Module 2. Drug Classes to Treat Diabetes: Oral Agents

LEARNING OBJECTIVES

1. Define the different classes of oral medications used to treat type 2 diabetes;

2. Outline how treatment plans for patients with diabetes are designed according to American Diabetes Association and American Association of Clinical Endocrinologists guidelines;

3. Discuss the mechanisms of action, adverse effects, and potential drug interactions of diabetes medications;

4. Recognize the effects of oral diabetes agents on glycosylated hemoglobin levels; and

5. List open-ended questions to ask patients who are taking oral diabetes agents to assess the need for a consultation with the pharmacist.

Post-test/Rationale

1. Dapagliflozin belongs to which class of drugs?

A. Dipeptidyl peptidase-4 inhibitors
B. Sodium glucose cotransporter-2 inhibitors***
C. Sulfonylureas
D. Bile acid sequestrants

Correct answer: B

Rationale (Objective #1): Dapagliflozin is a sodium glucose cotransporter-2 inhibitor.

2. Which of the following is recommended as a first-line agent for treating type 2 diabetes in both the American Diabetes Association and the American Association of Clinical Endocrinologists guidelines?

A. Metformin***
B. Glipizide
C. Sitagliptin
D. Pioglitazone

Correct answer: A

Rationale (Objective #2): Metformin is the only first-line agent in the American Diabetes Association guidelines and it is the preferred first-line agent in the American Association of Clinical Endocrinologists guidelines.

3. What is the mechanism of action of nateglinide?
A. It increases levels of thyroid hormones
B. It stimulates the beta cells of the pancreas to release insulin***
C. It prevents the reabsorption of filtered glucose from the urine and promotes urinary glucose excretion
D. It increases levels of incretin hormones

Correct answer: B

Rationale (Objectives #3 and #4): Nateglinide is a meglitinide. These medications work as rapid-acting insulin secretagogues through direct interaction with the beta cells of the pancreas.

4. Which of the following medications works by slowing the absorption of sugars from the gastrointestinal tract?

A. Canagliflozin
B. Acarbose***
C. Saxagliptin
D. Glimepiride

Correct answer: B

Rationale (Objective #3): Acarbose is an alpha-glucosidase inhibitor. It works by preventing the absorption of sugars from the gastrointestinal tract.

5. Which of the following would be an appropriate counseling point that a pharmacist may tell a patient receiving metformin?

A. Take this medication on an empty stomach
B. You may experience weight gain while taking this medication
C. This medication may cause diarrhea, but the risk of this effect is lower with extended-release tablets***
D. Avoid eating grapefruit or drinking grapefruit juice while taking this medication

Correct answer: C

Rationale (Objective #3): Metformin commonly causes diarrhea. Metformin should be taken with food, and grapefruit does not interact with metformin. Diabetic ketoacidosis is a contraindication to metformin use and cannot be treated with altered food and beverage intake.

6. Which of the following medications may cause a vitamin B₁₂ deficiency?

A. Glyburide
B. Linagliptin
C. Metformin***
D. Miglitol
Correct answer: C

Rationale (Objective #3): Treatment with metformin may cause a deficiency of vitamin B₁₂.

7. What is an appropriate hemoglobin A₁C target for most nonpregnant adult patients according to the American Diabetes Association guidelines?

A. Lower than 6.5%
B. Lower than 10%
C. Lower than 7%***
D. Higher than 8%

Correct answer: C

Rationale (Objective #4): The hemoglobin A₁C (A₁C) goal for most nonpregnant adults, according to the American Diabetes Association guidelines, is lower than 7%. More or less stringent A₁C goals may be appropriate for some patients.

8. A patient is new to glyburide so the technician referred him to the pharmacist for counseling. What may the pharmacist say?

A. Take this medication with a meal***
B. Do not eat grapefruit or drink grapefruit juice while taking this medication
C. This medication may cause flatulence, which can be relieved by taking the medication on an empty stomach
D. This medication may cause weight loss

Correct answer: A

Rationale (Objective #3): Most sulfonylureas should be taken with meals. Grapefruit does not interact with sulfonylureas. Sulfonylureas do not cause flatulence or weight loss, and they should not be taken on an empty stomach.

9. A patient taking glyburide has experienced several episodes of hypoglycemia. She asks about other oral agents that have lower risks of hypoglycemia. Which of the following agents might the pharmacist recommend?

A. Glipizide
B. Linagliptin***
C. Nateglinide
D. Glyburide

Correct answer: B

Rationale (Objective #3): Linagliptin has a low risk of hypoglycemia and does not need dose adjustment for renal impairment. Glipizide, glyburide, and nateglinide all carry high risks of hypoglycemia.
10. A patient asks why he needs to take every dose of repaglinide with a meal. Which of the following statements is true?

A. Food helps the body absorb the repaglinide, which makes the medication more effective
B. This medication causes a rapid increase in the release of insulin in response to a meal, so it should be taken with a meal to help improve post-meal blood glucose levels***
C. This medication can be very irritating to the stomach and taking the medication with a meal helps reduce this stomach discomfort
D. This medication does not need to be taken with a meal; a full glass of water should suffice

Correct answer: B

Rationale (Objective #3): Meglitinides are rapid-acting secretagogues; they promote insulin release and may cause hypoglycemia if not taken with a meal.