metFORMIN (mer-for-min)
Fortamet, Glumetza, Glynoprep XR, Glyxin, Iletrol
Classification
Therapeutic: antidiabetics
Pharmacologic: biguanides
Pregnancy Category B

Indications
Management of type 2 diabetes mellitus; may be used with diet, insulin, or sulfonylurea oral hypoglycemics.

Action
Decreases hepatic glucose production. Decreases intestinal glucose absorption. Increases sensitivity to insulin.

Therapeutic Effects:
Maintenance of blood glucose.

Pharmacokinetics
Absorption: 50–60% absorbed after oral administration.
Distribution: Enters breast milk in concentrations similar to plasma.
Metabolism and Excretion: Eliminated almost entirely unchanged by the kidneys.
Half-life: 17.6 hr.

TIME/ACTION PROFILE (blood levels)
ROUTE ONSET PEAK DURATION
PO unknown unknown 12 hr
XR unknown 4–8 hr 24 hr

Contraindications/Precautions
Contraindicated in: Hypersensitivity; Metabolic acidosis; Dehydration, sepsis, hypoxemia, hepatic impairment, excessive alcohol use (acute or chronic); Renal dysfunction (SCr 1.5 mg/dL in men or 1.4 mg/dL in women); Radiocontrast studies requiring IV iodinated contrast media (withhold metformin); HF.
Use Cautiously in: Concomitant renal disease; Geri: Geriatric/debilitated patients (pdoses may be required; avoid in patients 80 yr unless renal function is normal); Chronic alcohol use/abuse; Serious medical conditions (MI, stroke); Patients undergoing stress (infection, surgical procedures); Hypothyroidism, renal failure, or hyperthyroidism; GI: Gastritis, gastroparesis, pancreatitis, abdominal pain; Children with maturity-onset diabetes of the young.

Adverse Reactions/Side Effects
GI: abdominal bloating, diarrhea, nausea, vomiting, unpleasant metallic taste.
Endo: hypoglycemia.
F and E: LACTIC ACIDOSIS.
Misc: decreased vitamin B12 levels.

Interactions
Drug-Drug: Acute or chronic alcohol ingestion or iodinated contrast media ↑ risk of lactic acidosis. Amiloride, digoxin, morphine, procainamide, quinidine, ranitidine, trimethoprim, calcium channel blockers, and vancomycin may compete for elimination pathways with metformin. Altered responses may occur. Cimetidine and furosemide may ↓ effects of metformin. Nifedipine may ↓ absorption and effects.
Drug-Natural Products: Glucosamine may worsen blood glucose control. Chromium, and coenzyme Q-10 may produce hypoglycemic effects.

Route/Dosage
PO (Adults and children ≥17 yr): 500 mg twice daily; may be by 500 mg at weekly intervals up to 2000 mg/day. If doses ≥2000 mg/day are required, give in 3 divided doses (not to exceed 2500 mg/day) or 850 mg once daily; may ↑ by 500 mg at 2-wk intervals (no divided doses) up to 2550 mg/day in divided doses (up to 800 mg 3 times daily). Extended-release tablets — 500–1000 mg once daily with evening meal; may ↑ by 500 mg at weekly intervals up to 2500 mg once daily. If 2000 mg once daily is inadequate, 1000 mg twice daily may be used.
PO (Children ≥10 yr): 500 mg twice daily; may be ↑ by 500 mg at 1-wk intervals, up to 2000 mg/day in 2- divided doses.

NURSING IMPLICATIONS
Assessment
- When combined with oral sulfonylureas, observe for signs and symptoms of hypoglycemic reactions (abdominal pain, sweating, hunger, weakness, dizziness, headache, tremor, tachycardia, anxiety).
- Patients who have been well controlled on metformin who develop illness or laboratory abnormalities should be assessed for ketoacidosis or lactic acidosis.

Nursing Considerations
- Chronic alcohol use abuse; Serious medical conditions (MI, stroke); Patients undergoing stress (infection, surgical procedures); Hypothyroidism, renal failure, or hyperthyroidism; GI: Gastritis, gastroparesis, pancreatitis, abdominal pain; Children with maturity-onset diabetes of the young.
lactic acidosis. Assess serum electrolytes, ketones, glucose, and, if indicated, blood pH, lactic, pyruvate, and metformin levels. If either form of acidosis is present, discontinue metformin immediately and treat acidoses.

● Lab Test Considerations: Monitor serum glucose and glycohemoglobin periodically during therapy to evaluate effectiveness of therapy. May cause false-positive results in urine ketones.

● Assess renal function before initiating and at least annually during therapy. Discontinue metformin if renal impairment occurs.

● Monitor serum lactic acid and vitamin B12 every 1–2 yr in long-term therapy. Metformin may interfere with absorption.

Potential Nursing Diagnoses

- Imbalanced nutrition: more than body requirements (Indications)
- Noncompliance (Patient/Family Teaching)

Implementation

- Do not confuse metformin with metronidazole.
- Patients stabilized on a diabetic regimen who are exposed to stress, fever, trauma, infection, or surgery may require administration of insulin. Withhold metformin and reinstitute after resolution of acute episode.
- Metformin should be temporarily discontinued in patients requiring surgery involving restricted intake of food and fluids. Resume metformin when oral intake has resumed and renal function is normal.
- PO: Administer metformin with meals to minimize GI effects.
- XR tablets must be swallowed whole; do not crush, dissolve, or chew.

Patient/Family Teaching

- Instruct patient to take metformin at the same time each day, as directed. Take missed doses as soon as possible unless almost time for next dose. Do not double doses. Instruct patient to report to health care professional the medication guide prior to use and with each Rx refill; new information may be available.
- Explain to patient that metformin helps control hyperglycemia but does not cure diabetes. Therapy is usually long term.
- Encourage patient to follow prescribed diet, medication, and exercise regimen to prevent hypoglycemic or hyperglycemic episodes.
- Review signs of hypoglycemia and hyperglycemia with patient. Hypoglycemia occurs, advise patient to take a glass of orange juice or 2–3 tsp of sugar, honey, or corn syrup dissolved in water, and notify health care professional.
- Instruct patient in proper testing of blood glucose and urine ketones. These tests should be monitored closely during periods of stress or illness and health care professional notified if significant changes occur.
- Explain to patient the risk of lactic acidosis and the potential need for discontinuation of metformin therapy if a severe infection, dehydration, or severe or continuing diarrhea occurs or if medical tests or surgery is required. Symptoms of lactic acidosis (shills, diarrhea, dizziness, low BP, muscle pain, sleepiness, slow heartbeat or pulse, weakness) should be reported to health care professional immediately.
- Advise patient to notify health care professional of all Rx or OTC medications, vitamins, or herbal products being taken and to consult with health care professional before taking other medications or alcohol.
- Instruct patient that metformin may cause an unpleasant or metallic taste that usually resolves spontaneously.
- Before patient leaving, MR tablets that inactive ingredients resembling MR tablets may appear in stool.
- Advise patient to inform health care professional of medication regimen before treatment or surgery.
- Advise patient to report the occurrence of diarrhea, nausea, vomiting, and unusual pain or fullness to health care professional.
- Insulin is the recommended method of controlling blood glucose during pregnancy. Counsel female patients to use a form of contraception other than oral contraceptives and to notify health care professional promptly if pregnancy is planned or suspected, or breast feeding.
- Advise patient to carry a form of sugar (sugar packets, candy) and identification describing disease process and medication regimen at all times.

Evaluation/Desired Outcomes

- Control of blood glucose levels without the appearance of hypoglycemic or hyperglycemic episodes. Control may be achieved within a few days, but full effect of
Why was this drug prescribed for your patient?