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

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
09 March 2023 (09.03.2023)

WIPO | PCT

(10) International Publication Number
WO 2023/034409 A1

(51) International Patent Classification:
C07K 16/28 (2006.01)

(21) International Application Number:
PCT/US2022/042196

(22) International Filing Date:
31 August 2022 (31.08.2022)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
63/239,630 01 September 2021 (01.09.2021) US
63/388,088 11 July 2022 (11.07.2022) US

(71) Applicant: **BIOGEN MA INC.** [US/US]; 225 Binney Street, Cambridge, Massachusetts 02142 (US).

(72) Inventors: **DALKILIC-LIDDLE, Isin**; 225 Binney Street, Cambridge, Massachusetts 02142 (US). **SMITH, Benjamin A.**; 225 Binney Street, Cambridge, Massachusetts 02142 (US). **HANF, Karl J. M.**; 225 Binney Street, Cambridge, Massachusetts 02142 (US). **QIAN, Fang**; 225 Binney Street, Cambridge, Massachusetts 02142 (US). **PEPINSKY, R. Blake**; 225 Binney Street, Cambridge, Massachusetts 02142 (US). **CAMERON, Thomas O.**; 225 Binney Street, Cambridge, Massachusetts 02142 (US).

(74) Agent: **BRENNAN, Jack**; Fish & Richardson, P.O. Box 1022, Minneapolis, Minnesota 55440-1022 (US).

(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, CV, CZ, DE, DJ, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IQ, IR, IS, IT, JM, 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.

(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).

Declarations under Rule 4.17:
— *as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))*

Published:
— *with international search report (Art. 21(3))*

(54) Title: ANTI-TRANSFERRIN RECEPTOR ANTIBODIES AND USES THEREOF

ANTIBODY-A Family VH

```
1   5    10   15   20   25  30    a    40   45   50 a  55   60   65   70   75   80 abc  85   90   95    abcdefghi   105     113  Kabat pos #
1   5  9     15   20   25 29  38     45   50   55      65   70   75   80   85   90   95   100  105  110     130  135  140  145 149  AHo pos #
-1   5    10   15   20   25   30   35   40   45   50   55   60   65   70  -74    80   85   90   95   100  105  110  115  120  125  sequential pos #, rabAB-A_VH
-QSLEESGGGLVQPGASLTLTCKASGIDFSSSGYMCWVRQAPGKGLEWIGCIYTYSSNTYYASWAKGRFTISKT-SSTTVTLQMTSLTAADTATYFCARGTYGYTGYTYTMGYFSLWGPGTLVTVSS    rabAB-A_VH  (SEQ ID NO:4)
EVQLVESGGGLVQPGGSLRLSCAASGIDFSSSGYMAWVRQAPGKGLEWVGAIYTYSSNTYYAASVKGRFTISRDDSKNSLYLQMNSLKTEDTAVYYCARGTYGYTGYTYTMGYFSLWGQGTLVTVSS    ANTIBODY-A_H0  (SEQ ID NO:5)
-QSLVESGGGLVQPGGSLRLSCAASGIDFSSSGYMAWVRQAPGKGLEWVGAIYTYSSNTYYAASVKGRFTISRDDSKNSLYLQMNSLKTEDTAVYYCARGTYGYTGYTYTMGYFSLWGQGTLVTVSS    ANTIBODY-A_H1  (SEQ ID NO:6)
-QSLVESGGGLVQPGGSLRLSCAASGIDFSSSGYMAWVRQAPGKGLEWVGAIYTYSSNTYYAASVKGRFTISKT-SSTTVYLQMNSLKTEDTAVYYCARGTYGYTGYTYTMGYFSLWGQGTLVTVSS    ANTIBODY-A_H2  (SEQ ID NO:7)
-QSLVESGGGLVQPGGSLRLSCKASGIDFSSSGYMAWVRQAPGKGLEWVGAIYTYSSNTYYASWAKGRFTISKD-SKNSVYLQMNSLKTEDTAVYYCARGTYGYTGYTYTMGYFSLWGPGTLVTVSS    ANTIBODY-A_H3  (SEQ ID NO:8)
-QSLVESGGGLVQPGGSLRLSCKASGIDFSSSGYMSWVRQAPGKGLEWVGVIYTYSSNTYYASWAKGRFTISKD-SKNSVYLQMNSLKTEDTAVYYCARGTYGYTGYTYTMGYFSLWGPGTLVTVSS    ANTIBODY-A_H3(SV) (SEQ ID NO:9)
-QSLVESGGGLVQPGGSLRLSCKASGIDFSSSGYMSWVRQAPGKGLEWVGRIYTYSSNTYYASWAKGRFTISKD-SKNSVYLQMNSLKTEDTAVYYCARGTYGYTGYTYTMGYFSLWGPGTLVTVSS    ANTIBODY-A_H3(SR)(SEQ ID NO:10)
-QSLVESGGGLVQPGGSLRLSCKASGIDFSSSGYMSWVRQAPGKGLEWVGYIYTYSSNTYYASWAKGRFTISKD-SKNSVYLQMNSLKTEDTAVYYCARGTYGYTGYTYTMGYFSLWGPGTLVTVSS    ANTIBODY-A_H3(SY)(SEQ ID NO:11)
-QSLVESGGGLVQPGGSLRLSCKASGIDFSSSGYMHWVRQAPGKGLEWVGAIYTYSSNTYYASWAKGRFTISKD-SKNSVYLQMNSLKTEDTAVYYCARGTYGYTGYTYTMGYFSLWGPGTLVTVSS    ANTIBODY-A_H3(HA)(SEQ ID NO:12)
-QSLVESGGGLVQPGGSLRLSCKASGIDFSSSGYMAWVRQAPGKGLEWVGAIYTYSSNTYYASWAKGRFTISKT-SSTTVYLQMNSLKTEDTAVYYCARGTYGYTGYTYTMGYFSLWGPGTLVTVSS    ANTIBODY-A_H4  (SEQ ID NO:13)
EVQLVESGGGLVQPGGSLRLSCAASGIDFSSSGYMCWVRQAPGKGLEWVGCIYTYSSNTYYAASVKGRFTISRDDSKNSLYLQMNSLKTEDTAVYYCARGTYGYTGYTYTMGYFSLWGQGTLVTVSS    ANTIBODY-A_H0C (SEQ ID NO:14)
-QSLVESGGGLVQPGGSLRLSCAASGIDFSSSGYMCWVRQAPGKGLEWVGCIYTYSSNTYYAASVKGRFTISRDDSKNSLYLQMNSLKTEDTAVYYCARGTYGYTGYTYTMGYFSLWGQGTLVTVSS    ANTIBODY-A_H1C (SEQ ID NO:15)
-QSLVESGGGLVQPGGSLRLSCAASGIDFSSSGYMCWVRQAPGKGLEWVGCIYTYSSNTYYAASVKGRFTISKT-SSTTVYLQMNSLKTEDTAVYYCARGTYGYTGYTYTMGYFSLWGQGTLVTVSS    ANTIBODY-A_H2C (SEQ ID NO:16)
-QSLVESGGGLVQPGGSLRLSCKASGIDFSSSGYMCWVRQAPGKGLEWVGCIYTYSSNTYYASWAKGRFTISKD-SKNSVYLQMNSLKTEDTAVYYCARGTYGYTGYTYTMGYFSLWGPGTLVTVSS    ANTIBODY-A_H3C (SEQ ID NO:17)
-QSLVESGGGLVQPGGSLRLSCKASGIDFSSSGYMCWVRQAPGKGLEWVGCIYTYSSNTYYASWAKGRFTISKT-SSTTVYLQMNSLKTEDTAVYYCARGTYGYTGYTYTMGYFSLWGPGTLVTVSS    ANTIBODY-A_H4C (SEQ ID NO:18)
   L ESGGGLVQPG SL L C ASGIDFSSSGYM WVRQAPGKGLEW G IYTYSSNTYYA  KGRFTIS  S    LQM SL  DTA Y CARGTYGYTGYTYTMGYFSLWG GTLVTVSS    conserved
```

Fig. 1A

(57) Abstract: The present disclosure provides anti-transferrin receptor antibodies, compositions comprising the same and methods of their use. This disclosure also provides polynucleotides and vectors encoding the anti-transferrin receptor antibodies and cells comprising the same, methods of making the antibodies, and molecules comprising the antibodies.

WO 2023/034409 A1