

PATENT ASSIGNMENT COVER SHEET

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SUBMISSION TYPE:	NEW ASSIGNMENT	
NATURE OF CONVEYANCE:	ASSIGNMENT	
CONVEYING PARTY DATA		
	Name	Execution Date
	NOVARTIS AG	03/13/2015
RECEIVING PARTY DATA		
Name:	ARROWHEAD RESEARCH CORPORATION	
Street Address:	225 SOUTH LAKE AVENUE	
Internal Address:	SUITE 1050	
City:	PASADENA	
State/Country:	CALIFORNIA	
Postal Code:	91101	
PROPERTY NUMBERS Total: 1		
	Property Type	Number
	Application Number:	16269282
CORRESPONDENCE DATA		
Fax Number:		
<i>Correspondence will be sent to the e-mail address first; if that is unsuccessful, it will be sent using a fax number, if provided; if that is unsuccessful, it will be sent via US Mail.</i>		
Phone:	608-316-3984	
Email:	patents@arrowheadpharma.com	
Correspondent Name:	ROBERT M. TEIGEN	
Address Line 1:	502 S. ROSA ROAD	
Address Line 4:	MADISON, WISCONSIN 53719	
ATTORNEY DOCKET NUMBER:	N055236-US2	
NAME OF SUBMITTER:	ROBERT M. TEIGEN	
SIGNATURE:	/Robert M. Teigen/	
DATE SIGNED:	04/22/2019	
Total Attachments: 12		
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PATENT ASSIGNMENT

This Patent Assignment (this "*Assignment*") dated March 13th, 2015 and deemed to have effect as of March 13, 2015, by and between Arrowhead Research Corporation, a Delaware corporation having an address at 225 South Lake Avenue, Suite 1050, Pasadena, California 91101 ("*Assignee*"), and NOVARTIS AG, a company incorporated in Switzerland whose address is Lichtstrasse 35, 4056 Basel, Switzerland ("*Assignor*" and, together with Assignee, the "*Parties*").

WHEREAS, Novartis Institutes for BioMedical Research, Inc., and Assignee are parties to the Asset Purchase and Exclusive License Agreement entered into as of March 3, 2015 (the "*Purchase and License Agreement*"; capitalized terms used herein without definition shall have the meanings assigned to them in the Purchase and License Agreement), pursuant to which Assignor has agreed to sell to Assignee and Assignee has agreed to purchase from Assignor, the Acquired RNAi Assets, including without limitation, the patents and patent applications set forth on Schedule A hereto and described below; and

WHEREAS, Assignor desires to sell and assign, and Assignee desires to purchase and acquire, Assignor's entire right, title and interest in and to such patents and patent applications;

NOW, THEREFORE, in consideration of mutual covenants and agreements set forth below and the Purchase and License Agreement, and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, and intending to be legally bound hereby, the Parties hereto agree as follows:

1. **ASSIGNMENT.** Assignor hereby irrevocably and unconditionally grants, conveys, transfers, and assigns to Assignee all of Assignor's right, title and interest in and to the patents and the patent applications set forth on Schedule A and the inventions claimed therein, including the rights to file, prosecute, obtain issuance of, maintain and enforce U.S., foreign or international counterparts thereof, and continuations, continuations-in-part, divisions, extensions, reissues, reexaminations, and renewals of any of the foregoing, and other patent applications that claim the inventions claimed in such applications and have a right of priority thereto, including all rights in any patents issuing on any of the foregoing (collectively, the "*Assigned Patent Rights*"); (ii) all causes of action (whether known or unknown or whether currently pending, filed, or otherwise) and other enforcement rights under, or on account of, any of the Assigned Patents Rights, including, without limitation, all causes of action and other enforcement rights for (A) damages, (B) injunctive relief, (C) inventorship rights and (D) any other remedies of any kind for past, current and future infringement; and (iii) rights to collect royalties or other payments under or on account of any of the Assigned Patent Rights, the same to be held by Assignee for Assignee's own use and enjoyment, and for the use and enjoyment of Assignee's successors, assigns and other legal representatives, as fully and entirely as the same would have been held and enjoyed by Assignor if this Assignment had not been made; together with all rights to income, royalties, and license fees deriving from the Assigned Patent Rights after the Closing, causes of actions, claims for damages, and demands or other rights for, or arising from, any past, present, and future infringement or other violation of the Assigned Patent Rights, and

the right to sue for and collect such past, present and future damages, as permitted under the applicable laws for any jurisdiction or country in which such claims may be asserted for the use and benefit of Assignee and its successors, assigns and other legal representatives.

2. **FURTHER ASSURANCE.** Assignor agrees, without charge to Assignee, to assist Assignee in perfecting Assignee's right, title and interest throughout the world in all Assigned Patent Rights, and the intellectual property rights therein assigned to Assignee hereunder, include executing applications, assignments, declarations, affidavits, and any other papers in connection therewith reasonably necessary to perfect such right, title and interest in Assignee. In the event Assignee is unable for any reason, after reasonable effort, to secure Assignor's signature on any document needed to perfect the transfer of ownership of the Assigned Patent Rights, Assignor hereby irrevocably designates and appoints Assignee and its duly authorized officers and agents as Assignor's agent and attorney-in-fact, which appointment is coupled with an interest, to act for and on Assignor's behalf to execute and file such documents, with the same legal force and effect as if executed by Assignor. Assignor agrees to provide such assistance and cooperation as Assignee may reasonably request in connection with Assignee's prosecution of any patent applications included in the Assigned Patent Rights (including appeals in connection therewith), including providing documents and materials in the possession or control of Assignor and making the named inventors in any of the patent applications reasonably available to Assignee upon reasonable prior notice if such inventors remain employed by Assignor or any of its Affiliates at the time of Assignor's receipt of such written notice from Assignee.

3. **GENERAL.**

3.1 Severability. If any term, provision, covenant or restriction of this Assignment is held by a court of competent jurisdiction or other Governmental Authority to be invalid, void or unenforceable, the remainder of the terms, provisions, covenants and restrictions of this Assignment shall remain in full force and effect and shall in no way be affected, impaired or invalidated so long as the economic or legal substance of the transactions contemplated hereby is not affected in any manner materially adverse to any Party. Upon such a determination, the Parties shall negotiate in good faith to modify this Assignment so as to effect the original intent of the Parties as closely as possible in an acceptable manner in order that the transactions contemplated hereby be consummated as originally contemplated to the fullest extent possible..

3.2 Amendments and Waivers. Any provision of this Assignment may be amended or waived if, but only if, such amendment or waiver is in writing and is signed, in the case of an amendment, by each Party, or in the case of a waiver, by the Party against whom the waiver is to be effective. No failure or delay by any Party in exercising any right, power or privilege hereunder shall operate as a waiver thereof nor shall any single or partial exercise thereof preclude any other or further exercise thereof or the exercise of any other right, power or privilege. The rights and remedies herein provided shall be cumulative and not exclusive of any rights or remedies provided by law.

3.3 Entire Agreement. The Purchase and License Agreement, this Assignment and the other Transaction Documents constitute the entire agreement between the Parties with respect to the subject matter of this Assignment and supersede all prior agreements

and understandings, both oral and written, between the Parties with respect to the subject matter of Purchase and License Agreement, this Assignment and the other Transaction Documents. Nothing in this Assignment shall itself change, amend, extend or alter (nor shall it be deemed or construed as changing, amending, extending or altering) the terms or conditions of the Purchase and License Agreement in any manner whatsoever. Assignor acknowledges and agrees that the representations, warranties, covenants, agreements and indemnities contained in the Purchase and License Agreement shall not be superseded hereby but shall remain in full force and effect to the extent provided therein. In the event of any conflict or inconsistency between the terms of the Purchase and License Agreement and the terms hereof, the terms of the Purchase and License Agreement shall govern.

3.4 Successors and Assigns. This Assignment shall be binding upon and inure to the benefit of the Parties and their respective successors and assigns. This Assignment and the rights and obligations hereunder shall not be assignable by Assignor without the prior written consent of Assignee, and any such purported assignment without such consent shall be void. This Assignment and the rights granted to Assignor hereunder shall be assignable by Assignee without the written consent of Assignor.

3.5 Governing Law. This Assignment shall be governed by and construed in accordance with the law of the State of Delaware, without regard to the conflicts of law rules of such state.

3.6 Jurisdiction. The Parties agree that any suit, action or proceeding seeking to enforce any provision of, or based on any matter arising out of or in connection with, this Assignment or the transactions contemplated hereby shall be brought in the United States District Court for the District of Delaware or the Court of Chancery of the State of Delaware, so long as one of such courts shall have subject matter jurisdiction over such suit, action or proceeding, and that any cause of action arising out of this Assignment shall be deemed to have arisen from a transaction of business in the State of Delaware, and each of the Parties hereby irrevocably consents to the jurisdiction of such courts (and of the appropriate appellate courts therefrom) in any such suit, action or proceeding and irrevocably waives, to the fullest extent permitted by Applicable Law, any objection that it may now or hereafter have to the laying of the venue of any such suit, action or proceeding in any such court or that any such suit, action or proceeding brought in any such court has been brought in an inconvenient forum. Process in any such suit, action or proceeding may be served on any Party anywhere in the world, whether within or without the jurisdiction of any such court. Without limiting the foregoing, each Party agrees that service of process on such Party as provided in Section 8.01 of the Purchase and License Agreement shall be deemed effective service of process on such Party.

3.7 Counterparts; Effectiveness. This Assignment may be signed in any number of counterparts, each of which shall be an original, with the same effect as if the signatures thereto and hereto were upon the same instrument. This Assignment shall become effective when each Party shall have received a counterpart hereof signed by the other Party hereto. Until and unless each Party has received a counterpart hereof signed by the other Party hereto, this Agreement shall have no effect and no Party shall have any right or obligation hereunder (whether by virtue of any other oral or written agreement or other communication).

[SIGNATURE PAGE TO PATENT ASSIGNMENT]

IN WITNESS WHEREOF, each of the parties hereto has executed this Assignment, or has caused this Assignment to be executed on its behalf by a representative duly authorized, all as of the date first above set forth.

"Assignor"

NOVARTIS AG

By: 
Name: Thomas Digby
Title: Authorized Signatory

By: 
Name: Dr. Oliver M. Brupbacher
Title: Attorney at Law, LL.M.

[SIGNATURE PAGE TO PATENT ASSIGNMENT]

"Assignee"

ARROWHEAD RESEARCH CORPORATION

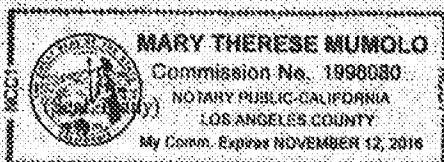
By: [Signature]
Name: Patrick O'Brien
Title: General Counsel

A notary public or other officer completing this certificate verifies only the identity of the individual who signed the document to which this certificate is attached, and not the truthfulness, accuracy, or validity of that document.

State of California, USA

County of Los Angeles

This instrument was acknowledged before me on 03/20/2015 by Patrick O'Brien as an officer of Arrowhead Research Corporation



Signature: [Signature]
Name: Mary Therese Mumolo
Title: Notary Public

Schedule A

NOVARTIS AG

Case reference	Filing Date	Filing Number	Publication Number	Grant Number
SPECIFIC TARGETS:				
INTRATHECAL USE OF P2X3 AND MOB-5 siRNAs				
PAT032648-EP-EPT	03 Sep 2003	03793797.6	1551424	
PAT032648-JP-PCT	03 Sep 2003	2004-533463	2006-501256A	4754216
PAT032648-JP-PCTD	21 Feb 2011	2011-034713	2011-178783	
PAT032648-US-PCT	03 Sep 2003	10/529312	2006-0030534	
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PAT032648-US-PCTD02	04 Nov 2011	13/289334	2012-0033230	8198259
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siRNAs TO ALPHA-ENaC				
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PAT050662-AR-NP	12 Jun 2008	P080102318	AR066984A1	
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HCV siRNAs + CHOL + CHOL-REDUCING AGENT				
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siRNAs TO HSF1 (see also 54711)				
PAT053960-AR-NP	16 Dec 2010	P100104667	AR079494A1	
PAT053960-AU-PCT	16 Dec 2010	2010332881		
PAT053960-AU-PCTD	23 Dec 2014			
PAT053960-BQ-NP	16 Dec 2010	SP-00396-2011	10233	
PAT053960-BR-PCT	16 Dec 2010	112012014760.9		
PAT053960-BS-NP	14 Dec 2010			
PAT053960-CA-PCT	16 Dec 2010	2784783		
PAT053960-CN-PCT	16 Dec 2010	201080057690.4	CN102686729A	
PAT053960-EA-EAT	16 Dec 2010	201200874		
PAT053960-EP-EPT	16 Dec 2010	10792928.3	EP2513309	
PAT053960-GC-NP	18 Dec 2010	GCC/P/2010/17377		
PAT053960-HK-FPR	03 Jan 2013	13100051.1	1172926A	
PAT053960-IN-PCT	16 Dec 2010	4511/DELNP/2012		
PAT053960-IQ-NP	01 Dec 2010	353/2010		
PAT053960-JR-NP	05 Dec 2010	389090385		
PAT053960-JM-NP	15 Dec 2010			
PAT053960-JO-NP	16 Dec 2010	450/2010		
PAT053960-JP-PCT	16 Dec 2010	2012-543756	2013-514321	
PAT053960-KR-PCT	16 Dec 2010	2012-7018714	2012-0104381	
PAT053960-KS-NP	14 Dec 2010	182		
PAT053960-LB-NP	09 Dec 2010	9234		
PAT053960-MX-PCT	16 Dec 2010	MX/a/2012/007032		
PAT053960-PA-NP	17 Dec 2010	89119-01		
PAT053960-PK-NP	15 Dec 2010	1050/2010		
PAT053960-PY-NP	16 Dec 2010	53930		
PAT053960-TW-NP	17 Dec 2010	099144666	201130495	
PAT053960-US-DIV	01 Feb 2012	13/363493	2012-0129914	8481509
PAT053960-US-DIV02	01 Feb 2012	13/363504	2012-0129915	8623838
PAT053960-US-DIV03	15 Oct 2013	14/054166	2014-0039039	
PAT053960-US-NP	16 Dec 2010	12/970268	2011-0166058	8293718
PAT053960-US-PSP	18 Dec 2009	61/288137		
PAT053960-UY-NP	17 Dec 2010	33114		
PAT053960-VE-NP	16 Dec 2010	2010/1996		

PAT053960-WO-PCT	16 Dec 2010	PCT/EP2010/069917	WO2011/073326	
siRNAs TO BETA-ENAC				
PAT054121-AR-NP	20 Apr 2011	P110101377		
PAT054121-AU-PCT	20 Apr 2011	2011244335		
PAT054121-BR-PCT	20 Apr 2011	BR112012027080-0		
PAT054121-CA-PCT	20 Apr 2011	2797051		
PAT054121-CN-PCT	20 Apr 2011	201180030997.X	CN 102985544 A	
PAT054121-EA-EAT	20 Apr 2011	201201457		
PAT054121-EP-EPT	20 Apr 2011	11715243.9	EP2561077	
PAT054121-GC-NP	20 Apr 2011	GCC/P/2011/18224		
PAT054121-IN-PCT	20 Apr 2011	8601/DELNP/12	8601/DELNP/12	
PAT054121-IO-NP	14 Mar 2011			
PAT054121-JO-NP	21 Apr 2011	137/2011		
PAT054121-JP-PCT	20 Apr 2011	2013-505469	2013-525332	
PAT054121-JP-PCTD	17 Apr 2014	2014-085797	2014-169301	
PAT054121-JP-PCTD02	17 Apr 2014	2014-085799		
PAT054121-JP-PCTD03	17 Apr 2014	2014-085802		
PAT054121-JP-PCTD04	17 Apr 2014	2014-085803		
PAT054121-KR-PCT	20 Apr 2011	2012-7030568	2013-0051954	
PAT054121-LB-NP	20 Apr 2011	9345		
PAT054121-MX-PCT	20 Apr 2011	MX/A/12/012355		
PAT054121-PK-NP	21 Apr 2011	296/2011		
PAT054121-TW-NP	22 Apr 2011	100114186	201141489	1434692
PAT054121-US-DIV	23 Jan 2012	13/355879	2012-0122960	8344129
PAT054121-US-DIV02	23 Jan 2012	13/355903	2012-0115933	8344130
PAT054121-US-DIV03	23 Jan 2012	13/355930	2012-0115934	8344131
PAT054121-US-DIV04	13 Sep 2012	13/614836	2013-0012571	8598335
PAT054121-US-DIV05	01 Oct 2013	14/042924	2014-0107179	
PAT054121-US-NP	20 Apr 2011	13/090580	2011-0263681	8344127
PAT054121-US-PSP	23 Apr 2010	61/327379		
PAT054121-US-PSP02	11 May 2010	61/333398		
PAT054121-VE-NP	25 Apr 2011	2011/535		
PAT054121-WO-PCT	20 Apr 2011	PCT/EP2011/056299	WO2011/131707	
siRNAs TO BETA-CATENIN				
PAT054417-AU-PCT	08 Jan 2013	2013208720		
PAT054417-BR-PCT	08 Jan 2013	112014016870-9		
PAT054417-CA-PCT	08 Jan 2013	2860676		
PAT054417-CN-PCT	08 Jan 2013	201380013297.9		
PAT054417-EP-EPT	08 Jan 2013	13704633.0	EP2802658	
PAT054417-JP-PCT	08 Jan 2013	2014-551706		
PAT054417-US-PCT	08 Jul 2014	14/371131		
PAT054417-US-PSP	09 Jan 2012	61/584530		
PAT054417-US-PSP02	14 Feb 2012	61/598530		
PAT054417-WO-PCT	08 Jan 2013	PCT/IB2013/050159	WO2013/105022	

siRNAs TO KRAS				
PAT054420-AU-PCT	30 Apr 2013	2013256471		
PAT054420-BR-PCT	30 Apr 2013	112014027337-5		
PAT054420-CA-PCT	30 Apr 2013	2872304		
PAT054420-CN-PCT	30 Apr 2013	PCT/US2013/038847		
PAT054420-EA-EAT	30 Apr 2013	PCT/US2013/038847		
PAT054420-EP-EPT	30 Apr 2013	13721578.6		
PAT054420-IN-PCT	30 Apr 2013	PCT/US2013/038847		
PAT054420-JP-PCT	30 Apr 2013	PCT/US2013/038847		
PAT054420-KR-PCT	30 Apr 2013	2014-7033421		
PAT054420-MX-PCT	30 Apr 2013	MX/A/2014/013367		
PAT054420-US-PCT	29 Oct 2014	14/397815		
PAT054420-US-PSP	02 May 2012	61/641588		
PAT054420-WO-PCT	30 Apr 2013	PCT/US2013/038847	WO/2013/166004	
siRNAs TO H12-ALPHA				
PAT054421-US-PSP	28 Feb 2013	61/770713		
PAT054421-WO-PCT	27 Feb 2014	PCT/US2014/018873	WO/2014/134255	
siRNAs TO HSF1				
PAT054711-AU-PCT	30 Aug 2012	2012303650		
PAT054711-BR-PCT	30 Aug 2012	1120140051038		
PAT054711-CA-PCT	30 Aug 2012	2847285		
PAT054711-CN-PCT	30 Aug 2012	201280053243.0	103930547	
PAT054711-EA-EAT	30 Aug 2012	201490553		
PAT054711-EP-EPT	30 Aug 2012	12783287.1	EP2751272	
PAT054711-IN-PCT	30 Aug 2012	2347/DELNP/2014		
PAT054711-JP-PCT	30 Aug 2012	2014-527791	2014-525435	
PAT054711-KR-PCT	30 Aug 2012	2014-7008647	2014-0057374	
PAT054711-MX-PCT	30 Aug 2012	MX/a/14/002536		
PAT054711-US-PCT	30 Aug 2012	14/342193		
PAT054711-US-PSP	02 Sep 2011	61/530532		
PAT054711-US-PSP02	14 Feb 2012	61/598453		
PAT054711-WO-PCT	30 Aug 2012	PCT/IB2012/054455	WO2013/030778	
siRNAs TO APOC3				
PAT055236-US-PSP	16 Jul 2014	62/025164		