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PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1 Stylesheet Version v1.2 EPAS ID: PAT4377336

| SUBMISSION TYPE: | NEW ASSIGNMENT |
|-----------------------|----------------|
| NATURE OF CONVEYANCE: | ASSIGNMENT |

CONVEYING PARTY DATA

| Name | Execution Date | |
|---------------|----------------|--|
| DAVID E. ROOT | 11/17/2016 | |

RECEIVING PARTY DATA

| Name: | THE BROAD INSTITUTE INC. | | |
|-----------------|--------------------------|--|--|
| Street Address: | 415 MAIN STREET | | |
| City: | CAMBRIDGE | | |
| State/Country: | MASSACHUSETTS | | |
| Postal Code: | 02142 | | |

PROPERTY NUMBERS Total: 1

| Property Type | Number |
|---------------------|----------|
| Application Number: | 15298895 |

CORRESPONDENCE DATA

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using a fax number, if provided; if that is unsuccessful, it will be sent via US Mail.

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| ATTORNEY DOCKET NUMBER: | 46783.01.2147 |
|-------------------------|-----------------|
| NAME OF SUBMITTER: | JOSHUA HAMLET |
| SIGNATURE: | /Joshua Hamlet/ |
| DATE SIGNED: | 04/20/2017 |

Total Attachments: 3

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PATENT REEL: 042082 FRAME: 0389 504330650

ASSIGNMENT

I, David E. Root, residing at: 17 Newell Rd., Brookline MA 02446 being the inventor(s) of certain improvements in the international application entitled: COMPOSITIONS AND METHODS **TARGETING** FOR CANCER-SPECIFIC SEQUENCE VARIATIONS for good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, hereby assign unto THE BROAD INSTITUTE INC. having a place of business at 415 Main Street, Cambridge, MA 02142, its successors and assigns (1) the entire right, title and interest in all countries throughout the world in and to any and all of my inventions and discoveries in my United States Provisional Application No. 62/246,988 filed October 27, 2015 and a PCT International Application filed under the Patent Cooperation Treaty in the PCT United States Receiving Office (ROIUS) on October 20, 2016 identified as International Application No. PCT/US2016/057915 , and designating all PCT member countries/states, as well as in any renewals, revivals, reissues, reexaminations, extensions, continuations and divisions thereof, and any substitute applications therefore; (2) the full and complete right to file patent applications in the name of THE BROAD INSTITUTE INC., or their designee's election, on the aforesaid inventions, discoveries and applications in all countries of the world; (3) the entire right title and interest in and to any Letters Patent which may issue on the aforesaid inventions, discoveries and applications in any country of the world and any renewals, revivals, reissues, reexaminations and extensions thereof, and any patents of confirmation, registration and importation of the same; and (4) the entire right, title and interest in and to all Convention and Treaty Rights of all kinds thereon, including without limitation all rights of priority in any country of the world, in and to the following application(s):

United States Provisional Application No. 62/246,988 filed October 27, 2015 and all rights of priority in any country of the world deriving from the above-identified International Application.

I hereby authorize and request the competent authorities to grant and to issue any and all such Letters Patent in any country throughout the world to **THE BROAD INSTITUTE INC.** as the assignee of the entire right, title and interest therein, as fully and entirely as the same would have been held and enjoyed by me had this assignment, sale and transfer not been made.

I agree, at any time, upon the request of THE BROAD INSTITUTE INC. to execute and to deliver to THE BROAD INSTITUTE INC. any additional applications for patents for

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said inventions and discoveries, or any part or parts thereof, and any applications for patents of confirmation, registration and importation based on any Letters Patent issuing on said inventions, discoveries or applications, and divisions, continuations, renewals, revivals, reissues, reexaminations and extensions thereof.

I further agree, at any time, upon request of THE BROAD INSTITUTE INC., to execute and to deliver to THE BROAD INSTITUTE INC., such additional documents, if any, as are necessary or desirable to secure patent protection on said inventions, discoveries and applications throughout all countries of the world, and otherwise to do what is necessary to give full effect to and to perfect any and all rights of THE BROAD INSTITUTE INC., under this Assignment, including the execution, delivery and procurement of any and all further documents evidencing this assignment, transfer and sale as may be necessary or desirable.

In testimony of which I have hereupon affixed my signature it is my intention that this Assignment instrument be effective, and all rights transferred herein shall be considered to have vested in **THE BROAD INSTITUTE INC.** as from the October 27, 2015 filing date of the first filed United States Provisional Application No. 62/246,988 from which priority is hereby claimed.

I, David E. Root, hereby authorize the attorneys of record, Vedder Price P.C., to insert the PCT Application Serial No. for the instant application entitled COMPOSITIONS AND METHODS FOR TARGETING CANCER-SPECIFIC SEQUENCE VARIATIONS, even if the PCT Application Serial No. and filing date are after the execution date of this document as this document is to be effective as to such a PCT Application.

| 11/17/2016 | | | Dil 2 Rout | | |
|--------------------------------------|---------------|-----------|--|---|--|
| Date | David E. Root | | | | |
| Commonwealth of Massachusetts |) | | | | |
| |) | SS | | | |
| COUNTY OF MIDDLESEX |) | | | | |
| I. Carnelina M. Comm | ito | , a | a Notary Public in and for the county an | d | |
| | | | at David E. Root, personally known to me to b | | |
| the same person whose name is sul | oscribe | ed to the | ne foregoing instrument, appeared before me thi | S | |
| day in person and acknowledged th | at he | signed a | and delivered the said instrument as his free an | d | |
| voluntary act for the uses and purpo | ses th | erein set | et forth. | | |

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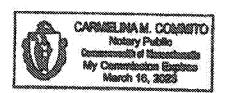
Patent 46783.99.2147/BI-2015/120

| IN WITNESS | WHEREOF, I have | hereunto set my han | d and Notarial Seal, | this / | 7 th day of |
|------------|-----------------|---------------------|----------------------|--------|------------------------|
| November | , 2016. | • | , | | |

Countling Y. Commito

My Commission Expires:

SEAL



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PATENT REEL: 042082 FRAME: 0392

RECORDED: 04/20/2017