

**CENTER FOR DRUG EVALUATION AND  
RESEARCH**

*APPLICATION NUMBER:*

**206545Orig1s000**

**OTHER REVIEW(S)**

MEMORANDUM

DEPARTMENT OF HEALTH AND HUMAN SERVICES  
PUBLIC HEALTH SERVICE  
FOOD AND DRUG ADMINISTRATION  
CENTER FOR DRUG EVALUATION AND RESEARCH

**DATE:** July 17, 2014

**SUBJECT:** RPM Labeling Review

**APPLICATION/DRUG:** NDA 206545, Zydelig

PLR labeling review was conducted on the initial label submitted under NDA 205858 for Zydelig. There is only one label for this product and therefore only one RPM label review. See RPM label review dated November 5, 2013 under NDA 205858.

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/s/  
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MARA B MILLER  
07/17/2014

**Department of Health and Human Services  
Public Health Service  
Food and Drug Administration  
Center for Drug Evaluation and Research  
Office of Medical Policy**

**PATIENT LABELING REVIEW**

Date: June 26, 2014

To: Ann Farrell, MD  
Director  
**Division of Hematology Products (DHP)**

Robert Kane, MD  
Deputy Director for Safety  
**Division of Hematology Products (DHP)**

Through: LaShawn Griffiths, MSHS-PH, BSN, RN  
Associate Director for Patient Labeling  
**Division of Medical Policy Programs (DMPP)**

Barbara Fuller, RN, MSN, CWOCN  
Team Leader, Patient Labeling  
**Division of Medical Policy Programs (DMPP)**

From: Nathan Caulk, MS, BSN, RN  
Patient Labeling Reviewer  
**Division of Medical Policy Programs (DMPP)**

Kathleen Davis, RN  
**Regulatory Review Officer**  
**Office of Prescription Drug Promotion (OPDP)**

Subject: Review of Patient Labeling: Medication Guide (MG)

Drug Name (established name): Zydelig (idelalisib)

Dosage Form and Route: tablets, for oral use

Application Type/Number: NDA 205858 and NDA 206545

Applicant: Gilead Sciences, Inc.

## 1 INTRODUCTION

On September 11, 2013, Gilead Sciences, Inc. submitted for the Agency's review an original New Drug Application (NDA) 205858 for Zydelig (idelalisib) tablets for the proposed indication for the treatment of patients with refractory indolent non-Hodgkin lymphoma (iNHL). On December 6, 2013, Gilead Sciences, Inc. submitted for the Agency's review original New Drug Application (NDA) 206545 for Zydelig (idelalisib) tablets. The purpose of this submission is for the proposed indication for the treatment of patients with relapsed chronic lymphocytic leukemia and for the treatment of patients with refractory indolent B-cell non-Hodgkin lymphoma.

This collaborative review is written by the Division of Medical Policy Programs (DMPP) and the Office of Prescription Drug Promotion (OPDP) in response to requests by the Division of Hematology Products (DHP) on October 21, 2013 and January 30, 2014, for DMPP and OPDP to review the Applicant's proposed Patient Package Insert (PPI) for Zydelig (idelalisib) tablets.

## 2 MATERIAL REVIEWED

- Draft Zydelig (idelalisib) tablets PPI received on September 11, 2013 and December 6, 2013, revised and resubmitted by the Applicant as draft Medication Guide (MG) on June 17, 2014, and received by DMPP and OPDP on June 18, 2014.
- Draft Zydelig (idelalisib) tablets Prescribing Information (PI) received on September 11, 2013 and December 6, 2013, revised by the Review Division throughout the review cycle, and received by DMPP and OPDP on June 18, 2014.

## 3 REVIEW METHODS

To enhance patient comprehension, materials should be written at a 6<sup>th</sup> to 8<sup>th</sup> grade reading level, and have a reading ease score of at least 60%. A reading ease score of 60% corresponds to an 8<sup>th</sup> grade reading level. In our review of the MG the target reading level is at or below an 8<sup>th</sup> grade level.

Additionally, in 2008 the American Society of Consultant Pharmacists Foundation (ASCP) in collaboration with the American Foundation for the Blind (AFB) published *Guidelines for Prescription Labeling and Consumer Medication Information for People with Vision Loss*. The ASCP and AFB recommended using fonts such as Verdana, Arial or APHont to make medical information more accessible for patients with vision loss. We have reformatted the MG document using the Verdana font, size 10.

In our collaborative review of the MG we have:

- simplified wording and clarified concepts where possible
- ensured that the MG is consistent with the Prescribing Information (PI)
- removed unnecessary or redundant information

- ensured that the MG is free of promotional language or suggested revisions to ensure that it is free of promotional language
- ensured that the MG meets the Regulations as specified in 21 CFR 208.20
- ensured that the MG meets the criteria as specified in FDA's Guidance for Useful Written Consumer Medication Information (published July 2006)
- ensured that the MG is consistent with the approved comparator labeling where applicable.

#### **4 CONCLUSIONS**

The MG is acceptable with our recommended changes.

#### **5 RECOMMENDATIONS**

- Please send these comments to the Applicant and copy DMPP and OPDP on the correspondence.
- Our collaborative review of the MG is appended to this memorandum. Consult DMPP and OPDP regarding any additional revisions made to the PI to determine if corresponding revisions need to be made to the MG.

Please let us know if you have any questions.

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/s/  
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NATHAN P CAULK  
06/26/2014

KATHLEEN T DAVIS  
06/26/2014

BARBARA A FULLER  
06/26/2014

LASHAWN M GRIFFITHS  
06/26/2014

**FOOD AND DRUG ADMINISTRATION**  
**Center for Drug Evaluation and Research**  
**Office of Prescription Drug Promotion**

**\*\*\*\*Pre-decisional Agency Information\*\*\*\***

**Memorandum**

**Date:** June 25, 2014

**To:** Mara Miller, Regulatory Project Manager  
Division of Hematology Products (DHP)

**From:** Kathleen Davis, Regulatory Review Officer  
Office of Prescription Drug Promotion (OPDP)

**CC:** Karen Rulli, Team Leader, OPDP

**Subject:** Comments on draft labeling (Package Insert) for ZYDELIG®  
(idelalisib) tablets, for oral use  
NDA 205858 and NDA 206545

In response to your consult requests dated October 21, 2013, and January 30, 2014, we have reviewed the draft Package Insert (PI) for Zydlig and offer the following comments. OPDP has made these comments using the PI version provided via email link on June 18, 2014. OPDP's comments on the Medication Guide will be provided as a collaborative review with DMPP under separate cover.

Thank you for the opportunity to consult on this proposed labeling.

Section	Statement from draft	Comment
<b>HIGHLIGHTS, Boxed Warning</b>  <b>And</b>  <b>Boxed Warning</b>	(b) (4)	OPDP is concerned that the wording of the Boxed Warning header could be misconstrued to indicate that (b) (4) when this is not the case. OPDP recommends editing this language to ensure that there is no minimization of the other risk concepts in the boxed warning.
<b>HIGHLIGHTS, Boxed Warning</b>		Pursuant to discussions had on June 16, 2014 with the review division, OPDP suggests that this language be amended, if appropriate, to specify that fatalities have resulted from severe diarrhea/colitis in Zydlig-treated patients. Suggested language:

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/s/  
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KATHLEEN T DAVIS

06/25/2014

**MEMORANDUM**

**DEPARTMENT OF HEALTH AND HUMAN SERVICES  
PUBLIC HEALTH SERVICE  
FOOD AND DRUG ADMINISTRATION  
CENTER FOR DRUG EVALUATION AND RESEARCH**

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**CLINICAL INSPECTION SUMMARY**

**DATE:** April 16, 2014

**TO:** Mara Bauman Miller, M.A., Regulatory Project Manager  
Donna Przepiorka, M.D., Ph.D., Medical Officer  
Barry Miller, M.Sc., C.R.N.P., Clinical Analyst  
Nicole Gormley, M.D.  
R. Angelo de Claro, M.D., Cross Discipline Team Leader  
Division of Hematology Products (DHP)

**FROM:** Anthony Orendia, M.D., F.A.C.P.  
Medical Officer, GCP Assessment Branch  
Division of Good Clinical Practice Compliance  
Office of Scientific Investigations

**THROUGH:** Janice Pohlman, M.D., M.P.H.  
Team Leader, GCP Assessment Branch  
Division of Good Clinical Practice Compliance  
Office of Scientific Investigations

Kassa Ayalew, M.D., M.P.H.  
Acting Branch Chief, GCP Assessment Branch  
Division of Good Clinical Practice Compliance  
Office of Scientific Investigations

**SUBJECT:** Evaluation of Clinical Inspections

**NDA:** 206545

**APPLICANT:** Gilead Sciences, Inc.

**DRUG:** idelalisib

**NME:** Yes

**THERAPEUTIC CLASSIFICATION/REVIEW:** Priority review

**INDICATION:** Treatment of chronic lymphocytic leukemia (CLL) in combination with rituximab, for patients previously treated chronic lymphocytic leukemia

CONSULTATION REQUEST DATE (signed):	December 30, 2013
INSPECTION SUMMARY GOAL DATE (Original):	June 6, 2014
INSPECTION SUMMARY GOAL DATE (Revised):	April 17, 2014
DIVISION ACTION GOAL DATE (Original):	August 6, 2014
DIVISION ACTION GOAL DATE (Revised)	May 6, 2014
PDUFA DATE:	August 6, 2014

## **I. BACKGROUND:**

Chronic lymphocytic leukemia (CLL) is a serious and disabling malignancy in the elderly, who may require sequential treatment with chemotherapeutic agents to achieve tumor control. Rituximab treatment alone does not achieve tumor control, specifically in patients with bulky adenopathy.

The proposed novel treatment, idelalisib is a selective PI3K $\delta$  inhibitor. Idelalisib inhibits lymphoma growth in animal models of lymphoid malignancy, and potentially in patients with non-Hodgkin lymphoma. For chronic lymphocytic leukemia, idelalisib may offer complementary nodal and peripheral blood activity as part of the therapeutic cocktail.

Three domestic clinical sites and the sponsor participating in CLL Study 312-0116 were selected for inspection because the sites had a large number of treatment responders or significant efficacy findings.

CLL Protocol GS-US-312-0116 (referred to as 312-0116 subsequently) Study 312-0116 was a Phase 3, multicenter, 2-arm, randomized, double-blind, placebo-controlled, parallel-group study. The primary study objective was to evaluate the additional treatment effect of idelalisib added to rituximab on progression-free survival in subjects with previously treated CLL. The primary study endpoint was progression-free survival (PFS) – defined as the interval from randomization to the earlier of the first documentation of definitive disease progression or death from any cause. Definitive disease progression was CLL progression based on standard criteria and occurring for any reason other than lymphocytosis (i.e., increasing lymphadenopathy, bone marrow involvement; decreasing platelet count, hemoglobin, or neutrophil count, or worsening of disease-related symptoms).

## II. RESULTS:

<b>Name of CI City, State</b>	<b>Protocol/Study Site/Number of Subjects Enrolled (n)</b>	<b>Inspection Date</b>	<b>Final Classification*</b>
Bruce Cheson, M.D. Georgetown University Medical Center Lombardi Cancer Center 3800 Reservoir Road, Northwest, 2nd Level Washington, DC 20007	312-0116/Site 6767 N=13	Jan. 23 to 31, 2014	Preliminary: NAI
Richard Furman, M.D. Cornell University Medical School 525 East 68th St. New York, NY 10065	312-0116/Site 5775 N=22	Feb. 14 to 24, 2014	Preliminary: NAI
John Pagel, M.D., Ph.D. Fred Hutchinson Cancer Research Center Fairview Ave. N., D3-190 Seattle, WA 98109	312-0116/Site 6708 N=12	Jan. 8 to Feb. 4, 2014	VAI
Sponsor: Gilead Sciences, Inc. 199 East Blaine Street, Seattle, WA 98102	312-0116/Site 6767 N=13 312-0116/Site 5775 N=22 312-0116/Site 6708 N=12	Feb. 10 to March 6, 2014	Preliminary: VAI

### \*Key to Classifications

NAI = No deviation from regulations. Data acceptable.

VAI-No Response Requested = Deviations(s) from regulations. Data acceptable.

OAI = Significant deviations from regulations. Data unreliable/critical findings may affect data integrity.

Preliminary= The Establishment Inspection Report (EIR) has not been received, findings are based on preliminary communication with the field at the Office of Regulatory Affairs (ORA), or final review of the EIR is pending. Once a final letter is issued by CDER to the inspected entity and the case file is closed, the preliminary designation is converted to a final regulatory classification.

### CLINICAL STUDY SITE INVESTIGATORS

- Bruce Cheson, M.D./Protocol 312-0116/Site 6767**  
Washington, D.C.

#### **a. What was inspected:**

The inspection was conducted in accordance with Compliance Program 7348.811, from January 23, 2014 to February 3, 2014. A total of 20 subjects were screened, and 13 subjects were enrolled. Six subjects were still on this study at the study completion. An audit of five enrolled subjects' records was conducted.

The inspection evaluated the following documents: source records, screening and enrollment logs, case report forms, study drug accountability logs, study monitoring visits, and correspondence. Informed consent documents and sponsor-generated correspondence were also inspected.

**b. General observations/commentary:**

Source documents for randomized subjects whose records were reviewed were verified against the case report forms and NDA subject line listings. The efficacy endpoints were centrally adjudicated. Source documents for the raw data used to assess the primary study endpoint were verifiable at the study site. There were no limitations during conduct of the clinical site inspection.

In general, this clinical site appeared to be in compliance with Good Clinical Practices. A Form FDA 483 (List of Inspectional Observations) was not issued at the end of the inspection.

**c. Assessment of data integrity:**

Data submitted by this clinical site appear acceptable in support of this specific indication.

**2. Richard Furman, M.D./Protocol 312-0116/Site 5775**  
NY, NY

**a. What was inspected:**

The inspection was conducted in accordance with Compliance Program 7348.811, from February 14 to 24, 2014. A total of 29 subjects were screened and 22 subjects were enrolled in the study. The study is ongoing. An audit of the enrolled subjects' records was conducted.

The inspection evaluated the following documents: source records, screening and enrollment logs, case report forms, study drug accountability logs, study monitoring visits, and correspondence. Informed consent documents and sponsor-generated correspondence were also inspected.

**b. General observations/commentary:**

Source documents for randomized subjects whose records were reviewed were verified against the case report forms and NDA subject line listings. Source documents for the raw data used to assess the primary study endpoint were verifiable at the study site. There were no limitations during conduct of the clinical site inspection. There was no under-reporting of serious adverse events at this clinical study site.

In general, this clinical site appeared to be in compliance with Good Clinical Practices. A Form FDA 483 was not issued at the end of the inspection.

**c. Assessment of data integrity:**

Data submitted by this clinical site appear acceptable for this specific indication.

**3. John Pagel, M.D., Ph.D./Protocol 312-0116/Site 6708**  
Seattle, WA

**a. What was inspected:**

The inspection was conducted in accordance with Compliance Program 7348.811, from January 8 to February 4, 2014. A total of 18 subjects were screened and 12 subjects were enrolled. One patient died and 11 subjects completed the study. An audit of all the enrolled subjects' records was conducted.

The inspection evaluated the following documents: source records, screening and enrollment logs, case report forms, study drug accountability logs, study monitoring visits, and correspondence. Informed consent documents and sponsor-generated correspondence were also inspected.

**b. General observations/commentary:**

Source documents for randomized subjects whose records were reviewed were verified against the case report forms and NDA subject line listings. The efficacy endpoints were centrally adjudicated. Source documents for the raw data used to assess the primary study endpoint were verifiable at the study site. There were no limitations during conduct of the clinical site inspection by ORA staff.

In general, this clinical site appeared to be in compliance with Good Clinical Practices. A Form FDA 483 was issued at the end of the inspection for failure to follow the study protocol according to the investigational plan and for failure to prepare and to maintain adequate records. Please see relevant examples below.

1. The clinical study site failed to submit an updated informed consent form, dated 7/26/12, which contained updated risks associated with the study drug until 6/7/13. As a result, an outdated version of the ICF, approved by the IRB on 11/5/12 was used to consent 12 subjects. These ICFs did not include "new risk information" such as cardiac arrest, stroke, cerebral bleed, venous blood clots, retinal detachment, and infections. This citation was also reiterated as a regulatory deficiency during the sponsor inspection.
2. Serious Adverse Events (SAEs) were not reported within 24 hours, per study protocol for the following subjects:

- (a) Subject 6708-10329 had cellulitis of the right hand and arm, noted by the site on 4/3/2013 that was not reported to the sponsor until 4/5/2013.
  - (b) Subject 6708-10254 had Herpes mucositis/sore throat noted by the site on 7/12/2013 that was not reported to the sponsor until 7/16/2013.
  - (c) Subject 6708-10230 had febrile neutropenia and diarrhea on 3/31/2013 that was not reported to the sponsor until 4/2/2013.
3. Screen failure Subjects (b) (6) (12/18/2012) with lack of lymphadenopathy and (b) (6) (1/15/2013) with lack of progressive lymphadenopathy had inadequate documentation of the reasons that they were screen failures.
4. The following discrepancies between the source documents and the eCRFs were observed:
- (a) Screen failures, Subject (b) (6) (on 12/18/2012) and Subject (b) (6) (on 1/15/2013), were not documented in the eCRF until 12/31/2013.
  - (b) Subject 6708-10230 source documents did not show that the investigational drug was administered at Visit 5. However, the eCRF showed that the investigational drug was administered on 3/21/2013.
  - (c) The Infusion Titration Annotation record documented on Visit 3 that Subject 6708-10230 had "mild chest tightness" on 2/21/2013 and Subject 6708-10662 had nausea on 6/17/2013. However, the eCRF entry indicating whether a subject had an infusion reaction was "not checked."

The List of Inspectional Observations (Form FDA 483) was communicated to the DHP Medical Team who did not consider the above findings critical to determination of efficacy or having an impact on subject safety. DHP was reassured that the serious adverse events, as isolated occurrences, were eventually and dutifully reported. Delayed and inadequate documentation for screen failures were considered minor regulatory deficiencies, and unlikely to have any impact on the safety and efficacy assessments for this NDA. Although subjects initially signed informed consent forms (ICFs) lacking updated safety information, this specific risk information, including infection and hypercoagulable states, was thought to be consistent with events that might be expected in seriously ill patients with CLL. Per Dr. Pagel's response, the ICFs were updated once submitted to and approved by the IRB.

Dr. Pagel responded adequately to these observations in a letter dated March 4, 2014.

**c. Assessment of data integrity:**

The regulatory deficiencies noted above are considered to be noncritical to determination of efficacy or impacting on subject safety by DHP. Data submitted by this clinical site appear acceptable in support of this specific indication.

**SPONSOR**

**5. Gilead Sciences, Inc.**

Seattle, WA

**a. What was inspected:**

The inspection was conducted in accordance with Compliance Program 7348.810, from February 10 to March 6, 2014.

The inspection evaluated the following: documents related to study monitoring visits and correspondence, Institutional Review Board (IRB) approvals, completed Form FDA 1572s, monitoring reports, drug accountability, training of staff and site monitors.

**b. General observations/commentary:**

The sponsor generally maintained adequate oversight of the clinical trial. There was no evidence of under-reporting of adverse events. In general, there were no GCP noncompliant sites reported.

A Form FDA 483 was issued at the end of the sponsor inspection. Specifically, the sponsor-monitor allowed Site 6708 to enroll subjects with outdated Informed Consent Forms lacking new risk information. The consent form from July 2012 was not submitted to and approved by the IRB until June 2013. All 12 subjects who were initially consented used the outdated version of the ICF.

In OSI's discussions with DHP, DHP noted that the above regulatory deficiency was noncritical. The updated risk information such as frequent infections or infrequent adverse effects (e.g., stroke, cerebral bleed, and "vein clots") are recognized and expected events occurring in oncology patients.

**c. Assessment of data integrity:**

Despite the above regulatory deficiencies which were not clinically significant, the sponsor monitoring appeared reliable. Data submitted by this sponsor appear acceptable in support of the respective indication.

**III. OVERALL ASSESSMENT OF FINDINGS AND GENERAL RECOMMENDATIONS**

Three domestic sites were selected for inspection supporting this NDA: Bruce Cheson, M.D., Richard Furman, M.D. and John Pagel, M.D. The sponsor (Gilead Sciences) was also inspected.

The final regulatory classification for Dr. Pagel is VAI (Voluntary Action Indicated). The preliminary regulatory classification for Dr. Cheson and Dr. Furman is NAI (No Action Indicated). The preliminary classification for Gilead Sciences is VAI (Voluntary Action Indicated). The study data collected from these clinical sites and submitted by the sponsor appear generally reliable in support of the requested indication.

*Note: The inspectional observations noted above are based on preliminary communications with the field investigator and/or preliminary review of the EIR. CDER OSI classification of inspection is finalized when written correspondence is issued to the inspected entity (eg, principal investigator). A clinical inspection summary addendum will be generated if conclusions on the currently reported inspections change significantly, upon receipt and/or final review of the Establishment Inspection Report (EIR).*

*{See appended electronic signature page}*

Anthony Orencia, M.D.  
Medical Officer  
Good Clinical Practice Assessment Branch  
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Office of Scientific Investigations

CONCURRENCE:

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Division of Good Clinical Practice Compliance  
Office of Scientific Investigations

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ANTHONY J ORENCIA  
04/16/2014

JANICE K POHLMAN  
04/16/2014

KASSA AYALEW  
04/16/2014

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## **LABEL AND LABELING REVIEW**

Division of Medication Error Prevention and Analysis (DMEPA)  
Office of Medication Error Prevention and Risk Management (OMEPRM)  
Office of Surveillance and Epidemiology (OSE)  
Center for Drug Evaluation and Research (CDER)

**\*\*\* This document contains proprietary information that cannot be released to the public\*\*\***

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<b>Date of This Review:</b>	April 7, 2014
<b>Requesting Office or Division:</b>	Division of Hematology Products (DHP)
<b>Application Type and Number:</b>	NDA 206545
<b>Date of Submission:</b>	December 13, 2013
<b>Product Name and Strength:</b>	Zydelig (Idelalisib) Tablets 100 mg and 150 mg
<b>Product Type:</b>	Single Ingredient
<b>Rx or OTC:</b>	Rx
<b>Applicant/Sponsor Name:</b>	Gilead Sciences, Inc.
<b>OSE RCM #:</b>	2013-2085
<b>DMEPA Primary Reviewer:</b>	Michelle Rutledge, PharmD
<b>DMEPA Team Leader:</b>	Yelena Maslov, PharmD

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### 1. REASON FOR REVIEW

This review evaluates the proposed container label and prescribing information for Zydelig for areas of vulnerability that could lead to medication errors. The Applicant intends to market this product under NDA205858 (for B-cell non-Hodgkin lymphoma indication) and NDA 206545 (for chronic lymphocytic leukemia (CLL)) indications. Therefore, for this NDA 206545, Gilead submitted study data supporting an indication of chronic lymphocytic leukemia (CLL). OSE Review# 2013-2085 contains our label and labeling recommendations regarding Zydelig for B-cell non-Hodgkin lymphoma.

### 2. MATERIALS REVIEWED

We considered the materials listed in Table 1 for this review. The Appendices provide the methods and results for each material reviewed.

<b>Table 1. Materials Considered for this Label and Labeling Review</b>	
<b>Material Reviewed</b>	<b>Appendix Section (for Methods and Results)</b>
Product Information/Prescribing Information	A
FAERS	B – N/A
ISMP Newsletters	C
Previous DMEPA Reviews	D
Human Factors Study (if applicable)	E – N/A
Other (if applicable)	F – N/A
Container Label, Carton Labeling, and Instructions for Use or Medication Guide (if applicable)	G

N/A = not applicable to this review

### 3. OVERALL ASSESSMENT OF THE MATERIALS REVIEWED

We reviewed the label and labeling, and identified the following areas of vulnerability to error:

- The use of symbols in the prescribing information.
- The lack of strengths differentiation, and decreased prominence of cautionary statements on the container labels.
- The increased prominence of the “Rx Only” statement on the principal display panel.

Therefore, we conclude that the proposed labels and labeling can be improved to increase readability, increase prominence of important safety information, and to provide clarity in the Dosing and Administration section of the prescribing information.

## 4. CONCLUSION & RECOMMENDATIONS

### RECOMMENDATIONS FOR THE APPLICANT

#### A. Prescribing Information

1. The prescribing information includes the use of error-prone symbols<sup>1</sup>. Dangerous abbreviations, symbols, and dose designations that are included on the Institute of Safe Medication Practice's List of Error-Prone Abbreviations, Symbols, and Dose Designations<sup>1</sup> appear throughout the package insert. As part of a national campaign to avoid the use of dangerous abbreviations and dose designations, FDA agreed not to approve such error prone abbreviations in the approved labeling of products. Therefore, please revise accordingly, for example, to read "greater than and equal to" instead of the use of symbols ( $\geq$ ).

#### B. Container Labels

1. Both strengths use gray color for the boxes (b) (4) at the bottom of the container label. This can contribute to the selection of the wrong product strength errors. Thus, please provide sufficient differentiation between the two strengths of the product by using different colors to highlight the strengths and to highlight the bar at the bottom of the label.
2. Debold the statement "Rx Only" because it appears as prominent as other important information on the principal display panel<sup>2</sup>.
3. Add the statement "Keep this and all medications out of the reach of children" on the side panel to help ensure the safe use of the drug.

If you have further questions or need clarifications, please contact Sonny Saini, OSE Project Manager, at 301-796-0532.

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<sup>1</sup> ISMP's List of Error-Prone Abbreviations, Symbols, and Dose Designations [Internet]. Horsham (PA): Institute for Safe Medication Practices. 2013 [cited 2014 April 2]. Available from: <http://www.ismp.org/tools/errorproneabbreviations.pdf>.

<sup>2</sup> Guidance for Industry Safety Considerations for Container Labels and Carton Labeling Draft Guidance [Internet]. FDA. April 2013 [cited 2014 March 31]. Available from: <http://www.fda.gov/downloads/Drugs/GuidanceComplianceRegulatoryInformation/Guidances/UCM349009.pdf>

## APPENDICES: METHODS & RESULTS FOR EACH MATERIALS REVIEWED

### APPENDIX A. PRODUCT INFORMATION/PRESCRIBING INFORMATION

Table 2 presents relevant product information for Zydelig that Gilead Sciences, Inc. submitted on December 13, 2013.

Table 2. Relevant Product Information for Zydelig	
Active Ingredient	Idelalisib
Indication	Treatment of patients with relapsed lymphocytic leukemia
Route of Administration	Oral
Dosage Form	Tablet
Strength	100 mg and 150 mg
Dose and Frequency	Take 150 mg orally, twice daily
How Supplied	60 count bottles
Storage	Store below 30°C (86°F)

### APPENDIX C. ISMP NEWSLETTERS

#### C.1 Methods

We searched the Institute for Safe Medication Practices (ISMP) newsletters on April 3, 2014 using the search terms, listed below, and then individually reviewed each newsletter. We limited our analysis to newsletters that described medication errors or actions possibly associated with the label and labeling.

ISMP Newsletters Search Strategy	
Date Range	April 3, 2014
ISMP Newsletter Search Strategy	Match Any of the words
Search Terms	Zydelig, Idelalisib

#### C.2 Results

Our search of ISMP did not yield any articles.

## **APPENDIX D. PREVIOUS DMEPA REVIEWS**

### **D.1 Methods**

We searched the [L:Drive] using the terms, Zydelig, to identify reviews previously performed by DMEPA.

### **D.2 Results**

DMEPA has reviewed Zydelig Label and Labeling information in the following OSE reviews:

NDA 205858 Label and Labeling Review dated October 30, 2013 (OSE Review# 2013-2085)

## **APPENDIX G. CONTAINER LABEL, CARTON LABELING, INSTRUCTIONS FOR USE, MEDICATION GUIDE**

### **G.1 List of Label and Labeling Reviewed**

We reviewed the most recent Zydelig labels and labeling submitted by Gilead Sciences, Inc. on September 11, 2013 and December 13, 2013.

- Container label
- Carton label (not submitted)
- Prescribing Information (not listed)

### **G.2 Label and Labeling Images**



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/s/  
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MICHELLE K RUTLEDGE  
04/07/2014

YELENA L MASLOV  
04/07/2014

## RPM FILING REVIEW

(Including Memo of Filing Meeting)

**To be completed for all new NDAs, BLAs, and Efficacy Supplements [except SE8 (labeling change with clinical data) and SE9 (manufacturing change with clinical data)]**

Application Information		
NDA # 206545 BLA#	NDA Supplement #:S- BLA Supplement #	Efficacy Supplement Type SE-
Proprietary Name: Zydelig Established/Proper Name: Idelalisib Dosage Form: Tablet Strengths: 100 mg and 150 mg		
Applicant: Gilead Sciences, Inc. Agent for Applicant (if applicable):		
Date of Application: 12/6/13 Date of Receipt: 12/6/13 Date clock started after UN:		
PDUFA Goal Date: 8/6/14		Action Goal Date (if different):
Filing Date: 2/4/14		Date of Filing Meeting: 10/18/2013 and 11/7/2013
Chemical Classification: (1,2,3 etc.) (original NDAs only) 1		
Proposed indication(s)/Proposed change(s): Treatment of patients with CLL		
Type of Original NDA: AND (if applicable) Type of NDA Supplement:		<input checked="" type="checkbox"/> 505(b)(1) <input type="checkbox"/> 505(b)(2) <input type="checkbox"/> 505(b)(1) <input type="checkbox"/> 505(b)(2)
<i>If 505(b)(2): Draft the "505(b)(2) Assessment" review found at:  <a href="http://inside.fda.gov:9003/CDER/OfficeofNewDrugs/ImmediateOffice/UCM027499">http://inside.fda.gov:9003/CDER/OfficeofNewDrugs/ImmediateOffice/UCM027499</a>            and refer to Appendix A for further information.</i>		
Review Classification:  <i>If the application includes a complete response to pediatric WR, review classification is Priority.</i>  <i>If a tropical disease priority review voucher was submitted, review classification is Priority.</i>		<input type="checkbox"/> Standard <input checked="" type="checkbox"/> Priority  <input type="checkbox"/> Tropical Disease Priority Review Voucher submitted
Resubmission after withdrawal? <input type="checkbox"/>		Resubmission after refuse to file? <input type="checkbox"/>
Part 3 Combination Product? <input type="checkbox"/>  <i>If yes, contact the Office of Combination Products (OCP) and copy them on all Inter-Center consults</i>	<input type="checkbox"/> Convenience kit/Co-package <input type="checkbox"/> Pre-filled drug delivery device/system (syringe, patch, etc.) <input type="checkbox"/> Pre-filled biologic delivery device/system (syringe, patch, etc.) <input type="checkbox"/> Device coated/impregnated/combined with drug <input type="checkbox"/> Device coated/impregnated/combined with biologic <input type="checkbox"/> Separate products requiring cross-labeling <input type="checkbox"/> Drug/Biologic <input type="checkbox"/> Possible combination based on cross-labeling of separate products <input type="checkbox"/> Other (drug/device/biological product)	

<input checked="" type="checkbox"/> Fast Track Designation <input checked="" type="checkbox"/> Breakthrough Therapy Designation- <input checked="" type="checkbox"/> Rolling Review <input checked="" type="checkbox"/> Orphan Designation  <input type="checkbox"/> Rx-to-OTC switch, Full <input type="checkbox"/> Rx-to-OTC switch, Partial <input type="checkbox"/> Direct-to-OTC  Other:	<input type="checkbox"/> PMC response <input type="checkbox"/> PMR response: <input type="checkbox"/> FDAAA [505(o)] <input type="checkbox"/> PREA deferred pediatric studies [21 CFR 314.55(b)/21 CFR 601.27(b)] <input type="checkbox"/> Accelerated approval confirmatory studies (21 CFR 314.510/21 CFR 601.41) <input type="checkbox"/> Animal rule postmarketing studies to verify clinical benefit and safety (21 CFR 314.610/21 CFR 601.42)			
Collaborative Review Division (if OTC product):				
List referenced IND Number(s): 101254				
<b>Goal Dates/Product Names/Classification Properties</b>	<b>YES</b>	<b>NO</b>	<b>NA</b>	<b>Comment</b>
PDUFA and Action Goal dates correct in tracking system?  <i>If no, ask the document room staff to correct them immediately. These are the dates used for calculating inspection dates.</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
Are the proprietary, established/proper, and applicant names correct in tracking system?  <i>If no, ask the document room staff to make the corrections. Also, ask the document room staff to add the established/proper name to the supporting IND(s) if not already entered into tracking system.</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
Is the review priority (S or P) and all appropriate classifications/properties entered into tracking system (e.g., chemical classification, combination product classification, 505(b)(2), orphan drug)? <i>For NDAs/NDA supplements, check the New Application and New Supplement Notification Checklists for a list of all classifications/properties at:</i> <a href="http://inside.fda.gov:9003/CDER/OfficeofBusinessProcessSupport/ucm163969.htm">http://inside.fda.gov:9003/CDER/OfficeofBusinessProcessSupport/ucm163969.htm</a>  <i>If no, ask the document room staff to make the appropriate entries.</i>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Application Integrity Policy</b>	<b>YES</b>	<b>NO</b>	<b>NA</b>	<b>Comment</b>
Is the application affected by the Application Integrity Policy (AIP)? <i>Check the AIP list at:</i> <a href="http://www.fda.gov/ICECI/EnforcementActions/ApplicationIntegrityPolicy/default.htm">http://www.fda.gov/ICECI/EnforcementActions/ApplicationIntegrityPolicy/default.htm</a>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
If yes, explain in comment column.				
If affected by AIP, has OC/OMPQ been notified of the submission? If yes, date notified:	<input type="checkbox"/>	<input type="checkbox"/>		
<b>User Fees</b>	<b>YES</b>	<b>NO</b>	<b>NA</b>	<b>Comment</b>
Is Form 3397 (User Fee Cover Sheet) included with authorized signature?	<input checked="" type="checkbox"/>	<input type="checkbox"/>		

<p><u>User Fee Status</u></p> <p><i>If a user fee is required and it has not been paid (and it is not exempted or waived), the application is unacceptable for filing following a 5-day grace period. Review stops. Send Unacceptable for Filing (UN) letter and contact user fee staff.</i></p>	<p>Payment for this application:</p> <p> <input type="checkbox"/> Paid  <input checked="" type="checkbox"/> Exempt (orphan, government)  <input type="checkbox"/> Waived (e.g., small business, public health)  <input type="checkbox"/> Not required         </p>
<p><i>If the firm is in arrears for other fees (regardless of whether a user fee has been paid for this application), the application is unacceptable for filing (5-day grace period does not apply). Review stops. Send UN letter and contact the user fee staff.</i></p>	<p>Payment of other user fees:</p> <p> <input checked="" type="checkbox"/> Not in arrears  <input type="checkbox"/> In arrears         </p>

<b>505(b)(2) (NDAs/NDA Efficacy Supplements only)</b>	<b>YES</b>	<b>NO</b>	<b>NA</b>	<b>Comment</b>
Is the application for a duplicate of a listed drug and eligible for approval under section 505(j) as an ANDA?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Is the application for a duplicate of a listed drug whose only difference is that the extent to which the active ingredient(s) is absorbed or otherwise made available to the site of action is less than that of the reference listed drug (RLD)? [see 21 CFR 314.54(b)(1)].	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Is the application for a duplicate of a listed drug whose only difference is that the rate at which the proposed product's active ingredient(s) is absorbed or made available to the site of action is unintentionally less than that of the listed drug [see 21 CFR 314.54(b)(2)]?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<p><i>If you answered yes to any of the above questions, the application may be refused for filing under 21 CFR 314.101(d)(9). Contact the 505(b)(2) review staff in the Immediate Office of New Drugs</i></p>				
<p>Is there unexpired exclusivity on any drug product containing the active moiety (e.g., 5-year, 3-year, orphan, or pediatric exclusivity)?</p> <p><i>Check the Electronic Orange Book at:</i>  <a href="http://www.accessdata.fda.gov/scripts/cder/ob/default.cfm">http://www.accessdata.fda.gov/scripts/cder/ob/default.cfm</a> </p>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>If yes, please list below:</b>				
Application No.	Drug Name	Exclusivity Code	Exclusivity Expiration	
<p><i>If there is unexpired, 5-year exclusivity remaining on the active moiety for the proposed drug product, a 505(b)(2) application cannot be submitted until the period of exclusivity expires (unless the applicant provides paragraph IV patent certification; then an application can be submitted four years after the date of approval.) Pediatric exclusivity will extend both of the timeframes in this provision by 6 months. 21 CFR 314.108(b)(2). Unexpired, 3-year exclusivity may block the approval but not the submission of a 505(b)(2) application.</i></p>				
<b>Exclusivity</b>	<b>YES</b>	<b>NO</b>	<b>NA</b>	<b>Comment</b>
Does another product (same active moiety) have orphan exclusivity for the same indication? <i>Check the Orphan Drug</i>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

<b>Designations and Approvals list at:</b> <a href="http://www.accessdata.fda.gov/scripts/opdlisting/oopd/index.cfm">http://www.accessdata.fda.gov/scripts/opdlisting/oopd/index.cfm</a>				
<b>If another product has orphan exclusivity</b> , is the product considered to be the same product according to the orphan drug definition of sameness [see 21 CFR 316.3(b)(13)]?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
<i>If yes, consult the Director, Division of Regulatory Policy II, Office of Regulatory Policy</i>				
Has the applicant requested 5-year or 3-year Waxman-Hatch exclusivity? (NDAs/NDA efficacy supplements only)	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>If yes</b> , # years requested: 5				
<i>Note: An applicant can receive exclusivity without requesting it; therefore, requesting exclusivity is not required.</i>				
Is the proposed product a single enantiomer of a racemic drug previously approved for a different therapeutic use (NDAs only)?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<b>If yes</b> , did the applicant: (a) elect to have the single enantiomer (contained as an active ingredient) not be considered the same active ingredient as that contained in an already approved racemic drug, and/or (b): request exclusivity pursuant to section 505(u) of the Act (per FDAAA Section 1113)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
<i>If yes, contact Mary Ann Holovac, Director of Drug Information, OGD/DLPS/LRB.</i>				

Format and Content				
<i>Do not check mixed submission if the only electronic component is the content of labeling (COL).</i>	<input type="checkbox"/> All paper (except for COL) <input checked="" type="checkbox"/> All electronic <input type="checkbox"/> Mixed (paper/electronic)  <input checked="" type="checkbox"/> CTD <input type="checkbox"/> Non-CTD <input type="checkbox"/> Mixed (CTD/non-CTD)			
<b>If mixed (paper/electronic) submission</b> , which parts of the application are submitted in electronic format?				
<b>Overall Format/Content</b>	<b>YES</b>	<b>NO</b>	<b>NA</b>	<b>Comment</b>
<b>If electronic submission</b> , does it follow the eCTD guidance? <sup>1</sup> <b>If not</b> , explain (e.g., waiver granted).	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Index:</b> Does the submission contain an accurate comprehensive index?	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
Is the submission complete as required under 21 CFR 314.50 (NDAs/NDA efficacy supplements) or under 21 CFR 601.2 (BLAs/BLA efficacy supplements) including:	<input checked="" type="checkbox"/>	<input type="checkbox"/>		

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<http://www.fda.gov/downloads/Drugs/GuidanceComplianceRegulatoryInformation/Guidances/ucm072349.pdf>

<input checked="" type="checkbox"/> legible <input checked="" type="checkbox"/> English (or translated into English) <input checked="" type="checkbox"/> pagination <input checked="" type="checkbox"/> navigable hyperlinks (electronic submissions only)				
<b>If no, explain.</b>				
<b>BLAs only:</b> Companion application received if a shared or divided manufacturing arrangement?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>If yes, BLA #</b>				
<b>Forms and Certifications</b>				
<i><b>Electronic forms and certifications with electronic signatures (scanned, digital, or electronic – similar to DARRTS, e.g., /s/) are acceptable. Otherwise, <b>paper</b> forms and certifications with hand-written signatures must be included. <b>Forms</b> include: user fee cover sheet (3397), application form (356h), patent information (3542a), financial disclosure (3454/3455), and clinical trials (3674); <b>Certifications</b> include: debarment certification, patent certification(s), field copy certification, and pediatric certification.</b></i>				
<b>Application Form</b>	<b>YES</b>	<b>NO</b>	<b>NA</b>	<b>Comment</b>
Is form FDA 356h included with authorized signature per 21 CFR 314.50(a)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
<i>If foreign applicant, a U.S. agent must sign the form [see 21 CFR 314.50(a)(5)].</i>				
Are all establishments and their registration numbers listed on the form/attached to the form?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Patent Information</b> (NDAs/NDA efficacy supplements only)	<b>YES</b>	<b>NO</b>	<b>NA</b>	<b>Comment</b>
Is patent information submitted on form FDA 3542a per 21 CFR 314.53(c)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Financial Disclosure</b>	<b>YES</b>	<b>NO</b>	<b>NA</b>	<b>Comment</b>
Are financial disclosure forms FDA 3454 and/or 3455 included with authorized signature per 21 CFR 54.4(a)(1) and (3)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
<i>Forms must be signed by the APPLICANT, not an Agent [see 21 CFR 54.2(g)].</i>				
<i>Note: Financial disclosure is required for bioequivalence studies that are the basis for approval.</i>				
<b>Clinical Trials Database</b>	<b>YES</b>	<b>NO</b>	<b>NA</b>	<b>Comment</b>
Is form FDA 3674 included with authorized signature?	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
<i>If yes, ensure that the application is also coded with the supporting document category, "Form 3674."</i>				

<i>If no, ensure that language requesting submission of the form is included in the acknowledgement letter sent to the applicant</i>				
<b>Debarment Certification</b>	<b>YES</b>	<b>NO</b>	<b>NA</b>	<b>Comment</b>
<p>Is a correctly worded Debarment Certification included with authorized signature?</p> <p><i>Certification is not required for supplements if submitted in the original application; If foreign applicant, <b>both</b> the applicant and the U.S. Agent must sign the certification [per Guidance for Industry: Submitting Debarment Certifications].</i></p> <p><i>Note: Debarment Certification should use wording in FD&amp;C Act Section 306(k)(1) i.e., "[Name of applicant] hereby certifies that it did not and will not use in any capacity the services of any person debarred under section 306 of the Federal Food, Drug, and Cosmetic Act in connection with this application." Applicant may not use wording such as, "To the best of my knowledge..."</i></p>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Field Copy Certification (NDAs/NDA efficacy supplements only)</b>	<b>YES</b>	<b>NO</b>	<b>NA</b>	<b>Comment</b>
<p><b>For paper submissions only:</b> Is a Field Copy Certification (that it is a true copy of the CMC technical section) included?</p> <p><i>Field Copy Certification is not needed if there is no CMC technical section or if this is an electronic submission (the Field Office has access to the EDR)</i></p> <p><i>If maroon field copy jackets from foreign applicants are received, return them to CDR for delivery to the appropriate field office.</i></p>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
<b>Controlled Substance/Product with Abuse Potential</b>	<b>YES</b>	<b>NO</b>	<b>NA</b>	<b>Comment</b>
<p><u>For NMEs:</u> Is an Abuse Liability Assessment, including a proposal for scheduling, submitted per 21 CFR 314.50(d)(5)(vii)?</p> <p><i>If yes, date consult sent to the Controlled Substance Staff:</i></p> <p><u>For non-NMEs:</u> <i>Date of consult sent to Controlled Substance Staff:</i></p>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
<b>Pediatrics</b>	<b>YES</b>	<b>NO</b>	<b>NA</b>	<b>Comment</b>
<p><b><u>PREA</u></b></p> <p>Does the application trigger PREA?</p> <p><i>If yes, notify PeRC RPM (PeRC meeting is required)<sup>2</sup></i></p> <p><i>Note: NDAs/BLAs/efficacy supplements for new active ingredients, new indications, new dosage forms, new dosing regimens, or new routes of administration trigger PREA. All waiver &amp; deferral requests, pediatric plans, and pediatric assessment studies must be</i></p>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		Orphan Designation

<sup>2</sup> <http://inside.fda.gov:9003/CDER/OfficeofNewDrugs/PediatricandMaternalHealthStaff/ucm027829.htm>

<i>reviewed by PeRC prior to approval of the application/supplement.</i>				
<b>If the application triggers PREA</b> , are the required pediatric assessment studies or a full waiver of pediatric studies included?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
<b>If studies or full waiver not included</b> , is a request for full waiver of pediatric studies OR a request for partial waiver and/or deferral with a pediatric plan included?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
<i>If no, request in 74-day letter</i>				
<b>If a request for full waiver/partial waiver/deferral is included</b> , does the application contain the certification(s) required by FDCA Section 505B(a)(3) and (4)?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
<i>If no, request in 74-day letter</i>				
<b><u>BPCA</u> (NDAs/NDA efficacy supplements only):</b>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
Is this submission a complete response to a pediatric Written Request?				
<i>If yes, notify Pediatric Exclusivity Board RPM (pediatric exclusivity determination is required)<sup>3</sup></i>				
<b>Proprietary Name</b>	<b>YES</b>	<b>NO</b>	<b>NA</b>	<b>Comment</b>
Is a proposed proprietary name submitted?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<i>If yes, ensure that the application is also coded with the supporting document category, "Proprietary Name/Request for Review."</i>				
<b>REMS</b>	<b>YES</b>	<b>NO</b>	<b>NA</b>	<b>Comment</b>
Is a REMS submitted?	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	
<i>If yes, send consult to OSE/DRISK and notify OC/OSI/DSC/PMSB via the CDER OSI RMP mailbox</i>				
<b>Prescription Labeling</b>	<input type="checkbox"/> <b>Not applicable</b>			
Check all types of labeling submitted.	<input checked="" type="checkbox"/> Package Insert (PI) <input checked="" type="checkbox"/> Patient Package Insert (PPI) <input type="checkbox"/> Instructions for Use (IFU) <input type="checkbox"/> Medication Guide (MedGuide) <input type="checkbox"/> Carton labels <input checked="" type="checkbox"/> Immediate container labels <input type="checkbox"/> Diluent <input type="checkbox"/> Other (specify)			
	<b>YES</b>	<b>NO</b>	<b>NA</b>	<b>Comment</b>
Is Electronic Content of Labeling (COL) submitted in SPL	<input checked="" type="checkbox"/>	<input type="checkbox"/>		

<sup>3</sup> <http://inside.fda.gov:9003/CDER/OfficeofNewDrugs/PediatricandMaternalHealthStaff/ucm027837.htm>

format?				
<i>If no, request applicant to submit SPL before the filing date.</i>				
Is the PI submitted in PLR format? <sup>4</sup>	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
<b>If PI not submitted in PLR format</b> , was a waiver or deferral requested before the application was received or in the submission? <b>If requested before application was submitted</b> , what is the status of the request?	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	
<i>If no waiver or deferral, request applicant to submit labeling in PLR format before the filing date.</i>				
All labeling (PI, PPI, MedGuide, IFU, carton and immediate container labels) consulted to OPDP?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
MedGuide, PPI, IFU (plus PI) consulted to PLT? ( <i>send WORD version if available</i> )	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
Carton and immediate container labels, PI, PPI sent to OSE/DMEPA and appropriate CMC review office (OBP or ONDQA)?	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>OTC Labeling</b>	<input checked="" type="checkbox"/> <b>Not Applicable</b>			
Check all types of labeling submitted.	<input type="checkbox"/> Outer carton label <input type="checkbox"/> Immediate container label <input type="checkbox"/> Blister card <input type="checkbox"/> Blister backing label <input type="checkbox"/> Consumer Information Leaflet (CIL) <input type="checkbox"/> Physician sample <input type="checkbox"/> Consumer sample <input type="checkbox"/> Other (specify)			
	<b>YES</b>	<b>NO</b>	<b>NA</b>	<b>Comment</b>
Is electronic content of labeling (COL) submitted?	<input type="checkbox"/>	<input type="checkbox"/>		
<i>If no, request in 74-day letter.</i>				
Are annotated specifications submitted for all stock keeping units (SKUs)?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<i>If no, request in 74-day letter.</i>				
If representative labeling is submitted, are all represented SKUs defined?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<i>If no, request in 74-day letter.</i>				
All labeling/packaging, and current approved Rx PI (if switch) sent to OSE/DMEPA?	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	
<b>Other Consults</b>	<b>YES</b>	<b>NO</b>	<b>NA</b>	<b>Comment</b>
Are additional consults needed? (e.g., IFU to CDRH; QT study report to QT Interdisciplinary Review Team)	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	

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<http://inside.fda.gov:9003/CDER/OfficeofNewDrugs/StudyEndpointsandLabelingDevelopmentTeam/ucm025576.htm>

<i>If yes, specify consult(s) and date(s) sent:</i>				
<b>Meeting Minutes/SPAs</b>	<b>YES</b>	<b>NO</b>	<b>NA</b>	<b>Comment</b>
End-of Phase 2 meeting(s)? <b>Date(s):</b> September 5, 2013	<input checked="" type="checkbox"/>	<input type="checkbox"/>		
<i>If yes, distribute minutes before filing meeting</i>				
Pre-NDA/Pre-BLA/Pre-Supplement meeting(s)? <b>Date(s):</b>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
<i>If yes, distribute minutes before filing meeting</i>				
Any Special Protocol Assessments (SPAs)? <b>Date(s):</b>	<input type="checkbox"/>	<input checked="" type="checkbox"/>		
<i>If yes, distribute letter and/or relevant minutes before filing meeting</i>				

ATTACHMENT

**MEMO OF FILING MEETING**

**DATE:** October 18, 2013 and November 7, 2013

**BLA/NDA/Supp #:** NDA 206545

**PROPRIETARY NAME:** Zydelig (conditional approval granted)

**ESTABLISHED/PROPER NAME:** Idelalisib

**DOSAGE FORM/STRENGTH:** 100 mg and 150 mg Tablets

**APPLICANT:** Gilead Sciences, Inc.

**PROPOSED INDICATION(S)/PROPOSED CHANGE(S):**

- Treatment of CLL

**BACKGROUND:** Gilead submitted NDA 205858 on September 11, 2014 for the treatment of iNHL. Shortly after the submission for this indication, Gilead's CLL trial produced promising results and the Division agreed that Gilead could submit the CLL indication for review; however, it was determined that because the submission of the CLL data would need to be a rolling submission/review, a second NDA number (NDA 206545) was required. The final submission for the CLL indication was received as NDA 206545 on December 6, 2013 and the final determination of "fileable" was given at that time.

**REVIEW TEAM:**

Discipline/Organization	Names		Present at filing meeting? (Y or N)
Regulatory Project Management	RPM:	Mara Miller	Y
	CPMS/TL:	Ebla Ali Ibrahim and Amy Baird	Y/N
Cross-Discipline Team Leader (CDTL)	R. Angelo de Claro		Y
Clinical	Reviewer:	Nicole Gormley	Y
			Y
	TL:	R. Angelo de Claro	Y
Clinical Pharmacology	Reviewer:	Stacy Shord	Y
	TL:	Julie Bullock	Y

Discipline/Organization	Names		Present at filing meeting? (Y or N)
Biostatistics	Reviewer:	Sirisha Mushti	Y
	TL:	Yuan Li Shen	Y
Nonclinical (Pharmacology/Toxicology)	Reviewer:	Natalie Simpson Ramadevi Gudi	Y
	TL:	Haleh Saber	Y
Product Quality (CMC)	Reviewer:	Li Shan Hsieh	Y
	TL:	Janice Brown	Y
Quality Microbiology ( <i>for sterile products</i> )	Reviewer:	Jessica Cole	Y
	TL:	Barry Riley	N
CMC Labeling Review	Reviewer:	N/A	
	TL:	N/A	
Facility Review/Inspection	Reviewer:	Vipul Dholakia	N
	TL:		
OSE/DMEPA	Reviewer:	Tingting Gao	Y
	TL:	Yelena Maslov	Y
OSE/DRISK	Reviewer:	Naomi Redd	Y
	TL:	Cynthia LaCivita	Y
OC/OSI/DSC/PMSB (REMS)	Reviewer:	N/A	
	TL:	N/A	

Bioresearch Monitoring (OSI)	Reviewer:	Anthony Orencia	N
	TL:	Janice Pohlman	N
Controlled Substance Staff (CSS)	Reviewer:	N/A	
	TL:	N/A	
Pharmacometrics	DJ Maranthe Nitin Mehotra		Y
Biopharmaceutics	Sandra Suarez Angelica Dorantes		Y
OSE/DPV	Lynda McCulley Tracy Salaam		Y

**FILING MEETING DISCUSSION:**

<p><b>GENERAL</b></p> <ul style="list-style-type: none"> <li>505(b)(2) filing issues: <ul style="list-style-type: none"> <li>Is the application for a duplicate of a listed drug and eligible for approval under section 505(j) as an ANDA?</li> <li>Did the applicant provide a scientific “bridge” demonstrating the relationship between the proposed product and the referenced product(s)/published literature?</li> </ul> </li> </ul> <p>Describe the scientific bridge (e.g., BA/BE studies):</p>	<input checked="" type="checkbox"/> Not Applicable  <input type="checkbox"/> YES <input type="checkbox"/> NO  <input type="checkbox"/> YES <input type="checkbox"/> NO
<ul style="list-style-type: none"> <li>Per reviewers, are all parts in English or English translation?</li> </ul> <p><b>If no, explain:</b></p>	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
<ul style="list-style-type: none"> <li>Electronic Submission comments</li> </ul> <p><b>List comments:</b></p>	<input type="checkbox"/> Not Applicable
<p><b>CLINICAL</b></p> <p><b>Comments:</b></p>	<input type="checkbox"/> Not Applicable <input checked="" type="checkbox"/> FILE <input type="checkbox"/> REFUSE TO FILE  <input type="checkbox"/> Review issues for 74-day letter
<ul style="list-style-type: none"> <li>Clinical study site(s) inspections(s) needed?</li> </ul>	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO

<b>If no, explain:</b>	
<ul style="list-style-type: none"> <li>Advisory Committee Meeting needed? <ul style="list-style-type: none"> <li><b>Comments:</b></li> </ul> </li> </ul> <p><i>If no, for an NME NDA or original BLA , include the reason. For example:</i></p> <ul style="list-style-type: none"> <li><i>this drug/biologic is not the first in its class</i></li> <li><i>the clinical study design was acceptable</i></li> <li><i>the application did not raise significant safety or efficacy issues</i></li> <li><i>the application did not raise significant public health questions on the role of the drug/biologic in the diagnosis, cure, mitigation, treatment or prevention of a disease</i></li> </ul>	<input type="checkbox"/> YES Date if known: <input checked="" type="checkbox"/> NO <input type="checkbox"/> To be determined  Reason: <i>the application did not raise significant safety or efficacy issues; the application did not raise significant public health questions on the role of the drug/biologic in the diagnosis, cure, mitigation, treatment or prevention of a disease</i>
<ul style="list-style-type: none"> <li>Abuse Liability/Potential</li> </ul> <p><b>Comments:</b></p>	<input checked="" type="checkbox"/> Not Applicable <input type="checkbox"/> FILE <input type="checkbox"/> REFUSE TO FILE  <input type="checkbox"/> Review issues for 74-day letter
<ul style="list-style-type: none"> <li>If the application is affected by the AIP, has the division made a recommendation regarding whether or not an exception to the AIP should be granted to permit review based on medical necessity or public health significance?</li> </ul> <p><b>Comments:</b></p>	<input checked="" type="checkbox"/> Not Applicable <input type="checkbox"/> YES <input type="checkbox"/> NO
<p><b>CLINICAL MICROBIOLOGY</b></p> <p><b>Comments:</b></p>	<input checked="" type="checkbox"/> Not Applicable <input type="checkbox"/> FILE <input type="checkbox"/> REFUSE TO FILE  <input type="checkbox"/> Review issues for 74-day letter
<p><b>CLINICAL PHARMACOLOGY</b></p> <p><b>Comments:</b></p>	<input type="checkbox"/> Not Applicable <input checked="" type="checkbox"/> FILE <input type="checkbox"/> REFUSE TO FILE  <input type="checkbox"/> Review issues for 74-day letter
<ul style="list-style-type: none"> <li>Clinical pharmacology study site(s) inspections(s) needed?</li> </ul>	<input type="checkbox"/> YES <input checked="" type="checkbox"/> NO
<p><b>BIOSTATISTICS</b></p>	<input type="checkbox"/> Not Applicable <input checked="" type="checkbox"/> FILE <input type="checkbox"/> REFUSE TO FILE

<b>Comments:</b>	<input type="checkbox"/> Review issues for 74-day letter
<b>NONCLINICAL (PHARMACOLOGY/TOXICOLOGY)</b>  <b>Comments:</b>	<input type="checkbox"/> Not Applicable <input checked="" type="checkbox"/> FILE <input type="checkbox"/> REFUSE TO FILE  <input type="checkbox"/> Review issues for 74-day letter
<b>IMMUNOGENICITY (BLAs/BLA efficacy supplements only)</b>  <b>Comments:</b>	<input checked="" type="checkbox"/> Not Applicable <input type="checkbox"/> FILE <input type="checkbox"/> REFUSE TO FILE  <input type="checkbox"/> Review issues for 74-day letter
<b>PRODUCT QUALITY (CMC)</b>  <b>Comments:</b>	<input type="checkbox"/> Not Applicable <input checked="" type="checkbox"/> FILE <input type="checkbox"/> REFUSE TO FILE  <input checked="" type="checkbox"/> Review issues for 74-day letter
<u><b>Environmental Assessment</b></u>  <ul style="list-style-type: none"> <li>• Categorical exclusion for environmental assessment (EA) requested?   <b>If no</b>, was a complete EA submitted?   <b>If EA submitted</b>, consulted to EA officer (OPS)?</li> </ul> <b>Comments:</b>	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO  <input type="checkbox"/> YES <input type="checkbox"/> NO  <input type="checkbox"/> YES <input type="checkbox"/> NO
<u><b>Quality Microbiology (for sterile products)</b></u>  <ul style="list-style-type: none"> <li>• Was the Microbiology Team consulted for validation of sterilization? (NDAs/NDA supplements only)</li> </ul> <b>Comments:</b>	<input type="checkbox"/> Not Applicable  <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO

<p><b><u>Facility Inspection</u></b></p> <ul style="list-style-type: none"> <li>• Establishment(s) ready for inspection?</li> <li>▪ Establishment Evaluation Request (EER/TBP-EER) submitted to OMPQ?</li> </ul> <p><b>Comments:</b></p>	<p><input type="checkbox"/> Not Applicable</p> <p><input checked="" type="checkbox"/> YES <input type="checkbox"/> NO</p> <p><input checked="" type="checkbox"/> YES <input type="checkbox"/> NO</p>
<p><b><u>Facility/Microbiology Review (BLAs only)</u></b></p> <p><b>Comments:</b></p>	<p><input checked="" type="checkbox"/> Not Applicable <input type="checkbox"/> FILE <input type="checkbox"/> REFUSE TO FILE</p> <p><input type="checkbox"/> Review issues for 74-day letter</p>
<p><b><u>CMC Labeling Review</u></b></p> <p><b>Comments:</b></p>	<p><input type="checkbox"/> Review issues for 74-day letter</p>
<p><b>APPLICATIONS IN THE PROGRAM (PDUFA V) (NME NDAs/Original BLAs)</b></p> <ul style="list-style-type: none"> <li>• Were there agreements made at the application's pre-submission meeting (and documented in the minutes) regarding certain late submission components that could be submitted within 30 days after receipt of the original application?</li> <li>• If so, were the late submission components all submitted within 30 days?</li> </ul>	<p><input type="checkbox"/> N/A</p> <p><input type="checkbox"/> YES <input checked="" type="checkbox"/> NO</p> <p><input type="checkbox"/> YES <input type="checkbox"/> NO</p>
<ul style="list-style-type: none"> <li>• What late submission components, if any, arrived after 30 days?</li> </ul>	
<ul style="list-style-type: none"> <li>• Was the application otherwise complete upon submission, including those applications where there were no agreements regarding late submission components?</li> </ul>	<p><input checked="" type="checkbox"/> YES <input type="checkbox"/> NO</p>

<ul style="list-style-type: none"> <li>Is a comprehensive and readily located list of all clinical sites included or referenced in the application?</li> </ul>	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
<ul style="list-style-type: none"> <li>Is a comprehensive and readily located list of all manufacturing facilities included or referenced in the application?</li> </ul>	<input checked="" type="checkbox"/> YES <input type="checkbox"/> NO
<b>REGULATORY PROJECT MANAGEMENT</b>	
<b>Signatory Authority:</b> Richard Pazdur, M.D  <b>Date of Mid-Cycle Meeting</b> (for NME NDAs/BLAs in “the Program” PDUFA V): mid-cycle February 10, 2014  <b>21<sup>st</sup> Century Review Milestones</b> (listing review milestones in this document is optional):  <b>Comments:</b>	
<b>REGULATORY CONCLUSIONS/DEFICIENCIES</b>	
<input type="checkbox"/>	The application is unsuitable for filing. Explain why:
<input checked="" type="checkbox"/>	The application, on its face, appears to be suitable for filing.  <u>Review Issues:</u>  <input checked="" type="checkbox"/> No review issues have been identified for the 74-day letter.  <input type="checkbox"/> Review issues have been identified for the 74-day letter. List (optional):  <u>Review Classification:</u>  <input type="checkbox"/> Standard Review  <input checked="" type="checkbox"/> Priority Review
<b>ACTIONS ITEMS</b>	
<input checked="" type="checkbox"/>	Ensure that any updates to the review priority (S or P) and classifications/properties are entered into tracking system (e.g., chemical classification, combination product classification, 505(b)(2), orphan drug).
<input type="checkbox"/>	If RTF, notify everybody who already received a consult request, OSE PM, and Product Quality PM (to cancel EER/TBP-EER).
<input type="checkbox"/>	If filed, and the application is under AIP, prepare a letter either granting (for signature by Center Director) or denying (for signature by ODE Director) an exception for review.
<input type="checkbox"/>	BLA/BLA supplements: If filed, send 60-day filing letter

<input checked="" type="checkbox"/>	<p>If priority review:</p> <ul style="list-style-type: none"> <li>• notify sponsor in writing by day 60 (For BLAs/BLA supplements: include in 60-day filing letter; For NDAs/NDA supplements: see CST for choices)</li> <li>• notify OMPQ (so facility inspections can be scheduled earlier)</li> </ul>
<input checked="" type="checkbox"/>	Send review issues/no review issues by day 74
<input checked="" type="checkbox"/>	Conduct a PLR format labeling review and include labeling issues in the 74-day letter
<input checked="" type="checkbox"/>	Update the PDUFA V DARRTS page (for NME NDAs in the Program)
<input type="checkbox"/>	<p>BLA/BLA supplements: Send the Product Information Sheet to the product reviewer and the Facility Information Sheet to the facility reviewer for completion. Ensure that the completed forms are forwarded to the CDER RMS-BLA Superuser for data entry into RMS-BLA one month prior to taking an action [These sheets may be found in the CST eRoom at:  <a href="http://erom.fda.gov/eRoom/CDER2/CDERStandardLettersCommittee/0_1685f">http://erom.fda.gov/eRoom/CDER2/CDERStandardLettersCommittee/0_1685f</a> ]</p>
<input type="checkbox"/>	Other

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**This is a representation of an electronic record that was signed electronically and this page is the manifestation of the electronic signature.**  
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/s/  
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MARA B MILLER  
02/04/2014

MONSURAT O AKINSANYA  
02/04/2014

## Interdisciplinary Review Team for QT Studies Consultation: Thorough QT Study Review

<b>NDA</b>	205858
<b>Generic Name</b>	Idelalisib (IDELA)
<b>Sponsor</b>	Gilead Sciences, Inc.
<b>Indication</b>	Treatment of patients with refractory indolent non-Hodgkin lymphoma
<b>Dosage Form</b>	Tablets
<b>Drug Class</b>	PI3K delta inhibitor
<b>Therapeutic Dosing Regimen</b>	150 mg
<b>Duration of Therapeutic Use</b>	Chronic
<b>Maximum Tolerated Dose</b>	400 mg
<b>Submission Number and Date</b>	SDN 001 /11 Sept 2013
<b>Review Division</b>	DHP

Note: Any text in the review with a light background should be inferred as copied from the sponsor's document.

### 1 SUMMARY

#### 1.1 OVERALL SUMMARY OF FINDINGS

No significant QTc prolongation effects of idelalisib (150 mg and 400 mg) were detected in this TQT study. The largest upper bounds of the 2-sided 90% CI for the mean differences between idelalisib (150 mg and 400 mg) and placebo were below 10 ms, the threshold for regulatory concern as described in ICH E14 guidelines. The largest lower bound of the 2-sided 90% CI for the  $\Delta\Delta\text{QTcN}$  for moxifloxacin was greater than 5 ms, and the moxifloxacin profile over time is adequately demonstrated in Figure 4, indicating that assay sensitivity was established.

In this randomized, partially-blinded, placebo- and positive-controlled, 4 period single-dose crossover study, 48 healthy subjects received idelalisib 150 mg, idelalisib 400 mg, placebo, and moxifloxacin 400 mg. Overall summary of findings is presented in Table 1.

**Table 1: The Point Estimates and the 90% CIs Corresponding to the Largest Upper Bounds for Idelalisib (150 mg and 400 mg) and the Largest Lower Bound for Moxifloxacin (FDA Analysis)**

Treatment	Time (hour)	$\Delta\Delta\text{QTcN}$ (ms)	90% CI (ms)
Idelalisib 150 mg	4	1.7	(-1.6, 5.)
Idelalisib 400 mg	5	3.1	(0.2, 5.9)
Moxifloxacin 400 mg*	4	13.8	(10.5, 17.0)

- Multiple endpoint adjustment was not applied. The largest lower bound after Bonferroni adjustment for 4 time points is 9.3 ms

IDELA given at 400 mg provided higher exposures relative to 150 mg (~ 60% higher for  $C_{\max}$ , and ~2.3-fold higher for  $\text{AUC}_{\text{inf}}$ ) and were higher than those observed in subjects with impaired organ function (IDELA AUC ~60% higher in hepatically impaired subjects [313-0112] or ~30% higher in renally impaired subjects) or with strong CYP3A inhibitor coadministration (~26% higher  $C_{\max}$  and 80% higher AUC upon coadministration with ketoconazole, which is also an inhibitor of aldehyde oxidase the major oxidative enzyme responsible for IDELA oxidation).

## 2 PROPOSED LABEL

### 2.1 SPONSOR'S PROPOSED LABEL

#### 12.2 Pharmacodynamics

##### Electrocardiographic Effects

The effect of idelalisib (b) (4) (150 mg) and (b) (4) (400 mg) (b) (4) on the QTc interval was evaluated in a placebo- and positive-controlled (moxifloxacin 400 mg) crossover study in (b) (4) healthy subjects. (b) (4)

### 2.2 QT-IRT'S PROPOSED LABEL

*QT-IRT's proposed labeling language is a suggestion only. We defer final labeling decisions to the Division.*

#### 12.2 Pharmacodynamics

##### Cardiac Electrophysiology

At a dose 2.7 times the maximum recommended dose, idelalisib did not prolong the QT interval (b) (4)

### **3 BACKGROUND**

#### **3.1 PRODUCT INFORMATION**

Idelalisib is an oral, selective, small molecule inhibitor of the p110 $\delta$  isoform of phosphatidylinositol 3-kinase that has demonstrated a clinically meaningful benefit in a highly refractory population of patients with indolent non-Hodgkin lymphoma.

#### **3.2 MARKET APPROVAL STATUS**

Idelalisib is not approved for marketing in any country.

#### **3.3 PRECLINICAL INFORMATION**

The IC<sub>50</sub> for the hERG potassium current was estimated to be greater than 50  $\mu$ M..

#### **3.4 PREVIOUS CLINICAL EXPERIENCE**

A total of 352 subjects received IDELA monotherapy and 290 subjects enrolled for treatment with IDELA combination therapy. No AEs as per ICH E14 guidance were reported.

#### **3.5 CLINICAL PHARMACOLOGY**

Appendix 6.1 summarizes the key features of idelalisib's clinical pharmacology.

### **4 SPONSOR'S SUBMISSION**

#### **4.1 OVERVIEW**

The QT-IRT reviewed the protocol prior to conducting this study under NDA 205858. The sponsor submitted the study report GS-US-313-0117 for the study drug, including electronic datasets and waveforms to the ECG warehouse.

#### **4.2 TQT STUDY**

##### **4.2.1 Title**

A Phase 1, Partially-Blinded, Randomized, Placebo- and Positive-Controlled Study to Evaluate the Effect of idelalisib (GS-1101) on the QT/QTc Interval in Healthy Subjects

##### **4.2.2 Protocol Number**

GS-US-313-0117

##### **4.2.3 Study Dates**

First subject enrolled: 06 Feb 2013

Last subject observation: 15 Apr 2013

##### **4.2.4 Objectives**

Primary objective:

To evaluate the effects of idelalisib (IDELA, formerly GS-1101, CAL-101) (at therapeutic and supratherapeutic doses) and metabolite GS-563117 on time-

matched, baseline-adjusted, placebo-corrected QT interval corrected for heart rate calculated using Fridericia correction (QTcF)

Secondary objectives:

- To explore the effect of idelalisib (at therapeutic and suprathreshold doses) and metabolite GS-563117 on corrected QT using other approaches, such as QTc calculated using population correction (QTcN)
- To determine the pharmacokinetics (PK) of IDELA and metabolite GS-563117
- To explore the relationship between time-matched, baseline-adjusted, placebo corrected QTc ( $\Delta\Delta\text{QTc}$ ) and idelalisib, and metabolite GS-563117, plasma concentrations
- To explore the effect of idelalisib (at therapeutic and suprathreshold doses) and metabolite GS-563117 on other electrocardiogram (ECG) parameters, including PR interval
- To evaluate the safety and tolerability of idelalisib in healthy subjects at the doses administered

## 4.2.5 Study Description

### 4.2.5.1 Design

This was a Phase 1, partially-blinded, randomized, placebo- and positive-controlled, 4-period single-dose crossover study was conducted to evaluate the effect of idelalisib on time-matched change from baseline of QTcF and QTcN, and to explore the effect of idelalisib on ECG parameters.

### 4.2.5.2 Controls

The Sponsor used both placebo and positive (moxifloxacin) controls

### 4.2.5.3 Blinding

Study drugs were provided to the study pharmacist in an unblinded fashion. To maintain the blinding, idelalisib and matching placebo tablets were visually identical, and the number of tablets administered for Treatments A, B, and C were the same. Moxifloxacin was administered as a positive control and were not blinded.

## 4.2.6 Treatment Regimen

### 4.2.6.1 Treatment Arms

Subjects were randomized in a 1:1 ratio to 1 of 2 Williams squares, and then 1 of 4 possible treatment sequences per Williams square: IDELA plus placebo (Treatment A), IDELA alone (Treatment B), placebo alone (Treatment C), and moxifloxacin alone (Treatment D).

Treatment A (Therapeutic Exposure):

- 150 mg IDELA (1 × 150-mg IDELA tablet), plus
- Placebo (1 × 100-mg placebo tablet plus 1 × 150-mg placebo tablet)

Treatment B (Suprathreshold Exposure):

- 400 mg IDELA (2 × 150-mg IDELA tablets plus 1 × 100-mg IDELA tablet)

Treatment C (Placebo Control):

- Placebo (1 × 100-mg placebo tablet plus 2 × 150-mg placebo tablet),

Treatment D (Positive Control):

- 400 mg moxifloxacin (1 × 400-mg moxifloxacin tablet)

#### 4.2.6.2 Sponsor's Justification for Doses

A single dose of 150 mg IDELA was selected as the therapeutic dose for this study. Selection of this dose was based on safety and efficacy data from previous single-dose and multiple-dose clinical studies using IDELA in healthy subjects and subjects with hematologic malignancies. Safety results from clinical studies to date indicate that IDELA is well tolerated when administered to healthy subjects at single doses through 400 mg and upon multiple dosing to doses of 350 mg twice daily (BID) for subjects with hematologic malignancies (the highest dose levels tested).

A single dose of 400 mg IDELA was selected as the supratherapeutic dose for this study, which provides overall exposures (AUC) approximately 60% to 100% higher and peak concentrations approximately 44% to 60% higher than the therapeutic dose of 150 mg (depending on fed or fasted dosing), in the unlikely event of additional and/or unexpected drug interactions or overdosage. IDELA is metabolized by aldehyde oxidase, cytochrome P450 (CYP) 3A, and UGT1A4. Co-administration of IDELA with the highly potent CYP3A inhibitor, ketoconazole, resulted in only modest to moderate increases in IDELA exposure (26% higher  $C_{max}$ , 80% higher AUC), consistent with the multiple metabolic pathways that contribute to IDELA disposition. Exposures of the primary circulating metabolite of IDELA, GS-563117, were also increased. As such, the 400-mg dose was expected to provide IDELA exposures that were supratherapeutic and suitable for evaluation in a thorough QT/QTc study. The plasma AUC of metabolite GS-563117 with IDELA 400 mg was expected to represent/cover clinically observed exposures upon chronic dosing of IDELA 150 mg BID.

*Reviewer's Comment: Sponsor's dose selection was reasonable based on exposure-dose relationship and PK result of drug-drug interaction with ketoconazole.*

#### 4.2.6.3 Instructions with Regard to Meals

Study treatment was administered in the morning following an overnight fast (no food or liquids, except water, for at least 8 hours) with 240 mL of water within 5 minutes of consuming a standard meal. Subjects were restricted from water consumption 1 hour before and 2 hours after dosing, except for the 240 mL of water given with the study drug; and food intake was restricted until after collection of the 4-hour postdose blood draw.

*Reviewer's Comment: Agree with administration under fasted conditions. IDELA  $C_{max}$  was not different under fed or fasted conditions. IDELA  $AUC_{inf}$  was ~36% higher with a high-fat meal relative to fasted condition.*

#### 4.2.6.4 ECG and PK Assessments

Serial blood samples were collected for PK analysis relative to the dosing of IDELA and its metabolite, GS-563117, on Days 1, 11, 21, and 31 at the following time points:

predose ( $\leq 5$  minutes before dose) and at 0.5, 1, 1.5, 2, 2.5, 3, 3.5, 4, 4.5, 5, 8, 12, 20, 24, 36, and 48 hours postdose.

The time points for 24-hour ECG sampling were as follows:

- Predose (pre-meal) baseline triplicate ECGs collected at 1.5, 1, and 0.5 hours prior to the morning meal.
- Postdose triplicate ECGs at 1, 1.5, 2, 2.5, 3, 4, 5, 12, and 24 hours following administration of study drugs.

*Reviewer's Comment: Agree with the timing of ECGs since it covers  $T_{max}$  and extends to 48 hours.*

#### **4.2.6.5 Baseline**

The Sponsor used the average predose of the QTc values collected at 1.5, 1 and 0.5 hours as the QTc baseline values.

#### **4.2.7 ECG Collection**

Intensive 12-Lead Holter monitoring will be used to obtain digital ECGs. Standard 12-Lead ECGs will be obtained while subjects are recumbent.

#### **4.2.8 Sponsor's Results**

##### **4.2.8.1 Study Subjects**

A total of 48 healthy subjects enrolled and 46 subjects (95.8%) completed the study. Subjects in the safety and pharmacodynamic analysis sets were predominantly black or African American (58.3%) or white (33.3%), evenly split between female (47.9%) and male (52.1%), and had a mean age of 33 years (range, 20 to 45 years), mean BMI of 27 kg/m<sup>2</sup>. Two subjects (4.2%) withdrew consent and were withdrawn from study treatment.

##### **4.2.8.1.1 Primary Analysis**

The primary endpoint was time-matched baseline-adjusted mean differences between IDELA (150 mg and 400 mg) and placebo in QTcF. The sponsor used mixed model and the results are presented in Table 2. This model included sequence, period, time, treatment, and time-by-treatment interaction, and gender as fixed effects, subject within sequence as a random effect and baseline as covariate. The upper limits of the 2-sided 90% CI for idelalisib (150 mg and 400 mg) were below 10 ms.

**Table 2: Sponsor Results  $\Delta$ QTcF and  $\Delta\Delta$ QTcF for IDELA 150 mg and IDELA 400 mg**

Scheduled Time	Least-Squares Means			Treatment Difference		90% Confidence Intervals	
	IDELA 150 mg	IDELA 400 mg	Placebo	IDELA 150 mg -Placebo	IDELA 400 mg -Placebo	IDELA 150 mg -Placebo	IDELA 400 mg -Placebo
1 hour	-11.6	-10.3	-9.1	-2.5	-1.2	-4.9, 0.0	-3.7, 1.3
1.5 hours	-10.6	-11.4	-9.6	-1.0	-1.8	-3.4, 1.5	-4.2, 0.7
2 hours	-12.6	-10.4	-8.3	-4.3	-2.1	-6.7, -1.8	-4.6, 0.3
2.5 hours	-11.4	-12.5	-10.7	-0.7	-1.8	-3.1, 1.8	-4.2, 0.7
3 hours	-8.8	-8.2	-8.8	-0.0	0.6	-2.5, 2.4	-1.8, 3.1
4 hours	-9.7	-8.9	-10.7	1.0	1.8	-1.5, 3.4	-0.7, 4.3
5 hours	-11.1	-7.0	-10.0	-1.1	3.0	-3.6, 1.3	0.5, 5.5
12 hours	-8.6	-8.8	-10.3	1.7	1.5	-0.8, 4.1	-1.0, 3.9
24 hours	-0.8	-1.3	-0.9	0.0	-0.4	-2.5, 2.5	-2.9, 2.0

Source: *Clinical Study Report GS-US-313-0117, Section 10.2.2.1.1, Table 10-6, Pg 65/396*

*Reviewer's Comments: We will provide our independent analysis results in Section 5.2.*

#### **4.2.8.1.2 Assay Sensitivity**

The sponsor used the same mixed model to analyze the  $\Delta$ QTcF effect for moxifloxacin. The analysis results were presented in Table 3. The largest unadjusted lower bound 1-sided 95% is 12.8 ms which was greater than 5 ms. Thus, assay sensitivity in this thorough QTcF study was established.

**Table 3: Sponsor Results  $\Delta$ QTcF and  $\Delta\Delta$ QTcF for Moxifloxacin 400 mg**

Scheduled Time	Least-Squares Means		Treatment Difference	90% Confidence Intervals
	Moxifloxacin	Placebo	Moxifloxacin - Placebo	Moxifloxacin - Placebo
1 hour	-4.0	-9.1	5.1	
1.5 hours	-0.8	-9.6	8.8	6.4, 11.3
2 hours	-1.6	-8.3	6.7	4.2, 9.1
2.5 hour	0.4	-10.7	11.2	8.7, 13.6
3 hours	2.0	-8.8	10.8	8.4, 13.3
4 hours	2.2	-10.7	12.8	10.4, 15.3
5 hours	-1.1	-10.0	8.9	-
12 hours	-4.8	-10.3	5.5	-
24 hours	4.1	-0.9	5.0	-

Note: Assay sensitivity analysis was performed only at postdose time points 1.5, 2, 2.5, 3, and 4 hours.

Source: *Clinical Study Report GS-US-313-0117*, Section 10.2.1, *Table 10-5*, Pg 63/396

#### **4.2.8.1.3 Categorical Analysis**

Categorical analysis was used to summarize in the categories of QTc  $\leq$ 450 ms, between 450 ms and 480 ms, between 480 ms and 500 ms, and  $>$ 500 ms, and changes from baseline QTc  $\leq$ 30 ms, between 30 and 60 ms, and  $>$ 60 ms. No subject's absolute QTc  $>$  480 ms and no subjects  $\Delta$ QTc  $>$ 60 ms.

**Table 4: Sponsor Analyses of Categorical Analysis in QTcF**

	<b>IDELA 150 mg (N=47)</b>	<b>IDELA 400 mg (N=47)</b>	<b>Placebo (N=46)</b>	<b>Moxifloxacin 400 mg (N=47)</b>
<b>Observed Value</b>				
> 500 msec	0	0	0	0
> 480 - 500 msec	0	0	0	0
> 450 - 480 msec	0	1 (2.1%)	2 (4.3%)	2 (4.3%)
- Missing -	0	0	0	0
<b>Change from Predose/Baseline</b>				
> 60 msec	0	0	0	0
> 30 - 60 msec	0	0	0	0
- Missing -	0	0	0	0

Note: Only subjects with treatment-emergent QTc interval prolongations (> 450, > 480, and > 500 msec) were counted as events for "Observed Value" and included in the numerator. Treatment-emergent means a subject had a QTc interval prolongation at any postdose assessment that was not present at the predose assessment.

#### **4.2.8.2 Safety Analysis**

No deaths or SAEs occurred during this study, and no subject discontinued the study due to an AE.

#### **4.2.8.3 Clinical Pharmacology**

##### **4.2.8.3.1 Pharmacokinetic Analysis**

The PK results are presented in Table 5 for IDELA and Table 6 for metabolite GS-563117. IDELA C<sub>max</sub> and AUC values in the thorough QT study were 60% and 130% higher, respectively, following administration of 400 mg idelalisib compared with 150 mg, the intended clinical dose. GS-563117 C<sub>max</sub> and AUC values for 400 mg were 70% and 140% higher, respectively, than 150 mg.

**Table 5: GS-US-313-0117: IDELA Single-Dose Pharmacokinetic Parameters by Treatment (IDELA PK Analysis Set)**

<b>IDELA PK Parameter</b>	<b>IDELA 150 mg (N=47)</b>	<b>IDELA 400 mg (N=47)</b>
$C_{\max}$ (ng/mL)	1927.74 (26.4)	3134.89 (16.4)
$T_{\max}$ (h)	2.00 (1.50, 2.50)	1.53 (1.50, 2.50)
$t_{1/2}$ (h)	8.33 (5.19, 12.85)	10.42 (7.71, 15.70)
$AUC_{\text{last}}$ (ng·h/mL)	8275.38 (28.9)	18560.31 (27.7)
$AUC_{\text{inf}}$ (ng·h/mL)	8392.99 (28.6)	19072.39 (28.0)

Source: Page 59 of Sponsor's final clinical study report on the QTc study, GS-US-313-0117.

**Table 6: GS-US-313-0117: IDELA Single-Dose Pharmacokinetic Parameters by Treatment (GS-563117 PK Analysis Set)**

<b>GS-563117 PK Parameter</b>	<b>IDELA 150 mg (N=47)</b>	<b>IDELA 400 mg (N=47)</b>
$C_{\max}$ (ng/mL)	2038.6 (33.2)	3520.9 (27.7)
$T_{\max}$ (h)	3.00 (2.50, 3.52)	3.50 (3.50, 4.50)
$t_{1/2}$ (h)	8.53 (8.05, 9.80)	9.99 (8.39, 12.72)
$AUC_{\text{last}}$ (ng·h/mL)	21,479.7 (41.4)	49,942.6 (34.0)
$AUC_{\text{inf}}$ (ng·h/mL)	21,987.1 (41.9)	52,778.8 (35.5)

Source: Page 61 of Sponsor's final clinical study report on the QTc study, GS-US-313-0117.

#### 4.2.8.3.2 Exposure-Response Analysis

A linear mixed-effect model was used to quantify the relationship between plasma concentrations of IDELA and  $\Delta\Delta QTcF$  with gender as a fixed effect and subject as a random effect. The statistical analyses of the relationship between IDELA plasma concentrations and  $\Delta\Delta QTcF$  are summarized in Table 7 and the relationship between IDELA plasma concentrations and  $\Delta\Delta QTcF$  is depicted graphically in Figure 1. The results suggest that there were no relevant relationships between IDELA plasma concentration and  $\Delta\Delta QTcF$  interval.

**Table 7: GS-US-313-0117: Statistical Analysis of the Relationship between IDELA Plasma Concentrations and Time-Matched, Baseline- Adjusted, and Placebo-Corrected QTcF (IDELA PK/PD Analysis Set)**

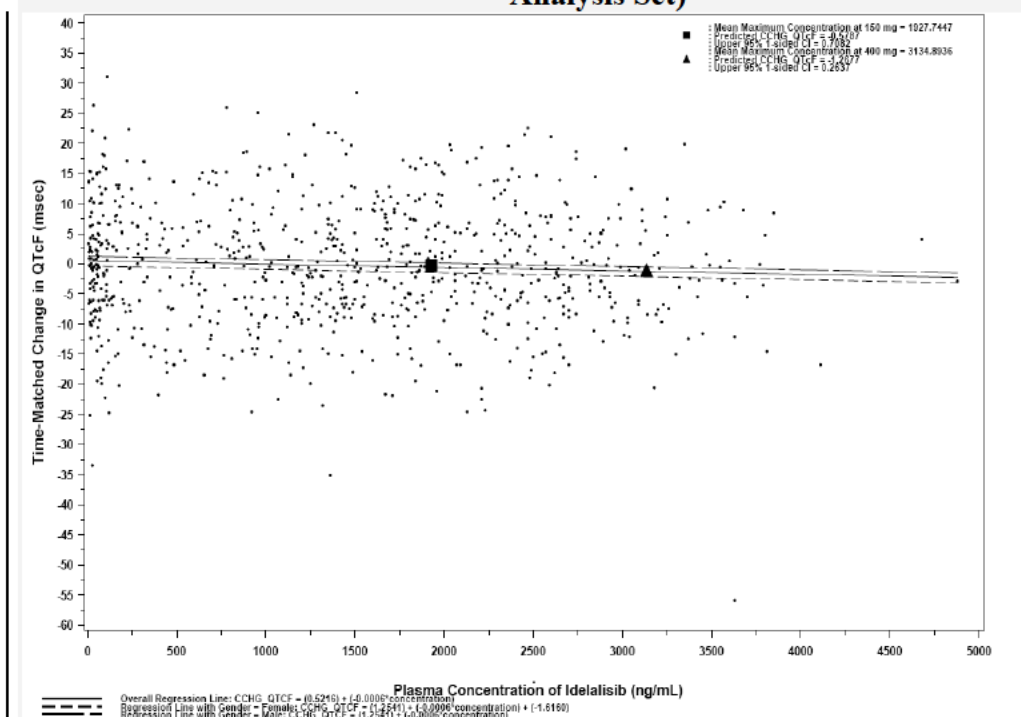
QTcF	Estimate	Standard Error	95% Confidence Interval		P-value
			Lower	Upper	
Time-Matched, Baseline-Adjusted, and Placebo-Corrected QTcF					
Overall Regression Equation: CCHG_QTcF = a + (b*Concentration)					
Intercept (a)	0.5216	0.8878	-1.2666	2.3098	0.5598
Concentration (b)	-0.0006	0.0003	-0.0012	0.0000	0.0666
Regression Equation with Gender as a Fixed Effect: CCHG QTcF = a + (b*Concentration) + (c*Gender)					
Intercept (a)	1.2541	1.1279	-1.0192	3.5273	0.2723
Concentration (b)	-0.0006	0.0003	-0.0012	0.0000	0.0687
Gender (c) <sup>a</sup>	-1.6160	1.5371	-4.7138	1.4819	0.2989

CCHG QTcF = time-matched, baseline-adjusted, and placebo-corrected QTcF

a 0=male,  
1=female

Note: Overall PK/PD regression included concentration as a continuous covariate and subject within sequence as a random effect, and PK/PD regression with gender as a fixed effect included gender as a fixed effect, concentration as a continuous covariate, and subject within sequence as a random effect.

**Figure 1: GS-US-313-0117: Scatter Plot of Time-Matched, Baseline- Adjusted, and Placebo-Corrected QTcF versus IDELA Plasma Concentration (IDELA PK/PD Analysis Set)**



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Note: Overall PK/PD regression included concentration as a continuous covariate and subject within sequence as a random effect, and PK/PD regression with gender included gender as a fixed effect, concentration as a covariate, and subject within sequence as a random effect.

A linear mixed-effect model was used to quantify the relationship between plasma concentrations of GS-563117 and  $\Delta\Delta QTcF$  with gender as a fixed effect and subject as a random effect. The statistical analyses of the relationship between GS-563117 plasma concentrations and  $\Delta\Delta QTcF$  are summarized in Table 8 and the relationship between GS-563117 plasma concentrations and  $\Delta\Delta QTcF$  is depicted graphically in Figure 2. As noted with IDELA, the results suggest that there were no relevant relationships between GS-563117 plasma concentration and  $\Delta\Delta QTcF$  interval.

**Table 8: GS-US-313-0117: Statistical Analysis of the Relationship between IDELA Plasma Concentrations and Time-Matched, Baseline- Adjusted, and Placebo-Corrected QTcF (GS-563117 PK/PD Analysis Set)**

QTcF	Estimate	Standard Error	95% Confidence Interval		P-value
			Lower	Upper	

**Time-Matched, Baseline-Adjusted, and Placebo-Corrected QTcF**

Overall Regression Equation: CCHG\_QTcF = a + (b\*Concentration)

Intercept (a)	-1.1512	0.9224	-3.0090	0.7067	0.2185
Concentration (b)	0.0005	0.0003	-0.0001	0.0011	0.1114

**Regression Equation with Gender as a Fixed Effect: CCHG QTcF = a + (b\*Concentration) + (c\*Gender)**

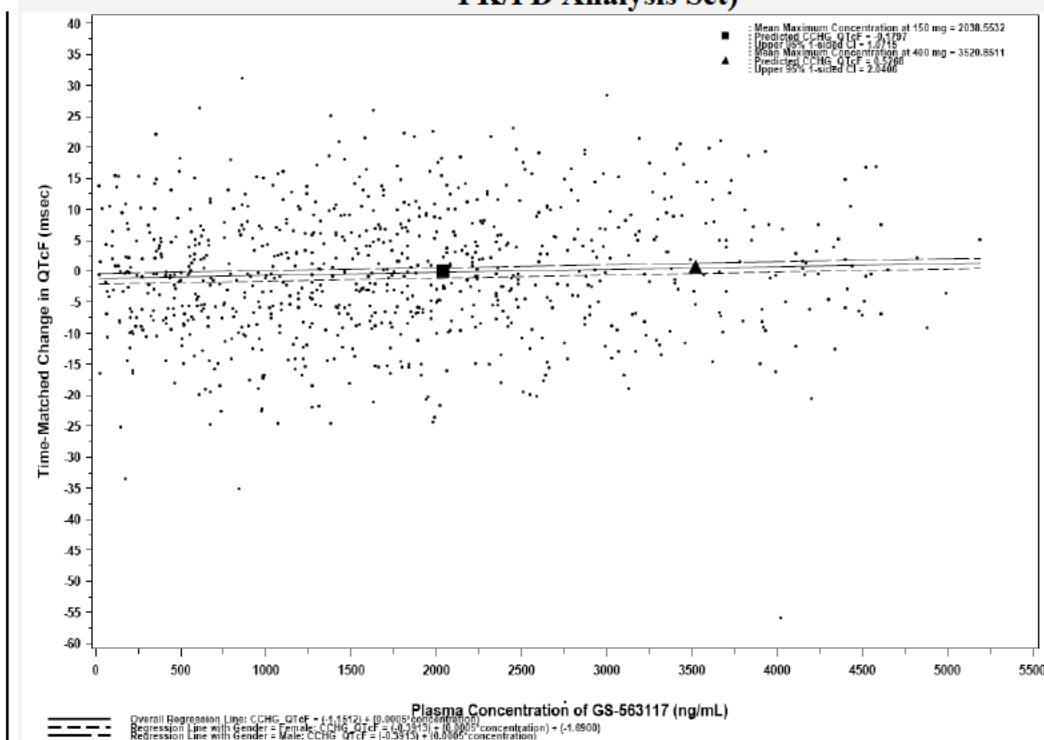
Intercept (a)	-0.3913	1.1452	-2.6993	1.9167	0.7342
Concentration (b)	0.0005	0.0003	-0.0001	0.0011	0.1061
Gender (c) <sup>a</sup>	-1.6900	1.5128	-4.7389	1.3588	0.2700

CCHG QTcF = time-matched, baseline-adjusted, and placebo-corrected QTcF

a 0=male,  
1=female

Note: Overall PK/PD regression included concentration as a continuous covariate and subject within sequence as a random effect, and PK/PD regression included gender as a fixed effect, concentration as a continuous covariate, and subject within sequence as a random effect.

**Figure 2: GS-US-313-0117: Scatter Plot of Time-Matched, Baseline- Adjusted, and Placebo-Corrected QTcF versus GS-563117 Plasma Concentration (GS-563117 PK/PD Analysis Set)**



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Note: Overall PK/PD regression included concentration as a continuous covariate and subject within sequence as a random effect, and PK/PD regression with gender included gender as a fixed effect, concentration as a covariate, and subject within sequence as a random effect.

*Analysis: A plot of  $\Delta\Delta QTcN$  vs. drug concentrations is presented in Figure 7.*

## 5 REVIEWERS' ASSESSMENT

### 5.1 EVALUATION OF THE QT/RR CORRECTION METHOD

We evaluated the appropriateness of the correction methods. Baseline values were excluded in the validation. Ideally, a good correction QTc would result in no relationship of QTc and RR intervals.

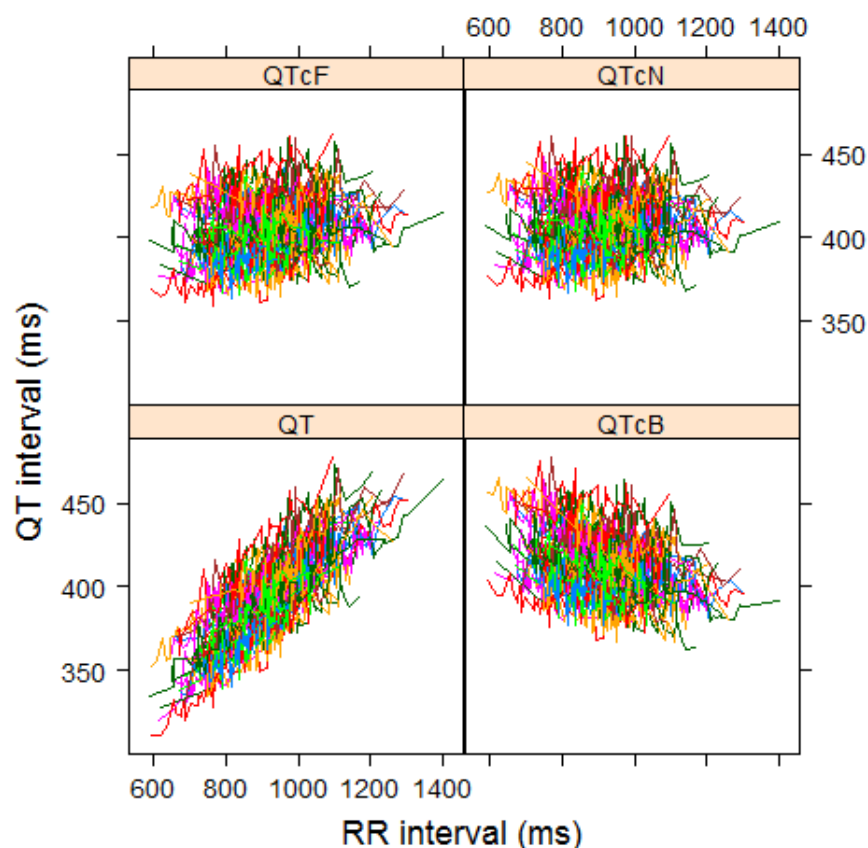
We used the criterion of Mean Sum of Squared Slopes (MSSS) from individual regressions of QTc versus RR. The smaller this value is, the better the correction. Based on the results listed in Table 9, it appears that QTcN is the best correction method. Therefore, this statistical reviewer used QTcN for the primary statistical analysis.

**Table 9: Average of Sum of Squared Slopes for Different QT-RR Correction Methods**

Treatment Group	Correction Method							
	QTcB		QTcF		QTcI		QTcN	
	N	MSSS	N	MSSS	N	MSSS	N	MSSS
Idelalisib 150 mg	47	0.0045	47	0.0021	47	0.0018	47	0.0016
Idelalisib 400 mg	47	0.0050	47	0.0015	47	0.0020	47	0.0013
Moxifloxacin 400 mg	47	0.0066	47	0.0013	47	0.0013	47	0.0014
Placebo	46	0.0043	46	0.0020	46	0.0012	46	0.0015
All	48	0.0039	48	0.0009	48	0.0008	48	0.0005

The QT-RR interval relationship is presented in Figure 3 together with the Bazett's (QTcB), Fridericia (QTcF) and QTcN corrections.

**Figure 3: QT, QTcB, and QTcF, QTcN vs. RR (Each Subject's Data Points are Connected with a Line)**



## 5.2 STATISTICAL ASSESSMENTS

### 5.2.1 QTc Analysis

#### 5.2.1.1 The Primary Analysis for Idelalisib

The statistical reviewer used mixed model to analyze the  $\Delta$ QTcN effect. The model includes treatment as fixed effect and baseline values as a covariate. The analysis results are listed in Table 10. The largest upper bounds of the 2-sided 90% CI for the mean differences between idelalisib 150 mg and placebo, and between idelalisib 400 mg and placebo are 5.0 ms and 5.9 ms, respectively. This reviewer also used same model to analyze the QTcF effect. The analysis results are similar with QTcN's results (see Table 11).

**Table 10: Analysis Results of  $\Delta$ QTcN and  $\Delta\Delta$ QTcN for Idelalisib 150 mg, Idelalisib 400 mg and Moxifloxacin 400 mg**

	Placebo	Idelalisib 150 mg				Idelalisib 400 mg				Moxifloxacin				
	$\Delta$ QTcN	$\Delta$ QTcN		$\Delta\Delta$ QTcN		$\Delta$ QTcN		$\Delta\Delta$ QTcN		$\Delta$ QTcN		$\Delta\Delta$ QTcN		
Time (h)	LS Mean	N	LS Mean	LS Mean	90% CI	N	LS Mean	LS Mean	90% CI	N	LS Mean	LS Mean	90% CI	*Adj 90% CI
1	-6.9	47	-9.8	-2.9	(-5.3, -0.5)	46	-8.7	-1.8	(-4.2, 0.6)	47	-2.0	4.9	(2.5, 7.3)	(1.6, 8.2)
1.5	-8.2	47	-9.2	-1.0	(-3.3, 1.3)	46	-10.1	-1.9	(-4.2, 0.4)	47	1.0	9.2	(6.9, 11.5)	(6.1, 12.4)
2	-6.7	47	-11.3	-4.6	(-7.3, -2.0)	46	-9.2	-2.5	(-5.2, 0.1)	47	0.3	7.0	(4.3, 9.7)	(3.4, 10.6)
2.5	-10.1	47	-10.6	-0.5	(-3.5, 2.5)	46	-11.8	-1.7	(-4.7, 1.3)	47	1.7	11.8	(8.8, 14.7)	(7.7, 15.8)
3	-8.2	46	-8.2	-0.0	(-2.7, 2.6)	47	-7.4	0.8	(-1.9, 3.4)	47	3.2	11.4	(8.8, 14.0)	(7.8, 15.0)
4	-9.7	47	-8.0	1.7	(-1.6, 5.0)	47	-7.6	2.1	(-1.2, 5.4)	47	4.1	13.8	(10.5, 17.0)	(9.3, 18.3)
5	-7.4	46	-8.4	-1.0	(-3.9, 1.9)	46	-4.3	3.1	(0.2, 5.9)	46	1.7	9.0	(6.2, 11.9)	(5.1, 13.0)
12	-7.5	47	-6.3	1.3	(-1.4, 4.0)	47	-6.3	1.2	(-1.5, 3.9)	47	-1.8	5.7	(3.0, 8.4)	(2.0, 9.4)
24	0.1	45	0.1	-0.0	(-3.2, 3.2)	47	-0.3	-0.4	(-3.6, 2.7)	47	5.1	5.0	(1.8, 8.1)	(0.6, 9.3)

- Bonferroni method was applied for multiple endpoint adjustment for 4 time points.

**Table 11 : Analysis Results of  $\Delta$ QTcF and  $\Delta\Delta$ QTcF for Idelalisib 150 mg, Idelalisib 400 mg and Moxifloxacin 400 mg**

	Placebo	Idelalisib 150 mg				Idelalisib 400 mg				Moxifloxacin 400 mg			
	$\Delta$ QTcF	$\Delta$ QTcF		$\Delta\Delta$ QTcF		$\Delta$ QTcF		$\Delta\Delta$ QTcF		$\Delta$ QTcF		$\Delta\Delta$ QTcF	
Time (h)	LS Mean	N	LS Mean	LS Mean	90% CI	N	LS Mean	LS Mean	90% CI	N	LS Mean	LS Mean	90% CI
1	-9.0	47	-11.7	-2.7	(-5.0, -0.4)	46	-10.3	-1.3	(-3.7, 1.0)	47	-4.0	5.0	(2.6, 7.3)
1.5	-9.7	47	-10.7	-1.0	(-3.2, 1.2)	46	-11.3	-1.7	(-3.9, 0.6)	47	-0.7	9.0	(6.8, 11.2)
2	-8.3	47	-12.6	-4.3	(-6.9, -1.7)	46	-10.4	-2.1	(-4.7, 0.6)	47	-1.6	6.8	(4.2, 9.4)
2.5	-10.8	47	-11.5	-0.7	(-3.6, 2.2)	46	-12.5	-1.7	(-4.6, 1.2)	47	0.5	11.3	(8.4, 14.2)
3	-8.9	46	-9.1	-0.2	(-2.8, 2.4)	47	-8.2	0.7	(-1.9, 3.3)	47	2.1	11.0	(8.4, 13.6)
4	-10.8	47	-9.8	0.9	(-2.4, 4.2)	47	-8.9	1.9	(-1.4, 5.2)	47	2.2	13.0	(9.7, 16.3)
5	-10.0	46	-11.2	-1.2	(-4.0, 1.6)	46	-6.9	3.1	(0.3, 5.9)	46	-1.1	8.9	(6.1, 11.8)
12	-10.3	47	-8.7	1.6	(-1.1, 4.4)	47	-8.8	1.5	(-1.2, 4.2)	47	-4.8	5.5	(2.8, 8.2)
24	-1.0	45	-1.0	0.0	(-3.0, 3.0)	47	-1.3	-0.3	(-3.3, 2.7)	47	4.2	5.2	(2.2, 8.2)

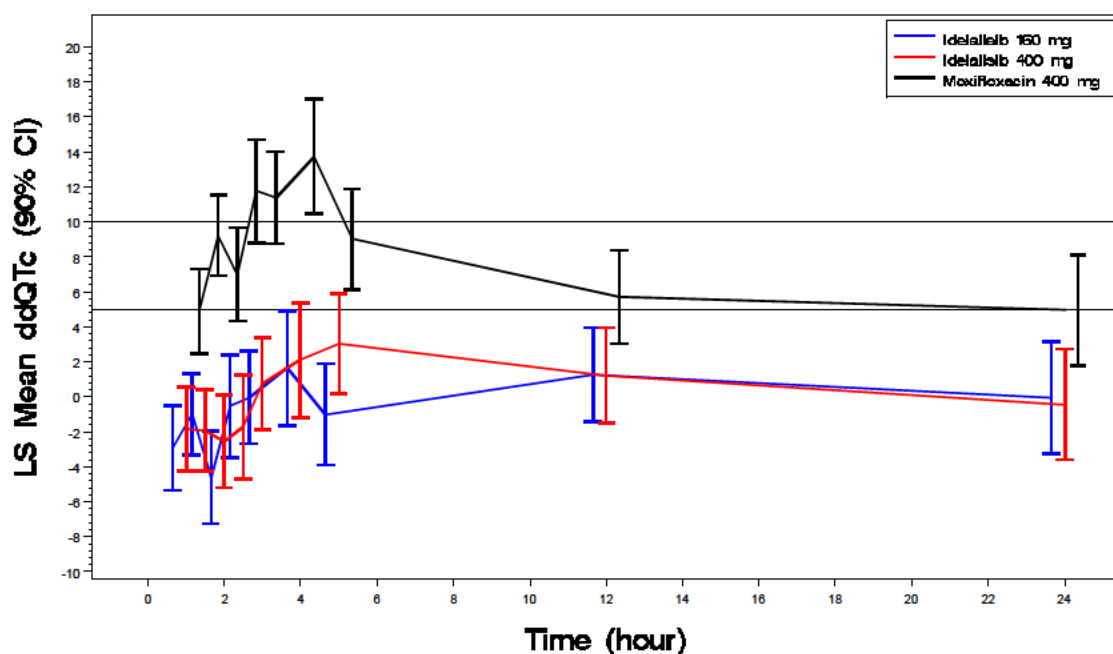
### 5.2.1.2 Assay Sensitivity Analysis

The statistical reviewer used the same statistical model to analyze moxifloxacin and placebo data. The results are presented in Table 10. The largest unadjusted of the 2-sided 90% lower confidence interval is 10.5 ms. By considering Bonferroni multiple endpoint adjustment, the largest lower confidence interval is 9.3 ms, which indicates that an at least 5 ms QTcN effect due to moxifloxacin can be detected from the study.

### 5.2.1.3 Graph of $\Delta\Delta$ QTcN Over Time

Figure 4 displays the time profile of  $\Delta\Delta$ QTcN for different treatment groups and moxifloxacin 400 mg.

**Figure 4: Mean and 90% CI  $\Delta\Delta$ QTcN Time Course for Idelalisib 150 mg, Idelalisib 400 mg and Moxifloxacin 400 mg**



#### 5.2.1.4 Categorical Analysis

Table 12 lists the number of subjects as well as the number of observations whose QTcN values are  $\leq 450$  ms, and between 450 ms and 480 ms, and changes from baseline QTc  $\leq 30$  ms, between 30 and 60 ms, and  $>60$  ms. No subject's QTcN is above 480 ms. No subject's change from baseline is above 60 ms (see Table 13).

**Table 12: Categorical Analysis for QTcN**

Treatment Group	Total N	Value $\leq 450$ ms	450 ms < Value $\leq 480$ ms
Idelalisib 150 mg	47	46 (97.9%)	1 (2.1%)
Idelalisib 400 mg	47	46 (97.9%)	1 (2.1%)
Moxifloxacin 400 mg	47	45 (95.7%)	2 (4.3%)
Placebo	46	44 (95.7%)	2 (4.3%)

**Table 13: Categorical Analysis for  $\Delta$ QTcN**

Treatment Group	Total N	Value $\leq$ 30 ms	30 ms<Value $\leq$ 60 ms
Idelalisib 150 mg	47	47 (100%)	0 (0.0%)
Idelalisib 400 mg	47	47 (100%)	0 (0.0%)
Moxifloxacin 400 mg	47	46 (97.9%)	1 (2.1%)
Placebo	46	46 (100%)	0 (0.0%)

### 5.2.2 HR Analysis

The statistical reviewer used mixed model to analyze the  $\Delta$ HR effect. The model includes treatment as fixed effect and baseline values as a covariate. The analysis results are listed in Table 14. The largest upper bounds of the 2-sided 90% CI for the mean differences between idelalisib 150 mg and placebo, and between idelalisib 400 mg and placebo are 5.5 bpm and 3.9 bpm, respectively. Table 15 presents the categorical analysis of HR. One subject who experienced HR interval greater than 100 bpm is in idelalisib 150-mg groups.

**Table 14: Analysis Results of  $\Delta$ HR and  $\Delta\Delta$ HR for Idelalisib 150 mg, Idelalisib 400 mg and Moxifloxacin 400 mg**

	Placebo	Idelalisib 150 mg				Idelalisib 400 mg				Moxifloxacin			
	$\Delta$ HR	$\Delta$ HR		$\Delta\Delta$ HR		$\Delta$ HR		$\Delta\Delta$ HR		$\Delta$ HR		$\Delta\Delta$ HR	
Time (h)	LS Mean	N	LS Mean	LS Mean	90% CI	N	LS Mean	LS Mean	90% CI	N	LS Mean	LS Mean	90% CI
1	8.9	47	7.2	-1.7	(-4.0, 0.5)	46	7.0	-2.0	(-4.2, 0.3)	47	8.2	-0.7	(-3.0, 1.5)
1.5	6.0	47	6.0	0.0	(-2.1, 2.2)	46	5.2	-0.7	(-2.9, 1.4)	47	7.2	1.3	(-0.9, 3.4)
2	6.9	47	5.4	-1.5	(-3.5, 0.6)	46	5.2	-1.7	(-3.7, 0.3)	47	7.4	0.5	(-1.5, 2.6)
2.5	2.8	47	3.6	0.8	(-1.0, 2.6)	46	3.0	0.2	(-1.6, 2.0)	47	4.6	1.8	(-0.0, 3.6)
3	2.6	46	3.5	0.9	(-0.9, 2.6)	47	3.4	0.8	(-0.9, 2.5)	47	4.5	1.9	(0.2, 3.6)
4	4.0	47	7.2	3.2	(0.9, 5.5)	47	5.7	1.6	(-0.6, 3.9)	47	7.4	3.3	(1.1, 5.6)
5	11.2	46	11.9	0.7	(-1.8, 3.2)	46	11.4	0.2	(-2.4, 2.7)	46	11.2	0.0	(-2.5, 2.5)
12	11.7	47	10.2	-1.4	(-3.6, 0.7)	47	10.4	-1.3	(-3.5, 0.8)	47	12.3	0.7	(-1.5, 2.8)
24	4.3	45	4.0	-0.3	(-2.5, 1.9)	47	4.2	-0.1	(-2.2, 2.1)	47	3.5	-0.7	(-2.9, 1.4)

**Table 15: Categorical Analysis for HR**

Treatment Group	Total N	HR < 100 bpm	HR $\geq$ 100 bpm
Idelalisib 150 mg	47	46 (97.9%)	1 (2.1%)
Idelalisib 400 mg	47	47 (100%)	0 (0.0%)
Moxifloxacin 400 mg	47	45 (95.7%)	2 (4.3%)
Placebo	46	46 (100%)	0 (0.0%)

### 5.2.3 PR Analysis

The statistical reviewer used mixed model to analyze the  $\Delta$ PR effect. The model includes treatment as fixed effect and baseline values as a covariate. The analysis results are listed in Table 16. The largest upper bounds of the 2-sided 90% CI for the mean differences between idelalisib 150 mg and placebo, and between idelalisib 400 mg and placebo are 4.3 ms and 4.6 ms, respectively. Table 17 presents the categorical analysis of PR. Three subjects who experienced PR interval greater than 200 ms are in both idelalisib 150-mg and 400-mg groups.

**Table 16: Analysis Results of  $\Delta$ PR and  $\Delta\Delta$ PR for Idelalisib 150 mg, Idelalisib 400 mg and Moxifloxacin 400 mg**

	Placebo	Idelalisib 150 mg				Idelalisib 400 mg				Moxifloxacin			
	$\Delta$ PR	$\Delta$ PR		$\Delta\Delta$ PR		$\Delta$ PR		$\Delta\Delta$ PR		$\Delta$ PR		$\Delta\Delta$ PR	
Time (h)	LS Mean	N	LS Mean	LS Mean	90% CI	N	LS Mean	LS Mean	90% CI	N	LS Mean	LS Mean	90% CI
1	-3.1	47	-1.8	1.3	(-1.0, 3.7)	46	-1.3	1.8	(-0.6, 4.2)	47	-4.4	-1.2	(-3.6, 1.1)
1.5	-2.3	47	-3.4	-1.1	(-3.6, 1.4)	46	-1.8	0.5	(-2.0, 3.0)	47	-4.9	-2.6	(-5.1, -0.1)
2	-3.6	47	-3.7	-0.2	(-2.5, 2.1)	46	-2.0	1.6	(-0.7, 3.9)	47	-7.2	-3.6	(-5.9, -1.3)
2.5	-3.5	47	-4.4	-0.8	(-3.1, 1.4)	46	-3.4	0.1	(-2.1, 2.3)	47	-6.3	-2.7	(-5.0, -0.5)
3	-3.7	46	-3.7	-0.0	(-2.2, 2.1)	47	-4.3	-0.6	(-2.8, 1.5)	47	-5.3	-1.6	(-3.7, 0.6)
4	-5.9	47	-6.1	-0.3	(-2.5, 2.0)	47	-3.5	2.3	(0.1, 4.6)	47	-7.5	-1.6	(-3.9, 0.7)
5	-5.8	46	-5.2	0.6	(-1.9, 3.0)	46	-5.7	0.0	(-2.4, 2.5)	46	-8.1	-2.3	(-4.8, 0.2)
12	-5.5	47	-6.7	-1.2	(-3.7, 1.4)	47	-5.3	0.2	(-2.3, 2.7)	47	-8.0	-2.5	(-5.0, 0.0)
24	-3.7	45	-1.9	1.8	(-0.6, 4.3)	47	-2.6	1.2	(-1.3, 3.6)	47	-3.8	-0.0	(-2.4, 2.4)

**Table 17: Categorical Analysis of PR**

Treatment Group	Total N	PR < 200 ms	PR $\geq$ 200 ms
Idelalisib 150 mg	47	45 (95.7%)	2 (4.3%)
Idelalisib 400 mg	47	44 (93.6%)	3 (6.4%)
Moxifloxacin 400 mg	47	47 (100%)	0 (0.0%)
Placebo	46	45 (97.8%)	1 (2.2%)

### 5.2.4 QRS Analysis

The statistical reviewer used mixed model to analyze the  $\Delta$ QRS effect. The model includes treatment as fixed effect and baseline values as a covariate. The analysis results are listed in Table 18. The largest upper bounds of the 2-sided 90% CI for the mean differences between idelalisib 150 mg and placebo, and between idelalisib 400 mg and placebo are 3.1 ms and 3.0 ms, respectively. Table 19 presents the categorical analysis of QRS. Six subjects who experienced QRS interval greater than 110 ms are in both idelalisib 150-mg and 400-mg groups.

**Table 18: Analysis Results of  $\Delta$ QRS and  $\Delta\Delta$ QRS for Idelalisib 150 mg, Idelalisib 400 mg and Moxifloxacin 400 mg**

	Placebo	Idelalisib 150 mg				Idelalisib 400 mg				Moxifloxacin			
	$\Delta$ QRS	$\Delta$ QRS		$\Delta\Delta$ QRS		$\Delta$ QRS		$\Delta\Delta$ QRS		$\Delta$ QRS		$\Delta\Delta$ QRS	
Time (h)	LS Mean	N	LS Mean	LS Mean	90% CI	N	LS Mean	LS Mean	90% CI	N	LS Mean	LS Mean	90% CI
1	-0.3	47	0.4	0.8	(-0.5, 2.1)	46	-0.3	0.1	(-1.3, 1.4)	47	-0.3	0.1	(-1.3, 1.4)
1.5	-1.2	47	-0.4	0.8	(-0.4, 2.0)	46	-1.3	-0.1	(-1.3, 1.1)	47	0.0	1.2	(0.0, 2.4)
2	-1.8	47	-1.1	0.7	(-0.7, 2.0)	46	-1.1	0.7	(-0.7, 2.0)	47	-0.8	1.0	(-0.3, 2.4)
2.5	-1.8	47	-1.3	0.5	(-0.7, 1.7)	46	-0.7	1.1	(-0.1, 2.2)	47	-0.7	1.1	(-0.0, 2.3)
3	-1.9	46	-1.4	0.4	(-0.8, 1.6)	47	-1.9	-0.1	(-1.3, 1.1)	47	-1.5	0.4	(-0.8, 1.6)
4	-2.9	47	-3.1	-0.2	(-1.7, 1.3)	47	-2.1	0.9	(-0.6, 2.4)	47	-3.0	-0.1	(-1.6, 1.4)
5	-0.7	46	0.1	0.8	(-0.6, 2.2)	46	0.9	1.6	(0.2, 3.0)	46	-0.1	0.6	(-0.8, 2.0)
12	-2.6	47	-1.2	1.4	(-0.1, 3.0)	47	-1.3	1.4	(-0.2, 2.9)	47	-1.8	0.9	(-0.7, 2.4)
24	-2.2	45	-0.5	1.7	(0.2, 3.1)	47	-0.7	1.5	(-0.0, 2.9)	47	-0.8	1.4	(-0.1, 2.8)

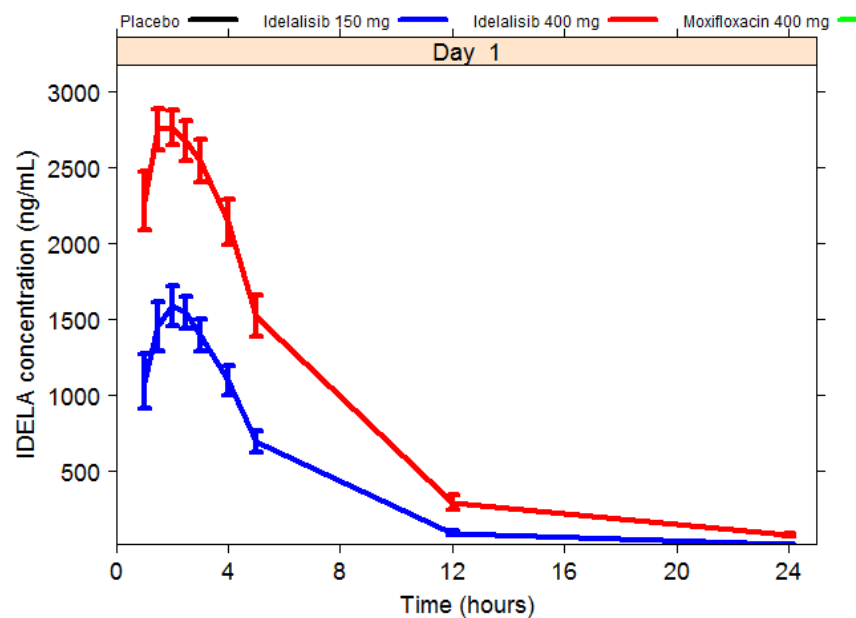
**Table 19: Categorical Analysis for QRS**

Treatment Group	Total N	QRS < 110 ms	QRS $\geq$ 110 ms
Idelalisib 150 mg	47	41 (87.2%)	6 (12.8%)
Idelalisib 400 mg	47	42 (89.4%)	5 (10.6%)
Moxifloxacin 400 mg	47	42 (89.4%)	5 (10.6%)
Placebo	46	42 (91.3%)	4 (8.7%)

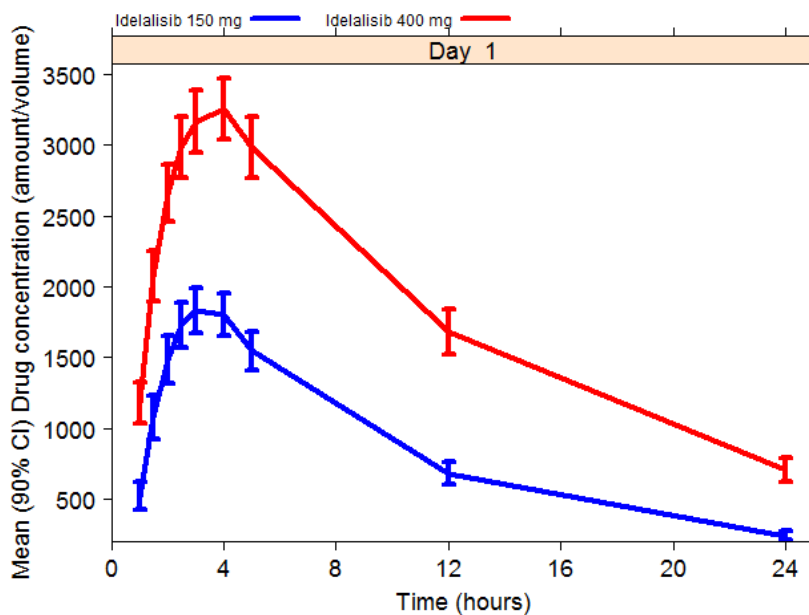
### 5.3 CLINICAL PHARMACOLOGY ASSESSMENTS

The mean IDELA concentration-time profile is illustrated in Figure 5. The mean GS-563117 concentration-time profile is illustrated in Figure 6.

**Figure 5: Mean IDELA concentration-time profiles for 150 mg (blue line) and 400 mg IDELA (red line)**

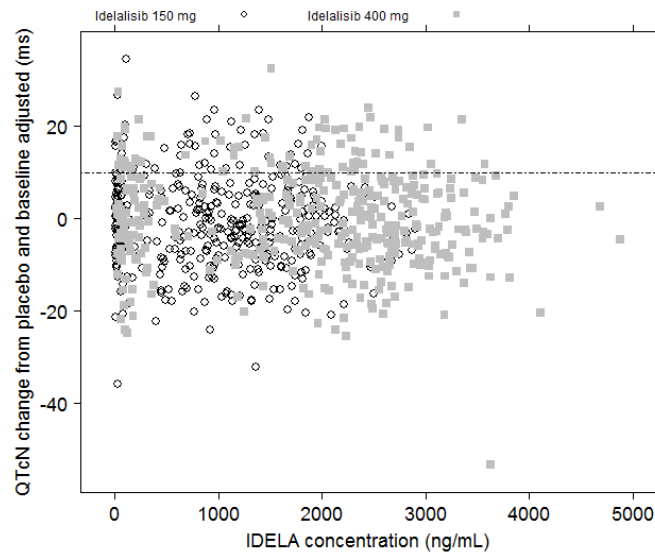


**Figure 6: Mean GS-563117 concentration (ng/mL)-time profiles for 150 mg (blue line) and 400 mg IDELA (red line)**

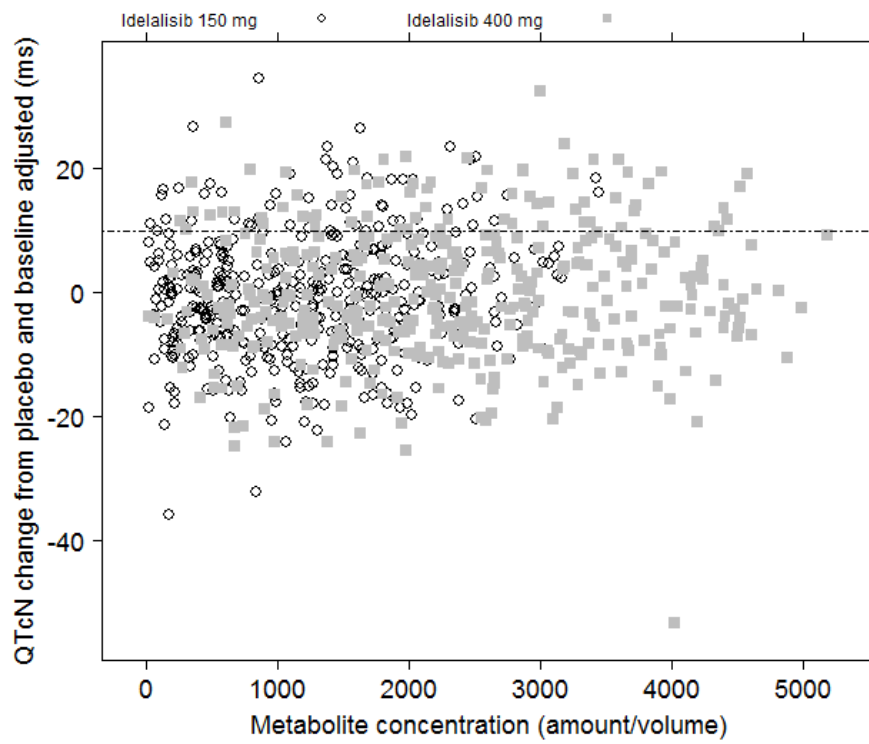


The relationship between  $\Delta\Delta\text{QTcN}$  and idelalisib concentrations is visualized in Figure 7 with no evident exposure-response relationship. The relationship between  $\Delta\Delta\text{QTcN}$  and GS-563117 concentrations is visualized in Figure 8 with no evident exposure-response relationship.

**Figure 7:  $\Delta\Delta$ QTcN vs. Plasma IDELA Concentration**



**Figure 8:  $\Delta\Delta$ QTcN vs. Plasma GS-563117 Concentration (ng/mL)**



## 5.4 CLINICAL ASSESSMENTS

### 5.4.1 Safety assessments

None of the events identified to be of clinical importance per the ICH E 14 guidelines i.e. syncope, seizure, significant ventricular arrhythmias or sudden cardiac death occurred in this study.

### 5.4.2 ECG assessments

Waveforms from the ECG warehouse were reviewed. Measurements were performed on the 'global' presentation of superimposed representative (median) PQRST complexes from all leads. According to ECG warehouse statistics less than 0.2 % of ECGs reported to have significant QT bias, according to the automated algorithm. Overall ECG acquisition and interpretation in this study appears acceptable.

### 5.4.3 PR and QRS Interval

Three subjects had a post-baseline PR > 200 ms ( $\leq 210$  ms). Six subjects had QRS > 110 ms at baseline.

## 6 APPENDIX

### 6.1 HIGHLIGHTS OF CLINICAL PHARMACOLOGY

Therapeutic dose	150 mg twice daily (BID)	
Maximum tolerated dose	A maximum tolerated dose has not been established in humans.	
Principal adverse events	<p>The most frequently reported (<math>\geq 20\%</math> of subjects) AEs among 354 subjects with B-cell malignancies receiving IDELA monotherapy were diarrhea (35.9%), fatigue (31.6%), pyrexia (27.1%), nausea (25.7%), cough (22.6%), and neutropenia (20.3%).</p> <p>In the Phase 1 dose-ranging monotherapy Study 101-02, adverse events which occurred that met the protocol-specified definition of dose-limiting toxicity were: <math>\geq</math> Grade 3 alanine aminotransferase increased, aspartate aminotransferase increased, and liver function test abnormal. However, these events were shown to be transient, reversible, and not dose-limiting since they did not recur in the majority of subjects who were rechallenged with IDELA. Subsequent studies have further demonstrated that the <math>\geq</math> Grade 3 transaminase increases associated with IDELA are manageable with dose interruption until resolution to Grade 1 or less.</p>	
Maximum dose tested	Single Dose	400 mg
	Multiple Dose	350 mg BID
Exposures Achieved at Maximum Tested Dose	Single Dose	400 mg Mean (%CV) $C_{\max}$ : ~3200 (18) ng/mL Mean (%CV) $AUC_{\inf}$ : ~19700 (28) ng•h/mL

	Multiple Dose	350 mg BID: Mean (%CV) $C_{max}$ : ~2860 (26) ng/mL Mean (%CV) $AUC_{tau}$ : ~16300 (23) ng•h/mL
Range of linear PK	IDELA exposures are less than dose-proportional over a range of 17 to 400 mg. Over this 24-fold dose range, $AUC$ and $C_{max}$ increases ~17-fold and ~10-fold, respectively. Upon multiple dose administrations of 50 to 350 mg BID, $AUC_{tau}$ and $C_{max}$ increased in a less than dose-proportional manner (~3.5-3.7-fold) over a 7-fold dose range.	
Accumulation at steady state	IDELA exhibits modest accumulation (1.2-1.8 fold) with BID administration over a dose range of 50 to 200 mg, consistent with its overall pharmacokinetics (PK).	
Metabolites	The biotransformation of IDELA was primarily via oxidation by aldehyde oxidase to its major and only circulating plasma metabolite, GS-563117. Other metabolic pathways involved to a lesser extent include oxidation by CYP3A and glucuronidation by UGT1A4. In plasma, the only two circulating species were IDELA (38%) and GS-563117 (62%). In urine, total radioactivity consisted primarily of IDELA (23%) and GS-563117 (49%). Trace metabolites were also observed (10% or less). In feces, radioactivity was accounted for mainly by IDELA (~12%), GS-563117 (~44%), and other oxidation products. Trace metabolites formed by oxidation and glucuronidation were also observed (6% or less) were also identified.	

Absorption	Absolute/Relative Bioavailability	The absolute bioavailability of IDELA has not been evaluated in humans. The oral bioavailability of IDELA is expected to be moderate to high based on overall PK, including the results from a human mass balance study.
	$T_{max}$	Median (range) for GS-1101: 2.00 (0.50, 4.02) hours Median (range) for GS-563117: 3.00 (1.00, 6.00) hours
Distribution	$V_{ss}/F$	Mean (%CV): ~96 L
	% bound	IDELA: 93-94% bound GS-563117: ~99% bound
Elimination	Route	Primary route: feces, ~78% of dose eliminated Other routes: urine, ~14.4% of dose eliminated
	Terminal $t_{1/2}$	IDELA: ~8.2 hours GS-563117: ~11.6 hours
	CL/F	IDELA: 14.9 L/h GS-563117: 4.4 L/h

Intrinsic Factors	Age	Population PK analyses of IDELA in subjects with hematologic malignancies indicated age did not have an effect on IDELA/GS-563117 PK and was not a clinically relevant covariate.
	Sex	Population PK analyses of IDELA in subjects with hematologic malignancies indicated sex did not have an effect on IDELA/GS-563117 PK and was not a clinically relevant covariate.
	Race	Population PK analyses of IDELA in subjects with hematologic malignancies indicated race did not have an effect on IDELA/GS-563117 PK and was not a clinically relevant covariate.
	Hepatic & Renal Impairment	<p>IDELA <math>C_{max}</math> and AUC increased ~5% and ~27%, respectively, in subjects with severe renal impairment relative to healthy matched controls. These changes were not considered to be clinically meaningful.</p> <p>IDELA <math>C_{max}</math> was generally comparable in subjects with moderate or severe hepatic impairment relative to healthy control subjects; IDELA AUC increased 58-60% in subjects with moderate or severe hepatic impairment relative to healthy matched controls. These changes were not considered to be clinically meaningful.</p>

Extrinsic Factors	Drug interactions	<p>When IDELA 400 mg was coadministered with ketoconazole 400 mg QD, IDELA <math>C_{max}</math> and AUC increased 26% and 79%, respectively.</p> <p>When IDELA 150 mg was coadministered with rifampin 600 mg QD, IDELA <math>C_{max}</math> and AUC decreased 58% and 75%, respectively.</p> <p>When oral midazolam 5 mg was coadministered with IDELA 150 mg BID, midazolam <math>C_{max}</math> and AUC increased 138% and 437%, respectively.</p> <p>When digoxin or rosuvastatin was coadministered with IDELA 150 mg BID, digoxin and rosuvastatin systemic exposures were not affected compared to those observed following their respective administration alone.</p>
	Food Effects	<p>IDELA <math>C_{max}</math> was not different under fed or fasted conditions. IDELA <math>AUC_{inf}</math> was ~36% higher with a high-fat meal relative to fasted condition.</p>
Expected High Clinical Exposure Scenario	<p>Coadministration of IDELA with multiple doses of a highly potent CYP3A4 inhibitor, ketoconazole, resulted in an increase in IDELA <math>C_{max}</math> and <math>AUC_{inf}</math> of 26% and 79%, respectively, indicating that IDELA is not a sensitive substrate of CYP3A4. This is consistent with the metabolic pathway: IDELA was primarily metabolized by aldehyde oxidase and to a lesser extent by CYP3A and by UGT1A4. Clinically relevant drug-drug interactions are not typically associated with aldehyde oxidase, a high capacity pathway. Based on the overall metabolic profile, the less than dose-proportional increases in IDELA exposures and the modestly higher exposures with food, the supratherapeutic 400-mg single dose of IDELA provides IDELA/GS-563117 exposures that cover the unlikely event of additional and/or unexpected drug interactions or overdose.</p>	

a: Information represents data from completed clinical pharmacology studies and population PK analyses

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/s/  
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