



"Rybelsus (Semaglutide): A Breakthrough in Diabetes Management and Beyond"

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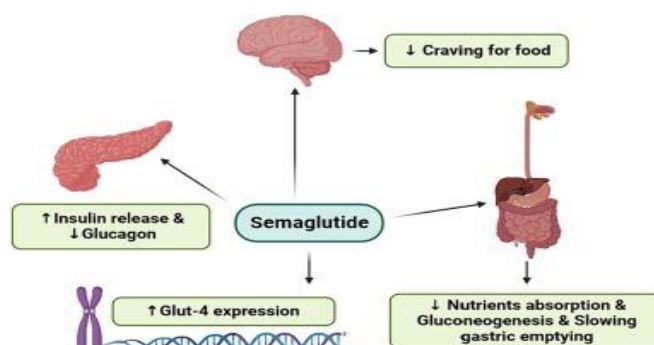
Abstract: Rybelsus is the first oral medication approved by the FDA for treating type 2 diabetes. It works by targeting the GLP-1 receptor, helping to control blood sugar levels. Taken once a day on an empty stomach, Rybelsus helps the body produce more insulin, reduces sugar production in the liver, and slows down digestion, which makes you feel fuller for longer. However, the body doesn't absorb it easily, so a special ingredient called SNAC is added to improve its effectiveness. Besides managing blood sugar, Rybelsus has other benefits, such as helping with weight loss, reducing inflammation, and improving heart health. Studies show it can lead to significant weight loss and better overall metabolism. Unlike other diabetes medications that require injections, Rybelsus is taken as a pill, making it more convenient and less likely to cause low blood sugar. While most people tolerate it well, some may experience side effects like stomach issues, pancreatitis, or kidney problems. Overall, Rybelsus is a major step forward in diabetes treatment.

Index Terms -Rybelsus, diabetes, GLP-1, weight, cardiovascular, side-effects, FDA.

I. INTRODUCTION

Rybelsus (oral Semaglutide) has become the initial FDA-approved oral product acting as a glucagon-like peptide 1 (GLP-1) receptor agonist for treating type 2 diabetes (1). GLP-1 receptor agonists, as a group, are extensively utilized and suggested for controlling type 2 diabetes. (1)

Rybelsus is commonly recommended to be used in conjunction with a nutritious diet and regular physical activity. It is meant to be consumed once a day and is best taken on an empty stomach for maximum absorption.



DOSAGE:

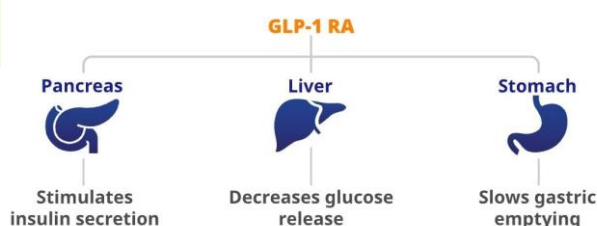
Rybelsus, a glucagon-like peptide-1 (GLP-1) receptor agonist, is approved for use in conjunction with diet and exercise to enhance glycaemic control in adults with type 2 diabetes mellitus. The initial dose of Rybelsus tablets is 3 mg once daily for a period of 30 days. Following 30 days on the 3 mg dose, the dosage should be increased to 7 mg once daily. If additional blood sugar control is required, the dosage may be raised to 14 mg once daily after at least 30 days on the 7 mg dose. (2)



Fig. 1.

various dosages of Rybelsus

Indication	Starting Dosage	Standard Dosage	Maximum Dosage
Type 2 Diabetes Mellitus	3mg on an empty stomach for 30 days.	7mg on an empty stomach after waking up	14mg on an empty stomach after waking up

Mechanism of Action:

Rybelsus treats type 2 diabetes in three ways:

- By increasing insulin levels, it effectively lowers blood sugar levels and slows down the digestion process to promote a feeling of fullness.
- It also decreases the production and release of sugar by the liver. Rybelsus prompts the pancreas to release more insulin when blood sugar levels are high and reduces the production of sugar by the liver.
- Additionally, it slows down the emptying of the stomach after meals, potentially prolonging the sensation of fullness. (3)

Pharmacokinetics:**Absorption:**

Subcutaneous semaglutide has high bioavailability (89%) and reaches peak concentration within 1 to 3 days, with steady-state levels achieved after 4 to 5 weeks. Oral semaglutide, with minimal intrinsic bioavailability (~0.01%), incorporates an absorption enhancer (SNAC) to improve uptake, achieving bioavailability of 0.4%–1%. Factors like gastric fluid composition and food intake significantly influence its absorption, with peak levels reached about 1 hour after dosing.

Distribution

After subcutaneous administration, semaglutide's mean apparent volume of distribution is about 12.5 L, while for oral administration in healthy individuals, it is approximately 8 L.

Metabolism

Semaglutide undergoes metabolic processing through proteolytic cleavage of its peptide backbone, followed by β -oxidation of the fatty acid sidechain.

Elimination

Semaglutide has a half-life of about 1 week, with its presence detectable in circulation for up to 5 weeks after the last dose. Clearance rates are approximately 0.05 L/h for subcutaneous administration in individuals with T2DM or obesity and 0.04 L/h for oral administration in healthy individuals. Semaglutide is mainly excreted via urine (3% as unchanged drug) and feces.(4)

GLP-1 Receptor Agonist and Semaglutide:

GLP-1 receptor agonists are incretin-based drugs that act like natural incretins that modulate the blood sugar levels for type 2 diabetes. These incretin mimetics enhance insulin secretion, diminish glucose output, and suppress liver production, decelerate gastric emptying and suppress appetite. Semaglutide, a GLP-1 analogue, binds to pancreatic β -cell receptor to induce insulin secretion and decrease glucagon release, which controls hyperglycemia. It increases appetite reduction, food intake, and weight loss. The glucagon-like peptide-1 agonist semaglutide is also available in injectable form (Ozempic used for the treatment of type 2 diabetes) and as the only oral GLP-1 analog (Rybelsus). Some common side effects of semaglutide are nausea and diarrhea. (6)

Benefits of Rybelsus**1. Weight Management**

Rybelsus functions as a glucagon-like peptide-1 (GLP-1) receptor agonist, imitating a naturally occurring hormone in the body. It boosts insulin release from the pancreas, aiding in the regulation of blood glucose levels through the reduction of blood glucose levels.

Weight loss may occur while taking Rybelsus due to its ability to slow down the emptying of the stomach after meals. By prolonging the presence of food in the stomach, Rybelsus increases feelings of fullness, reduces appetite, and lowers caloric intake, ultimately leading to a decrease in body weight.

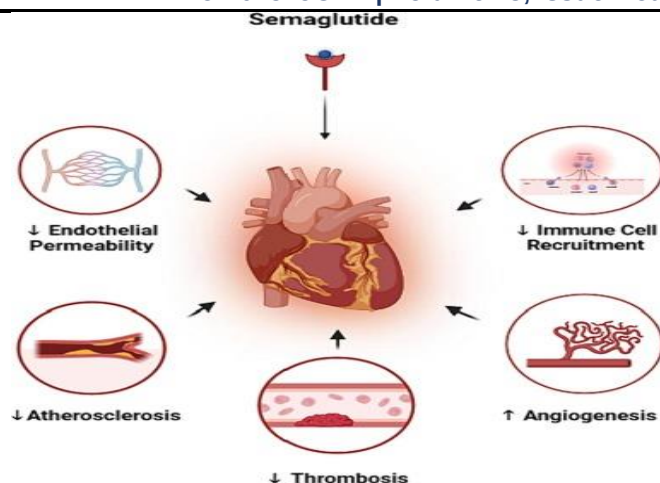
According to studies, participants who weighed 194 pounds and used Rybelsus 14 mg once day for 6 months lost approximately 8 pounds each. People who weighed 196 pounds and used Rybelsus 7 mg once daily for 6 months shed around 5 pounds of body weight. (5)

2. Anti-Inflammatory Action

Semaglutide, an agonist of the GLP-1 receptor, has demonstrated its ability to reduce inflammation by inhibiting the production of pro-inflammatory cytokines like IL-6 and TNF- α . (6)

3. Cardiovascular benefits

Losing weight has been shown to enhance metabolic function and reduce hypertension. Additionally, it can lead to the thinning of heart tissue and blood vessel walls, making it easier for the heart to circulate blood and decreasing the strain on the heart. (7)



3. Well Tolerated

The medication is well-tolerated by most patients, with a few experiencing mild gastrointestinal side effects.

4. Convenient Oral Administration

Rybelsus offers convenient oral administration, eliminating the need for injections commonly associated with other diabetes medications. This makes it simpler for patients to stick to their treatment plan.

5. Low Risk of Hypoglycaemia

When used as indicated, Rybelsus is less likely to cause dangerously low blood sugar levels than other diabetes drugs.

Possible side-effects of Rybelsus

The most common side effects may include

- ✓ Abdominal pain
- ✓ Decreased appetite
- ✓ Diarrhoea
- ✓ Nausea and Vomiting
- ✓ Constipation

Rybelsus may causes serious side effects which includes

- ✓ Hypoglycaemia (Low Blood sugar)
- ✓ Pancreatitis (Inflammation of Liver)
- ✓ Kidney Failure
- ✓ Serious Allergic Reactions
- ✓ Gall bladder problems (8)

II. Conclusion

Rybelsus (semaglutide) is a potential drug used for the treatment of type 2 diabetes that has benefits beyond blood sugar control, such as weight loss and cardiovascular protection and Anti- Inflammatory effects. As with any drug, patients must collaborate closely with their healthcare team to develop the optimal treatment plan for their individual needs.

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