

*Execution Copy***SHUTTLE PHARMACEUTICALS, LLC AND POLA PHARMA INC.****EXCLUSIVE OPTION AGREEMENT**

This Agreement, executed on this 4th day of July, 2016 ("Effective Date"), by and between, POLA PHARMA INC., a pharmaceutical company organized and existing under the laws of Japan, with its principal office located in 8-9-5 Nishigotanda Shinagawa-ku, Tokyo 141-0031, JAPAN, (hereinafter referred to as "POLA") and Shuttle Pharmaceuticals, LLC, a Maryland (USA) limited liability company having its principal place of business located at One Research Court, Ste. 450, Rockville, Maryland 20850 ("OPTIONEE"), defines the terms of the confidential relationship between the aforementioned parties (hereafter referred to as the "Parties" collectively or "Party" individually).

Recitals

POLA is the owner of certain Patent Rights (as later defined herein) relating to the technology entitled "Doranidazole" which was invented in POLA laboratories and POLA has the right to grant an option under said Patent Rights.

POLA desires to have the Patent Rights developed and commercialized to benefit the public and is willing to grant an option hereunder.

OPTIONEE wishes to obtain an exclusive Option to negotiate and acquire an exclusive license from POLA to Patent Rights to manufacture, use, sell and distribute products derived therefrom and POLA is willing to grant to OPTIONEE such an Option in accordance with the provisions of this Agreement.

NOW, THEREFORE, in consideration of the premises and the mutual promises and covenants hereinafter set forth, the Parties hereby agree as follows:

Article 11. Effective Date and Option Period

- 1.1 This Agreement shall begin on the Effective Date and continue for a period of twelve (12) months (the "Option Period") unless the Option is exercised, in which case this Agreement will terminate at the end of the stipulated negotiation period or upon execution of a license agreement, whichever occurs first. The effective Option Period may be extended to eighteen (18) months by mutual written consent of the Parties unless otherwise mutually agreed by the Parties.

Article 2

2. Definitions

- 2.1 **“Exclusive Option”** means an Option under which certain rights are granted to OPTIONEE under this Agreement.
- 2.2 **“Confidential Information”** shall refer to non-public information of any kind which is disclosed by the disclosing Party to the other Party for purposes within the scope of Patent Rights and commercialization of Invention/Patent Rights and/or this Agreement which is either (i) by appropriate marking identified as confidential and proprietary at the time of disclosure; (ii) if disclosed orally, is identified in writing within thirty (30) days as being confidential; or (iii) is of such a nature that a reasonable person familiar with the Invention/Patent Rights or the Agreement would consider it to be confidential or proprietary from the context or circumstances of disclosure.
- 2.3 **“Invention”** means invention known as Doranidazole made by POLA employees
- 2.4 **“Option”** has the meaning set forth in Section 3.1.
- 2.5 **“Option Field”** means the use of Patent Rights for medical uses in humans
- 2.6 **“Option Period”** shall mean the period as defined in Section 1.1
- 2.7 **“Option Territory”** means the U.S.A.
- 2.8 **“Option Products”** shall refer to and mean any and all tangible products and processes that are composed of, incorporate, employ, or are in any way produced by the practice of, the Inventions and/or Patent Rights, or which the manufacture, use, or sale of would constitute infringement of any Patent Rights in the Inventions.
- 2.9 **“Patent Rights”** means any U.S. or foreign patent applications or patents listed in Exhibit A, or the equivalent of such applications including any substitutions, divisionals, continuations, continuations-in-part, reissues, renewals, registrations, confirmations, re-examinations, extensions, supplementary protection certificates and the like, and any provisional applications, of any such patents or patent applications, and the Invention described and claimed therein.
- 2.10 **“Term”** shall mean the period as defined in Section 5.1

Article 3

3. Option for an Exclusive License

- 3.1 POLA, grants to OPTIONEE the Exclusive Option, with POLA, to obtain an exclusive license to the Patent Rights within the Option Field and the Option Territory for the duration of the Option Period (the "Option").
- 3.2 In consideration of the Exclusive Option licensed from POLA, OPTIONEE shall grant a royalty free, fully paid up, perpetual non-exclusive license to use any and all, including but not limited to , data, results, information and know how generated through any activities by OPTIONEE during the Option Period, for licensing, development or commercializing purpose of Doranidazole in accordance with Section 4.6 of this Agreement.
- 3.3 POLA shall have the right to market and offer, license, assign or transfer the Patent Rights in the Option Field to any third party out of the Option Territory.
- 3.4 Subject to Section 3.1, in order to exercise the Option, OPTIONEE must, no less than thirty (30) days prior to the end of Option Period, notify POLA in writing that it is exercising its rights and that it has satisfied the following: a) completion of feasibility studies set forth in Section 4.5 for clinical development and commercialization of Doranidazole in the United States; b) raised sufficient funding for research and development plans for the Option Products, proposed product offerings, marketing plans and sales projections, financing and expense projections, management team and future staffing plans and other business and technical information normally contained in such a document.
- 3.5 Upon exercise of the Option, the Parties shall execute within a reasonable period not to exceed thirty (30) days an exclusive license agreement ("**License Agreement**"), a draft copy for discussion purpose of which is appended as Exhibit B, granting OPTIONEE exclusive rights to make, have made, use, import, export, offer to sell and sell Option Products in the Option Field in the Option Territory. The Parties shall make best reasonable efforts to execute the License Agreement through the good faith discussions based on the foregoing draft on Exhibit B within such period. Such License Agreement shall include but not limited to the following provisions: license fees; royalty payments; fund-raising/financing milestones; diligence and milestone requirements, including performance benchmarks; the right to grant sublicenses; a commitment by OPTIONEE and any sublicensee to exert their best commercial efforts to rapidly introduce the licensed products into public use.
- 3.6 OPTIONEE understands that if the U.S. Government sponsors any development of the Patent Rights then it shall have certain rights relative thereto. This Option Agreement is explicitly made subject to the Government's rights under the applicable U.S. Government agreements, applicable law and regulation. In the event of any inconsistency between the terms of this Agreement and the terms of such Government agreement, applicable law or regulation, the Government agreement, applicable law or regulation will prevail.

Article 4

4. Evaluation Procedure and Patent Expenses

- 4.1 POLA hereby grants OPTIONEE a royalty free, internal use license during the Option Period to practice the Patent Rights, such as through a government sponsored research grant award or feasibility studies agreed by both Parties and set forth in Section 4.5, solely for the purpose of OPTIONEE'S internal evaluation of the Patent Rights in furtherance of this Agreement.
- 4.2 OPTIONEE shall have the right to evaluate Patent Rights and their market potential and submit a grant and other funding applications for the commercialization of the Inventions and the Patent Rights.
- 4.3 Upon execution of this Agreement, POLA shall provide OPTIONEE with the available English translations of Investigator's Brochure and CMC Part of CTD Module 2 of Doranidazole set forth in the Exhibit C for the evaluation by OPTIONEE during the Option Period as the Confidential Information in accordance with Article 6 below. For the avoidance of any doubt, the said translations shall be provided on "as is" basis and any additional translation necessary for OPTIONEE'S evaluation shall be done by OPTIONEE at its cost.
- 4.4 In case OPTIONEE needs the active pharmaceutical ingredient of Doranidazole ("API") for their evaluation, OPTIONEE may purchase API from POLA at US\$20,000/kg on "as is" basis up to 10kg.
- 4.5 During the Option Period, OPTIONEE shall make good faith efforts to evaluate the potential for developing the Inventions into commercial products in the Option Field including but not limited to pre-IND meeting with the FDA followed by conducting studies in case required by FDA for IND and the fund-raising activities ("**Option Period Activities**"). OPTIONEE shall provide to POLA a final copy of any grant applications at the time of its submission to any granting organization. OPTIONEE shall provide to POLA a written report of Option Period Activities on or before OPTIONEE exercises/does not exercise the Option precisely describing the results of the evaluations, including but not limited to, pre-IND meeting minutes, a summary of the fund-raising activities for the Invention, and descriptions of relevant business, legal, scientific, technical, research and development activities for an Option Product, and relevant analytical data developed, produced, created, or acquired by OPTIONEE as a result of due diligence on Inventions and Patent Rights in the Option Field ("**Option Evaluation Report**").

- 4.6 The Option Evaluation Report shall remain the sole and exclusive property of OPTIONEE and be disclosed to POLA for informational purposes only during the Option Period, subject to the rest of this Article 4 and Section 3.2. POLA and OPTIONEE shall treat all such information as Confidential Information in accordance with Article 6 below. In the event OPTIONEE exercises the Option and executes a license for the Patent Rights in the Option Territory, POLA shall have a right to use this property without any fees out of the Option Territory after the Option Period on prior written notice to OPTIONEE. In the event this Agreement is terminated as set forth in Sections 5.2, 5.3, 5.4 or 5.5, the Option Evaluation Report shall remain the sole and exclusive property of OPTIONEE, provided that POLA shall have a right to use this property to a third party upon POLA's prior written notice to OPTIONEE without any fees in or out of the Option Territory. POLA shall be permitted to retain a single copy of the Option Evaluation Report for its files, which shall be maintained in accordance with Articles 4 and 6.
- 4.7 POLA shall be responsible for the preparation, filing, prosecution and maintenance of any and all patent applications and patents included in Patent Rights. POLA shall consult with OPTIONEE as to the preparation, filing, prosecution, and maintenance of all Patent Rights reasonably prior to any deadline or action and shall provide OPTIONEE with drafts of any material filings in a reasonable amount of time in advance of the anticipated filing date and shall consider in good faith any comments of OPTIONEE on such patent filings for the Patent Rights

Article 5

5. Term and Termination

- 5.1 This Agreement shall commence on the Effective Date. Unless sooner terminated in accordance with this Article 5, this Agreement shall expire upon the latest to occur of:
(a) end of the Option Period; or
(b) upon execution of a license agreement.
- 5.2 In the event OPTIONEE does not exercise the Option or Parties cannot reach the agreement of terms and conditions of License Agreement, this Agreement shall be terminated immediately.
- 5.3 OPTIONEE may terminate this Agreement by giving thirty (30) days written notice to POLA.
- 5.4 POLA may terminate this Agreement upon thirty (30) days written notice to OPTIONEE if OPTIONEE breaches its obligations including but not limited to not fully conducting the Option Period Activities as planned or defaults on its payment obligations under this Agreement.
- 5.5 The Parties may mutually agree in writing to terminate the Agreement.

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5.6 Sections 3.2, 4.6, 6.1, 7.4, 7.5 and any other clauses of this Agreement which by nature would be required to remain in effect shall survive termination.

Article 6

6. Confidentiality

6.1 The Parties agree to keep any Confidential Information related to this Agreement, including without limitation, OPTIONEE'S business plan, the Option Evaluation Report, the Patent Rights and all information concerning it and any other information or discussion between the Parties, confidential.

Article 7

7. Miscellaneous Provisions

7.1 This Agreement shall be construed and the rights of the Parties determined in accordance with the laws of the state of Maryland, USA without regard to choice of law provisions.

7.2 No use of the name of POLA in any form of promotion or in connection with the sale of products, processes, devices, or designs is permitted without prior written approval from POLA. No Party will issue any news release, public announcement, advertisement, or any form of publicity concerning this Agreement and the Option Evaluation Report, without obtaining the prior written consent from the other Party, which consent shall not be withheld unreasonably.

7.3 All notices required or permitted to be given under this Agreement shall be in writing and shall be deemed to have been sufficiently given for all purposes thereof when mailed by certified mail to the Party to be notified. All notices shall be deemed to have been given when mailed as evidenced by the postmark at the point of mailing.

All notices and any correspondence respecting this Agreement shall be addressed as follows:

If to POLA:

By Postal Service:

Ataru Kobayashi, Director
Business Development and R&D
POLA PHARMA INC.
8-9-5 Nishigotanda Shinagawa-ku,
Tokyo 141-0031, JAPAN

If to OPTIONEE:

By United States Postal Service:

Anatoly Dritschilo, MD, CEO
Shuttle Pharmaceuticals, LLC
One Research Court, Suite 450
Rockville, MD 20850

- 7.4 This Agreement constitutes the entire and only agreement between the Parties relating to an option to acquire a license, and all prior negotiations, representations, agreements and understandings are superseded hereby. No agreements altering or supplementing the terms hereof may be made except by written mutual agreement by the Parties.
- 7.5 The relationship between POLA and OPTIONEE is that of independent contractors. POLA and OPTIONEE are not joint ventures, partners, principal and agent, master and servant, employer or employee, and have no other relationship other than independent contracting parties. POLA will have no power to bind or obligate OPTIONEE in any manner, other than as is expressly set forth in this Agreement. Likewise OPTIONEE will have no power to bind or obligate POLA in any manner, other than as is expressly set forth in this Agreement.
- 7.6 If any provision of this Agreement is ultimately held to be invalid, illegal or unenforceable, the validity, legality and enforceability of the remaining provisions will not in any way be affected or impaired thereby.
- 7.6.1 Any delay in enforcing a Party's right under this Agreement or any waiver as to a particular default or other matter will not constitute a waiver of such Party's rights to the future enforcement of its rights under this Agreement, except only as to an express written and signed waiver to a specific matter for a specific period of time.
- 7.6.2 This Agreement may be executed by the Parties in counterparts, each of which when so executed shall be deemed to be an original, but all of which shall constitute one and the same agreement.
- 7.6.3 UNDER NO CIRCUMSTANCES WILL ANY PARTY HERETO BE LIABLE TO ANY OTHER PARTY FOR INDIRECT, INCIDENTAL, CONSEQUENTIAL, EXEMPLARY OR SPECIAL DAMAGES, OR FOR ANY DAMAGES FOR BUSINESS INTERRUPTION THAT MAY ARISE OUT OF THIS AGREEMENT OR USE OF THE PATENT RIGHTS, WHETHER OR NOT FORESEEABLE AND WHETHER OR NOT A PARTY NOTIFIED ANY OTHER PARTY OF THE LIKELIHOOD OR POSSIBILITY OF SUCH DAMAGE.

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SEE NEXT PAGE FOR SIGNATURES.

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IN WITNESS WHEREOF, the Parties hereto have caused this instrument to be signed in duplicate by their duly authorized officers.

POLA PHARMA, INC.

SHUTTLE PHARMACEUTICALS, LLC

/s/ Ataru Kobayashi
Ataru Kobayashi, Director
Business Development and R&D

/s/ Anatoly Dritschilo
Anatoly Dritschilo, MD
CEO

July 7, 2016
Date

7/7/2016
Date

**Exhibit A
PATENT RIGHTS**

Doranidazole, Hypoxic Sensitizer Technologies

“Pharmaceutical composition”

Application No.	Publication No.	Patent No.
12/598044 (2008/4/16)	2010-0130576	8258165
13/365785(div)	2012-0136160	8202898
13/365723(div)	2012-0136295	8258166

“Pharmaceutical composition”

Application No.	Publication No.	Patent No.
12/523067 (2008/1/17)	2010-0076042	8541459
13/362527(div)	2012-0129905	8450356
13/362545(div)	2012-0130148	8420687

“METHOD FOR PRODUCING 2-NITROIMIDAZOLE DERIVATIVE” (Method of Manufacturing)

Application No.	Publication No.	Patent No.
12/522926 (2008/1/17)	2010-0004460	8030338

1. A method for producing 1-(1-benzoyloxymethyl-2-hydroxyethyl)oxymethyl-2-nitroimidazole, comprising: (A) reacting glycerin with a benzoylating agent to obtain 1-O-benzoylglycerin; (B) reacting 1-O-benzoylglycerin with dimethoxymethane in the presence of a dehydrating agent to obtain 4-benzoyloxymethyl-1,3-dioxolane; and then (C) reacting 4 benzoyloxymethyl-1,3-dioxolane with 2-nitroimidazole or 2-nitro-1-trialkylsilylimidazole in the presence of a Lewis acid, to obtain 1-(1-benzoyloxymethyl-2-hydroxyethyl)oxymethyl-2-nitroimidazole.

4. A method for producing 1-(1-hydroxymethyl-2-fluoro)ethoxymethyl-2-nitroimidazole, comprising: (D) subjecting the 1-(1-benzoyloxymethyl-2-hydroxyethyl)oxymethyl-2-nitroimidazole obtained by the method according to any one of claims 1 to 3, to substituted sulfonylation, fluorination, and then debenzoylation.

Exhibit B

Draft EXCLUSIVE LICENSE AGREEMENT

(To be negotiated)
