

# RepaNorm® Benta

## Repaglinide

### FORMS AND PRESENTATION

RepaNorm® 0.5 Benta: Tablets: Box of 30.

RepaNorm® 1 Benta: Tablets: Box of 30.

RepaNorm® 2 Benta: Tablets: Box of 30.

### COMPOSITION

RepaNorm® 0.5 Benta: Each tablet contains Repaglinide 0.5mg.

Excipients: meglumine, poloxamer, povidone, glycerol, calcium hydrogen phosphate, microcrystalline cellulose, starch, polacrillin potassium, magnesium stearate.

RepaNorm® 1 Benta: Each tablet contains Repaglinide 1mg.

Excipients: meglumine, poloxamer, povidone, glycerol, calcium hydrogen phosphate, microcrystalline cellulose, starch, polacrillin potassium, iron oxide yellow, magnesium stearate.

RepaNorm® 2 Benta: Each tablet contains Repaglinide 2mg.

Excipients: meglumine, poloxamer, povidone, glycerol, calcium hydrogen phosphate, microcrystalline cellulose, starch, polacrillin potassium, iron oxide yellow, magnesium stearate.

### PHARMACOLOGICAL PROPERTIES

#### Pharmacodynamic properties

Therapeutic class: Drugs used in diabetes.

ATC code: A10BX02.

Repaglinide is a novel short-acting oral secretagogue. Repaglinide lowers the blood glucose levels acutely by stimulating the release of insulin from the pancreas, an effect dependent upon functioning  $\beta$ -cells in the pancreatic islets.

Repaglinide closes ATP-dependent potassium channels in the  $\beta$ -cell membrane via a target protein different from other secretagogues. This depolarises the  $\beta$ -cell and leads to an opening of the calcium channels. The resulting increased calcium influx induces insulin secretion from the  $\beta$ -cell.

In type 2 diabetic patients, the insulinotropic response to a meal occurred within 30 minutes after an oral dose of Repaglinide. This resulted in a blood glucose-lowering effect throughout the meal period. The elevated insulin levels did not persist beyond the time of the meal challenge. Plasma Repaglinide levels decreased rapidly and low drug concentrations were seen in the plasma of type 2 diabetic patients 4 hours post-administration.

A dose-dependent decrease in blood glucose was demonstrated in type 2 diabetic patients when administered in doses from 0.5 to 4 mg Repaglinide.

Clinical study results have shown that Repaglinide is optimally dosed in relation to main meals (pre-prandial dosing).

Doses are usually taken within 15 minutes of the meal, but the time may vary from immediately preceding the meal to as long as 30 minutes before the meal.

One epidemiological study suggested an increased risk of acute coronary syndrome in Repaglinide treated patients as compared to sulfonylurea treated patients.

#### Pharmacokinetic properties

##### Absorption

Repaglinide is rapidly absorbed from the gastrointestinal tract, which leads to a rapid increase in the plasma concentration of the drug. The peak plasma level occurs within one hour post administration. After reaching a maximum, the plasma level decreases rapidly, and Repaglinide is eliminated within 4 - 6 hours. The plasma elimination half-life is approximately one hour.

No clinically relevant differences were seen in the pharmacokinetics of Repaglinide, when Repaglinide was administered 0, 15 or 30 minutes before a meal or in fasting state.

##### Distribution

Repaglinide pharmacokinetics are characterized by a mean absolute bioavailability of 63% (CV: 11%), low volume of distribution, 30 L (consistent with distribution into intracellular fluid), and rapid elimination from the blood.

A high inter-individual variability (60%) in Repaglinide plasma concentrations has been detected in the clinical trials. Intra-individual variability is low to moderate (35%) and as Repaglinide should be titrated against the clinical response, efficacy is not affected by inter-individual variability.

Repaglinide exposure is increased in patients with hepatic insufficiency and in the elderly type 2 diabetic patients. The AUC (SD) after 2 mg single dose exposure (4 mg in patients with hepatic insufficiency) was 31.4 ng/ml x hr (28.3) in healthy volunteers, 304.9 ng/ml x hr (228.0) in patients with hepatic insufficiency, and 117.9 ng/ml x hr (83.8) in the elderly type 2 diabetic patients.

After a 5 day treatment of Repaglinide (2 mg x 3/day) in patients with a severe impaired renal function (creatinine clearance: 20-39 ml/min), the results showed a significant 2-fold increase of the exposure (AUC) and half-life ( $t_{1/2}$ ) as compared to subjects with normal renal function.

Repaglinide is highly bound to plasma proteins in humans (greater than 98%).

##### Biotransformation

Repaglinide is almost completely metabolized, and no metabolites with clinically relevant hypoglycemic effect have been identified.

##### Elimination

Repaglinide and its metabolites are excreted primarily via the bile. A small fraction (less than 8%) of the administered dose appears in the urine, primarily as metabolites. Less than 1% of the parent drug is recovered in feces.

### INDICATIONS

RepaNorm® is indicated in patients with type 2 diabetes (Non Insulin-Dependent Diabetes Mellitus: NIDDM) whose hyperglycemia can no longer be controlled satisfactorily by diet,

weight reduction and exercise. RepaNorm® is also indicated in combination with metformin in type 2 diabetes patients who are not satisfactorily controlled on metformin alone.

Treatment should be initiated as an adjunct to diet and exercise to lower the blood glucose in relation to meals.

### CONTRAINDICATIONS

- Hypersensitivity to Repaglinide or to any of the excipients.
- Type 1 diabetes (Insulin-Dependent Diabetes Mellitus: IDDM), C-peptide negative.
- Diabetic ketoacidosis, with or without coma.
- Severe hepatic function disorder.
- Concomitant use of gemfibrozil.

### PRECAUTIONS

- Repaglinide should only be prescribed if poor blood glucose control and symptoms of diabetes persist despite adequate attempts at dieting, exercise and weight reduction.
- Repaglinide like other insulin secretagogues is capable of producing hypoglycemia.
- The blood glucose-lowering effect of oral hypoglycemic agents decreases in many patients over time. This may be due to progression of the severity of the diabetes or to diminished responsiveness to the product. This phenomenon is known as secondary failure, to distinguish it from primary failure, where the drug is ineffective in an individual patient when first given. Adjustment of dose and adherence to diet and exercise should be assessed before classifying a patient as a secondary failure.
- Repaglinide acts through a distinct binding site with a short action on the  $\beta$ -cells. The use of Repaglinide in case of secondary failure to insulin secretagogues has not been investigated in clinical trials.
- Trials investigating the combination with other insulin secretagogues and acarbose have not been performed.
- Trials of combination therapy with Neutral Protamine Hagedorn (NPH) insulin or thiazolidinediones have been performed. However, the benefit risk profile remains to be established when comparing to other combination therapies.
- Combination treatment with metformin is associated with an increased risk of hypoglycemia.

- When a patient stabilized on any oral hypoglycemic agent is exposed to stress such as fever, trauma, infection or surgery, a loss of glycaemic control may occur. At such times, it may be necessary to discontinue Repaglinide and treat with insulin on a temporary basis.

- The use of Repaglinide might be associated with an increased incidence of acute coronary syndrome (e.g. myocardial infarction).

- Repaglinide should be used with caution or be avoided in patients receiving drugs which influence Repaglinide metabolism. If concomitant use is necessary, careful monitoring of blood glucose and close clinical monitoring should be performed.

- No clinical studies have been conducted in patients with impaired hepatic function. No clinical studies have been performed in children and adolescents < 18 years of age or in patients > 75 years of age. Therefore, treatment is not recommended in these patient groups.

- Careful dose titration is recommended in debilitated or malnourished patients. The initial and maintenance dosages should be conservative.

#### Ability to drive and use machines

Patients should be advised to take precautions to avoid hypoglycemia whilst driving. This is particularly important in those who have reduced or absent awareness of the warning signs of hypoglycemia or have frequent episodes of hypoglycemia. The advisability of driving should be considered in these circumstances.

### PREGNANCY AND LACTATION

There are no studies of Repaglinide in pregnant or lactating women. Therefore the safety of Repaglinide in pregnant women cannot be assessed. Up to now Repaglinide showed not to be teratogenic in animal studies. Embryotoxicity, abnormal limb development in fetuses and new born pups, was observed in rats exposed to high doses in the last stage of pregnancy and during the lactation period. Repaglinide is detected in the milk of experimental animals. For that reason Repaglinide should be avoided during pregnancy and should not be used in lactating women.

### DRUG INTERACTIONS

A number of drugs are known to influence Repaglinide metabolism. Possible interactions should therefore be taken into account by the physician:

- In vitro data indicate that Repaglinide is metabolized predominantly by CYP2C8, but also by CYP3A4. Clinical data in healthy volunteers support CYP2C8 as being the most important enzyme involved in Repaglinide metabolism with CYP3A4 playing a minor role, but the relative contribution of CYP3A4 can be increased if CYP2C8 is inhibited. Consequently metabolism, and by that clearance of Repaglinide, may be altered by drugs which influence these cytochrome P-450 enzymes via inhibition or induction. Special care should be taken when both inhibitors of CYP2C8 and 3A4 are co-administered simultaneously with Repaglinide.

- Based on in vitro data, Repaglinide appears to be a substrate for active hepatic uptake (organic anion transporting protein OATP1B1). Drugs that inhibit OATP1B1 may likewise have the potential to increase plasma concentrations of Repaglinide, as has been shown for clopidogrel.

- The following substances may enhance and/or prolong the hypoglycemic effect of Repaglinide: Gemfibrozil, clarithromycin, itraconazole, ketokonazole, trimethoprim, ciclosporin, other anti-diabetic agents, monoamine oxidase inhibitors (MAOI), non selective beta blocking agents, angiotensin converting enzyme (ACE)-inhibitors, salicylates, NSAIDs, octreotide, alcohol, and anabolic steroids.

- Co-administration of gemfibrozil, (600 mg twice daily), an inhibitor of CYP2C8, and Repaglinide (a single dose of 0.25 mg) increased the Repaglinide AUC 8.1-fold and  $C_{max}$  2.4-fold in healthy volunteers. Half-life was prolonged from 1.3 hr to 3.7 hr, resulting in possibly enhanced and prolonged blood glucose-lowering effect of Repaglinide, and plasma Repaglinide concentration at 7 hr was increased 28.6-fold by gemfibrozil. The concomitant use of gemfibrozil and Repaglinide is contraindicated.

- Co-administration of trimethoprim (160 mg twice daily), a moderate CYP2C8 inhibitor, and Repaglinide (a single dose of 0.25 mg) increased the Repaglinide AUC,  $C_{max}$  and  $t_{1/2}$  (1.6-fold, 1.4-fold and 1.2-fold respectively) with no statistically significant effects on the

blood glucose levels. This lack of pharmacodynamic effect was observed with a sub-therapeutic dose of Repaglinide. Since the safety profile of this combination has not been established with dosages higher than 0.25 mg for Repaglinide and 320 mg for trimethoprim, the concomitant use of trimethoprim with Repaglinide should be avoided. If concomitant use is necessary, careful monitoring of blood glucose and close clinical monitoring should be performed.

- Rifampicin, a potent inducer of CYP3A4, but also CYP2C8, acts both as an inducer and inhibitor of the metabolism of Repaglinide. Seven days pre-treatment with rifampicin (600 mg), followed by co-administration of Repaglinide (a single dose of 4 mg) at day seven resulted in a 50% lower AUC (effect of a combined induction and inhibition). When Repaglinide was given 24 hours after the last rifampicin dose, an 80% reduction of the Repaglinide AUC was observed (effect of induction alone). Concomitant use of rifampicin and Repaglinide might therefore induce a need for Repaglinide dose adjustment which should be based on carefully monitored blood glucose concentrations at both initiation of rifampicin treatment (acute inhibition), following dosing (mixed inhibition and induction), withdrawal (induction alone) and up to approximately two weeks after withdrawal of rifampicin where the inductive effect of rifampicin is no longer present. It can not be excluded that other inducers, e.g. phenytoin, carbamazepine, phenobarbital, St John's Wort, may have a similar effect.

- The effect of ketoconazole, a prototype of potent and competitive inhibitors of CYP3A4, on the pharmacokinetics of Repaglinide has been studied in healthy subjects. Co-administration of 200 mg ketoconazole increased the Repaglinide (AUC and  $C_{max}$ ) by 1.2-fold with profiles of blood glucose concentrations altered by less than 8% when administered concomitantly (a single dose of 4 mg Repaglinide). Co-administration of 100 mg itraconazole, an inhibitor of CYP3A4, has also been studied in healthy volunteers, and increased the AUC by 1.4-fold. No significant effect on the glucose level in healthy volunteers was observed. In an interaction study in healthy volunteers, co-administration of 250 mg clarithromycin, a potent mechanism-based inhibitor of CYP3A4, slightly increased the Repaglinide (AUC) by 1.4-fold and  $C_{max}$  by 1.7-fold and increased the mean incremental AUC of serum insulin by 1.5-fold and the maximum concentration by 1.6-fold. The exact mechanism of this interaction is not clear.

- In a study conducted in healthy volunteers, the concomitant administration of Repaglinide (a single dose of 0.25 mg) and ciclosporin (repeated dose at 100 mg) increased Repaglinide AUC and  $C_{max}$  about 2.5-fold and 1.8-fold respectively. Since the interaction has not been established with dosages higher than 0.25 mg for Repaglinide, the concomitant use of ciclosporin with Repaglinide should be avoided. If the combination appears necessary, careful clinical and blood glucose monitoring should be performed.

-  $\beta$ -blocking agents may mask the symptoms of hypoglycemia.

- Co-administration of cimetidine, nifedipine, oestrogen, or simvastatin with Repaglinide, all CYP3A4 substrates, did not significantly alter the pharmacokinetic parameters of Repaglinide.

- Repaglinide had no clinically relevant effect on the pharmacokinetic properties of digoxin, theophylline or warfarin at steady state, when administered to healthy volunteers. Dosage adjustment of these compounds when co-administered with Repaglinide is therefore not necessary.

- The following substances may reduce the hypoglycemic effect of Repaglinide: Oral contraceptives, rifampicin, barbiturates, carbamazepine, thiazides, corticosteroids, danazol, thyroid hormones and sympathomimetics. When these medications are administered to or withdrawn from a patient receiving Repaglinide, the patient should be observed closely for changes in glycaemic control.

- When Repaglinide is used together with other drugs that are mainly secreted by the bile, like Repaglinide, any potential interaction should be considered.

#### ADVERSE EFFECTS

Based on the experience with Repaglinide and with other hypoglycemic agents the following adverse events have been seen: Frequencies are defined as: Common ( $\geq 1/100$  to  $<1/10$ ); uncommon ( $\geq 1/1,000$  to  $<1/100$ ); rare ( $\geq 1/10,000$  to  $<1/1,000$ ); very rare ( $< 1/10,000$ ); not known (cannot be estimated from the available data).

- Immune system disorders: Allergy, generalized hypersensitivity reactions (e.g. anaphylactic reaction), or immunological reactions such as vasculitis (very rare).

- Metabolism and nutrition disorders: Hypoglycemia (common); hypoglycemic coma and hypoglycemic unconsciousness (not known).

As with other hypoglycemic agents, hypoglycemic reactions have been observed after administration of Repaglinide. These reactions are mostly mild and easily handled through intake of carbohydrates. If severe, requiring third party assistance, infusion of glucose may be necessary. The occurrence of such reactions depends, as for every diabetes therapy, on individual factors, such as dietary habits, dosage, exercise and stress. Interactions with other medicinal products may increase the risk of hypoglycemia. During post marketing experience, cases of hypoglycemia have been reported in patients treated with Repaglinide in combination with metformin or thiazolidinedione.

- Gastro-intestinal disorders: Abdominal pain and diarrhea (common); vomiting and constipation (very rare); nausea (not known).

Gastro-intestinal complaints such as abdominal pain, diarrhea, nausea, vomiting and constipation have been reported in clinical trials. The rate and severity of these symptoms did not differ from that seen with other oral insulin secretagogues.

- Skin and subcutaneous tissue disorders: Hypersensitivity (not known).

- Hypersensitivity reactions of the skin may occur as erythema, itching, rashes and urticaria. There is no reason to suspect cross-allergenicity with sulphonylurea drugs due to the difference of the chemical structure.

- Eye disorders: Visual disturbances (very rare).

Changes in blood glucose levels have been known to result in transient visual disturbances, especially at the commencement of treatment. Such disturbances have only been reported in very few cases after initiation of Repaglinide treatment. No such cases have led to discontinuation of Repaglinide treatment in clinical trials.

- Cardiac disorders: Cardiovascular disease (rare).

Type 2 diabetes is associated with an increased risk for cardiovascular disease. In one

epidemiological study, a higher incidence of acute coronary syndrome was reported in the Repaglinide group. However, the causality of the relationship remains uncertain.

- Hepato-biliary disorders: Abnormal hepatic function, increased liver enzymes (very rare). In very rare cases, severe hepatic dysfunction has been reported. However, a causal relationship with Repaglinide has not been established.

Isolated cases of increase in liver enzymes have been reported during treatment with Repaglinide. Most cases were mild and transient, and very few patients discontinued treatment due to increase in liver enzymes.

#### DOSEAGE AND ADMINISTRATION

RepaNorm® is given pre-prandially and is titrated individually to optimize glycaemic control. In addition to the usual self-monitoring by the patient of blood and/or urinary glucose, the patient's blood glucose must be monitored periodically by the physician to determine the minimum effective dose for the patient. Glycosylated hemoglobin levels are also of value in monitoring the patient's response to therapy. Periodic monitoring is necessary to detect inadequate lowering of blood glucose at the recommended maximum dose level (i.e. primary failure) and to detect loss of adequate blood glucose-lowering response after an initial period of effectiveness (i.e. secondary failure).

Short-term administration of RepaNorm® may be sufficient during periods of transient loss of control in type 2 diabetic patients usually controlled well on diet.

RepaNorm® should be taken before main meals (i.e. pre-prandially).

Doses are usually taken within 15 minutes of the meal but time may vary from immediately preceding the meal to as long as 30 minutes before the meal (i.e. pre-prandially 2, 3, or 4 meals a day). Patients who skip a meal (or add an extra meal) should be instructed to skip (or add) a dose for that meal.

#### Initial dose

The dosage should be determined by the physician, according to the patient's requirements.

The recommended starting dose is 0.5 mg. One to two weeks should elapse between titration steps (as determined by blood glucose response).

If patients are transferred from another oral hypoglycemic agent the recommended starting dose is 1 mg.

#### Maintenance

The recommended maximum single dose is 4 mg taken with main meals.

The total maximum daily dose should not exceed 16 mg.

#### Renal impairment

RepaNorm® is primarily excreted via the bile and excretion is therefore not affected by renal disorders.

Eight percent of one dose of RepaNorm® is excreted through the kidneys and total plasma clearance of the product is decreased in patients with renal impairment. As insulin sensitivity is increased in diabetic patients with renal impairment, caution is advised when titrating these patients.

#### Hepatic impairment

No clinical studies have been conducted in patients > 75 years of age or in patients with hepatic insufficiency.

#### Children below 18 years of age

RepaNorm® is not recommended for use in children below age 18 due to a lack of data on safety and/or efficacy.

In debilitated or malnourished patients the initial and maintenance dosage should be conservative and careful dose titration is required to avoid hypoglycemic reactions.

#### Patients receiving other oral hypoglycemic agents (OHAs)

Patients can be transferred directly from other oral hypoglycemic agents to RepaNorm®. However, no exact dosage relationship exists between RepaNorm® and the other oral hypoglycemic agents. The recommended maximum starting dose of patients transferred to RepaNorm® is 1 mg given before main meals.

RepaNorm® can be given in combination with metformin, when the blood glucose is insufficiently controlled with metformin alone. In this case, the dosage of metformin should be maintained and RepaNorm® administered concomitantly. The starting dose of RepaNorm® is 0.5 mg, taken before main meals; titration is according to blood glucose response as for monotherapy.

#### OVERDOSAGE

Repaglinide has been given with weekly escalating doses from 4 - 20 mg four times daily in a 6 week period. No safety concerns were raised. As hypoglycemia in this study was avoided through increased caloric intake, a relative overdose may result in an exaggerated glucose-lowering effect with development of hypoglycemic symptoms (dizziness, sweating, tremor, headache etc.). Should these symptoms occur, adequate action should be taken to correct the low blood glucose (oral carbohydrates). More severe hypoglycemia with seizure, loss of consciousness or coma should be treated with IV glucose.

#### STORAGE CONDITIONS

Store below 30°C.

Keep in original pack in intact conditions.

Date of revision: November 2014.

#### This is a medicament

- A medicament is a product which affects your health, and its consumption contrary to instructions is dangerous for you.

- Follow strictly the doctor's prescription, the method of use, and the instructions of the pharmacist who sold the medicament.

- The doctor and the pharmacist are experts in medicine, its benefits and risks.

- Do not by yourself interrupt the period of treatment prescribed for you.

- Do not repeat the same prescription without consulting your doctor.

- Medicament: keep out of reach of children.

Council of Arab Health Ministers  
Union of Arab Pharmacists

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