DEPARTMENT OF HEALTH AND HUMAN SERVICES

Food and Drug Administration
Silver Spring, MD 20993

March 20, 2017

Anita Goel, MD, Ph.D.
Chairman and CEO
Nanobiosym Diagnostics, Inc.
245 First Street, 18th Floor
Cambridge, MA 02142

Dear Dr. Goel:

This letter is in response to your request that the Food and Drug Administration (FDA) issue an Emergency Use Authorization (EUA) for emergency use of Nanobiosym Diagnostics, Inc.'s ("Nanobiosym") Gene-RADAR® Zika Virus Test for the qualitative detection of RNA from Zika virus in human serum from individuals meeting Centers for Disease Control and Prevention (CDC) Zika virus clinical criteria (e.g., clinical signs and symptoms associated with Zika virus infection) and/or CDC Zika virus epidemiological criteria (e.g., history of residence in or travel to a geographic region with active Zika transmission at the time of travel, or other epidemiological criteria for which Zika virus testing may be indicated), by laboratories in the United States (U.S.) that are certified under the Clinical Laboratory Improvement Amendments of 1988 (CLIA), 42 U.S.C. § 263a, to perform high complexity tests, or by similarly qualified non-U.S. laboratories, pursuant to section 564 of the Federal Food, Drug, and Cosmetic Act (the Act) (21 U.S.C. § 360bbb-3).[1] Test results are for the identification of Zika virus RNA. Zika virus RNA is generally detectable in serum during the acute phase of infection and, according to the updated CDC Guidance for U.S. Laboratories Testing for Zika Virus Infection,[2] up to 14 days in serum, following onset of symptoms, if present. Positive results are indicative of current infection.

On February 26, 2016, pursuant to section 564(b)(1)(C) of the Act (21 U.S.C. § 360bbb-3(b)(1)(C)), the Secretary of Health and Human Services (HHS) determined that there is a significant potential for a public health emergency that has a significant potential to affect national security or the health and security of U.S. citizens living abroad and that involves Zika virus.[3] Pursuant to section 564(b)(1) of the Act (21 U.S.C. § 360bbb-3(b)(1)), and on the basis

[1] For ease of reference, this letter will refer to "laboratories in the United States (U.S.) that are certified under the Clinical Laboratory Improvement Amendments of 1988 (CLIA), 42 U.S.C. § 263a, to perform high complexity tests, or by similarly qualified non-U.S. laboratories" as "authorized laboratories."
[2] Available at http://www.cdc.gov/zika/laboratories/lab-guidance.html (last updated on November 16, 2016).
[3] As amended by the Pandemic and All Hazards Preparedness Reauthorization Act, Pub. L. No. 113-5, under section 564(b)(1)(C) of the Act, the Secretary may make a determination of a public health emergency, or of a significant potential for a public health emergency.

of such determination, the Secretary of HHS then declared that circumstances exist justifying the authorization of the emergency use of *in vitro* diagnostic tests for detection of Zika virus and/or diagnosis of Zika virus infection, subject to the terms of any authorization issued under 21 U.S.C. § 360bbb-3(a).[4]

Having concluded that the criteria for issuance of this authorization under section 564(c) of the Act (21 U.S.C. § 360bbb-3(c)) are met, I am authorizing the emergency use of the Gene-RADAR® Zika Virus Test (as described in the Scope of Authorization section of this letter (Section II)) in individuals meeting CDC Zika virus clinical criteria (e.g., clinical signs and symptoms associated with Zika virus infection) and/or CDC Zika virus epidemiological criteria (e.g., history of residence in or travel to a geographic region with active Zika transmission at the time of travel, or other epidemiological criteria for which Zika virus testing may be indicated) (as described in the Scope of Authorization section of this letter (Section II)) for the detection of Zika virus infection by authorized laboratories, subject to the terms of this authorization.

I. Criteria for Issuance of Authorization

I have concluded that the emergency use of the Gene-RADAR® Zika Virus Test for the detection of Zika virus and diagnosis of Zika virus infection in the specified population meets the criteria for issuance of an authorization under section 564(c) of the Act, because I have concluded that:

1. The Zika virus can cause Zika virus infection, a serious or life-threatening disease or condition to humans infected with the virus;

2. Based on the totality of scientific evidence available to FDA, it is reasonable to believe that the Gene-RADAR® Zika Virus Test, when used with the specified instrument(s) and in accordance with the Scope of Authorization, may be effective in detecting Zika virus and diagnosing Zika virus infection, and that the known and potential benefits of the Gene-RADAR® Zika Virus Test for detecting Zika virus and diagnosing Zika virus infection outweigh the known and potential risks of such product; and

3. There is no adequate, approved, and available alternative to the emergency use of the Gene-RADAR® Zika Virus Test for detecting Zika virus and diagnosing Zika virus infection.[5]

II. Scope of Authorization

I have concluded, pursuant to section 564(d)(1) of the Act, that the scope of this authorization is limited to the use of the authorized Gene-RADAR® Zika Virus Test by authorized laboratories for the detection of RNA from Zika virus and diagnosis of Zika virus infection in individuals meeting CDC Zika virus clinical criteria (e.g., clinical signs and symptoms associated with Zika virus infection) and/or CDC Zika virus epidemiological criteria (e.g., history of residence in or

[4] HHS. *Determination and Declaration Regarding Emergency Use of in Vitro Diagnostic Tests for Detection of Zika Virus and/or Diagnosis of Zika Virus Infection*. 81 Fed. Reg. 10878 (March 2, 2016).

[5] No other criteria of issuance have been prescribed by regulation under section 564(c)(4) of the Act.

travel to a geographic region with active Zika transmission at the time of travel, or other epidemiological criteria for which Zika virus testing may be indicated).

The Authorized Gene-RADAR® Zika Virus Test

The Gene-RADAR® Zika Virus Test is a real-time reverse transcription polymerase chain reaction (rRT-PCR) assay for the qualitative detection of RNA from Zika virus in human serum and other authorized specimen types.

To perform the Gene-RADAR® Zika Virus Test, the RNA is first extracted and purified from the patient specimen. The RNA is then reverse transcribed into cDNA which is amplified using the primer set and detected using the specific probe. The rRT-PCR is performed on the Gene-RADAR® Platform, or other authorized instruments.

The Gene-RADAR® Zika Virus Test includes the following materials or other authorized materials: Gene-RADAR® Zika Virus Kit Buffer 1 (containing primers, probes and reaction buffer), Gene-RADAR® Zika Virus Internal Process Control, Gene-RADAR® Zika Virus Positive/Negative Control, Gene-RADAR® Nanochips for use with samples and controls. The Gene-RADAR® Zika Virus Test also requires the use of additional materials and ancillary reagents that are not included with the test but are commonly used in clinical laboratories and are described in the authorized Gene-RADAR® Zika Virus Test Instructions for Use.

The Gene-RADAR® Zika Virus Test requires the following control materials, or other authorized control materials; all controls listed below must generate expected results in order for a test to be considered valid, as outlined in the Gene-RADAR® Zika Virus Test Instructions for Use:

- Gene-RADAR® Zika Virus Positive Control: Synthetic Zika RNA target sequence that can be amplified and detected – run with each batch of patient specimens. Monitors for failures of rRT-PCR reagents and reaction conditions.
- Negative Control: DNase and RNase-free water – run with each batch of patient specimens. Monitors for reagent and system contamination.
- Gene-RADAR® Zika Virus Internal Process Control: inactivated and stabilized MS2 Bacteriophage, requires extraction – added to each sample and control during the extraction step. The MS2 RNA is co-extracted and co-amplified with the target nucleic acid, and monitors for integrity of the kit reagents, equipment function and the presence of amplification inhibitors in the samples.

The above described Gene-RADAR® Zika Virus Test, when labeled consistently with the labeling authorized by FDA entitled "Gene-RADAR® Zika Virus Test Instructions for Use" (available at http://www.fda.gov/MedicalDevices/Safety/EmergencySituations/ucm161496.htm), which may be revised by Nanobiosym in consultation with the Division of Microbiology Devices (DMD)/Office of In Vitro Diagnostics and Radiological Health (OIR)/Center for Devices and Radiological Health (CDRH), is authorized to be distributed to and used by authorized laboratories under this EUA, despite the fact that it does not meet certain requirements otherwise required by federal law.

The above described Gene-RADAR® Zika Virus Test is authorized to be accompanied by the

following information pertaining to the emergency use, which is authorized to be made available to healthcare providers and patients, including pregnant women:

- Fact Sheet for Healthcare Providers: Interpreting Gene-RADAR® Zika Virus Test Results
- Fact Sheet for Patients: Understanding Results from the Gene-RADAR® Zika Virus Test

As described in Section IV below, Nanobiosym and its authorized distributors are also authorized to make available additional information relating to the emergency use of the authorized Gene-RADAR® Zika Virus Test that is consistent with, and does not exceed, the terms of this letter of authorization.

I have concluded, pursuant to section 564(d)(2) of the Act, that it is reasonable to believe that the known and potential benefits of the authorized Gene-RADAR® Zika Virus Test in the specified population, when used for detection of Zika virus and to diagnose Zika virus infection and used consistently with the Scope of Authorization of this letter (Section II), outweigh the known and potential risks of such a product.

I have concluded, pursuant to section 564(d)(3) of the Act, based on the totality of scientific evidence available to FDA, that it is reasonable to believe that the authorized Gene-RADAR® Zika Virus Test may be effective in the detection of Zika virus and diagnosis of Zika virus infection, when used consistently with the Scope of Authorization of this letter (Section II), pursuant to section 564(c)(2)(A) of the Act.

FDA has reviewed the scientific information available to FDA, including the information supporting the conclusions described in Section I above, and concludes that the authorized Gene-RADAR® Zika Virus Test, when used for detection of Zika virus and to diagnose Zika virus infection in the specified population (as described in the Scope of Authorization of this letter (Section II)), meets the criteria set forth in section 564(c) of the Act concerning safety and potential effectiveness.

The emergency use of the authorized Gene-RADAR® Zika Virus Test under this EUA must be consistent with, and may not exceed, the terms of this letter, including the Scope of Authorization (Section II) and the Conditions of Authorization (Section IV). Subject to the terms of this EUA and under the circumstances set forth in the Secretary of HHS's determination described above and the Secretary of HHS's corresponding declaration under section 564(b)(1), the Gene-RADAR® Zika Virus Test described above is authorized to detect Zika virus and diagnose Zika virus infection in individuals meeting CDC Zika virus clinical criteria (e.g., clinical signs and symptoms associated with Zika virus infection) and/or CDC Zika virus epidemiological criteria (e.g., history of residence in or travel to a geographic region with active Zika virus transmissions at the time of travel, or other epidemiological criteria for which Zika virus testing may be indicated).

This EUA will cease to be effective when the HHS declaration that circumstances exist to justify the EUA is terminated under section 564(b)(2) of the Act or when the EUA is revoked under section 564(g) of the Act.

III. Waiver of Certain Requirements

I am waiving the following requirements for the Gene-RADAR® Zika Virus Test during the duration of this EUA:

- Current good manufacturing practice requirements, including the quality system requirements under 21 CFR Part 820 with respect to the design, manufacture, packaging, labeling, storage, and distribution of the Gene-RADAR® Zika Virus Test.

- Labeling requirements for cleared, approved, or investigational devices, including labeling requirements under 21 CFR 809.10 and 21 CFR 809.30, except for the intended use statement (21 CFR 809.10(a)(2), (b)(2)), adequate directions for use (21 U.S.C. 352(f)), (21 CFR 809.10(b)(5), (7), and (8)), any appropriate limitations on the use of the device including information required under 21 CFR 809.10(a)(4), and any available information regarding performance of the device, including requirements under 21 CFR 809.10(b)(12).

IV. Conditions of Authorization

Pursuant to section 564 of the Act, I am establishing the following conditions on this authorization:

Nanobiosym and Its Authorized Distributor(s)

A. Nanobiosym and its authorized distributor(s) will distribute the authorized Gene-RADAR® Zika Virus Test with the authorized labeling only to authorized laboratories. Changes to the authorized labeling may be made by Nanobiosym in consultation with, and require concurrence of, DMD/OIR/CDRH.

B. Nanobiosym and its authorized distributor(s) will provide to authorized laboratories the authorized Gene-RADAR® Zika Virus Test Fact Sheet for Healthcare Providers and the authorized Gene-RADAR® Zika Virus Test Fact Sheet for Patients.

C. Nanobiosym and its authorized distributor(s) will make available on their websites the authorized Gene-RADAR® Zika Virus Test Fact Sheet for Healthcare Providers and the authorized Gene-RADAR® Zika Virus Test Fact Sheet for Patients.

D. Nanobiosym and its authorized distributor(s) will inform authorized laboratories and relevant public health authority(ies) of this EUA, including the terms and conditions herein.

E. Nanobiosym and its authorized distributor(s) will ensure that the authorized laboratories using the authorized Gene-RADAR® Zika Virus Test have a process in place for reporting test results to healthcare providers and relevant public health

authorities, as appropriate.[6]

F. Through a process of inventory control, Nanobiosym and its authorized distributor(s) will maintain records of device usage.

G. Nanobiosym and its authorized distributor(s) will collect information on the performance of the test. Nanobiosym will report to FDA any suspected occurrence of false positive and false negative results and significant deviations from the established performance characteristics of the test of which Nanobiosym becomes aware.

H. Nanobiosym and its authorized distributor(s) are authorized to make available additional information relating to the emergency use of the authorized Gene-RADAR® Zika Virus Test that is consistent with, and does not exceed, the terms of this letter of authorization.

Nanobiosym Diagnostics, Inc.

I. Nanobiosym will notify FDA of any authorized distributor(s) of the Gene-RADAR® Zika Virus Test, including the name, address, and phone number of any authorized distributor(s).

J. Nanobiosym will provide its authorized distributor(s) with a copy of this EUA, and communicate to its authorized distributor(s) any subsequent amendments that might be made to this EUA and its authorized accompanying materials (e.g., Fact Sheets, Instructions for Use).

K. Nanobiosym may request changes to the authorized Gene-RADAR® Zika Virus Test Fact Sheet for Healthcare Providers and the authorized Gene-RADAR® Zika Virus Test Fact Sheet for Patients. Such requests will be made by Nanobiosym in consultation with, and require concurrence of, DMD/OIR/CDRH.

L. Nanobiosym may request the addition of other instruments for use with the authorized Gene-RADAR® Zika Virus Test. Such requests will be made by Nanobiosym in consultation with, and require concurrence of, DMD/OIR/CDRH.

M. Nanobiosym may request the addition of other extraction methods for use with the authorized Gene-RADAR® Zika Virus Test. Such requests will be made by Nanobiosym in consultation with, and require concurrence of, DMD/OIR/CDRH.

N. Nanobiosym may request the addition of other specimen types for use with the authorized Gene-RADAR® Zika Virus Test. Such requests will be made by Nanobiosym in consultation with, and require concurrence of, DMD/OIR/CDRH.

[6] For questions related to reporting Zika test results to relevant public health authorities, it is recommended that Nanobiosym, other authorized distributor(s), and authorized laboratories consult with the applicable country, state or territory health department(s). According to CDC, Zika virus disease is a nationally notifiable condition (see http://www.cdc.gov/zika/).

O. Nanobiosym may request the addition and/or substitution of other control materials for use with the authorized Gene-RADAR® Zika Virus Test. Such requests will be made by Nanobiosym in consultation with, and require concurrence of, DMD/OIR/CDRH.

P. Nanobiosym may request the addition and/or substitution of other ancillary reagents and materials for use with the authorized Gene-RADAR® Zika Virus Test. Such requests will be made by Nanobiosym in consultation with, and require concurrence of, DMD/OIR/CDRH.

Q. Nanobiosym will assess traceability[7] of the Gene-RADAR® Zika Virus Test with FDA-recommended reference material(s). After submission to FDA and DMD/OIR/CDRH's review of and concurrence with the data, Nanobiosym will update its labeling to reflect the additional testing.

R. Nanobiosym will track adverse events and report to FDA under 21 CFR Part 803.

Authorized Laboratories

S. Authorized laboratories will include with reports of the results of the Gene-RADAR® Zika Virus Test the authorized Fact Sheet for Healthcare Providers and the authorized Fact Sheet for Patients. Under exigent circumstances, other appropriate methods for disseminating these Fact Sheets may be used, which may include mass media.

T. Authorized laboratories will perform the Gene-RADAR® Zika Virus Test using the QIAamp® Viral RNA Mini Kit or with other authorized extraction methods.

U. Authorized laboratories will perform the Gene-RADAR® Zika Virus Test on the Gene-RADAR® Platform, or other authorized instruments.

V. Authorized laboratories will perform the Gene-RADAR® Zika Virus Test on human serum or other authorized specimen types.

W. Authorized laboratories will have a process in place for reporting test results to healthcare providers and relevant public health authorities, as appropriate.[8]

X. Authorized laboratories will collect information on the performance of the test and report to DMD/OIR/CDRH (*via* email CDRH-EUA-Reporting@fda.hhs.gov) and Nanobiosym any suspected occurrence of false positive or false negative results of which they become aware.

[7] Traceability refers to tracing analytical sensitivity/reactivity back to a FDA-recommended reference material.
[8] For questions related to reporting Zika test results to relevant public health authorities, it is recommended that Nanobiosym, other authorized distributor(s), and authorized laboratories consult with the applicable country, state or territory health department(s). According to CDC, Zika virus disease is a nationally notifiable condition. http://www.cdc.gov/zika/.

Y. All laboratory personnel using the test should be appropriately trained in RT-PCR techniques and use appropriate laboratory and personal protective equipment when handling this kit, and use the test in accordance with the authorized labeling.

Nanobiosym, Its Authorized Distributor(s) and Authorized Laboratories

Z. Nanobiosym, its authorized distributor(s), and authorized laboratories, will ensure that any records associated with this EUA are maintained until notified by FDA. Such records will be made available to FDA for inspection upon request.

Conditions Related to Advertising and Promotion

AA. All advertising and promotional descriptive printed matter relating to the use of the authorized Gene-RADAR® Zika Virus Test shall be consistent with the Fact Sheets and authorized labeling, as well as the terms set forth in this EUA and the applicable requirements set forth in the Act and FDA regulations.

BB. All advertising and promotional descriptive printed matter relating to the use of the authorized Gene-RADAR® Zika Virus Test shall clearly and conspicuously state that:

- This test has not been FDA cleared or approved;
- This test has been authorized by FDA under an EUA for use by authorized laboratories;
- This test has been authorized only for the detection of RNA from Zika virus and diagnosis of Zika virus infection, not for any other viruses or pathogens; and
- This test is only authorized for the duration of the declaration that circumstances exist justifying the authorization of the emergency use of *in vitro* diagnostic tests for detection of Zika virus and/or diagnosis of Zika virus infection under section 564(b)(1) of the Act, 21 U.S.C. § 360bbb-3(b)(1), unless the authorization is terminated or revoked sooner.

No advertising or promotional descriptive printed matter relating to the use of the authorized Gene-RADAR® Zika Virus Test may represent or suggest that this test is safe or effective for the diagnosis of Zika virus infection.

The emergency use of the authorized Gene-RADAR® Zika Virus Test as described in this letter of authorization must comply with the conditions and all other terms of this authorization.

V. Duration of Authorization

This EUA will be effective until the declaration that circumstances exist justifying the authorization of the emergency use of *in vitro* diagnostic tests for detection of Zika virus and/or diagnosis of Zika virus infection is terminated under section 564(b)(2) of the Act or the EUA is revoked under section 564(g) of the Act.

Sincerely,

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Stephen Ostroff, M.D.
Acting Commissioner of Food and Drugs

Enclosures