



(51) International Patent Classification:

C07K 14/47 (2006.01) C07K 16/30 (2006.01)
A61K 39/00 (2006.01)

(21) International Application Number:

PCT/US2020/058891

(22) International Filing Date:

04 November 2020 (04.11.2020)

(25) Filing Language:

English

(26) Publication Language:

English

(30) Priority Data:

62/930,417	04 November 2019 (04.11.2019)	US
62/988,102	11 March 2020 (11.03.2020)	US
63/018,060	30 April 2020 (30.04.2020)	US
63/070,987	27 August 2020 (27.08.2020)	US

(71) Applicants: **INOVIO PHARMACEUTICALS, INC.**
[US/US]; 660 W. Germantown Pike, Suite 110, Plymouth
Meeting, PA 19462 (US). **REGENERON PHARMA-**

CEUTICALS, INC. [US/US]; 777 Old Saw Mill River
Road, Tarrytown, NY 10591 (US).

(72) Inventors; and

(71) Applicants: **YAN, Jian** [US/US]; 503 Sheffield Drive,
Wallingford, PA 19086 (US). **FERRARO, Bernadette**
[US/US]; 8594 Villa La Jolla Drive, #376, La Jolla, CA
92037 (US). **WALTERS, Jewell** [GB/US]; 11854 Stoney-
peak Drive, Unit 318, San Diego, CA 92128 (US).

(72) Inventors: **BREDLAU, Amy-Lee**; c/o Regeneration Phar-
maceuticals, Inc., 777 Old Saw Mill River Road, Tarrytown,
NY 10591 (US). **LOWY, Israel**; c/o Regeneration Pharma-
ceuticals, Inc., 777 Old Saw Mill River Road, Tarrytown,
NY 10591 (US). **SKOLNIK, Jeffrey**; 1940 Cardinal Lake
Drive, Cherry Hill, NJ 08003 (US).

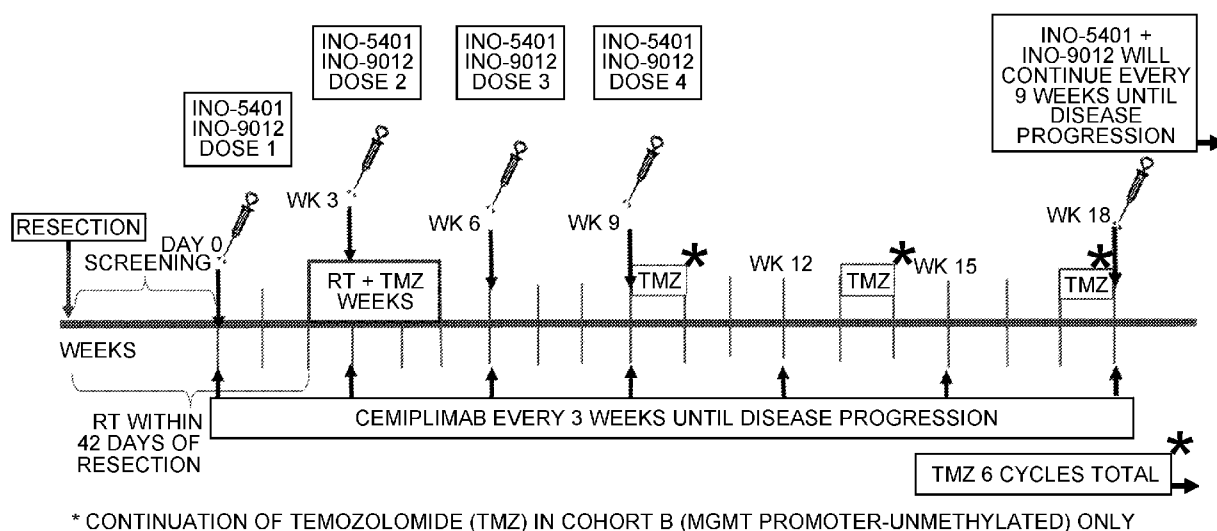
(74) Agent: **GROTH, Felicity E.**; Baker & Hostetler LLP,
2929 Arch Street, Cira Centre, 12th Floor, Philadelphia, PA
19104-2891 (US).

(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,

(54) Title: COMBINATION THERAPY TO TREAT BRAIN CANCER

Figure 1

STUDY SCHEMA



(57) Abstract: Provided herein are nucleic acid molecules, proteins, compositions and methods for treating brain cancer in a subject. In some embodiments, the compositions comprise cancer antigens hTERT, WT-1, and PSMA. In some embodiments, the compositions also comprise an adjuvant. The methods comprise administering to a subject in need thereof the cancer antigens. According to certain embodiments, the methods further involve administering the adjuvant and an anti-PD-1 antibody. In certain embodiments, the methods further comprise administering radiation therapy and/or a chemotherapeutic agent. In certain embodiments, the methods are clinically proven safe, clinically proven effective, or both.



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, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, KM, ML, MR, NE, SN, TD, TG).

Published:

- with international search report (Art. 21(3))
- with sequence listing part of description (Rule 5.2(a))

PCT

(PCT Rule 92*bis*.1 and
Administrative Instructions, Section 422)

GROTH, Felicity E.
Baker & Hostetler LLP
2929 Arch Street
Cira Centre, 12th Floor
Philadelphia, PA 19104-2891
ÉTATS-UNIS D'AMÉRIQUE

Date of mailing (<i>day/month/year</i>) 22 June 2021 (22.06.2021)			
Applicant's or agent's file reference 104409.000581		IMPORTANT NOTIFICATION	
International application No. PCT/US2020/058891		International filing date (<i>day/month/year</i>) 04 November 2020 (04.11.2020)	
1. The following indications appeared on record concerning: ☐ the applicant ☒ the inventor ☐ the agent ☐ the common representative			
Name and Address BREDLAU, Amy-Lee c/o Regeneration Pharmaceuticals, Inc. 777 Old Saw Mill River Road Tarrytown, NY 10591 UNITED STATES OF AMERICA		State of Nationality	State of Residence
		Telephone No.	
		Facsimile No.	
		E-mail address	
2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning: ☐ the person ☐ the name ☒ the address ☐ the nationality ☐ the residence			
Name and Address BREDLAU, Amy-Lee c/o Regeneron Pharmaceuticals, Inc. 777 Old Saw Mill River Road Tarrytown, NY 10591 UNITED STATES OF AMERICA		State of Nationality	State of Residence
		Telephone No.	
		Facsimile No.	
		E-mail address ☐ Notifications by e-mail authorized	
3. Further observations, if necessary:			
4. A copy of this notification has been sent to: ☒ the receiving Office ☐ the International Preliminary Examining Authority ☐ the International Searching Authority ☒ the designated Offices concerned ☐ the Authority(ies) specified for supplementary search ☐ the elected Offices concerned ☐ other: ☐			
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland		Authorized officer Roslik-Milliquet Ana e-mail pct.team4@wipo.int Telephone No. +41 22 338 74 04	

PCT

(PCT Rule 92*bis*.1 and
Administrative Instructions, Section 422)

GROTH, Felicity E.
Baker & Hostettler LLP
2929 Arch Street
Cira Centre, 12th Floor
Philadelphia, PA 19104-2891
ÉTATS-UNIS D'AMÉRIQUE

Date of mailing (<i>day/month/year</i>) 22 June 2021 (22.06.2021)			
Applicant's or agent's file reference 104409.000581		IMPORTANT NOTIFICATION	
International application No. PCT/US2020/058891		International filing date (<i>day/month/year</i>) 04 November 2020 (04.11.2020)	
1. The following indications appeared on record concerning: ☐ the applicant ☒ the inventor ☐ the agent ☐ the common representative			
Name and Address LOWY, Israel c/o Regeneration Pharmaceuticals, Inc. 777 Old Saw Mill River Road Tarrytown, NY 10591 UNITED STATES OF AMERICA		State of Nationality	State of Residence
		Telephone No.	
		Facsimile No.	
		E-mail address	
2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning: ☐ the person ☐ the name ☒ the address ☐ the nationality ☐ the residence			
Name and Address LOWY, Israel c/o Regeneron Pharmaceuticals, Inc. 777 Old Saw Mill River Road Tarrytown, NY 10591 UNITED STATES OF AMERICA		State of Nationality	State of Residence
		Telephone No.	
		Facsimile No.	
		E-mail address ☐ Notifications by e-mail authorized	
3. Further observations, if necessary:			
4. A copy of this notification has been sent to: ☒ the receiving Office ☐ the International Searching Authority ☐ the Authority(ies) specified for supplementary search ☐ the International Preliminary Examining Authority ☒ the designated Offices concerned ☐ the elected Offices concerned ☐ other:			
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland		Authorized officer Roslik-Milliquet Ana e-mail pct.team4@wipo.int Telephone No. +41 22 338 74 04	

PCT

(PCT Rule 92*bis*.1 and
Administrative Instructions, Section 422)

GROTH, Felicity E.
Baker & Hostetler LLP
2929 Arch Street
Cira Centre, 12th Floor
Philadelphia, PA 19104-2891
ÉTATS-UNIS D'AMÉRIQUE

Date of mailing (<i>day/month/year</i>) 06 April 2022 (06.04.2022)			
Applicant's or agent's file reference 104409.000581		IMPORTANT NOTIFICATION	
International application No. PCT/US2020/058891		International filing date (<i>day/month/year</i>) 04 November 2020 (04.11.2020)	
1. The following indications appeared on record concerning: ☒ the applicant ☒ the inventor ☐ the agent ☐ the common representative			
Name and Address FERRARO, Bernadette 8594 Villa La Jolla Drive, #376 La Jolla, CA 92037 UNITED STATES OF AMERICA		State of Nationality US	State of Residence US
		Telephone No.	
		Facsimile No.	
		E-mail address	
2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning: ☒ the person ☐ the name ☒ the address ☐ the nationality ☐ the residence			
Name and Address FERRARO, Bernadette 1447 Thomas Ave., San Diego, CA 92109 UNITED STATES OF AMERICA		State of Nationality	State of Residence
		Telephone No.	
		Facsimile No.	
		E-mail address ☐ Notifications by e-mail authorized	
3. Further observations, if necessary: The person identified above is now inventor only.			
4. A copy of this notification has been sent to: ☒ the receiving Office ☐ the International Preliminary Examining Authority ☐ the International Searching Authority ☒ the designated Offices concerned ☐ the Authority(ies) specified for supplementary search ☐ the elected Offices concerned ☐ other: ☐			
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland		Authorized officer Laskowski Marek e-mail pct.team4@wipo.int Telephone No. +41 22 338 74 04	

PCT

(PCT Rule 92*bis*.1 and
Administrative Instructions, Section 422)

GROTH, Felicity E.
Baker & Hostetler LLP
2929 Arch Street
Cira Centre, 12th Floor
Philadelphia, PA 19104-2891
ÉTATS-UNIS D'AMÉRIQUE

Date of mailing (day/month/year) 06 April 2022 (06.04.2022)			
Applicant's or agent's file reference 104409.000581		IMPORTANT NOTIFICATION	
International application No. PCT/US2020/058891		International filing date (day/month/year) 04 November 2020 (04.11.2020)	
1. The following indications appeared on record concerning: ☒ the applicant ☒ the inventor ☐ the agent ☐ the common representative			
Name and Address YAN, Jian 503 Sheffield Drive Wallingford, PA 19086 UNITED STATES OF AMERICA		State of Nationality US	State of Residence US
		Telephone No.	
		Facsimile No.	
		E-mail address	
2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning: ☒ the person ☐ the name ☐ the address ☐ the nationality ☐ the residence			
Name and Address YAN, Jian 503 Sheffield Drive Wallingford, PA 19086 UNITED STATES OF AMERICA		State of Nationality	State of Residence
		Telephone No.	
		Facsimile No.	
		E-mail address ☐ Notifications by e-mail authorized	
3. Further observations, if necessary: The person identified above is now inventor only.			
4. A copy of this notification has been sent to: ☒ the receiving Office ☐ the International Preliminary Examining Authority ☐ the International Searching Authority ☒ the designated Offices concerned ☐ the Authority(ies) specified for supplementary search ☐ the elected Offices concerned ☐ other: ☐			
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland		Authorized officer Laskowski Marek e-mail pct.team4@wipo.int Telephone No. +41 22 338 74 04	

PCT

(PCT Rule 92*bis*.1 and
Administrative Instructions, Section 422)

GROTH, Felicity E.
Baker & Hostetler LLP
2929 Arch Street
Cira Centre, 12th Floor
Philadelphia, PA 19104-2891
ÉTATS-UNIS D'AMÉRIQUE

Date of mailing (<i>day/month/year</i>) 06 April 2022 (06.04.2022)	
Applicant's or agent's file reference 104409.000581	IMPORTANT NOTIFICATION
International application No. PCT/US2020/058891	International filing date (<i>day/month/year</i>) 04 November 2020 (04.11.2020)
1. The following indications appeared on record concerning: ☒ the applicant ☒ the inventor ☐ the agent ☐ the common representative	
Name and Address WALTERS, Jewell 11854 Stoneypeak Drive Unit 318 San Diego, CA 92128 UNITED STATES OF AMERICA	State of Nationality GB State of Residence US Telephone No. Facsimile No. E-mail address
2. The International Bureau hereby notifies the applicant that the following change has been recorded concerning: ☒ the person ☐ the name ☒ the address ☐ the nationality ☐ the residence	
Name and Address WALTERS, Jewell 16303 Avenida Florencia Poway, CA 92064 UNITED STATES OF AMERICA	State of Nationality State of Residence Telephone No. Facsimile No. E-mail address ☐ Notifications by e-mail authorized
3. Further observations, if necessary: The person identified above is now inventor only.	
4. A copy of this notification has been sent to: ☒ the receiving Office ☐ the International Preliminary Examining Authority ☐ the International Searching Authority ☒ the designated Offices concerned ☐ the Authority(ies) specified for supplementary search ☐ the elected Offices concerned ☐ other:	
The International Bureau of WIPO 34, chemin des Colombettes 1211 Geneva 20, Switzerland	Authorized officer Laskowski Marek e-mail pct.team4@wipo.int Telephone No. +41 22 338 74 04