

HIGHLIGHTS OF PRESCRIBING INFORMATION

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

KOMBIGLYZE® XR (saxagliptin and metformin hydrochloride extended-release) tablets, for oral use
Initial U.S. Approval: 2010

WARNING: LACTIC ACIDOSIS

See full prescribing information for complete boxed warning.

- Post-marketing 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 KOMBIGLYZE XR and institute general supportive measures in a hospital setting. Prompt hemodialysis is recommended. (5.1)

RECENT MAJOR CHANGES

Boxed Warning	1/2017
Dosing and Administration (2.3, 2.4)	1/2017
Contraindications (4)	1/2017
Warnings and Precautions (5.1, 5.9)	1/2017
Warnings and Precautions (5.2, 5.3)	4/2016

INDICATIONS AND USAGE

KOMBIGLYZE XR is a combination of saxagliptin, a dipeptidyl peptidase-4 (DPP4) inhibitor, and metformin, a biguanide, indicated as an adjunct to diet and exercise to improve glycemic control in adults with type 2 diabetes mellitus when treatment with both saxagliptin and metformin is appropriate. (1, 14)

Limitations of Use:

- Not used for the treatment of type 1 diabetes mellitus or diabetic ketoacidosis. (1.1)

DOSAGE AND ADMINISTRATION

- Administer once daily with the evening meal. (2.1)
- Individualize the starting dose based on the patient's current regimen then adjust the dosage based on effectiveness and tolerability. (2.1)
- Do not exceed a daily dosage of 5 mg saxagliptin/2000 mg metformin HCl extended-release. (2.1)
- Swallow whole. Never crush, cut, or chew. (2.1)
- Limit the saxagliptin dosage to 2.5 mg daily for patients also taking strong cytochrome P450 3A4/5 inhibitors (e.g., ketoconazole). (2.2, 7.1)
- Assess renal function prior to initiation of KOMBIGLYZE XR and periodically thereafter. (2.3)
 - Do not use in patients with eGFR below 30 mL/min/1.73 m².
 - Initiation is not recommended in patients with eGFR between 30 - 45 mL/min/1.73 m².
 - Assess risk/benefit of continuing if eGFR falls below 45 mL/min/1.73 m².
 - Limit the saxagliptin component to 2.5 mg daily if eGFR is less than 45 mL/min/1.73 m².
 - Discontinue if eGFR falls below 30 mL/min/1.73 m².
- KOMBIGLYZE XR may need to be discontinued at time of, or prior to, iodinated contrast imaging procedures. (2.4)

DOSAGE FORMS AND STRENGTHS

Tablets:

- 5 mg saxagliptin/500 mg metformin HCl extended-release (3)
- 5 mg saxagliptin/1000 mg metformin HCl extended-release (3)
- 2.5 mg saxagliptin/1000 mg metformin HCl extended-release (3)

CONTRAINDICATIONS

- Severe renal impairment (eGFR below 30 mL/min/1.73 m²). (4)

- Hypersensitivity to metformin hydrochloride. (4)
- Metabolic acidosis, including diabetic ketoacidosis. (4, 5.1)
- History of a serious hypersensitivity reaction (e.g., anaphylaxis, angioedema, exfoliative skin conditions) to KOMBIGLYZE XR or saxagliptin. (4)

WARNINGS AND PRECAUTIONS

- **Lactic Acidosis:** See boxed warning. (5.1)
- **Pancreatitis:** If pancreatitis is suspected, promptly discontinue KOMBIGLYZE XR. (5.2)
- **Heart Failure:** Consider the risks and benefits of KOMBIGLYZE XR in patients who have known risk factors for heart failure. Monitor patients for signs and symptoms. (5.3)
- **Vitamin B₁₂ Deficiency:** Metformin may lower vitamin B₁₂ levels. Measure hematological parameters annually. (5.4, 6.1)
- **Hypoglycemia:** In the saxagliptin add-on to sulfonylurea, add-on to insulin, and add-on to metformin plus sulfonylurea trials, confirmed hypoglycemia was reported more commonly in patients treated with saxagliptin compared to placebo. When used with an insulin secretagogue (e.g., sulfonylurea) or insulin, a lower dose of the insulin secretagogue or insulin may be required to minimize the risk of hypoglycemia. (5.6, 6.1)
- **Hypersensitivity-Related Events (e.g., urticaria, facial edema):** More common in patients treated with saxagliptin than in patients treated with placebo; and post-marketing reports of serious hypersensitivity reactions, such as anaphylaxis, angioedema, and exfoliative skin conditions in patients treated with saxagliptin. Promptly discontinue KOMBIGLYZE XR, assess for other potential causes, institute appropriate monitoring and treatment, and initiate alternative treatment for diabetes. (5.7, 6.1, 6.2)
- **Arthralgia:** Severe and disabling arthralgia has been reported in patients taking DPP4 inhibitors. Consider as a possible cause for severe joint pain and discontinue drug if appropriate. (5.8)
- **Bullous Pemphigoid:** There have been postmarketing reports of bullous pemphigoid requiring hospitalization in patients taking DPP-4 inhibitors. Tell patients to report development of blisters or erosions. If bullous pemphigoid is suspected, discontinue KOMBIGLYZE XR (5.9).
- **Macrovascular Outcomes:** There have been no clinical studies establishing conclusive evidence of macrovascular risk reduction with KOMBIGLYZE XR or any other antidiabetic drug. (5.10)

ADVERSE REACTIONS

- Adverse reactions reported in >5% of patients treated with metformin extended-release and more commonly than in patients treated with placebo are: diarrhea and nausea/vomiting. (6.1)
- Adverse reactions reported in ≥5% of patients treated with saxagliptin and more commonly than in patients treated with placebo are: upper respiratory tract infection, urinary tract infection, and headache. (6.1)
- Adverse reactions reported in ≥5% of treatment-naïve patients treated with coadministered saxagliptin and metformin and more commonly than in patients treated with metformin alone are: headache and nasopharyngitis. (6.1)

To report SUSPECTED ADVERSE REACTIONS, contact AstraZeneca at 1-800-236-9933 or FDA at 1-800-FDA-1088 or www.fda.gov/medwatch.

DRUG INTERACTIONS

- Coadministration with strong CYP3A4/5 inhibitors (e.g., ketoconazole) significantly increases saxagliptin concentrations. Limit KOMBIGLYZE XR dose to 2.5 mg/1000 mg once daily. (2.2, 7.1)
- Carbonic anhydrase inhibitors may increase the risk of lactic acidosis. Consider more frequent monitoring. (7.2)
- Drugs that reduce metformin clearance (such as ranolazine, vandetanib, dolutegravir, and cimetidine) may increase the accumulation of metformin. Consider the benefits and risks of concomitant use. (7.3)
- Alcohol can potentiate the effect of metformin on lactate metabolism. Warn patients against excessive alcohol intake. (7.4)

USE IN SPECIFIC POPULATIONS

- No adequate and well-controlled studies in pregnant women. (8.1)
- **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.

Revised: 1/2017

FULL PRESCRIBING INFORMATION: CONTENTS*

WARNING: LACTIC ACIDOSIS

1 INDICATIONS AND USAGE

1.1 Limitation of Use

2 DOSAGE AND ADMINISTRATION

2.1 Recommended Dosage

2.2 Dosage Adjustments with Concomitant Use of Strong CYP3A4/5 Inhibitors

2.3 Recommendations for Dosing and Administration in Renal Impairment

2.4 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 Heart Failure

5.4 Vitamin B₁₂ Concentrations

5.5 Change in Clinical Status of Patients with Previously Controlled Type 2 Diabetes

5.6 Hypoglycemia with Concomitant Use of Sulfonylurea or Insulin

5.7 Hypersensitivity Reactions

5.8 Severe and Disabling Arthralgia

5.9 Bullous Pemphigoid

5.10 Macrovascular Outcomes

6 ADVERSE REACTIONS

6.1 Clinical Trials Experience

6.2 Postmarketing Experience

7 DRUG INTERACTIONS

7.1 Strong Inhibitors of CYP3A4/5 Enzymes

7.2 Carbonic Anhydrase Inhibitors

7.3 Drugs that Reduce Metformin Clearance

7.4 Alcohol

7.5 Insulin Secretagogues or Insulin

7.6 Use with Other Drugs

8 USE IN SPECIFIC POPULATIONS

8.1 Pregnancy

8.3 Nursing Mothers

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

13.2 Animal Toxicology and/or Pharmacology

14 CLINICAL STUDIES

14.1 Glycemic Efficacy Trials

14.2 Cardiovascular Safety Trial

16 HOW SUPPLIED/STORAGE AND HANDLING

17 PATIENT COUNSELING INFORMATION

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

FULL PRESCRIBING INFORMATION

WARNING: LACTIC ACIDOSIS

- Post-marketing 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 KOMBIGLYZE XR and institute general supportive measures in a hospital setting. Prompt hemodialysis is recommended [see *Warnings and Precautions (5.1)*].

1 INDICATIONS AND USAGE

KOMBIGLYZE XR is indicated as an adjunct to diet and exercise to improve glycemic control in adults with type 2 diabetes mellitus when treatment with both saxagliptin and metformin is appropriate [see *Clinical Studies (14)*].

1.1 Limitation of Use

KOMBIGLYZE XR is not indicated for the treatment of type 1 diabetes mellitus or diabetic ketoacidosis.

2 DOSAGE AND ADMINISTRATION

2.1 Recommended Dosage

The dosage of KOMBIGLYZE XR should be individualized on the basis of the patient's current regimen, effectiveness, and tolerability. KOMBIGLYZE XR should generally be administered once daily with the evening meal, with gradual dose titration to reduce the gastrointestinal side effects associated with metformin. The following dosage forms are available:

- KOMBIGLYZE XR (saxagliptin and metformin HCl extended-release) tablets 5 mg/500 mg
- KOMBIGLYZE XR (saxagliptin and metformin HCl extended-release) tablets 5 mg/1000 mg
- KOMBIGLYZE XR (saxagliptin and metformin HCl extended-release) tablets 2.5 mg/1000 mg

The recommended starting dose of KOMBIGLYZE XR in patients who need 5 mg of saxagliptin and who are not currently treated with metformin is 5 mg saxagliptin/500 mg metformin extended-release once daily with gradual dose escalation to reduce the gastrointestinal side effects due to metformin.

In patients treated with metformin, the dosage of KOMBIGLYZE XR should provide metformin at the dose already being taken, or the nearest therapeutically appropriate dose. Following a switch from metformin immediate-release to metformin extended-release, glycemic control should be closely monitored and dosage adjustments made accordingly.

Patients who need 2.5 mg saxagliptin in combination with metformin extended-release may be treated with KOMBIGLYZE XR 2.5 mg/1000 mg. Patients who need 2.5 mg saxagliptin who are either metformin naive or who require a dose of metformin higher than 1000 mg should use the individual components.

The maximum daily recommended dosage is 5 mg for saxagliptin and 2000 mg for metformin extended-release.

No studies have been performed specifically examining the safety and efficacy of KOMBIGLYZE XR in patients previously treated with other antihyperglycemic medications and switched to KOMBIGLYZE XR. Any change in therapy of type 2 diabetes should be undertaken with care and appropriate monitoring as changes in glycemic control can occur.

Inform patients that KOMBIGLYZE XR tablets must be swallowed whole and never crushed, cut, or chewed. Occasionally, the inactive ingredients of KOMBIGLYZE XR will be eliminated in the feces as a soft, hydrated mass that may resemble the original tablet.

2.2 Dosage Adjustments with Concomitant Use of Strong CYP3A4/5 Inhibitors

The maximum recommended dosage of saxagliptin is 2.5 mg once daily when coadministered with strong cytochrome P450 3A4/5 (CYP3A4/5) inhibitors (e.g., ketoconazole, atazanavir, clarithromycin, indinavir, itraconazole, nefazodone, nelfinavir, ritonavir, saquinavir, and telithromycin). For these patients, limit the KOMBIGLYZE XR dosage to 2.5 mg/1000 mg once daily [see *Dosage and Administration (2.1)*, *Drug Interactions (7.1)*, and *Clinical Pharmacology (12.3)*].

2.3 Recommendations for Dosing and Administration in Renal Impairment

Assess renal function prior to initiation of KOMBIGLYZE XR and periodically thereafter.

KOMBIGLYZE XR is contraindicated in patients with an estimated glomerular filtration rate (eGFR) below 30 mL/minute/1.73 m².

Initiation of KOMBIGLYZE XR in patients with an eGFR between 30 – 45 mL/minute/1.73 m² is not recommended.

In patients taking KOMBIGLYZE XR whose eGFR later falls below 45 mL/minute/1.73 m², assess the benefit risk of continuing therapy and limit dose of the saxagliptin component to 2.5 mg once daily.

Discontinue KOMBIGLYZE XR if the patient's eGFR later falls below 30 mL/minute/1.73 m² [*see Contraindications (4) and Warnings and Precautions (5.1)*].

2.4 Discontinuation for Iodinated Contrast Imaging Procedures

Discontinue KOMBIGLYZE XR 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 m²; a history of liver disease, alcoholism or heart failure; or in any patient who will be administered intra-arterial iodinated contrast. Re-evaluate eGFR 48 hours after the imaging procedure; restart KOMBIGLYZE XR if renal function is stable [*see Warnings and Precautions (5.1)*].

3 DOSAGE FORMS AND STRENGTHS

- KOMBIGLYZE XR (saxagliptin and metformin HCl extended-release) 5 mg/500 mg tablets are light brown to brown, biconvex, capsule-shaped, film-coated tablets with “5/500” printed on one side and “4221” printed on the reverse side, in blue ink.
- KOMBIGLYZE XR (saxagliptin and metformin HCl extended-release) 5 mg/1000 mg tablets are pink, biconvex, capsule-shaped, film-coated tablets with “5/1000” printed on one side and “4223” printed on the reverse side, in blue ink.
- KOMBIGLYZE XR (saxagliptin and metformin HCl extended-release) 2.5 mg/1000 mg tablets are pale yellow to light yellow, biconvex, capsule-shaped, film-coated tablets with “2.5/1000” printed on one side and “4222” printed on the reverse side, in blue ink.

4 CONTRAINDICATIONS

KOMBIGLYZE XR is contraindicated in patients with:

- Severe renal impairment (eGFR below 30 mL/min/1.73 m²).
- Hypersensitivity to metformin hydrochloride.
- Acute or chronic metabolic acidosis, including diabetic ketoacidosis. Diabetic ketoacidosis should be treated with insulin.
- History of a serious hypersensitivity reaction to KOMBIGLYZE XR or saxagliptin, such as anaphylaxis, angioedema, or exfoliative skin conditions [*see Warnings and Precautions (5.7) and Adverse Reactions (6.2)*].

5 WARNINGS AND PRECAUTIONS

5.1 Lactic Acidosis

There have been post-marketing 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 the 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 KOMBIGLYZE XR.

In KOMBIGLYZE XR-treated patients with a diagnosis or strong suspicion of lactic acidosis, prompt hemodialysis is recommended to correct the acidosis and remove accumulated metformin (metformin hydrochloride is dialyzable, with a clearance of up to 170 mL/minute 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 KOMBIGLYZE XR 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 post-marketing 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 *Clinical Pharmacology (12.3)*].

- Before initiating KOMBIGLYZE XR, obtain an estimated glomerular filtration rate (eGFR).
- KOMBIGLYZE XR is contraindicated in patients with an eGFR less than 30 mL/minute/1.73 m² [see *Contraindications (4)*].
- Initiation of KOMBIGLYZE XR is not recommended in patients with eGFR between 30 and 45 mL/minute/1.73 m².
- Obtain an eGFR at least annually in all patients taking KOMBIGLYZE XR. 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 KOMBIGLYZE XR whose eGFR later falls below 45 mL/minute/1.73 m², assess the benefit and risk of continuing therapy.

Drug Interactions: The concomitant use of KOMBIGLYZE XR 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 KOMBIGLYZE XR 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 m²; 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 KOMBIGLYZE XR 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. KOMBIGLYZE XR should be temporarily discontinued while patients have restricted food and fluid intake.

Hypoxic States: Several of the post-marketing 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 KOMBIGLYZE XR.

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 KOMBIGLYZE XR.

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

5.2 Pancreatitis

There have been post-marketing reports of acute pancreatitis in patients taking saxagliptin. In a cardiovascular outcomes trial enrolling participants with established atherosclerotic cardiovascular disease (ASCVD) or multiple risk factors for ASCVD (SAVOR trial), cases of definite acute pancreatitis were confirmed in 17 of 8240 (0.2%) patients receiving saxagliptin compared to 9 of 8173 (0.1%) receiving placebo. Pre-existing risk factors for pancreatitis were identified in 88% (15/17) of those patients receiving saxagliptin and in 100% (9/9) of those patients receiving placebo.

After initiation of KOMBIGLYZE XR, observe patients for signs and symptoms of pancreatitis. If pancreatitis is suspected, promptly discontinue KOMBIGLYZE XR 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 KOMBIGLYZE XR.

5.3 Heart Failure

In a cardiovascular outcomes trial enrolling participants with established ASCVD or multiple risk factors for ASCVD (SAVOR trial), more patients randomized to saxagliptin (289/8280, 3.5%) were hospitalized for heart failure compared to patients randomized to placebo (228/8212, 2.8%). In a time-to-first-event analysis the risk of hospitalization for heart failure was higher in the saxagliptin group (estimated Hazard Ratio: 1.27; 95% CI: 1.07, 1.51). Subjects with a prior history of heart failure and subjects with renal impairment had a higher risk for hospitalization for heart failure, irrespective of treatment assignment.

Consider the risks and benefits of KOMBIGLYZE XR prior to initiating treatment in patients at a higher risk for heart failure. Observe 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 KOMBIGLYZE XR.

5.4 Vitamin B₁₂ Concentrations

In controlled clinical trials of metformin of 29-week duration, a decrease to subnormal levels of previously normal serum vitamin B₁₂ levels, without clinical manifestations, was observed in approximately 7% of patients. Such decrease, possibly due to interference with B₁₂ absorption from the B₁₂-intrinsic factor complex, is, however, very rarely associated with anemia and appears to be rapidly reversible with discontinuation of metformin or vitamin B₁₂ supplementation. Measurement of hematologic parameters on an annual basis is advised in patients on KOMBIGLYZE XR and any apparent abnormalities should be appropriately investigated and managed [*see Adverse Reactions (6.1)*].

Certain individuals (those with inadequate vitamin B₁₂ or calcium intake or absorption) appear to be predisposed to developing subnormal vitamin B₁₂ levels. In these patients, routine serum vitamin B₁₂ measurements at 2- to 3-year intervals may be useful.

5.5 Change in Clinical Status of Patients with Previously Controlled Type 2 Diabetes

A patient with type 2 diabetes previously well-controlled on KOMBIGLYZE XR who develops laboratory abnormalities or clinical illness (especially vague and poorly defined illness) should be evaluated promptly for evidence of ketoacidosis or lactic acidosis. Evaluation should include serum electrolytes and ketones, blood glucose and, if indicated, blood pH, lactate, pyruvate, and metformin levels. If acidosis of either form occurs, KOMBIGLYZE XR must be stopped immediately and other appropriate corrective measures initiated.

5.6 Hypoglycemia with Concomitant Use of Sulfonylurea or Insulin

Saxagliptin

When saxagliptin was used in combination with a sulfonylurea or with insulin, medications known to cause hypoglycemia, the incidence of confirmed hypoglycemia was increased over that of placebo used in combination with a sulfonylurea or with insulin [*see Adverse Reactions (6.1)*]. Therefore, a lower dose of

the insulin secretagogue or insulin may be required to minimize the risk of hypoglycemia when used in combination with KOMBIGLYZE XR [see *Dosage and Administration (2.3)*].

Metformin hydrochloride

Hypoglycemia does not occur in patients receiving metformin alone under usual circumstances of use, but could occur when caloric intake is deficient, when strenuous exercise is not compensated by caloric supplementation, or during concomitant use with other glucose-lowering agents (such as sulfonylureas and insulin) or ethanol. Elderly, debilitated, or malnourished patients and those with adrenal or pituitary insufficiency or alcohol intoxication are particularly susceptible to hypoglycemic effects. Hypoglycemia may be difficult to recognize in the elderly and in people who are taking beta-adrenergic blocking drugs.

5.7 Hypersensitivity Reactions

There have been post-marketing reports of serious hypersensitivity reactions in patients treated with saxagliptin. These reactions include anaphylaxis, angioedema, and exfoliative skin conditions. Onset of these reactions occurred within the first 3 months after initiation of treatment with saxagliptin, with some reports occurring after the first dose. If a serious hypersensitivity reaction is suspected, discontinue KOMBIGLYZE XR, assess for other potential causes for the event, and institute alternative treatment for diabetes [see *Adverse Reactions (6.2)*].

Use caution in a patient with a history of angioedema to another dipeptidyl peptidase-4 (DPP4) inhibitor because it is unknown whether such patients will be predisposed to angioedema with KOMBIGLYZE XR.

5.8 Severe and Disabling Arthralgia

There have been post-marketing reports of severe and disabling arthralgia in patients taking DPP4 inhibitors. 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 DPP4 inhibitor. Consider DPP4 inhibitors as a possible cause for severe joint pain and discontinue drug if appropriate.

5.9 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 KOMBIGLYZE XR. If bullous pemphigoid is suspected, KOMBIGLYZE XR should be discontinued and referral to a dermatologist should be considered for diagnosis and appropriate treatment.

5.10 Macrovascular Outcomes

There have been no clinical studies establishing conclusive evidence of macrovascular risk reduction with KOMBIGLYZE XR or any other antidiabetic drug.

6 ADVERSE REACTIONS

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

- Pancreatitis [see *Warnings and Precautions (5.2)*]
- Heart Failure [see *Warnings and Precautions (5.3)*]
- Hypoglycemia with Concomitant Use of Sulfonylurea or Insulin [see *Warnings and Precautions (5.6)*]
- Hypersensitivity Reactions [see *Warnings and Precautions (5.7)*]
- Severe and disabling arthralgia [see *Warnings and Precautions (5.8)*]
- Bullous pemphigoid [see *Warnings and Precautions (5.9)*]

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.

Adverse Reactions in Efficacy Trials

Metformin hydrochloride

In placebo-controlled monotherapy trials of metformin extended-release, diarrhea and nausea/vomiting were reported in >5% of metformin-treated patients and more commonly than in placebo-treated patients (9.6% versus 2.6% for diarrhea and 6.5% versus 1.5% for nausea/vomiting). Diarrhea led to discontinuation of study medication in 0.6% of the patients treated with metformin extended-release.

Saxagliptin

The data in Table 1 are derived from a pool of 5 placebo-controlled clinical trials [see *Clinical Studies (14)*]. These data shown in the table reflect exposure of 882 patients to saxagliptin and a mean duration of exposure to saxagliptin of 21 weeks. The mean age of these patients was 55 years, 1.4% were 75 years or older and 48.4% were male. The population was 67.5% White, 4.6% Black or African American, 17.4% Asian, Other 10.5% and 9.8% were of Hispanic or Latino ethnicity. At baseline the population had diabetes for an average of 5.2 years and a mean HbA1c of 8.2%. Baseline estimated renal function was normal or mildly impaired (eGFR ≥ 60 mL/min/1.73m²) in 91% of these patients.

Table 1 shows common adverse reactions, excluding hypoglycemia, associated with the use of saxagliptin. These adverse reactions occurred more commonly on saxagliptin than on placebo and occurred in at least 5% of patients treated with saxagliptin.

Table 1: Adverse Reactions in Placebo-Controlled Trials* Reported in ≥5% of Patients Treated with Saxagliptin 5 mg and More Commonly than in Patients Treated with Placebo

	% of Patients	
	Saxagliptin 5 mg N=882	Placebo N=799
Upper respiratory tract infection	7.7	7.6
Urinary tract infection	6.8	6.1
Headache	6.5	5.9

* The 5 placebo-controlled trials include two monotherapy trials and one add-on combination therapy trial with each of the following: metformin, thiazolidinedione, or glyburide. Table shows 24-week data regardless of glycemic rescue.

In patients treated with saxagliptin 2.5 mg, headache (6.5%) was the only adverse reaction reported at a rate ≥5% and more commonly than in patients treated with placebo.

In the add-on to TZD trial, the incidence of peripheral edema was higher for saxagliptin 5 mg versus placebo (8.1% and 4.3%, respectively). The incidence of peripheral edema for saxagliptin 2.5 mg was 3.1%. None of the reported adverse reactions of peripheral edema resulted in study drug discontinuation. Rates of peripheral edema for saxagliptin 2.5 mg and saxagliptin 5 mg versus placebo were 3.6% and 2% versus 3% given as monotherapy, 2.1% and 2.1% versus 2.2% given as add-on therapy to metformin, and 2.4% and 1.2% versus 2.2% given as add-on therapy to glyburide.

The incidence rate of fractures was 1.0 and 0.6 per 100 patient-years, respectively, for saxagliptin (pooled analysis of 2.5 mg, 5 mg, and 10 mg) and placebo. The 10 mg saxagliptin dosage is not an approved dosage. The incidence rate of fracture events in patients who received saxagliptin did not increase over time. Causality has not been established and nonclinical studies have not demonstrated adverse effects of saxagliptin on bone.

An event of thrombocytopenia, consistent with a diagnosis of idiopathic thrombocytopenic purpura, was observed in the clinical program. The relationship of this event to saxagliptin is not known.

Discontinuation of therapy due to adverse reactions occurred in 2.2%, 3.3%, and 1.8% of subjects receiving saxagliptin 2.5 mg, saxagliptin 5 mg, and placebo, respectively. The most common adverse reactions (reported in at least 2 subjects treated with saxagliptin 2.5 mg or at least 2 subjects treated with saxagliptin 5 mg) associated with premature discontinuation of therapy included lymphopenia (0.1% and 0.5% versus 0%, respectively), rash (0.2% and 0.3% versus 0.3%), blood creatinine increased (0.3% and 0% versus 0%), and blood creatine phosphokinase increased (0.1% and 0.2% versus 0%).

Adverse Reactions with Concomitant Use with Insulin

In the add-on to insulin trial [see *Clinical Studies (14.1)*], the incidence of adverse events, including serious adverse events and discontinuations due to adverse events, was similar between saxagliptin and placebo, except for confirmed hypoglycemia [see *Adverse Reactions (6.1)*].

Adverse Reactions Associated with Saxagliptin Coadministered with Metformin Immediate-Release in Treatment-Naive Patients with Type 2 Diabetes

Table 2 shows the adverse reactions reported (regardless of investigator assessment of causality) in $\geq 5\%$ of patients participating in an additional 24-week, active-controlled trial of coadministered saxagliptin and metformin in treatment-naive patients.

Table 2: Coadministration of Saxagliptin and Metformin Immediate-Release in Treatment-Naive Patients: Adverse Reactions Reported in $\geq 5\%$ of Patients Treated with Combination Therapy of Saxagliptin 5 mg Plus Metformin Immediate-Release (and More Commonly than in Patients Treated with Metformin Immediate-Release Alone)

	Number (%) of Patients	
	Saxagliptin 5 mg + Metformin* N=320	Placebo + Metformin* N=328
Headache	24 (7.5)	17 (5.2)
Nasopharyngitis	22 (6.9)	13 (4.0)

* Metformin immediate-release was initiated at a starting dose of 500 mg daily and titrated up to a maximum of 2000 mg daily. In patients treated with the combination of saxagliptin and metformin immediate-release, either as saxagliptin add-on to metformin immediate-release therapy or as coadministration in treatment-naive patients, diarrhea was the only gastrointestinal-related event that occurred with an incidence $\geq 5\%$ in any treatment group in both studies. In the saxagliptin add-on to metformin immediate-release trial, the incidence of diarrhea was 9.9%, 5.8%, and 11.2% in the saxagliptin 2.5 mg, 5 mg, and placebo groups, respectively. When saxagliptin and metformin immediate-release were coadministered in treatment-naive patients, the incidence of diarrhea was 6.9% in the saxagliptin 5 mg + metformin immediate-release group and 7.3% in the placebo + metformin immediate-release group.

Hypoglycemia

In the saxagliptin clinical trials, adverse reactions of hypoglycemia were based on all reports of hypoglycemia. A concurrent glucose measurement was not required or was normal in some patients. Therefore, it is not possible to conclusively determine that all these reports reflect true hypoglycemia.

The incidence of reported hypoglycemia for saxagliptin 2.5 mg and saxagliptin 5 mg versus placebo given as monotherapy was 4% and 5.6% versus 4.1%, respectively. In the add-on to metformin immediate-release trial, the incidence of reported hypoglycemia was 7.8% with saxagliptin 2.5 mg, 5.8% with saxagliptin 5 mg, and 5% with placebo. When saxagliptin and metformin immediate-release were coadministered in treatment-naive patients, the incidence of reported hypoglycemia was 3.4% in patients given saxagliptin 5 mg + metformin immediate-release and 4% in patients given placebo + metformin immediate-release.

In the active-controlled trial comparing add-on therapy with saxagliptin 5 mg to glipizide in patients inadequately controlled on metformin alone, the incidence of reported hypoglycemia was 3% (19 events in 13 patients) with saxagliptin 5 mg versus 36.3% (750 events in 156 patients) with glipizide. Confirmed

symptomatic hypoglycemia (accompanying fingerstick blood glucose ≤ 50 mg/dL) was reported in none of the saxagliptin-treated patients and in 35 glipizide-treated patients (8.1%) ($p < 0.0001$).

In the saxagliptin add-on to insulin trial, the overall incidence of reported hypoglycemia was 18.4% for saxagliptin 5 mg and 19.9% for placebo. However, the incidence of confirmed symptomatic hypoglycemia (accompanying fingerstick blood glucose ≤ 50 mg/dL) was higher with saxagliptin 5 mg (5.3%) versus placebo (3.3%). Among the patients using insulin in combination with metformin, the incidence of confirmed symptomatic hypoglycemia was 4.8% with saxagliptin versus 1.9% with placebo.

In the saxagliptin add-on to metformin plus sulfonylurea trial, the overall incidence of reported hypoglycemia was 10.1% for saxagliptin 5 mg and 6.3% for placebo. Confirmed hypoglycemia was reported in 1.6% of the saxagliptin-treated patients and in none of the placebo-treated patients [*see Warnings and Precautions (5.6)*].

Hypersensitivity Reactions

Saxagliptin

Hypersensitivity-related events, such as urticaria and facial edema in the 5-study pooled analysis up to Week 24 were reported in 1.5%, 1.5%, and 0.4% of patients who received saxagliptin 2.5 mg, saxagliptin 5 mg, and placebo, respectively. None of these events in patients who received saxagliptin required hospitalization or were reported as life-threatening by the investigators. One saxagliptin-treated patient in this pooled analysis discontinued due to generalized urticaria and facial edema.

Renal Impairment

In the SAVOR trial, adverse reactions related to renal impairment, including laboratory changes (i.e., doubling of serum creatinine compared with baseline and serum creatinine > 6 mg/dL), were reported in 5.8% (483/8280) of saxagliptin-treated subjects and 5.1% (422/8212) of placebo-treated subjects. The most frequently reported adverse reactions included renal impairment (2.1% vs. 1.9%), acute renal failure (1.4% vs. 1.2%), and renal failure (0.8% vs. 0.9%), in the saxagliptin versus placebo groups, respectively. From baseline to the end of treatment, there was a mean decrease in eGFR of 2.5 mL/min/1.73m² for saxagliptin-treated patients and a mean decrease of 2.4 mL/min/1.73m² for placebo-treated patients. More subjects randomized to saxagliptin (421/5227, 8.1%) compared to subjects randomized to placebo (344/5073, 6.8%) had downward shifts in eGFR from > 50 mL/min (i.e., normal or mild renal impairment) to ≤ 50 mL/min (i.e., moderate or severe renal impairment). The proportions of subjects with renal adverse reactions increased with worsening baseline renal function and increased age, regardless of treatment assignment.

Infections

Saxagliptin

In the unblinded, controlled, clinical trial database for saxagliptin to date, there have been 6 (0.12%) reports of tuberculosis among the 4959 saxagliptin-treated patients (1.1 per 1000 patient-years) compared to no reports of tuberculosis among the 2868 comparator-treated patients. Two of these six cases were

confirmed with laboratory testing. The remaining cases had limited information or had presumptive diagnoses of tuberculosis. None of the six cases occurred in the United States or in Western Europe. One case occurred in Canada in a patient originally from Indonesia who had recently visited Indonesia. The duration of treatment with saxagliptin until report of tuberculosis ranged from 144 to 929 days. Post-treatment lymphocyte counts were consistently within the reference range for four cases. One patient had lymphopenia prior to initiation of saxagliptin that remained stable throughout saxagliptin treatment. The final patient had an isolated lymphocyte count below normal approximately four months prior to the report of tuberculosis. There have been no spontaneous reports of tuberculosis associated with saxagliptin use. Causality has not been established and there are too few cases to date to determine whether tuberculosis is related to saxagliptin use.

There has been one case of a potential opportunistic infection in the unblinded, controlled clinical trial database to date in a saxagliptin-treated patient who developed suspected foodborne fatal salmonella sepsis after approximately 600 days of saxagliptin therapy. There have been no spontaneous reports of opportunistic infections associated with saxagliptin use.

Vital Signs

Saxagliptin

No clinically meaningful changes in vital signs have been observed in patients treated with saxagliptin alone or in combination with metformin.

Laboratory Tests

Absolute Lymphocyte Counts

Saxagliptin

There was a dose-related mean decrease in absolute lymphocyte count observed with saxagliptin. From a baseline mean absolute lymphocyte count of approximately 2200 cells/microL, mean decreases of approximately 100 and 120 cells/microL with saxagliptin 5 mg and 10 mg, respectively, relative to placebo were observed at 24 weeks in a pooled analysis of five placebo-controlled clinical studies. Similar effects were observed when saxagliptin 5 mg and metformin were coadministered in treatment-naive patients compared to placebo and metformin. There was no difference observed for saxagliptin 2.5 mg relative to placebo. The proportion of patients who were reported to have a lymphocyte count ≤ 750 cells/microL was 0.5%, 1.5%, 1.4%, and 0.4% in the saxagliptin 2.5 mg, 5 mg, 10 mg, and placebo groups, respectively. In most patients, recurrence was not observed with repeated exposure to saxagliptin although some patients had recurrent decreases upon rechallenge that led to discontinuation of saxagliptin. The decreases in lymphocyte count were not associated with clinically relevant adverse reactions. The 10 mg saxagliptin dosage is not an approved dosage.

In the SAVOR trial mean decreases of approximately 84 cells/microL with saxagliptin relative to placebo was observed. The proportion of patients who experienced a decrease in lymphocyte counts to a count of ≤ 750 cells/microL was 1.6% (136/8280) and 1.0% (78/8212) on saxagliptin and placebo respectively.

The clinical significance of this decrease in lymphocyte count relative to placebo is not known. When clinically indicated, such as in settings of unusual or prolonged infection, lymphocyte count should be measured. The effect of saxagliptin on lymphocyte counts in patients with lymphocyte abnormalities (e.g., human immunodeficiency virus) is unknown.

Vitamin B₁₂ Concentrations

Metformin hydrochloride

Metformin may lower serum vitamin B₁₂ concentrations. Measurement of hematologic parameters on an annual basis is advised in patients on KOMBIGLYZE XR and any apparent abnormalities should be appropriately investigated and managed [see *Warnings and Precautions (5.4)*].

6.2 Postmarketing Experience

Additional adverse reactions have been identified during post-approval use. Because these reactions are reported voluntarily from a population of uncertain size, it is generally not possible to reliably estimate their frequency or establish a causal relationship to drug exposure.

Saxagliptin

- Hypersensitivity reactions including anaphylaxis, angioedema, and exfoliative skin conditions [see *Contraindications (4) and Warnings and Precautions (5.7)*]
- Acute pancreatitis [see *Warnings and Precautions (5.2)*]
- Severe and disabling arthralgia [see *Warnings and Precautions (5.8)*]
- Bullous pemphigoid [see *Warnings and Precautions (5.9)*]

Metformin hydrochloride

- Cholestatic, hepatocellular, and mixed hepatocellular liver injury

7 DRUG INTERACTIONS

7.1 Strong Inhibitors of CYP3A4/5 Enzymes

Ketoconazole significantly increased saxagliptin exposure. Similar significant increases in plasma concentrations of saxagliptin are anticipated with other strong CYP3A4/5 inhibitors (e.g., atazanavir, clarithromycin, indinavir, itraconazole, nefazodone, nelfinavir, ritonavir, saquinavir, and telithromycin). The dose of saxagliptin should be limited to 2.5 mg when coadministered with a strong CYP3A4/5 inhibitor [see *Dosage and Administration (2.2) and Clinical Pharmacology (12.3)*].

7.2 Carbonic Anhydrase Inhibitors

Topiramate or other carbonic anhydrase inhibitors (e.g., zonisamide, acetazolamide or dichlorphenamide) frequently causes a decrease in serum bicarbonate and induce non-anion gap, hyperchloremic metabolic acidosis. Concomitant use of these drugs with KOMBIGLYZE XR may increase the risk for lactic acidosis.

7.3 Drugs that Reduce Metformin Clearance

Concomitant use of drugs that interfere with common renal tubular transport systems involved in the renal elimination of metformin (e.g., organic cationic transporter-2 [OCT2] / multidrug and toxin extrusion [MATE] inhibitors such as ranolazine, vandetanib, dolutegravir, and cimetidine) could increase systemic exposure to metformin and may increase the risk for lactic acidosis [see *Clinical Pharmacology (12.3)*]. Consider the benefits and risks of concomitant use.

7.4 Alcohol

Alcohol is known to potentiate the effect of metformin on lactate metabolism. Warn patients against excessive alcohol intake while receiving KOMBIGLYZE XR.

7.5 Insulin Secretagogues or Insulin

In the saxagliptin add-on to sulfonylurea, add-on to insulin, and add-on to metformin plus sulfonylurea trials, confirmed hypoglycemia was reported more commonly in patients treated with saxagliptin compared to placebo. When used with an insulin secretagogue (e.g., sulfonylurea) or insulin, a lower dose of the insulin secretagogue or insulin may be required to minimize the risk of hypoglycemia.

7.6 Use with Other Drugs

Some medications can predispose to hyperglycemia and may lead to loss of glycemic control. These medications include the thiazides and other diuretics, corticosteroids, phenothiazines, thyroid products, estrogens, oral contraceptives, phenytoin, nicotinic acid, sympathomimetics, calcium channel blockers, and isoniazid. When such drugs are administered to a patient receiving KOMBIGLYZE XR, the patient should be closely observed for loss of glycemic control. When such drugs are withdrawn from a patient receiving KOMBIGLYZE XR, the patient should be observed closely for hypoglycemia.

8 USE IN SPECIFIC POPULATIONS

8.1 Pregnancy

Pregnancy Category B

There are no adequate and well-controlled studies in pregnant women with KOMBIGLYZE XR or its individual components. Because animal reproduction studies are not always predictive of human response, KOMBIGLYZE XR, like other antidiabetic medications, should be used during pregnancy only if clearly needed.

Coadministration of saxagliptin and metformin, to pregnant rats and rabbits during the period of organogenesis, was neither embryo-lethal nor teratogenic in either species when tested at doses yielding systemic exposures (AUC) up to 100 and 10 times the maximum recommended human doses (MRHD; saxagliptin 5 mg and metformin 2000 mg), respectively, in rats; and 249 and 1.1 times the MRHDs in rabbits. In rats, minor developmental toxicity was limited to an increased incidence of wavy ribs; associated maternal toxicity was limited to weight decrements of 11% to 17% over the course of the study,

and related reductions in maternal food consumption. In rabbits, coadministration was poorly tolerated in a subset of mothers (12 of 30), resulting in death, moribundity, or abortion. However, among surviving mothers with evaluable litters, maternal toxicity was limited to marginal reductions in body weight over the course of gestation days 21 to 29; and associated developmental toxicity in these litters was limited to fetal body weight decrements of 7%, and a low incidence of delayed ossification of the fetal hyoid.

Saxagliptin

Saxagliptin was not teratogenic at any dose tested when administered to pregnant rats and rabbits during periods of organogenesis. Incomplete ossification of the pelvis, a form of developmental delay, occurred in rats at a dose of 240 mg/kg, or approximately 1503 and 66 times human exposure to saxagliptin and the active metabolite, respectively, at the MRHD of 5 mg. Maternal toxicity and reduced fetal body weights were observed at 7986 and 328 times the human exposure at the MRHD for saxagliptin and the active metabolite, respectively. Minor skeletal variations in rabbits occurred at a maternally toxic dose of 200 mg/kg, or approximately 1432 and 992 times the MRHD.

Saxagliptin administered to female rats from gestation day 6 to lactation day 20 resulted in decreased body weights in male and female offspring only at maternally toxic doses (exposures \geq 1629 and 53 times saxagliptin and its active metabolite at the MRHD). No functional or behavioral toxicity was observed in offspring of rats administered saxagliptin at any dose.

Saxagliptin crosses the placenta into the fetus following dosing in pregnant rats.

Metformin hydrochloride

Metformin was not teratogenic in rats and rabbits at doses up to 600 mg/kg/day. This represents an exposure of about 2 and 6 times the maximum recommended human daily dose of 2000 mg based on body surface area comparisons for rats and rabbits, respectively. Determination of fetal concentrations demonstrated a partial placental barrier to metformin.

8.3 Nursing Mothers

No studies in lactating animals have been conducted with the combined components of KOMBIGLYZE XR. In studies performed with the individual components, both saxagliptin and metformin are secreted in the milk of lactating rats. It is not known whether saxagliptin or metformin are secreted in human milk. Because many drugs are secreted in human milk, caution should be exercised when KOMBIGLYZE XR is administered to a nursing woman.

8.4 Pediatric Use

Safety and effectiveness of KOMBIGLYZE XR in pediatric patients under 18 years of age have not been established. Additionally, studies characterizing the pharmacokinetics of KOMBIGLYZE XR in pediatric patients have not been performed.

8.5 Geriatric Use

KOMBIGLYZE XR

Elderly patients are more likely to have decreased renal function. Assess renal function more frequently in the elderly [see *Warnings and Precautions (5.1)* and *Clinical Pharmacology (12.3)*].

Saxagliptin

In the seven, double-blind, controlled clinical safety and efficacy trials of saxagliptin, a total of 4751 (42.0%) of the 11301 patients randomized to saxagliptin were 65 years and over, and 1210 (10.7%) were 75 years and over. No overall differences in safety or effectiveness were observed between subjects ≥ 65 years old and younger subjects. While this clinical experience has not identified differences in responses between the elderly and younger patients, greater sensitivity of some older individuals cannot be ruled out.

Metformin hydrochloride

Controlled clinical studies of metformin did not include sufficient numbers of elderly patients to determine whether they respond differently from younger patients, although other reported clinical experience has not identified differences in responses between the elderly and young patients. Metformin is known to be substantially excreted by the kidney. In general, dose selection for an elderly patient should be cautious, usually starting at the low end of the dosing range, reflecting the greater frequency of decreased hepatic, renal, or cardiac function, and of concomitant disease or other drug therapy and the higher risk of lactic acidosis. Assess renal function more frequently in elderly patients. [see *Contraindications (4)*, *Warnings and Precautions (5.1)*, and *Clinical Pharmacology (12.3)*].

8.6 Renal Impairment

Saxagliptin

In a 12-week randomized placebo-controlled trial, saxagliptin 2.5 mg was administered to 85 subjects with moderate (n=48) or severe (n=18) renal impairment or end-stage renal disease (ESRD) (n=19) [see *Clinical Studies (14)*]. The incidence of adverse events, including serious adverse events and discontinuations due to adverse events, was similar between saxagliptin and placebo. The overall incidence of reported hypoglycemia was 20% among subjects treated with saxagliptin 2.5 mg and 22% among subjects treated with placebo. Four saxagliptin-treated subjects (4.7%) and three placebo-treated subjects (3.5%) reported at least one episode of confirmed symptomatic hypoglycemia (accompanying fingerstick glucose ≤ 50 mg/dL).

Metformin hydrochloride

Metformin is substantially excreted by the kidney, and the risk of metformin accumulation and lactic acidosis increases with the degree of renal impairment. KOMBIGLYZE XR is contraindicated in severe renal impairment, patients with an estimated glomerular filtration rate (eGFR) below 30 mL/min/1.73 m² [see *Dosage and Administration (2.3)*, *Contraindications (4)*, *Warnings and Precautions (5.1)* and *Clinical Pharmacology (12.3)*].

8.7 Hepatic Impairment

Use of metformin in patients with hepatic impairment has been associated with some cases of lactic acidosis. KOMBIGLYZE XR is not recommended in patients with hepatic impairment [see *Warnings and Precautions (5.1)*].

10 OVERDOSAGE

Saxagliptin

In a controlled clinical trial, once-daily, orally administered saxagliptin in healthy subjects at doses up to 400 mg daily for 2 weeks (80 times the MRHD) had no dose-related clinical adverse reactions and no clinically meaningful effect on QTc interval or heart rate.

In the event of an overdose, appropriate supportive treatment should be initiated as dictated by the patient's clinical status. Saxagliptin and its active metabolite are removed by hemodialysis (23% of dose over 4 hours).

Metformin hydrochloride

Overdose of metformin hydrochloride has occurred, including ingestion of amounts greater than 50 grams. Hypoglycemia was reported in approximately 10% of cases, but no causal association with metformin hydrochloride has been established. Lactic acidosis has been reported in approximately 32% of metformin overdose cases [see *Warnings and Precautions (5.1)*]. Metformin is dialyzable with a clearance of up to 170 mL/min under good hemodynamic conditions. Therefore, hemodialysis may be useful for removal of accumulated drug from patients in whom metformin overdosage is suspected.

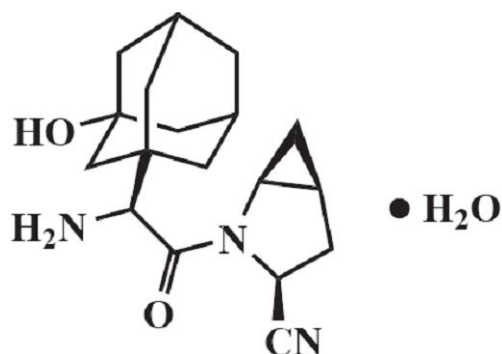
11 DESCRIPTION

KOMBIGLYZE XR (saxagliptin and metformin HCl extended-release) tablets contain two oral antihyperglycemic medications used in the management of type 2 diabetes: saxagliptin and metformin hydrochloride.

Saxagliptin

Saxagliptin is an orally active inhibitor of the dipeptidyl-peptidase-4 (DPP4) enzyme.

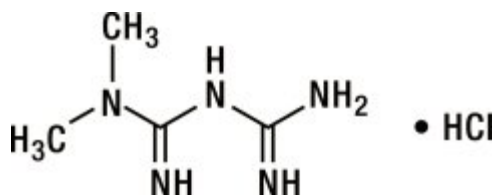
Saxagliptin monohydrate is described chemically as (1*S*,3*S*,5*S*)-2-[(2*S*)-2-Amino-2-(3-hydroxytricyclo[3.3.1.1^{3,7}]dec-1-yl)acetyl]-2-azabicyclo[3.1.0]hexane-3-carbonitrile, monohydrate or (1*S*,3*S*,5*S*)-2-[(2*S*)-2-Amino-2-(3-hydroxyadamantan-1-yl)acetyl]-2-azabicyclo[3.1.0]hexane-3-carbonitrile hydrate. The empirical formula is C₁₈H₂₅N₃O₂•H₂O and the molecular weight is 333.43. The structural formula is:



Saxagliptin monohydrate is a white to light yellow or light brown, non-hygroscopic, crystalline powder. It is sparingly soluble in water at 24°C ± 3°C, slightly soluble in ethyl acetate, and soluble in methanol, ethanol, isopropyl alcohol, acetonitrile, acetone, and polyethylene glycol 400 (PEG 400).

Metformin hydrochloride

Metformin hydrochloride (*N,N*-dimethylimidodicarbonimidic diamide hydrochloride) is a white to off-white crystalline compound with a molecular formula of C₄H₁₁N₅ • HCl and a molecular weight of 165.63. Metformin hydrochloride is freely soluble in water, slightly soluble in alcohol, and is practically insoluble in acetone, ether, and chloroform. The pK_a of metformin is 12.4. The pH of a 1% aqueous solution of metformin hydrochloride is 6.68. The structural formula is:



KOMBIGLYZE XR

KOMBIGLYZE XR is available for oral administration as tablets containing either 5.58 mg saxagliptin hydrochloride (anhydrous) equivalent to 5 mg saxagliptin and 500 mg metformin hydrochloride (KOMBIGLYZE XR 5 mg/500 mg), or 5.58 mg saxagliptin hydrochloride (anhydrous) equivalent to 5 mg saxagliptin and 1000 mg metformin hydrochloride (KOMBIGLYZE XR 5 mg/1000 mg), or 2.79 mg saxagliptin hydrochloride (anhydrous) equivalent to 2.5 mg saxagliptin and 1000 mg metformin hydrochloride (KOMBIGLYZE XR 2.5 mg/1000 mg). Each film-coated tablet of KOMBIGLYZE XR contains the following inactive ingredients: carboxymethylcellulose sodium, hypromellose 2208, and magnesium stearate. The 5 mg/500 mg strength tablet of KOMBIGLYZE XR also contains microcrystalline cellulose and hypromellose 2910. In addition, the film coatings contain the following inactive ingredients: polyvinyl alcohol, polyethylene glycol 3350, titanium dioxide, talc, and iron oxides.

The biologically inert components of the tablet may occasionally remain intact during gastrointestinal transit and will be eliminated in the feces as a soft, hydrated mass.

12 CLINICAL PHARMACOLOGY

12.1 Mechanism of Action

KOMBIGLYZE XR

KOMBIGLYZE XR combines two antihyperglycemic medications with complementary mechanisms of action to improve glycemic control in adults with type 2 diabetes: saxagliptin, a dipeptidyl-peptidase-4 (DPP4) inhibitor, and metformin hydrochloride, a biguanide.

Saxagliptin

Increased concentrations of the incretin hormones such as glucagon-like peptide-1 (GLP-1) and glucose-dependent insulinotropic polypeptide (GIP) are released into the bloodstream from the small intestine in response to meals. These hormones cause insulin release from the pancreatic beta cells in a glucose-dependent manner but are inactivated by the DPP4 enzyme within minutes. GLP-1 also lowers glucagon secretion from pancreatic alpha cells, reducing hepatic glucose production. In patients with type 2 diabetes, concentrations of GLP-1 are reduced but the insulin response to GLP-1 is preserved. Saxagliptin is a competitive DPP4 inhibitor that slows the inactivation of the incretin hormones, thereby increasing their bloodstream concentrations and reducing fasting and postprandial glucose concentrations in a glucose-dependent manner in patients with type 2 diabetes mellitus.

Metformin hydrochloride

Metformin improves glucose tolerance in patients with type 2 diabetes, lowering both basal and postprandial plasma glucose. Metformin decreases hepatic glucose production, decreases intestinal absorption of glucose, and improves insulin sensitivity by increasing peripheral glucose uptake and utilization. Unlike sulfonylureas, metformin does not produce hypoglycemia in patients with type 2 diabetes or in healthy subjects except in unusual circumstances [see [Warnings and Precautions \(5.6\)](#)] and does not cause hyperinsulinemia. With metformin therapy, insulin secretion remains unchanged while fasting insulin levels and day-long plasma insulin response may actually decrease.

12.2 Pharmacodynamics

Saxagliptin

In patients with type 2 diabetes mellitus, administration of saxagliptin inhibits DPP4 enzyme activity for a 24-hour period. After an oral glucose load or a meal, this DPP4 inhibition resulted in a 2- to 3-fold increase in circulating levels of active GLP-1 and GIP, decreased glucagon concentrations, and increased glucose-dependent insulin secretion from pancreatic beta cells. The rise in insulin and decrease in glucagon were associated with lower fasting glucose concentrations and reduced glucose excursion following an oral glucose load or a meal.

Cardiac Electrophysiology

Saxagliptin

In a randomized, double-blind, placebo-controlled, 4-way crossover, active comparator study using moxifloxacin in 40 healthy subjects, saxagliptin was not associated with clinically meaningful prolongation of the QTc interval or heart rate at daily doses up to 40 mg (8 times the MRHD).

12.3 Pharmacokinetics

KOMBIGLYZE XR

Bioequivalence and food effect of KOMBIGLYZE XR was characterized under low calorie diet. The low calorie diet consisted of 324 kcal with meal composition that contained 11.1% protein, 10.5% fat, and 78.4% carbohydrate. The results of bioequivalence studies in healthy subjects demonstrated that KOMBIGLYZE XR combination tablets are bioequivalent to coadministration of corresponding doses of saxagliptin (ONGLYZA[®]) and metformin hydrochloride extended-release (GLUCOPHAGE[®] XR) as individual tablets under fed conditions.

Saxagliptin

The pharmacokinetics of saxagliptin and its active metabolite, 5-hydroxy saxagliptin were similar in healthy subjects and in patients with type 2 diabetes mellitus. The C_{max} and AUC values of saxagliptin and its active metabolite increased proportionally in the 2.5 to 400 mg dose range. Following a 5 mg single oral dose of saxagliptin to healthy subjects, the mean plasma AUC values for saxagliptin and its active metabolite were 78 ng•h/mL and 214 ng•h/mL, respectively. The corresponding plasma C_{max} values were 24 ng/mL and 47 ng/mL, respectively. The average variability (%CV) for AUC and C_{max} for both saxagliptin and its active metabolite was less than 25%.

No appreciable accumulation of either saxagliptin or its active metabolite was observed with repeated once-daily dosing at any dose level. No dose- and time-dependence were observed in the clearance of saxagliptin and its active metabolite over 14 days of once-daily dosing with saxagliptin at doses ranging from 2.5 to 400 mg.

Metformin hydrochloride

Metformin extended-release C_{max} is achieved with a median value of 7 hours and a range of 4 to 8 hours. At steady state, the AUC and C_{max} are less than dose proportional for metformin extended-release within the range of 500 to 2000 mg. After repeated administration of metformin extended-release, metformin did not accumulate in plasma. Metformin is excreted unchanged in the urine and does not undergo hepatic metabolism. Peak plasma levels of metformin extended-release tablets are approximately 20% lower compared to the same dose of metformin immediate-release tablets, however, the extent of absorption (as measured by AUC) is similar between extended-release tablets and immediate-release tablets.

Absorption

Saxagliptin

The median time to maximum concentration (T_{max}) following the 5 mg once daily dose was 2 hours for saxagliptin and 4 hours for its active metabolite. Administration with a high-fat meal resulted in an increase in T_{max} of saxagliptin by approximately 20 minutes as compared to fasted conditions. There was a 27% increase in the AUC of saxagliptin when given with a meal as compared to fasted conditions. Saxagliptin may be administered with or without food. Food has no significant effect on the pharmacokinetics of saxagliptin when administered as KOMBIGLYZE XR combination tablets.

Metformin hydrochloride

Following a single oral dose of metformin extended-release, C_{max} is achieved with a median value of 7 hours and a range of 4 to 8 hours. Although the extent of metformin absorption (as measured by AUC) from the metformin extended-release tablet increased by approximately 50% when given with food, there was no effect of food on C_{max} and T_{max} of metformin. Both high and low fat meals had the same effect on the pharmacokinetics of metformin extended-release. Food has no significant effect on the pharmacokinetics of metformin when administered as KOMBIGLYZE XR combination tablets.

Distribution

Saxagliptin

The *in vitro* protein binding of saxagliptin and its active metabolite in human serum is negligible. Therefore, changes in blood protein levels in various disease states (e.g., renal or hepatic impairment) are not expected to alter the disposition of saxagliptin.

Metformin hydrochloride

Distribution studies with extended-release metformin have not been conducted; however, the apparent volume of distribution (V/F) of metformin following single oral doses of immediate-release metformin 850 mg averaged 654 ± 358 L. Metformin is negligibly bound to plasma proteins, in contrast to sulfonylureas, which are more than 90% protein bound. Metformin partitions into erythrocytes, most likely as a function of time. Metformin is negligibly bound to plasma proteins and is, therefore, less likely to interact with highly protein-bound drugs such as salicylates, sulfonamides, chloramphenicol, and probenecid, as compared to the sulfonylureas, which are extensively bound to serum proteins.

Metabolism

Saxagliptin

The metabolism of saxagliptin is primarily mediated by cytochrome P450 3A4/5 (CYP3A4/5). The major metabolite of saxagliptin is also a DPP4 inhibitor, which is one-half as potent as saxagliptin. Therefore, strong CYP3A4/5 inhibitors and inducers will alter the pharmacokinetics of saxagliptin and its active metabolite [see *Drug Interactions (7.1)*].

Metformin hydrochloride

Intravenous single-dose studies in healthy subjects demonstrate that metformin is excreted unchanged in the urine and does not undergo hepatic metabolism (no metabolites have been identified in humans) or biliary excretion.

Metabolism studies with extended-release metformin tablets have not been conducted.

Excretion

Saxagliptin

Saxagliptin is eliminated by both renal and hepatic pathways. Following a single 50 mg dose of ¹⁴C-saxagliptin, 24%, 36%, and 75% of the dose was excreted in the urine as saxagliptin, its active metabolite, and total radioactivity, respectively. The average renal clearance of saxagliptin (~230 mL/min) was greater than the average estimated glomerular filtration rate (~120 mL/min), suggesting some active renal excretion. A total of 22% of the administered radioactivity was recovered in feces representing the fraction of the saxagliptin dose excreted in bile and/or unabsorbed drug from the gastrointestinal tract. Following a single oral dose of saxagliptin 5 mg to healthy subjects, the mean plasma terminal half-life ($t_{1/2}$) for saxagliptin and its active metabolite was 2.5 and 3.1 hours, respectively.

Metformin hydrochloride

Renal clearance is approximately 3.5 times greater than creatinine clearance, which indicates that tubular secretion is the major route of metformin elimination. Following oral administration, approximately 90% of the absorbed drug is eliminated via the renal route within the first 24 hours, with a plasma elimination half-life of approximately 6.2 hours. In blood, the elimination half-life is approximately 17.6 hours, suggesting that the erythrocyte mass may be a compartment of distribution.

Specific Populations

Renal Impairment

Saxagliptin

A single-dose, open-label study was conducted to evaluate the pharmacokinetics of saxagliptin (10 mg dose) in subjects with varying degrees of chronic renal impairment compared to subjects with normal renal function. The 10 mg dosage is not an approved dosage. The degree of renal impairment did not affect C_{max} of saxagliptin or its metabolite. In subjects with moderate renal impairment with eGFR 30 to less than 45 mL/min/1.73 m², severe renal impairment (eGFR 15 to less than 30 mL/min/1.73 m²) and ESRD patient on hemodialysis, the AUC values of saxagliptin or its active metabolite were >2 fold.

Metformin hydrochloride

In patients with decreased renal function, the plasma and blood half-life of metformin is prolonged and the renal clearance is decreased [*see Contraindications (4) and Warnings and Precautions (5.1)*].

Hepatic Impairment

No pharmacokinetic studies of metformin have been conducted in patients with hepatic impairment.

Body Mass Index

Saxagliptin

No dosage adjustment is recommended based on body mass index (BMI) which was not identified as a significant covariate on the apparent clearance of saxagliptin or its active metabolite in the population pharmacokinetic analysis.

Gender

Saxagliptin

No dosage adjustment is recommended based on gender. There were no differences observed in saxagliptin pharmacokinetics between males and females. Compared to males, females had approximately 25% higher exposure values for the active metabolite than males, but this difference is unlikely to be of clinical relevance. Gender was not identified as a significant covariate on the apparent clearance of saxagliptin and its active metabolite in the population pharmacokinetic analysis.

Metformin hydrochloride

Metformin pharmacokinetic parameters did not differ significantly between healthy subjects and patients with type 2 diabetes when analyzed according to gender (males=19, females=16). Similarly, in controlled clinical studies in patients with type 2 diabetes, the antihyperglycemic effect of metformin was comparable in males and females.

Geriatric

Saxagliptin

No dosage adjustment is recommended based on age alone. Elderly subjects (65-80 years) had 23% and 59% higher geometric mean C_{max} and geometric mean AUC values, respectively, for saxagliptin than young subjects (18-40 years). Differences in active metabolite pharmacokinetics between elderly and young subjects generally reflected the differences observed in saxagliptin pharmacokinetics. The difference between the pharmacokinetics of saxagliptin and the active metabolite in young and elderly subjects is likely due to multiple factors including declining renal function and metabolic capacity with increasing age. Age was not identified as a significant covariate on the apparent clearance of saxagliptin and its active metabolite in the population pharmacokinetic analysis.

Metformin hydrochloride

Limited data from controlled pharmacokinetic studies of metformin in healthy elderly subjects suggest that total plasma clearance of metformin is decreased, the half-life is prolonged, and C_{max} is increased, compared to healthy young subjects. From these data, it appears that the change in metformin pharmacokinetics with aging is primarily accounted for by a change in renal function.

Race and Ethnicity

Saxagliptin

No dosage adjustment is recommended based on race. The population pharmacokinetic analysis compared the pharmacokinetics of saxagliptin and its active metabolite in 309 Caucasian subjects with 105 non-Caucasian subjects (consisting of six racial groups). No significant difference in the pharmacokinetics of saxagliptin and its active metabolite were detected between these two populations.

Metformin hydrochloride

No studies of metformin pharmacokinetic parameters according to race have been performed. In controlled clinical studies of metformin in patients with type 2 diabetes, the antihyperglycemic effect was comparable in Whites (n=249), Blacks (n=51), and Hispanics (n=24).

Drug Interaction Studies

Specific pharmacokinetic drug interaction studies with KOMBIGLYZE XR have not been performed, although such studies have been conducted with the individual saxagliptin and metformin components.

In Vitro Assessment of Drug Interactions

In *in vitro* studies, saxagliptin and its active metabolite did not inhibit CYP1A2, 2A6, 2B6, 2C9, 2C19, 2D6, 2E1, or 3A4, or induce CYP1A2, 2B6, 2C9, or 3A4. Therefore, saxagliptin is not expected to alter the metabolic clearance of coadministered drugs that are metabolized by these enzymes. Saxagliptin is a P-glycoprotein (P-gp) substrate, but is not a significant inhibitor or inducer of P-gp.

In Vivo Assessment of Drug Interactions

Table 3: Effect of Coadministered Drug on Systemic Exposures of Saxagliptin and its Active Metabolite, 5-hydroxy Saxagliptin

Coadministered Drug	Dosage of Coadministered Drug*	Dosage of Saxagliptin*	Geometric Mean Ratio (ratio with/without coadministered drug) No Effect = 1.00		
				AUC [†]	C _{max}
No dosing adjustments required for the following:					
Metformin	1000 mg	100 mg	saxagliptin	0.98	0.79
			5-hydroxy saxagliptin	0.99	0.88
Glyburide	5 mg	10 mg	saxagliptin	0.98	1.08
			5-hydroxy saxagliptin	ND	ND
Pioglitazone [‡]	45 mg QD for 10 days	10 mg QD for 5 days	saxagliptin	1.11	1.11
			5-hydroxy saxagliptin	ND	ND
Digoxin	0.25 mg q6h first day followed by q12h second day followed by QD for 5 days	10 mg QD for 7 days	saxagliptin	1.05	0.99
			5-hydroxy saxagliptin	1.06	1.02

Coadministered Drug	Dosage of Coadministered Drug*	Dosage of Saxagliptin*	Geometric Mean Ratio (ratio with/without coadministered drug) No Effect = 1.00		
				AUC [†]	C _{max}
Simvastatin	40 mg QD for 8 days	10 mg QD for 4 days	saxagliptin	1.12	1.21
			5-hydroxy saxagliptin	1.02	1.08
Diltiazem	360 mg LA QD for 9 days	10 mg	saxagliptin	2.09	1.63
			5-hydroxy saxagliptin	0.66	0.57
Rifampin [§]	600 mg QD for 6 days	5 mg	saxagliptin	0.24	0.47
			5-hydroxy saxagliptin	1.03	1.39
Omeprazole	40 mg QD for 5 days	10 mg	saxagliptin	1.13	0.98
			5-hydroxy saxagliptin	ND	ND
Aluminum hydroxide + magnesium hydroxide + simethicone	aluminum hydroxide: 2400 mg magnesium hydroxide: 2400 mg simethicone: 240 mg	10 mg	saxagliptin	0.97	0.74
			5-hydroxy saxagliptin	ND	ND
Famotidine	40 mg	10 mg	saxagliptin	1.03	1.14
			5-hydroxy saxagliptin	ND	ND
Limit KOMBIGLYZE XR dose to 2.5 mg/1000 mg once daily when coadministered with strong CYP3A4/5 inhibitors [see Drug Interactions (7.1) and Dosage and Administration (2.2)]:					
Ketoconazole	200 mg BID for 9 days	100 mg	saxagliptin	2.45	1.62
			5-hydroxy saxagliptin	0.12	0.05
Ketoconazole	200 mg BID for 7 days	20 mg	saxagliptin	3.67	2.44
			5-hydroxy saxagliptin	ND	ND

* Single dose unless otherwise noted. The 10 mg saxagliptin dose is not an approved dosage.

† AUC = AUC(INF) for drugs given as single dose and AUC = AUC(TAU) for drugs given in multiple doses.

‡ Results exclude one subject.

§ The plasma dipeptidyl peptidase-4 (DPP4) activity inhibition over a 24-hour dose interval was not affected by rifampin. ND=not determined; QD=once daily; q6h=every 6 hours; q12h=every 12 hours; BID=twice daily; LA=long acting.

Table 4: Effect of Saxagliptin on Systemic Exposures of Coadministered Drugs

Coadministered Drug	Dosage of Coadministered Drug*	Dosage of Saxagliptin*	Geometric Mean Ratio (ratio with/without saxagliptin) No Effect = 1.00		
				AUC [†]	C _{max}
No dosing adjustments required for the following:					
Metformin	1000 mg	100 mg	metformin	1.20	1.09
Glyburide	5 mg	10 mg	glyburide	1.06	1.16
Pioglitazone [‡]	45 mg QD for 10 days	10 mg QD	pioglitazone	1.08	1.14

Coadministered Drug	Dosage of Coadministered Drug*	Dosage of Saxagliptin*	Geometric Mean Ratio (ratio with/without saxagliptin) No Effect = 1.00		
				AUC [†]	C _{max}
		for 5 days	hydroxy-pioglitazone	ND	ND
Digoxin	0.25 mg q6h first day followed by q12h second day followed by QD for 5 days	10 mg QD for 7 days	digoxin	1.06	1.09
Simvastatin	40 mg QD for 8 days	10 mg QD for 4 days	simvastatin simvastatin acid	1.04 1.16	0.88 1.00
Diltiazem	360 mg LA QD for 9 days	10 mg	diltiazem	1.10	1.16
Ketoconazole	200 mg BID for 9 days	100 mg	ketoconazole	0.87	0.84
Ethinyl estradiol and norgestimate	ethinyl estradiol 0.035 mg and norgestimate 0.250 mg for 21 days	5 mg QD for 21 days	ethinyl estradiol norelgestromin norgestrel	1.07 1.10 1.13	0.98 1.09 1.17

* Single dose unless otherwise noted. The 10 mg saxagliptin dose is not an approved dosage.

† AUC = AUC(INF) for drugs given as single dose and AUC = AUC(TAU) for drugs given in multiple doses.

‡ Results include all subjects.

ND=not determined; QD=once daily; q6h=every 6 hours; q12h=every 12 hours; BID=twice daily; LA=long acting.

Table 5: Effect of Coadministered Drug on Plasma Metformin Systemic Exposure

Coadministered Drug	Dose of Coadministered Drug*	Dose of Metformin*	Geometric Mean Ratio (ratio with/without coadministered drug) No Effect = 1.00		
				AUC [†]	C _{max}
No dosing adjustments required for the following:					
Glyburide	5 mg	850 mg	metformin	0.91 [‡]	0.93 [‡]
Furosemide	40 mg	850 mg	metformin	1.09 [‡]	1.22 [‡]
Nifedipine	10 mg	850 mg	metformin	1.16	1.21
Propranolol	40 mg	850 mg	metformin	0.90	0.94
Ibuprofen	400 mg	850 mg	metformin	1.05 [‡]	1.07 [‡]
Drugs that are eliminated by renal tubular secretion may increase the accumulation of metformin [see Drug Interactions (7.3)].					
Cimetidine	400 mg	850 mg	metformin	1.40	1.61

* All metformin and coadministered drugs were given as single doses.

† AUC = AUC(INF)

‡ Ratio of arithmetic means

Table 6: Effect of Metformin on Coadministered Drug Systemic Exposure

Coadministered Drug	Dose of Coadministered Drug*	Dose of Metformin*	Geometric Mean Ratio (ratio with/without metformin) No Effect = 1.00		
				AUC [†]	C _{max}
No dosing adjustments required for the following:					
Glyburide	5 mg	850 mg	glyburide	0.78 [‡]	0.63 [‡]
Furosemide	40 mg	850 mg	furosemide	0.87 [‡]	0.69 [‡]
Nifedipine	10 mg	850 mg	nifedipine	1.10 [§]	1.08
Propranolol	40 mg	850 mg	propranolol	1.01 [§]	1.02
Ibuprofen	400 mg	850 mg	ibuprofen	0.97 [¶]	1.01 [¶]
Cimetidine	400 mg	850 mg	cimetidine	0.95 [§]	1.01

* All metformin and coadministered drugs were given as single doses.

† AUC = AUC(INF) unless otherwise noted.

‡ Ratio of arithmetic means, p-value of difference <0.05.

§ AUC(0-24 hr) reported.

¶ Ratio of arithmetic means.

13 NONCLINICAL TOXICOLOGY

13.1 Carcinogenesis, Mutagenesis, Impairment of Fertility

Carcinogenesis

KOMBIGLYZE XR

No animal studies have been conducted with KOMBIGLYZE XR to evaluate carcinogenesis, mutagenesis, or impairment of fertility. The following data are based on the findings in the studies with saxagliptin and metformin individually.

Saxagliptin

Saxagliptin did not induce tumors in either mice (50, 250, and 600 mg/kg) or rats (25, 75, 150, and 300 mg/kg) at the highest doses evaluated. The highest doses evaluated in mice were equivalent to approximately 870 (males) and 1165 (females) times the human exposure at the MRHD of 5 mg/day. In rats, exposures were approximately 355 (males) and 2217 (females) times the MRHD.

Metformin hydrochloride

Long-term carcinogenicity studies have been performed in rats (dosing duration of 104 weeks) and mice (dosing duration of 91 weeks) at doses up to and including 900 mg/kg/day and 1500 mg/kg/day, respectively. These doses are both approximately 4 times the maximum recommended human daily dose of 2000 mg based on body surface area comparisons. No evidence of carcinogenicity with metformin was found in either male or female mice. Similarly, there was no tumorigenic potential observed with

metformin in male rats. There was, however, an increased incidence of benign stromal uterine polyps in female rats treated with 900 mg/kg/day.

Mutagenesis

Saxagliptin

Saxagliptin was not mutagenic or clastogenic with or without metabolic activation in an *in vitro* Ames bacterial assay, an *in vitro* cytogenetics assay in primary human lymphocytes, an *in vivo* oral micronucleus assay in rats, an *in vivo* oral DNA repair study in rats, and an oral *in vivo/in vitro* cytogenetics study in rat peripheral blood lymphocytes. The active metabolite was not mutagenic in an *in vitro* Ames bacterial assay.

Metformin hydrochloride

There was no evidence of a mutagenic potential of metformin in the following *in vitro* tests: Ames test (*S. typhimurium*), gene mutation test (mouse lymphoma cells), or chromosomal aberrations test (human lymphocytes). Results in the *in vivo* mouse micronucleus test were also negative.

Impairment of Fertility

Saxagliptin

In a rat fertility study, males were treated with oral gavage doses for 2 weeks prior to mating, during mating, and up to scheduled termination (approximately 4 weeks total) and females were treated with oral gavage doses for 2 weeks prior to mating through gestation day 7. No adverse effects on fertility were observed at exposures of approximately 603 (males) and 776 (females) times the MRHD. Higher doses that elicited maternal toxicity also increased fetal resorptions (approximately 2069 and 6138 times the MRHD). Additional effects on estrous cycling, fertility, ovulation, and implantation were observed at approximately 6138 times the MRHD.

Metformin hydrochloride

Fertility of male or female rats was unaffected by metformin when administered at doses as high as 600 mg/kg/day, which is approximately 3 times the maximum recommended human daily dose based on body surface area comparisons.

13.2 Animal Toxicology and/or Pharmacology

Saxagliptin

Saxagliptin produced adverse skin changes in the extremities of cynomolgus monkeys (scabs and/or ulceration of tail, digits, scrotum, and/or nose). Skin lesions were reversible at ≥ 20 times the MRHD but in some cases were irreversible and necrotizing at higher exposures. Adverse skin changes were not observed at exposures similar to (1-3 times) the MRHD of 5 mg. Clinical correlates to skin lesions in monkeys have not been observed in human clinical trials of saxagliptin.

14 CLINICAL STUDIES

There have been no clinical efficacy or safety studies conducted with KOMBIGLYZE XR to characterize its effect on A1C reduction. Bioequivalence of KOMBIGLYZE XR with coadministered saxagliptin and metformin hydrochloride extended-release tablets has been demonstrated; however, relative bioavailability studies between KOMBIGLYZE XR and coadministered saxagliptin and metformin hydrochloride immediate-release tablets have not been conducted. The metformin hydrochloride extended-release tablets and metformin hydrochloride immediate-release tablets have a similar extent of absorption (as measured by AUC) while peak plasma levels of extended-release tablets are approximately 20% lower than those of immediate-release tablets at the same dose.

14.1 Glycemic Efficacy Trials

The coadministration of saxagliptin and metformin immediate-release tablets has been studied in adults with type 2 diabetes inadequately controlled on metformin alone and in treatment-naïve patients inadequately controlled on diet and exercise alone. In these two trials, treatment with saxagliptin dosed in the morning plus metformin immediate-release tablets at all doses produced clinically relevant and statistically significant improvements in A1C, fasting plasma glucose (FPG), and 2-hour postprandial glucose (PPG) following a standard oral glucose tolerance test (OGTT), compared to control. Reductions in A1C were seen across subgroups including gender, age, race, and baseline BMI.

In these two trials, decrease in body weight in the treatment groups given saxagliptin in combination with metformin immediate-release was similar to that in the groups given metformin immediate-release alone. Saxagliptin plus metformin immediate-release was not associated with significant changes from baseline in fasting serum lipids compared to metformin alone.

The coadministration of saxagliptin and metformin immediate-release tablets has also been evaluated in an active-controlled trial comparing add-on therapy with saxagliptin to glipizide in 858 patients inadequately controlled on metformin alone, in a placebo-controlled trial where a subgroup of 314 patients inadequately controlled on insulin plus metformin received add-on therapy with saxagliptin or placebo, and a trial comparing saxagliptin to placebo in 257 patients inadequately controlled on metformin plus a sulfonylurea.

In a 24-week, double-blind, randomized trial, patients treated with metformin immediate-release 500 mg twice daily for at least 8 weeks were randomized to continued treatment with metformin immediate-release 500 mg twice daily or to metformin extended-release either 1000 mg once daily or 1500 mg once daily. The mean change in A1C from baseline to Week 24 was 0.1% (95% confidence interval 0%, 0.3%) for the metformin immediate-release treatment arm, 0.3% (95% confidence interval 0.1%, 0.4%) for the 1000 mg metformin extended-release treatment arm, and 0.1% (95% confidence interval 0%, 0.3%) for the 1500 mg metformin extended-release treatment arm. Results of this trial suggest that patients receiving metformin immediate-release treatment may be safely switched to metformin extended-release once daily at the same total daily dose, up to 2000 mg once daily. Following a switch from metformin immediate-release to metformin extended-release, glycemic control should be closely monitored and dosage adjustments made accordingly.

Saxagliptin Morning and Evening Dosing

A 24-week monotherapy trial was conducted to assess a range of dosing regimens for saxagliptin. Treatment-naïve patients with inadequately controlled diabetes (A1C $\geq 7\%$ to $\leq 10\%$) underwent a 2-week, single-blind diet, exercise, and placebo lead-in period. A total of 365 patients were randomized to 2.5 mg every morning, 5 mg every morning, 2.5 mg with possible titration to 5 mg every morning, or 5 mg every evening of saxagliptin, or placebo. Patients who failed to meet specific glycemic goals during the study were treated with metformin rescue therapy added on to placebo or saxagliptin; the number of patients randomized per treatment group ranged from 71 to 74.

Treatment with either saxagliptin 5 mg every morning or 5 mg every evening provided significant improvements in A1C versus placebo (mean placebo-corrected reductions of -0.4% and -0.3% , respectively).

Coadministration of Saxagliptin with Metformin Immediate-Release in Treatment-Naïve Patients

A total of 1306 treatment-naïve patients with type 2 diabetes mellitus participated in this 24-week, randomized, double-blind, active-controlled trial to evaluate the efficacy and safety of saxagliptin coadministered with metformin immediate-release in patients with inadequate glycemic control (A1C $\geq 8\%$ to $\leq 12\%$) on diet and exercise alone. Patients were required to be treatment-naïve to be enrolled in this study.

Patients who met eligibility criteria were enrolled in a single-blind, 1-week, dietary and exercise placebo lead-in period. Patients were randomized to one of four treatment arms: saxagliptin 5 mg + metformin immediate-release 500 mg, saxagliptin 10 mg + metformin immediate-release 500 mg, saxagliptin 10 mg + placebo, or metformin immediate-release 500 mg + placebo (the maximum recommended approved saxagliptin dose is 5 mg daily; the 10 mg daily dose of saxagliptin does not provide greater efficacy than the 5 mg daily dose and the 10 mg saxagliptin dosage is not an approved dosage). Saxagliptin was dosed once daily. In the 3 treatment groups using metformin immediate-release, the metformin dose was up-titrated weekly in 500 mg per day increments, as tolerated, to a maximum of 2000 mg per day based on FPG. Patients who failed to meet specific glycemic goals during this study were treated with pioglitazone rescue as add-on therapy.

Coadministration of saxagliptin 5 mg plus metformin immediate-release provided significant improvements in A1C, FPG, and PPG compared with placebo plus metformin immediate-release (Table 7).

Table 7: Glycemic Parameters at Week 24 in a Placebo-Controlled Trial of Saxagliptin Coadministration with Metformin Immediate-Release in Treatment-Naïve Patients*

Efficacy Parameter	Saxagliptin 5 mg + Metformin N=320	Placebo + Metformin N=328
Hemoglobin A1C (%)	N=306	N=313

Efficacy Parameter	Saxagliptin 5 mg + Metformin N=320	Placebo + Metformin N=328
Baseline (mean)	9.4	9.4
Change from baseline (adjusted mean [†])	-2.5	-2.0
Difference from placebo + metformin (adjusted mean [†])	-0.5 [‡]	
95% Confidence Interval	(-0.7, -0.4)	
Percent of patients achieving A1C <7%	60% [§] (185/307)	41% (129/314)
Fasting Plasma Glucose (mg/dL)	N=315	N=320
Baseline (mean)	199	199
Change from baseline (adjusted mean [†])	-60	-47
Difference from placebo + metformin (adjusted mean [†])	-13 [§]	
95% Confidence Interval	(-19, -6)	
2-hour Postprandial Glucose (mg/dL)	N=146	N=141
Baseline (mean)	340	355
Change from baseline (adjusted mean [†])	-138	-97
Difference from placebo + metformin (adjusted mean [†])	-41 [§]	
95% Confidence Interval	(-57, -25)	

* Intent-to-treat population using last observation on study or last observation prior to pioglitazone rescue therapy for patients needing rescue.

[†] Least squares mean adjusted for baseline value.

[‡] p-value <0.0001 compared to placebo + metformin

[§] p-value <0.05 compared to placebo + metformin

Addition of Saxagliptin to Metformin Immediate-Release

A total of 743 patients with type 2 diabetes participated in this 24-week, randomized, double-blind, placebo-controlled trial to evaluate the efficacy and safety of saxagliptin in combination with metformin immediate-release in patients with inadequate glycemic control (A1C \geq 7% and \leq 10%) on metformin alone. To qualify for enrollment, patients were required to be on a stable dose of metformin (1500-2550 mg daily) for at least 8 weeks.

Patients who met eligibility criteria were enrolled in a single-blind, 2-week, dietary and exercise placebo lead-in period during which patients received metformin immediate-release at their pre-study dose, up to 2500 mg daily, for the duration of the study. Following the lead-in period, eligible patients were randomized to 2.5 mg, 5 mg, or 10 mg of saxagliptin or placebo in addition to their current dose of open-label metformin immediate-release (the maximum recommended approved saxagliptin dose is 5 mg daily; the 10 mg daily dose of saxagliptin does not provide greater efficacy than the 5 mg daily dose and the 10 mg dosage is not an approved dosage). Patients who failed to meet specific glycemic goals during the study were treated with pioglitazone rescue therapy, added on to existing study medications. Dose titrations of saxagliptin and metformin immediate-release were not permitted.

Saxagliptin 2.5 mg and 5 mg add-on to metformin immediate-release provided significant improvements in A1C, FPG, and PPG compared with placebo add-on to metformin immediate-release (Table 8). Mean changes from baseline for A1C over time and at endpoint are shown in Figure 1. The proportion of patients who discontinued for lack of glycemic control or who were rescued for meeting prespecified glycemic criteria was 15% in the saxagliptin 2.5 mg add-on to metformin immediate-release group, 13% in the saxagliptin 5 mg add-on to metformin immediate-release group, and 27% in the placebo add-on to metformin immediate-release group.

Table 8: Glycemic Parameters at Week 24 in a Placebo-Controlled Study of Saxagliptin as Add-On Combination Therapy with Metformin Immediate-Release*

Efficacy Parameter	Saxagliptin 2.5 mg + Metformin N=192	Saxagliptin 5 mg + Metformin N=191	Placebo + Metformin N=179
Hemoglobin A1C (%)	N=186	N=186	N=175
Baseline (mean)	8.1	8.1	8.1
Change from baseline (adjusted mean [†])	-0.6	-0.7	+0.1
Difference from placebo (adjusted mean [†])	-0.7 [‡]	-0.8 [‡]	
95% Confidence Interval	(-0.9, -0.5)	(-1.0, -0.6)	
Percent of patients achieving A1C <7%	37% [§] (69/186)	44% [§] (81/186)	17% (29/175)
Fasting Plasma Glucose (mg/dL)	N=188	N=187	N=176
Baseline (mean)	174	179	175
Change from baseline (adjusted mean [†])	-14	-22	+1
Difference from placebo (adjusted mean [†])	-16 [§]	-23 [§]	
95% Confidence Interval	(-23, -9)	(-30, -16)	
2-hour Postprandial Glucose (mg/dL)	N=155	N=155	N=135
Baseline (mean)	294	296	295
Change from baseline (adjusted mean [†])	-62	-58	-18
Difference from placebo (adjusted mean [†])	-44 [§]	-40 [§]	
95% Confidence Interval	(-60, -27)	(-56, -24)	

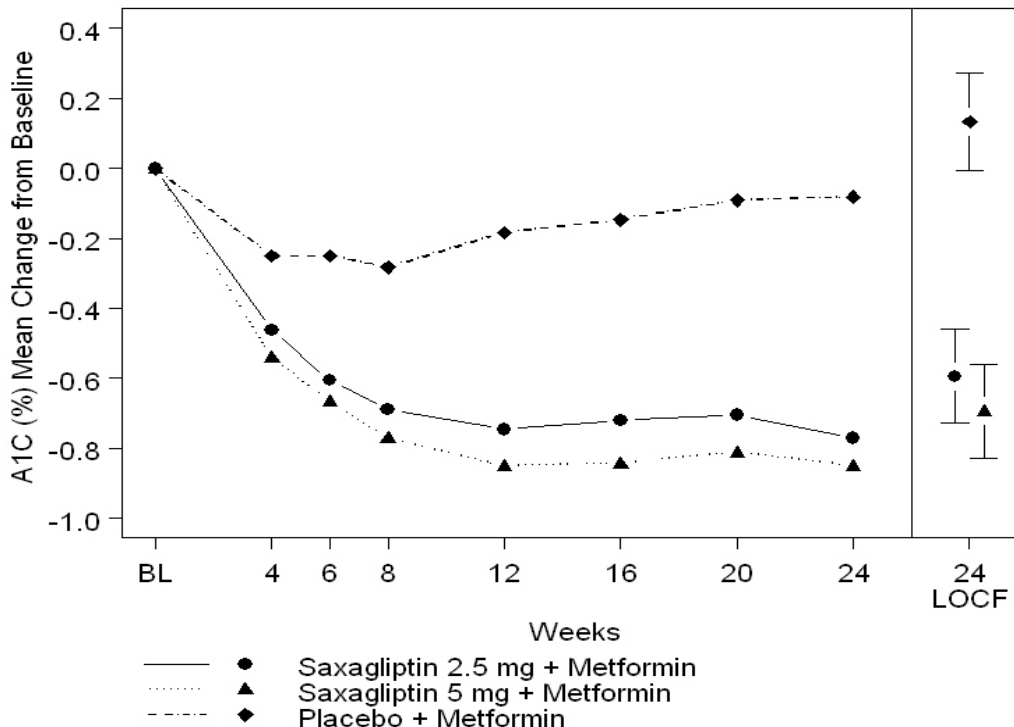
* Intent-to-treat population using last observation on study or last observation prior to pioglitazone rescue therapy for patients needing rescue.

[†] Least squares mean adjusted for baseline value.

[‡] p-value <0.0001 compared to placebo + metformin.

[§] p-value <0.05 compared to placebo + metformin.

Figure 1: Mean Change from Baseline in A1C in a Placebo-Controlled Trial of Saxagliptin as Add-On Combination Therapy with Metformin Immediate-Release*



* Includes patients with a baseline and week 24 value.
 Week 24 (LOCF) includes intent-to-treat population using last observation on study prior to pioglitazone rescue therapy for patients needing rescue. Mean change from baseline is adjusted for baseline value.

Saxagliptin Add-On Combination Therapy with Metformin Immediate-Release versus Glipizide Add-On Combination Therapy with Metformin Immediate-Release

In this 52-week, active-controlled trial, a total of 858 patients with type 2 diabetes and inadequate glycemic control (A1C >6.5% and ≤10%) on metformin immediate-release alone were randomized to double-blind add-on therapy with saxagliptin or glipizide. Patients were required to be on a stable dose of metformin immediate-release (at least 1500 mg daily) for at least 8 weeks prior to enrollment.

Patients who met eligibility criteria were enrolled in a single-blind, 2-week, dietary and exercise placebo lead-in period during which patients received metformin immediate-release (1500-3000 mg based on their prestudy dose). Following the lead-in period, eligible patients were randomized to 5 mg of saxagliptin or 5 mg of glipizide in addition to their current dose of open-label metformin immediate-release. Patients in the glipizide plus metformin immediate-release group underwent blinded titration of the glipizide dose during the first 18 weeks of the trial up to a maximum glipizide dose of 20 mg per day. Titration was based on a goal FPG ≤110 mg/dL or the highest tolerable glipizide dose. Fifty percent (50%) of the glipizide-treated patients were titrated to the 20-mg daily dose; 21% of the glipizide-treated patients had a final daily glipizide dose of 5 mg or less. The mean final daily dose of glipizide was 15 mg.

After 52 weeks of treatment, saxagliptin and glipizide resulted in similar mean reductions from baseline in A1C when added to metformin immediate-release therapy (Table 9). This conclusion may be limited to patients with baseline A1C comparable to those in the trial (91% of patients had baseline A1C <9%).

From a baseline mean body weight of 89 kg, there was a statistically significant mean reduction of 1.1 kg in patients treated with saxagliptin compared to a mean weight gain of 1.1 kg in patients treated with glipizide (p<0.0001).

Table 9: Glycemic Parameters at Week 52 in an Active-Controlled Trial of Saxagliptin versus Glipizide in Combination with Metformin Immediate-Release*

Efficacy Parameter	Saxagliptin 5 mg + Metformin N=428	Titrated Glipizide + Metformin N=430
Hemoglobin A1C (%)	N=423	N=423
Baseline (mean)	7.7	7.6
Change from baseline (adjusted mean [†])	-0.6	-0.7
Difference from glipizide + metformin (adjusted mean [†])	0.1	
95% Confidence Interval	(-0.02, 0.2) [‡]	
Fasting Plasma Glucose (mg/dL)	N=420	N=420
Baseline (mean)	162	161
Change from baseline (adjusted mean [†])	-9	-16
Difference from glipizide + metformin (adjusted mean [†])	6	
95% Confidence Interval	(2, 11) [§]	

* Intent-to-treat population using last observation on study.

† Least squares mean adjusted for baseline value.

‡ Saxagliptin + metformin is considered non-inferior to glipizide + metformin because the upper limit of this confidence interval is less than the prespecified non-inferiority margin of 0.35%.

§ Significance not tested.

Saxagliptin Add-On Combination Therapy with Insulin (with or without Metformin Immediate-Release)

A total of 455 patients with type 2 diabetes participated in this 24-week, randomized, double-blind, placebo-controlled trial to evaluate the efficacy and safety of saxagliptin in combination with insulin in patients with inadequate glycemic control (A1C ≥7.5% and ≤11%) on insulin alone (N=141) or on insulin in combination with a stable dose of metformin immediate-release (N=314). Patients were required to be on a stable dose of insulin (≥30 units to ≤150 units daily) with ≤20% variation in total daily dose for ≥8 weeks prior to screening. Patients entered the trial on intermediate- or long-acting (basal) insulin or premixed insulin. Patients using short-acting insulins were excluded unless the short-acting insulin was administered as part of a premixed insulin.

Patients who met eligibility criteria were enrolled in a single-blind, four-week, dietary and exercise placebo lead-in period during which patients received insulin (and metformin immediate-release if

applicable) at their pretrial dose(s). Following the lead-in period, eligible patients were randomized to add-on therapy with either saxagliptin 5 mg or placebo. Doses of the antidiabetic therapies were to remain stable but patients were rescued and allowed to adjust the insulin regimen if specific glycemic goals were not met or if the investigator learned that the patient had self-increased the insulin dose by >20%. Data after rescue were excluded from the primary efficacy analyses.

Add-on therapy with saxagliptin 5 mg provided significant improvements from baseline to Week 24 in A1C and PPG compared with add-on placebo (Table 10). Similar mean reductions in A1C versus placebo were observed for patients using saxagliptin 5 mg add-on to insulin alone and saxagliptin 5 mg add-on to insulin in combination with metformin immediate-release (−0.4% and −0.4%, respectively). The percentage of patients who discontinued for lack of glycemic control or who were rescued was 23% in the saxagliptin group and 32% in the placebo group.

The mean daily insulin dose at baseline was 53 units in patients treated with saxagliptin 5 mg and 55 units in patients treated with placebo. The mean change from baseline in daily dose of insulin was 2 units for the saxagliptin 5 mg group and 5 units for the placebo group.

Table 10: Glycemic Parameters at Week 24 in a Placebo-Controlled Trial of Saxagliptin as Add-On Combination Therapy with Insulin*

Efficacy Parameter	Saxagliptin 5 mg + Insulin (+/- Metformin) N=304	Placebo + Insulin (+/- Metformin) N=151
Hemoglobin A1C (%)	N=300	N=149
Baseline (mean)	8.7	8.7
Change from baseline (adjusted mean [†])	−0.7	−0.3
Difference from placebo (adjusted mean [†])	−0.4 [‡]	
95% Confidence Interval	(−0.6, −0.2)	
2-hour Postprandial Glucose (mg/dL)	N=262	N=129
Baseline (mean)	251	255
Change from baseline (adjusted mean [†])	−27	−4
Difference from placebo (adjusted mean [†])	−23 [§]	
95% Confidence Interval	(−37, −9)	

* Intent-to-treat population using last observation on study or last observation prior to insulin rescue therapy for patients needing rescue.

† Least squares mean adjusted for baseline value and metformin use at baseline.

‡ p-value <0.0001 compared to placebo + insulin.

§ p-value <0.05 compared to placebo + insulin.

The change in fasting plasma glucose from baseline to Week 24 was also tested, but was not statistically significant. The percent of patients achieving an A1C <7% was 17% (52/300) with saxagliptin in combination with insulin compared to 7% (10/149) with placebo. Significance was not tested.

Saxagliptin Add-On Combination Therapy with Metformin plus Sulfonylurea

A total of 257 subjects with type 2 diabetes participated in this 24-week, randomized, double-blind, placebo-controlled trial to evaluate the efficacy and safety of saxagliptin in combination with metformin plus a sulfonylurea in patients with inadequate glycemic control (A1C $\geq 7\%$ and $\leq 10\%$). Patients were to be on a stable combined dose of metformin extended-release or immediate-release (at maximum tolerated dose, with minimum dose for enrollment being 1500 mg) and a sulfonylurea (at maximum tolerated dose, with minimum dose for enrollment being $\geq 50\%$ of the maximum recommended dose) for ≥ 8 weeks prior to enrollment.

Patients who met eligibility criteria were entered in a 2-week enrollment period to allow assessment of inclusion/exclusion criteria. Following the 2-week enrollment period, eligible patients were randomized to either double-blind saxagliptin (5 mg once daily) or double-blind matching placebo for 24 weeks. During the 24-week double-blind treatment period, patients were to receive metformin and a sulfonylurea at the same constant dose ascertained during enrollment. Sulfonylurea dose could be down titrated once in the case of a major hypoglycemic event or recurring minor hypoglycemic events. In the absence of hypoglycemia, titration (up or down) of study medication during the treatment period was prohibited.

Saxagliptin in combination with metformin plus a sulfonylurea provided significant improvements in A1C and PPG compared with placebo in combination with metformin plus a sulfonylurea (Table 11). The percentage of patients who discontinued for lack of glycemic control was 6% in the saxagliptin group and 5% in the placebo group.

Table 11: Glycemic Parameters at Week 24 in a Placebo-Controlled Trial of Saxagliptin as Add-On Combination Therapy with Metformin plus Sulfonylurea*

Efficacy Parameter	Saxagliptin 5 mg + Metformin plus Sulfonylurea N=129	Placebo + Metformin plus Sulfonylurea N=128
Hemoglobin A1C (%)	N=127	N=127
Baseline (mean)	8.4	8.2
Change from baseline (adjusted mean [†])	-0.7	-0.1
Difference from placebo (adjusted mean [†])	-0.7 [‡]	
95% Confidence Interval	(-0.9, -0.5)	
2-hour Postprandial Glucose (mg/dL)	N=115	N=113
Baseline (mean)	268	262
Change from baseline (adjusted mean [†])	-12	5
Difference from placebo (adjusted mean [†])	-17 [§]	
95% Confidence Interval	(-32, -2)	

* Intent-to-treat population using last observation prior to discontinuation.

† Least squares mean adjusted for baseline value.

‡ p-value <0.0001 compared to placebo + metformin plus sulfonylurea

§ p-value <0.05 compared to placebo + metformin plus sulfonylurea.

The change in fasting plasma glucose from baseline to Week 24 was also tested, but was not statistically significant. The percent of patients achieving an A1C <7% was 31% (39/127) with saxagliptin in combination with metformin plus a sulfonylurea compared to 9% (12/127) with placebo. Significance was not tested.

14.2 Cardiovascular Safety Trial

The cardiovascular risk of saxagliptin was evaluated in SAVOR, a multicenter, multinational, randomized, double-blind study comparing saxagliptin (N=8280) to placebo (N=8212), both administered in combination with standard of care, in adult patients with type 2 diabetes at high risk for atherosclerotic cardiovascular disease. Of the randomized study subjects, 97.5% completed the trial, and the median duration of follow-up was approximately 2 years. The trial was event-driven, and patients were followed until a sufficient number of events were accrued.

Subjects were at least 40 years of age, had A1C \geq 6.5%, and multiple risk factors (21% of randomized subjects) for cardiovascular disease (age \geq 55 years for men and \geq 60 years for women plus at least one additional risk factor of dyslipidemia, hypertension, or current cigarette smoking) or established (79% of the randomized subjects) cardiovascular disease defined as a history of ischemic heart disease, peripheral vascular disease, or ischemic stroke. The majority of subjects were male (67%) and Caucasian (75%) with a mean age of 65 years. Approximately 16% of the population had moderate (estimated glomerular filtration rate [eGFR] \geq 30 to \leq 50 mL/min) to severe (eGFR <30 mL/min) renal impairment, and 13% had a prior history of heart failure. Subjects had a median duration of type 2 diabetes mellitus of approximately 10 years, and a mean baseline A1C level of 8.0%. Approximately 5% of subjects were treated with diet and exercise only at baseline. Overall, the use of diabetes medications was balanced across treatment groups (metformin 69%, insulin 41%, sulfonylureas 40%, and TZDs 6%). The use of cardiovascular disease medications was also balanced (ACE inhibitors or ARBs 79%, statins 78%, aspirin 75%, beta-blockers 62%, and non-aspirin antiplatelet medications 24%).

The primary analysis in SAVOR was time to first occurrence of a Major Adverse Cardiac Event (MACE). A major adverse cardiac event in SAVOR was defined as a cardiovascular death, or a nonfatal myocardial infarction (MI) or a nonfatal ischemic stroke. The study was designed as a non-inferiority trial with a pre-specified risk margin of 1.3 for the hazard ratio of MACE, and was also powered for a superiority comparison if non-inferiority was demonstrated.

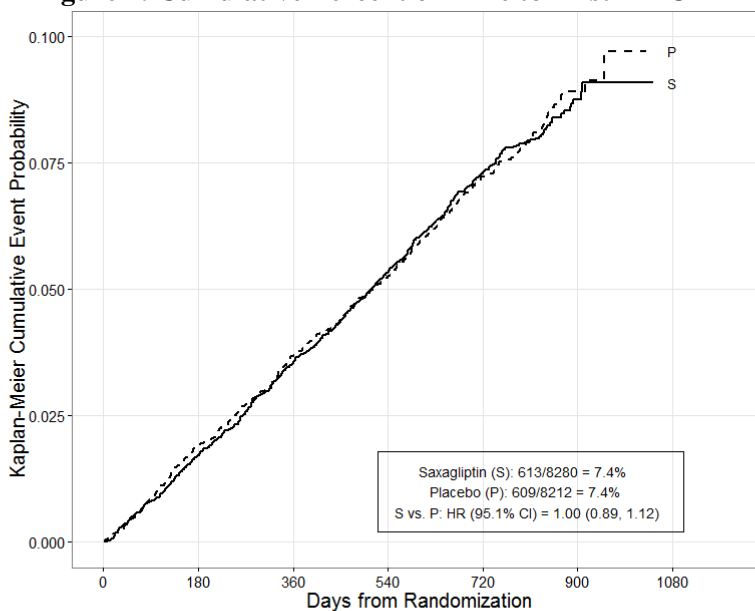
The results of SAVOR, including the contribution of each component to the primary composite endpoint are shown in Table 12. The incidence rate of MACE was similar in both treatment arms: 3.8 MACE per 100 patient-years on placebo vs. 3.8 MACE per 100 patient-years on saxagliptin. The estimated hazard ratio of MACE associated with saxagliptin relative to placebo was 1.00 with a 95.1% confidence interval of (0.89, 1.12). The upper bound of this confidence interval, 1.12, excluded a risk margin larger than 1.3.

Table 12: Major Adverse Cardiovascular Events (MACE) by Treatment Group in the SAVOR Trial

	Saxagliptin		Placebo		Hazard Ratio (95.1% CI)
	Number of Subjects (%)	Rate per 100 PY	Number of Subjects (%)	Rate per 100 PY	
Composite of first event of CV death, non-fatal MI or non-fatal ischemic stroke (MACE)	N=8280	Total PY = 16308.8	N=8212	Total PY = 16156.0	
	613 (7.4)	3.8	609 (7.4)	3.8	1.00 (0.89, 1.12)
CV death	245 (3.0)	1.5	234 (2.8)	1.4	
Non-fatal MI	233 (2.8)	1.4	260 (3.2)	1.6	
Non-fatal ischemic stroke	135 (1.6)	0.8	115 (1.4)	0.7	

The Kaplan-Meier-based cumulative event probability is presented in Figure 2 for time to first occurrence of the primary MACE composite endpoint by treatment arm. The curves for both saxagliptin and placebo arms are close together throughout the duration of the trial. The estimated cumulative event probability is approximately linear for both arms, indicating that the incidence of MACE for both arms was constant over the trial duration.

Figure 2: Cumulative Percent of Time to First MACE



	0	180	360	540	720	900	1080
P	8212	7983	7761	7267	4855	851	0
S	8280	8071	7836	7313	4920	847	0

Vital status was obtained for 99% of subjects in the trial. There were 798 deaths in the SAVOR trial. Numerically more patients (5.1%) died in the saxagliptin group than in the placebo group (4.6%). The risk of deaths from all cause (Table 13) was not statistically different between the treatment groups (HR: 1.11; 95.1% CI: 0.96, 1.27).

Table 13: All-Cause Mortality by Treatment Group in the SAVOR Study

	Saxagliptin		Placebo		Hazard Ratio (95.1% CI)
	Number of Subjects (%)	Rate per 100 PY	Number of Subjects (%)	Rate per 100 PY	
	N=8280	PY=16645.3	N=8212	PY=16531.5	
All-cause mortality	420 (5.1)	2.5	378 (4.6)	2.3	1.11 (0.96, 1.27)
CV death	269 (3.2)	1.6	260 (3.2)	1.6	
Non-CV death	151 (1.8)	0.9	118 (1.4)	0.7	

16 HOW SUPPLIED/STORAGE AND HANDLING

How Supplied

KOMBIGLYZE[®] XR (saxagliptin and metformin HCl extended-release) tablets have markings on both sides and are available in the strengths and packages listed in Table 14.

Table 14: KOMBIGLYZE XR Tablet Presentations

Tablet Strength (saxagliptin and metformin HCl extended-release)	Film-Coated Tablet Color/Shape	Tablet Markings	Package Size	NDC Code
5 mg/500 mg	light brown to brown, biconvex, capsule-shaped	“5/500” on one side and “4221” on the reverse, in blue ink	Bottles of 30	0310-6135-30
5 mg/1000 mg	pink, biconvex, capsule-shaped	“5/1000” on one side and “4223” on the reverse, in blue ink	Bottles of 30	0310-6145-30
2.5 mg/1000 mg	pale yellow to light yellow, biconvex, capsule-shaped	“2.5/1000” on one side and “4222” on the reverse, in blue ink	Bottles of 60	0310-6125-60

Storage and Handling

Store at 20°C to 25°C (68°F to 77°F); excursions permitted between 15°C and 30°C (59°F and 86°F) [see USP Controlled Room Temperature].

17 PATIENT COUNSELING INFORMATION

Advise the patient to read FDA-approved patient labeling (Medication Guide).

Medication Guide

Healthcare providers should instruct their patients to read the Medication Guide before starting KOMBIGLYZE XR therapy and to reread it each time the prescription is renewed. Patients should be instructed to inform their healthcare provider if they develop any unusual symptom or if any existing symptom persists or worsens.

Patients should be informed of the potential risks and benefits of KOMBIGLYZE XR and of alternative modes of therapy. Patients should also be informed about the importance of adherence to dietary instructions, regular physical activity, periodic blood glucose monitoring and A1C testing, recognition and management of hypoglycemia and hyperglycemia, and assessment of diabetes complications. During periods of stress such as fever, trauma, infection, or surgery, medication requirements may change and patients should be advised to seek medical advice promptly.

Lactic Acidosis

The risks of lactic acidosis due to the metformin component, its symptoms and conditions that predispose to its development, as noted in *Warnings and Precautions (5.1)*, should be explained to patients. Patients should be advised to discontinue KOMBIGLYZE XR immediately and to promptly notify their healthcare provider if unexplained hyperventilation, myalgia, malaise, unusual somnolence, dizziness, slow or irregular heartbeat, sensation of feeling cold (especially in the extremities), or other nonspecific symptoms occur. Gastrointestinal symptoms are common during initiation of metformin treatment and may occur during initiation of KOMBIGLYZE XR therapy; however, patients should consult their physician if they develop unexplained symptoms. Although gastrointestinal symptoms that occur after stabilization are unlikely to be drug related, such an occurrence of symptoms should be evaluated to determine if it may be due to lactic acidosis or other serious disease.

Patients should be counseled against excessive alcohol intake while receiving KOMBIGLYZE XR.

Patients should be informed about the importance of regular testing of renal function and hematological parameters when receiving treatment with KOMBIGLYZE XR.

Instruct patients to inform their doctor that they are taking KOMBIGLYZE XR prior to any surgical or radiological procedure, as temporary discontinuation of KOMBIGLYZE XR may be required until renal function has been confirmed to be normal [see *Warnings and Precautions (5.1)*].

Pancreatitis

Patients should be informed that acute pancreatitis has been reported during post-marketing use of saxagliptin. Before initiating KOMBIGLYZE XR, patients should be questioned about other risk factors for pancreatitis, such as a history of pancreatitis, alcoholism, gallstones, or hypertriglyceridemia. Patients should also be informed that persistent severe abdominal pain, sometimes radiating to the back, which may or may not be accompanied by vomiting, is the hallmark symptom of acute pancreatitis. Patients should be instructed to promptly discontinue KOMBIGLYZE XR and contact their healthcare provider if persistent severe abdominal pain occurs [see *Warnings and Precautions (5.2)*].

Heart Failure

Patients should be informed of the signs and symptoms of heart failure. Before initiating KOMBIGLYZE XR, patients should be asked about a history of heart failure or other risk factors for heart failure including moderate to severe renal impairment. Patients should be instructed to contact their healthcare provider as soon as possible if they experience symptoms of heart failure, including increasing shortness of breath, rapid increase in weight or swelling of the feet [see *Warnings and Precautions (5.3)*].

Hypoglycemia

Patients should be informed that the incidence of hypoglycemia may be increased when KOMBIGLYZE XR is added to an insulin secretagogue (e.g., sulfonylurea) or insulin.

Hypersensitivity Reactions

Patients should be informed that serious allergic (hypersensitivity) reactions, such as angioedema, anaphylaxis, and exfoliative skin conditions, have been reported during post-marketing use of saxagliptin. If symptoms of these allergic reactions (such as rash, skin flaking or peeling, urticaria, swelling of the skin, or swelling of the face, lips, tongue, and throat that may cause difficulty in breathing or swallowing) occur, patients must stop taking KOMBIGLYZE XR and seek medical advice promptly.

Severe and Disabling Arthralgia

Inform patients that severe and disabling joint pain may occur with this class of drugs. The time to onset of symptoms can range from one day to years. Instruct patients to seek medical advice if severe joint pain occurs [see *Warnings and Precautions (5.8)*].

Bullous Pemphigoid

Inform patients that bullous pemphigoid may occur with this class of drugs. Instruct patients to seek medical advice if blisters or erosions occur [see *Warnings and Precautions (5.9)*].

Administration Instructions

Patients should be informed that KOMBIGLYZE XR must be swallowed whole and not crushed or chewed, and that the inactive ingredients may occasionally be eliminated in the feces as a soft mass that may resemble the original tablet.

Missed Dose

Patients should be informed that if they miss a dose of KOMBIGLYZE XR, they should take the next dose as prescribed, unless otherwise instructed by their healthcare provider. Patients should be instructed not to take an extra dose the next day.

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Distributed by:
AstraZeneca Pharmaceuticals LP
Wilmington, DE 19850

MEDICATION GUIDE
KOMBIGLYZE® XR (kom-be-glyze X-R)
(saxagliptin and metformin HCl extended-release)
tablets

Read this Medication Guide carefully before you start taking KOMBIGLYZE XR and each time you get a refill. There may be new information. This information does not take the place of talking with your healthcare provider about your medical condition or treatment. If you have any questions about KOMBIGLYZE XR, ask your healthcare provider.

What is the most important information I should know about KOMBIGLYZE XR?

Serious side effects can happen in people taking KOMBIGLYZE XR, including:

- 1. Lactic acidosis. Metformin, one of the medicines in KOMBIGLYZE XR, can cause a rare but serious condition called lactic acidosis (a build-up of an acid in the blood) that can cause death. Lactic acidosis is a medical emergency and must be treated in the hospital.**

Call your doctor right away if you have any of the following symptoms, which could be signs of lactic acidosis:

- you feel cold in your hands or feet
- you feel dizzy or lightheaded
- you have a slow or irregular heartbeat
- you feel very weak or tired
- you have unusual (not normal) muscle pain
- you have trouble breathing
- you feel sleepy or drowsy
- you have stomach pains, nausea or vomiting

Most people who have had lactic acidosis with metformin have other things that, combined with the metformin, led to the lactic acidosis. Tell your doctor if you have any of the following, because you have a higher chance for getting lactic acidosis with KOMBIGLYZE XR if you:

- have severe kidney problems or your kidneys are affected by certain x-ray tests that use injectable dye
- have liver problems
- drink alcohol very often, or drink a lot of alcohol in short-term "binge" drinking
- get dehydrated (lose a large amount of body fluids). This can happen if you are sick with a fever, vomiting, or diarrhea. Dehydration can also happen when you sweat a lot with activity or exercise and do not drink enough fluids
- have surgery
- have a heart attack, severe infection, or stroke

The best way to keep from having a problem with lactic acidosis from metformin is to tell your doctor if you have any of the problems in the list above. Your doctor may decide to stop your KOMBIGLYZE XR for a while if you have any of these things.

KOMBIGLYZE XR can have other serious side effects. See "What are the possible side effects of KOMBIGLYZE XR?"

2. Inflammation of the pancreas (pancreatitis) which may be severe and lead to death

Certain medical problems make you more likely to get pancreatitis.

Before you start taking KOMBIGLYZE XR:

Tell your healthcare provider if you have ever had:

- inflammation of your pancreas (pancreatitis)
- a history of alcoholism
- stones in your gallbladder (gallstones)
- high blood triglyceride levels

It is not known if having these medical problems will make you more likely to get pancreatitis with KOMBIGLYZE XR.

Stop taking KOMBIGLYZE XR and contact your healthcare provider right away if you have pain in your stomach area (abdomen) that is severe and will not go away. The pain may be felt going from your abdomen through to your back. The pain may happen with or without vomiting. These may be

<p>symptoms of pancreatitis.</p> <p>3. Heart failure</p> <p>Before you start taking KOMBIGLYZE XR: Tell your healthcare provider if you</p> <ul style="list-style-type: none">• have ever had heart failure or have problems with your kidneys. <p>Contact your healthcare provider right away if you have any of the following symptoms:</p> <ul style="list-style-type: none">• increasing shortness of breath or trouble breathing, especially when you lie down• an unusually fast increase in weight• swelling in the feet, ankles or legs <p>These may be symptoms of heart failure.</p>
<p>What is KOMBIGLYZE XR?</p> <ul style="list-style-type: none">• KOMBIGLYZE XR is a prescription medicine that contains saxagliptin and metformin hydrochloride. KOMBIGLYZE XR is used with diet and exercise to help control high blood sugar (hyperglycemia) in adults with type 2 diabetes.• KOMBIGLYZE XR is not for people with type 1 diabetes.• KOMBIGLYZE XR is not for people with diabetic ketoacidosis (increased ketones in your blood or urine). It is not known if KOMBIGLYZE XR is safe and effective in children younger than 18 years old.
<p>Who should not take KOMBIGLYZE XR?</p> <p>Do not take KOMBIGLYZE XR if you:</p> <ul style="list-style-type: none">• have kidney problems.• are allergic to metformin hydrochloride, saxagliptin, or any of the ingredients in KOMBIGLYZE XR. See the end of this Medication Guide for a complete list of ingredients in KOMBIGLYZE XR. Symptoms of a serious allergic reaction to KOMBIGLYZE XR may include:<ul style="list-style-type: none">• swelling of your face, lips, throat, and other areas on your skin• difficulty with swallowing or breathing• raised, red areas on your skin (hives)• skin rash, itching, flaking, or peeling <p>If you have these symptoms, stop taking KOMBIGLYZE XR and contact your healthcare provider right away.</p> <ul style="list-style-type: none">• have a condition called metabolic acidosis or diabetic ketoacidosis (increased ketones in your blood or urine).
<p>What should I tell my healthcare provider before taking KOMBIGLYZE XR?</p> <p>Before you take KOMBIGLYZE XR, tell your healthcare provider if you:</p> <ul style="list-style-type: none">• have type 1 diabetes. KOMBIGLYZE XR should not be used to treat type 1 diabetes.• have a history or risk for diabetic ketoacidosis (high levels of certain acids, known as ketones, in the blood or urine). KOMBIGLYZE XR should not be used for the treatment of diabetic ketoacidosis.• have kidney problems.• have liver problems.• have heart problems, including congestive heart failure.• are older than 80 years. If you are over 80 years old you should not take KOMBIGLYZE XR unless your kidneys have been checked and they are normal.• drink alcohol very often, or drink a lot of alcohol in short-term “binge” drinking.• are going to get an injection of dye or contrast agents for an x-ray procedure or if you are going to have surgery and will not be able to eat or drink much. In these situations, KOMBIGLYZE XR may need to be stopped for a short time. Talk to your healthcare provider about when you should stop KOMBIGLYZE XR and when you should start KOMBIGLYZE XR again. See “What is the most important information I should know about KOMBIGLYZE XR?”• have any other medical conditions.• are pregnant or plan to become pregnant. It is not known if KOMBIGLYZE XR will harm your unborn baby. If you are pregnant, talk with your healthcare provider about the best way to control your blood sugar while you are pregnant.• are breast-feeding or plan to breast-feed. It is not known if KOMBIGLYZE XR passes into your breast

milk. Talk with your healthcare provider about the best way to feed your baby while you take KOMBIGLYZE XR.

Tell your healthcare provider about all the medicines you take, including prescription and over-the-counter medicines, vitamins, and herbal supplements. Know the medicines you take. Keep a list of them to show your healthcare provider and pharmacist when you get a new medicine.

KOMBIGLYZE XR may affect the way other medicines work, and other medicines may affect how KOMBIGLYZE XR works.

Tell your healthcare provider if you will be starting or stopping certain other types of medicines, such as antibiotics, or medicines that treat fungus or HIV/AIDS, because your dose of KOMBIGLYZE XR might need to be changed.

How should I take KOMBIGLYZE XR?

- Take KOMBIGLYZE XR exactly as your healthcare provider tells you.
- KOMBIGLYZE XR should be taken with meals to help lessen an upset stomach side effect.
- Swallow KOMBIGLYZE XR whole. Do not crush, cut, or chew KOMBIGLYZE XR.
- You may sometimes pass a soft mass in your stools (bowel movement) that looks like KOMBIGLYZE XR tablets.
- When your body is under some types of stress, such as fever, trauma (such as a car accident), infection, or surgery, the amount of diabetes medicine that you need may change. Tell your healthcare provider right away if you have any of these problems.
- Your healthcare provider should do blood tests to check how well your kidneys are working before and during your treatment with KOMBIGLYZE XR.
- Your healthcare provider will check your diabetes with regular blood tests, including your blood sugar levels and your hemoglobin A1C.
- Follow your healthcare provider's instructions for treating blood sugar that is too low (hypoglycemia). Talk to your healthcare provider if low blood sugar is a problem for you. See **"What are the possible side effects of KOMBIGLYZE XR?"**
- Check your blood sugar as your healthcare provider tells you to.
- Stay on your prescribed diet and exercise program while taking KOMBIGLYZE XR.
- If you miss a dose of KOMBIGLYZE XR, take your next dose as prescribed unless your healthcare provider tells you differently. Do not take an extra dose the next day.
- If you take too much KOMBIGLYZE XR, call your healthcare provider, local Poison Control Center, or go to the nearest hospital emergency room right away.

What are the possible side effects of KOMBIGLYZE XR?

KOMBIGLYZE XR can cause serious side effects, including:

- See **"What is the most important information I should know about KOMBIGLYZE XR?"**

• **Allergic (hypersensitivity) reactions, such as:**

- swelling of your face, lips, throat, and other areas on your skin
- difficulty with swallowing or breathing
- raised, red areas on your skin (hives)
- skin rash, itching, flaking, or peeling

If you have these symptoms, stop taking KOMBIGLYZE XR and contact your healthcare provider right away.

- **Low blood sugar (hypoglycemia).** May become worse in people who also take another medication to treat diabetes, such as sulfonylureas or insulin. Tell your healthcare provider if you take other diabetes medicines. If you have symptoms of low blood sugar, you should check your blood sugar and treat if low, then call your healthcare provider. Symptoms of low blood sugar include:

- shaking
- sweating
- rapid heartbeat
- change in vision
- hunger
- headache
- change in mood

- **Joint pain.** Some people who take medicines called DPP-4 inhibitors, one of the medicines in KOMBIGLYZE XR, may develop joint pain that can be severe. Call your healthcare provider if you have severe joint pain.

- **Skin reaction.** Some people who take medicines called DPP-4 inhibitors, one of the medicines in KOMBIGLYZE XR, may develop a skin reaction called bullous pemphigoid that can require treatment in

<p>a hospital. Tell your healthcare provider right away if you develop blisters or the breakdown of the outer layer of your skin (erosion). Your healthcare provider may tell you to stop taking KOMBIGLYZE XR.</p> <p>Common side effects of KOMBIGLYZE XR include:</p> <ul style="list-style-type: none">• upper respiratory tract infection• headache• stuffy or runny nose and sore throat• diarrhea• urinary tract infection• nausea and vomiting <p>Taking KOMBIGLYZE XR with meals can help lessen the common stomach side effects of metformin. If you have unexplained stomach problems, tell your healthcare provider. Stomach problems that start later during treatment may be a sign of something more serious.</p> <p>Tell your healthcare provider if you have any side effects that bother you or that do not go away. These are not all of the possible side effects of KOMBIGLYZE XR. For more information, ask your healthcare provider or pharmacist.</p> <p>Call your doctor for medical advice about side effects. You may report side effects to the FDA at 1-800-FDA-1088.</p>
<p>How should I store KOMBIGLYZE XR?</p> <p>Store KOMBIGLYZE XR between 68°F and 77°F (20°C and 25°C).</p> <p>Keep KOMBIGLYZE XR and all medicines out of the reach of children.</p>
<p>General information about the use of KOMBIGLYZE XR</p> <p>Medicines are sometimes prescribed for purposes other than those listed in a Medication Guide. Do not use KOMBIGLYZE XR for a condition for which it was not prescribed. Do not give KOMBIGLYZE XR to other people, even if they have the same symptoms you have. It may harm them.</p> <p>This Medication Guide summarizes the most important information about KOMBIGLYZE XR. If you would like more information, talk with your healthcare provider. You can ask your pharmacist or healthcare provider for information about KOMBIGLYZE XR that is written for healthcare professionals.</p>
<p>What are the ingredients of KOMBIGLYZE XR?</p> <p>Active ingredients: saxagliptin and metformin hydrochloride.</p> <p>Inactive ingredients in each tablet: carboxymethylcellulose sodium, hypromellose 2208, and magnesium stearate.</p> <p>The 5 mg/500 mg tablet also contains: microcrystalline cellulose and hypromellose 2910.</p> <p>Tablet film coat contains: polyvinyl alcohol, polyethylene glycol 3350, titanium dioxide, talc, and iron oxides.</p>
<p>What is type 2 diabetes?</p> <p>Type 2 diabetes is a condition in which your body does not make enough insulin, and the insulin that your body produces does not work as well as it should. Your body can also make too much sugar. When this happens, sugar (glucose) builds up in the blood. This can lead to serious medical problems.</p> <p>The main goal of treating diabetes is to lower your blood sugar so that it is as close to normal as possible. High blood sugar can be lowered by diet and exercise, and by certain medicines when necessary.</p> <p>Talk to your healthcare provider about how to prevent, recognize, and take care of low blood sugar (hypoglycemia), high blood sugar (hyperglycemia), and problems you have because of your diabetes. KOMBIGLYZE XR (saxagliptin and metformin HCl extended-release) tablets.</p>
<p>KOMBIGLYZE XR is a registered trademark of the AstraZeneca group of companies. Distributed by: AstraZeneca Pharmaceuticals LP, Wilmington, DE 19850. For more information, go to www.kombiglyzexr.com or call 1-800-236-9933.</p> <p>This Medication Guide has been approved by the U.S. Food and Drug Administration.</p>

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