

1 TITLE PAGE



VERTEX PHARMACEUTICALS INCORPORATED

Clinical Study Protocol

**A Phase 3, Open-label Study Evaluating the
Long-term Safety and Efficacy of VX-445
Combination Therapy in Subjects With Cystic
Fibrosis Who Are Heterozygous for the *F508del*
Mutation and a Gating or Residual Function Mutation
(F/G and F/RF Genotypes)**

Vertex Study Number: VX18-445-110

IND Number: 132547

EudraCT Number: 2019-000833-37

Date of Protocol: 30 May 2019 (Version 1.0)

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2 PROTOCOL SYNOPSIS

| | |
|---|--|
| Title | A Phase 3, Open-label Study Evaluating the Long-term Safety and Efficacy of VX-445 Combination Therapy in Subjects With Cystic Fibrosis Who Are Heterozygous for the <i>F508del</i> Mutation and a Gating or Residual Function Mutation (F/G and F/RF Genotypes) |
| Brief Title | A Study Evaluating the Long-term Safety and Efficacy of VX-445 Combination Therapy |
| Clinical Phase and Clinical Study Type | Phase 3, safety and efficacy |
| Objectives | <p>Primary Objective</p> <p>To evaluate the long-term safety and tolerability of VX-445/tezacaftor (TEZ)/ivacaftor (IVA) in subjects with cystic fibrosis (CF) who are heterozygous for the <i>F508del</i> mutation and a gating (F/G) or residual function (F/RF) mutation</p> <p>Secondary Objectives</p> <ul style="list-style-type: none"> • To evaluate the long-term efficacy of VX-445/TEZ/IVA • To evaluate the pharmacodynamics (PD) of VX-445/TEZ/IVA |
| Endpoints | <p>Primary Endpoint</p> <p>Safety and tolerability of long-term treatment with VX-445/TEZ/IVA based on adverse events (AEs), clinical laboratory values, ECGs, vital signs, and pulse oximetry</p> <p>Secondary Endpoints</p> <ul style="list-style-type: none"> • Absolute change in percent predicted forced expiratory volume in 1 second (ppFEV₁) • Absolute change in sweat chloride (SwCl) • Absolute change in body mass index (BMI) • Absolute change in BMI z-score • Absolute change in body weight • Absolute change in Cystic Fibrosis Questionnaire-Revised (CFQ-R) respiratory domain (RD) score <p>Exploratory Endpoints</p> <ul style="list-style-type: none"> • Absolute change in CFQ-R non-RD scores • Inflammatory mediators • Blood biomarkers |
| Number of Subjects | Subjects who complete the last Treatment Period visit in the parent study (Study VX18-445-104 [Study 104]) and meet eligibility criteria are eligible to enroll. Approximately 250 subjects are expected to enroll. |
| Study Population | Male and female CF subjects 12 years of age or older with F/G or F/RF genotypes |

Investigational Drug Study drug refers to VX-445/TEZ/IVA and IVA

Study drugs will be orally administered as 2 fixed-dose combination (FDC) film-coated tablets of VX-445/TEZ/IVA in the morning, and 1 film-coated IVA tablet in the evening.

Active substance: VX-445/TEZ/IVA

Activity: VX-445 is a CFTR corrector, TEZ is a CFTR corrector, and IVA is a CFTR potentiator (increased Cl⁻ secretion)

Strength: 100 mg/50 mg/75 mg FDC tablet

Active substance: IVA

Activity: CFTR potentiator (increased Cl⁻ secretion)

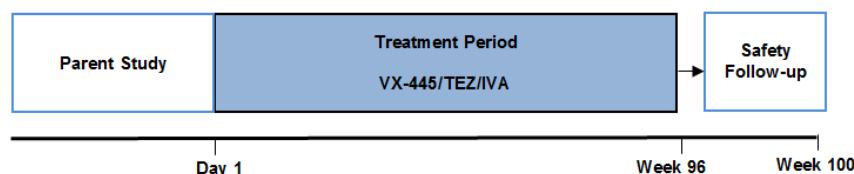
Strength: 150 mg tablet

Study Duration The total study duration is approximately 100 weeks (from the first dose of study drug in this study), including a 96-week Treatment Period and a 4-week Safety Follow-up Period.

Study Design This is a Phase 3, multicenter, open-label study for subjects who completed the last Treatment Period visit in the parent study (Study 104) and meet eligibility criteria (Figure 2-1).

All subjects will receive the triple combination (TC) of VX-445/TEZ/IVA at the same dosage as that evaluated in Study 104.

Figure 2-1 VX18-445-110 Study Design



IVA: ivacaftor; TEZ: tezacaftor
 Note: Parent study refers to Study 104.

Assessments

Safety: AEs, clinical laboratory assessments, ECGs, vital signs, pulse oximetry, physical examinations, and ophthalmologic examinations (for subjects <18 years of age on the date of informed consent in the parent study)

Efficacy: Spirometry, height (for ≤21 years of age), weight, and CFQ-R

PD: SwCl

Exploratory: Inflammatory mediators, blood biomarker samples, and sputum samples

Statistical Analyses The primary objective of the study is the evaluation of the long-term safety and tolerability of VX-445/TEZ/IVA. The safety endpoints of long-term treatment include AEs, clinical laboratory values, ECGs, vital signs, and pulse oximetry from the first dose of study drug in the open-label study, for subjects who received at least 1 dose of study drug in the open-label study. The safety analysis will be descriptive only.

The secondary objective of the study is the evaluation of long-term efficacy and PD of VX-445/TEZ/IVA, as assessed by spirometry, SwCl, BMI, BMI z-score, weight, and CFQ-R. Methods of efficacy analyses will be similar as those used in the parent study.

Interim Analyses Interim analyses (IAs) may take place at any time during the study at the discretion of the sponsor. In the event that the parent study is still ongoing, a limited Vertex team may be unblinded to the treatment assignments in the parent study for the purpose of reviewing the interim results and will not be involved in or influence the conduct of the remaining part of the parent study to protect the integrity of the parent study.

IDMC Reviews The independent data monitoring committee (IDMC) will conduct periodic safety reviews of study data as outlined in the IDMC charter.

3 SCHEDULE OF ASSESSMENTS

The schedule of assessments is in [Table 3-1](#). All visits will be scheduled relative to the Day 1 Visit in this study.

The Cystic Fibrosis Questionnaire–Revised (CFQ-R) must be completed before any other assessment (except signing of the informed consent form [ICF]) at relevant clinic visits. Remaining assessments may be performed in any order when more than 1 assessment is required at a particular time point. All assessments will be performed before study drug dosing (Section [9.6.1](#)), unless noted otherwise.

Table 3-1 VX18-445-110: Treatment Period and Safety Follow-up Visit

| Event/Assessment ^a | Treatment Period | | | | | | | ETT Visit ^b | Safety Follow-up Visit 28 (± 7) Days After Last Dose ^c | Comments |
|---|--------------------|-------------------|-----------------------------------|---|--------------------|-----------------------------|--------------------|------------------------|---|---|
| | Day 1 ^d | Day 15 (± 3 Days) | Weeks 4, 8, 16, 24, 36 (± 5 Days) | Weeks 12, 20, 28, 32, 40, 44, 52, 56, 64, 68, 76, 80, 88, 92 (± 5 Days) | Week 48 (± 5 Days) | Weeks 60, 72, 84 (± 5 Days) | Week 96 (± 5 Days) | | | |
| Clinic visit | X | X | X | | X | X | X | X | X | |
| Telephone contact | | | | X | | | | | | Assess the subject's status, any AEs, concomitant medications, treatments, and procedures |
| ICF and assent (when applicable) | X | | | | | | | | | Section 8 |
| Inclusion and exclusion criteria confirmation | X | | | | | | | | | Section 8 |
| CFQ-R | X | | Weeks 4, 8, 24 | | X | Week 72 | X | X | X | Must be completed before any other assessments (except signing of ICF) at relevant clinic visits (Section 11.5.3) |
| Weight and height | X | X | X | | X | X | X | X | X | Measured with shoes off. Height will be collected only for subjects ≤21 years of age (Section 11.5.2) |

^a All assessments will be performed before study drug dosing (Section 9.6.1), unless noted otherwise.

^b If the subject prematurely discontinues study drug treatment, an ETT Visit should be scheduled as soon as possible after the decision to discontinue treatment (Section 9.1.3).

^c The Safety Follow-up Visit is required for all subjects. Refer to Section 9.1.2 for subjects who transition to a commercially available or managed access program-supplied next-generation corrector TC regimen. For subjects who complete an ETT Visit 3 weeks or later following the last dose of study drug, the ETT Visit will replace the Safety Follow-up Visit (Section 9.1.3).

^d The Day 1 Visit of this study should be on the same day as the last scheduled visit of the parent study. Subjects whose Day 1 Visit is NOT within 1 day of the last scheduled visit in the Treatment Period of the parent study will have all Day 1 assessments performed (Section 9.1.1). Subjects whose Day 1 Visit is within 1 day of the last scheduled visit in the Treatment Period of the parent study will NOT have to repeat assessments that were performed as part of the last scheduled visit of the parent study Treatment Period.

Table 3-1 VX18-445-110: Treatment Period and Safety Follow-up Visit

| Event/Assessment ^a | Treatment Period | | | | | | | ETT Visit ^b | Safety Follow-up Visit 28 (± 7) Days After Last Dose ^c | Comments |
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| OE | | | | | X | | X | X | | Subjects <18 years of age on the date of informed consent in the parent study will have an OE within 28 days of the Week 48 and Week 96 Visits. In addition, an OE will be performed within 28 days of the ETT Visit for subjects whose cumulative study drug exposure (in the parent study and current study) is at least 12 weeks since their last study OE. (Section 11.6.6) |
| Complete physical examination | X | | | | | | X | X | | Section 11.6.3 |
| Pregnancy test (all female subjects) | Urine | | Urine | Urine | Urine | Urine | Serum | Serum | Serum | At telephone contact visits, a urine pregnancy test will be performed with a home kit provided by the study site (Section 11.6.2) |
| Serum FSH | | | | | | | | | | As needed for any suspected postmenopausal female with at least 12 months of continuous spontaneous amenorrhea (Section 11.6.2) |

Table 3-1 VX18-445-110: Treatment Period and Safety Follow-up Visit

| Event/Assessment ^a | Treatment Period | | | | | | | ETT Visit ^b | Safety Follow-up Visit 28 (± 7) Days After Last Dose ^c | Comments |
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| | Day 1 ^d | Day 15 (± 3 Days) | Weeks 4, 8, 16, 24, 36 (± 5 Days) | Weeks 12, 20, 28, 32, 40, 44, 52, 56, 64, 68, 76, 80, 88, 92 (± 5 Days) | Week 48 (± 5 Days) | Weeks 60, 72, 84 (± 5 Days) | Week 96 (± 5 Days) | | | |
| Standard 12-lead ECG | X | X | Weeks 4, 8, 24 | | X | Week 72 | X | X | X | After subjects have rested for at least 5 minutes and before dosing, as applicable (Sections 11.6.3, 11.6.4, and 11.6.5) |
| Vital signs | X | X | X | | X | X | X | X | X | |
| Pulse oximetry | X | X | X | | X | X | X | X | X | |
| Spirometry | X | X | X | | X | X | X | X | X | Before dosing, as applicable, and should be performed pre-bronchodilator (Section 11.5.1) |
| SwCl | X | X | Weeks 4, 8, 24 | | X | Week 72 | X | X | | Must occur before dosing. At each time point, 2 samples will be collected, 1 from each arm (left and right) (Section 11.3). |
| Urinalysis | X | | | | Week 48 | | X | X | | Section 11.6.2 |
| Hematology | X | X | X | | X | X | X | X | X | Section 11.6.2 |
| Coagulation | X | | Weeks 4, 24 | | X | Week 72 | X | X | X | Section 11.6.2 |
| Serum chemistry | X | X | X | | X | X | X | X | X | Section 11.6.2 |
| Inflammatory mediator samples | X | | Weeks 4, 24 | | | | X | X | | Section 11.4.1 |
| Blood biomarker samples | X | | Weeks 4, 24 | | | | X | X | | Section 11.4.2 |
| Blood sample for RNA | X | | Weeks 4, 24 | | | | X | X | | Section 11.4.2 |
| Sputum samples | X | | Weeks 4, 24 | | | | X | X | | Collected from subjects who can produce a sample spontaneously (Section 11.4.3) |
| Study drug count | X | X | X | | X | X | X | X | | Section 10.6 |

Table 3-1 VX18-445-110: Treatment Period and Safety Follow-up Visit

| Event/Assessment ^a | Treatment Period | | | | | | | ETT Visit ^b | Safety Follow-up Visit 28 (± 7) Days After Last Dose ^c | Comments |
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| | Day 1 ^d | Day 15 (± 3 Days) | Weeks 4, 8, 16, 24, 36 (± 5 Days) | Weeks 12, 20, 28, 32, 40, 44, 52, 56, 64, 68, 76, 80, 88, 92 (± 5 Days) | Week 48 (± 5 Days) | Weeks 60, 72, 84 (± 5 Days) | Week 96 (± 5 Days) | | | |
| Study drug dosing | Day 1 through evening before Week 96 Visit | | | | | | | | | Section 9.6.1 |
| Medications review | Continuous from signing of the ICF through completion of study participation | | | | | | | | | Completion of study participation is defined in Section 9.1.5 |
| Treatments and procedures review | | | | | | | | | | |
| AEs and SAEs | Continuous from signing of the ICF through completion of study participation | | | | | | | | | Sections 13.1.1.3 and 13.1.2.2 |

AE: adverse event; CFQ-R: Cystic Fibrosis Questionnaire-Revised; ETT: Early Termination of Treatment; FSH: follicle-stimulating hormone; ICF: informed consent form; OE: ophthalmologic examination; SAE: serious adverse event; SwCl: sweat chloride; TC: triple combination

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List of Abbreviations

| Abbreviation | Definition |
|------------------------|--|
| AE | adverse event |
| ALT | alanine transaminase |
| AST | aspartate transaminase |
| BMI | body mass index |
| bpm | beats per minute |
| CF | cystic fibrosis |
| CFQ-R | Cystic Fibrosis Questionnaire-Revised |
| CFTR | CF transmembrane conductance regulator protein |
| <i>CFTR</i> | CF transmembrane conductance regulator gene |
| Cl ⁻ | chloride ion |
| CRF | case report form |
| CSR | clinical study report |
| CTCAE | Common Terminology Criteria for Adverse Events |
| CYP | cytochrome P450 |
| ECG | electrocardiogram |
| EDC | electronic data capture |
| ETT | Early Termination of Treatment |
| EU | European Union |
| F/F | homozygous for <i>F508del</i> |
| F/G | heterozygous for <i>F508del</i> and a gating mutation |
| F/MF | heterozygous for <i>F508del</i> with a second CFTR allele carrying a minimal function mutation that is not responsive to TEZ, IVA, and TEZ/IVA |
| F/RF | heterozygous for <i>F508del</i> and a residual function mutation |
| <i>F508del</i> | <i>CFTR</i> gene mutation with an in-frame deletion of a phenylalanine codon corresponding to position 508 of the wild-type protein |
| F508del | CFTR protein lacking the phenylalanine normally found at position 508 of the wild-type protein |
| FDA | Food and Drug Administration |
| FDC | fixed-dose combination |
| FEF _{25%-75%} | forced expiratory flow, midexpiratory phase |
| FEV ₁ | forced expiratory volume in 1 second |
| FSH | follicle-stimulating hormone |
| FVC | forced vital capacity |
| GCP | Good Clinical Practice |
| GPS | Global Patient Safety |
| HIPAA | Health Insurance Portability and Accountability Act |
| HR | heart rate |
| IA | interim analysis |
| ICF | informed consent form |
| ICH | International Council for Harmonization |
| IDMC | independent data monitoring committee |
| IEC | independent ethics committee |
| IND | Investigational New Drug (application) (US) |
| IPD | important protocol deviation |
| IRB | institutional review board |

| Abbreviation | Definition |
|---------------------|--|
| IVA | ivacaftor |
| LUM | lumacaftor |
| max | maximum value |
| MedDRA | Medical Dictionary for Regulatory Activities |
| MF | minimal function |
| min | minimum value |
| MMRM | mixed-effects model for repeated measures |
| OATP1B1 | organic anion transporting polypeptide 1B1 |
| OL-FAS | Open-label Full Analysis Set |
| OL-SS | Open-label Safety Set |
| PD | pharmacodynamic, pharmacodynamics |
| P-gp | P-glycoprotein |
| PK | pharmacokinetic, pharmacokinetics |
| ppFEV ₁ | percent predicted forced expiratory volume in 1 second |
| PR | PR interval, segment |
| PT | Preferred Term |
| QRS | the portion of an ECG comprising the Q, R, and S waves, together representing ventricular depolarization |
| QT | QT interval |
| QTc | QT interval corrected |
| QTcF | QT interval corrected by Fridericia's formula |
| RD | respiratory domain |
| RF | residual function |
| RNA | ribonucleic acid |
| RR | interval from the onset of 1 QRS complex to the next |
| SAE | serious adverse event |
| SAP | statistical analysis plan |
| SD | standard deviation |
| SI | SI units (International System of Units) |
| SOC | System Organ Class |
| SUSAR | suspected, unexpected, serious adverse reaction |
| SwCl | sweat chloride |
| TC | triple combination |
| TE | treatment-emergent |
| TEAE | treatment-emergent adverse event |
| TEZ | tezacaftor |
| ULN | upper limit of normal |
| US | United States |

5 INTRODUCTION

5.1 Background

Cystic fibrosis (CF) is an autosomal recessive chronic disease with serious morbidities and frequent premature mortality. CF affects more than 70,000 individuals worldwide¹ (approximately 30,000 in the US² and 45,000 in the EU³). Based on its prevalence, CF qualifies as an orphan disease.^{4,5}

CF is caused by decreased quantity and/or function of the CFTR protein due to mutations in the *CFTR* gene.⁶ CFTR is an ion channel that regulates the flow of chloride and other ions across epithelia in various tissues, including the lungs, pancreas and other gastrointestinal organs, and sweat glands.⁷ Decreased CFTR quantity or function results in the failure to regulate chloride transport in these tissues leading to the multisystem pathology associated with CF.⁸ In the lungs, obstruction of airways with thick mucus, establishment of a chronic bacterial infection in the airways, and damaging inflammatory responses are all thought to play a role in causing irreversible structural changes in the lungs, leading to respiratory failure. Progressive loss of lung function is the leading cause of mortality.⁹

The most common disease-causing *CFTR* mutation is *F508del*, which accounts for approximately 70% of the identified alleles in people with CF.¹⁰ Approximately 40% to 45% of people with CF are homozygous for *F508del* (F/F), and approximately 85% have at least 1 *F508del* allele.^{2,3}

Based on the understanding of the molecular defects caused by *CFTR* mutations, 2 complementary approaches have been developed to address the decreased quantity and/or function of CFTR in order to enhance chloride transport in patients with CF. Correctors facilitate the cellular processing and trafficking to increase the quantity of CFTR at the cell surface. Potentiators increase the channel open probability (channel gating activity) of the CFTR protein delivered to the cell surface to enhance ion transport. With differing mechanisms of action, a combination of correctors and potentiators increases *F508del* CFTR-mediated chloride transport more than either type of modulator alone.

The therapeutic activity of CFTR modulators has been established with products developed by Vertex and approved for the treatment of CF: ivacaftor (IVA) monotherapy (Kalydeco™), lumacaftor (LUM)/IVA (Orkambi®), and tezacaftor (TEZ)/IVA (Symdeko™/Symkevi®).

VX-445 is a next-generation CFTR corrector. In vitro, the triple combination (TC) of VX-445, TEZ, and IVA (VX-445/TEZ/IVA) increased CFTR chloride transport more than any of the dual combinations (VX-445/TEZ, VX-445/IVA, and TEZ/IVA) or individual components (VX-445, TEZ, and IVA) when added to human bronchial epithelial (HBE) cells derived from 2 groups of CF patients: those heterozygous for *F508del* with a second *CFTR* allele carrying a minimal function (MF) mutation that is not responsive to TEZ, IVA, and TEZ/IVA (F/MF genotypes); and those homozygous for *F508del* (F/F genotypes).

Additional information about VX-445/TEZ/IVA can be found in the Investigator's Brochure.

5.2 Study Rationale

This study will provide data on the long-term safety, efficacy, and durability of VX-445/TEZ/IVA in CF subjects who are heterozygous for the *F508del* mutation and a gating (F/G) or residual function (F/RF) mutation.

6 STUDY OBJECTIVES

6.1 Primary Objective

To evaluate the long-term safety and tolerability of VX-445/TEZ/IVA in subjects with CF who are heterozygous for the *F508del* mutation and a gating (F/G) or residual function (F/RF) mutation

6.2 Secondary Objectives

- To evaluate the long-term efficacy of VX-445/TEZ/IVA
- To evaluate the pharmacodynamics (PD) of VX-445/TEZ/IVA

7 STUDY ENDPOINTS

7.1 Primary Endpoint

Safety and tolerability of long-term treatment with VX-445/TEZ/IVA based on adverse events (AEs), clinical laboratory values, ECGs, vital signs, and pulse oximetry.

7.2 Secondary Endpoints

- Absolute change in percent predicted forced expiratory volume in 1 second (ppFEV₁)
- Absolute change in sweat chloride (SwCl)
- Absolute change in body mass index (BMI)
- Absolute change in BMI z-score
- Absolute change in body weight
- Absolute change in CFQ-R respiratory domain (RD) score

7.3 Exploratory Endpoints

- Absolute change in CFQ-R non-RD scores
- Inflammatory mediators
- Blood biomarkers

8 STUDY POPULATION

Eligibility will be reviewed and documented by an appropriately qualified member of the investigator's team before subjects are enrolled.

Subjects who meet all of the inclusion criteria and none of the exclusion criteria will be eligible. In the criteria below, "parent study" refers to Study VX18-445-104 (Study 104).

8.1 Inclusion Criteria

1. Subject (or his or her legally appointed and authorized representative) will sign and date an ICF, and, when appropriate, an assent form.
2. Willing and able to comply with scheduled visits, treatment plan, study restrictions, laboratory tests, contraceptive guidelines, and other study procedures.
3. Did not withdraw consent from the parent study.
4. Meets at least 1 of the following criteria:
 - Completed study drug treatment in the parent study.
 - Had study drug interruption(s) in the parent study, but without prematurely discontinuing study drug in the parent study and completed study visits up to the last scheduled visit of the Treatment Period of the parent study.
5. Willing to remain on a stable CF treatment regimen (as defined in Section 9.5) through completion of study participation.

8.2 Exclusion Criteria

1. History of any illness or any clinical condition that, in the opinion of the investigator, might confound the results of the study or pose an additional risk in administering study drug to the subject.
2. Pregnant and breast-feeding females. All female subjects, regardless of childbearing potential status, must have a negative pregnancy test at the Day 1 Visit before receiving the first dose of study drug.
3. History of drug intolerance in the parent study that would pose an additional risk to the subject in the opinion of the investigator (e.g., subjects with a history of allergy or hypersensitivity to the study drug).
4. Current participation in an investigational drug study (other than the parent study). Participation in a non-interventional study (including observational studies, registry studies, and studies requiring blood collections without administration of study drug) and screening for another Vertex study is permitted.

9 STUDY IMPLEMENTATION

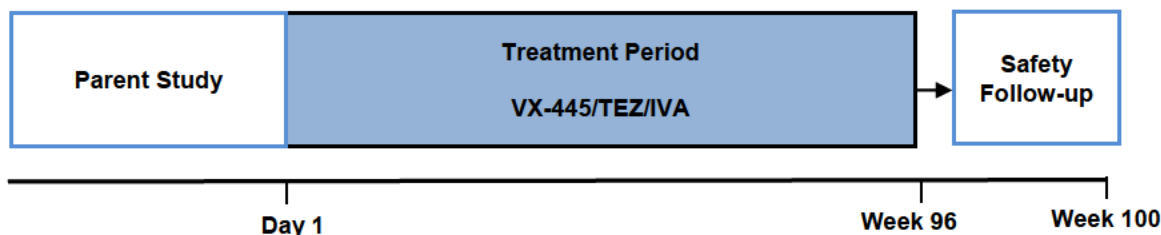
9.1 Study Design

This is a Phase 3, multicenter, open-label study for subjects who completed the last Treatment Period visit in the parent study (Study 104) and meet eligibility criteria (see Section 8). A schematic of the study design is shown in [Figure 9-1](#).

All subjects will receive VX-445/TEZ/IVA at the same dosage as that evaluated in Study 104. Study drug administration is described in Section 9.6.

Study visits and assessments to be conducted are shown in [Table 3-1](#). All visits will occur within the windows specified.

Study drug is defined in Section 10.

Figure 9-1 VX18-445-110 Study Design

IVA: ivacaftor; TEZ: tezacaftor

Notes: Parent study refers to Study 104. The timing of the Day 1 Visit, relative to the last scheduled visit of the parent study, is detailed in Section 9.1.1. The figure is not drawn to scale.

9.1.1 Treatment Period

Treatment Period assessments are listed in [Table 3-1](#).

Subjects will receive the first dose of study drug on Day 1 after obtaining informed consent (and assent, when applicable), confirming eligibility, and completing any pre-dose assessments. Subjects who enroll in this study on a study drug interruption will NOT receive the first dose of study drug until they meet the resumption criteria in [Section 9.8](#); before receiving study drug, subjects will repeat all Day 1 assessments.

Study drug administration details are provided in [Section 9.6](#).

The Day 1 Visit of this study should be on the same day as the last scheduled visit of the parent study.

Subjects whose Day 1 Visit is NOT within 1 day of the last scheduled visit in the Treatment Period of the parent study will have all Day 1 assessments performed.

Subjects whose Day 1 Visit is within 1 day of the last scheduled visit in the Treatment Period of the parent study will NOT have to repeat assessments that were performed as part of the last scheduled visit of the parent study Treatment Period.

9.1.2 Safety Follow-up

The Safety Follow-up Visit is scheduled to occur 28 (\pm 7) days after the last dose of study drug. The Safety Follow-up Visit assessments are listed in [Table 3-1](#).

The Safety Follow-up Visit is required for all subjects. However, subjects who transition within 28 days of the last dose of study drug to either a commercially available or managed access program-supplied next-generation corrector TC regimen, or to another qualified Vertex study, will complete the Week 96 Visit (or the Early Termination of Treatment [ETT] Visit, if the transition occurs before the Week 96 Visit). In these cases, the Week 96 Visit (or the ETT Visit) will replace the Safety Follow-up Visit.

For subjects who complete an ETT Visit 3 weeks or later following the last dose of study drug, the ETT Visit will replace the Safety Follow-up Visit ([Section 9.1.3](#)).

9.1.3 Early Termination of Treatment

If a subject prematurely discontinues study drug treatment, an ETT Visit should be scheduled as soon as possible after the decision to discontinue treatment.

If the ETT Visit occurs 3 weeks or later following the last dose of study drug, then the ETT Visit will replace the Safety Follow-up Visit, and a separate Safety Follow-up Visit will not be required.

During the course of study conduct, if local health authorities decline to approve the TC of VX-445/TEZ/IVA, or if clinical benefit is not demonstrated for the use of the TC for the treatment of CF in specific subpopulations enrolled in this study, subjects with the relevant *CFTR* genotypes may be discontinued after communication to investigators and IRBs/IECs of the risks/benefits related to the safety and efficacy observed for the relevant subset of subjects.

If a subject withdraws from the study and also withdraws consent or assent, no further assessments will be performed. Vertex may retain and continue to use any data and samples collected before such withdrawal of consent or assent.

9.1.4 Lost to Follow-up

A subject will be considered lost to follow-up if both of the following occur:

- The subject misses 2 consecutive study visits (telephone contact and/or clinic visit) and is subsequently unable to be contacted by telephone (3 documented attempts by telephone within 2 weeks following the second missed visit)
- The subject does not respond within 2 weeks to a registered letter sent after the 3 attempted telephone contacts.

9.1.5 Completion of Study Participation

Completion of study participation for each individual subject is defined as: the Safety Follow-up Visit; or, in situations in which the ETT Visit or the Week 96 Visit replace the Safety Follow-up Visit (Section 9.1.2), the ETT Visit or the Week 96 Visit.

If subjects withdraw consent or assent, completion of study participation is defined as date of withdrawal of consent or assent, whichever is earlier (Section 9.9).

If subjects are lost to follow-up (Section 9.1.4), the date of completion of study participation will be defined as the date of last contact.

The end of study is defined in Section 13.2.8.

9.1.6 Independent Data Monitoring Committee

This study will be monitored by an independent data monitoring committee (IDMC), which will conduct periodic safety reviews of study data (Section 12.3.6.2). Procedural details of the IDMC's structure and function, frequency of meetings, and data planned for review will be included in the IDMC charter. The IDMC charter will be finalized before the first subject is enrolled.

9.2 Method of Assigning Subjects to Treatment Groups

This is an open-label study. Randomization is not required because all subjects will be treated identically in a single cohort.

9.3 Rationale for Study Elements

9.3.1 Study Design and Population

This Phase 3 study will enroll subjects who completed the last Treatment Period visit in the parent study of VX-445/TEZ/IVA and meet eligibility criteria. Results from this study will provide information on the long-term safety and efficacy of TC treatment with VX-445/TEZ/IVA in CF subjects 12 years of age or older with F/G or F/RF genotypes, as per the population enrolled in the parent study.

9.3.2 Study Drug Dose and Duration

All subjects will receive VX-445/TEZ/IVA at the same dosage as that in the parent study (Study 104).

The overall treatment duration will be 96 weeks. This duration was employed in open-label extension studies for previously approved CFTR modulators, Kalydeco and Orkambi, and is considered sufficient for the evaluation of long-term safety and efficacy.

9.3.3 Rationale for Study Assessments

The safety, efficacy, and PD assessments are standard parameters for clinical studies in drug development and are generally recognized as reliable, accurate, and relevant to the study of CF subjects. Baseline and follow-up ophthalmologic examinations (OEs) are recommended for monitoring of CF subjects <18 years of age treated with regimens that contain IVA, therefore OEs have been included in the standard safety assessments for those who were <18 years of age on the date of informed consent in the parent study.

Obstruction of airways with thick mucus, chronic bacterial infection of the airways, and inflammatory response all play a role in causing lung damage in CF. Therefore, assessments of inflammatory mediators and other blood biomarkers are included.

9.4 Study Restrictions

9.4.1 Prohibited Medications

Table 9-1 lists prohibited medications. A non-exhaustive list of study prohibitions and cautions for medication will be provided in the Study Reference Manual. Guidance for concomitant medications is provided in Section 9.5.

Table 9-1 Prohibited Medications

| Medication | Timing of Restriction | | Rationale |
|--|--|--|---|
| | Start of Restriction | End of Restriction | |
| Moderate and strong CYP3A inducers | None allowed within 14 days before the first dose of study drug on Day 1 | None allowed through completion of study participation | VX-445, TEZ, and IVA are metabolized extensively via CYP3A4. Therefore, use of moderate and strong inducers and inhibitors of CYP3A, which have the potential to alter the exposure of VX-445, TEZ, or IVA, will be prohibited. |
| Moderate and strong CYP3A inhibitors (except ciprofloxacin) ^a | None allowed within 14 days before the first dose of study drug on Day 1 | None allowed through completion of study participation | |

Table 9-1 Prohibited Medications

| Medication | Timing of Restriction | | Rationale |
|--|---|--|--|
| | Start of Restriction | End of Restriction | |
| CFTR modulators (investigational or approved), except for study drugs in the parent study and this study | None allowed within 28 days or 5 terminal half-lives (whichever is longer) before the first dose of study drug on Day 1 | None allowed until after the last dose of study drug | These agents may confound the results of this study. |

IVA: ivacaftor; TEZ: tezacaftor

^a Ciprofloxacin is not a moderate CYP3A inhibitor on the basis of results of a drug-drug interaction study conducted with IVA, a sensitive CYP3A substrate (Kalydeco [ivacaftor] US Package Insert).

9.5 Prior and Concomitant Medications

Information regarding prior and concomitant medications, including CF medications, other medications, and herbal and naturopathic remedies, will be collected in each subject's source documentation for medications taken within the 56 days before the first dose of study drug in this study through completion of study participation, as defined in Section 9.1.5.

- Subjects should remain on a stable treatment regimen for their CF through completion of study participation. Stable treatment regimen is defined as the current treatment regimen for CF that subjects have been following for at least 28 days before Day 1. Subjects should not initiate long-term treatment with new medication from 28 days before the Day 1 Visit through completion of study participation. Subjects who are taking inhaled tobramycin or other chronically inhaled antibiotics should remain on that regimen throughout the study.
- Subjects may receive doses of prednisone or prednisolone of up to 10 mg/day chronically, or up to 60 mg daily for up to 5 days.
- VX-445 may inhibit OATP1B1 and OATP1B3, which may increase the exposure of medicinal products that are substrates for these transporters. Substrates such as statins, glyburide, nateglinide, and repaglinide should be used with caution.
- IVA is a weak inhibitor of P-glycoprotein (P-gp). Administration of IVA may increase systemic exposure of medicinal products that are sensitive substrates of P-gp, which may increase or prolong their therapeutic effect and adverse reactions. Digoxin or other substrates of P-gp with a narrow therapeutic index, such as cyclosporine, everolimus, sirolimus, and tacrolimus, should be used with caution and appropriate monitoring.
- IVA may inhibit CYP2C9; therefore during coadministration with warfarin, additional monitoring of the international normalized ratio is recommended. Other medicinal products that are CYP2C9 substrates for which exposure may be increased include glimepiride and glipizide; these should be used with caution.
- Information about bronchodilator use during the study will be collected and documented. Subjects who are using a bronchodilator must have their spirometry assessments performed according to the guidelines provided in Section 11.5.1.

9.6 Administration

9.6.1 Dosing

Study drug will be administered orally. Additional information is provided in the Pharmacy Manual.

Study drug should be administered with a fat-containing meal or snack, such as a standard “CF” meal or snack, or a standard meal.

1. It is recommended that the dose be taken within 30 minutes of the start of the meal or snack.
2. Study drug will be administered as 2 fixed-dose combination (FDC) TC tablets in the morning and 1 IVA tablet in the evening. For each subject, doses of study drug should be taken at approximately the same time (± 2 hours) each day.
3. On days of scheduled visits, the morning dose of TC will be administered at the site after predose assessments have been completed. A meal or snack will be provided by the site for the morning dose of TC.
4. If a subject’s scheduled visit is to occur in the afternoon, the following guidelines should be used:
 - If the dose in the clinic will be within 6 hours of the subject’s scheduled morning dose, the subject should withhold their morning dose of TC and the morning dose of TC will be administered in the clinic.
 - If the dose in the clinic will be more than 6 hours after the subject’s scheduled morning dose of TC, the subject should take the morning dose of TC at home.
5. Subjects will be instructed to bring all used and unused materials associated with the study drug to the site; study drug will be dispensed at each visit, as appropriate.

9.6.2 Missed Doses

If 6 hours or less have passed since the missed morning or evening dose, the subject should take the missed dose as soon as possible and continue on the original schedule.

Morning dose: If more than 6 hours have passed since the missed **morning** dose, the subject should take the missed dose as soon as possible and should not take the evening dose.

Evening dose: If more than 6 hours have passed since the missed **evening** dose, the subject should not take the missed dose. The next scheduled morning dose should be taken at the usual time.

Morning and evening doses should not be taken at the same time.

9.7 Dose Modification for Toxicity

No dose modifications for toxicity are allowed. Treatment may be interrupted as outlined in Section 9.8. If any unacceptable toxicity arises, individual subjects will discontinue dosing (Section 9.1.3).

9.8 Study Drug Interruption and Stopping Rules

In subjects who have interrupted study drug for >72 hours for any reason, the investigator should resume study drug only after a thorough investigation of the cause for interruption. The

investigator will evaluate the subject's clinical stability and should consider resumption of study drug only after the subject is clinically stable and there is no comorbidity or condition that, in the opinion of the investigator, might confound the results of the study or pose an additional risk in administering study drug to the subject.

The medical monitor should be notified of an interruption of study drug that lasts >72 hours for any reason and of the resumption of study drug after such interruption. The medical monitor should be notified of any plan to discontinue study drug.

9.8.1 Liver Function Tests

The central laboratory will notify the medical monitor of alanine transaminase (ALT) or aspartate transaminase (AST) $>3 \times$ upper limit of normal (ULN) and total bilirubin $>2 \times$ ULN that are derived from centrally submitted samples.

Subjects with new treatment-emergent ALT or AST elevations of $>3 \times$ ULN, with or without total bilirubin $>2 \times$ ULN, must be followed closely, including confirmatory testing performed by the central laboratory within 48 to 72 hours of the initial finding and subsequent close monitoring of ALT, AST, and bilirubin levels, as clinically indicated.

If a subject cannot return to the site for confirmatory testing, a local laboratory may be used. Local laboratory results must be reported immediately to the medical monitor, and the subject must have the tests repeated and sent to the central laboratory as soon as possible (ideally within 48 to 72 hours).

Study drug administration **must be interrupted** immediately (prior to confirmatory testing) if any of the following criteria are met:

- ALT or AST $>8 \times$ ULN
- ALT or AST $>5 \times$ ULN for more than 2 weeks
- ALT or AST $>3 \times$ ULN, in association with total bilirubin $>2 \times$ ULN and/or clinical jaundice

A thorough investigation of potential causes should be conducted, and the subject should be followed closely for clinical progression.

Study drug administration **must be discontinued** if the following criterion is met:

- Subsequent ALT or AST values confirm the initial elevation that satisfied the interruption rule (above), and no convincing alternative etiology (e.g., acetaminophen use, viral hepatitis, alcohol ingestion) is identified, regardless of whether transaminase levels have improved.

All subjects in whom treatment is discontinued for elevated transaminases (and bilirubin, as applicable) should have these levels monitored closely until levels normalize or return to baseline.

If an alternative, reversible cause of transaminase elevation with or without increased bilirubin or clinical jaundice has been identified, study drug administration may be resumed once transaminases return to baseline or are $\leq 2 \times$ ULN, whichever is higher. Regardless of the duration of interruption, the medical monitor should be notified prior to resumption of study drug. Upon resumption of study drug, transaminases and bilirubin should be assessed weekly for 4 weeks. If a protocol-defined transaminase elevation interruption threshold recurs within 4 weeks of rechallenge with the study drug (with confirmation of the initial elevation by repeat

testing within 48 to 72 hours), then the study drug must be permanently discontinued, regardless of the presumed etiology.

9.8.2 Rash

Individuals who develop generalized rash will be monitored closely. Study drug dosing should be interrupted if a subject develops a generalized rash of Grade 3 or higher, or a rash that is considered a serious adverse event (SAE). The investigator will notify the medical monitor of any rash that results in interruption of study drug, is Grade 3 or higher (Section 13.1.1.4), or is an SAE. Investigators should consider additional evaluation including laboratory testing (e.g., complete blood count with differential, liver function test), photographs of the rash, and dermatology consultation. The investigator may consider resumption of study drug if considered clinically appropriate.

9.9 Removal of Subjects

Subjects may withdraw from the study at any time at their own request. Subjects may be withdrawn from study drug treatment at any time at the discretion of the investigator or Vertex for safety, behavior, noncompliance with study procedures, or administrative reasons.

In addition, a subject must be discontinued from study drug treatment if the subject meets any of the following criteria:

- Meets any of the stopping (discontinuation) criteria (Section 9.8)
- Becomes pregnant (Section 11.6.7.2)

If a subject does not return for a scheduled visit, reasonable effort will be made to contact the subject. In any circumstance, reasonable effort will be made to document subject outcome. The investigator will inquire about the reason for withdrawal, request that the subject return all unused investigational product(s), request that the subject return for an ETT Visit and Safety Follow-up Visit, if applicable (see Section 9.1.3), and follow up with the subject regarding any unresolved AEs.

If a subject withdraws consent or assent for the study, no further assessments will be performed. Vertex may retain and continue using the study data and samples after the study ends, and may use the samples and information in the development of the study compounds, for other drugs and diagnostics, in publications and presentations, and for education purposes. If a subject withdraws from the study, the study data and samples collected will remain part of the study. A subject will not be able to request the withdrawal of his or her information from the study data. A subject may request destruction of the samples collected from him or her during the study as long as those samples can be identified as his or her samples.

With the exception of subjects who cannot access the commercial product after regulatory approval because reimbursement by the subject's insurance carrier (whether government or private payer) is not yet available or because the subject lacks insurance coverage, subjects who become eligible to receive commercially available TC by prescription of a physician may be discontinued from study drug dosing and will complete the ETT Visit before beginning commercially available TC dosing. The Safety Follow-up Visit will not be required if the subject immediately continues on commercially available TC.

If evaluation of efficacy data from the parent study suggests that the VX-445/TEZ/IVA treatment does not provide clinically meaningful benefit for subsets of subjects included in these studies,

Vertex may recommend that subjects with relevant genotypes discontinue from the study. In addition, if local health authorities decline to approve VX-445/TEZ/IVA, or if clinical benefit is not demonstrated for the use of VX-445/TEZ/IVA for the treatment of CF in specific subpopulations enrolled in this study, subjects with the relevant *CFTR* genotypes may be discontinued after communication to investigators and IRBs/IECs of the risks/benefits related to the safety and efficacy observed for the relevant subset of subjects.

9.10 Replacement of Subjects

Subjects who withdraw or are withdrawn during the study drug Treatment Period will not be replaced.

10 STUDY DRUG INFORMATION AND MANAGEMENT

Study drug refers to VX-445/TEZ/IVA and IVA.

10.1 Preparation and Dispensing

Study drug may be dispensed only under the supervision of the investigator or an authorized designee and only for administration to the study subjects.

10.2 Packaging and Labeling

Study drug tablets will be supplied in blister cards by Vertex. Study drug labeling will be in compliance with applicable local and national regulations. Additional details regarding packaging, labeling, and dispensing for study drug will be in the Pharmacy Manual.

10.3 Study Drug Supply, Storage, and Handling

VX-445/TEZ/IVA will be supplied as FDC film-coated tablets containing 100 mg VX-445, 50 mg TEZ, and 75 mg IVA (Table 10-1).

IVA will be supplied as a film-coated tablet containing 150 mg IVA (Table 10-1).

Blister cards must be stored under conditions noted in the Pharmacy Manual. The investigator, or an authorized designee (e.g., a licensed pharmacist), will ensure that all investigational product is stored in a secured area, under recommended storage conditions, and in accordance with applicable regulatory requirements. To ensure adequate records, all study drugs will be accounted for via the drug accountability forms as instructed by Vertex.

Table 10-1 Study Drug: Dosing Form/Route/Strength

| Drug Name, Dosing Form, Route | Tablet Strength |
|----------------------------------|-----------------|
| VX-445/TEZ/IVA, FDC tablet, oral | |
| VX-445 | 100 mg |
| TEZ | 50 mg |
| IVA | 75 mg |
| IVA, tablet, oral | 150 mg |

FDC: fixed-dose combination; IVA: ivacaftor; TEZ: tezacaftor

10.4 Drug Accountability

The pharmacist or designated study site staff will maintain information regarding the dates and amounts of (1) study drug received; (2) study drug dispensed to the subjects; and (3) study drug

returned by the subjects. Subjects will be instructed to return all used and unused materials associated with the study drug to the site. These materials will be retained at the site according to instructions provided by Vertex or its designee. The study monitor will review study drug records and inventory throughout the study.

If a site uses a site-specific drug accountability system and/or process, including processes associated with the destruction of returned materials, the process must be documented and approved by Vertex. The study monitor must review the drug accountability documentation on a regular basis. The study monitor will promptly communicate to Vertex any discrepancies he or she is unable to resolve with the site.

10.5 Disposal, Return, or Retention of Unused Drug

The study site staff or pharmacy personnel will retain all materials returned by the subjects until the study monitor has performed drug accountability. The investigator will ensure that the materials are destroyed in compliance with applicable environmental regulations, institutional policy, and any special instructions provided by Vertex. Destruction will be adequately documented.

10.6 Compliance

To ensure treatment compliance, the investigator or designee will supervise all study drug dosing that occurs at the site. At each visit, site personnel will review that the subject is compliant with study drug dosing and remind the subject of study drug dosing requirements. Compliance will also be assessed by ongoing study drug count.

If a subject demonstrates continued noncompliance of study drug dosing despite educational efforts, the investigator should consider discontinuing the subject from the study.

10.7 Blinding and Unblinding

This will be an open-label study. However, subjects (and their parents/caregivers/companions) should not be informed of their study-related spirometry and SwCl results until Vertex has determined that the study has completed (i.e., clinical study report [CSR] finalization). Individual SwCl test results will also not be disclosed to the study sites. In addition, the Vertex study team will not have access to the spirometry or SwCl results of this study until the database lock of the parent study.

11 ASSESSMENTS

The schedule of assessments is shown in [Table 3-1](#).

11.1 Subject and Disease Characteristics

Subject and disease characteristics include the following: demographics, medical history, height, and weight. Select demographic and baseline characteristic data and medical history will be derived from the parent study.

11.2 Pharmacokinetics

Not applicable

11.3 Pharmacodynamics: Sweat Chloride

SwCl samples will be collected with an approved collection device. Each collection will occur before study drug dosing (Section 9.6.1). At each time point, 2 samples will be collected; 1 from each arm (left and right). Sweat samples will be sent to a central laboratory for testing and interpretation of results. Specific instructions for the collection, handling, processing, and shipping of SwCl samples to the central laboratory will be provided separately.

See Section 10.7 for information about access to SwCl results.

11.4 Exploratory Assessments

These data will be used for exploratory purposes. Detailed procedures for the collection, processing, storage, and shipment of samples for exploratory assessments will be provided in a separate document.

11.4.1 Inflammatory Mediators

Blood samples (inflammatory mediator samples) will be collected at the time points noted in Table 3-1 and tested to assess markers related to inflammation. These may include, but are not limited to, C-reactive protein, immunoglobulin G, white blood cell (leukocyte) count, and interleukin-8.

11.4.2 Other Blood Biomarkers

Serum from an inflammatory mediator sample and an additional blood sample for plasma will be collected and banked for potential future exploratory evaluation of other blood biomarkers (e.g., proteins, peptides, lipids, metabolites, etc.) in relation to pharmacokinetics (PK), PD, treatment response, AEs, and various disease manifestations of CF.

A blood sample for RNA isolation will be collected as indicated in Table 3-1 for potential exploratory evaluation of gene signatures associated with various disease manifestations of CF and/or treatment response.

11.4.3 Microbiology and Other Sputum Biomarkers

Sputum samples will be collected as indicated in Table 3-1 from subjects who can produce a sample spontaneously. Each sample will be processed and frozen for potential exploratory evaluation of microbiology analysis and sputum biomarkers (which may include, but are not limited to, qualitative and quantitative bacterial and viral assessments including genomic analyses, analysis of immune cells, inflammatory markers, proteins, peptides, lipids, and endogenous metabolites) in relation to PK, PD, treatment response, AEs, and various disease manifestations of CF.

11.5 Efficacy

11.5.1 Spirometry

Spirometry will be performed according to the American Thoracic Society Guidelines/European Respiratory Society Guidelines¹¹ and according to the additional guidelines that follow.

Pre-bronchodilator spirometry is defined as spirometry testing performed for subjects who have

- withheld their short-acting bronchodilators (e.g., albuterol) or anticholinergic (e.g., ipratropium bromide [Atrovent[®]]) for more than 4 hours before the spirometry assessment;
- withheld their long-acting bronchodilator (e.g., salmeterol) for more than 12 hours before the spirometry assessment; and
- withheld their once-daily, long-acting bronchodilator (e.g., tiotropium bromide [Spiriva[®]]) for more than 24 hours before the spirometry assessment.

All spirometry assessments should be performed pre-bronchodilator. During the Treatment Period, spirometry assessments must be performed before study drug dosing (Section 9.6.1) at approximately the same time at each visit. In the event that a subject forgets to withhold bronchodilator(s), spirometry should be performed according to the following:

- If a subject's Day 1 spirometry assessment from the parent study is pre-bronchodilator, but, on a subsequent visit in this study, the subject forgets to withhold bronchodilator use, a post-bronchodilator spirometry assessment will be obtained for that visit only and the visit will not be rescheduled.
- If, on Day 1 of the parent study, the subject forgets to withhold his or her dose of bronchodilator, spirometry should be performed post-bronchodilator and all subsequent spirometric measurements in this study (according to the schedule of assessments in Table 3-1) should be performed post-bronchodilator.
- Each spirometry assessment will be recorded in the source documents as pre- or post-bronchodilator.

All sites will be provided with spirometers to be used for all study assessments. Spirometry data will be transmitted to a centralized spirometry service for quality review.

See Section 10.7 for information about access to spirometry results.

The measured spirometric values listed below will be converted to percent predicted values using the standard equations of Global Lung Function Initiative.¹²

- Forced expiratory volume in 1 second (FEV₁) (L)
- Forced vital capacity (FVC) (L)
- FEV₁/FVC (ratio)
- Forced expiratory flow, midexpiratory phase (FEF_{25%-75%}) (L/s)

11.5.2 Height and Weight

Height and weight will be measured with shoes off. For subjects whose date of informed consent occurs after their 21st birthday, height will not be collected in this study. For subjects whose date of informed consent occurs on or before their 21st birthday, height will be collected through the first visit after the subject's 21st birthday and does not need to be collected at future visits.

11.5.3 Cystic Fibrosis Questionnaire-Revised

The CFQ-R provides information about demographics; general quality of life, school, work, or daily activities; and symptom difficulties (pertaining to CF).

Subjects will be asked to complete the CFQ-R in their native language, if validated translations are available.^{13, 14} If there is no validated translation available in the subject's native language, the subject will not complete the questionnaire. Copies of the CFQ-R used will be provided in the Study Reference Manual. Validated translations of the CFQ-R, if available, will be provided for participating centers in non-English-speaking countries.^{15, 16}

The CFQ-R will be completed before any other assessments are performed at that visit.

At the Day 1 Visit of this study, subjects will complete the same version of the CFQ-R that was completed in the parent study. At all subsequent visits, subjects will complete the version of the CFQ-R appropriate for the subject's age at the time of the visit. Subjects who are 12 and 13 years of age will complete the CFQ-R Child version themselves, and their parents/caregivers will complete the CFQ-R Parent version. Subjects 14 years of age or older at the date of informed consent will complete the Adolescent/Adult version of the questionnaire themselves at all visits.

11.6 Safety

Safety evaluations will include AEs, clinical laboratory assessments, physical examinations, and clinical evaluation of vital signs, ECGs, and pulse oximetry.

OEs will be conducted only on subjects who are <18 years of age on the date of informed consent in the parent study.

11.6.1 Adverse Events

All AEs will be assessed, documented, and reported in accordance with ICH GCP Guidelines. Section 13.1 outlines the definitions, collection periods, criteria, and procedures for documenting, grading, and reporting AEs. A separate document that details AE CRF completion guidelines for investigators as well as training will be provided.

11.6.2 Clinical Laboratory Assessments

Blood and urine samples will be analyzed at a central laboratory, with the exception of the urine pregnancy tests. As described below, urine pregnancy tests will either be analyzed at the site or at home using a home kit. On Day 1, blood samples will be collected before the first dose of the study drug in this study.

Laboratory test results that are abnormal and considered clinically significant will be reported as AEs (Section 13.1).

The safety laboratory test panels are shown in Table 11-1.

Table 11-1 Safety Laboratory Test Panels

| Serum Chemistry | Hematology | Urinalysis ^a |
|----------------------------------|---------------------------------------|-------------------------|
| Glucose | Hemoglobin | Leukocyte esterase |
| Blood urea nitrogen ^b | Erythrocytes | Nitrite |
| Creatinine | Mean corpuscular volume | Urobilinogen |
| Sodium | Platelets | Urine protein |
| Potassium | Reticulocytes | pH |
| Calcium | Leukocytes | Urine blood |
| Chloride | Differential (absolute and percent): | Specific gravity |
| Magnesium | Eosinophils | Urine ketones |
| Bicarbonate | Basophils | Urine bilirubin |
| Inorganic phosphate | Neutrophils | Urine glucose |
| Total and direct bilirubin | Lymphocytes | |
| Alkaline phosphatase | Monocytes | |
| Aspartate transaminase | Coagulation | |
| Alanine transaminase | Activated partial thromboplastin time | |
| Amylase | Prothrombin time | |
| Lipase | Prothrombin time International | |
| Gamma-glutamyl transferase | Normalized Ratio | |
| Protein | | |
| Albumin | | |
| Creatine kinase | | |
| Total cholesterol | | |
| Lactate dehydrogenase | | |

^a If urinalysis results are positive for leukocyte esterase, nitrite, protein, or blood, microscopic examination of urine will be performed, and results will be provided for leukocytes, erythrocytes, crystals, bacteria, and casts.

^b If blood urea nitrogen cannot be collected, urea may be substituted.

Pregnancy (β -human Chorionic Gonadotropin) Tests for Female Subjects: All female subjects, regardless of childbearing potential status, must have a negative pregnancy test at the Day 1 Visit before receiving the first dose of study drug.

All female subjects must have a pregnancy test every 4 weeks. Serum pregnancy tests will be performed at the study site and analyzed at the central laboratory. Urine pregnancy tests will either be performed and analyzed at the site or, at assessment time points when telephone contact takes the place of a clinic visit, at home by using a home kit provided by the site. Results of a home urine pregnancy test will be reported to the site by telephone. Additional pregnancy tests may be required according to local regulations and/or requirements.

Follicle-stimulating Hormone (FSH): Blood samples for FSH will be measured as needed for any suspected postmenopausal female with at least 12 months of continuous spontaneous amenorrhea. Serum FSH levels must be in the postmenopausal range as determined by the laboratory performing the test.

Additional Evaluations: Additional clinical laboratory evaluations will be performed at other times if judged to be clinically appropriate.

For the purposes of study conduct and unless noted otherwise, only laboratory tests done in the central laboratory may be used. Local laboratories may be used at the discretion of the local investigator for management of urgent medical issues. If a local laboratory test value is found to be abnormal and clinically significant, it will be verified by the central laboratory as soon as

possible after the investigator becomes aware of the abnormal result. If it is not possible to send a timely specimen to the central laboratory (e.g., the subject was hospitalized elsewhere), the investigator may base the assessment of an AE on the local laboratory value.

11.6.3 Physical Examinations and Vital Signs

A physical examination of all body systems and vital signs assessment will be performed at the select study visits (see [Table 3-1](#)). At other visits, symptom-directed physical examinations and symptom-directed vital signs assessments can be performed at the discretion of the investigator or healthcare provider.

A complete physical examination includes a review of the following systems: head, neck, and thyroid; eyes, ears, nose, and throat; respiratory; cardiovascular; lymph nodes; abdomen; skin; musculoskeletal; and neurological. Breast, anorectal, and genital examinations will be performed when medically indicated. Any clinically significant abnormal findings in physical examinations will be reported as AEs.

Vital signs include blood pressure (systolic and diastolic), temperature, pulse rate, and respiratory rate. The subject will be instructed to rest for at least 5 minutes before vital signs are assessed.

11.6.4 Pulse Oximetry

Pulse oximetry is a noninvasive measure of oxygen delivery to the tissues and has been correlated with clinical status and lung function. Arterial oxygen saturation by pulse oximetry will be assessed following at least a 5-minute rest and before study drug dosing.

11.6.5 Electrocardiograms

Standard 12-lead ECGs will be performed using a machine with printout according to the schedule of assessments ([Table 3-1](#)). Additional standard 12-lead ECGs will be performed at any other time if clinically indicated. The performance of all ECGs will adhere to the following guidelines:

- The subject will be instructed to rest for at least 5 minutes before having an ECG.
- The test should be performed in the supine position.

A printout of the ECG traces will be made for safety review by the investigator and maintained with source documentation. Clinically significant ECG abnormalities occurring during the study through completion of study participation will be recorded as AEs.

To ensure the safety of the subjects, a qualified individual at the study site will make comparisons to baseline measurements. If the QTcF is increased by >60 msec from the baseline or an absolute QTcF value is ≥ 500 msec for any scheduled ECG, 2 additional ECGs will be performed approximately 2 to 4 minutes apart to confirm the original measurement. If either of the QTcF values from these repeated ECGs remains above the threshold value (>60 msec from baseline or ≥ 500 msec), a single ECG will be repeated at least hourly until QTcF values from 2 successive ECGs fall below the threshold value that triggered the repeat measurement. Further details pertaining to ECGs will be provided to sites in the ECG Manual.

11.6.6 Ophthalmologic Examination

OEs are required only for subjects who are <18 years of age on the date of informed consent in the parent study. OEs do not need to be completed if there is documentation of bilateral lens removal for the subject.

All examinations will be conducted by a licensed ophthalmologist or optometrist and will include

- measurement of best-corrected distance visual acuity of each eye; and
- pharmacologically dilated examination of the lens with a slit lamp.

Subjects <18 years of age on the date of informed consent in the parent study are required to complete OEs as indicated in [Table 3-1](#). These examinations should be completed within 28 days of the relevant study visit. An OE is also required within 28 days of the ETT Visit for subjects whose cumulative study drug exposure (in the parent study and current study) is at least 12 weeks since the last study OE.

Any clinically significant abnormal findings will be reported as AEs.

11.6.7 Contraception and Pregnancy

The effects of VX-445, TEZ, and IVA on conception, pregnancy, and lactation in humans are not known. VX-445, TEZ, and IVA did not show genotoxic potential in a standard battery of in vitro (Ames test, chromosomal aberration, or micronucleus in cultured mammalian cells) and in vivo (rodent micronucleus) studies. Reproductive toxicology studies of VX-445, TEZ, and IVA have not shown teratogenicity in rats and rabbits.

11.6.7.1 Contraception

Contraception requirement for a couple is waived for the following:

- True abstinence for the subject, when this is in line with the preferred and usual lifestyle of the subject. Periodic abstinence (e.g., calendar, ovulation, symptothermal, postovulation methods) and withdrawal are not acceptable methods of contraception. True abstinence must be practiced from the date of informed consent through 90 days after the last dose of study drug.
- If the male is infertile (e.g., bilateral orchiectomy). If a male subject is assumed to have complete bilateral absence of the vas deferens, infertility must be documented before the first dose of study drug (e.g., examination of a semen specimen or by demonstration of the absence of the vas deferens by ultrasound).
- If the female is of non-childbearing potential. To be considered of non-childbearing potential, the female must meet at least 1 of the following criteria:
 - Postmenopausal: Amenorrheic for at least 12 consecutive months and a serum FSH level within the laboratory's reference range for postmenopausal females.
 - Documented hysterectomy or bilateral oophorectomy/salpingo-oophorectomy.

Note: All other females (including females with tubal ligations) will be considered to be of childbearing potential.

- Same-sex relationships

For subjects for whom the contraception requirement is not waived, study participation requires a commitment from the subject that at least 1 acceptable method of contraception is used as a couple. Methods of contraception must be in successful use from signing of consent (or assent, when applicable), approximately 28 days before the first dose of study drug (unless otherwise noted), and until 90 days following the last dose of study drug. Additional contraception requirements may need to be followed according to local regulations and/or requirements. Acceptable methods of contraception are listed in Table 11-2.

Table 11-2 Acceptable Methods of Contraception

| Method | Male Subjects and Their Female (Non-study) Partners | Female Subjects and Their Male (Non-study) Partners |
|--|--|--|
| Vasectomy performed at least 6 months previously, with a documented negative postvasectomy semen analysis for sperm | Yes | Yes |
| Bilateral tubal occlusion (e.g., ligation) performed at least 6 months previously | Yes | Yes |
| Male or female condom with or without spermicide ^a | Yes | Yes |
| Female barrier contraception (such as diaphragm, cervical cap, or sponge) with spermicide | Yes | Yes |
| Continuous use of an intrauterine device for at least 90 days before the first dose of study drug | Yes | Yes |
| Oral, implanted, injected, or vaginal hormonal contraceptives, if successfully used for at least 60 days before the first dose of study drug | Yes | Yes |

^a A female condom cannot be used with a male condom due to risk of tearing.

Additional notes:

- If over the course of the study the subject meets the criteria for waiving the contraception requirements, the subject does not need to follow the contraceptive methods listed in Table 11-2.
- If over the course of the study the subject's status changes and the subject does not meet the criteria for waiving the contraception requirements, the subject must begin following the contraceptive methods listed in Table 11-2.
- Male subjects must not donate sperm during the period starting from the first dose of study drug until 90 days after the last dose of study drug.
- Female subjects should not nurse a child during the period starting from the first dose of study drug until 90 days after the last dose of study drug.
- For male subjects with a female partner of childbearing potential, the couple should not plan to become pregnant during the study or within 90 days after the last dose of study drug, with the exception of couples who plan to become pregnant by artificial insemination using sperm banked by the male subject before the first dose of study drug or sperm from another source.

11.6.7.2 Pregnancy

Subjects will be counseled to inform the investigator of any pregnancy that occurs during study treatment and for 90 days after the last dose of study drug.

If a female subject becomes pregnant during study participation, study drug will be permanently discontinued immediately. The investigator will notify the medical monitor and Vertex Global Patient Safety (GPS) within 24 hours of the site's knowledge of the subject's (or partner's) pregnancy using the Pregnancy Information Collection Form. Male subjects with female partners who become pregnant during the study must use a male condom to avoid exposure of a potential embryo or fetus to study drug via the seminal fluid.

The subject or partner will be followed until the end of the pregnancy and the infant will be followed for 1 year after the birth, provided informed consent is obtained. A separate ICF will be provided to explain these follow-up activities. Pregnancy itself does not constitute an AE.

12 STATISTICAL AND ANALYTICAL PLANS

This section presents a summary of the planned analyses for this protocol. Statistical analysis details will be provided in the statistical analysis plan (SAP) and clinical pharmacologic analysis details will be provided in the clinical pharmacology analysis plan, both of which will be finalized before the clinical data lock for the study.

12.1 Sample Size

The primary and secondary objectives of the study are the evaluation of the long-term safety and tolerability, and long-term efficacy of VX-445/TEZ/IVA. This is an open-label study that will enroll subjects who complete the last Treatment Period visit in the parent study and meet eligibility criteria. The parent study is a Phase 3 Vertex study investigating VX-445/TEZ/IVA (Study 104). Approximately 250 subjects are expected to enroll in this open-label study.

12.2 Analysis Sets

The **Open-label All Subjects Set** is defined as all subjects who were enrolled (defined as subject having data in the clinical database) in the open-label study. This analysis set will be used for individual subject data listings and disposition summary tables unless otherwise specified.

The **Open-label Full Analysis Set (OL-FAS)** is defined as all enrolled subjects who have received at least 1 dose of study drug in the open-label study. The OL-FAS will be used to summarize subject demographics and baseline characteristics and for all efficacy analyses unless otherwise specified.

The **Open-label Safety Set (OL-SS)** is defined as all subjects who have received at least 1 dose of study drug in the open-label study. The OL-SS will be used for all safety analyses unless otherwise specified.

12.3 Statistical Analysis

12.3.1 General Considerations

Continuous variables will be summarized using the following descriptive summary statistics: the number of subjects (n), mean, SD, median, minimum value (min), and maximum value (max). The precision of the measurement for each continuous variable will be specified in the SAP. Unless otherwise specified, min and max values will be reported with the same precision as

the units of the raw data. The mean, median, and SD will be reported to 1 additional decimal place. Any values that require a transformation to standard units (metric or SI) will be converted with the appropriate precision.

Categorical variables will be summarized using counts and percentages. Percentages will be presented to 1 decimal place.

The baseline value, unless otherwise specified, for the long-term safety analysis will be the most recent non-missing measurement (scheduled or unscheduled) collected before the first dose of VX-445/TEZ/IVA either in the parent study or the open-label study, as applicable. The baseline value for the long-term efficacy analysis will be defined as the most recent non-missing measurement (scheduled or unscheduled) collected before the first dose of study drug in the parent study. For assessments collected in duplicate or triplicate, the baseline will be defined as the average of non-missing values.

Baseline characteristics of subjects in the open-label study will be the same as the baseline characteristics in the parent study.

Change (absolute change) from baseline will be calculated as post-baseline value - baseline value.

The **Efficacy Analysis Period** in the open-label study will include the time from the first dose of study drug in the open-label study to the last scheduled efficacy visit in the open-label study, unless otherwise specified.

The **Treatment-emergent (TE) Period** in the open-label study will include the time from the first dose of study drug in the open-label study to 28 days after the last dose of the study drug in the open-label study or to the completion date of study participation (as defined in Section 9.1.5), whichever occurs first.

The long-term efficacy analysis will be performed by parent study for the Efficacy Analysis Period in the open-label study.

In general, long-term safety analyses will be performed in a pooled fashion.

12.3.2 Background Characteristics

12.3.2.1 Subject Disposition

Subject disposition will be summarized for the Open-label All Subjects Set. The number and percentage of subjects in the following categories for the open-label study will be summarized as appropriate:

- Open-label All Subjects Set
- Dosed (OL-SS)
- Enrolled and dosed (OL-FAS)
- Completed Treatment Period
- Prematurely discontinued treatment and the reasons for discontinuation
- Completed study
- Prematurely discontinued the study and the reasons for discontinuation

12.3.2.2 Demographics and Baseline Characteristics

Demographics, background (e.g., medical history), and baseline characteristics will be summarized by descriptive summary statistics. Baseline characteristics will be the same as the parent study baseline characteristics.

The following demographics and baseline characteristics will be summarized for the OL-FAS and will include (but not limited to) sex, race, ethnicity, baseline age, baseline weight, baseline height, baseline BMI, baseline ppFEV₁, baseline SwCl, and baseline score of CFQ-R RD.

Medical history will be summarized by MedDRA System Organ Class (SOC) and Preferred Term (PT) for the OL-FAS.

12.3.2.3 Prior and Concomitant Medications

Medications will be coded using the World Health Organization-Drug Dictionary and categorized as follows:

- **Prior medication:** any medication that was administered during the 56 days before the first dose of study drug in the open-label study
- **Concomitant medication:** medication continued or newly received during the TE Period in the open-label study
- **Post-treatment medication:** medication continued or newly received after the TE Period in the open-label study

A given medication may be classified as a prior medication, a concomitant medication, or a post-treatment medication; both prior and concomitant; both concomitant and post-treatment; or prior, concomitant, and post-treatment. If a medication has a missing or partially missing start/end date or time and if it cannot be determined whether it was taken before initial dosing in the open-label study, concomitantly during the TE Period in the open-label study, or beyond the TE Period in the open-label study, it will be considered in all 3 categories of prior, concomitant, and post-treatment medication.

Prior medications and concomitant medications will be summarized descriptively by Preferred Name based on the OL-FAS. Post-treatment medications will be provided separately in an individual subject data listing.

12.3.2.4 Study Drug Exposure and Compliance

Study drug exposure will be summarized for the OL-SS in terms of treatment a subject received in the open-label study, defined as [(the last day of study drug in the open-label study – the first day of study drug in the open-label study) + 1 day], regardless of study drug interruption.

Study drug compliance will be summarized overall and by treatment group based on the OL-FAS, and will be calculated as: $100 \times [1 - (\text{total number of days of study drug interruption in the open-label study}) / (\text{duration of study drug exposure in days in the open-label study})]$. A study drug interruption on a given day is defined as an interruption of any study drug on that day.

In addition, percentage of tablets taken in the open-label study will also be summarized overall and by treatment group based on the OL-FAS, and will be calculated as $100 \times [(\text{total number of tablets dispensed in the open-label study}) - (\text{total number of tablets returned in the open-label study}) / (\text{total number of tablets dispensed in the open-label study})]$.

study)] / (total number of tablets planned to be taken per day × duration of study drug exposure in days for the open-label study).

12.3.2.5 Important Protocol Deviations

An important protocol deviation (IPD) is a deviation that may significantly affect the completeness, accuracy, or reliability of the study data or that may significantly affect a subject's rights, safety, or well-being. The rules for identifying an IPD in the open-label study will be described in the SAP.

All IPDs will be provided in an individual subject data listing, and summarized, as appropriate.

12.3.3 Efficacy and Pharmacodynamic Analyses

The secondary objectives of the study are the evaluation of the long-term efficacy and PD of VX-445/TEZ/IVA.

12.3.3.1 Analysis of Primary Endpoint

Not applicable since efficacy and PD are not primary objectives.

12.3.3.2 Analysis of Secondary Efficacy Endpoints

The secondary endpoints include:

- **Absolute change in ppFEV₁**

One of the secondary efficacy endpoints is the absolute change in ppFEV₁ at visits in the open-label study, for subjects who receive at least 1 dose of study drug in the open-label study. The primary analysis for this secondary endpoint will be based on a mixed-effects model for repeated measures (MMRM), with the absolute change from baseline in ppFEV₁ as the dependent variable for visits in the open-label study. The model will be similar to the one used for the primary efficacy analysis in the parent study.

The details including sensitivity analyses and supportive analyses will be described in the SAP.

- **Absolute change in SwCl**

Analysis of this PD endpoint will be based on an MMRM similar to the analysis of the absolute change in ppFEV₁.

- **Absolute change in BMI**

Analysis of this endpoint will be based on an MMRM similar to the analysis of the absolute change in ppFEV₁.

- **Absolute change in BMI z-score**

Analysis of this endpoint will be based on an MMRM similar to the analysis of the absolute change in ppFEV₁.

- **Absolute change in body weight**

Analysis for this endpoint will be based on an MMRM similar to the analysis of the absolute change in ppFEV₁.

- **Absolute change in CFQ-R RD score**

Analysis of this endpoint will be based on an MMRM similar to the analysis of the absolute change in ppFEV₁.

12.3.3.3 Analysis of Exploratory Efficacy Endpoints

Exploratory efficacy endpoints include:

- **Absolute change in CFQ-R non-RD scores**

Analysis of this endpoint will be based on an MMRM similar to the analysis of the absolute change in ppFEV₁. Additional details will be specified in the SAP.

12.3.3.4 Multiplicity Adjustment

Not applicable

12.3.4 Safety Analysis

The primary objective of the study is the evaluation of the long-term safety and tolerability of VX-445/TEZ/IVA. All safety analyses will be based on the TE Period in the open-label study for subjects in the OL-SS.

The overall long-term safety profile of study drug will be assessed in terms of the following safety and tolerability endpoints:

- Incidence of treatment-emergent AEs (TEAEs)
- Clinical laboratory values (i.e., serum chemistry, hematology, coagulation, and urinalysis)
- ECGs
- Vital signs
- Pulse oximetry

In general, long-term safety analysis will be performed in a pooled fashion. All safety data will be presented in individual subject data listings. Only a descriptive analysis of safety data will be performed.

12.3.4.1 Adverse Events

For analysis purposes, AEs will be classified as pretreatment AEs, TEAEs, or post-treatment AEs, defined as follows:

- **Pretreatment AE:** any AE that occurred before the first dose of VX-445/TEZ/IVA in the TE Period in the open-label study
- **TEAE:** any AE that worsened (either in severity or seriousness) or newly developed at or after the first dose date of VX-445/TEZ/IVA in the TE Period in the open-label study
- **Post-treatment AE:** any AE that worsened (either in severity or seriousness) or newly developed after the TE Period in the open-label study

For AEs with missing or partial start dates, if there is no clear evidence that the AEs started before or after study drug treatment, then the AEs will be classified as TEAEs.

AE summary tables will be presented for TEAEs only and will include the following:

- All TEAEs
- TEAEs by strongest relationship
- TEAEs by maximum severity
- TEAEs leading to treatment discontinuation
- TEAEs leading to treatment interruption
- Serious TEAEs
- TEAEs leading to death
- Grade 3 and Grade 4 TEAEs
- Frequently reported TEAEs

Summaries will be presented by MedDRA SOC and PT using frequency counts and percentages (i.e., number and percentage of subjects with an event). When summarizing the number and percentage of subjects with an event, subjects with multiple occurrences of the same AE or a continuing AE will be counted once. Only the maximum severity level will be presented in the severity summaries, and the strongest relationship level will be presented in the relationship summaries. An AE overview table will be provided. In addition, a listing containing individual subject level AE data for all deaths and other serious and significant AEs will be provided separately. All AEs, including pre- and post-treatment AEs, will be presented in individual subject data listings.

Exposure-adjusted event rates may also be provided.

12.3.4.2 Clinical Laboratory Assessments

For the TE laboratory measurements, the observed values and change from baseline values of the continuous laboratory parameters will be summarized in SI units for the pooled population at each time point during the TE Period in the open-label study.

The number and percentage of subjects with at least 1 threshold analysis event during the TE Period in the open-label study will be summarized. The shift of the threshold analysis criteria from baseline to post-baseline will also be summarized for selected laboratory parameters. The threshold analysis and parameter selection criteria will be provided in the SAP.

Results of urinalysis and pregnancy tests will be listed in individual subject data listings only. In addition, a listing containing individual subject laboratory assessment values will be provided. This listing will include data from scheduled and unscheduled time points.

Additional safety laboratory data analyses may be described in the SAP.

12.3.4.3 Electrocardiogram

For the TE ECG measurements, a summary of observed values and change from baseline values will be provided at each time point during the TE Period in the open-label study, for the following standard 12-lead ECG interval measurements (in msec): RR, PR, QT, QTc for heart rate (HR) interval (QTcF), QRS duration, and HR (beats per minute [bpm]).

The number and percentage of subjects with at least 1 threshold analysis event during the TE Period in this open-label study will be summarized. The threshold analysis criteria will be provided in the SAP.

Additional ECG analyses may be described in the SAP.

12.3.4.4 Vital Signs

For the TE vital signs measurements, the observed values and change from baseline values will be summarized at each time point during the TE Period in the open-label study. The following vital signs parameters will be summarized: systolic and diastolic blood pressure (mm Hg), temperature (°C), pulse rate (bpm), and respiratory rate (breaths per minute).

The number and percentage of subjects with at least 1 threshold analysis event during the TE Period in the open-label study will be summarized. The threshold analysis criteria will be provided in the SAP.

Additional vital signs analyses may be described in the SAP.

12.3.4.5 Pulse Oximetry

For the TE pulse oximetry measurements, a summary of observed values and change from baseline values will be provided at each time point during the TE Period in the open-label study, for the percent of oxygen saturation by pulse oximetry.

The number and percentage of subjects with shift changes from baseline (normal/missing and low according to the reference range) to the lowest percent of oxygen saturation during the TE Period will be summarized.

12.3.4.6 Physical Examination

No tables, figures, or listings will be provided for physical examination data.

12.3.4.7 Other Safety Analyses

Details of other safety analyses may be included in the SAP.

12.3.5 Exploratory Endpoints

Details of other analyses, including inflammatory mediators and blood biomarkers will be provided in a separate document.

12.3.6 Interim and Independent Data Monitoring Committee Analyses

12.3.6.1 Interim Analysis

Interim analyses (IAs) may take place at any time during the study at the discretion of the sponsor. In the event that the parent study is still ongoing, a limited Vertex team may be unblinded to the treatment assignments in the parent study for the purpose of reviewing the interim results, and will not be involved in or influence the conduct of the remaining part of the parent study to protect the integrity of the parent study.

12.3.6.2 Independent Data Monitoring Committee Analysis

The IDMC (Section 9.1.6) will conduct periodic safety reviews of study data as outlined in the IDMC charter.

The IDMC's objectives, responsibilities, and operational details will be defined in a separate document (IDMC charter), which will be finalized before the first subject is enrolled in the study.

13 PROCEDURAL, ETHICAL, REGULATORY, AND ADMINISTRATIVE CONSIDERATIONS

13.1 Adverse Event and Serious Adverse Event Documentation, Severity Grading, and Reporting

13.1.1 Adverse Events

13.1.1.1 Definition of an Adverse Event

An AE is defined as any untoward medical occurrence in a subject during the study; the event does not necessarily have a causal relationship with the treatment. This includes any newly occurring event or worsening of a pre-existing condition (e.g., increase in its severity or frequency) after the ICF is signed.

An AE is considered serious if it meets the definition in Section [13.1.2.1](#).

13.1.1.2 Clinically Significant Assessments

Study assessments including laboratory tests, ECGs, physical examinations, and vital signs will be assessed and those deemed to have clinically significant worsening from baseline will be documented as an AE. When possible, a clinical diagnosis for the study assessment will be provided, rather than the abnormal test result alone (e.g., urinary tract infection, anemia). In the absence of a diagnosis, the abnormal study assessment itself will be listed as the AE (e.g., bacteria in urine or decreased hemoglobin).

An abnormal study assessment is considered clinically significant if the subject has 1 or more of the following:

- Concomitant signs or symptoms related to the abnormal study assessment
- Further diagnostic testing or medical/surgical intervention
- A change in the dose of study drug or discontinuation from the study

Repeat testing to determine whether the result is abnormal, in the absence of any of the above criteria, does not necessarily meet clinically significant criteria. The determination of whether the study assessment results are clinically significant will be made by the investigator.

A laboratory value that is Grade 4 will not automatically be an SAE. A Grade 4 laboratory value will be an SAE if the subject's clinical status indicates a life-threatening AE.

13.1.1.3 Documentation of Adverse Events

All AEs will be collected from the time the ICF is signed until the subject completes study participation, as defined in Section [9.1.5](#).

All subjects will be queried, using nonleading questions, about the occurrence of AEs at each study visit. When possible, a constellation of signs and/or symptoms will be identified as 1 overall event or diagnosis. All AEs for enrolled subjects will be recorded in the CRF and source document. AEs for subjects who are screened but not subsequently enrolled will be

recorded only in the subject's source documents. The following data will be documented for each AE:

- Description of the event
- Classification of “serious” or “nonserious”
- Date of first occurrence and date of resolution (if applicable)
- Severity
- Causal relationship to study drug(s)
- Action taken
- Outcome
- Concomitant medication or other treatment given

13.1.1.4 Adverse Event Severity

The investigator will determine and record the severity of all serious and nonserious AEs. The guidance available at the following website will be consulted: Common Terminology Criteria for Adverse Events (CTCAE), Version 5.0, Cancer Therapy Evaluation Program, http://ctep.cancer.gov/protocolDevelopment/electronic_applications/ctc.htm (Accessed July 2018). AEs of CTCAE Grades 4 and 5 will be documented as “life-threatening.” When considering the severity of an AE in a pediatric subject, the investigator will consider that reference ranges for pediatric clinical laboratory parameters may differ from those in the CTCAE. The severity of an AE described by a term that does not appear in the CTCAE will be determined according to the definitions in Table 13-1.

Table 13-1 Grading of AE Severity

| Classification | Definition |
|-----------------------------------|---|
| Mild (Grade 1) | Mild level of discomfort and does not interfere with regular activities |
| Moderate (Grade 2) | Moderate level of discomfort and significantly interferes with regular activities |
| Severe (Grade 3) | Significant level of discomfort and prevents regular activities |
| Life-threatening (Grade 4) | Any adverse drug event that places the subject, in the view of the investigator, at immediate risk of death |

AE: adverse event

13.1.1.5 Adverse Event Causality

Every effort will be made by the investigator to assess the relationship of the AE, if any, to the study drug(s). Causality will be classified using the categories in Table 13-2.

Table 13-2 Classifications for AE Causality

| Classification | Definition |
|----------------|---|
| Related | There is an association between the event and the administration of investigational study drug, a plausible mechanism for the event to be related to the investigational study drug and causes other than the investigational study drug have been ruled out, and/or the event reappeared on re-exposure to the investigational study drug. |

Table 13-2 Classifications for AE Causality

| Classification | Definition |
|-------------------------|--|
| Possibly related | There is an association between the event and the administration of the investigational study drug and there is a plausible mechanism for the event to be related to investigational study drug, but there may also be alternative etiology, such as characteristics of the subject's clinical status or underlying disease. |
| Unlikely related | The event is unlikely to be related to the investigational study drug and likely to be related to factors other than investigational study drug. |
| Not related | The event is related to an etiology other than the investigational study drug (the alternative etiology will be documented in the subject's medical record). |

AE: adverse event

13.1.1.6 Study Drug Action Taken

The investigator will classify the study drug action taken with regard to the AE. The action taken will be classified according to the categories in Table 13-3.

Table 13-3 Classifications for Study Drug Action Taken With Regard to an AE

| Classification | Definition |
|-------------------------|--|
| Dose not changed | Study drug dose not changed in response to an AE |
| Dose reduced | Study drug dose reduced in response to an AE |
| Drug interrupted | Study drug administration interrupted in response to an AE |
| Drug withdrawn | Study drug administration permanently discontinued in response to an AE |
| Not applicable | Action taken regarding study drug administration does not apply. "Not applicable" will be used in circumstances such as when the investigational treatment had been completed before the AE began and no opportunity to decide whether to continue, interrupt, or withdraw treatment is possible. |

AE: adverse event

13.1.1.7 Adverse Event Outcome

An AE will be followed until the investigator has determined and provided the final outcome. The outcome will be classified according to the categories in Table 13-4.

Table 13-4 Classifications for Outcome of an AE

| Classification | Definition |
|--|--|
| Recovered/resolved | Resolution of an AE with no residual signs or symptoms |
| Recovered/resolved with sequelae | Resolution of an AE with residual signs or symptoms |
| Not recovered/not resolved (continuing) | Either incomplete improvement or no improvement of an AE, such that it remains ongoing |
| Fatal | Outcome of an AE is death. "Fatal" will be used when death is at least possibly related to the AE. |
| Unknown | Outcome of an AE is not known (e.g., a subject lost to follow up) |

AE: adverse event

13.1.1.8 Treatment Given

The investigator ensures adequate medical care is provided to subjects for any AEs, including clinically significant laboratory values related to study drug. In addition, the investigator will describe whether any treatment was given for the AE. “Yes” is used if any treatment was given in response to an AE, and may include treatments such as other medications, surgery, or physical therapy. “No” indicates the absence of any kind of treatment for an AE.

13.1.2 Serious Adverse Events

13.1.2.1 Definition of a Serious Adverse Event

An SAE is any AE that meets any of the following outcomes:

- Fatal (death, regardless of cause, that occurs during participation in the study or occurs after participation and is suspected of being a delayed toxicity due to administration of the study drug)
- Life-threatening, such that the subject was at immediate risk of death from the reaction as it occurred
- Inpatient hospitalization or prolongation of hospitalization
- Persistent or significant disability/incapacity (disability is defined as a substantial disruption of a person’s ability to conduct normal life functions)
- Congenital anomaly or birth defect
- Important medical event that, based upon appropriate medical judgment, may jeopardize the subject or may require medical or surgical intervention to prevent 1 of the outcomes listed above (e.g., an allergic bronchospasm requiring intensive treatment in an emergency room or at home)

If a subject has a hospitalization or procedure (e.g., surgery) for an event or condition that occurred before the subject signed the ICF, and the hospitalization or procedure was planned before the subject signed the ICF, the hospitalization or procedure will not be considered to indicate an SAE, unless an AE caused the hospitalization or procedure to be rescheduled sooner or to be prolonged relative to what was planned. In addition, hospitalizations clearly not associated with an AE (e.g., social hospitalization for purposes of respite care) will not be considered to indicate an SAE.

Clarification will be made between the terms “serious” and “severe” because they are not synonymous. The term “severe” is often used to describe the intensity (severity) of a specific event, as in mild, moderate, or severe myocardial infarction. The event itself, however, may be of relatively minor medical significance, such as a severe headache. This is not the same as “serious”, which is based on subject/event outcome or action described above, and is usually associated with events that pose a threat to a subject’s life or functioning. Seriousness, not severity, serves as a guide for defining expedited regulatory reporting obligations.

13.1.2.2 Reporting and Documentation of Serious Adverse Events

All SAEs that occur after obtaining informed consent and assent (where applicable) through completion of study participation, regardless of causality, will be reported by the investigator to Vertex GPS **within 24 hours of identification**. In addition, all SAEs that occur after the Safety

Follow-up Visit and are considered related to study drug(s) will be reported to Vertex GPS **within 24 hours of identification.**

For SAEs that occur after obtaining informed consent and assent (where applicable) through completion of study participation, the SAE Form will be completed for new/initial events as well as to report follow-up information on previously reported events. Investigators are asked to report follow-up information as soon as it becomes available to ensure timely reporting to health authorities.

Please send completed SAE Forms to Vertex GPS via:

Email: globalpatientsafety@vrtx.com (preferred choice)

Fax: +1-617-341-6159

For technical issues related to submitting the form, contact telephone: +1-617-341-6677

SAEs that occur after the Safety Follow-up Visit and are considered related to study drug(s) will be recorded on the Vertex Clinical Trial Safety Information Collection Form (hereafter referred to as the “SAE Form”) using a recognized medical term or diagnosis that accurately reflects the event. SAEs will be assessed by the investigator for relationship to the investigational study drug(s) and possible etiologies. On the SAE Form, relationship to study drug(s) will be assessed only as related (includes possibly related) or not related (includes unlikely related), and severity assessment will not be required. For the purposes of study analysis, if the event has not resolved at the end of the study reporting period, it will be documented as ongoing. For purposes of regulatory safety monitoring, the investigator is required to follow the event to resolution and report the outcome to Vertex using the SAE Form.

13.1.2.3 Expedited Reporting and Investigator Safety Letters

Vertex, as study sponsor, is responsible for reporting suspected, unexpected, serious adverse reactions (SUSARs) involving the study drug(s) to all regulatory authorities, IECs, and participating investigators in accordance with ICH Guidelines and/or local regulatory requirements, as applicable. In addition, Vertex, or authorized designee, will be responsible for the submission of safety letters to central IECs.

It is the responsibility of the investigator or designee to promptly notify the local IRB/IEC of all unexpected serious adverse drug reactions involving risk to human subjects.

13.2 Administrative Requirements

13.2.1 Ethical Considerations

The study will be conducted in accordance with the current ICH GCP Guidelines, which are consistent with the ethical principles founded in the Declaration of Helsinki, and in accordance with local applicable laws and regulations. The IRB/IEC will review all appropriate study documentation to safeguard the rights, safety, and well-being of the subjects. The study will be conducted only at sites where IRB/IEC approval has been obtained. The protocol, Investigator’s Brochure, sample ICF, advertisements (if applicable), written information given to the subjects (including diary cards), safety updates, annual progress reports, and any revisions to these documents will be provided to the IRB/IEC by the investigator or Vertex, as allowable by local applicable laws and regulations.

13.2.2 Subject Information and Informed Consent

After the study has been fully explained, written informed consent will be obtained from the subject or legal representative or guardian (if applicable), and assent will be obtained from the subject (if applicable), before study participation. The method of obtaining and documenting the informed consent and assent (if applicable) and the contents of the consent will comply with ICH GCP and all applicable laws and regulations and will be subject to approval by Vertex or its designee. When determining the age of the subject, other study eligibility criteria, and timing of collection applicable assessments, the informed consent will be used as the reference (e.g., age at time of informed consent, date of informed consent, timing of AE collection).

13.2.3 Investigator Compliance

No modifications to the protocol will be made without the approval of both the investigator and Vertex. Changes that significantly affect the safety of the subjects, the scope of the investigation, or the scientific quality of the study (i.e., efficacy assessments) will require IRB/IEC notification before implementation, except where the modification is necessary to eliminate an apparent immediate hazard to human subjects. Vertex will submit all protocol modifications to the required regulatory authorities.

When circumstances require an immediate departure from procedures set forth in the protocol, the investigator will contact Vertex to discuss the planned course of action. If possible, contact will be made before the implementation of any changes. Any departures from the protocol will be fully documented in the source documentation and in a protocol deviation log.

13.2.4 Access to Records

The investigator will make the office and/or hospital records of subjects enrolled in this study available for inspection by Vertex or its representative at the time of each monitoring visit and for audits. The records will also be available for direct inspection, verification, and copying, as required by applicable laws and regulations, by officials of the regulatory health authorities (FDA and others). The investigator will comply with applicable privacy and security laws for use and disclosure of information related to the research set forth in this protocol.

13.2.5 Subject Privacy

To maintain subject confidentiality and to comply with applicable data protection and privacy laws and regulations, all CRFs, study reports, and communications relating to the study will identify subjects by assigned subject numbers, and access to subject names linked to such numbers will be limited to the site and the study physician and will not be disclosed to Vertex. As required by applicable laws and regulations in the countries in which the study is being conducted, the investigator will allow Vertex and/or its representatives access to all pertinent medical records to allow for the verification of data gathered in the CRFs/SAE Forms and the review of the data collection process. The FDA and regulatory authorities in other jurisdictions, including the IRB/IEC, may also request access to all study records, including source documentation, for inspection.

For sites participating in the US, and in accordance with the Health Insurance Portability and Accountability Act (HIPAA) and associated regulations, an executed HIPAA authorization will be obtained by the site from each subject (or the legal representative of the subject) before research activities may begin. Each HIPAA authorization will comply with all HIPAA requirements including authorization allowing the site access to and use of the subject's

personally identifiable health information, authorization for the site to disclose such information to Vertex, the FDA, and other parties requiring access under the protocol, and statements as to the purpose for which such information may be used and for how long.

13.2.6 Record Retention

The investigator will maintain all study records according to ICH GCP Guidelines and/or applicable local regulatory requirement(s), whichever is longest, as described in the Clinical Trial Agreement. If the investigator withdraws from the responsibility of keeping the study records, custody will be transferred to a person willing to accept the responsibility and Vertex will be notified.

13.2.7 Study Termination

At any time, Vertex may terminate this study in its entirety or may terminate this study at any particular site. In addition, for reasonable cause, either the investigators or their IRBs/IECs may terminate the study at their center.

Conditions that may lead to reasonable cause and warrant termination include, but are not limited to:

- Subject or investigator noncompliance
- Unsatisfactory subject enrollment
- Lack of adherence to protocol procedures
- Lack of evaluable and/or complete data
- Potentially unacceptable risk to study subjects
- Decision to modify drug development plan
- Decision by the FDA or other regulatory authority

Written notification that includes the reason for the clinical study termination is required.

13.2.8 End of Study

The end of study is defined as the last scheduled visit (or scheduled contact) of the last subject.

13.3 Data Quality Assurance

Vertex or its designated representative will conduct a study site visit to verify the qualifications of each investigator, inspect clinical study site facilities, and inform the investigator of responsibilities and procedures for ensuring adequate and correct study documentation.

The investigator is required to prepare and maintain adequate and accurate case histories designed to record all observations and other data pertinent to the study for each subject. Study data for each enrolled subject will be entered into a CRF by study site personnel using a secure, validated, web-based electronic data capture (EDC) application. Vertex will have read-only access to site-entered clinical data in the EDC application.

Instances of missing, discrepant, or uninterpretable data will be queried with the investigator for resolution. Any changes to study data will be made to the CRF and documented in an audit trail, which will be maintained within the clinical database.

13.4 Monitoring

Monitoring and auditing procedures developed or approved by Vertex will be followed to comply with GCP Guidelines. On-site checking of the CRFs/SAE Forms for completeness and clarity, cross-checking with source documents, and clarification of administrative matters will be performed.

The study will be monitored by Vertex or its designee. Monitoring will be done by personal visits from a representative of Vertex or designee (study site monitor), who will review the CRFs/SAE Forms and source documents. The study site monitor will ensure that the investigation is conducted according to the protocol design and regulatory requirements.

Protocol deviations will be monitored and identified throughout study conduct as outlined in the Protocol Deviation Plan.

13.5 Electronic Data Capture

Vertex will provide the study sites with secure access to and training on the EDC application sufficient to permit study site personnel to enter or correct information in the CRFs on the subjects for which they are responsible.

A CRF will be completed for each enrolled study subject. It is the investigator's responsibility to ensure the accuracy, completeness, clarity, and timeliness of the data reported in the subject's CRF. Source documentation supporting the CRF data will indicate the subject's participation in the study and will document the dates and details of study procedures, AEs, other observations, and subject status.

The investigator, or designated representative, will complete the CRF as soon as possible after information is collected.

The audit trail entry will show the user's identification information and the date and time of any correction. The investigator will provide formal approval of all the information in the CRFs, including any changes made to them, to endorse the final submitted data for the subjects for whom the investigator is responsible.

Vertex will retain the CRF data and corresponding audit trails. A copy of the final archival CRF in the form of a compact disc or other electronic media will be placed in the investigator's study file.

13.6 Confidentiality and Disclosure

Any and all scientific, commercial, and technical information disclosed by Vertex in this protocol or elsewhere will be considered the confidential and proprietary property of Vertex. The investigator shall hold such information in confidence and shall not disclose the information to any third party except to such of the investigator's employees and staff as have been made aware that the information is confidential and who are bound to treat it as such and to whom disclosure is necessary to evaluate that information. The investigator shall not use such information for any purpose other than determining mutual interest in performing the study and, if the parties decide to proceed with the study, for the purpose of conducting the study.

The investigator understands that the information developed from this clinical study will be used by Vertex in connection with the development of the study drug and other drugs and diagnostics, and therefore may be disclosed as required to other clinical investigators, business partners and

associates, the FDA, and other government agencies. The investigator also understands that, to allow for the use of the information derived from the clinical study, the investigator has the obligation to provide Vertex with complete test results and all data developed in the study.

13.7 Publications and Clinical Study Report

13.7.1 Publication of Study Results

Vertex is committed to reporting the design and results of all clinical studies in a complete, accurate, balanced, transparent, and timely manner, consistent with Good Publication Practices.¹⁷ [_ENREF_17](#)

Publication Planning: Vertex staff along with the lead principal investigators, the steering committee, and/or the publication committee will work together to develop a publication plan.

Authorship: Authorship of publications will be determined based on the Recommendations for Conduct, Reporting, Editing, and Publication of Scholarly Work in Medical Journals, which states that authorship should be based on the following 4 criteria¹⁸:

1. Substantial contributions to conception and design, acquisition of data, or analysis and interpretation of data;
2. Drafting of the article or revising it critically for important intellectual content;
3. Final approval of the version to be published; and
4. Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

All authors must meet conditions 1, 2, 3, and 4. All persons designated as authors should qualify for authorship, and all those who qualify should be listed. Contributions such as medical writing, enrollment of subjects, acquisition of funding, collection of data, or general supervision of the research group, alone, do not justify authorship.

Contributors: Contributors who meet fewer than all 4 of International Committee of Medical Journal Editors criteria for authorship will not be listed as authors, but their contribution will be acknowledged and specified either as a group (e.g., “study investigators”) or individually (e.g., “served as scientific advisor”).

Publication Review: As required by a separate clinical study agreement, Vertex must have the opportunity to review all publications, including any manuscripts, abstracts, oral/slide presentations, and book chapters regarding this study before submission to congresses or journals for consideration.

13.7.2 Clinical Study Report

A CSR, written in accordance with the ICH E3 Guideline, will be submitted in accordance with local regulations.

14 REFERENCES

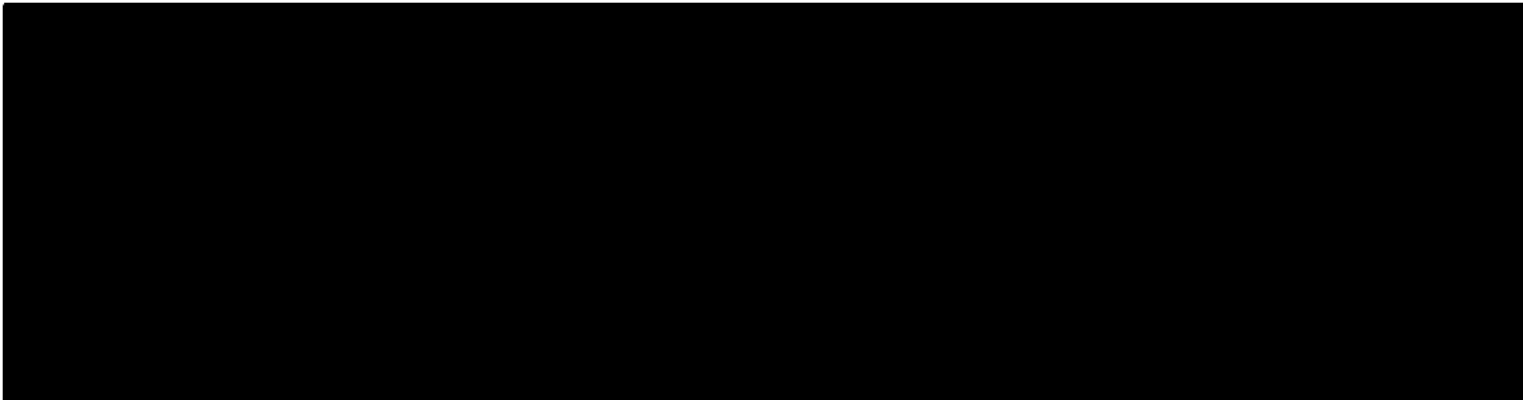
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15 PROTOCOL SIGNATURE PAGES

15.1 Sponsor Signature Page

| | | | | | |
|---|--------------|------------|-----|---------------|-------------|
| Protocol #: | VX18-445-110 | Version #: | 1.0 | Version Date: | 30 May 2019 |
| Study Title: A Phase 3, Open-label Study Evaluating the Long-term Safety and Efficacy of VX-445 Combination Therapy in Subjects With Cystic Fibrosis Who Are Heterozygous for the <i>F508del</i> Mutation and a Gating or Residual Function Mutation (F/G and F/RF Genotypes) | | | | | |



15.2 Investigator Signature Page

| | | | | | |
|---|--------------|------------|-----|---------------|-------------|
| Protocol #: | VX18-445-110 | Version #: | 1.0 | Version Date: | 30 May 2019 |
| Study Title: A Phase 3, Open-label Study Evaluating the Long-term Safety and Efficacy of VX-445 Combination Therapy in Subjects With Cystic Fibrosis Who Are Heterozygous for the <i>F508del</i> Mutation and a Gating or Residual Function Mutation (F/G and F/RF Genotypes) | | | | | |

I have read Protocol VX18-445-110, Version 1.0, and agree to conduct the study according to its terms. I understand that all information concerning VX-445, TEZ, IVA, and this protocol supplied to me by Vertex Pharmaceuticals Incorporated (Vertex) is confidential.

Printed Name

Signature

Date

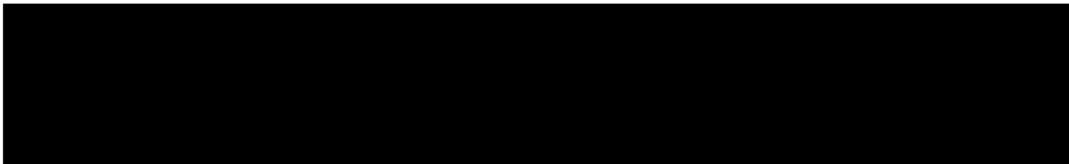
1 TITLE PAGE



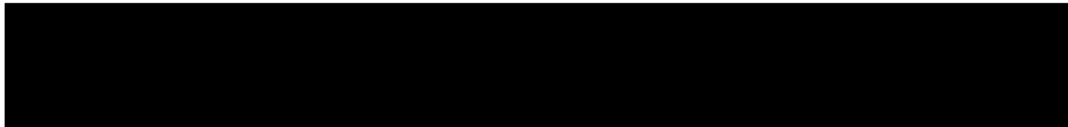
VERTEX PHARMACEUTICALS INCORPORATED

Clinical Study Protocol Addendum for Cystic Fibrosis

Cystic Fibrosis Studies for the Following Programs



Elexacaftor/Tezacaftor/Ivacaftor (VX-445/VX-661/VX-770)



Version and Date of Protocol Addendum: Version 3.0, 29 July 2020
Replaces Version 2.0, dated 15 May 2020

Vertex Pharmaceuticals Incorporated
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Summary of Changes to Cystic Fibrosis Clinical Study Protocols

Vertex is currently evaluating several CFTR modulators in clinical studies for the treatment of cystic fibrosis (CF), a serious and life-threatening disease. In completed studies, treatment with these CFTR modulators has generally resulted in rapid, robust, clinically meaningful, and statistically significant improvements in clinical measures, and are generally safe and well tolerated. Adverse events (AEs) seen with these treatments are mostly consistent with common manifestations of CF disease or with common illnesses in CF subjects.

During this COVID-19 pandemic, the safety of the subjects, investigators, and site personnel participating in these clinical studies is Vertex's first priority, thus it is important to minimize any unnecessary risk to COVID-19 exposure through travel to study sites. This addendum summarizes the measures taken for ongoing CF clinical studies. These operational adjustments were implemented to align with Health Authority guidance ensuring the protection of subjects, investigators, and site personnel while maintaining compliance with GCP and minimizing impact to the integrity of the studies. Overall, the benefit-risk of these studies remains favorable.

Vertex recommends that subjects and sites refer to local guidance regarding travel restrictions. There are no operational changes to the study protocols for subjects who can travel to the study sites for their visits. However, to ensure continued safety of subjects who *cannot* travel to the study sites for their visits (for any reason due to COVID-19), specific alternative measures are being implemented to minimize the risk of exposure to COVID-19 (see table below). As the COVID-19 pandemic evolves, Vertex will continue to assess the need for additional actions to ensure the safety of all involved in these clinical studies.

Addendum Version 3.0 summarizes additional measures taken for these ongoing CF clinical studies (see table below) to ensure continued safety.

Summary of Changes in Ongoing CF Clinical Studies for Subjects Who Cannot Travel to the Study Site

| Protocol Change | Rationale for Change | Study Number |
|--|--|---|
| Addendum Version 3.0, dated 29 July 2020 | | |
| <p>Assessments</p> <p>Unscheduled visit(s) will be permissible at the discretion of the investigator(s) or Vertex. The unscheduled visit(s) may be conducted at any time during the study (including after the protocol defined last study visit) in the event assessments specified to be collected at a scheduled visit were not collected due to COVID-19.</p> | <p>To ensure subject safety and/or to facilitate evaluation of safety and/or efficacy if assessments are not performed per the schedule in the protocol due to COVID-19.</p> | <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>VX18-445-110</p> <p>[REDACTED]</p> |
| <p>Implementaion of measures described in addenda versions 1.0 and 2.0, as applicable.</p> | <p>To ensure subject safety and/or to facilitate evaluation of safety and/or efficacy while maintaining study integrity and the safety of subjects and site personnel.</p> | <p>[REDACTED]</p> |

Summary of Changes in Ongoing CF Clinical Studies for Subjects Who Cannot Travel to the Study Site

| Protocol Change | Rationale for Change | Study Number |
|---|--|---|
| Addendum Version 2.0, dated 15 May 2020 | | |
| <p>Assessments</p> <p>Weight and height/length/stature may be assessed by subjects or their caregivers using medical grade scales and stadiometers, as indicated per protocol and per local regulation. Sites and subjects will receive training and guidance as needed on these devices.</p> <p>Subjects or caregivers will provide these measurements to site personnel by telephone or video call. Investigators will review results and contact subjects for follow-up as needed. All data will continue to be retained in the subject's source files.</p> | <p>To allow for collection of key data to assess safety and/or efficacy while maintaining study integrity and the safety of subjects and site personnel.</p> <p><i>Addendum 1 allowed for these assessments to be performed by qualified personnel conducting the in-home visits. Addendum 2 allows for these assessments to be performed by subjects or caregivers.</i></p> | <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>VX18-445-110</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> |



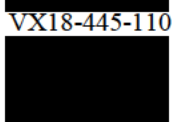






Summary of Changes in Ongoing CF Clinical Studies for Subjects Who Cannot Travel to the Study Site

| Protocol Change | Protocol Change | Protocol Change |
|---|--|---|
| Addendum Version 1.0, dated 24 April 2020 | | |
| <p>Consenting of Subjects ICFs may be provided electronically or by post mail to subjects (and/or caregivers, as indicated per protocol). The subjects and/or caregivers will review the ICF with an appropriately qualified member of the investigator’s team via telephone contact or video call. After this review, subjects and/or caregivers will consent (or assent, if applicable), and/or re-consent verbally and by signing and dating the ICF and returning it to the site via post mail. The signed and dated ICF will then be signed and dated by the investigator.</p> <p>Subjects participating in select studies may have the opportunity to enroll in longterm extension studies. Informed consent (or assent, if applicable), and/or re-consent for subjects (and/or caregivers, as indicated per protocol) may be obtained per the same process described above, as applicable.</p> | <p>To provide alternative methods of obtaining re-consent or consent, as applicable, while ensuring subject safety.</p> | <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> |
| <p>Study Drug Shipping Study drug may be shipped directly from the site to the subject, as applicable, and if permitted by local regulations; subject protected health information will not be released to Vertex.</p> <p>Reconciliation, return, and destruction of study drug will continue to occur at the clinical site as indicated per protocol and in adherence to local regulations.</p> | <p>To ensure subjects can continue treatment with study drug without interruption while ensuring their safety.</p> <p>To clarify that despite these alternative measures, reconciliation, return, and destruction of study drug will remain as indicated per protocol.</p> | <p>[REDACTED]</p> <p>VX18-445-110</p> <p>[REDACTED]</p> |
| <p>In-home Visits and/or Telephone Contact Study visits may be conducted as in-home visits by qualified personnel as requested by participating sites on a per-subject basis. In addition, all subjects may be contacted by site personnel by telephone or video call, irrespective of in-home visits.</p> | <p>To provide subjects the opportunity to continue participation in the clinical studies while ensuring their safety by minimizing the risk to COVID-19 exposure through travel.</p> | <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> |

Summary of Changes in Ongoing CF Clinical Studies for Subjects Who Cannot Travel to the Study Site

| Protocol Change | Protocol Change | Protocol Change |
|--|---|---|
| Addendum Version 1.0, dated 24 April 2020 | | |
| <p>Safety Assessments and Reporting</p> <p>Safety assessments, as indicated per protocol, may be performed by qualified personnel conducting the in-home visits (e.g., personnel from site or qualified health care agency). These assessments may include the following, as indicated per protocol, and per local regulation:</p> <ul style="list-style-type: none"> • vital signs • pulse oximetry • height/length/stature • weight • physical examination (complete or abbreviated) • pregnancy test (serum or urine) • urinalysis • blood draws for safety test panels (chemistry, LFT panel, lipid panel, hematology, coagulation). <p>Blood and/or urine samples for safety assessments are analyzed as indicated per protocol for subjects who have in-home visits.</p> <p>Blood and/or urine samples for safety assessments may be collected and analyzed at local laboratories for subjects who do not have in-home visits, but do not complete the assessment at the site.</p> <p>In addition, safety assessments will be evaluated by telephone. These assessments may include the review of the following:</p> <ul style="list-style-type: none"> • AEs • signs and symptoms/systems for CF • medications • planned or unplanned hospitalizations for CF • study drug administration • outcomes related to PEX • outcomes related to antibiotic treatment <p>Investigators will review results (in-home and telephone) and contact subjects for follow-up as needed.</p> <p>All data will continue to be retained in the subject’s source files.</p> <p>Any clinically significant finding (e.g., AE, SAE, laboratory abnormalities) will continue to be reported as indicated per protocol.</p> | <p>To assess the safety and tolerability of the CFTR modulator evaluated in the specific clinical study while ensuring subject safety. These safety assessments will continue to provide safety data while minimizing burden to subjects and site personnel.</p> <p>To clarify that despite these alternative measures, all adverse events and serious adverse events should be reported as indicated per protocol.</p> | <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>VX18-445-110</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> |

Summary of Changes in Ongoing CF Clinical Studies for Subjects Who Cannot Travel to the Study Site

| Protocol Change | Protocol Change | Protocol Change |
|---|---|--|
| Addendum Version 1.0, dated 24 April 2020 | | |
| <p>Efficacy and Other Assessments Efficacy and other assessments, as indicated per protocol, may be performed by qualified personnel conducting the in-home visits. These assessments may include the following, as indicated per protocol, and per local regulation.</p> <p><u>In-home Spirometry Assessment</u> A spirometry device may be provided to subjects for in-home assessments of lung function as indicated per protocol. Sites and subjects will receive training and guidance as needed.</p> <p><u>Patient Reported Outcome</u> CFQ-R questionnaires may be provided to subjects (electronically or post mail) to be completed at home as indicated per protocol. Subjects will return these questionnaires to the site via post mail.</p> <p><u>Other Assessments</u></p> <ul style="list-style-type: none"> • ECGs • sweat chloride • blood samples for <i>CFTR</i> genotype testing, IRT, PK, FSH, inflammatory mediator, biomarkers, and vitamin levels • fecal samples for FE-1, fecal calprotectin, and other markers of intestinal inflammation <p>other patient reported outcomes (e.g., TSQM, SF-12)</p> | <p>To be able to assess safety, treatment effectiveness, and quality of life measures of the CFTR modulator evaluated in the specific clinical study while ensuring subject safety.</p> |   VX18-445-110        |

Summary of Changes in Ongoing CF Clinical Studies for Subjects Who Cannot Travel to the Study Site

| Protocol Change | Protocol Change | Protocol Change |
|---|--|---|
| Addendum Version 1.0, dated 24 April 2020 | | |
| <p>Remote Monitoring Vertex has implemented remote monitoring visits where applicable, including remote source data verification, as allowed per local regulations. Remote monitoring will focus on collection of safety data, and data supporting primary and key secondary endpoints.</p> | <p>To allow for review of key data to inform on the safety of subjects receiving treatment.</p> <p>To allow for review of other key data to inform on the objectives of the study while maintaining study integrity and the safety of subjects and site personnel.</p> | <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>VX18-445-110</p> <p>[REDACTED]</p> <p>[REDACTED]</p> <p>[REDACTED]</p> |

AE: adverse event; CF: cystic fibrosis; CFQ-R: Cystic Fibrosis Questionnaire-Revised; ECG: electrocardiogram; FE-1: fecal elastase-1; FSH: follicle-stimulating hormone; GCP: Good Clinical Practice; ICF: informed consent form; IRT: immunoreactive trypsinogen; LFT: liver function test; PEx: pulmonary exacerbation; PK: pharmacokinetic; SAE: serious adverse event; SF-12: 12-Item Short Form Health Survey; TSQM: Treatment Satisfaction Questionnaire for Medication