

## **SUMMARY OF PRODUCT CHARACTERISTICS**

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

GLUFORMIN 500 mg tablets

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

One uncoated tablet contains 500 mg Metformin hydrochloride corresponding to 390 mg Metformin base.

For the full list of excipients, see section 6.1

### **3. PHARMACEUTICAL FORM**

Uncoated tablet.

White, circular, biconvex uncoated tablets.

### **4. CLINICAL PARTICULARS**

#### **4.1 Therapeutic indications**

Treatment of type 2 diabetes mellitus, particularly in overweight patients, when dietary management and exercise alone do not result in adequate glycaemic control.

In adults, Gluformin may be used as monotherapy or in combination with other oral antidiabetic agents or with insulin.

In children from 10 years of age and adolescents, Gluformin may be used as monotherapy or in combination with insulin.

A reduction of diabetic complications has been shown in overweight type 2 diabetic adult patients treated with Metformin as first-line therapy after diet failure (see section 5.1).

#### **4.2 Posology and Method of Administration**

##### **Posology**

Adults with normal renal function ( $GFR \geq 90$  mL/min)

##### **Monotherapy in type 2 diabetes mellitus and combination with other oral antidiabetic agents**

The usual starting dose is 500 mg or 850 mg Metformin hydrochloride 2 or 3 times daily given during or after meals.

After 10 to 15 days the dose should be adjusted on the basis of blood glucose measurements. A slow increase of dose may improve gastrointestinal tolerability.

The maximum recommended dose of Metformin hydrochloride is 3g daily, taken as 3 divided doses.

If transfer from another oral antidiabetic agent is intended: discontinue the other agent and initiate metformin at the dose indicated above.

##### **Combination with insulin**

Metformin and insulin may be used in combination therapy to achieve better blood glucose control.

Metformin hydrochloride is given at the usual starting dose of 500 mg or 850 mg 2 or 3 times daily, while insulin dosage is adjusted on the basis of blood glucose measurements.

##### **Elderly**

Due to the potential for decreased renal function in elderly subjects, the metformin dosage should be adjusted based on renal function. Regular assessment of renal function is necessary (see section 4.4).

## **Paediatric population**

### **Children and adolescents:**

#### **Monotherapy and combination with insulin**

Gluformin 500 mg, can be used in children from 10 years of age and adolescents.

The usual starting dose is 500 mg or 850 mg metformin hydrochloride once daily, given during or after meals

After 10 to 15 days the dose should be adjusted on the basis of blood glucose measurements. A slow increase of dose may improve gastrointestinal tolerability. The maximum recommended dose of metformin hydrochloride is 2 g daily, taken as 2 or 3 divided doses.

### **4.3 Contraindications**

- Hypersensitivity to metformin or to any of the excipients listed in section 6.1.
- Any type of acute metabolic acidosis (such as lactic acidosis, diabetic ketoacidosis).
- Diabetic pre-coma.
- Severe renal failure (GFR < 30 mL/min).
- Acute conditions with the potential to alter renal function such as: dehydration, severe infection, shock.
- Disease which may cause tissue hypoxia (especially acute disease, or worsening of chronic disease) such as: decompensated heart failure, respiratory failure, recent myocardial infarction, shock.
- Hepatic insufficiency, acute alcohol intoxication, alcoholism.

### **4.4 Special warnings and precautions for use**

#### **Lactic acidosis**

Lactic acidosis is a very rare, but serious metabolic complication, that can occur due to metformin accumulation. Reported cases of lactic acidosis in patients on Metformin have occurred primarily in diabetic patients with significant renal failure. The incidence of lactic acidosis can and should be reduced by assessing also other associated risk factors (such as poorly controlled diabetes, ketosis, prolonged fasting, excessive alcohol intake, hepatic insufficiency and any condition associated with hypoxia).

#### **Diagnosis**

Lactic acidosis is characterised by acidotic dyspnoea, abdominal pain and hypothermia, followed by coma. Diagnostic laboratory findings include decreased blood pH, plasma lactate levels above 5 mmol/l, and an increased anion gap and lactate/pyruvate ratio. If metabolic acidosis is suspected, Metformin should be discontinued and the patient should be hospitalised immediately (see section 4.9).

#### **Renal function:**

As Metformin is excreted by the kidney, serum creatinine levels should be determined before initiating treatment and regularly thereafter:

- at least annually in patients with normal renal function
- at least two to four times a year in patients with serum creatinine levels at the upper limit of normal and in elderly patients.

Decreased renal function in elderly patients is frequent and asymptomatic. Special caution should be exercised in situations where renal function may become impaired (for example when initiating antihypertensive therapy or diuretic therapy and when starting therapy with a non-steroidal anti-inflammatory drug).

#### **Administration of iodinated contrast agents:**

As the intravascular administration of iodinated contrast materials in radiologic studies can lead to renal failure, metformin hydrochloride should be discontinued prior to or at the time

of the test and not be re-instituted until 48 hours afterwards, and only after renal function has been re-evaluated and found to be normal.

### **Surgery**

Metformin must be discontinued at the time of surgery under general, spinal or epidural anaesthesia.

Therapy may be restarted no earlier than 48 hours following surgery or resumption of oral nutrition and provided that renal function has been re-evaluated and found to be stable.

### **Elderly:**

Due to the limited therapeutic efficacy data in the reduction of risk or delay of type 2 diabetes in patients 75 years and older, metformin initiation is not recommended in these patients.

### **Paediatric population**

#### **Children and adolescents:**

The diagnosis of type 2 diabetes mellitus should be confirmed before treatment with metformin is initiated.

No effect of metformin on growth and puberty has been detected during controlled clinical studies of one-year duration but no long-term data on these specific points are available. Therefore, a careful follow-up of the effect of metformin on these parameters in metformin-treated children, especially prepubescent children, is recommended.

#### **Children aged between 10 and 12 years**

Only 15 subjects aged between 10 and 12 years were included in the controlled clinical studies conducted in children and adolescents. Although efficacy and safety of metformin in these children did not differ from efficacy and safety in older children and adolescents, particular caution is recommended when prescribing to children aged between 10 and 12 years.

### **Other precautions**

All patients should continue their diet with a regular distribution of carbohydrate intake during the day. Overweight patients should continue their energy-restricted diet. The usual laboratory tests for diabetes monitoring should be performed regularly.

Metformin alone does not cause hypoglycaemia, but caution is advised when it is used in combination with insulin or other oral antidiabetics (e.g. sulfonylureas or meglitinides).

## **4.5 Interaction with other medicinal products and other forms of interaction**

Concomitant use not recommended

### **Alcohol**

Alcohol intoxication is associated with an increased risk of lactic acidosis, particularly in cases of fasting, malnutrition or hepatic impairment.

Consumption of alcohol and alcohol-containing medicinal products should be avoided.

### **Iodinated contrast agents**

Metformin must be discontinued prior to or at the time of the imaging procedure and not restarted until at least 48 hours after, provided that renal function has been re-evaluated and found to be stable, see sections 4.2 and 4.4.

### **Combinations requiring precautions for use**

Some medicinal products can adversely affect renal function which may increase the risk of lactic acidosis, e.g. NSAIDs, including selective cyclo-oxygenase (COX) II inhibitors, ACE inhibitors, angiotensin II receptor antagonists and diuretics, especially loop diuretics. When starting or using such products in combination with metformin, close monitoring of renal function is necessary.

### **Medicinal products with intrinsic hyperglycaemic activity (e.g., glucocorticoids (systemic and local routes) and sympathomimetics)**

More frequent blood glucose monitoring may be required, especially at the beginning of treatment. If necessary, adjust the metformin dosage during therapy with the respective medicinal product and upon its discontinuation.

### **Organic cation transporters (OCT)**

Metformin is a substrate of both transporters OCT1 and OCT2.

Co-administration of metformin with

- Inhibitors of OCT1 (such as verapamil) may reduce efficacy of metformin.
- Inducers of OCT1 (such as rifampicin) may increase gastrointestinal absorption and efficacy of metformin.
- Inhibitors of OCT2 (such as cimetidine, dolutegravir, ranolazine, trimethoprim, vandetanib, isavuconazole) may decrease the renal elimination of metformin and thus lead to an increase in metformin plasma concentration.
- Inhibitors of both OCT1 and OCT2 (such as crizotinib, olaparib) may alter efficacy and renal elimination of metformin.
- Caution is therefore advised, especially in patients with renal impairment, when these drugs are coadministered with metformin, as metformin plasma concentration may increase. If needed, dose adjustment of metformin may be considered as OCT inhibitors/inducers may alter the efficacy of metformin.

## **4.6 Fertility, Pregnancy and Lactation**

### **Use in Pregnancy**

To date no relevant epidemiological data are available. Animal studies do not indicate harmful effects with respect to pregnancy, embryonal and foetal development, parturition or postnatal development (see section 5.3).

When a woman with diabetes plans to become pregnant and during pregnancy, diabetes should not be treated with metformin hydrochloride but insulin should be used to maintain blood glucose levels as close to normal as possible in order to lower the risk of foetal malformations associated with abnormal blood glucose levels.

### **Breast-feeding**

Metformin is contraindicated during lactation (see section 4.3).

Metformin is excreted into milk in lactating rats. Similar data are not available in humans and a decision should be made whether to discontinue breast feeding or to discontinue metformin, taking into account the importance of the medicinal product to the mother.

### **Fertility**

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

## **4.7 Effects on Ability to drive and Use Machines**

Metformin tablet when used alone does not cause hypoglycaemia and therefore has no effect on the ability to drive or to use machines.

However, patients should be alerted to the risk of hypoglycaemia when metformin is used in combination with other antidiabetic agents (e.g. sulfonylureas, insulin or meglitinides).

## **4.8 Undesirable effects**

During treatment initiation, the most common adverse reactions are nausea, vomiting, diarrhoea, abdominal pain and loss of appetite which resolve spontaneously in most cases. To prevent them, it is recommended to take metformin in 2 or 3 daily doses and to increase slowly the doses.

The following adverse reactions may occur under treatment with metformin.

Frequencies are defined as follows: very common:  $\geq 1/10$ ; common  $>1/100$ ,  $<1/10$ ; uncommon  $>1/1,000$ ,  $<1/100$ ; rare  $>1/10,000$ ,  $<1/1,000$ ; very rare  $<1/10,000$ . Within each frequency grouping, adverse reactions are presented in order of decreasing seriousness.

### **Metabolism and nutrition disorders**

#### **Very rare**

- Lactic acidosis (see section 4.4).
- Decrease of vitamin B12 absorption with decrease of serum levels during long-term use of metformin. Consideration of such aetiology is recommended if a patient presents with megaloblastic anaemia.

### **Nervous system disorders**

#### **Common**

- Taste disturbance

### **Gastrointestinal disorders**

#### **Very common**

- Gastrointestinal disorders such as nausea, vomiting, diarrhoea, abdominal pain and loss of appetite. These undesirable effects occur most frequently during initiation of therapy and resolve spontaneously in most cases. To prevent them, it is recommended that metformin be taken in 2 or 3 daily doses during or after meals. A slow increase of the dose may also improve gastrointestinal tolerability.

### **Hepatobiliary disorders**

#### **Very rare**

- Isolated reports of liver function tests abnormalities or hepatitis resolving upon metformin discontinuation.

### **Skin and subcutaneous tissue disorders**

#### **Very rare**

- Skin reactions such as erythema, pruritus, urticaria

### **Paediatric population**

In published and post marketing data and in controlled clinical studies in a limited paediatric population aged 10-16 years treated during 1-year, adverse event reporting was similar in nature and severity to that reported in adults.

### **Reporting of suspected adverse reactions**

Reporting suspected adverse reactions after authorisation of the medicinal product is important. It allows continued monitoring of the benefit/risk balance of the medicinal product. Healthcare professionals are asked to report any suspected adverse reactions via the national reporting system listed in Appendix V.

## **4.9 Overdose**

Hypoglycaemia has not been seen with metformin hydrochloride doses of up to 85 g, although lactic acidosis has occurred in such circumstances. High overdose of metformin or concomitant risks may lead to lactic acidosis. Lactic acidosis is a medical emergency and must be treated in hospital. The most effective method to remove lactate and metformin is haemodialysis.

## **5. PHARMACOLOGICAL PROPERTIES**

### **5.1 Pharmacodynamic properties**

Pharmacotherapeutic group: Blood glucose lowering drugs. Biguanides; ATC code: A10BA02.

### **Mechanism of action**

Metformin is a biguanide with antihyperglycaemic effects, lowering both basal and postprandial plasma glucose. It does not stimulate insulin secretion and therefore does not produce hypoglycaemia.

### **Metformin may act via 3 mechanisms:**

- Reduction of hepatic glucose production by inhibiting gluconeogenesis and glycogenolysis.
- In muscle, by increasing insulin sensitivity, improving peripheral glucose uptake and utilization.
- Delay of intestinal glucose absorption.

Metformin stimulates intracellular glycogen synthesis by acting on glycogen synthase.

Metformin increases the transport capacity of all types of membrane glucose transporters (GLUTs) known to date.

### **Pharmacodynamic effects**

In clinical studies, use of metformin was associated with either a stable body weight or modest weight loss.

In humans, independent of its action on blood glucose, metformin has favourable effects on lipid metabolism. This has been shown at therapeutic doses in controlled, medium-term or long-term clinical studies: metformin reduces total cholesterol, LDL cholesterol and triglyceride levels.

### **Clinical efficacy**

#### ***Type 2 diabetes mellitus***

The prospective randomised study (UKPDS) has established the long-term benefit of intensive blood glucose control in adult patients with type 2 diabetes.

Analysis of the results for overweight patients treated with metformin after failure of diet alone showed:

- A significant reduction of the absolute risk of any diabetes-related complication in the metformin group (29.8 events/1000 patient-years) versus diet alone (43.3 events/1000 patient years),  $p=0.0023$ , and versus the combined sulfonylurea and insulin monotherapy groups (40.1 events/1000 patient-years),  $p=0.0034$ ;
- A significant reduction of the absolute risk of diabetes-related mortality: metformin 7.5 events/1000 patient-years, diet alone 12.7 events/1000 patient-years,  $p=0.017$ ;
- a significant reduction of the absolute risk of overall mortality: Metformin 13.5 events/1000 patient-years versus diet alone 20.6 events/1000 patient-years ( $p=0.011$ ), and versus the combined sulfonylurea and insulin monotherapy groups 18.9 events/1000 patient years ( $p=0.021$ );
- a significant reduction in the absolute risk of myocardial infarction: metformin 11 events/1000 patient-years, diet alone 18 events/1000 patient-years ( $p=0.01$ ).  
Benefit regarding clinical outcome has not been shown for metformin used as second-line therapy, in combination with a sulfonylurea.  
In type 1 diabetes, the combination of metformin and insulin has been used in selected patients, but the clinical benefit of this combination has not been formally established.

### **Paediatric population**

Controlled clinical studies in a limited paediatric population aged 10-16 years treated during 1 year demonstrated a similar response in glycaemic control to that seen in adults.

## **5.2 Pharmacokinetic properties**

### **Absorption**

After an oral dose of metformin hydrochloride tablet, maximum plasma concentration ( $C_{max}$ ) is reached in approximately 2.5 hours ( $t_{max}$ ). Absolute bioavailability of a 500 mg

or 850 mg metformin hydrochloride tablet is approximately 50-60% in healthy subjects. After an oral dose, the non-absorbed fraction recovered in faeces was 20-30%.

After oral administration, metformin absorption is saturable and incomplete. It is assumed that the pharmacokinetics of metformin absorption is non-linear.

At the recommended metformin doses and dosing schedules, steady state plasma concentrations are reached within 24 to 48 hours and are generally less than 1 microgram/ml. In controlled clinical trials, maximum metformin plasma levels (C<sub>max</sub>) did not exceed 5 microgram/ml, even at maximum doses.

Food decreases the extent and slightly delays the absorption of metformin. Following oral administration of a 850 mg tablet, a 40% lower plasma peak concentration, a 25% decrease in AUC (area under the curve) and a 35 minute prolongation of the time to peak plasma concentration were observed. The clinical relevance of these findings is unknown.

### **Distribution**

Plasma protein binding is negligible. Metformin partitions into erythrocytes. The blood peak is lower than the plasma peak and appears at approximately the same time. The red blood cells most likely represent a secondary compartment of distribution. The mean volume of distribution (V<sub>d</sub>) ranged between 63-276 l.

### **Metabolism**

Metformin is excreted unchanged in the urine. No metabolites have been identified in humans.

### **Elimination**

Renal clearance of metformin is > 400 ml/min, indicating that metformin is eliminated by glomerular filtration and tubular secretion. Following an oral dose, the apparent terminal elimination half-life is approximately 6.5 hours.

When renal function is impaired, renal clearance is decreased in proportion to that of creatinine and thus the elimination half-life is prolonged, leading to increased levels of metformin in plasma.

### **Characteristics in specific groups of patients**

#### **Renal impairment**

The available data in subjects with moderate renal insufficiency are scarce and no reliable estimation of the systemic exposure to metformin in this subgroup as compared to subjects with normal renal function could be made. Therefore, the dose adaptation should be made upon clinical efficacy/tolerability considerations (see section 4.2).

#### **Paediatric population**

Single dose study: After single doses of metformin hydrochloride 500 mg paediatric patients have shown similar pharmacokinetic profile to that observed in healthy adults.

Multiple dose study: Data are restricted to one study. After repeated doses of 500 mg twice daily for 7 days in paediatric patients the peak plasma concentration (C<sub>max</sub>) and systemic exposure (AUC<sub>0-t</sub>) were reduced by approximately 33% and 40%, respectively compared to diabetic adults who received repeated doses of 500 mg twice daily for 14 days. As the dose is individually titrated based on glycaemic control, this is of limited clinical relevance.

## **5.3 Preclinical safety data**

Preclinical data reveal no special hazard for humans based on conventional studies on safety, pharmacology, repeated dose toxicity, genotoxicity, carcinogenic potential and reproductive toxicity.

## **6. PHARMACEUTICAL PARTICULARS**

### **6.1 List of excipients**

Sodium starch glycolate, Maize starch, Povidone (PVP K 30), Colloidal anhydrous

Silica, Magnesium stearate, Instacoat Altimate IC-AL-20001, Isopropyl alcohol, Purified water.

**6.2 Incompatibilities**

Not applicable.

**6.3 Shelf life**

5 years.

**6.4 Special precautions for storage**

This medicinal product does not require any special storage conditions

**6.5 Nature and contents of container**

(10x10) tablets in blister packs (Aluminium-Aluminium)

Not all pack sizes may be marketed.

**6.6 Special precautions for disposal**

Any unused product or waste material should be disposed of in accordance with local requirements.

**7. MARKETING AUTHORISATION HOLDER**

SYGEN PHARMACEUTICALS LIMITED  
KM. 38, LAGOS ABEOKUTA EXPRESSWAY  
SANGO OTA,  
OGUN STATE.  
NIGERIA

**8. MARKETING AUTHORISATION NUMBER(S)**

NAFDAC Reg. No.: 04-6426

**9. DATE OF FIRST AUTHORISATION/RENEWAL OF THE AUTHORISATION**

04/04/2018

**10. DATE OF REVISION OF THE TEXT**

17/04/2023