3 of SEQ ID NO: 987 – 989;

f) CDR H1-3 of SEQ ID NO: 1004 – 1006 and CDR L1-3 of SEQ ID NO: 999 – 1001;

g) CDR H1-3 of SEQ ID NO: 1028 – 1030 and CDR L1-3 of SEQ ID NO: 1023 – 1025;

h) CDR H1-3 of SEQ ID NO: 1040 – 1042 and CDR L1-3 of SEQ ID NO: 1035 – 1037;

i) CDR H1-3 of SEQ ID NO: 1052 – 1054 and CDR L1-3 of SEQ ID NO: 1047 – 1049;

j) CDR H1-3 of SEQ ID NO: 1074 – 1076 and CDR L1-3 of SEQ ID NO: 1069 – 1071;

k) CDR H1-3 of SEQ ID NO: 1086 – 1088 and CDR L1-3 of SEQ ID NO: 1081 – 1083;

l) CDR H1-3 of SEQ ID NO: 1098 – 1000 and CDR L1-3 of SEQ ID NO: 1093 – 1095;

m) CDR H1-3 of SEQ ID NO: 1110 – 1112 and CDR L1-3 of SEQ ID NO: 1105 – 1107;

n) CDR H1-3 of SEQ ID NO: 1122 – 1124 and CDR L1-3 of SEQ ID NO: 1117 – 1119;

o) CDR H1-3 of SEQ ID NO: 1016 – 1018 and CDR L1-3 of SEQ ID NO: 1011 – 1013; and

p) CDR H1-3 of SEQ ID NO: 1765 – 1767 and CDR L1-3 of SEQ ID NO: 1770 – 1772.

27. The bispecific single chain antibody molecule of claim 26, wherein the binding domains are arranged in the order VH EpCAM-VL EpCAM-VH CD3-VL CD3 or VL EpCAM-VH EpCAM-VH CD3-VL CD3.

28. The bispecific single chain antibody molecule according to claim 27, wherein the bispecific single chain antibody molecule comprises a sequence selected from:

(a) an amino acid sequence as depicted in any of SEQ ID NOs: 944, 948, 946, 960, 972, 984, 996, 1008, 1032, 1044, 1056, 1078, 1090, 1102, 1114, 1126, 1020, or 1776;

(b) an amino acid sequence encoded by a nucleic acid sequence as depicted in any of SEQ ID NOs: 945, 949, 947, 961, 973, 985, 979, 1009, 1033, 1045, 1057, 1079, 1091, 1103, 1115, 1127, 1021, or 1777; and

(c) an amino acid sequence at least 90 % identical, more preferred at least 95 % identical, most preferred at least 96 % identical to the amino acid sequence of (a) or (b).

29. The bispecific single chain antibody molecule according to any one of claims 1 to 8, wherein the second binding domain is capable of binding to human Fibroblast activation protein alpha (FAP alpha), and/or a non-Chimpanzee primate FAP alpha.

30. The bispecific single chain antibody molecule according to claim 29, wherein the bispecific single chain antibody molecule comprises a group of the following sequences as CDR H1, CDR H2, CDR H3, CDR L1, CDR L2 and CDR L3 in the second binding domain selected from:

a) CDR H1-3 of SEQ ID NO: 1137 - 1139 and CDR L1-3 of SEQ ID NO: 1132 - 1134;

b) CDR H1-3 of SEQ ID NO: 1849 - 1851and CDR L1-3 of SEQ ID NO: 1854 - 1856;

c) CDR H1-3 of SEQ ID NO: 1835 - 1837and CDR L1-3 of SEQ ID NO: 1840 - 1842;

d) CDR H1-3 of SEQ ID NO: 1779 - 1781and CDR L1-3 of SEQ ID NO: 1784 - 1786;

e) CDR H1-3 of SEQ ID NO: 1793 – 1795 and CDR L1-3 of SEQ ID NO: 1798 – 1800;

f) CDR H1-3 of SEQ ID NO: 1863 – 1865 and CDR L1-3 of SEQ ID NO: 1868 – 1870;

g) CDR H1-3 of SEQ ID NO: 1807 – 1809 and CDR L1-3 of SEQ ID NO: 1812 – 1814;

h) CDR H1-3 of SEQ ID NO: 1821 – 1823 and CDR L1-3 of SEQ ID NO: 1826 – 1828;

i) CDR H1-3 of SEQ ID NO: 1891 – 1893 and CDR L1-3 of SEQ ID NO: 1896 – 1898;

j) CDR H1-3 of SEQ ID NO: 1877 – 1879 and CDR L1-3 of SEQ ID NO: 1882 – 1884;

k) CDR H1-3 of SEQ ID NO: 1961 – 1963 and CDR L1-3 of SEQ ID NO: 1966 – 1968;

l) CDR H1-3 of SEQ ID NO: 1947 – 1949 and CDR L1-3 of SEQ ID NO: 1952-1954;

m) CDR H1-3 of SEQ ID NO: 1975 – 1977 and CDR L1-3 of SEQ ID NO: 1980 – 1982;

n) CDR H1-3 of SEQ ID NO: 1933 – 1935 and CDR L1-3 of SEQ ID NO: 1938 – 1940;

o) CDR H1-3 of SEQ ID NO: 1919 – 1921 and CDR L1-3 of SEQ ID NO: 1924 – 1926; and

p) CDR H1-3 of SEQ ID NO: 1905 – 1907 and CDR L1-3 of SEQ ID NO: 1910 – 1912.

31. The bispecific single chain antibody molecule of claim 30, wherein the binding domains are arranged in the order VH FAP alpha-VL FAP alpha-VH CD3-VL CD3 or VL FAP alpha-VH FAP alpha-VH CD3-VL CD3.

32. The bispecific single chain antibody molecule according to claim 31, wherein the bispecific single chain antibody molecule comprises a sequence selected from:

(a) an amino acid sequence as depicted in any of SEQ ID NOs: 1143, 1147, 1145, 1860, 1846, 1790, 1804, 1874, 1818, or 1832;

(b) an amino acid sequence encoded by a nucleic acid sequence as depicted in any of SEQ ID NOs: 1144, 1148, 1146, 1861, 1847, 1791, 1805, 1875, 1818 or 1833; and

(c) an amino acid sequence at least 90 % identical, more preferred at least 95 % identical, most preferred at least 96 % identical to the amino acid sequence of (a) or (b).

33. The bispecific single chain antibody molecule according to any one of claims 1 to 8, wherein the second binding domain is capable of binding to human Insulin-like growth factor I receptor (IGF-IR or IGF-1R), and/or a non-Chimpanzee primate IGF-1R.

34. The bispecific single chain antibody molecule according to claim 33, wherein the bispecific single chain antibody molecule comprises a group of the following sequences as CDR H1, CDR H2, CDR H3, CDR L1, CDR L2 and CDR L3 in the second binding domain selected from:

a) CDR H1-3 of SEQ ID NO: 2016 - 2018and CDR L1-3 of SEQ ID NO: 2021 - 2023;

b) CDR H1-3 of SEQ ID NO: 2030 - 2032 and CDR L1-3 of SEQ ID NO: 2035 - 2037;

c) CDR H1-3 of SEQ ID NO: 2044 - 2046 and CDR L1-3 of SEQ ID NO: 2049 - 2051;

d) CDR H1-3 of SEQ ID NO: 2058 - 2060 and CDR L1-3 of SEQ ID NO: 2063 – 2065;

e) CDR H1-3 of SEQ ID NO: 2072 – 2074 and CDR L1-3 of SEQ ID NO: 2077 – 2079;

f) CDR H1-3 of SEQ ID NO: 2086 – 2088 and CDR L1-3 of SEQ ID NO: 2091 – 2093;

g) CDR H1-3 of SEQ ID NO: 2100 – 2102 and CDR L1-3 of SEQ ID NO: 2105 – 2107;

h) CDR H1-3 of SEQ ID NO: 2114 – 2116 and CDR L1-3 of SEQ ID NO: 2119 – 2121;

i) CDR H1-3 of SEQ ID NO: 2128 – 2130 and CDR L1-3 of SEQ ID NO: 2133 – 2135;

j) CDR H1-3 of SEQ ID NO: 2142 – 2144 and CDR L1-3 of SEQ ID NO: 2147 – 2149:

k) CDR H1-3 of SEQ ID NO: 2156 – 2158 and CDR L1-3 of SEQ ID NO: 2161 – 2163;

l) CDR H1-3 of SEQ ID NO: 2170 – 2172 and CDR L1-3 of SEQ ID NO: 2175 – 2177;

m) CDR H1-3 of SEQ ID NO: 2184 – 2186 and CDR L1-3 of SEQ ID NO: 2189 – 2191;

n) CDR H1-3 of SEQ ID NO: 2198 – 2200 and CDR L1-3 of SEQ ID NO: 2203 – 2205; and

o) CDR H1-3 of SEQ ID NO: 2212 – 2214 and CDR L1-3 of SEQ ID NO: 2217 – 2219.

35. The bispecific single chain antibody molecule of claim 34, wherein the binding domains are arranged in the order VH IGF-1R-VL IGF-1R-VH CD3-VL CD3 or VL IGF-1R-VH IGF-1R-VH CD3-VL CD3.

36. The bispecific single chain antibody molecule according to claim 35, wherein the bispecific single chain antibody molecule comprises a sequence selected from:

(a) an amino acid sequence as depicted in any of SEQ ID NOs: 2027, 2041, 2055, 2069, 2083, 2097, 2111, 2125, 2139, 2153, 2167, 2181, 2195, 2209, or 2223;

(b) an amino acid sequence encoded by a nucleic acid sequence as depicted in any of SEQ ID NOs: 2028, 2042, 2056, 2070, 2084, 2098, 2112, 2126, 2140, 2154, 2168, 2182, 2196, 2210, or 2224; and

(c) an amino acid sequence at least 90 % identical, more preferred at least 95 % identical, most preferred at least 96 % identical to the amino acid sequence of (a) or (b).

37. A nucleic acid sequence encoding a bispecific single chain antibody molecule as defined in any of claims 1 to 36.

38. A vector, which comprises a nucleic acid sequence as defined in claim 37.

39. The vector of claim 38, wherein said vector further comprises a regulatory sequence, which is operably linked to said nucleic acid sequence defined in claim 37.

40. The vector of claim 39, wherein said vector is an expression vector.

41. A host transformed or transfected with a vector defined in any of claims 38 to 40.

42. A process for the production of a bispecific single chain antibody molecule according to any of claims 1 to 36, said process comprising culturing a host defined in claim 41 under conditions allowing the expression of the polypeptide as defined in any of claims 1 to 36 and recovering the produced polypeptide from the culture.

43. A pharmaceutical composition comprising a bispecific single chain antibody molecule according to any one of claims 1 to 36, or produced according to the process of claim 42.

44. The pharmaceutical composition of claim 43, wherein the pharmaceutical composition is for use in the prevention, treatment or amelioration of cancer or autoimmune diseases.

45. A bispecific single chain antibody molecule according to any one of claims 1 to 36, or produced according to the process of claim 42, wherein said bispecific single chain antibody molecule is for use in the prevention, treatment or amelioration of cancer or autoimmune diseases.

46. The bispecific single chain antibody molecule of claim 45, or the pharmaceutical composition of claim 44, wherein said cancer is/are
    (a) prostate cancer, bladder cancer or pancreatic cancer;
    (b) a B-cell malignancy, such as B-NHL (B cell non-Hodgkin Lymphoma), B-ALL (acute lymphoblastic B cell leukemia), B-CLL (chronic lymphocytic B cell leukemia), or Multiple Myeloma;
    (c) a carcinoma, sarcoma, glioblastoma/astrocytoma, melanoma, mesothelioma, Wilms tumor or a hematopoietic malignancy such as leukemia, lymphoma or multiple myeloma;
    (d) carcinomas (breast, kidney, lung, colorectal, colon, pancreas mesothelioma), sarcomas, and neuroectodermal tumors (melanoma,

glioma, neuroblastoma);

(e) epithelial cancer or a minimal residual cancer;

(f) epithelial cancer; or

(g) bone or soft tissue cancer (e.g. Ewing sarcoma), breast, liver, lung, head and neck, colorectal, prostate, leiomyosarcoma, cervical and endometrial cancer, ovarian, prostate, and pancreatic cancer.

47. The bispecific single chain antibody molecule of claim 45 or 46, or the pharmaceutical composition of claim 43, 44 or 46, which is further comprising suitable formulations of carriers, stabilizers and/or excipients.

48. The bispecific single chain antibody molecule of claim 45, 46 or 47, or the pharmaceutical composition of claim 43, 44, 46 or 47, wherein said bispecific single chain antibody molecule or pharmaceutical composition is suitable to be administered in combination with an additional drug.

49. The bispecific single chain antibody molecule or the pharmaceutical composition of claim 48, wherein said drug is a non-proteinaceous compound or a proteinaceous compound.

50. The bispecific single chain antibody molecule or the pharmaceutical composition of claim 49, wherein said proteinaceous compound or non-proteinaceous compound is administered simultaneously or non-simultaneously with the bispecific single chain antibody molecule of claim 45, 49, or 47, or the pharmaceutical composition according to claim 43 or 44.

51. Use of a bispecific single chain antibody molecule as defined in any of claims 1 to 36, or produced according to claim 42, for the preparation of a pharmaceutical composition for the prevention, treatment or amelioration of a disease.

52. A method for the prevention, treatment or amelioration of a disease in a subject in the need thereof, said method comprising the step of administration of an effective amount of a pharmaceutical composition of claim 43 or 44.

53. The method of claim 52, wherein said disease is cancer.

54. The method of claim 53, wherein said cancer is/are
(a) prostate cancer, bladder cancer or pancreatic cancer;
(b) a B-cell malignancy, such as B-NHL (B cell non-Hodgkin Lymphoma), B-ALL (acute lymphoblastic B cell leukemia), B-CLL (chronic lymphocytic B cell leukemia), or Multiple Myeloma;
(c) a carcinoma, sarcoma, glioblastoma/astrocytoma, melanoma, mesothelioma, Wilms tumor or a hematopoietic malignancy such as leukemia, lymphoma or multiple myeloma;
(d) carcinomas (breast, kidney, lung, colorectal, colon, pancreas mesothelioma), sarcomas, and neuroectodermal tumors (melanoma, glioma, neuroblastoma);
(e) epithelial cancer or a minimal residual cancer;
(f) epithelial cancer; or
(g) bone or soft tissue cancer (e.g. Ewing sarcoma), breast, liver, lung, head and neck, colorectal, prostate, leiomyosarcoma, cervical and endometrial cancer, ovarian, prostate, and pancreatic cancer.

55. The method of any of claims 52 to 54, wherein said pharmaceutical composition is administered in combination with an additional drug.

56. The method of claim 55, wherein said drug is a non-proteinaceous compound or a proteinaceous compound.

57. The method of claim 56, wherein said proteinaceous compound or non-proteinaceous compound is administered simultaneously or non-simultaneously with a pharmaceutical composition according to claim 43 or 44.

58. The method of any one of claims 52 to 57, wherein said subject is a human.

59. A kit comprising a bispecific single chain antibody molecule as defined in any of claims 1 to 36, a nucleic acid molecule as defined in claim 37, a vector as defined in any of claims 38 to 40, or a host as defined in claim 41.

Claims

1. A bispecific single chain antibody molecule comprising a first binding domain which specifically binds to an epitope of human and Callithrix jacchus, Saguinus oedipus or Saimiri sciureus CD3ε (epsilon) chain, wherein said epitope is part of an amino acid sequence comprised in the group consisting of SEQ ID NOs. 2, 4, 6, or 8 and comprises at least the amino acid sequence Gln-Asp-Gly-Asn-Glu, and a second binding domain binding to an antigen selected from the group consisting of Prostate Stem Cell Antigen (PSCA), B-Lymphocyte antigen CD19 (CD19), hepatocyte growth factor receptor (C-MET), Endosialin, the EGF-like domain 1 of EpCAM, encoded by exon 2, Fibroblast activation protein alpha (FAP alpha) and Insulin-like growth factor I receptor (IGF-IR or IGF-1R).

2. The bispecific single chain antibody molecule according to claim 1, wherein the first binding domain comprises a VL region comprising CDR-L1, CDR-L2 and CDR-L3 selected from:
   (a) CDR-L1 as depicted in SEQ ID NO. 27, CDR-L2 as depicted in SEQ ID NO. 28 and CDR-L3 as depicted in SEQ ID NO. 29;
   (b) CDR-L1 as depicted in SEQ ID NO. 117, CDR-L2 as depicted in SEQ ID NO. 118 and CDR-L3 as depicted in SEQ ID NO. 119; and
   (c) CDR-L1 as depicted in SEQ ID NO. 153, CDR-L2 as depicted in SEQ ID NO. 154 and CDR-L3 as depicted in SEQ ID NO. 155.

3. The bispecific single chain antibody molecule according to claim 1 or 2, wherein the first binding domain comprises a VH region comprising CDR-H 1, CDR-H2 and CDR-H3 selected from:
   (a) CDR-H1 as depicted in SEQ ID NO. 12, CDR-H2 as depicted in SEQ ID NO. 13 and CDR-H3 as depicted in SEQ ID NO. 14;
   (b) CDR-H1 as depicted in SEQ ID NO. 30, CDR-H2 as depicted in SEQ ID NO. 31 and CDR-H3 as depicted in SEQ ID NO. 32;
   (c) CDR-H1 as depicted in SEQ ID NO. 48, CDR-H2 as depicted in SEQ ID NO. 49 and CDR-H3 as depicted in SEQ ID NO. 50;
   (d) CDR-H1 as depicted in SEQ ID NO. 66, CDR-H2 as depicted in SEQ ID NO. 67 and CDR-H3 as depicted in SEQ ID NO. 68;
   (e) CDR-H1 as depicted in SEQ ID NO. 84, CDR-H2 as depicted in SEQ ID NO. 85 and CDR-H3 as depicted in SEQ ID NO. 86;
   (f) CDR-H1 as depicted in SEQ ID NO. 102, CDR-H2 as depicted in SEQ ID NO. 103 and CDR-H3 as depicted in SEQ ID NO. 104;

(g) CDR-H1 as depicted in SEQ ID NO. 120, CDR-H2 as depicted in SEQ ID NO. 121 and CDR-H3 as depicted in SEQ ID NO. 122;

(h) CDR-H1 as depicted in SEQ ID NO. 138, CDR-H2 as depicted in SEQ ID NO. 139 and CDR-H3 as depicted in SEQ ID NO. 140;

(i) CDR-H1 as depicted in SEQ ID NO. 156, CDR-H2 as depicted in SEQ ID NO. 157 and CDR-H3 as depicted in SEQ ID NO. 158; and

(j) CDR-H1 as depicted in SEQ ID NO. 174, CDR-H2 as depicted in SEQ ID NO. 175 and CDR-H3 as depicted in SEQ ID NO. 176.

4. The bispecific single chain antibody molecule according to any one of claims 1 to 3, wherein the second binding domain is selected from the group consisting of binding domains binding to human Prostate Stem Cell Antigen (PSCA) and/or a non-human primate PSCA, binding to human B-Lymphocyte antigen CD19 (CD19), and/or a non-human primate CD19, binding to human hepatocyte growth factor receptor (C-MET), and/or a non-human primate C-MET, binding to human Endosialin, and/or a non-human primate Endosialin, binding to human EGF-like domain 1 of EpCAM, encoded by exon 2, and/or a non-human primate EGF-like domain 1 of EpCAM, encoded by exon 2, binding to human Fibroblast activation protein alpha (FAP alpha), and/or a non-human primate FAP alpha, and binding to human Insulin-like growth factor I receptor (IGF-IR or IGF-1R), and/or a non-human primate IGF-1R.

5. The bispecific single chain antibody molecule according to claim 4 binding to human Prostate Stem Cell Antigen (PSCA) and/or a non-human primate PSCA, wherein the bispecific single chain antibody molecule comprises a group of the following sequences as CDR-H1, CDR-H2, CDR-H3, CDR-L1, CDR-L2 and CDR-L3 in the second binding domain selected from:

a) CDR-H1-3 of SEQ ID NO: 382 – 384 and CDR-L1-3 of SEQ ID NO: 377 – 379;

b) CDR-H1-3 of SEQ ID NO: 400 – 402 and CDR-L1-3 of SEQ ID NO: 395 – 397;

c) CDR-H1-3 of SEQ ID NO: 414 – 416 and CDR-L1-3 of SEQ ID NO: 409 – 411;

d) CDR-H1-3 of SEQ ID NO: 432 – 434 and CDR-L1-3 of SEQ ID NO: 427 – 429;

e) CDR-H1-3 of SEQ ID NO: 1215 – 1217 and CDR-L1-3 of SEQ ID NO: 1220 – 1222;

f) CDR-H1-3 of SEQ ID NO: 1187 – 1189 and CDR-L1-3 of SEQ ID NO: 1192 – 1194;

g) CDR-H1-3 of SEQ ID NO: 1173 – 1175 and CDR-L1-3 of SEQ ID NO: 1178 – 1180;

h) CDR-H1-3 of SEQ ID NO: 1229 – 1231 and CDR-L1-3 of SEQ ID NO: 1234 – 1236;

i) CDR-H1-3 of SEQ ID NO: 1201 – 1203 and CDR-L1-3 of SEQ ID NO: 1206 – 1208;

k) CDR-H1-3 of SEQ ID NO: 1257 – 1259 and CDR-L1-3 of SEQ ID NO: 1262 – 1264; and

l) CDR-H1-3 of SEQ ID NO: 1243 – 1245 and CDR-L1-3 of SEQ ID NO: 1248 – 1250.

6. The bispecific single chain antibody molecule according to claim 4 binding to human B-Lymphocyte antigen CD19 (CD19), and/or a non-human primate CD19, wherein the bispecific single chain antibody molecule comprises a group of the following sequences as CDR H1, CDR H2, CDR H3, CDR L1, CDR L2 and CDR L3 in the second binding domain selected from:

a) CDR-H1-3 of SEQ ID NO: 478 - 480 and CDR-L1-3 of SEQ ID NO: 473 - 475;

b) CDR-H1-3 of SEQ ID NO: 530 - 532 and CDR-L1-3 of SEQ ID NO: 525 - 527;

c) CDR-H1-3 of SEQ ID NO: 518 - 520 and CDR-L1-3 of SEQ ID NO: 513 - 515;

d) CDR-H1-3 of SEQ ID NO: 506 - 508 and CDR-L1-3 of SEQ ID NO: 501 – 503;

e) CDR-H1-3 of SEQ ID NO: 494 – 496 and CDR-L1-3 of SEQ ID NO: 489 – 491;

f) CDR-H1-3 of SEQ ID NO: 542 – 544 and CDR-L1-3 of SEQ ID NO: 537 – 539;

g) CDR-H1-3 of SEQ ID NO: 554 – 556 and CDR-L1-3 of SEQ ID NO: 549 – 551;

h) CDR-H1-3 of SEQ ID NO: 566 – 568 and CDR-L1-3 of SEQ ID NO: 561 – 563;

i) CDR-H1-3 of SEQ ID NO: 578 – 580 and CDR-L1-3 of SEQ ID NO: 573 – 575;

j) CDR-H1-3 of SEQ ID NO: 590 – 592 and CDR-L1-3 of SEQ ID NO: 585 – 587;

k) CDR-H1-3 of SEQ ID NO: 602 – 604 and CDR-L1-3 of SEQ ID NO: 597 – 599;

l) CDR-H1-3 of SEQ ID NO: 614 – 616 and CDR-L1-3 of SEQ ID NO: 609 – 611;

m) CDR-H1-3 of SEQ ID NO: 626 – 628 and CDR-L1-3 of SEQ ID NO: 621 – 623;

n) CDR-H1-3 of SEQ ID NO: 638 – 640 and CDR-L1-3 of SEQ ID NO: 633 – 635;

o) CDR-H1-3 of SEQ ID NO: 650 – 652 and CDR-L1-3 of SEQ ID NO: 645 – 647;

p) CDR-H1-3 of SEQ ID NO: 662 – 664 and CDR-L1-3 of SEQ ID NO: 657 – 659;

q) CDR-H1-3 of SEQ ID NO: 674 – 676 and CDR-L1-3 of SEQ ID NO: 669 – 671;

r) CDR-H1-3 of SEQ ID NO: 686 – 688 and CDR-L1-3 of SEQ ID NO: 681 – 683;

s) CDR-H1-3 of SEQ ID NO: 698 – 700 and CDR-L1-3 of SEQ ID NO: 693 – 695;

t) CDR-H1-3 of SEQ ID NO: 710 – 712 and CDR-L1-3 of SEQ ID NO: 705 – 707;

u) CDR-H1-3 of SEQ ID NO: 722 – 724 and CDR-L1-3 of SEQ ID NO: 717 – 719;

v) CDR-H1-3 of SEQ ID NO: 734 – 736 and CDR-L1-3 of SEQ ID NO: 729 – 731;

w) CDR-H1-3 of SEQ ID NO: 746 – 748 and CDR-L1-3 of SEQ ID NO: 741 – 743;

x) CDR-H1-3 of SEQ ID NO: 758 – 760 and CDR-L1-3 of SEQ ID NO: 753 – 755;

y) CDR-H1-3 of SEQ ID NO: 1271 - 1273 and CDR-L1-3 of SEQ ID NO: 1276 – 1278;

z) CDR-H1-3 of SEQ ID NO: 1285 – 1287 and CDR-L1-3 of SEQ ID NO: 1290 – 1292;

aa) CDR-H1-3 of SEQ ID NO: 1299 – 1301 and CDR-L1-3 of SEQ ID NO: 1304 – 1306;

ab) CDR-H1-3 of SEQ ID NO: 1313 – 1315 and CDR-L1-3 of SEQ ID NO: 1318 – 1320;

ac) CDR-H1-3 of SEQ ID NO: 1327 – 1329 and CDR-L1-3 of SEQ ID NO: 1332 – 1334;

ad) CDR-H1-3 of SEQ ID NO: 1341 – 1343 and CDR-L1-3 of SEQ ID NO: 1346 – 1348;

ae) CDR-H1-3 of SEQ ID NO: 1355 – 1357 and CDR-L1-3 of SEQ ID NO: 1360 – 1362;

af) CDR-H1-3 of SEQ ID NO: 1369 – 1371 and CDR-L1-3 of SEQ ID NO: 1374 – 1376; and

ag) CDR-H1-3 of SEQ ID NO: 1383 – 1385 and CDR-L1-3 of SEQ ID NO: 1388 – 1390.

7. The bispecific single chain antibody molecule according to claim 4 binding to human hepatocyte growth factor receptor (C-MET), and/or a non-human primate C-MET, wherein the bispecific single chain antibody molecule comprises a group of the following sequences as CDR-H1, CDR-H2, CDR-H3, CDR-L1, CDR-L2 and CDR-L3 in the second binding domain selected from:

a) CDR-H1-3 of SEQ ID NO: 821 - 823 and CDR-L1-3 of SEQ ID NO: 816 - 818;

b) CDR-H1-3 of SEQ ID NO: 836 - 838 and CDR-L1-3 of SEQ ID NO: 833 - 835;

c) CDR-H1-3 of SEQ ID NO: 845 – 847 and CDR-L1-3 of SEQ ID NO: 840 - 842;

d) CDR-H1-3 of SEQ ID NO: 863 - 865 and CDR-L1-3 of SEQ ID NO: 858 – 860;

e) CDR-H1-3 of SEQ ID NO: 881 – 883 and CDR-L1-3 of SEQ ID NO: 876 – 878;

f) CDR-H1-3 of SEQ ID NO: 899 – 901 and CDR-L1-3 of SEQ ID NO: 894 – 896;

g) CDR-H1-3 of SEQ ID NO: 1401 – 1403 and CDR-L1-3 of SEQ ID NO: 1406 – 1408;

h) CDR-H1-3 of SEQ ID NO: 1415 – 1417 and CDR-L1-3 of SEQ ID NO: 1420 – 1422;

i) CDR-H1-3 of SEQ ID NO: 1429 – 1431 and CDR-L1-3 of SEQ ID NO: 1434 – 1436;

j) CDR-H1-3 of SEQ ID NO: 1443 – 1445 and CDR-L1-3 of SEQ ID NO: 1448 – 1450;

k) CDR-H1-3 of SEQ ID NO: 1457 – 1459 and CDR-L1-3 of SEQ ID NO: 1462 – 1464;

l) CDR-H1-3 of SEQ ID NO: 1471 – 1473 and CDR-L1-3 of SEQ ID NO: 1476 – 1478;

m) CDR-H1-3 of SEQ ID NO: 1639 – 1641 and CDR-L1-3 of SEQ ID NO: 1644 – 1646;

n) CDR-H1-3 of SEQ ID NO: 1625 – 1627 and CDR-L1-3 of SEQ ID NO: 1630 – 1632;

o) CDR-H1-3 of SEQ ID NO: 1611 – 1613 and CDR-L1-3 of SEQ ID NO: 1616 – 1618;

p) CDR-H1-3 of SEQ ID NO: 1597 – 1599 and CDR-L1-3 of SEQ ID NO: 1602 – 1604;

q) CDR-H1-3 of SEQ ID NO: 1569 – 1571 and CDR-L1-3 of SEQ ID NO: 1574 – 1576;

r) CDR-H1-3 of SEQ ID NO: 1555 – 1557 and CDR-L1-3 of SEQ ID NO: 1560 – 1562;

s) CDR-H1-3 of SEQ ID NO: 1583 – 1585 and CDR-L1-3 of SEQ ID NO: 1588 – 1590;

t) CDR-H1-3 of SEQ ID NO: 1541 – 1543 and CDR-L1-3 of SEQ ID NO: 1546 – 1548;

u) CDR-H1-3 of SEQ ID NO: 1513 – 1515 and CDR-L1-3 of SEQ ID NO: 1518 – 1520;

v) CDR-H1-3 of SEQ ID NO: 1527 – 1529 and CDR-L1-3 of SEQ ID NO: 1532 – 1534;

w) CDR-H1-3 of SEQ ID NO: 1499 – 1501 and CDR-L1-3 of SEQ ID NO: 1504 – 1506; and

x) CDR-H1-3 of SEQ ID NO: 1485 – 1487 and CDR-L1-3 of SEQ ID NO: 1490 – 1492.

8. The bispecific single chain antibody molecule according to claim 4 binding to human Endosialin, and/or a non-human primate Endosialin, wherein the bispecific single chain antibody molecule comprises a group of the following sequences as CDR-H1, CDR-H2, CDR-H3, CDR-L1, CDR-L2 and CDR-L3 in the second binding domain selected from:

a) CDR-H1-3 of SEQ ID NO: 1653 – 1655 and CDR-L1-3 of SEQ ID NO: 1658 - 1660;

b) CDR-H1-3 of SEQ ID NO: 1667 - 1669 and CDR-L1-3 of SEQ ID NO: 1672 - 1674;

c) CDR-H1-3 of SEQ ID NO: 1681 – 1683 and CDR-L1-3 of SEQ ID NO: 1686 – 1688;

d) CDR-H1-3 of SEQ ID NO: 1695 – 1697 and CDR-L1-3 of SEQ ID NO: 1700 – 1702;

e) CDR-H1-3 of SEQ ID NO: 1709 – 1711 and CDR-L1-3 of SEQ ID NO: 1714 – 1716; and

f) CDR-H1-3 of SEQ ID NO: 1723 – 1725 and CDR-L1-3 of SEQ ID NO: 1728 – 1730.

9. The bispecific single chain antibody molecule according to claim 4 binding to human EGF-like domain 1 of EpCAM, encoded by exon 2, and/or a non-human primate EGF-like domain 1 of EpCAM, encoded by exon 2, wherein the bispecific single chain antibody molecule comprises a group of the following sequences as CDR-H1, CDR-

H2, CDR-H3, CDR-L1, CDR-L2 and CDR-L3 in the second binding domain selected from:

a) CDR-H1-3 of SEQ ID NO: 940 - 942 and CDR-L1-3 of SEQ ID NO: 935 - 937;

b) CDR-H1-3 of SEQ ID NO: 956 - 958 and CDR-L1-3 of SEQ ID NO: 951 - 953;

c) CDR-H1-3 of SEQ ID NO: 968 - 970 and CDR-L1-3 of SEQ ID NO: 963 - 965;

d) CDR-H1-3 of SEQ ID NO: 980 - 982 and CDR-L1-3 of SEQ ID NO: 975-977;

e) CDR-H1-3 of SEQ ID NO: 992 – 994 and CDR-L1-3 of SEQ ID NO: 987 – 989;

f) CDR-H1-3 of SEQ ID NO: 1004 – 1006 and CDR-L1-3 of SEQ ID NO: 999 – 1001;

g) CDR-H1-3 of SEQ ID NO: 1028 – 1030 and CDR-L1-3 of SEQ ID NO: 1023 – 1025;

h) CDR-H1-3 of SEQ ID NO: 1040 – 1042 and CDR-L1-3 of SEQ ID NO: 1035 – 1037;

i) CDR-H1-3 of SEQ ID NO: 1052 – 1054 and CDR-L1-3 of SEQ ID NO: 1047 – 1049;

j) CDR-H1-3 of SEQ ID NO: 1074 – 1076 and CDR-L1-3 of SEQ ID NO: 1069 – 1071;

k) CDR-H1-3 of SEQ ID NO: 1086 – 1088 and CDR-L1-3 of SEQ ID NO: 1081 – 1083;

l) CDR-H1-3 of SEQ ID NO: 1098 – 1100 and CDR-L1-3 of SEQ ID NO: 1093 – 1095;

m) CDR-H1-3 of SEQ ID NO: 1110 – 1112 and CDR-L1-3 of SEQ ID NO: 1105 – 1107;

n) CDR-H1-3 of SEQ ID NO: 1122 – 1124 and CDR-L1-3 of SEQ ID NO: 1117 – 1119;

o) CDR-H1-3 of SEQ ID NO: 1016 – 1018 and CDR-L1-3 of SEQ ID NO: 1011 – 1013; and

p) CDR-H1-3 of SEQ ID NO: 1765 – 1767 and CDR-L1-3 of SEQ ID NO: 1770 – 1772.

10. The bispecific single chain antibody molecule according to claim 4 binding to human Fibroblast activation protein alpha (FAP alpha), and/or a non-human primate FAP alpha, wherein the bispecific single chain antibody molecule comprises a group of the following sequences as CDR-H1, CDR-H2, CDR-H3, CDR-L1, CDR-L2 and CDR-L3 in the second binding domain selected from:

a) CDR-H1-3 of SEQ ID NO: 1137 - 1139 and CDR-L1-3 of SEQ ID NO: 1132 - 1134;

b) CDR-H1-3 of SEQ ID NO: 1849 - 1851 and CDR-L1-3 of SEQ ID NO: 1854 - 1856;

c) CDR-H1-3 of SEQ ID NO: 1835 - 1837 and CDR-L1-3 of SEQ ID NO: 1840 - 1842;

d) CDR-H1-3 of SEQ ID NO: 1779 - 1781 and CDR-L1-3 of SEQ ID NO: 1784 - 1786;

e) CDR-H1-3 of SEQ ID NO: 1793 – 1795 and CDR-L1-3 of SEQ ID NO: 1798 – 1800;

f) CDR-H1-3 of SEQ ID NO: 1863 – 1865 and CDR-L1-3 of SEQ ID NO: 1868 – 1870;

g) CDR-H1-3 of SEQ ID NO: 1807 – 1809 and CDR-L1-3 of SEQ ID NO: 1812 – 1814;

h) CDR-H1-3 of SEQ ID NO: 1821 – 1823 and CDR-L1-3 of SEQ ID NO: 1826 – 1828;

i) CDR-H1-3 of SEQ ID NO: 1891 – 1893 and CDR-L1-3 of SEQ ID NO: 1896 – 1898;

j) CDR-H1-3 of SEQ ID NO: 1877 – 1879 and CDR-L1-3 of SEQ ID NO: 1882 – 1884;

k) CDR-H1-3 of SEQ ID NO: 1961 – 1963 and CDR-L1-3 of SEQ ID NO: 1966 – 1968;

l) CDR-H1-3 of SEQ ID NO: 1947 – 1949 and CDR-L1-3 of SEQ ID NO: 1952-1954;

m) CDR-H1-3 of SEQ ID NO: 1975 – 1977 and CDR-L1-3 of SEQ ID NO: 1980 – 1982;

n) CDR-H1-3 of SEQ ID NO: 1933 – 1935 and CDR-L1-3 of SEQ ID NO: 1938 – 1940;

o) CDR-H1-3 of SEQ ID NO: 1919 – 1921 and CDR-L1-3 of SEQ ID NO: 1924 – 1926; and

p) CDR-H1-3 of SEQ ID NO: 1905 – 1907 and CDR-L1-3 of SEQ ID NO: 1910 – 1912.

11. The bispecific single chain antibody molecule according to claim 4 binding to human Insulin-like growth factor I receptor (IGF-IR or IGF-1R), and/or a non-human primate IGF-1R, wherein the bispecific single chain antibody molecule comprises a group of the following sequences as CDR-H1, CDR-H2, CDR-H3, CDR-L1, CDR-L2 and CDR-L3 in the second binding domain selected from:

a) CDR-H1-3 of SEQ ID NO: 2016 - 2018 and CDR-L1-3 of SEQ ID NO: 2021 - 2023;

b) CDR-H1-3 of SEQ ID NO: 2030 - 2032 and CDR-L1-3 of SEQ ID NO: 2035 - 2037;

c) CDR-H1-3 of SEQ ID NO: 2044 - 2046 and CDR-L1-3 of SEQ ID NO: 2049 - 2051;

d) CDR-H1-3 of SEQ ID NO: 2058 - 2060 and CDR-L1-3 of SEQ ID NO: 2063 – 2065;

e) CDR-H1-3 of SEQ ID NO: 2072 – 2074 and CDR-L1-3 of SEQ ID NO: 2077 – 2079;

f) CDR-H1-3 of SEQ ID NO: 2086 – 2088 and CDR-L1-3 of SEQ ID NO: 2091 – 2093;

g) CDR-H1-3 of SEQ ID NO: 2100 – 2102 and CDR-L1-3 of SEQ ID NO: 2105 – 2107;

h) CDR-H1-3 of SEQ ID NO: 2114 – 2116 and CDR-L1-3 of SEQ ID NO: 2119 – 2121;

i) CDR-H1-3 of SEQ ID NO: 2128 – 2130 and CDR-L1-3 of SEQ ID NO: 2133 – 2135;

j) CDR-H1-3 of SEQ ID NO: 2142 – 2144 and CDR-L1-3 of SEQ ID NO: 2147 – 2149:

k) CDR-H1-3 of SEQ ID NO: 2156 – 2158 and CDR-L1-3 of SEQ ID NO: 2161 – 2163;

l) CDR-H1-3 of SEQ ID NO: 2170 – 2172 and CDR-L1-3 of SEQ ID NO: 2175 – 2177;
m) CDR-H1-3 of SEQ ID NO: 2184 – 2186 and CDR-L1-3 of SEQ ID NO: 2189 – 2191;
n) CDR-H1-3 of SEQ ID NO: 2198 – 2200 and CDR-L1-3 of SEQ ID NO: 2203 – 2205; and
o) CDR-H1-3 of SEQ ID NO: 2212 – 2214 and CDR-L1-3 of SEQ ID NO: 2217 – 2219.

12. A nucleic acid sequence encoding a bispecific single chain antibody molecule as defined in any of claims 1 to 11.

13. A vector, which comprises a nucleic acid sequence as defined in claim 12.

14. A host cell transformed or transfected with a vector defined in claim 13.

15. A process for the production of a bispecific single chain antibody molecule according to any of claims 1 to 11, said process comprising culturing a host cell defined in claim 14 under conditions allowing the expression of the polypeptide as defined in any of claims 1 to 11 and recovering the produced polypeptide from the culture.

16. A pharmaceutical composition comprising a bispecific single chain antibody molecule according to any one of claims 1 to 11, or produced according to the process of claim 15.

17. The bispecific single chain antibody molecule of claim 1, wherein said first binding domain binds to the N-terminal CD3 epsilon polypeptide fragment in vitro and to the native CD3 epsilon subunit of the CD3 complex on T cells in vivo with the same binding affinity.

18. The bispecific single chain antibody molecule of claim 1, wherein the homogeneity of the bispecific single chain antibody molecule is at least 90%, 95% or 98%.