

Ofev	Prescribing Information
100 mg, 150 mg	February 2022

# **OFEV**

## **NINTEDANIB**

### **SOFT CAPSULES**

#### **100 MG, 150 MG**

### **FULL PRESCRIBING INFORMATION**

#### **1 NAME OF THE MEDICINAL PRODUCT**

Ofev 100 mg

Ofev 150 mg

#### **2 QUALITATIVE AND QUANTITATIVE COMPOSITION**

Each Ofev 100 mg soft capsule contains 100 mg nintedanib;

Each Ofev 150 mg soft capsule contains 150 mg nintedanib;

#### **3 PHARMACEUTICAL FORM**

Soft capsules.

#### **4 INDICATIONS AND USAGE**

##### **4.1 Idiopathic Pulmonary Fibrosis**

OFEV is indicated for the treatment of idiopathic pulmonary fibrosis (IPF) in adults.

##### **4.2 Chronic Fibrosing Interstitial Lung Diseases with a Progressive Phenotype**

OFEV is indicated in adults for the treatment of chronic fibrosing interstitial lung diseases (ILDs) with a progressive phenotype

##### **4.3 Systemic Sclerosis-Associated Interstitial Lung Disease**

OFEV is indicated to slow the rate of decline in pulmonary function in patients with systemic sclerosis associated interstitial lung disease (SSc-ILD).

#### **5 DOSAGE AND ADMINISTRATION**

##### **5.1 Testing Prior to OFEV Administration**

Conduct liver function tests in all patients and a pregnancy test in females of reproductive potential prior to initiating treatment with OFEV [see Warnings and Precautions (8.2, 8.4)].

##### **5.2 Recommended Dosage**

The recommended dosage of OFEV is 150 mg taken orally twice daily administered approximately 12 hours apart.

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### Administration Information

OFEV capsules should be taken with food [*see Clinical Pharmacology (14.3)*] and swallowed whole with liquid. OFEV capsules should not be chewed or crushed because of a bitter taste. The effect of chewing or crushing of the capsule on the pharmacokinetics of nintedanib is not known.

### Information for Missed Dose

If a dose of OFEV is missed, the next dose should be taken at the next scheduled time. Advise the patient to not make up for a missed dose. Do not exceed the recommended maximum daily dosage of 300 mg.

## **5.3 Recommended Dosage for Patients with Hepatic Impairment**

### Mild Hepatic Impairment

In patients with mild hepatic impairment (Child Pugh A), the recommended dosage of OFEV is 100 mg orally twice daily approximately 12 hours apart taken with food [*see Use in Specific Populations (11.6)*].

## **5.4 Dosage Modification due to Adverse Reactions**

In addition to symptomatic treatment, if applicable, the management of adverse reactions of OFEV may require dose reduction or temporary interruption until the specific adverse reaction resolves to levels that allow continuation of therapy. OFEV treatment may be resumed at the full dosage (150 mg twice daily), or at the reduced dosage (100 mg twice daily), which subsequently may be increased to the full dosage. If a patient does not tolerate 100 mg twice daily, discontinue treatment with OFEV [*see Warnings and Precautions (8.2, 8.3, 8.5, 8.7) and Adverse Reactions (9.1)*].

### Elevated Liver Enzymes

Dose modifications or interruptions may be necessary for liver enzyme elevations. Conduct liver function tests (aspartate aminotransferase (AST), alanine aminotransferase (ALT), and bilirubin) prior to initiation of treatment with OFEV, at regular intervals during the first three months of treatment, and periodically thereafter or as clinically indicated. Measure liver tests promptly in patients who report symptoms that may indicate liver injury, including fatigue, anorexia, right upper abdominal discomfort, dark urine or jaundice. Discontinue OFEV in patients with AST or ALT greater than 3 times the upper limit of normal (ULN) with signs or symptoms of liver injury and for AST or ALT elevations greater than 5 times the upper limit of normal. For AST or ALT greater than 3 times to less than 5 times the ULN without signs of liver damage, interrupt treatment or reduce OFEV to 100 mg twice daily. Once liver enzymes have returned to baseline values, treatment with OFEV may be reintroduced at a reduced dosage (100 mg twice daily), which subsequently may be increased to the full dosage (150 mg twice daily) [*see Warnings and Precautions (8.2) and Adverse Reactions (9.1)*].

In patients with mild hepatic impairment (Child Pugh A), consider treatment interruption, or discontinuation for management of adverse reactions.

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## 6 DOSAGE FORMS AND STRENGTHS

150 mg capsules: brown, opaque, oblong, soft capsules imprinted in black with the Boehringer Ingelheim company symbol and "150".

100 mg capsules: peach, opaque, oblong, soft capsules imprinted in black with the Boehringer Ingelheim company symbol and "100".

## 7 CONTRAINDICATIONS

Hypersensitivity to the active substance or any of the excipients listed in section 13.

## 8 WARNINGS AND PRECAUTIONS

### 8.1 Hepatic Impairment

Treatment with OFEV is not recommended in patients with moderate (Child Pugh B) or severe (Child Pugh C) hepatic impairment [see Use in Specific Populations (11.6) and Clinical Pharmacology (14.3)]. Patients with mild hepatic impairment (Child Pugh A) can be treated with a reduced dose of OFEV [see Dosage and Administration - (5.3)].

### 8.2 Elevated Liver Enzymes and Drug-Induced Liver Injury

Cases of drug-induced liver injury (DILI) have been observed with OFEV treatment. In the clinical trials and postmarketing period, non-serious and serious cases of DILI were reported. Cases of severe liver injury with fatal outcome have been reported in the postmarketing period. The majority of hepatic events occur within the first three months of treatment. In clinical trials, administration of OFEV was associated with elevations of liver enzymes (ALT, AST, ALKP, GGT) and bilirubin. Liver enzyme and bilirubin increases were reversible with dose modification or interruption in the majority of cases. In IPF studies (Study 1, Study 2, and Study 3), the majority (94%) of patients with ALT and/or AST elevations had elevations less than 5 times ULN and the majority (95%) of patients with bilirubin elevations had elevations less than 2 times ULN. In the chronic fibrosing ILDs with a progressive phenotype study (Study 5), the majority (95%) of patients with ALT and/or AST elevations had elevations less than 5 times ULN and the majority (94%) of patients with bilirubin elevations had elevations less than 2 times ULN. In the SSc-ILD study (Study 4), a maximum ALT and/or AST greater than or equal to 3 times ULN was observed for 4.9% of patients in the OFEV group and for 0.7% of patients in the placebo group [see Use in Specific Populations (11.6) and Clinical Pharmacology (14.3)]. Patients with a low body weight (less than 65 kg), Asian, and female patients may have a higher risk of elevations in liver enzymes. Nintedanib exposure increased with patient age, which may also result in a higher risk of increased liver enzymes [see Clinical Pharmacology (14.3)].

Conduct liver function tests (ALT, AST, and bilirubin) prior to initiation of treatment with OFEV, at regular intervals during the first three months of treatment, and periodically thereafter or as clinically indicated. Measure liver tests promptly in patients who report symptoms that may indicate liver injury, including fatigue, anorexia, right upper abdominal discomfort, dark urine or jaundice. Dosage modifications or interruption may be necessary for liver enzyme elevations [see Dosage and Administration (5.1, 5.3)].

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### 8.3 Gastrointestinal Disorders

#### Diarrhea

In clinical trials, diarrhea was the most frequent gastrointestinal event reported. In most patients, the event was of mild to moderate intensity and occurred within the first 3 months of treatment. In IPF studies (Study 1, Study 2, and Study 3), diarrhea was reported in 62% versus 18% of patients treated with OFEV and placebo, respectively [see Adverse Reactions (6.1)]. Diarrhea led to permanent dose reduction in 11% of patients treated with OFEV compared to 0 placebo-treated patients. Diarrhea led to discontinuation of OFEV in 5% of the patients compared to less than 1% of placebo-treated patients. In the chronic fibrosing ILDs with a progressive phenotype study (Study 5), diarrhea was reported in 67% versus 24% of patients treated with OFEV and placebo, respectively [see Adverse Reactions (6.1)]. Diarrhea led to permanent dose reduction in 16% of patients treated with OFEV compared to less than 1% of placebo-treated patients. Diarrhea led to discontinuation of OFEV in 6% of the patients compared to less than 1% of placebo-treated patients. In the SSc-ILD study (Study 4), diarrhea was reported in 76% versus 32% of patients treated with OFEV and placebo, respectively [see Adverse Reactions (9.1)]. Diarrhea led to permanent dose reduction in 22% of patients treated with OFEV compared to 1% of placebo-treated patients. Diarrhea led to discontinuation of OFEV in 7% of the patients compared to 0.3% of placebo-treated patients.

Dosage modifications or treatment interruptions may be necessary in patients with adverse reactions of diarrhea. Treat diarrhea at first signs with adequate hydration and antidiarrheal medication (e.g., loperamide), and consider dose reduction or treatment interruption if diarrhea continues [see Dosage and Administration (5.3)]. OFEV treatment may be resumed at the full dosage (150 mg twice daily), or at the reduced dosage (100 mg twice daily), which subsequently may be increased to the full dosage. If severe diarrhea persists despite symptomatic treatment, discontinue treatment with OFEV.

#### Nausea and Vomiting

In IPF studies (Study 1, Study 2, and Study 3), nausea was reported in 24% versus 7% and vomiting was reported in 12% versus 3% of patients treated with OFEV and placebo, respectively. In the chronic fibrosing ILDs with a progressive phenotype study (Study 5), nausea was reported in 29% versus 9% and vomiting was reported in 18% versus 5% of patients treated with OFEV and placebo, respectively. In the SSc-ILD study (Study 4), nausea was reported in 32% versus 14% and vomiting was reported in 25% versus 10% of patients treated with OFEV and placebo, respectively [see *Adverse Reactions (9.1)*]. In most patients, these events were of mild to moderate intensity. In IPF studies (Study 1, Study 2, and Study 3), nausea led to discontinuation of OFEV in 2% of patients and vomiting led to discontinuation of OFEV in 1% of the patients. In the chronic fibrosing ILDs with a progressive phenotype study (Study 5), nausea led to discontinuation of OFEV in less than 1% of patients and vomiting led to discontinuation of OFEV in 1% of the patients. In the SSc-ILD study (Study 4), nausea led to discontinuation of OFEV in 2% of patients and vomiting led to discontinuation of OFEV in 1% of the patients.

For nausea or vomiting that persists despite appropriate supportive care including anti-emetic therapy, dose reduction or treatment interruption may be required [see *Dosage and Administration (5.4)*]. OFEV treatment may be resumed at the full dosage (150 mg twice daily), or at the reduced dosage (100

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mg twice daily), which subsequently may be increased to the full dosage. If severe nausea or vomiting does not resolve, discontinue treatment with OFEV.

#### **8.4 Embryo-Fetal Toxicity**

Based on findings from animal studies and its mechanism of action, OFEV can cause fetal harm when administered to a pregnant woman. Nintedanib caused embryo-fetal deaths and structural abnormalities in rats and rabbits when administered during organogenesis at less than (rats) and approximately 5 times (rabbits) the maximum recommended human dose (MRHD) in adults. Advise pregnant women of the potential risk to a fetus. Advise females of reproductive potential to avoid becoming pregnant while receiving treatment with OFEV and to use highly effective contraception at initiation of, during treatment, and at least 3 months after the last dose of OFEV. Nintedanib does not change the exposure to oral contraceptive containing ethinylestradiol and levonorgestrel in patients with SSc-ILD. However, the efficacy of oral hormonal contraceptives may be compromised by vomiting and/or diarrhea or other conditions where the drug absorption may be reduced. Advise women taking oral hormonal contraceptives experiencing these conditions to use alternative highly effective contraception. Verify pregnancy status prior to treatment with OFEV and during treatment as appropriate [see Use in Specific Populations (11.1, 11.3) and Clinical Pharmacology (14.1, 14.3)].

#### **8.5 Arterial Thromboembolic Events**

Arterial thromboembolic events have been reported in patients taking OFEV. In IPF studies (Study 1, Study 2, and Study 3), arterial thromboembolic events were reported in 2.5% of patients treated with OFEV and less than 1% of placebo-treated patients. Myocardial infarction was the most common adverse reaction under arterial thromboembolic events, occurring in 1.5% of OFEV-treated patients compared to less than 1% of placebo-treated patients. In the chronic fibrosing ILDs with a progressive phenotype study (Study 5), arterial thromboembolic events were reported in less than 1% of patients in both treatment arms. Myocardial infarction was observed in less than 1% of patients in both treatment arms. In the SSc-ILD study (Study 4), arterial thromboembolic events were reported in 0.7% of patients in both treatment arms. There were 0 cases of myocardial infarction in OFEV-treated patients compared to 0.7% of placebo-treated patients.

Use caution when treating patients at higher cardiovascular risk including known coronary artery disease. Consider treatment interruption in patients who develop signs or symptoms of acute myocardial ischemia.

#### **8.6 Risk of Bleeding**

Based on the mechanism of action (VEGFR inhibition), OFEV may increase the risk of bleeding. In IPF studies (Study 1, Study 2, and Study 3), bleeding events were reported in 10% of patients treated with OFEV and in 7% of patients treated with placebo. In the chronic fibrosing ILDs with a progressive phenotype study (Study 5), bleeding events were reported in 11% of patients treated with OFEV and in 13% of patients treated with placebo. In the SSc-ILD study (Study 4), bleeding events were reported in 11% of patients treated with OFEV and in 8% of patients treated with placebo. In clinical trials, epistaxis was the most frequent bleeding event reported.

In the postmarketing period non-serious and serious bleeding events, some of which were fatal, have been observed.

Use OFEV in patients with known risk of bleeding only if the anticipated benefit outweighs the potential risk.

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### 8.7 Gastrointestinal Perforation and ischaemic colitis

Based on the mechanism of action, OFEV may increase the risk of gastrointestinal perforation. In IPF studies (Study 1, Study 2, and Study 3), gastrointestinal perforation was reported in less than 1% of patients treated with OFEV, compared to 0 cases in the placebo-treated patients. In the chronic fibrosing ILDs with a progressive phenotype study (Study 5), gastrointestinal perforation was not reported in any patients in any treatment arm. In the SSc-ILD study (Study 4), no cases of gastrointestinal perforation were reported in patients treated with OFEV or in placebo-treated patients. In the postmarketing period, cases of gastrointestinal perforations and cases of ischaemic colitis have been reported, some of which were fatal.

Use caution when treating patients who have had recent abdominal surgery, previous history of diverticular disease or receiving concomitant corticosteroids or NSAIDs. Discontinue therapy with OFEV in patients who develop gastrointestinal perforation or ischaemic colitis. Exceptionally, Ofev can be reintroduced after complete resolution of ischaemic colitis and careful assessment of patient's condition and other risk factors.

Only use OFEV in patients with known risk of gastrointestinal perforation or ischaemic colitis if the anticipated benefit outweighs the potential risk.

### 8.8 Aneurysms and artery dissections

The use of VEGF pathway inhibitors in patients with or without hypertension may promote the formation of aneurysms and/or artery dissections. Before initiating Ofev, this risk should be carefully considered in patients with risk factors such as hypertension or history of aneurysm

### 8.9 Nephrotic Range Proteinuria and thrombotic microangiopathy

Cases of proteinuria within the nephrotic range have been reported in the postmarketing period. Histological findings, when available, were consistent with glomerular microangiopathy with or without renal thrombi. Improvement in proteinuria has been observed after OFEV was discontinued; however, in some cases, residual proteinuria persisted. Consider treatment interruption in patients who develop new or worsening proteinuria.

VEGF pathway inhibitors have been associated with thrombotic microangiopathy (TMA), including very few case reports for nintedanib. If laboratory or clinical findings associated with TMA occur in a patient receiving nintedanib, treatment with nintedanib should be discontinued and thorough evaluation for TMA should be completed.

## 9. ADVERSE REACTIONS

The following clinically significant adverse reactions are discussed in greater detail in other sections of the labeling:

- Elevated Liver Enzymes and Drug-Induced Liver Injury [see *Warnings and Precautions* (8.2)]
- Gastrointestinal Disorders [see *Warnings and Precautions* (8.3)]
- Embryo-Fetal Toxicity [see *Warnings and Precautions* (8.4)]
- Arterial Thromboembolic Events [see *Warnings and Precautions* (8.5)]
- Risk of Bleeding [see *Warnings and Precautions* (8.6)]
- Gastrointestinal Perforation and ischaemic colitis [see *Warnings and Precautions* (8.7)]
- Aneurysms and artery dissections [see *Warnings and Precautions* (8.8)]
- Nephrotic Range Proteinuria [see *Warnings and Precaution* (8.9)]

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### 9.1 Clinical Trials Experience

Because clinical trials are conducted under widely varying conditions, adverse reaction rates observed in the clinical trials of a drug cannot be directly compared to rates in the clinical trials of another drug and may not reflect the rates observed in practice.

The safety of OFEV was evaluated in over 1000 IPF patients, 332 patients with chronic fibrosing ILDs with a progressive phenotype, and over 280 patients with SSc-ILD. Over 200 IPF patients were exposed to OFEV for more than 2 years in clinical trials.

#### Idiopathic Pulmonary Fibrosis

OFEV was studied in three randomized, double-blind, placebo-controlled, 52-week trials. In the phase 2 (Study 1) and phase 3 (Study 2 and Study 3) trials, 723 patients with IPF received OFEV 150 mg twice daily and 508 patients received placebo. The median duration of exposure was 10 months for patients treated with OFEV and 11 months for patients treated with placebo. Subjects ranged in age from 42 to 89 years (median age of 67 years). Most patients were male (79%) and Caucasian (60%).

The most frequent serious adverse reactions reported in patients treated with OFEV, more than placebo, were bronchitis (1.2% vs. 0.8%) and myocardial infarction (1.5% vs. 0.4%). The most common adverse events leading to death in patients treated with OFEV, more than placebo, were pneumonia (0.7% vs. 0.6%), lung neoplasm malignant (0.3% vs. 0%), and myocardial infarction (0.3% vs. 0.2%). In the predefined category of major adverse cardiovascular events (MACE) including MI, fatal events were reported in 0.6% of OFEV-treated patients and 1.8% of placebo-treated patients.

Adverse reactions leading to permanent dose reductions were reported in 16% of OFEV-treated patients and 1% of placebo-treated patients. The most frequent adverse reaction that led to permanent dose reduction in the patients treated with OFEV was diarrhea (11%).

Adverse reactions leading to discontinuation were reported in 21% of OFEV-treated patients and 15% of placebo-treated patients. The most frequent adverse reactions that led to discontinuation in OFEV-treated patients were diarrhea (5%), nausea (2%), and decreased appetite (2%).

The most common adverse reactions with an incidence of greater than or equal to 5% and more frequent in the OFEV than placebo treatment group are listed in Table 1.

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**Table 1 Adverse Reactions Occurring in  $\geq 5\%$  of OFEV-treated Patients with Idiopathic Pulmonary Fibrosis and More Commonly Than Placebo in Study 1, Study 2, and Study 3**

Adverse Reaction	OFEV, 150 mg n=723	Placebo n=508
<b>Gastrointestinal disorders</b>		
Diarrhea	62%	18%
Nausea	24%	7%
Abdominal pain <sup>a</sup>	15%	6%
Vomiting	12%	3%
<b>Hepatobiliary disorders</b>		
Liver enzyme elevation <sup>b</sup>	14%	3%
<b>Metabolism and nutrition disorders</b>		
Decreased appetite	11%	5%
<b>Nervous system disorders</b>		
Headache	8%	5%
<b>Investigations</b>		
Weight decreased	10%	3%
<b>Vascular disorders</b>		
Hypertension <sup>c</sup>	5%	4%

<sup>a</sup> Includes abdominal pain, abdominal pain upper, abdominal pain lower, gastrointestinal pain and abdominal tenderness.

<sup>b</sup> Includes gamma-glutamyltransferase increased, hepatic enzyme increased, alanine aminotransferase increased, aspartate aminotransferase increased, hepatic function abnormal, liver function test abnormal, transaminase increased, blood alkaline phosphatase-increased, alanine aminotransferase abnormal, aspartate aminotransferase abnormal, and gamma-glutamyltransferase abnormal.

<sup>c</sup> Includes hypertension, blood pressure increased, hypertensive crisis, and hypertensive cardiomyopathy.

In addition, hypothyroidism was reported in patients treated with OFEV, more than placebo (1.1% vs. 0.6%).

Alopecia was also reported in more patients treated with OFEV than placebo (0.8% vs. 0.4%).

### *Combination with Pirfenidone*

Concomitant treatment with nintedanib and pirfenidone was investigated in an exploratory open-label, randomized (1:1) trial of nintedanib 150 mg twice daily with add-on pirfenidone (titrated to 801 mg three times a day) compared to nintedanib 150 mg twice daily alone in 105 randomized patients for 12 weeks. The primary endpoint was the percentage of patients with gastrointestinal adverse events from baseline to Week 12. Gastrointestinal adverse events were in line with the established safety profile of each component and were experienced in 37 (70%) patients treated with pirfenidone added to nintedanib versus 27 (53%) patients treated with nintedanib alone.

Diarrhea, nausea, vomiting, and abdominal pain (includes upper abdominal pain, abdominal discomfort, and abdominal pain) were the most frequent adverse events reported in 20 (38%) versus 16 (31%), in 22 (42%) versus 6 (12%), in 15 (28%) versus 6 (12%), and in 15 (28%) versus 7 (14%) patients treated with pirfenidone added to nintedanib versus nintedanib alone, respectively. More subjects reported AST or ALT elevations (greater than or equal to 3x the upper limit of normal) when using pirfenidone in combination with nintedanib (n=3 (6%)) compared to nintedanib alone (n=0) [see *Warnings and Precautions (8.2, 8.3)*].

### Chronic Fibrosing Interstitial Lung Diseases with a Progressive Phenotype



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OFEV was studied in a phase 3, double-blind, placebo-controlled trial (Study 5) in which 663 patients with chronic fibrosing ILDs with a progressive phenotype were randomized to receive OFEV 150 mg twice daily (n=332) or placebo (n=331) for at least 52 weeks. At 52 weeks, the median duration of exposure was 12 months for patients in both treatment arms. Subjects ranged in age from 27 to 87 years (median age of 67 years). The majority of patients were Caucasian (74%) or Asian (25%). Most patients were male (54%).

The most frequent serious adverse event reported in patients treated with OFEV, more than placebo, was pneumonia (4% vs. 3%). Adverse events leading to death were reported in 3% of patients treated with OFEV and in 5% of patients treated with placebo. No pattern was identified in the adverse events leading to death.

Adverse reactions leading to permanent dose reductions were reported in 33% of OFEV-treated patients and 4% of placebo-treated patients. The most frequent adverse reaction that led to permanent dose reduction in the patients treated with OFEV was diarrhea (16%).

Adverse reactions leading to discontinuation were reported in 20% of OFEV-treated patients and 10% of placebo-treated patients. The most frequent adverse reaction that led to discontinuation in OFEV-treated patients was diarrhea (6%).

The safety profile in patients with chronic fibrosing ILDs with a progressive phenotype treated with OFEV was consistent with that observed in IPF patients. In addition, the following adverse events were reported in OFEV more than placebo in chronic progressive fibrosing ILD: nasopharyngitis (13% vs. 12%), upper respiratory tract infection (7% vs 6%), urinary tract infection (6% vs. 4%), fatigue (10% vs. 6%), and back pain (6% vs. 5%).

#### Systemic Sclerosis-Associated Interstitial Lung Disease

OFEV was studied in a phase 3, randomized, double-blind, placebo-controlled trial (Study 4) in which 576 patients with SSc-ILD received OFEV 150 mg twice daily (n=288) or placebo (n=288). Patients were to receive treatment for at least 52 weeks; individual patients were treated for up to 100 weeks. The median duration of exposure was 15 months for patients treated with OFEV and 16 months for patients treated with placebo. Subjects ranged in age from 20 to 79 years (median age of 55 years). Most patients were female (75%). Patients were mostly Caucasian (67%), Asian (25%), or Black (6%). At baseline, 49% of patients were on stable therapy with mycophenolate.

The most frequent serious adverse events reported in patients treated with OFEV, more than placebo, were interstitial lung disease (2.4% nintedanib vs. 1.7% placebo) and pneumonia (2.8% nintedanib vs. 0.3% placebo). Within 52 weeks, 5 patients treated with OFEV (1.7%) and 4 patients treated with placebo (1.4%) died. There was no pattern among adverse events leading to death in either treatment arm.

Adverse reactions leading to permanent dose reductions were reported in 34% of OFEV-treated patients and 4% of placebo-treated patients. The most frequent adverse reaction that led to permanent dose reduction in the patients treated with OFEV was diarrhea (22%).

Adverse reactions leading to discontinuation were reported in 16% of OFEV-treated patients and 9% of placebo-treated patients. The most frequent adverse reactions that led to discontinuation in OFEV-treated patients were diarrhea (7%), nausea (2%), vomiting (1%), abdominal pain (1%), and interstitial lung disease (1%).

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The safety profile in patients treated with OFEV with or without mycophenolate at baseline was comparable.

The most common adverse reactions with an incidence of greater than or equal to 5% in OFEV-treated patients and more commonly than in placebo are listed in Table 2.

**Table 2 Adverse Reactions Occurring in  $\geq$ 5% of OFEV-treated Patients with Systemic Sclerosis-Associated Interstitial Lung Disease and More Commonly Than Placebo in Study 4**

Adverse Reaction	OFEV, 150 mg n=288	Placebo n=288
Diarrhea	76%	32%
Nausea	32%	14%
Vomiting	25%	10%
Skin ulcer	18%	17%
Abdominal pain <sup>a</sup>	18%	11%
Liver enzyme elevation <sup>b</sup>	13%	3%
Weight decreased	12%	4%
Fatigue	11%	7%
Decreased appetite	9%	4%
Headache	9%	8%
Pyrexia	6%	5%
Back pain	6%	4%
Dizziness	6%	4%
Hypertension <sup>c</sup>	5%	2%

<sup>a</sup> Includes abdominal pain, abdominal pain upper, abdominal pain lower, and esophageal pain.

<sup>b</sup> Includes alanine aminotransferase increased, gamma-glutamyltransferase increased, aspartate aminotransferase increased, hepatic enzyme increased, blood alkaline phosphatase increased, transaminase increased, and hepatic function abnormal.

<sup>c</sup> Includes hypertension, blood pressure increased, and hypertensive crisis.

In addition, alopecia was reported in patients treated with OFEV, more than placebo (1.4% vs. 1.0%).

## 9.2 Postmarketing Experience

The following adverse reactions have been identified during postapproval use of OFEV. Because these reactions are reported voluntarily from a population of uncertain size, it is not always possible to reliably estimate their frequency or establish a causal relationship to drug exposure. The following adverse reactions have been identified during postapproval use of OFEV:

drug-induced liver injury [see Warnings and Precautions (8.2)], non-serious and serious bleeding events, some of which were fatal [see Warnings and Precautions (8.6)], ischaemic colitis [see Warnings and Precautions (8.7)], proteinuria [see Warnings and Precautions 8.9], pancreatitis, thrombocytopenia, rash, pruritus.

Vascular disorders: Aneurysms and artery dissections (Frequency ‘Not known’) [see Warnings and Precautions (8.8)]

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## **Reporting of suspected adverse reactions**

You can report side effects to the Ministry of Health by following the link 'Reporting Side Effects of Drug Treatment' on the Ministry of Health home page ([www.health.gov.il](http://www.health.gov.il)) which links to an online form for reporting side effects. You can also use this link: <https://sideeffects.health.gov.il>

## **10 DRUG INTERACTIONS**

### **10.1 P-glycoprotein (P-gp) and CYP3A4 Inhibitors and Inducers**

Nintedanib is a substrate of P-gp and, to a minor extent, CYP3A4 [*see Clinical Pharmacology (14.3)*]. Coadministration with oral doses of a P-gp and CYP3A4 inhibitor, ketoconazole, increased exposure to nintedanib by 60%. Concomitant use of P-gp and CYP3A4 inhibitors (e.g., erythromycin) with OFEV may increase exposure to nintedanib [*see Clinical Pharmacology (14.3)*]. In such cases, patients should be monitored closely for tolerability of OFEV. Management of adverse reactions may require interruption, dose reduction, or discontinuation of therapy with OFEV [*see Dosage and Administration (5.4)*].

Coadministration with oral doses of a P-gp and CYP3A4 inducer, rifampicin, decreased exposure to nintedanib by 50%. Concomitant use of P-gp and CYP3A4 inducers (e.g., carbamazepine, phenytoin, and St. John's wort) with OFEV should be avoided as these drugs may decrease exposure to nintedanib [*see Clinical Pharmacology (14.3)*].

### **10.2 Anticoagulants**

Nintedanib is a VEGFR inhibitor and may increase the risk of bleeding. Monitor patients on full anticoagulation therapy closely for bleeding and adjust anticoagulation treatment as necessary [*see Warnings and Precautions (8.6)*].

### **10.3 Pirfenidone**

In a multiple-dose study conducted to assess the pharmacokinetic effects of concomitant treatment with nintedanib and pirfenidone, the coadministration of nintedanib with pirfenidone did not alter the exposure of either agent [*see Clinical Pharmacology (14.3)*]. Therefore, no dose adjustment is necessary during concomitant administration of nintedanib with pirfenidone.

### **10.4 Bosentan**

Coadministration of nintedanib with bosentan did not alter the pharmacokinetics of nintedanib [*see Clinical Pharmacology (12.3)*].

## **11 USE IN SPECIFIC POPULATIONS**

### **11.1 Pregnancy**

#### **Risk Summary**

Based on findings from animal studies and its mechanism of action [*see Clinical Pharmacology (14.1)*], OFEV can cause fetal harm when administered to a pregnant woman. There are no data on the use of OFEV during pregnancy. In animal studies of pregnant rats and rabbits treated during organogenesis, nintedanib caused embryo-fetal deaths and structural abnormalities at less than (rats) and approximately 5 times (rabbits) the maximum recommended human dose [*see Data*]. Advise pregnant women of the potential risk to a fetus.

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The estimated background risk of major birth defects and miscarriage for the indicated population is unknown. In the U.S. general population, the estimated background risk of major birth defects is 2% to 4% and miscarriage in clinically recognized pregnancies is 15% to 20%.

## Data

### *Animal Data*

In animal reproduction toxicity studies, nintedanib caused embryo-fetal deaths and structural abnormalities in rats and rabbits at less than and approximately 5 times the maximum recommended human dose (MRHD) in adults (on a plasma AUC basis at maternal oral doses of 2.5 and 15 mg/kg/day in rats and rabbits, respectively). Malformations included abnormalities in the vasculature, urogenital, and skeletal systems. Vasculature anomalies included missing or additional major blood vessels. Skeletal anomalies included abnormalities in the thoracic, lumbar, and caudal vertebrae (e.g., hemivertebra, missing, or asymmetrically ossified), ribs (bifid or fused), and sternbrae (fused, split, or unilaterally ossified). In some fetuses, organs in the urogenital system were missing. In rabbits, a significant change in sex ratio was observed in fetuses (female:male ratio of approximately 71%:29%) at approximately 15 times the MRHD in adults (on an AUC basis at a maternal oral dose of 60 mg/kg/day). Nintedanib decreased post-natal viability of rat pups during the first 4 post-natal days when dams were exposed to less than the MRHD (on an AUC basis at a maternal oral dose of 10 mg/kg/day).

## **11.2 Lactation**

### Risk Summary

There is no information on the presence of nintedanib in human milk, the effects on the breast-fed infant or the effects on milk production. Nintedanib and/or its metabolites are present in the milk of lactating rats [*see Data*]. Because of the potential for serious adverse reactions in nursing infants from OFEV, advise women that breastfeeding is not recommended during treatment with OFEV.

## Data

Milk and plasma of lactating rats have similar concentrations of nintedanib and its metabolites.

## **11.3 Females and Males of Reproductive Potential**

Based on findings from animal studies and its mechanism of action, OFEV can cause fetal harm when administered to a pregnant woman and may reduce fertility in females of reproductive potential [*see Use in Specific Populations (11.1), Clinical Pharmacology (14.1, 14.3), and Nonclinical Toxicology (15.1)*]. Counsel patients on pregnancy prevention and planning.

### Pregnancy Testing

Verify the pregnancy status of females of reproductive potential prior to treatment with OFEV and during treatment as appropriate [*see Dosage and Administration (5.1), Warnings and Precautions (8.4), and Use in Specific Populations (11.1)*].

### Contraception

OFEV can cause fetal harm when administered to a pregnant woman. Advise females of reproductive potential to avoid becoming pregnant while receiving treatment with OFEV. Advise females of reproductive potential to use highly effective contraception at initiation of, during treatment, and for at least 3 months after taking the last dose of OFEV. Nintedanib does not change the exposure to oral contraceptive containing ethinylestradiol and levonorgestrel in patients with SSc-ILD. However, the efficacy of oral hormonal contraceptives may be compromised by vomiting and/or diarrhea or other conditions where the drug absorption may be reduced. Advise women taking oral hormonal contraceptives experiencing these conditions to use alternative highly effective contraception.

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### Infertility

Based on animal data, OFEV may reduce fertility in females of reproductive potential [see *Nonclinical Toxicology (15.1)*].

### **11.4 Pediatric Use**

Safety and effectiveness in pediatric patients have not been established.

### **11.5 Geriatric Use**

Of the total number of subjects in phase 2 and 3 clinical studies of OFEV in IPF (Study 1, Study 2, and Study 3), 61% were 65 and over, while 16% were 75 and over. In the chronic fibrosing ILDs with a progressive phenotype clinical study (Study 5), 61% were 65 and over, while 19% were 75 and older. In SSc-ILD (Study 4), 21.4% were 65 and over, while 1.9% were 75 and older. In phase 3 studies, no overall differences in effectiveness were observed between subjects who were 65 and over and younger subjects; no overall differences in safety were observed between subjects who were 65 and over or 75 and over and younger subjects, but greater sensitivity of some older individuals cannot be ruled out.

### **11.6 Hepatic Impairment**

Nintedanib is predominantly eliminated via biliary/fecal excretion (greater than 90%). In a PK study performed in patients with hepatic impairment (Child Pugh A, Child Pugh B), exposure to nintedanib was increased [see *Clinical Pharmacology (14.3)*]. In patients with mild hepatic impairment (Child Pugh A), the recommended dosage of OFEV is 100 mg twice daily [see *Dosage and Administration (5.2)*].

Monitor for adverse reactions and consider treatment interruption or discontinuation for management of adverse reactions in these patients [see *Dosage and Administration (5.3)*]. Treatment of patients with moderate (Child Pugh B) and severe (Child Pugh C) hepatic impairment with OFEV is not recommended [see *Warnings and Precautions (8.1)*].

### **11.7 Renal Impairment**

Based on a single-dose study, less than 1% of the total dose of nintedanib is excreted via the kidney [see *Clinical Pharmacology (14.3)*]. Adjustment of the starting dose in patients with mild to moderate renal impairment is not required. The safety, efficacy, and pharmacokinetics of nintedanib have not been studied in patients with severe renal impairment (less than 30 mL/min CrCl) and end-stage renal disease.

### **11.8 Smokers**

Smoking was associated with decreased exposure to OFEV [see *Clinical Pharmacology (14.3)*], which may alter the efficacy profile of OFEV. Encourage patients to stop smoking prior to treatment with OFEV and to avoid smoking when using OFEV.

## **12 OVERDOSAGE**

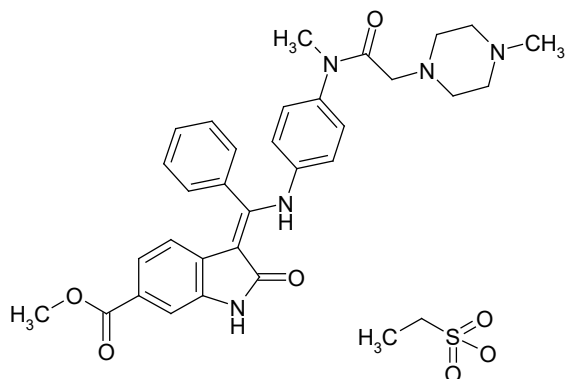
In IPF trials, one patient was inadvertently exposed to a dose of 600 mg daily for a total of 21 days. A non-serious adverse event (nasopharyngitis) occurred and resolved during the period of incorrect dosing, with no onset of other reported events. Overdosage was also reported in two patients in oncology studies who were exposed to a maximum of 600 mg twice daily for up to 8 days. Adverse events reported were consistent with the existing safety profile of OFEV. Both patients recovered. In case of overdosage, interrupt treatment and initiate general supportive measures as appropriate.

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## 13 DESCRIPTION

OFEV capsules contain nintedanib, a kinase inhibitor [see *Mechanism of Action (14.1)*]. Nintedanib is presented as the ethanesulfonate salt (esylate), with the chemical name 1*H*-Indole-6-carboxylic acid, 2,3-dihydro-3-[[[4-[methyl[(4-methyl-1-piperazinyl)acetyl]amino]phenyl]amino]phenylmethylene]-2-oxo-,methyl ester, (3*Z*)-, ethanesulfonate (1:1).

Its structural formula is:



Nintedanib esylate is a bright yellow powder with an empirical formula of  $C_{31}H_{33}N_5O_4 \cdot C_2H_6O_3S$  and a molecular weight of 649.76 g/mol.

OFEV capsules for oral administration are available in 2 dose strengths containing 100 mg or 150 mg of nintedanib (equivalent to 120.40 mg or 180.60 mg nintedanib ethanesulfonate, respectively). The inactive ingredients of OFEV are the following: Fill Material: triglycerides, hard fat, lecithin. Capsule Shell: gelatin, glycerol, titanium dioxide, red ferric oxide, yellow ferric oxide, black ink.

## 14 CLINICAL PHARMACOLOGY

### 14.1 Mechanism of Action

Nintedanib is a small molecule that inhibits multiple receptor tyrosine kinases (RTKs) and non-receptor tyrosine kinases (nRTKs). Nintedanib inhibits the following RTKs: platelet-derived growth factor receptor (PDGFR)  $\alpha$  and  $\beta$ , fibroblast growth factor receptor (FGFR) 1-3, vascular endothelial growth factor receptor (VEGFR) 1-3, colony stimulating factor 1 receptor (CSF1R), and Fms-like tyrosine kinase-3 (FLT-3). These kinases except for FLT-3 have been implicated in pathogenesis of interstitial lung diseases (ILD). Nintedanib binds competitively to the adenosine triphosphate (ATP) binding pocket of these kinases and blocks the intracellular signaling cascades, which have been demonstrated to be involved in the pathogenesis of fibrotic tissue remodeling in ILD. Nintedanib also inhibits the following nRTKs: Lck, Lyn and Src kinases. The contribution of FLT3 and nRTK inhibition to nintedanib efficacy in ILD is unknown.

### 14.2 Pharmacodynamics

#### Cardiac Electrophysiology

In a study in renal cell cancer patients, QT/QTc measurements were recorded and showed that a single oral dose of 200 mg nintedanib as well as multiple oral doses of 200 mg nintedanib administered twice daily for 15 days did not prolong the QTcF interval.

### 14.3 Pharmacokinetics

The PK properties of nintedanib were similar in healthy volunteers, patients with IPF, patients with chronic fibrosing ILDs with a progressive phenotype, patients with SSc-ILD, and cancer patients. The PK of nintedanib is linear. Dose proportionality was shown by an increase of nintedanib exposure with

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increasing doses (dose range 50 to 450 mg once daily and 150 to 300 mg twice daily). Accumulation upon multiple administrations in patients with IPF was 1.76-fold for AUC. Steady-state plasma concentrations were achieved within one week of dosing. Nintedanib trough concentrations remained stable for more than one year. The inter-individual variability in the PK of nintedanib was moderate to high (coefficient of variation of standard PK parameters in the range of 30% to 70%), intra-individual variability low to moderate (coefficients of variation below 40%).

### Absorption

Nintedanib reached maximum plasma concentrations approximately 2 to 4 hours after oral administration as a soft gelatin capsule under fed conditions. The absolute bioavailability of a 100 mg dose was 4.7% (90% CI: 3.62 to 6.08) in healthy volunteers. Absorption and bioavailability are decreased by transporter effects and substantial first-pass metabolism.

After food intake, nintedanib exposure increased by approximately 20% compared to administration under fasted conditions (90% CI: 95.3% to 152.5%) and absorption was delayed (median  $t_{max}$  fasted: 2.00 hours; fed: 3.98 hours), irrespective of the food type.

### Distribution

Nintedanib follows bi-phasic disposition kinetics. After intravenous infusion, a high volume of distribution which was larger than total body volume ( $V_{ss}$ : 1050 L) was observed.

The *in vitro* protein binding of nintedanib in human plasma was high, with a bound fraction of 97.8%. Serum albumin is considered to be the major binding protein. Nintedanib is preferentially distributed in plasma with a blood to plasma ratio of 0.87.

### Elimination

The effective half-life of nintedanib in patients with IPF was 9.5 hours (gCV 31.9%). Total plasma clearance after intravenous infusion was high (CL: 1390 mL/min; gCV 28.8%). Urinary excretion of unchanged drug within 48 hours was about 0.05% of the dose after oral and about 1.4% of the dose after intravenous administration; the renal clearance was 20 mL/min.

### Metabolism

The prevalent metabolic reaction for nintedanib is hydrolytic cleavage by esterases resulting in the free acid moiety BIBF 1202. BIBF 1202 is subsequently glucuronidated by UGT enzymes, namely UGT 1A1, UGT 1A7, UGT 1A8, and UGT 1A10 to BIBF 1202 glucuronide. Only a minor extent of the biotransformation of nintedanib consisted of CYP pathways, with CYP3A4 being the predominant enzyme involved. The major CYP-dependent metabolite could not be detected in plasma in the human absorption, distribution, metabolism, and elimination study. *In vitro*, CYP-dependent metabolism accounted for about 5% compared to about 25% ester cleavage.

### Excretion

The major route of elimination of drug-related radioactivity after oral administration of [ $^{14}C$ ] nintedanib was via fecal/biliary excretion (93.4% of dose), and the majority of OFEV was excreted as BIBF 1202. The contribution of renal excretion to the total clearance was low (0.65% of dose). The overall recovery was considered complete (above 90%) within 4 days after dosing.

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## Specific Populations

### *Age, Body Weight, and Sex*

Based on population PK analysis, age and body weight were correlated with nintedanib exposure. However, the effects on exposure are not sufficient to warrant a dose adjustment. There was no influence of sex on the exposure of nintedanib.

### ***Patients with Renal Impairment***

Based on a population PK analysis of data from 933 patients with IPF, exposure to nintedanib was not influenced by mild (CrCl: 60 to 90 mL/min; n=399) or moderate (CrCl: 30 to 60 mL/min; n=116) renal impairment. Data in severe renal impairment (CrCl below 30 mL/min) was limited.

### ***Patients with Hepatic Impairment***

A dedicated single-dose phase I pharmacokinetics study of OFEV compared 8 subjects with mild hepatic impairment (Child Pugh A) and 8 subjects with moderate hepatic impairment (Child Pugh B) to 17 subjects with normal hepatic function. In subjects with mild hepatic impairment, the mean exposure to nintedanib was 2.4-fold higher based on  $C_{max}$  (90% CI: 1.6 to 3.6) and 2.2-fold higher based on  $AUC_{0-inf}$  (90% CI: 1.4 to 3.5). In subjects with moderate hepatic impairment, exposure was 6.9-fold higher based on  $C_{max}$  (90% CI: 4.4 to 11.0) and 7.6-fold higher based on  $AUC_{0-inf}$  (90% CI: 5.1 to 11.3). Subjects with severe hepatic impairment (Child Pugh C) have not been studied.

### *Smokers*

In the population PK analysis, the exposure of nintedanib was 21% lower in current smokers compared to ex- and never-smokers. The effect is not sufficient to warrant a dose adjustment.

## Drug Interaction Studies

### *Potential for Nintedanib to Affect Other Drugs*

Effect of nintedanib coadministration on pirfenidone AUC and  $C_{max}$  was evaluated in a multiple-dose study. Nintedanib did not have an effect on the exposure of pirfenidone.

Fifteen female patients with SSc-ILD received a single dose of a combination of 30 mcg ethinylestradiol and 150 mcg levonorgestrel before and after twice daily dosing of 150 mg nintedanib for at least 10 days. Co-administration of nintedanib did not change the exposure of ethinylestradiol and levonorgestrel [see Warnings and Precautions (8.4) and Use in Specific Populations (11.3)].

In *in vitro* studies, nintedanib was shown not to be an inhibitor of OATP-1B1, OATP-1B3, OATP-2B1, OCT-2, or MRP-2. *In vitro* studies also showed that nintedanib has weak inhibitory potential on OCT-1, BCRP, and

P-gp; these findings are considered to be of low clinical relevance. Nintedanib and its metabolites, BIBF 1202 and BIBF 1202 glucuronide, did not inhibit or induce CYP enzymes *in vitro*.

### *Potential for Other Drugs to Affect Nintedanib*

Nintedanib is a substrate of P-gp and, to a minor extent, CYP3A4. Coadministration with the P-gp and CYP3A4 inhibitor, ketoconazole, increased exposure to nintedanib 1.61-fold based on AUC and 1.83-fold based on  $C_{max}$  in a dedicated drug-drug interaction study. In a drug-drug interaction study with the P-gp and CYP3A4 inducer, rifampicin, exposure to nintedanib decreased to 50.3% based on AUC and to 60.3% based on  $C_{max}$  upon coadministration with rifampicin compared to administration of nintedanib alone.

Effect of pirfenidone coadministration on nintedanib AUC and  $C_{max}$  was evaluated in a multiple-dose drug-drug interaction study. Pirfenidone did not have an effect on the exposure of nintedanib.



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Concomitant treatment with nintedanib and pirfenidone was also investigated in a separate trial, which was an exploratory open-label, randomized (1:1) trial of nintedanib 150 mg twice daily with add-on pirfenidone (titrated to 801 mg three times a day) compared to nintedanib 150 mg twice daily alone in 105 randomized patients for 12 weeks. Similar nintedanib trough plasma concentrations were observed when comparing patients receiving nintedanib alone with patients receiving nintedanib with add-on pirfenidone.

Healthy volunteers received a single dose of 150 mg nintedanib before and after multiple dosing of 125 mg bosentan twice daily at steady state. Coadministration of nintedanib with bosentan did not alter the pharmacokinetics of nintedanib.

Nintedanib displays a pH-dependent solubility profile with increased solubility at acidic pH less than 3. However, in the clinical trials, coadministration with proton pump inhibitors or histamine H2 antagonists did not influence the exposure (trough concentrations) of nintedanib.

In *in vitro* studies, nintedanib was shown not to be a substrate of OATP-1B1, OATP-1B3, OATP-2B1, OCT-2, MRP-2, or BCRP. *In vitro* studies also showed that nintedanib was a substrate of OCT-1; these findings are considered to be of low clinical relevance.

## 15 NONCLINICAL TOXICOLOGY

### 15.1 Carcinogenesis, Mutagenesis, Impairment of Fertility

Two-year oral carcinogenicity studies of nintedanib in rats and mice have not revealed any evidence of carcinogenic potential. Nintedanib was dosed up to 10 and 30 mg/kg/day in rats and mice, respectively. These doses were less than and approximately 4 times the MRHD on a plasma drug AUC basis.

Nintedanib was negative for genotoxicity in the *in vitro* bacterial reverse mutation assay, the mouse lymphoma cell forward mutation assay, and the *in vivo* rat micronucleus assay.

In rats, nintedanib reduced female fertility at exposure levels approximately 3 times the MRHD (on an AUC basis at an oral dose of 100 mg/kg/day). Effects included increases in resorption and post-implantation loss, and a decrease in gestation index. Changes in the number and size of corpora lutea in the ovaries were observed in chronic toxicity studies in rats and mice. An increase in the number of females with resorptions only was observed at exposures approximately equal to the MRHD (on an AUC basis at an oral dose of 20 mg/kg/day). Nintedanib had no effects on male fertility in rats at exposure levels approximately 3 times the MRHD (on an AUC basis at an oral dose of 100 mg/kg/day).

## 16 CLINICAL STUDIES

### 16.1 Idiopathic Pulmonary Fibrosis

The clinical efficacy of OFEV has been studied in 1231 patients with IPF in one phase 2 (Study 1 [NCT00514683]) and two phase 3 studies (Study 2 [NCT01335464] and Study 3 [NCT01335477]). These were randomized, double-blind, placebo-controlled studies comparing treatment with OFEV 150 mg twice daily to placebo for 52 weeks.

Study 2 and Study 3 were identical in design. Study 1 was very similar in design. Patients were randomized in a 3:2 ratio (1:1 for Study 1) to either OFEV 150 mg or placebo twice daily for 52 weeks. Study 1 also included other treatment arms (50 mg daily, 50 mg twice daily, and 100 mg twice daily) that are not further discussed. The primary endpoint was the annual rate of decline in Forced Vital Capacity (FVC). Time to first acute IPF exacerbation was a key secondary endpoint in Study 2 and

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Study 3 and a secondary endpoint in Study 1. Change from baseline in FVC percent predicted and survival were additional secondary endpoints in all studies.

Patients were required to have a diagnosis of IPF (ATS/ERS/JRS/ALAT criteria) for less than 5 years. Diagnoses were centrally adjudicated based on radiologic and, if applicable, histopathologic confirmation. Patients were required to be greater than or equal to 40 years of age with an FVC greater than or equal to 50% of predicted and a carbon monoxide diffusing capacity (DLCO, corrected for hemoglobin) 30% to 79% of predicted. Patients with relevant airways obstruction (i.e., pre-bronchodilator FEV<sub>1</sub>/FVC less than 0.7) or, in the opinion of the investigator, likely to receive a lung transplant during the studies were excluded (being listed for lung transplant was acceptable for inclusion). Patients with greater than 1.5 times ULN of ALT, AST, or bilirubin, patients with a known risk or predisposition to bleeding, patients receiving a full dose of anticoagulation treatment, and patients with a recent history of myocardial infarction or stroke were excluded from the studies. Patients were also excluded if they received other investigational therapy, azathioprine, cyclophosphamide, or cyclosporine A within 8 weeks of entry into this trial, or n-acetyl cysteine and prednisone (greater than 15 mg/day or equivalent) within 2 weeks. The majority of patients were Caucasian (60%) or Asian (30%) and male (79%). Patients had a mean age of 67 years and a mean FVC percent predicted of 80%.

#### Annual Rate of Decline in FVC

A statistically significant reduction in the annual rate of decline of FVC (in mL) was demonstrated in patients receiving OFEV compared to patients receiving placebo based on the random coefficient regression model, adjusted for gender, height, and age. The treatment effect on FVC was consistent in all 3 studies. See Table 3 for individual study results.

**Table 3 Annual Rate of Decline in FVC (mL) in Study 1, Study 2, and Study 3<sup>a</sup>**

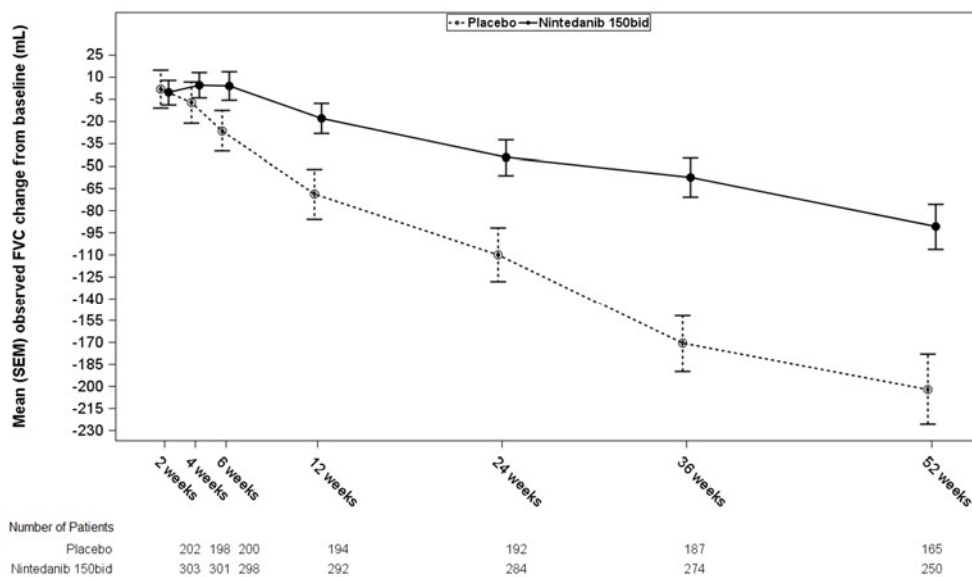
	Study 1		Study 2		Study 3	
	OFEV 150 mg twice daily	Placebo	OFEV 150 mg twice daily	Placebo	OFEV 150 mg twice daily	Placebo
Number of analyzed patients	84	83	309	204	329	219
Rate <sup>a</sup> of decline over 52 weeks	-60	-191	-115	-240	-114	-207
Comparison vs placebo Difference <sup>b</sup>	131		125		94	
95% CI	(27, 235)		(78, 173)		(45, 143)	

<sup>a</sup>Randomized set in Study 1; treated set in Study 2 and Study 3

<sup>b</sup>Estimated based on a random coefficient regression model

Figure 1 displays the change from baseline over time in both treatment groups for Study 2. When the mean observed FVC change from baseline was plotted over time, the curves diverged at all timepoints through Week 52. Similar plots were seen for Study 1 and Study 3.

**Figure 1 Mean (SEM) Observed FVC Change from Baseline (mL) Over Time in Study 2**

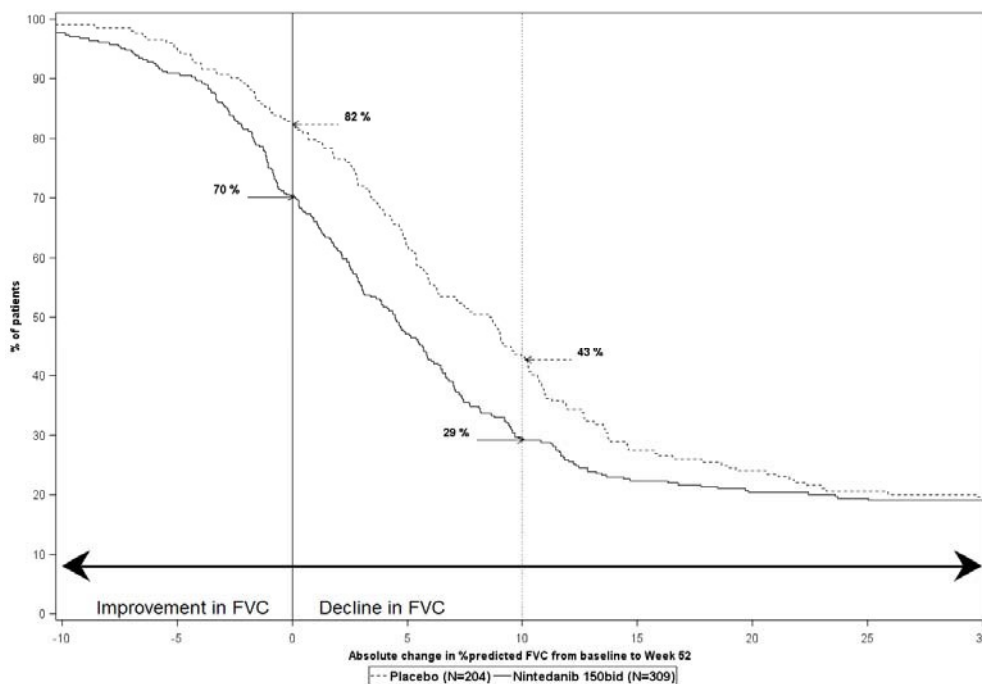


bid = twice daily

Change from Baseline in Percent Predicted Forced Vital Capacity

Figure 2 presents the cumulative distribution for all cut-offs for the change from baseline in FVC percent predicted at Week 52 for Study 2. For all categorical declines in lung function, the proportion of patients declining was lower on OFEV than on placebo. Study 3 showed similar results.

**Figure 2 Cumulative Distribution of Patients by Change in Percent Predicted FVC from Baseline to Week 52 (Study 2).\*** The vertical lines indicate  $\geq 0\%$  decline or  $\geq 10\%$  decline.



\*Missing data for change from baseline at Week 52 in percent predicted FVC (due to death, lost to follow-up or censoring before 52 weeks) was imputed using the worst decline from baseline at Week 52 observed among all patients with available data, regardless of treatment.  
bid = twice daily

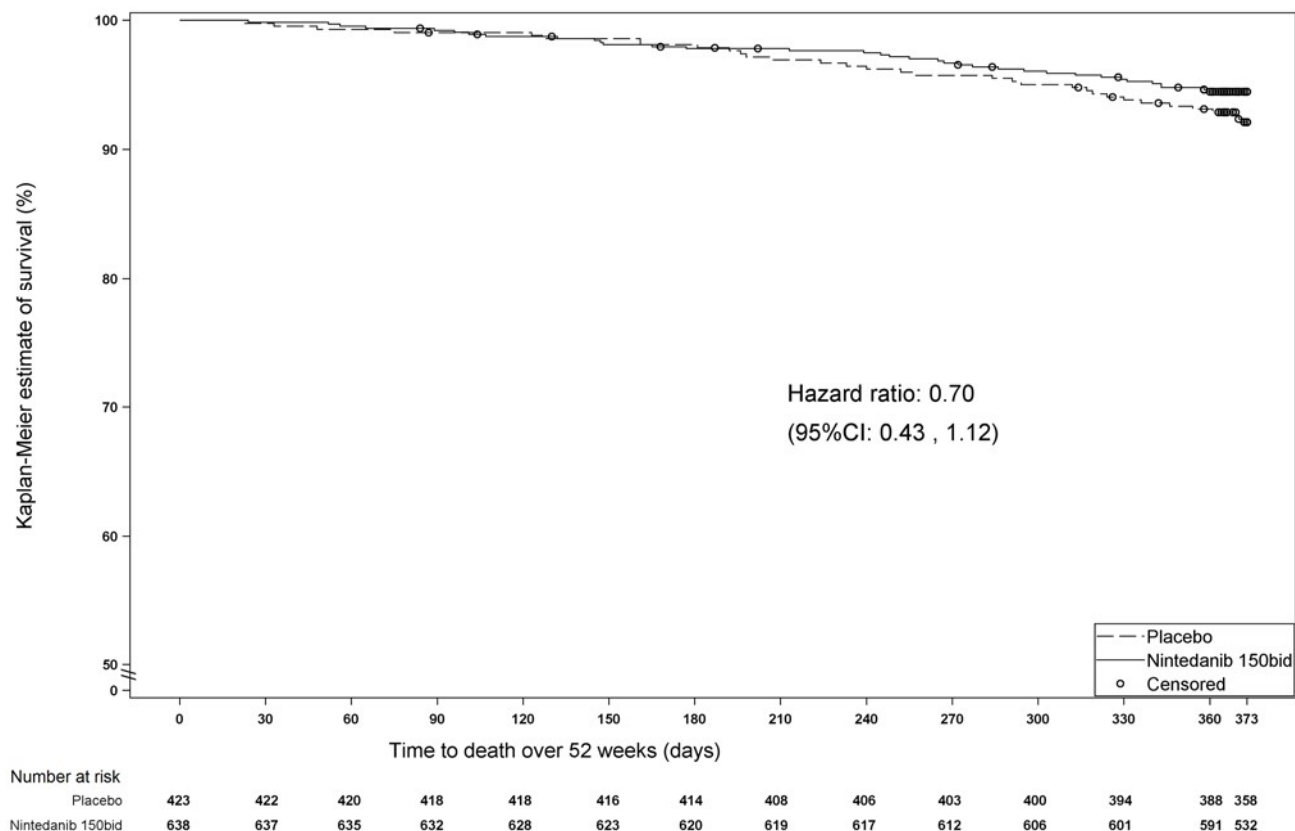
### Time to First Acute IPF Exacerbation

Acute IPF exacerbation was defined as unexplained worsening or development of dyspnea within 30 days, new diffuse pulmonary infiltrates on chest x-ray, and/or new high-resolution CT parenchymal abnormalities with no pneumothorax or pleural effusion, and exclusion of alternative causes. Acute IPF exacerbation was adjudicated in Study 2 and Study 3. In Study 1 (investigator-reported) and Study 3 (adjudicated), the risk of first acute IPF exacerbation over 52 weeks was significantly reduced in patients receiving OFEV compared to placebo (hazard ratio [HR]: 0.16, 95% CI: 0.04, 0.71) and (HR: 0.20, 95% CI: 0.07, 0.56), respectively. In Study 2 (adjudicated), there was no difference between the treatment groups (HR: 0.55, 95% CI: 0.20, 1.54).

### Survival

Survival was evaluated for OFEV compared to placebo in Study 2 and Study 3 as an exploratory analysis to support the primary endpoint (FVC). All-cause mortality was assessed over the study duration and available follow-up period, irrespective of cause of death and whether patients continued treatment. All-cause mortality did not show a statistically significant difference (See Figure 3).

**Figure 3 Kaplan-Meier Estimates of All-Cause Mortality at Vital Status – End of Study: Study 2 and Study 3**



bid = twice daily

## 16.2 Chronic Fibrosing Interstitial Lung Diseases with a Progressive Phenotype

The clinical efficacy of OFEV has been studied in patients with chronic fibrosing ILDs with a progressive phenotype in a randomized, double-blind, placebo-controlled phase 3 trial (Study 5 [NCT02999178]). A total of 663 patients were randomized in a 1:1 ratio to receive either OFEV 150 mg twice daily or matching placebo for at least 52 weeks. Randomization was stratified based on high resolution computed tomography (HRCT) fibrotic pattern as assessed by central readers: 412 patients with UIP-like HRCT pattern and 251 patients with other HRCT fibrotic patterns were randomized. There were 2 co-primary populations defined for the analyses in this trial: all patients (the overall population) and patients with HRCT with UIP-like HRCT fibrotic pattern.

The primary endpoint was the annual rate of decline in FVC (in mL) over 52 weeks. Other endpoints included time to first acute ILD exacerbation and time to death.

Patients with a clinical diagnosis of a chronic fibrosing ILD were selected if they had relevant fibrosis (greater than 10% fibrotic features) on HRCT and presented with clinical signs of progression (defined as FVC decline  $\geq 10\%$ , FVC decline  $\geq 5\%$  and  $<10\%$  with worsening symptoms or imaging, or worsening symptoms and worsening imaging all in the 24 months prior to screening). Patients were required to have an FVC greater than or equal to 45% of predicted and a DLCO 30% to less than 80% of predicted. Patients were required to have progressed despite management deemed appropriate in clinical practice by investigators for the patient's relevant ILD.

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Patients with IPF, relevant airways obstruction (i.e., pre-bronchodilator FEV1/FVC less than 0.7), or significant pulmonary hypertension were excluded from the trial. Patients with greater than 1.5 times ULN of ALT, AST, or bilirubin, patients with a known risk or predisposition to bleeding, patients receiving a full dose of anticoagulation treatment, and patients with a recent history of myocardial infarction or stroke were excluded. Patients were also excluded if they received other investigational therapy, azathioprine, cyclosporine, mycophenolate mofetil, tacrolimus, oral corticosteroids greater than 20 mg/day, or the combination of oral corticosteroids + azathioprine + n-acetylcysteine within 4 weeks of randomization, cyclophosphamide within 8 weeks prior to randomization, rituximab within 6 months, or previous treatment with nintedanib or pirfenidone.

The majority of patients were Caucasian (74%) or Asian (25%). Patients were mostly male (54%) and had a mean age of 66 years and a mean FVC percent predicted of 69%, and 49% were never-smokers. The underlying clinical ILD diagnoses in groups represented in the trial were hypersensitivity pneumonitis (26%), autoimmune ILDs (26%), idiopathic nonspecific interstitial pneumonia (19%), unclassifiable idiopathic interstitial pneumonia (17%), and other ILDs (12%).

#### Annual Rate of Decline in FVC

There was a statistically significant reduction in the annual rate of decline in FVC (in mL) over 52 weeks in patients receiving OFEV compared to patients receiving placebo. The annual rate of decline in FVC (in mL) over 52 weeks was significantly reduced by 107 mL in patients receiving OFEV compared to patients receiving placebo. Results in the subpopulations of patients with HRCT with UIP-like fibrotic pattern and patients with other fibrotic patterns (Other HRCT) are included with the overall population in Table 4.

**Table 4 Annual Rate of Decline in FVC (mL) in Study 5**

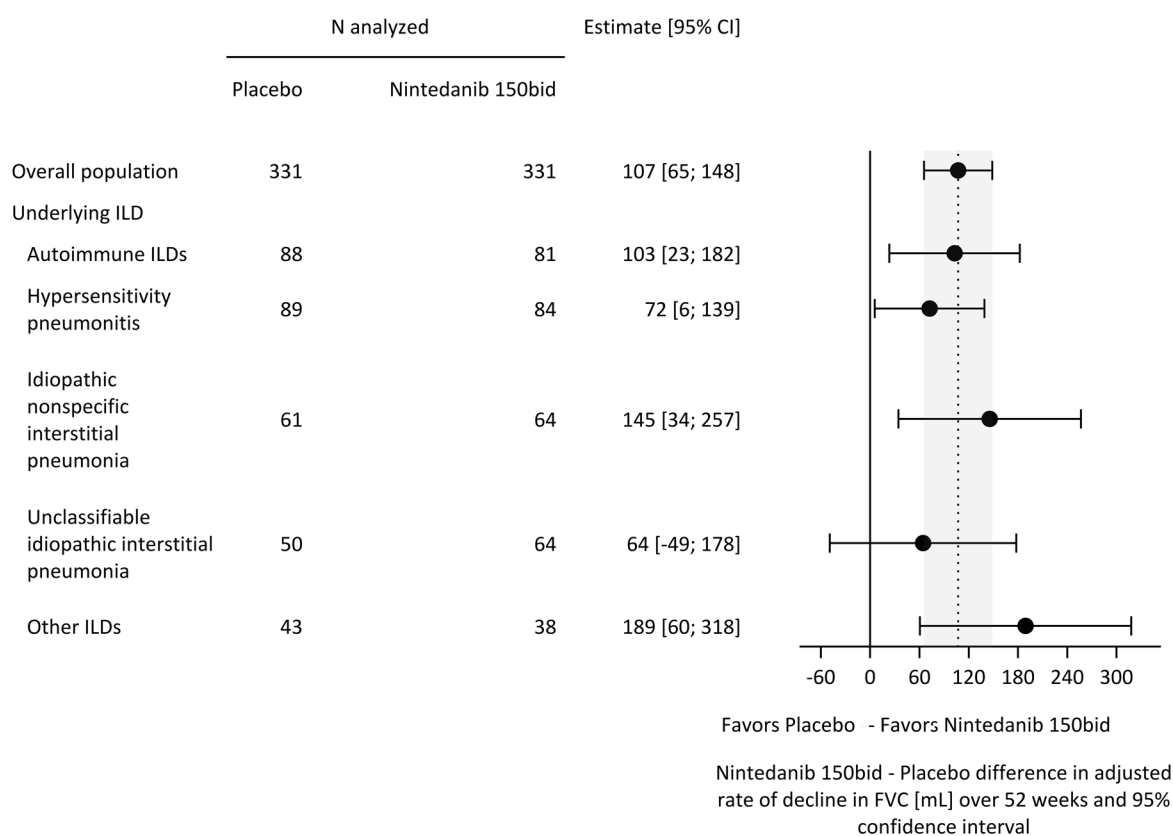
	Overall		UIP-like Subpopulation		Other HRCT Subpopulation	
	OFEV	Placebo	OFEV	Placebo	OFEV	Placebo
Number of analyzed patients	331	331	206	206	125	125
Adjusted annual rate of decline over 52 weeks	-81	-188	-83	-211	-79	-154
Comparison vs placebo difference <sup>a</sup>	107		128		75*	
95% CI	(65, 148)		(71, 186)		(16, 135)*	

\*Comparison based on the Other HRCT subpopulation was not included in the multiple testing procedure. Values shown here are for descriptive purposes.

<sup>a</sup>Based on a random coefficient regression model with fixed categorical effects of treatment, HRCT pattern, fixed continuous effects of time, baseline FVC (mL), and including treatment by time and baseline by time interactions

A post-hoc exploratory analysis by ILD diagnosis was performed and is shown in Figure 4. Treatment response across ILD diagnoses was consistent for FVC.

**Figure 4 Annual Rate of Decline in FVC (mL) over 52 Weeks based on Underlying ILD Diagnosis in Study 5\***

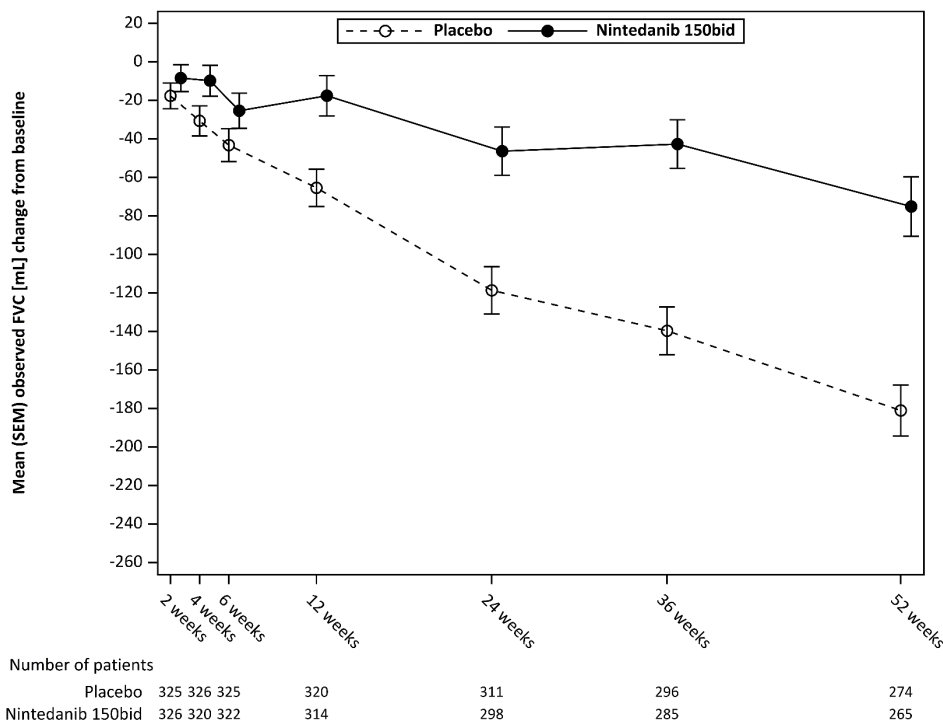


ILD = interstitial lung disease; Autoimmune ILDs: includes rheumatoid arthritis-associated ILD, mixed connective tissue disease, systemic sclerosis-associated ILD, and other terms; Other ILDs: includes fibrosing ILDs not categorized under autoimmune ILDs, hypersensitivity pneumonitis, idiopathic nonspecific interstitial pneumonia, or unclassifiable idiopathic interstitial pneumonia. The three most common ILDs in this category are exposure-related ILD, sarcoidosis, and pleuro-parenchymal fibroelastosis.

\*These results are from a post-hoc exploratory analysis. Values shown here are for descriptive purposes.

Figure 5 shows the change in FVC from baseline over time in the treatment groups. When the mean observed FVC change from baseline was plotted over time, the curves diverged at all timepoints through Week 52.

**Figure 5 Mean (SEM) Observed FVC Change from Baseline (mL) Over 52 Weeks in Study 5**



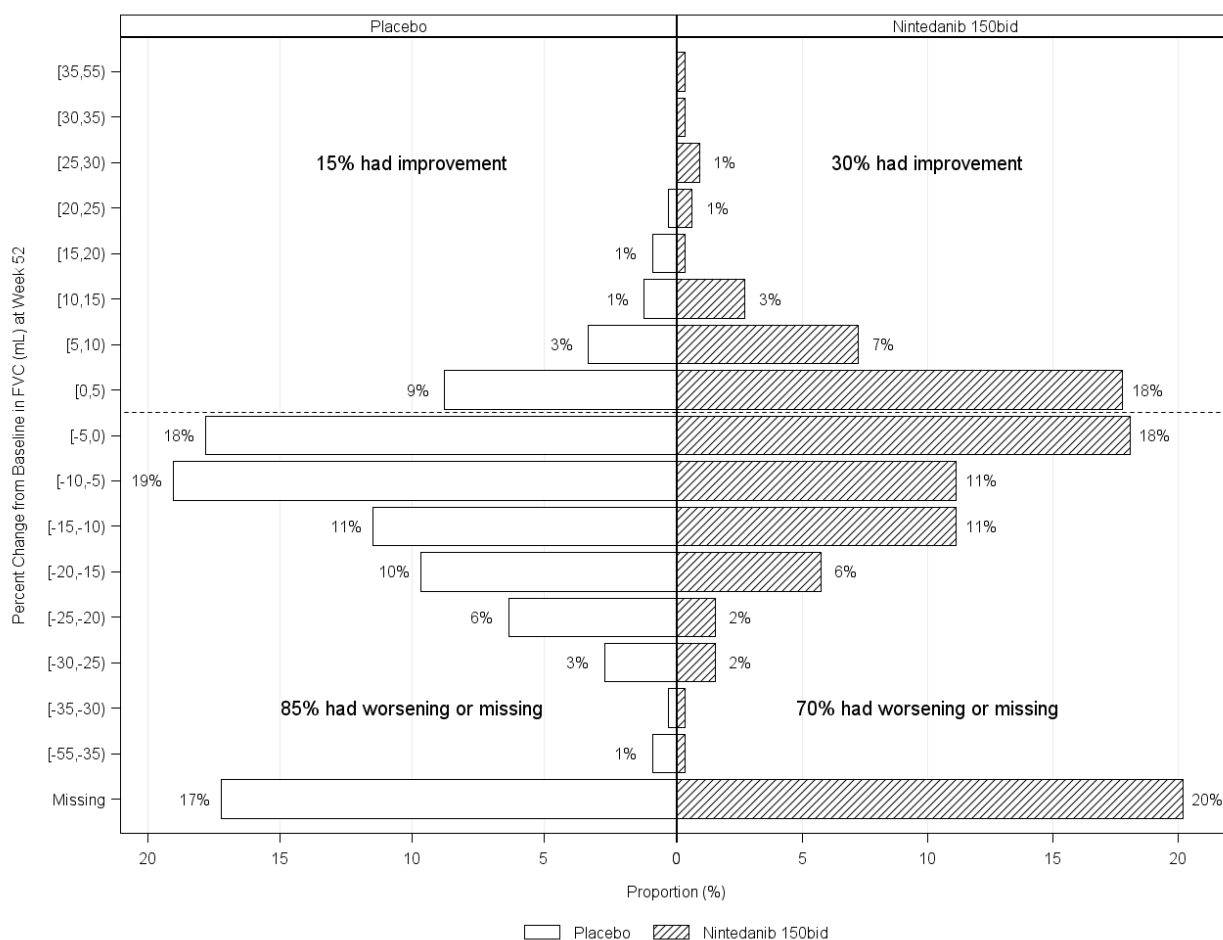


bid = twice daily

### Percent Change from Baseline in Forced Vital Capacity

Figure 6 presents the percent change from baseline in FVC in mL at Week 52 for Study 5. For the majority of patients, the decline in lung function was less on OFEV than on placebo.

**Figure 6 Histogram of the Percent Change in FVC (mL) from Baseline to Week 52 According to Treatment and Percent Increments or Decrements of 5 (Study 5)<sup>a</sup>**



<sup>a</sup> Patients classified as having missing FVC data at Week 52 are those with no FVC assessment between Day 310 and Day 373.

bid = twice daily

### Time to First Acute ILD Exacerbation

Acute ILD exacerbation was defined as unexplained worsening or development of dyspnea within 30 days, new diffuse pulmonary infiltrates on chest x-ray, and/or new HRCT parenchymal abnormalities with no pneumothorax or pleural effusion, and exclusion of alternative causes. Acute ILD exacerbations were not adjudicated.

The risk of first acute ILD exacerbation did not show a statistically significant difference between the OFEV group compared to placebo (52 week treatment period: HR 0.72, (95% CI: 0.38, 1.37); whole trial: HR 0.63 (95% CI: 0.37, 1.07)).

Ofev	Prescribing Information
100 mg, 150 mg	February 2022

### Survival

Survival was evaluated for OFEV compared to placebo in Study 5 to support the primary endpoint (FVC). All-cause mortality was assessed over the study duration and available follow-up period, irrespective of cause of death and whether patients continued treatment. All-cause mortality did not show a statistically significant difference (52 week treatment period: HR 0.94 (95% CI: 0.47, 1.86); whole trial: HR 0.78 (95% CI: 0.50, 1.21)).

### **16.3 Systemic Sclerosis-Associated Interstitial Lung Disease**

The clinical efficacy of nintedanib has been studied in patients with SSc-ILD in a randomized, double-blind, placebo-controlled phase 3 trial (Study 4 [NCT02597933]). A total of 580 patients were randomized in a 1:1 ratio to receive either OFEV 150 mg twice daily or matching placebo for at least 52 weeks, of which 576 patients were treated. Randomization was stratified by anti-topoisomerase antibody (ATA) status. Individual patients remained on blinded trial treatment for up to 100 weeks. The primary endpoint was the annual rate of decline in FVC over 52 weeks. The absolute change from baseline in the modified Rodnan skin score (mRSS) at Week 52 was a key secondary endpoint. Mortality over the whole trial was an additional secondary endpoint.

Patients were diagnosed with SSc-ILD based upon the 2013 American College of Rheumatology / European League Against Rheumatism classification criteria for SSc with onset of disease (first non-Raynaud symptom) of less than 7 years and greater than or equal to 10% fibrosis on a chest high resolution computed tomography (HRCT) scan conducted within the previous 12 months. Patients were required to have an FVC greater than or equal to 40% of predicted and a DLCO 30-89% of predicted. Patients with relevant airways obstruction (i.e., pre-bronchodilator FEV<sub>1</sub>/FVC less than 0.7) or previous or planned hematopoietic stem cell transplant were excluded from the trial. Patients with greater than 1.5 times ULN of ALT, AST, or bilirubin, patients with a known risk or predisposition to bleeding, patients receiving a full dose of anticoagulation treatment, and patients with a recent history of myocardial infarction or stroke were excluded from the study. Patients were excluded if they had significant pulmonary hypertension, more than three digital fingertip ulcers, a history of severe digital necrosis requiring hospitalization, or a history of scleroderma renal crisis. Patients were also excluded if they received other investigational therapy, azathioprine within 8 weeks prior to randomization, cyclophosphamide or cyclosporine A within 6 months prior to randomization, or previous treatment with nintedanib or pirfenidone.

The majority of patients were female (75%). Patients were mostly Caucasian (67%), Asian (25%), or Black (6%). The mean age was 54 years. Overall, 52% of patients had diffuse cutaneous systemic sclerosis (SSc) and 48% had limited cutaneous SSc. The mean time since first onset of a non-Raynaud symptom was 3.49 years. At baseline, 49% of patients were on stable therapy with mycophenolate.

### Annual Rate of Decline in FVC

The annual rate of decline of FVC (in mL) over 52 weeks was significantly reduced by 41 mL in patients receiving OFEV compared to patients receiving placebo, corresponding to a relative treatment effect of 44%. See Table 5.

Ofev	Prescribing Information
100 mg, 150 mg	February 2022

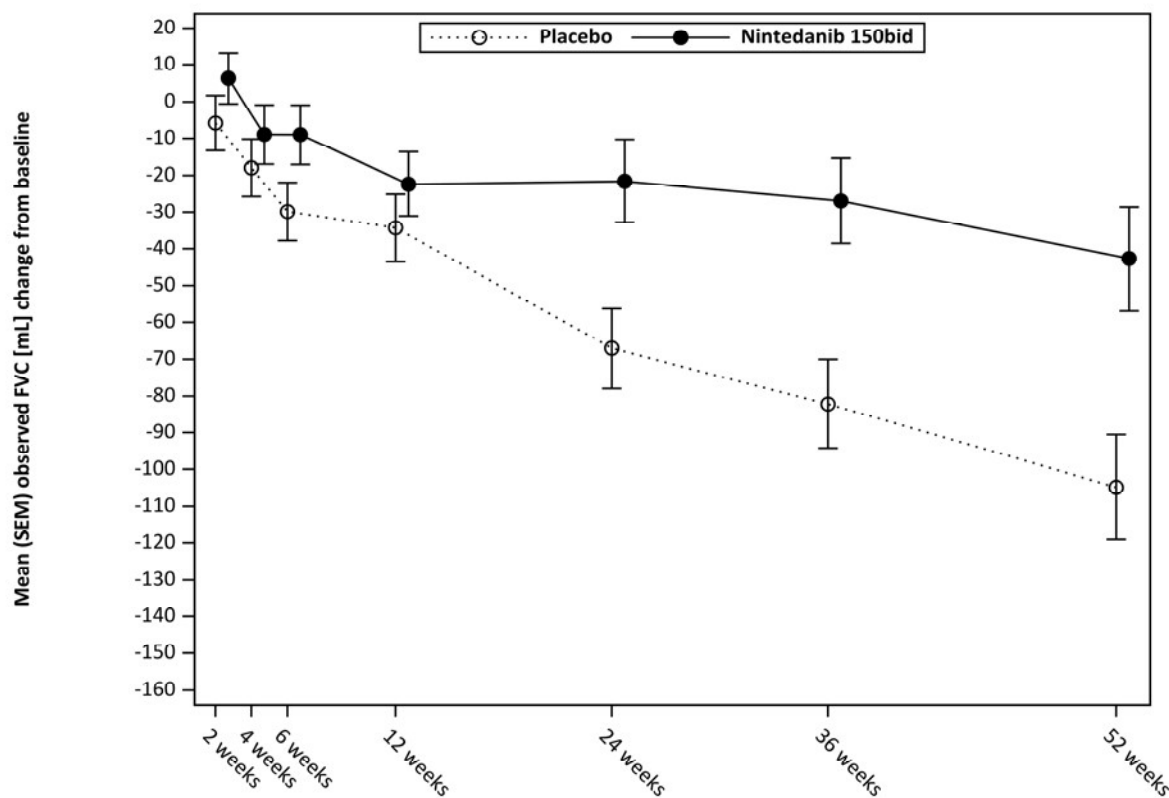
**Table 5 Annual Rate of Decline in FVC (mL) in Study 4**

	OFEV 150 mg twice daily	Placebo
Number of analyzed patients	287	288
Adjusted rate of decline over 52 weeks	-52	-93
Comparison vs placebo Difference <sup>a</sup>	41	
95% CI	(3, 79)	

<sup>a</sup>Based on a random coefficient regression model, adjusted for gender, height, age, ATA status, FVC at baseline, FVC at baseline-by-time

Figure 7 displays the change from baseline over time in both treatment groups. When the mean observed FVC change from baseline was plotted over time, the curves diverged at all timepoints through Week 52. Separation of the mean values is seen after 12 weeks of treatment.

**Figure 7 Mean (SEM) Observed FVC Change from Baseline (mL) Over Time in Study 4**



Number of patients	2 weeks	4 weeks	6 weeks	12 weeks	24 weeks	36 weeks	52 weeks
Placebo	283	281	280	283	280	268	257
Nintedanib 150bid	283	281	273	278	265	262	241

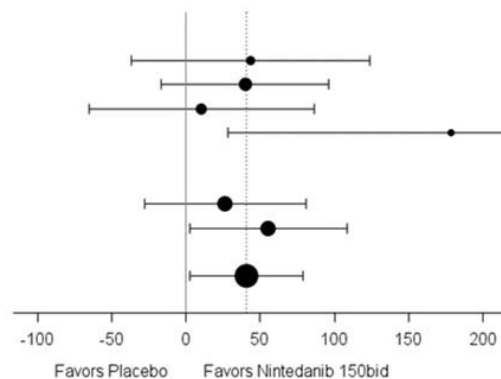
bid = twice daily

In two pre-specified subgroup efficacy analyses, the mean treatment difference in FVC decline at 52 weeks in patients were examined by region and mycophenolate use (Figure 8).

**Figure 8**

**Subgroup Analyses of the Mean Treatment Difference in FVC (mL) Decline at Week 52 by Region and Mycophenolate Use (Study 4)**

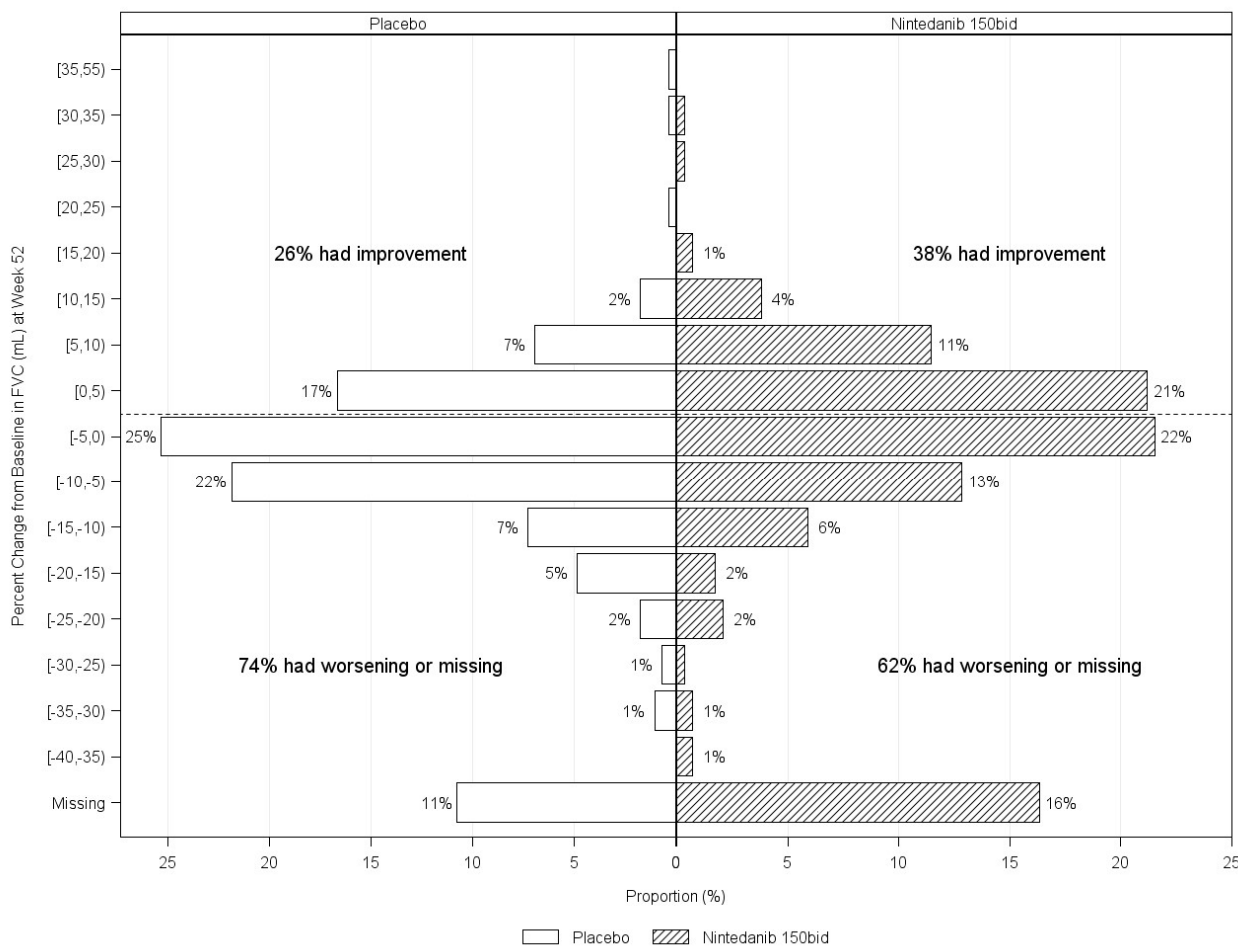
	Placebo		Nintedanib 150bid		Difference [95% CI]
	N	Rate of Decline	N	Rate of Decline	
Region					
Asia	71	-92	59	-48	43 [-37; 124]
Europe	126	-107	139	-67	40 [-17; 96]
Canada and United States	73	-52	69	-42	10 [-66; 86]
Rest of World	18	-176	20	2	178 [28; 329]
Mycophenolate use at baseline					
Yes	140	-67	138	-40	26 [-28; 81]
No	148	-119	149	-64	55 [2; 109]
ALL	288	-93	287	-52	41 [3; 79]



Percent Change from Baseline in Forced Vital Capacity

Figure 9 presents the percent change from baseline in FVC in mL at Week 52 for Study 4. For the majority of patients, the decline in lung function was less on OFEV than on placebo.

**Figure 9 Histogram of the Percent Change in FVC (mL) from Baseline to Week 52 According to Treatment and Percent Increments or Decrements of 5 (Study 4)<sup>a</sup>**



<sup>a</sup> Patients classified as having missing FVC data at Week 52 are those with no FVC assessment between Day 310 and Day 373.  
bid = twice daily

### Modified Rodnan Skin Score

No benefit in mRSS was observed in patients receiving OFEV. The adjusted mean absolute change from baseline in mRSS at Week 52 was comparable between the OFEV group (-2.17 (95% CI: -2.69, -1.65)) and the placebo group (-1.96 (95% CI: -2.48, -1.45)). The adjusted mean difference between the treatment groups was -0.21 (95% CI: -0.94, 0.53).

### Survival

No difference in survival was observed in an exploratory analysis of mortality over the whole trial (OFEV: n=10 (3.5%) vs. placebo: n=9 (3.1%)). The analysis of time to death over the whole trial resulted in a HR of 1.16 (95% CI: 0.47, 2.84).

## **17 HOW SUPPLIED/STORAGE AND HANDLING**

**150 mg:** brown- colored, opaque, oblong, soft gelatin capsules imprinted in black with the Boehringer Ingelheim company symbol on one side and with "150". The capsule bright yellow viscous suspension. They are packaged in aluminium blisters containing 10 capsules each, pack-size available as follows: 60 capsules.

Ofev	Prescribing Information
100 mg, 150 mg	February 2022

100 mg: peach- coloured, opaque, oblong, soft gelatin capsules imprinted in black with the Boehringer Ingelheim company symbol on one side and with "100". The capsule contains a bright yellow viscous suspension. They are packaged in aluminium blisters containing 10 capsules each, pack-size available as follows: 30 or 60 capsules.  
Not all pack sizes may be marketed.

### **Storage**

Store below 25°C. Store in the original package in order to protect from moisture.

OFEV capsules should not be opened or crushed. If contact with the content of the capsule occurs, wash hands immediately and thoroughly.

### **18 MANUFACTURER**

Boehringer Ingelheim Pharma GmbH & Co. KG  
Binger St. 173, D-55216  
Ingelheim AM Rhein  
Germany

### **19 MARKETING AUTHORISATION HOLDER**

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Medinat Ha-Yehudim 89 St.  
P.O. Box 4124  
Herzliya Pituach 4676672

### **20 MARKETING AUTHORISATION NUMBER(S)**

Ofev 100 mg            154 74 34335 00  
Ofev 150 mg           154 75 34339 00

This leaflet was revised in February 2022 according to MOH's guidelines.