

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property
Organization
International Bureau

(43) International Publication Date
04 August 2022 (04.08.2022)

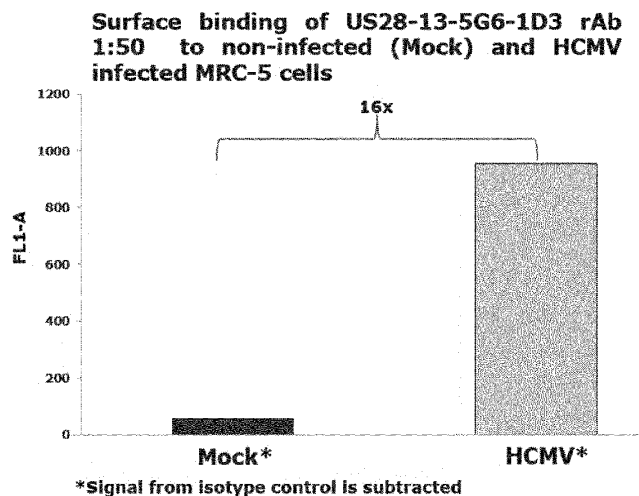


(10) International Publication Number
WO 2022/162192 A2

- (51) **International Patent Classification:**
A61K 38/00 (2006.01) *C07K 14/045* (2006.01)
A61P 31/12 (2006.01) *C07K 16/28* (2006.01)
- (21) **International Application Number:**
PCT/EP2022/052130
- (22) **International Filing Date:**
28 January 2022 (28.01.2022)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:**
2101228.1 29 January 2021 (29.01.2021) GB
- (71) **Applicant:** THELPER AS [NO/NO]; Oslo Cancer Cluster Incubator, Ullernchausséen 64, 0379 Oslo (NO).
- (72) **Inventor:** VETVIK, Katja; Thelper AS, Oslo Cancer Cluster Incubator, Ullernchausséen 64, 0379 Oslo (NO).
- (74) **Agent:** WRIGHT, Andrew, John; Potter Clarkson, The Belgrave Centre, Talbot Street, Nottingham, NG1 5GG (GB).
- (81) **Designated States** (*unless otherwise indicated, for every kind of national protection available*): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, IT, JO, JP, KE, KG, KH, KN, KP, KR, KW, KZ, LA, LC, LK, LR, LS, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU, RW, SA, SC, SD, SE, SG, SK, SL, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, WS, ZA, ZM, ZW.

(54) **Title:** THERAPEUTIC AND DIAGNOSTIC AGENTS AND USES THEREOF

Fig 9



(57) **Abstract:** The present invention provides binding molecules having one or more of (preferably all of) highly specific binding to the US28 protein of human cytomegalovirus (HCMV), very low levels of non-specific binding to healthy (non-infected) cells, and/or a strain-agnostic binding ability, as well as nucleic acid molecules encoding the said binding molecules. The binding molecules are designed to bind to extracellular domain 3 (ECD3) of a US28 protein of human cytomegalovirus (HCMV), the third of the four extracellular domains presented by US28, corresponding to positions 167 to 183 of the US28 protein sequence as defined by SEQ ID NO:5. The binding molecules of the present invention have been demonstrated to have excellent binding properties, including particular binding specificity for aggressive and/or metastasizing HCMV-infected cancers, including breast cancers. In certain preferred embodiments, the binding molecule is selected from an antibody (including, for example, a BiTE antibody) and a chimeric antigen

[Continued on next page]

(84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, ST, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

- *without international search report and to be republished upon receipt of that report (Rule 48.2(g))*
- *with sequence listing part of description (Rule 5.2(a))*

receptor (CAR), or functional variants, fragments, fusion proteins, and/or conjugates thereof. Also provided are cells expressing said binding molecules, such as CAR-expressing cells, including CAR-T cells, CAR-NK cells, and CAR-M cells.