

## HIGHLIGHTS OF PRESCRIBING INFORMATION

These highlights do not include all the information needed to use JENTADUETO safely and effectively. See full prescribing information for JENTADUETO.

JENTADUETO® (linagliptin and metformin hydrochloride tablets), for oral use

Initial U.S. Approval: 2012

### WARNING: LACTIC ACIDOSIS

See full prescribing information for complete boxed warning.

- Postmarketing cases of metformin-associated lactic acidosis have resulted in death, hypothermia, hypotension, and resistant bradyarrhythmias. Symptoms included malaise, myalgias, respiratory distress, somnolence, and abdominal pain. Laboratory abnormalities included elevated blood lactate levels, anion gap acidosis, increased lactate/pyruvate ratio; and metformin plasma levels generally >5 mcg/mL. (5.1)
- Risk factors include renal impairment, concomitant use of certain drugs, age ≥65 years old, radiological studies with contrast, surgery and other procedures, hypoxic states, excessive alcohol intake, and hepatic impairment. Steps to reduce the risk of and manage metformin-associated lactic acidosis in these high risk groups are provided in the Full Prescribing Information. (5.1)
- If lactic acidosis is suspected, discontinue JENTADUETO and institute general supportive measures in a hospital setting. Prompt hemodialysis is recommended. (5.1)

### INDICATIONS AND USAGE

JENTADUETO is a combination of linagliptin, a dipeptidyl peptidase-4 (DPP-4) inhibitor and metformin hydrochloride (HCl), a biguanide, indicated as an adjunct to diet and exercise to improve glycemic control in adults with type 2 diabetes mellitus (1)

#### Limitations of Use

- Not recommended in patients with type 1 diabetes mellitus (1)
- Has not been studied in patients with a history of pancreatitis (1)

### DOSAGE AND ADMINISTRATION

- Individualize the starting dosage of JENTADUETO based on the patient's current regimen (2.1)
- The maximum recommended dosage is 2.5 mg linagliptin/1,000 mg metformin HCl twice daily (2.1)
- Take orally twice daily with meals, with gradual dosage escalation to reduce the gastrointestinal effects due to metformin (2.1)
- Prior to initiation, assess renal function with estimated glomerular filtration rate (eGFR) (2.2)
  - Do not use in patients with eGFR below 30 mL/min/1.73 m<sup>2</sup>
  - Initiation is not recommended in patients with eGFR between 30 - 45 mL/min/1.73 m<sup>2</sup>
  - Assess risk/benefit of continuing if eGFR falls below 45 mL/min/1.73 m<sup>2</sup>
  - Discontinue if eGFR falls below 30 mL/min/1.73 m<sup>2</sup>
- JENTADUETO may need to be discontinued at time of, or prior to, iodinated contrast imaging procedures (2.3)

### DOSAGE FORMS AND STRENGTHS

Tablets:

- 2.5 mg linagliptin/500 mg metformin HCl (3)
- 2.5 mg linagliptin/850 mg metformin HCl (3)
- 2.5 mg linagliptin/1,000 mg metformin HCl (3)

### CONTRAINDICATIONS

- Severe renal impairment (eGFR below 30 mL/min/1.73 m<sup>2</sup>) (4)
- Metabolic acidosis, including diabetic ketoacidosis (4)
- Hypersensitivity to linagliptin, metformin, or any of the excipients in JENTADUETO (4)

### WARNINGS AND PRECAUTIONS

- *Lactic acidosis*: See boxed warning (5.1)
- *Pancreatitis*: There have been reports of acute pancreatitis, including fatal pancreatitis. If pancreatitis is suspected, promptly discontinue JENTADUETO. (5.2)
- *Hypoglycemia*: Consider lowering the dosage of insulin secretagogue or insulin to reduce the risk of hypoglycemia when initiating JENTADUETO (5.3)
- *Hypersensitivity reactions*: Serious hypersensitivity reactions (e.g., anaphylaxis, angioedema, and exfoliative skin conditions) have occurred with JENTADUETO. If hypersensitivity reactions occur discontinue JENTADUETO, treat promptly, and monitor until signs and symptoms resolve. (5.4)
- *Vitamin B<sub>12</sub> deficiency*: Metformin may lower vitamin B<sub>12</sub> levels. Measure hematologic parameters annually and vitamin B<sub>12</sub> at 2 to 3 year intervals and manage any abnormalities. (5.5)
- *Arthralgia*: Severe and disabling arthralgia has been reported in patients taking linagliptin. Consider as a possible cause for severe joint pain and discontinue drug if appropriate. (5.6)
- *Bullous pemphigoid*: There have been reports of bullous pemphigoid requiring hospitalization. Tell patients to report development of blisters or erosions. If bullous pemphigoid is suspected, discontinue JENTADUETO. (5.7)
- *Heart failure*: Heart failure has been observed with two other members of the DPP-4 inhibitor class. Consider risks and benefits of JENTADUETO in patients who have known risk factors for heart failure. Monitor for signs and symptoms. (5.8)

### ADVERSE REACTIONS

Most common adverse reactions (incidence ≥5% and more often than placebo) were nasopharyngitis and diarrhea (6.1)

To report SUSPECTED ADVERSE REACTIONS, contact Boehringer Ingelheim Pharmaceuticals, Inc. at 1-800-542-6257 or FDA at 1-800-FDA-1088 or [www.fda.gov/medwatch](http://www.fda.gov/medwatch).

### DRUG INTERACTIONS

- *Carbonic Anhydrase Inhibitors*: May increase risk of lactic acidosis. Consider more frequent monitoring. (7)
- *Drugs that Reduce Metformin Clearance*: May increase risk of lactic acidosis. Consider benefits and risks of concomitant use. (7)
- *Alcohol*: Can potentiate the effect of metformin on lactate metabolism. Warn patients against excessive alcohol intake. (7)
- *Strong P-glycoprotein/CYP3A4 Inducer*: Efficacy may be reduced when administered in combination (e.g., rifampin). Use of alternative treatments is strongly recommended. (7)

### USE IN SPECIFIC POPULATIONS

- *Females and Males of Reproductive Potential*: Advise premenopausal females of the potential for an unintended pregnancy (8.3)
- *Geriatric Use*: Assess renal function more frequently (8.5)
- *Hepatic Impairment*: Avoid use in patients with hepatic impairment (8.7)

See 17 for PATIENT COUNSELING INFORMATION and Medication Guide.

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**FULL PRESCRIBING INFORMATION: CONTENTS\***

**WARNING: LACTIC ACIDOSIS**

**1 INDICATIONS AND USAGE**

**2 DOSAGE AND ADMINISTRATION**

- 2.1 Recommended Dosage and Administration
- 2.2 Recommended Dosing in Renal Impairment
- 2.3 Discontinuation for Iodinated Contrast Imaging Procedures

**3 DOSAGE FORMS AND STRENGTHS**

**4 CONTRAINDICATIONS**

**5 WARNINGS AND PRECAUTIONS**

- 5.1 Lactic Acidosis
- 5.2 Pancreatitis
- 5.3 Hypoglycemia with Concomitant Use with Insulin and Insulin Secretagogues
- 5.4 Hypersensitivity Reactions
- 5.5 Vitamin B<sub>12</sub> Deficiency
- 5.6 Severe and Disabling Arthralgia
- 5.7 Bullous Pemphigoid
- 5.8 Heart Failure

**6 ADVERSE REACTIONS**

- 6.1 Clinical Trials Experience
- 6.2 Postmarketing Experience

**7 DRUG INTERACTIONS**

**8 USE IN SPECIFIC POPULATIONS**

- 8.1 Pregnancy
- 8.2 Lactation
- 8.3 Females and Males of Reproductive Potential
- 8.4 Pediatric Use
- 8.5 Geriatric Use
- 8.6 Renal Impairment
- 8.7 Hepatic Impairment

**10 OVERDOSAGE**

**11 DESCRIPTION**

**12 CLINICAL PHARMACOLOGY**

- 12.1 Mechanism of Action
- 12.2 Pharmacodynamics
- 12.3 Pharmacokinetics

**13 NONCLINICAL TOXICOLOGY**

- 13.1 Carcinogenesis, Mutagenesis, Impairment of Fertility

**14 CLINICAL STUDIES**

- 14.1 Glycemic Control Trials in Adults with Type 2 Diabetes Mellitus
- 14.2 Linagliptin Cardiovascular Safety Trials in Patients with Type 2 Diabetes Mellitus

**16 HOW SUPPLIED/STORAGE AND HANDLING**

**17 PATIENT COUNSELING INFORMATION**

\*Sections or subsections omitted from the full prescribing information are not listed.

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## FULL PRESCRIBING INFORMATION

### WARNING: LACTIC ACIDOSIS

Postmarketing cases of metformin-associated lactic acidosis have resulted in death, hypothermia, hypotension, and resistant bradyarrhythmias. The onset of metformin-associated lactic acidosis is often subtle, accompanied only by nonspecific symptoms such as malaise, myalgias, respiratory distress, somnolence, and abdominal pain. Metformin-associated lactic acidosis was characterized by elevated blood lactate levels ( $>5$  mmol/Liter), anion gap acidosis (without evidence of ketonuria or ketonemia), an increased lactate/pyruvate ratio; and metformin plasma levels generally  $>5$  mcg/mL [see *Warnings and Precautions (5.1)*].

Risk factors for metformin-associated lactic acidosis include renal impairment, concomitant use of certain drugs (e.g., carbonic anhydrase inhibitors such as topiramate), age 65 years old or greater, having a radiological study with contrast, surgery and other procedures, hypoxic states (e.g., acute congestive heart failure), excessive alcohol intake, and hepatic impairment.

Steps to reduce the risk of and manage metformin-associated lactic acidosis in these high risk groups are provided in the full prescribing information [see *Dosage and Administration (2.2)*, *Contraindications (4)*, *Warnings and Precautions (5.1)*, *Drug Interactions (7)*, and *Use in Specific Populations (8.6, 8.7)*].

If metformin-associated lactic acidosis is suspected, immediately discontinue JENTADUETO and institute general supportive measures in a hospital setting. Prompt hemodialysis is recommended [see *Warnings and Precautions (5.1)*].

## 1 INDICATIONS AND USAGE

JENTADUETO is indicated as an adjunct to diet and exercise to improve glycemic control in adults with type 2 diabetes mellitus.

### Limitations of Use

JENTADUETO is not recommended in patients with type 1 diabetes mellitus.

JENTADUETO has not been studied in patients with a history of pancreatitis. It is unknown whether patients with a history of pancreatitis are at an increased risk for the development of pancreatitis while using JENTADUETO [see *Warnings and Precautions (5.2)*].

## 2 DOSAGE AND ADMINISTRATION

### 2.1 Recommended Dosage and Administration

The dosage of JENTADUETO should be individualized on the basis of both effectiveness and tolerability, while not exceeding the maximum recommended dosage of 2.5 mg linagliptin/1,000 mg metformin hydrochloride (HCl), taken orally twice daily. JENTADUETO should be given twice daily with meals. Dosage escalation should be gradual to reduce the gastrointestinal (GI) side effects associated with metformin use.

Recommended starting dosage:

- In patients currently not treated with metformin HCl, initiate treatment with 2.5 mg linagliptin/500 mg metformin HCl twice daily.
- In patients already treated with metformin HCl, start with 2.5 mg linagliptin and the current dosage of metformin HCl taken at each of the two daily meals (e.g., a patient on metformin HCl 1,000 mg twice daily would be started on 2.5 mg linagliptin/1,000 mg metformin HCl twice daily with meals).
- Patients already treated with linagliptin and metformin HCl individual components may be switched to JENTADUETO containing the same dosages of each component.

### 2.2 Recommended Dosing in Renal Impairment

Assess renal function prior to initiation of JENTADUETO and periodically thereafter.

JENTADUETO is contraindicated in patients with an estimated glomerular filtration rate (eGFR) below 30 mL/min/1.73 m<sup>2</sup>.

Initiation of JENTADUETO in patients with an eGFR between 30-45 mL/min/1.73 m<sup>2</sup> is not recommended.

In patients taking JENTADUETO whose eGFR later falls below 45 mL/min/1.73 m<sup>2</sup>, assess benefit/risk of continuing therapy.

Discontinue JENTADUETO if the patient's eGFR later falls below 30 mL/min/1.73 m<sup>2</sup> [see *Contraindications (4)* and *Warnings and Precautions (5.1)*].

### 2.3 Discontinuation for Iodinated Contrast Imaging Procedures

Discontinue JENTADUETO at the time of, or prior to, an iodinated contrast imaging procedure in patients with an eGFR between 30 and 60 mL/min/1.73 m<sup>2</sup>; in patients with a history of liver disease, alcoholism or heart failure; or in patients who will be administered intra-arterial iodinated contrast. Re-evaluate eGFR 48 hours after the imaging procedure; restart JENTADUETO if renal function is stable [see *Warnings and Precautions (5.1)*].

## 3 DOSAGE FORMS AND STRENGTHS

JENTADUETO tablets are a combination of linagliptin and metformin HCl available as:

- 2.5 mg linagliptin/500 mg metformin HCl tablets are light yellow, oval, biconvex tablets debossed with "D2/500" on one side and the Boehringer Ingelheim symbol on the other side
- 2.5 mg linagliptin/850 mg metformin HCl tablets are light orange, oval, biconvex tablets debossed with "D2/850" on one side and the Boehringer Ingelheim symbol on the other side
- 2.5 mg linagliptin/1,000 mg metformin HCl tablets are light pink, oval, biconvex tablets debossed with "D2/1000" on one side and the Boehringer Ingelheim symbol on the other side

## 4 CONTRAINDICATIONS

JENTADUETO is contraindicated in patients with:

- severe renal impairment (eGFR below 30 mL/min/1.73 m<sup>2</sup>) [see *Warnings and Precautions (5.1)*].
- acute or chronic metabolic acidosis, including diabetic ketoacidosis [see *Warnings and Precautions (5.1)*].
- hypersensitivity to linagliptin, metformin, or any of the excipients in JENTADUETO, reactions such as anaphylaxis, angioedema, exfoliative skin conditions, urticaria, or bronchial hyperreactivity have occurred with linagliptin [see *Warnings and Precautions (5.4)* and *Adverse Reactions (6.1)*].

## 5 WARNINGS AND PRECAUTIONS

### 5.1 Lactic Acidosis

#### *Metformin*

There have been postmarketing cases of metformin-associated lactic acidosis, including fatal cases. These cases had a subtle onset and were accompanied by nonspecific symptoms such as malaise, myalgias, abdominal pain, respiratory distress, or increased somnolence; however, hypothermia, hypotension and resistant bradyarrhythmias have occurred with severe acidosis. Metformin-associated lactic acidosis was characterized by elevated blood lactate concentrations (>5 mmol/Liter), anion gap acidosis (without evidence of ketonuria or ketonemia), and an increased lactate:pyruvate ratio; metformin plasma levels generally >5 mcg/mL. Metformin decreases liver uptake of lactate increasing lactate blood levels which may increase risk of lactic acidosis, especially in patients at risk.

If metformin-associated lactic acidosis is suspected, general supportive measures should be instituted promptly in a hospital setting, along with immediate discontinuation of JENTADUETO. In JENTADUETO-treated patients with a diagnosis or strong suspicion of lactic acidosis, prompt hemodialysis is recommended to correct the acidosis and remove accumulated metformin (metformin is dialyzable, with clearance of up to 170 mL/min under good hemodynamic conditions). Hemodialysis has often resulted in reversal of symptoms and recovery.

Educate patients and their families about the symptoms of lactic acidosis and if these symptoms occur instruct them to discontinue JENTADUETO and report these symptoms to their healthcare provider.

For each of the known and possible risk factors for metformin-associated lactic acidosis, recommendations to reduce the risk of and manage metformin-associated lactic acidosis are provided below:

**Renal Impairment:** The postmarketing metformin-associated lactic acidosis cases primarily occurred in patients with significant renal impairment. The risk of metformin accumulation and metformin-associated lactic acidosis increases with the severity of renal impairment because metformin is substantially excreted by the kidney. Clinical recommendations based upon the patient's renal function include [see *Dosage and Administration (2.2)* and *Clinical Pharmacology (12.3)*]:

- Before initiating JENTADUETO, obtain an estimated glomerular filtration rate (eGFR).
- JENTADUETO is contraindicated in patients with an eGFR less than 30 mL/min/1.73 m<sup>2</sup> [see *Contraindications (4)*].
- Initiation of JENTADUETO is not recommended in patients with eGFR between 30 – 45 mL/min/1.73 m<sup>2</sup>.
- Obtain an eGFR at least annually in all patients taking JENTADUETO. In patients at increased risk for the development of renal impairment (e.g., the elderly), renal function should be assessed more frequently.
- In patients taking JENTADUETO whose eGFR later falls below 45 mL/min/1.73 m<sup>2</sup>, assess the benefit and risk of continuing therapy.

**Drug Interactions:** The concomitant use of JENTADUETO with specific drugs may increase the risk of metformin-associated lactic acidosis: those that impair renal function, result in significant hemodynamic change, interfere with acid-base balance or increase metformin accumulation [see *Drug Interactions (7)*]. Therefore, consider more frequent monitoring of patients.

**Age 65 or Greater:** The risk of metformin-associated lactic acidosis increases with the patient's age because elderly patients have a greater likelihood of having hepatic, renal, or cardiac impairment than younger patients. Assess renal function more frequently in elderly patients [see *Use in Specific Populations (8.5)*].

**Radiological Studies with Contrast:** Administration of intravascular iodinated contrast agents in metformin-treated patients has led to an acute decrease in renal function and the occurrence of lactic acidosis. Stop JENTADUETO at the time of, or prior to, an iodinated contrast imaging procedure in patients with an eGFR between 30 and 60 mL/min/1.73 m<sup>2</sup>; in patients with a history of hepatic impairment, alcoholism, or heart failure; or in patients who will be administered intra-arterial iodinated contrast. Re-evaluate eGFR 48 hours after the imaging procedure, and restart JENTADUETO if renal function is stable.

**Surgery and Other Procedures:** Withholding of food and fluids during surgical or other procedures may increase the risk for volume depletion, hypotension and renal impairment. JENTADUETO should be temporarily discontinued while patients have restricted food and fluid intake.

**Hypoxic States:** Several of the postmarketing cases of metformin-associated lactic acidosis occurred in the setting of acute congestive heart failure (particularly when accompanied by hypoperfusion and hypoxemia). Cardiovascular collapse (shock), acute myocardial infarction, sepsis, and other conditions associated with hypoxemia have been associated with lactic acidosis and may also cause prerenal azotemia. When such events occur, discontinue JENTADUETO.

**Excessive Alcohol Intake:** Alcohol potentiates the effect of metformin on lactate metabolism and this may increase the risk of metformin-associated lactic acidosis. Warn patients against excessive alcohol intake while receiving JENTADUETO.

**Hepatic Impairment:** Patients with hepatic impairment have developed cases of metformin-associated lactic acidosis. This may be due to impaired lactate clearance resulting in higher lactate blood levels. Therefore, avoid use of JENTADUETO in patients with clinical or laboratory evidence of hepatic disease.

### 5.2 Pancreatitis

Acute pancreatitis, including fatal pancreatitis, has been reported in patients treated with linagliptin. In the CARMELINA trial [see *Clinical Studies (14.2)*], acute pancreatitis was reported in 9 (0.3%) patients treated with linagliptin and in 5 (0.1%) patients treated with placebo. Two patients treated with linagliptin in the CARMELINA trial had acute pancreatitis with a fatal outcome. There have been postmarketing reports of acute pancreatitis, including fatal pancreatitis, in patients treated with linagliptin.

Take careful notice of potential signs and symptoms of pancreatitis. If pancreatitis is suspected, promptly discontinue JENTADUETO and initiate appropriate management. It is unknown whether patients with a history of pancreatitis are at increased risk for the development of pancreatitis while using JENTADUETO.

### 5.3 Hypoglycemia with Concomitant Use with Insulin and Insulin Secretagogues

Insulin secretagogues and insulin are known to cause hypoglycemia. The risk of hypoglycemia is increased when JENTADUETO is used in combination with an insulin secretagogue (e.g., sulfonylurea) or insulin [see *Adverse Reactions (6.1)*]. Therefore, a lower dosage of the insulin secretagogue or insulin may be required to reduce the risk of hypoglycemia when used in combination with JENTADUETO.

### 5.4 Hypersensitivity Reactions

There have been postmarketing reports of serious hypersensitivity reactions in patients treated with linagliptin. These reactions include anaphylaxis, angioedema, and exfoliative skin conditions. Onset of these reactions occurred predominantly within the first 3 months after initiation of treatment with linagliptin, with some reports

occurring after the first dose. If a serious hypersensitivity reaction is suspected, discontinue JENTADUETO, assess for other potential causes for the event, and institute alternative treatment for diabetes mellitus.

Angioedema has also been reported with other dipeptidyl peptidase-4 (DPP-4) inhibitors. Use caution in a patient with a history of angioedema to another DPP-4 inhibitor because it is unknown whether such patients will be predisposed to angioedema with JENTADUETO.

### 5.5 Vitamin B<sub>12</sub> Deficiency

In metformin clinical trials of 29-week duration, a decrease to subnormal levels of previously normal serum vitamin B<sub>12</sub> levels was observed in approximately 7% of metformin-treated patients. Such decrease, possibly due to interference with B<sub>12</sub> absorption from the B<sub>12</sub>-intrinsic factor complex, may be associated with anemia but appears to be rapidly reversible with discontinuation of metformin or vitamin B<sub>12</sub> supplementation. Certain individuals (those with inadequate vitamin B<sub>12</sub> or calcium intake or absorption) appear to be predisposed to developing subnormal vitamin B<sub>12</sub> levels. Measure hematologic parameters on an annual basis and vitamin B<sub>12</sub> at 2 to 3 year intervals in patients on JENTADUETO and manage any abnormalities [see *Adverse Reactions (6.1)*].

### 5.6 Severe and Disabling Arthralgia

There have been postmarketing reports of severe and disabling arthralgia in patients taking linagliptin. The time to onset of symptoms following initiation of drug therapy varied from one day to years. Patients experienced relief of symptoms upon discontinuation of the medication. A subset of patients experienced a recurrence of symptoms when restarting the same drug or a different DPP-4 inhibitor. Consider DPP-4 inhibitors as a possible cause for severe joint pain and discontinue drug if appropriate.

### 5.7 Bullous Pemphigoid

Bullous pemphigoid was reported in 7 (0.2%) patients treated with linagliptin compared to none in patients treated with placebo in the CARMELINA trial [see *Clinical Studies (14.2)*], and 3 of these patients were hospitalized due to bullous pemphigoid. Postmarketing cases of bullous pemphigoid requiring hospitalization have been reported with DPP-4 inhibitor use. In reported cases, patients typically recovered with topical or systemic immunosuppressive treatment and discontinuation of the DPP-4 inhibitor. Tell patients to report development of blisters or erosions while receiving JENTADUETO. If bullous pemphigoid is suspected, JENTADUETO should be discontinued and referral to a dermatologist should be considered for diagnosis and appropriate treatment.

### 5.8 Heart Failure

An association between DPP-4 inhibitor treatment and heart failure has been observed in cardiovascular outcomes trials for two other members of the DPP-4 inhibitor class. These trials evaluated patients with type 2 diabetes mellitus and atherosclerotic cardiovascular disease.

Consider the risks and benefits of JENTADUETO prior to initiating treatment in patients at risk for heart failure, such as those with a prior history of heart failure and a history of renal impairment, and observe these patients for signs and symptoms of heart failure during therapy. Advise patients of the characteristic symptoms of heart failure and to immediately report such symptoms. If heart failure develops, evaluate and manage according to current standards of care and consider discontinuation of JENTADUETO.

## 6 ADVERSE REACTIONS

The following serious adverse reactions are described below or elsewhere in the prescribing information:

- Lactic Acidosis [see *Warnings and Precautions (5.1)*]
- Pancreatitis [see *Warnings and Precautions (5.2)*]
- Hypoglycemia with Concomitant Use with Insulin and Insulin Secretagogues [see *Warnings and Precautions (5.3)*]
- Hypersensitivity Reactions [see *Warnings and Precautions (5.4)*]
- Vitamin B<sub>12</sub> Deficiency [see *Warnings and Precautions (5.5)*]
- Severe and Disabling Arthralgia [see *Warnings and Precautions (5.6)*]
- Bullous Pemphigoid [see *Warnings and Precautions (5.7)*]
- Heart Failure [see *Warnings and Precautions (5.8)*]

### 6.1 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.

#### *Linagliptin/Metformin*

The safety of concomitantly administered linagliptin (daily dosage 5 mg) and metformin (mean daily dosage of approximately 1,800 mg) has been evaluated in 2,816 patients with type 2 diabetes mellitus treated for ≥12 weeks in clinical trials.

Three placebo-controlled trials with linagliptin + metformin were conducted: 2 studies were 24 weeks in duration, 1 trial was 12 weeks in duration. In the 3 placebo-controlled clinical studies, adverse reactions which occurred in ≥5% of patients receiving linagliptin + metformin (n=875) and were more common than in patients given placebo + metformin (n=539) included nasopharyngitis (5.7% vs 4.3%).

In a 24-week factorial design trial, adverse reactions reported in ≥5% of patients receiving linagliptin + metformin and were more common than in patients given placebo are shown in Table 1.

**Table 1 Adverse Reactions Reported in ≥5% of Patients Treated with Linagliptin + Metformin and Greater than with Placebo in a 24-week Factorial-Design Trial**

Adverse Reactions	Placebo (%) n=72	Linagliptin Monotherapy (%) n=142	Metformin Monotherapy (%) n=291	Combination of Linagliptin with Metformin (%) n=286
Nasopharyngitis	1.4	5.6	2.7	6.3
Diarrhea	2.8	3.5	3.8	6.3

Other adverse reactions reported in clinical studies with treatment of linagliptin + metformin were hypersensitivity (e.g., urticaria, angioedema, or bronchial hyperreactivity), cough, decreased appetite, nausea, vomiting, pruritus, and pancreatitis.

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