



August 25, 2021

Life Technologies Corporation
Lynne McBride
Director of Clinical and Regulatory Affairs
7335 Executive Way
Frederick, MD 21704

Re: P160045/S028

Trade/Device Name: Oncomine™ Dx Target Test

Product Code: PQP

Filed: March 2, 2021

Amended: April 12, 2021, April 15, 2021, May 10, 2021, and August 18, 2021

Dear Lynne McBride:

The Center for Devices and Radiological Health (CDRH) of the Food and Drug Administration (FDA) has completed its review of your premarket approval application (PMA) supplement to expand the intended use of the Oncomine™ Dx Target Test to include a companion diagnostic indication for the detection of single nucleotide variants in *IDH1* in cholangiocarcinoma patients who may benefit from treatment with TIBSOVO® (ivosidenib). This device is indicated as follows:

The Oncomine™ Dx Target Test is a qualitative in vitro diagnostic test that uses targeted high throughput, parallel-sequencing technology to detect single nucleotide variants (SNVs) and deletions in 23 genes from DNA and fusions in *ROS1* and *RET* from RNA isolated from formalin-fixed, paraffin-embedded (FFPE) tumor tissue samples from patients with non-small cell lung cancer (NSCLC), and *IDH1* SNVs from FFPE tumor tissue samples from patients with cholangiocarcinoma (CC) using the Ion PGM™ Dx System.

The test is indicated as a companion diagnostic to aid in selecting NSCLC and CC patients for treatment with the targeted therapies listed in Table 1 in accordance with the approved therapeutic product labeling.

Table 1: List of Variants for Therapeutic Use

| Tissue type | Gene | Variant | Targeted therapy |
|------------------------------------|-------------|---|---|
| Non-Small Cell Lung Cancer (NSCLC) | <i>BRAF</i> | <i>BRAF</i> V600E mutations | TAFINLAR® (dabrafenib) in combination with MEKINIST® (trametinib) |
| | <i>EGFR</i> | <i>EGFR</i> L858R mutation, <i>EGFR</i> Exon 19 deletions | IRESSA® (gefitinib) |
| | <i>RET</i> | <i>RET</i> Fusions | GAVRETO™ (pralsetinib) |
| | <i>ROS1</i> | <i>ROS1</i> Fusions | XALKORI® (crizotinib) |
| Cholangiocarcinoma (CC) | <i>IDH1</i> | <i>IDH1</i> R132C, <i>IDH1</i> R132G, <i>IDH1</i> R132L, | TIBSOVO® (ivosidenib) |

| Tissue type | Gene | Variant | Targeted therapy |
|-------------|------|--|------------------|
| | | <i>IDH1</i> R132S, and <i>IDH1</i> R132H mutations | |

Safe and effective use has not been established for selecting therapies using this device for variants and tissue types other than those in Table 1.

Results other than those listed in Table 1 are indicated for use only in patients who have already been considered for all appropriate therapies (including those listed in Table 1). Analytical performance using NSCLC specimens has been established for the variants listed in Table 2.

Table 2: List of Variants with Established Analytical Performance Only

| Gene | Variant ID | Nucleotide Change |
|---------------|------------|-------------------|
| <i>KRAS</i> | COSM512 | c.34_35delGGinsTT |
| <i>KRAS</i> | COSM516 | c.34G>T |
| <i>MET</i> | COSM707 | c.3029C>T |
| <i>PIK3CA</i> | COSM754 | c.1035T>A |

The test is not indicated to be used for standalone diagnostic purposes, screening, monitoring, risk assessment, or prognosis.

We are pleased to inform you that the PMA supplement is approved. You may begin commercial distribution of the device in accordance with the conditions of approval described below. Although this letter refers to your product as a device, please be aware that some approved products may instead be combination products. The Premarket Approval Database located at <https://www.accessdata.fda.gov/scripts/cdrh/cfdocs/cfPMA/pma.cfm> identifies combination product submissions.

The sale and distribution of this device are restricted to prescription use in accordance with 21 CFR 801.109 and under section 515(d)(1)(B)(ii) of the Federal Food, Drug, and Cosmetic Act (the act). The device is further restricted under section 515(d)(1)(B)(ii) of the act insofar as the labeling must specify the specific training or experience practitioners need in order to use the device. FDA has determined that these restrictions on sale and distribution are necessary to provide reasonable assurance of the safety and effectiveness of the device. Your device is therefore a restricted device subject to the requirements in sections 502(q) and (r) of the act, in addition to the many other FDA requirements governing the manufacture, distribution, and marketing of devices.

Expiration dating for this device has been established and approved at 5 months when the Oncomine™ Dx Target DNA and RNA Panel and DNA Control Kit, the Ion PGM Dx Sequencing and Library Reagents Kits, and the Ion OneTouch™ Dx Template Reagents Kit are stored at -30°C to -10°C; the Oncomine™ Dx Target RNA Control Kit is stored at -90°C to -60°C; the Ion OneTouch™ Dx Template Dx ES Beads and Ion PGM Dx Library Equalizer Kit are stored at 2°C to 8°C; and Ion PGM Dx Sequencing Supplies and Solutions Kit and Ion OneTouch™ Dx Template Supplies and Solutions Kits are stored at 15°C to 30°C. This is to advise you that the protocol you used to establish this expiration dating is considered an approved protocol for the purpose of extending the expiration dating as provided by 21 CFR 814.39(a)(7).

Continued approval of the PMA is contingent upon the submission of periodic reports, required under 21 CFR 814.84, at intervals of one year (unless otherwise specified) from the date of approval of the original PMA. This report, identified as "Annual Report" and bearing the applicable PMA reference number, should be submitted to the address below. The Annual Report should indicate the beginning and ending date of the period covered by the report and should include the information required by 21 CFR 814.84.

In addition to the above, and in order to provide continued reasonable assurance of the safety and effectiveness of the PMA device, the Annual Report must include, separately for each model number (if applicable), the number of devices sold and distributed during the reporting period, including those distributed to distributors. The distribution data will serve as a denominator and provide necessary context for FDA to ascertain the frequency and prevalence of adverse events, as FDA evaluates the continued safety and effectiveness of the device.

You have agreed to provide the following non-clinical information in a report, which may be followed by a PMA supplement within 1 year of the date of this letter.

1. Thermo Fisher Scientific/Life Technologies Corp. must provide data from a well-designed and well-controlled interference study, whereby the effects of conjugated bile salts are tested on the assay workflow of the ODxT Test using intended use specimens carrying IDH1 mutations detected by the assay at analyte levels near LoD. The data from this study must be adequate to support that conjugated bile salts do not affect the performance of the assay.
2. Thermo Fisher Scientific/Life Technologies Corp. (TFS) must provide data to support that implementation of a new user training program (started June 2018) does not result in unacceptably high assay failures. TFS will also provide an analysis comparing the failure rate prior to and after the implementation of the new user training program by comparing:
 - the assay failure rate and quality metrics of every run performed by TFS from the date of implementation of the new training program to 9 months after the PMA approval date to
 - the assay failure rate and quality metrics prior to the implementation of the new user training program using a similar time range and a similar number of runs performed

This analysis should show that the new user training program has reduced the number of assay failures to an acceptable value.

3. Thermo Fisher Scientific/Life Technologies Corp. will provide a final approved aggregation validation protocol for the merging of multiple assay definition files (ADF) associated with approved companion diagnostic indications and associated updates to the Torrent Suite Dx software for a final ADF and Torrent Suite Dx versions to be commercialized to support new approved indications within 60 days of approval of this PMA supplement.
4. Thermo Fisher Scientific/Life Technologies Corp. will provide results and software validation documentation from regression testing on the commercial release configuration to confirm there are no defects for the merged assay definition files based on the approved aggregation validation protocol and no new defects other than those listed in the approved Torrent Suite Dx versions within 6 months of approval of this PMA supplement.

Be advised that failure to comply with any post-approval requirement, including the interference study, assay failure report, and software update, constitutes grounds for FDA withdrawal of approval of the PMA in accordance with 21 CFR 814.82(c) and 814.46(a)(2).

This is a reminder that as of September 24, 2014, class III devices are subject to certain provisions of the final Unique Device Identification (UDI) rule. These provisions include the requirement to provide a UDI on the device label and packages (21 CFR 801.20), format dates on the device label in accordance with 21 CFR 801.18, and submit data to the Global Unique Device Identification Database (GUDID) (21 CFR 830 Subpart E). Additionally, 21 CFR 814.84 (b)(4) requires PMA annual reports submitted after September 24, 2014, to identify each device identifier currently in use for the subject device, and the device identifiers for devices that have been discontinued since the previous periodic report. It is not necessary to identify any device identifier discontinued prior to December 23, 2013. Combination Products may also be subject to UDI requirements (see 21 CFR 801.30). For more information on these requirements, please see the UDI website, <https://www.fda.gov/medical-devices/device-advice-comprehensive-regulatory-assistance/unique-device-identification-udi-system>.

Before making any change affecting the safety or effectiveness of the PMA device, you must submit a PMA supplement or an alternate submission (30-day notice) in accordance with 21 CFR 814.39. All PMA supplements and alternate submissions (30-day notice) must comply with the applicable requirements in 21 CFR 814.39. For more information, please refer to the FDA guidance document entitled, "Modifications to Devices Subject to Premarket Approval (PMA) - The PMA Supplement Decision-Making Process" <https://www.fda.gov/media/81431/download>.

You are reminded that many FDA requirements govern the manufacture, distribution, and marketing of devices. For example, in accordance with the Medical Device Reporting (MDR) regulation, 21 CFR 803.50 and 21 CFR 803.52 for devices or post-marketing safety reporting (21 CFR 4, Subpart B) for combination products, you are required to report adverse events for this device. Manufacturers of medical devices, including in vitro diagnostic devices, are required to report to FDA no later than 30 calendar days after the day they receive or otherwise becomes aware of information, from any source, that reasonably suggests that one of their marketed devices:

1. May have caused or contributed to a death or serious injury; or
2. Has malfunctioned and such device or similar device marketed by the manufacturer would be likely to cause or contribute to a death or serious injury if the malfunction were to recur.

Additional information on MDR, including how, when, and where to report, is available at <https://www.fda.gov/medical-devices/medical-device-safety/medical-device-reporting-mdr-how-report-medical-device-problems> and on combination product post-marketing safety reporting is available at (see <https://www.fda.gov/combination-products/guidance-regulatory-information/postmarketing-safety-reporting-combination-products>).

In accordance with the recall requirements specified in 21 CFR 806.10 for devices or the post-marketing safety reporting requirements (21 CFR 4, Subpart B) for combination products, you are required to submit a written report to FDA of any correction or removal of this device initiated by you to: (1) reduce a risk to health posed by the device; or (2) remedy a violation of the act caused by the device which may present a

risk to health, with certain exceptions specified in 21 CFR 806.10(a)(2). Additional information on recalls is available at

<https://www.fda.gov/safety/recalls-market-withdrawals-safety-alerts/industry-guidance-recalls>.

CDRH does not evaluate information related to contract liability warranties. We remind you, however, that device labeling must be truthful and not misleading. CDRH will notify the public of its decision to approve your PMA by making available, among other information, a summary of the safety and effectiveness data upon which the approval is based. The information can be found on the FDA CDRH Internet Home Page located at <https://www.fda.gov/medical-devices/device-approvals-denials-and-clearances/pma-approvals>. Written requests for this information can also be made to the Food and Drug Administration, Dockets Management Branch, (HFA-305), 5630 Fishers Lane, Rm. 1061, Rockville, MD 20852. The written request should include the PMA number or docket number. Within 30 days from the date that this information is placed on the Internet, any interested person may seek review of this decision by submitting a petition for review under section 515(g) of the act and requesting either a hearing or review by an independent advisory committee. FDA may, for good cause, extend this 30-day filing period.

Failure to comply with any post-approval requirement constitutes a ground for withdrawal of approval of a PMA. The introduction or delivery for introduction into interstate commerce of a device that is not in compliance with its conditions of approval is a violation of law.

You are reminded that, as soon as possible and before commercial distribution of your device, you must submit an amendment to this PMA submission with a copy of all final labeling. Final labeling that is identical to the labeling approved in draft form will not routinely be reviewed by FDA staff when accompanied by a cover letter stating that the final labeling is identical to the labeling approved in draft form. If the final labeling is not identical, any changes from the final draft labeling should be highlighted and explained in the amendment.

All required documents should be submitted, unless otherwise specified, to the address below and should reference the above PMA number to facilitate processing.

U.S. Food and Drug Administration
Center for Devices and Radiological Health
Document Control Center - WO66-G609
10903 New Hampshire Avenue
Silver Spring, MD 20993-0002

If you have any questions concerning this approval order, please contact Abdelrahmman Abukhdeir at 240-402-6482 or Abdelrahmman.Abukhdeir@fda.hhs.gov.

Sincerely,


Reena Philip -S

Reena Philip, Ph.D.

Director

Division of Molecular Genetics
and Pathology

OHT7: Office of In Vitro Diagnostics
and Radiological Health

Office of Product Evaluation and Quality

Center for Devices and Radiological Health