

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

(19) World Intellectual Property
Organization
International Bureau

(43) International Publication Date
26 August 2021 (26.08.2021)



(10) International Publication Number
WO 2021/165928 A2

- (51) **International Patent Classification:**
C07K 14/245 (2006.01) *C07K 14/26* (2006.01)
- (21) **International Application Number:**
PCT/IB2021/051457
- (22) **International Filing Date:**
20 February 2021 (20.02.2021)
- (25) **Filing Language:** English
- (26) **Publication Language:** English
- (30) **Priority Data:**
62/980,433 23 February 2020 (23.02.2020) US
63/144,058 01 February 2021 (01.02.2021) US
- (71) **Applicant:** PFIZER INC. [US/US]; 235 East 42nd Street, New York, New York 10017 (US).
- (72) **Inventors:** DONALD, Robert G. K.; c/o Pfizer Inc., 401 N. Middletown Road, Pearl River, New York 10965 (US).
PAN, Rosalind; c/o Pfizer Inc., 401 N. Middletown Road, Pearl River, New York 10965 (US).
- (74) **Agent:** ZIELINSKI, Bryan C. et al.; Pfizer Inc., 235 East 42nd Street, MS 235/9/86, New York, New York 10017 (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, 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.
- (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,

(54) **Title:** *ESCHERICHIA COLI* COMPOSITIONS AND METHODS THEREOF

FIG. 1A

type 1 fimbriae D-mannose specific adhesin [Escherichia coli FimH J96 ELL41155.1
(E.coli J96): 300 aa
1 MRRITLLEAF LMGVSHAW SPACKTAGST AIPGGGSA VYNLAIPVYN
51 VQGNLVOLS TOFCNDVPE ETIDIVTLO RGSAYGVLS M⁹⁶GVKYSB
121 SYTEFETES TDFVYNSHT DQWVYALV TPVSSAGGVA KAGSLIAVL
151 T⁹⁶GVKYSB TDFVYNSHT DQWVYALV TPVSSAGGVA KAGSLIAVL
201 PIPLTVYCAK SQNLGVYLSG TTAGAGNSIF TINTAGSPAQ GVGVLTNRG
251 TTPANITVS LGAVGTSANS LGLTANYART GQVYAGNVQ SIGVTFVYQ (SEQ ID
NO: 1)
FimH J96 sequence
1 MKRIVITLFAV LLMGVSHAW SPACKTAGST AIPGGGSA VYNLAIPVYN
51 VQGNLVOLS TOFCNDVPE ETIDIVTLO RGSAYGVLS M⁹⁶GVKYSB
101 SSYFPTTSE TPRVYNSHT DQWVYALV TPVSSAGGVA KAGSLIAVL
151 IPRQNNVNS DQFQVWNY ANNDVVPTG GQVVSARDVT VTLFQVPSV
201 PIPLTVYCAK SQNLGVYLSG TTAGAGNSIF TINTAGSPAQ GVGVLTNRG
251 TTPANITVS LGAVGTSANS LGLTANYART GQVYAGNVQ SIGVTFVYQ (SEQ ID
NO: 1)
Fragment of FimH, corresponding to aa residues 22-300 of SEQ ID NO: 1 (mature FimH
protein)
1 LACKAGST AIPGGGSA VYNLAIPVYN VQGNLVOLS LGLCHDQV ETIDIVTLO
RGSAYGVLS M⁹⁶GVKYSB TDFVYNSHT DQWVYALV TPVSSAGGVA KAGSLIAVL
PIPLTVYCAK SQNLGVYLSG TTAGAGNSIF TINTAGSPAQ GVGVLTNRG
251 TTPANITVS LGAVGTSANS LGLTANYART GQVYAGNVQ SIGVTFVYQ (SEQ ID NO: 2)
FimH lectin domain (SEQ ID NO: 3, which corresponds to aa residues 1-158 of SEQ ID
NO: 2)
1 LACKAGST AIPGGGSA VYNLAIPVYN VQGNLVOLS LGLCHDQV ETIDIVTLO
RGSAYGVLS M⁹⁶GVKYSB TDFVYNSHT DQWVYALV TPVSSAGGVA KAGSLIAVL
PIPLTVYCAK SQNLGVYLSG TTAGAGNSIF TINTAGSPAQ GVGVLTNRG
251 TTPANITVS LGAVGTSANS LGLTANYART GQVYAGNVQ SIGVTFVYQ (SEQ ID NO: 3)
FimH pilin domain (SEQ ID NO: 4, which corresponds to aa residues 160-279 of SEQ
ID NO: 2)
160 GYDRAUDET VTLPGGSA VYNLAIPVYN VQGNLVOLS LGLCHDQV ETIDIVTLO
RGSAYGVLS M⁹⁶GVKYSB TDFVYNSHT DQWVYALV TPVSSAGGVA KAGSLIAVL
PIPLTVYCAK SQNLGVYLSG TTAGAGNSIF TINTAGSPAQ GVGVLTNRG
251 TTPANITVS LGAVGTSANS LGLTANYART GQVYAGNVQ SIGVTFVYQ (SEQ ID NO: 4)
pS802198 - FimH mlgk signal pept / F22, Q200, J96 FimH N28S V45C L55C N81S N249Q /
7 AA linker / HmG A1_K14 / GGH68 in pcDNA3.1(+)
VETDTLLWLLWVPGSTGFACKTASGTAIPGGGSA VYNLAIPVYN VQGNLVOLS LGLCHDQV
ETIDIVTLO RGSAYGVLS M⁹⁶GVKYSB TDFVYNSHT DQWVYALV TPVSSAGGVA KAGSLIAVL
PIPLTVYCAK SQNLGVYLSG TTAGAGNSIF TINTAGSPAQ GVGVLTNRG
251 TTPANITVS LGAVGTSANS LGLTANYART GQVYAGNVQ SIGVTFVYQ (SEQ ID NO: 5)
pS802307 - FimH mlgk signal pept / F22, Q200, J96 FimH N28S N81S N249Q / H68 in
pcDNA3.1(+)
VETDTLLWLLWVPGSTGFACKTASGTAIPGGGSA VYNLAIPVYN VQGNLVOLS LGLCHDQV
ETIDIVTLO RGSAYGVLS M⁹⁶GVKYSB TDFVYNSHT DQWVYALV TPVSSAGGVA KAGSLIAVL
PIPLTVYCAK SQNLGVYLSG TTAGAGNSIF TINTAGSPAQ GVGVLTNRG
251 TTPANITVS LGAVGTSANS LGLTANYART GQVYAGNVQ SIGVTFVYQ (SEQ ID NO: 6)
Number of amino acids: 310 Molecular weight: 32095.30 Theoretical pI: 7.25
pS802063 FimH Lectin Domain Wild Type construct
METDTLLWLLWVPGSTGFACKTASGTAIPGGGSA VYNLAIPVYN VQGNLVOLS LGLCHDQV
ETIDIVTLO RGSAYGVLS M⁹⁶GVKYSB TDFVYNSHT DQWVYALV TPVSSAGGVA KAGSLIAVL
PIPLTVYCAK SQNLGVYLSG TTAGAGNSIF TINTAGSPAQ GVGVLTNRG
251 TTPANITVS LGAVGTSANS LGLTANYART GQVYAGNVQ SIGVTFVYQ (SEQ ID NO: 7)
pS802158 FimH Lectin Domain Lock Mutant
METDTLLWLLWVPGSTGFACKTASGTAIPGGGSA VYNLAIPVYN VQGNLVOLS LGLCHDQV
ETIDIVTLO RGSAYGVLS M⁹⁶GVKYSB TDFVYNSHT DQWVYALV TPVSSAGGVA KAGSLIAVL
PIPLTVYCAK SQNLGVYLSG TTAGAGNSIF TINTAGSPAQ GVGVLTNRG
251 TTPANITVS LGAVGTSANS LGLTANYART GQVYAGNVQ SIGVTFVYQ (SEQ ID NO: 8)

(57) **Abstract:** This invention provides a polypeptide derived from *E. coli* or a fragment thereof, including compositions and methods thereof. In one embodiment, the compositions comprise a polypeptide derived from *E. coli* or a fragment thereof; and modified O-polysaccharide molecules derived from *E. coli* lipopolysaccharides or conjugates thereof. In a further aspect, the compositions further comprise modified O-polysaccharide molecules derived from *Klebsiella pneumoniae* or conjugates thereof.

[Continued on next page]

WO 2021/165928 A2

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))*
- *as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))*

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))*
- *in black and white; the international application as filed contained color or greyscale and is available for download from PATENTSCOPE*