Exhibit 10.2

[*] = Certain confidential information contained in this document, marked by brackets, is filed with the Securities and Exchange Commission pursuant to Rule 24b-2 of the Securities Exchange Act of 1934, as amended

SECOND AMENDMENT TO CLINICAL TRIAL COLLABORATION AGREEMENT

This Second Amendment to Clinical Trial Collaboration Agreement (this "**Amendment**") is made and entered into as of August 28, 2014 (the "**Amendment Effective Date**") and amends the Clinical Trial Collaboration Agreement dated April 18, 2013, as amended effective June 15, 2014 ("**Agreement**") between ARCA biopharma, Inc., a Delaware corporation (hereinafter **"ARCA"**), and Medtronic, Inc., a Delaware corporation (hereinafter **"Medtronic"**) (collectively, the "**Parties**").

INTRODUCTION

ARCA is currently conducting the Phase 2B Study and has determined that changes in the terms of the Agreement would improve the progress of the Phase 2B Study. To that end, the Parties have agreed to modify the Agreement as provided in this Amendment.

NOW, THEREFORE, in consideration of the foregoing premises and the mutual covenants contained herein, and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the parties hereby agree as follows:

ARTICLE I

Terms defined in the Agreement have the same meaning when used in this Amendment, except to the extent a term is defined differently in this Amendment.

ARTICLE II

Section 5.1 (a) of the Agreement is hereby deleted and replaced in its entirety with the following:

(a) Medtronic will use its CareLink System and the Medtronic Devices implanted in patients in the Phase 2B Study to support the collection and analysis of AF burden data from up to 200 patients enrolled in the Phase 2B Study. [*] The AF Burden Substudy Protocol will require that the patients in the Phase 2B Study will either have an existing implanted Medtronic Device, or will have a Reveal inserted as part of enrollment in the Phase 2B Study; provided, that up to [*] of the patients in the Phase 2B study may be enrolled without having a Medtronic Device implanted ("Non-Medtronic Device Patients"). Such non-Medtronic Device Patients may include patients with no cardiac monitoring device of any kind, as well as patients implanted with cardiac monitoring devices made by other manufacturers. The AF Burden Substudy Protocol will also require that all patients with implanted Medtronic Devices be enrolled in CareLink. Medtronic has no obligation to provide CRMA Services in connection with Non-Medtronic Device Patients.

ARTICLE III

Section 5.2 of the Agreement is hereby deleted and replaced in its entirety with the following:

5.2 The Parties shall agree on an enrollment plan for the Phase 2B Study to ensure that all patients eligible for the study are actively enrolled, including those with existing Medtronic Devices and those willing to have a Reveal device implanted. Eligible patients without a Medtronic Device will be implanted with a Reveal without unreasonable delay. Medtronic shall ensure that sufficient Reveal devices and patient monitors are reasonably available to ARCA in order to avoid unreasonable delay in the enrollment process, and shall be responsible for distributing Reveals to the Study sites that require them based on device orders from ARCA. Medtronic shall provide training and technical support for Medtronic Devices, including training relating to insertion and use of Reveals, to the investigators. Medtronic will support the reimbursement process for Reveals and the patient monitors, including insertion and, if necessary, explantation, by providing information about reimbursement opportunities to investigators. If reimbursement for the Reveal device and patient monitor is denied for a patient who receives one during enrollment in the Phase 2B Study after the implanting physician has made reasonable efforts and cooperated with Medtronic in pursuit of reimbursement, [*], taken in the order of reimbursement denial, [*]; and b) only if required up to [*] for the cost of the explant procedure, and up to [*] for explant physician fees per patient. The Parties agree that the payments made by Medtronic hereunder: (a) are consistent with the fair market value of the applicable services and are inclusive of any and all applicable fees, personnel costs, overhead and the like; and (b) have not been determined in a manner that takes into account the volume or value of any referrals or business otherwise generated between the Parties and any third party. The Parties also agree that the payments made by Medtronic described in this Section 5.2 constitute the complete and full compensation owed by Medtronic to ARCA for the work performed under this Agreement and Medtronic shall not be liable to ARCA or to any third party for any other payments which may be associated with this Agreement or

with any of the services provided hereunder. ARCA shall provide Medtronic with an invoice along with accompanying documentation, in a form satisfactory to Medtronic, of the contracted implant, explant and physician fees for which payment is sought under this Section 5.2. All fees ARCA seeks for a given patient shall be included on a single invoice. Medtronic is not required to make any payment to ARCA for any invoice submitted hereunder until it has had the required documentation for at least 30 days, and ARCA shall not submit invoices to Medtronic more often than once every three months.

(a) In addition to the reimbursement process provided for in Section 5.2, ARCA will have the right, but not the obligation, for the duration of the Study, to purchase from Medtronic up to [*] of the latest version (available at the time of purchase) of Reveal devices for use in the Phase 2B study patients, at the price of [*] per Reveal LINQ System. The price charged in this Agreement is the confidential information of Medtronic. ARCA may negotiate agreements with particular Phase 2B study sites, under which any such site may receive Reveal LINQ Systems purchased by ARCA. ARCA shall not charge study patients or sites for any Reveal LINQ Systems so purchased by ARCA, and shall obtain the site's agreement not to seek reimbursement for such Reveal LINQ Systems. Medtronic's obligation in Section 5.2, to cover certain unreimbursed Reveal implant and explant costs for up to [*] Study patients, will be reduced by 1 patient for each Reveal LINQ System provided pursuant to the terms of this Section 5.3. In addition, Medtronic shall have no obligation to provide either reimbursement or reimbursement assistance for any implant or explant costs associated with any Reveal LINQ System purchased by ARCA pursuant to this Section 5.2 (a).

(b) ARCA agrees to engage Medtronic's [*] to assist ARCA and ARCA's CRO (the Duke Clinical Research Institute ("DCRI") in the support of Phase 2B study site identification and activation, and patient identification and enrollment in the Study, pursuant to the terms attached hereto as Exhibit A-1, and the invoicing provisions of Article XII. The Parties may add additional services to this Agreement by written amendment, including by adding an additional Exhibit A, (e.g., Exhibit A-2) that has been signed by both Parties. The Parties understand and agree that all services provided pursuant to this Section 5.2 (b) are undertaken at the express direction of ARCA and DCRI, and by providing such services Medtronic does not assume any obligations or liabilities of a sponsor of GENETIC-AF. ARCA shall indemnify, defend and hold harmless Medtronic, its respective trustees, officers, agents and employees (collectively "Indemnitees") against any third part claims, actions, suits or judgments ("Claims") made or instituted against Indemnitees that are premised on the claim that by virtue of the services provided pursuant to this section 5.2(b) Medtronic is a sponsor of GENETIC-AF, except to the extent the recovery in a Claim is caused by Medtronic performing services beyond the scope of the services for which ARCA retains Medtronic pursuant to this section.

ARTICLE IV

The following is added to the Agreement as a new Article XII:

ARTICLE XII

REVEAL SALE AND DISTRIBUTION

12.1 Reveal devices provided pursuant to this Agreement will be ordered from Medtronic by ARCA on behalf of the Genetic-AF study sites in a mutually agreed manner, shipped by Medtronic to the Genetic-AF study site identified by ARCA in its order. Medtronic will pay the shipping costs incurred to ship to the site and risk of loss passes to ARCA upon shipment. Medtronic will provide Reveal devices solely for use under Sections 5.2, 5.2(a) and 5.4 of this Agreement, and ARCA shall only order such devices for study sites that require them for the Genetic-AF study. Medtronic shall provide ARCA with an invoice along with accompanying documentation, in a form satisfactory to ARCA, for the agreed fees for devices and services provided by Medtronic pursuant to this Agreement. Except as provided otherwise in Exhibit A-1, payment is due within 30 days of the invoice date. The Parties' obligation to pay fees due pursuant to the Agreement survives termination and expiration of the Agreement.

12.2 ARCA represents and warrants it will not, and will not allow sites participating in the Genetic-AF study to use the Reveal devices provided by Medtronic pursuant to this Agreement for any purpose other than the Genetic-AF study. ARCA is responsible for the proper care, maintenance, loss, theft or mysterious disappearance of the Reveal devices provided under this Agreement. ARCA shall return to Medtronic all Reveal devices unused by study sites as soon as practicable after the completion of each phase of the Genetic-AF study, unless the Parties agree in writing to maintain the devices at a different location for use in the Phase 3 Portion.

12.3 ARCA represents and warrants that it will have agreements in place with study sites that require study sites to use the Reveal devices only for the purpose of the study, not bill health insurers for the Reveal devices ARCA purchases from Medtronic, obtain review and approval of the Genetic-AF study from an ethics committee, and obtain informed consent from study subjects.

12.4 ARCA shall not decompile, reverse engineer, disassemble or otherwise analyze any portion of the Reveal devices or Reveal LINQ Systems provided by Medtronic hereunder.

12.5 THE REVEAL DEVICES AND REVEAL LINQ SYSTEMS PROVIDED TO ARCA BY MEDTRONIC HEREUNDER ARE PROVIDED "AS-IS", WITHOUT ANY WARRANTY OF ANY KIND, INCLUDING WITHOUT LIMITATION THE WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR WARRANTY THAT THE USE OF THE MEDTRONIC MATERIALS WILL NOT INFRINGE ANY PATENT, COPYRIGHT, TRADEMARK OR OTHER RIGHT OF ANY THIRD PARTY.

12.6 ARCA shall indemnify, defend and hold harmless Medtronic, its respective trustees, officers, agents and employees (collectively "Indemnitees") against any third part claims, actions, suits or judgments ("Claims") made or instituted against Indemnitees to the extent they are caused by ARCA's purchase and return of the Reveal devices and Reveal LINQ Systems hereunder, except to the extent the recovery in a Claim is caused by an act or omission of Medtronic.

12.7 ARCA shall assist and cooperate with Medtronic with respect to fulfillment of Medtronic's legal and regulatory obligations applicable to Reveal devices and Reveal LINQ systems provided hereunder, such as FDA complaint reporting, device tracking and recall assistance. Upon termination or expiration of this Agreement or the Genetic-AF study, ARCA shall return all unused Reveal devices and Reveal LINQ Systems to Medtronic within 30 days of such termination or expiration. ARCA is not entitled to a credit for such returns.

ARTICLE V

MISCELLANEOUS

5.1 This Amendment may be executed in two or more counterparts, each of which shall be deemed an original, but all of which together shall constitute one and the same instrument.

5.2 Except as expressly and specifically amended herein, all other provisions of the Agreement shall continue in full force and effect.

5.3 The First Amendment to Clinical Trial Collaboration Agreement dated effective June 15, 2014 is hereby terminated and replaced by this Amendment.

IN WITNESS WHEREOF, the Parties hereto have caused this Amendment to be executed by their duly authorized representatives as of the Amendment Effective Date.

MEDTRONIC, INC., a Minnesota corporation

Date: September 9, 2014

By: /s/ Richard L. Clark
Name: Richard L. Clark
Title: Senior Director Diagnostics

ARCA BIOPHARMA, INC., a Delaware corporation

Date: September 5, 2014

By: /s/ Christopher Ozeroff
Christopher Ozeroff
SVP and General Counsel

[*]

[*] = Certain confidential information contained in this document, marked by brackets, is filed with the Securities and Exchange Commission pursuant to Rule 24b-2 of the Securities Exchange Act of 1934, as amended