

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

(19) World Intellectual Property
Organization
International Bureau



(10) International Publication Number
WO 2022/271862 A1

(43) International Publication Date
29 December 2022 (29.12.2022)

(51) International Patent Classification:

C12Q 1/6881 (2018.01) *C12N 5/0783* (2010.01)
C12N 5/071 (2010.01) *C12Q 1/68* (2018.01)
A61K 39/002 (2006.01)

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).

(21) International Application Number:

PCT/US2022/034579

(22) International Filing Date:

22 June 2022 (22.06.2022)

(25) Filing Language:

English

(26) Publication Language:

English

Published:

- with international search report (Art. 21(3))
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

(30) Priority Data:

63/214,176	23 June 2021 (23.06.2021)	US
63/256,445	15 October 2021 (15.10.2021)	US
63/296,250	04 January 2022 (04.01.2022)	US
63/321,142	18 March 2022 (18.03.2022)	US

(71) Applicant: **THYMMUNE THERAPEUTICS, INC.**

[US/US]; c/o LabCentral, 700 Main Street, North, Cambridge, Massachusetts 02139 (US).

(72) Inventors: **LIM, Bing**; Thymune Therapeutics, Inc., c/o

LabCentral, 700 Main Street, North, Cambridge, Massachusetts 02139 (US). **LUMMERTZ DA ROCHA, Edroaldo**; Thymune Therapeutics, Inc., c/o LabCentral, 700 Main Street, North, Cambridge, Massachusetts 02139 (US).

(74) Agent: **HAILE, Lisa A.** et al.; DLA Piper LLP US,

4365 Executive Drive, Suite 1100, San Diego, California 92121-2133 (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, 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,

(54) Title: THYMIC CELL COMPOSITIONS AND METHODS OF USE THEREOF

(57) Abstract: The present disclosure provides methods for generating and maintaining thymic cell *in vitro*. Compositions and systems of cell populations that include thymic cells are also provided herein. In one aspect, the disclosure provides a method for generating a population of thymic cells *in vitro* by culturing a population of cells in the presence of a soluble factor, a mineral or a combination thereof to induce differentiation or maturation of the population of cells to thymic cells; wherein the population of cells is optionally engineered to express a cell surface receptor or an intracellular factor; and wherein the population of cells comprises one or more cell types selected from the group consisting of pluripotent stem cells (PSCs), definitive endodermal (DE) cells, third pharyngeal pouch endodermal (PPE) cells, and anterior foregut endodermal (AFE) cells.



WO 2022/271862 A1