



(51) International Patent Classification:

C07D 217/14 (2006.01) *C07D 491/14* (2006.01)
A61K 31/4375 (2006.01) *A61P 11/06* (2006.01)
A61K 31/472 (2006.01) *A61P 17/06* (2006.01)
A61K 31/4741 (2006.01) *A61P 19/02* (2006.01)
C07D 471/04 (2006.01) *A61P 43/00* (2006.01)

(21) International Application Number:

PCT/JP2015/069370

(22) International Filing Date:

30 June 2015 (30.06.2015)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

2014-136359 1 July 2014 (01.07.2014) JP
 2014-262775 25 December 2014 (25.12.2014) JP

(71) Applicant: **TAKEDA PHARMACEUTICAL COMPANY LIMITED** [JP/JP]; 1-1, Doshomachi 4-chome, Chuo-ku, Osaka-shi, Osaka, 5410045 (JP).

(72) Inventors: **YAMAMOTO, Satoshi**; c/o TAKEDA PHARMACEUTICAL COMPANY LIMITED, 26-1, Muraoka-Higashi 2-chome, Fujisawa-shi, Kanagawa, 2510012 (JP). **SHIRAI, Junya**; c/o TAKEDA PHARMACEUTICAL COMPANY LIMITED, 26-1, Muraoka-Higashi 2-chome, Fujisawa-shi, Kanagawa, 2510012 (JP). **ODA, Tsuneo**; c/o TAKEDA PHARMACEUTICAL COMPANY LIMITED, 26-1, Muraoka-Higashi 2-chome, Fujisawa-shi, Kanagawa, 2510012 (JP). **KONO, Mitsunori**; c/o TAKEDA PHARMACEUTICAL COMPANY LIMITED, 26-1, Muraoka-Higashi 2-chome, Fujisawa-shi, Kanagawa, 2510012 (JP).

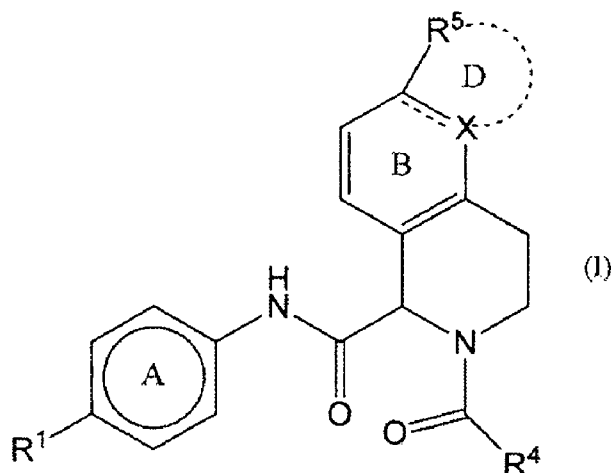
OCHIDA, Atsuko; c/o TAKEDA PHARMACEUTICAL COMPANY LIMITED, 26-1, Muraoka-Higashi 2-chome, Fujisawa-shi, Kanagawa, 2510012 (JP). **IMADA, Takashi**; c/o TAKEDA PHARMACEUTICAL COMPANY LIMITED, 26-1, Muraoka-Higashi 2-chome, Fujisawa-shi, Kanagawa, 2510012 (JP). **TOKUHARA, Hidekazu**; c/o TAKEDA PHARMACEUTICAL COMPANY LIMITED, 26-1, Muraoka-Higashi 2-chome, Fujisawa-shi, Kanagawa, 2510012 (JP). **TOMATA, Yoshihide**; c/o TAKEDA PHARMACEUTICAL COMPANY LIMITED, 26-1, Muraoka-Higashi 2-chome, Fujisawa-shi, Kanagawa, 2510012 (JP). **ISHII, Naoki**; c/o TAKEDA PHARMACEUTICAL COMPANY LIMITED, 26-1, Muraoka-Higashi 2-chome, Fujisawa-shi, Kanagawa, 2510012 (JP). **TAWADA, Michiko**; c/o TAKEDA PHARMACEUTICAL COMPANY LIMITED, 26-1, Muraoka-Higashi 2-chome, Fujisawa-shi, Kanagawa, 2510012 (JP). **FUKASE, Yoshiyuki**; c/o Tri-Institutional Therapeutics Discovery Institute, Belfer Research Building 16F, 413 East 69th Street, New York, New York, 10021 (US). **YUKAWA, Tomoya**; c/o TAKEDA PHARMACEUTICAL COMPANY LIMITED, 26-1, Muraoka-Higashi 2-chome, Fujisawa-shi, Kanagawa, 2510012 (JP). **FUKUMOTO, Shoji**; 12-2, Takenodai 5-chome, Nishi-ku, Kobe-shi, Hyogo, 6512274 (JP).

(74) Agent: **TAKASHIMA, Hajime**; Meiji Yasuda Seimei Osaka Midotsuji Bldg., 1-1, Fushimimachi 4-chome, Chuo-ku, Osaka-shi, Osaka, 5410044 (JP).

(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, DK, DM,

[Continued on next page]

(54) Title: HETEROCYCLIC COMPOUNDS AND THEIR USE AS RETINOID-RELATED ORPHAN RECEPTOR (ROR) GAMMA-T INHIBITORS



(57) Abstract: Provided are heterocyclic compounds having a ROR_γt inhibitory action represented by the formula (I): wherein each symbol is as defined in the specification, or a salt thereof.



DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IR, IS, JP, KE, KG, KN, KP, KR, 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, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

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).

(84) Designated States (*unless otherwise indicated, for every kind of regional protection available*): ARIPO (BW, GH,

Published:

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