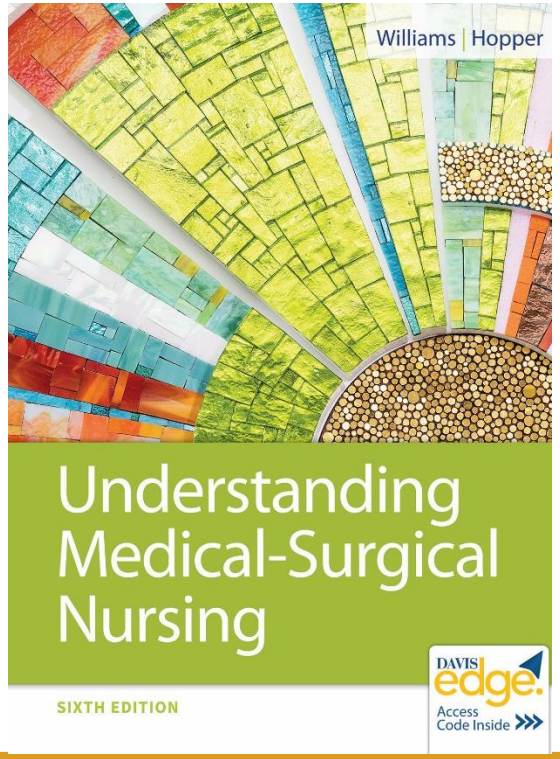


Chapter 40

Nursing Care of Patients With Disorders of the Endocrine Pancreas

Learning Outcomes

- Explain the pathophysiologies of type 1 and type 2 diabetes mellitus.
- Identify risk factors for type 1 and type 2 diabetes mellitus.
- Describe the signs and symptoms of diabetes mellitus.
- Describe causes, signs and symptoms, and treatment of high and low blood glucose levels.

Learning Outcomes (continued_1)

- Discuss how diabetes mellitus increases risk of complications such as heart disease, blindness, and kidney failure.
- Identify diagnostic tests used to diagnose and monitor diabetes mellitus and its complications.
- Identify therapeutic measures to help patients with diabetes mellitus control blood glucose levels.

Learning Outcomes (continued_2)

- Differentiate the action of insulin and oral hypoglycemic agents in lowering blood glucose levels.
- Plan nursing care and education for the patient with diabetes mellitus.
- List measures to increase the safety of the patient with diabetes mellitus who is undergoing surgery.
- Explain reactive hypoglycemia and its treatment.

Diabetes Mellitus

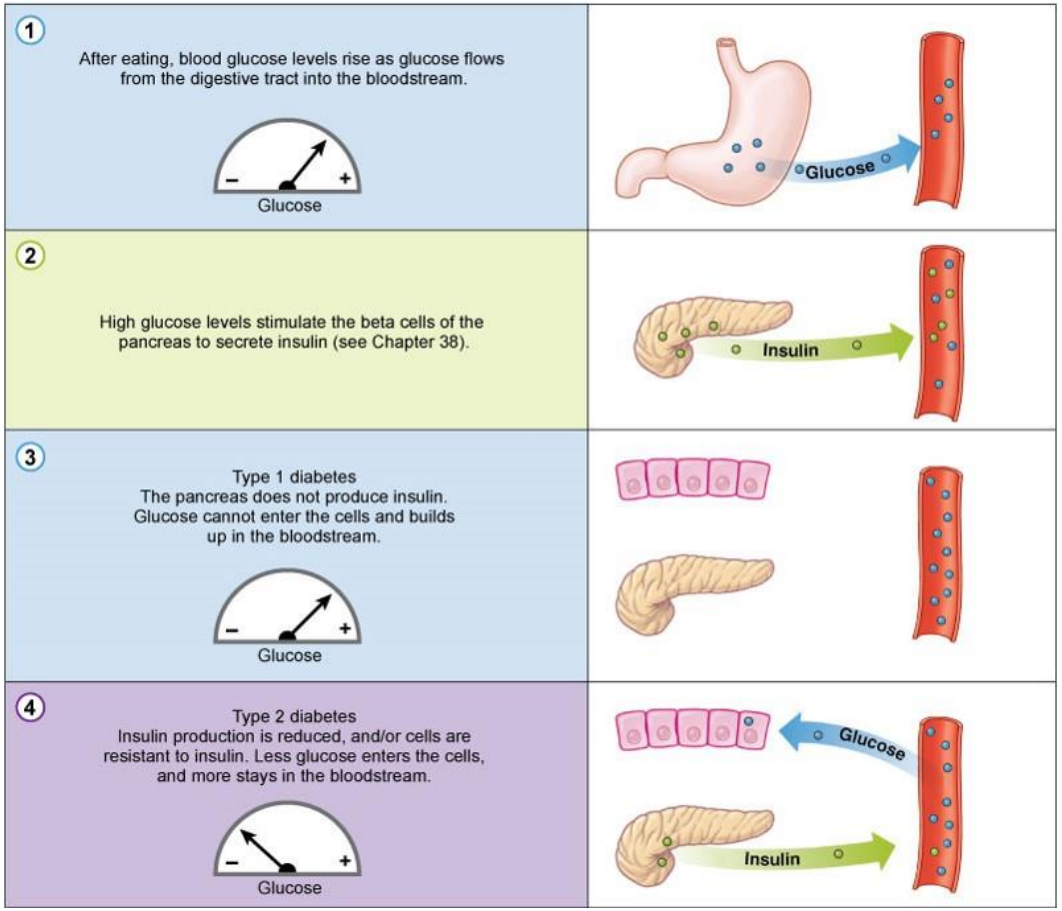
- Pathophysiology
  - Glucose intolerance
    - Faulty production of insulin

    OR

    - Tissue insensitivity to insulin
  - Altered carbohydrate, fat, protein metabolism
  - Long-term complications

Diabetes Mellitus (continued_1)

Pathophysiology



Type 1 Diabetes

- Some genetic component (10%)
- Autoimmune response to virus
- Destruction of beta cells
- Pancreas secretes NO insulin
- More common in young, thin patients
- Prone to ketosis

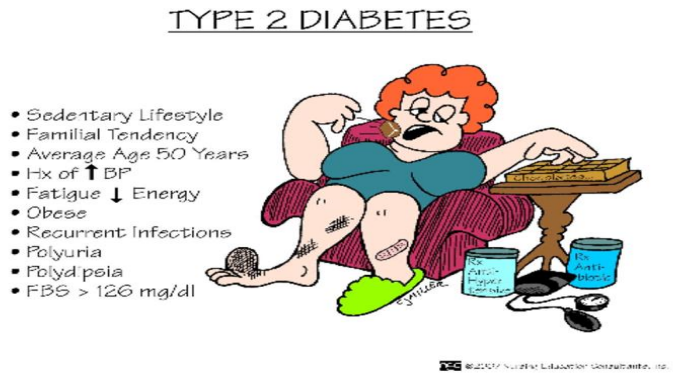
Type 2 Diabetes

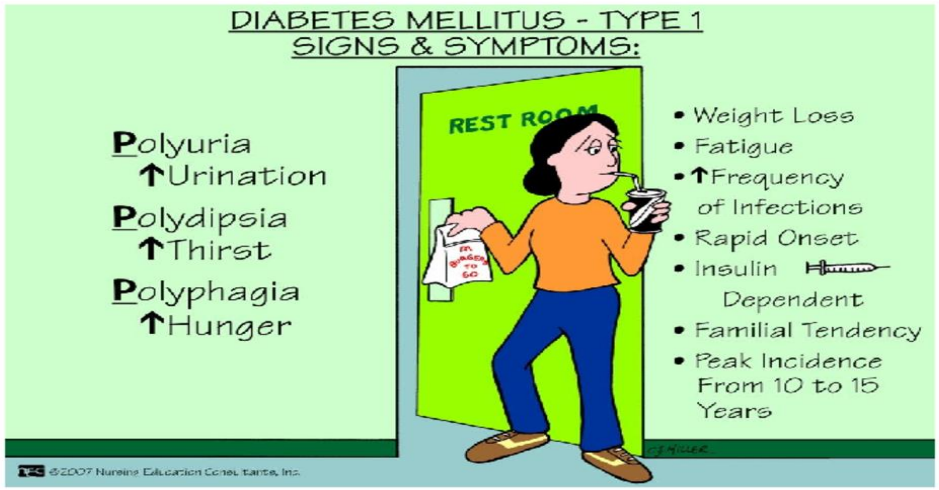
- Former names: Non–insulin-dependent diabetes mellitus (N I D D M), adult onset
- 95% of diabetes cases
- Large genetic component (90%)
- Reduced number of beta cells
- Reduced tissue sensitivity to insulin
- Largest risk factor is obesity
- Not usually ketosis-prone

Type 2 Diabetes in Youth

- More obesity in children
- Type 2 epidemic
- A nursing challenge

Compare type 1 with type 2





Other Types of Diabetes

- Gestational
  - Pregnancy
- Prediabetes
  - Glucose intolerance
- Secondary diabetes
  - Drugs
  - Pancreatic trauma

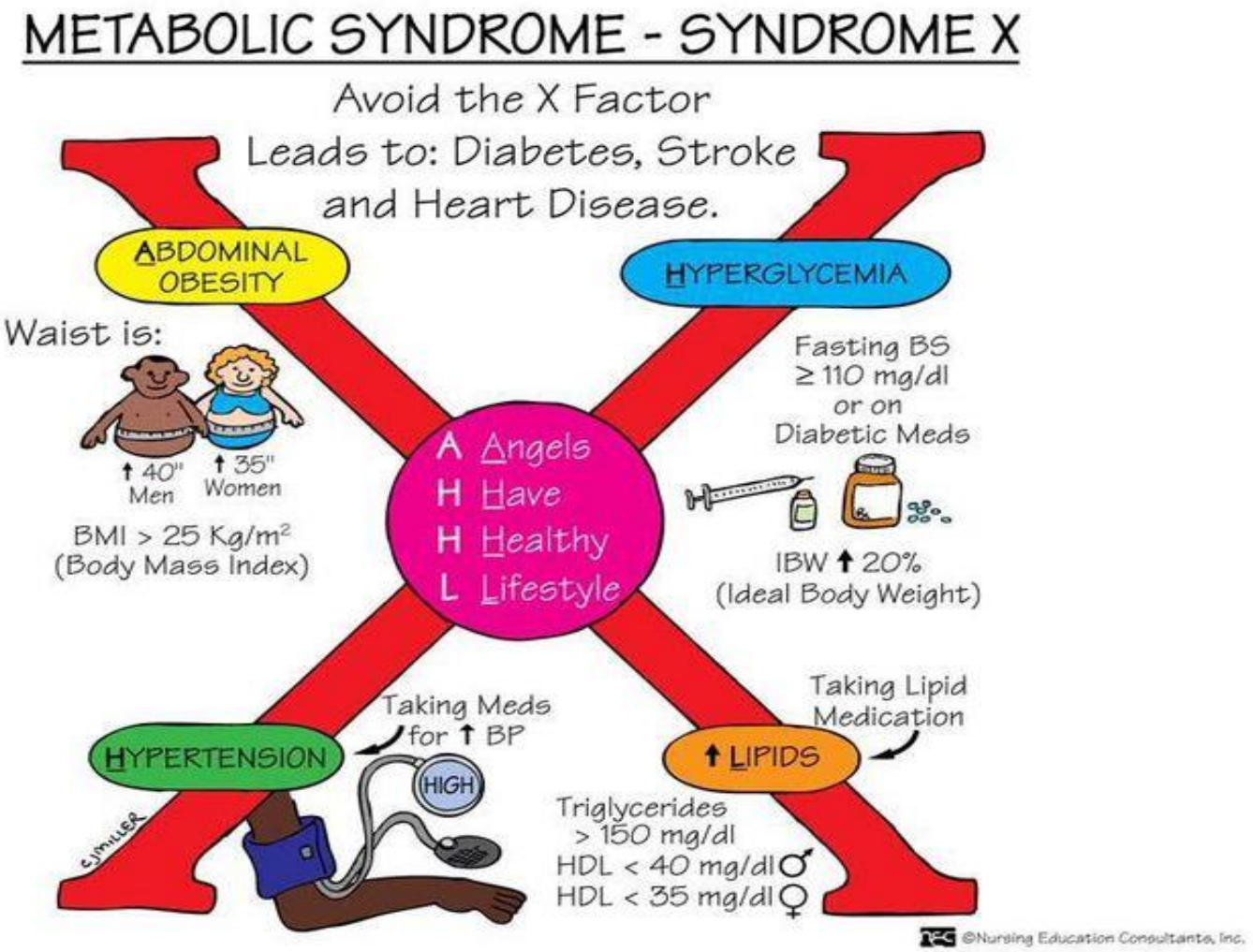
Metabolic Syndrome

- Elevated waist circumference
- Elevated triglycerides
- Low high-density lipoprotein (H D L) cholesterol
- Elevated blood pressure
- Elevated fasting plasma glucose

Signs and Symptoms

- The 3 P's
  - Polydipsia
  - Polyuria
  - Polyphagia
- Fatigue
- Blurred vision
- Infection prone
- Abdominal pain
- Headache
- Ketosis/acidosis

Metabolic syndrome at a glance



Diagnosing Diabetes

- Fasting blood glucose test ≥126 milligrams per deciliter
- Random blood glucose test ≥200 milligrams per deciliter
- Oral glucose tolerance test >200 milligrams per deciliter after 2 hours
- Hemoglobin A subscript 1c (H b A subscript 1c) >6.5%

Additional Tests

- Lipid profile
- Serum creatinine
- Urine microalbumin
- Urinalysis
- Electrocardiogram

Prevention of Type 2 Diabetes

- body weight loss
- Moderate physical activity
  - 150 minutes per week
- Metformin (oral Hypoglycemic) in some patients- first line of defense for type 2

Goals of Treatment

- glucose 80 to 130 milligrams per deciliter
- Peak glucose <180 milligrams per deciliter
- Blood pressure <140/90 millimeters of mercury
- Glycohemoglobin (HBA1C) <6.5%

Therapeutic Interventions

- Nutrition therapy- ***EAT HEALTHY FOOD***; *limit fast foods ect*
- Exercise- *moderate exercise plans*
- Medication- *if needed*
- Monitoring- *see your MD regularly and keep your appts*
- Education- *the more they understand the more independence they will have on their health.*

Nutrition Therapy

- Carbohydrate counting
- Glycemic index/load
- **Create your plate**
- REMEMBER CULTURAL DIETARY NEEDS!

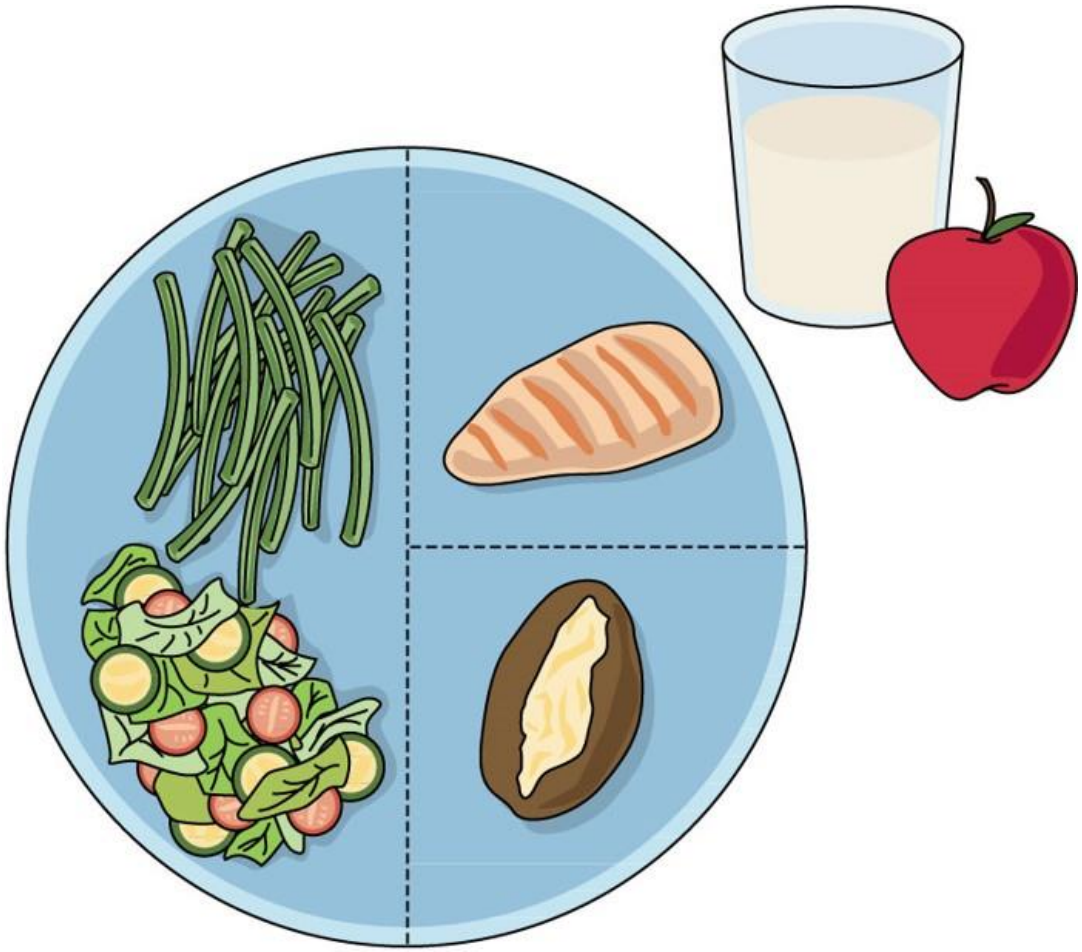
General Principles

- Type 1
  - Avoid wide swings in blood glucose.

  (example: low when you wake up and high in the afternoons)
- Type 2: Control
  - Blood pressure
  - Weight
  - Lipids

  BP/Obesity and High cholesterol often are precursor to DM type 2.
- Regular eating schedule- *again limit fast food*

Plate Method



Exercise

- Lowers glucose up to 48 hours.
- Lowers blood lipids.
- Exercise 150 minutes per week, over 3 days.
- Refer to health care provider or exercise physiologist.
- Avoid exercise during ketosis.
- Eat snack prior if blood glucose <100 milligrams per deciliter.
- Carry fast sugar.

Medication

- Insulin for type 1 or 2
- Oral hypoglycemics for type 2 only
- Other injectables as needed

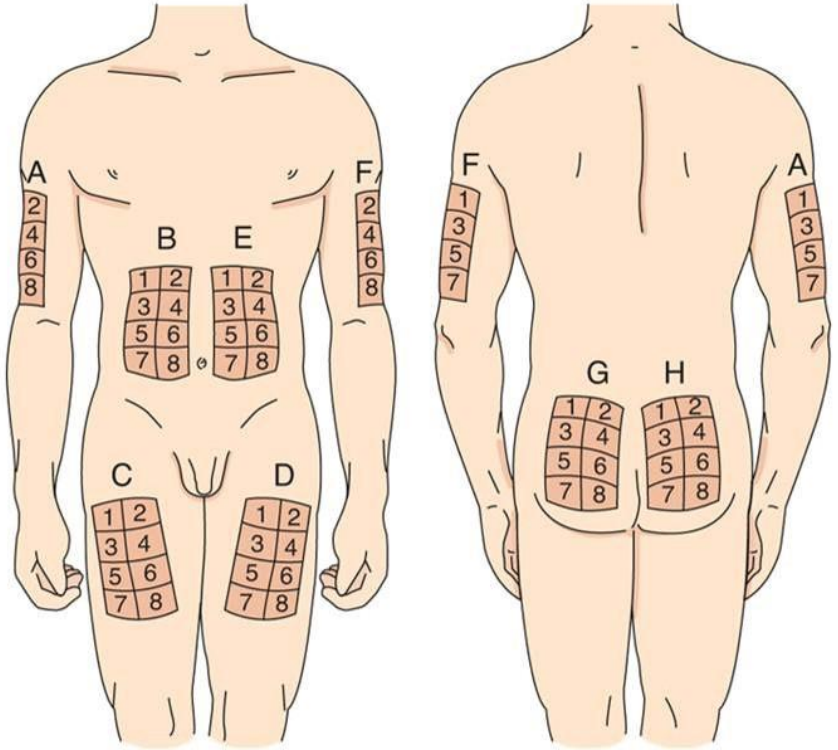
Insulin

- Action- fast or long acting
- Routes
  - Subcutaneous (S Q)
  - I V
- Insulin pump

Simple Nursing:
https://youtu.be/cm839JGmSFc

Insulin (continued)

- Site rotation
- Timing
  - Onset
  - Peak
  - Duration
- Regimens
  - Basal bolus- *big dose also called a loading dose.*
  - Sliding scale- *based on BS readings*



Rotation sites for injection of insulin.

Oral Hypoglycemics

- **Are not insulin!!!!**
- Action depends on medication
  - Stimulate pancreas
  - Increase tissue sensitivity to insulin
  - Slow carbohydrate digestion and absorption
  - Reduce glucose reabsorption by kidneys

Self-Monitoring of Blood Glucose

- Test before meals (AC) and at bedtime (HS) or as ordered.
- Record results.
- Analyze meaning of results.
- Know target glucose levels.
  - ***glucose 80 to 130 milligrams per deciliter***
- Call provider if out of range.

Glucose Diary

Day		Break-fast	Lunch	Supper	Bedtime	Urine Ketones	Notes
Sunday	Time	7:00	11:30	6:00	11:00		
	Glucose	186	108	116	142		
	Insulin	10 units Humalo	10 units Humalo	10 units Humalo	32 units Lantus		
Monday	Time	7:30	12:00	6:00	10:30	6:00-neg	Ate cake at Betty's party at 3 pm-oops!
	Glucose	171	97	302	180		
	Insulin	10 units Humalo	10 units Humalo	10 units Humalo	32 units Lantus		
Tuesday	Time						
	Glucose						
	Insulin						
Wednesday	Time						
	Glucose						
	Insulin						
Thursday	Time						
	Glucose						
	Insulin						
Friday	Time						
	Glucose						
	Insulin						
Saturday	Time						
	Glucose						
	Insulin						

Urine Testing

- Glucose
  - No longer recommended unless self-monitoring of blood glucose (*SMBG- Self monitoring of Blood glucose)* is impossible
- Ketones
  - If blood sugar elevated and risk present

Alterations in Blood Glucose

- Hyperglycemia
- Hypoglycemia = “insulin reaction”

Hyperglycemia

- Blood glucose >126 milligrams per deciliter
- Causes
  - Overeating
  - Stress
  - Illness
  - Not enough medication

Symptoms of Hyperglycemia

- 3 P’s
- Blurred vision
- Fatigue, lethargy
- Headache
- Abdominal pain
- Ketonuria
- Coma

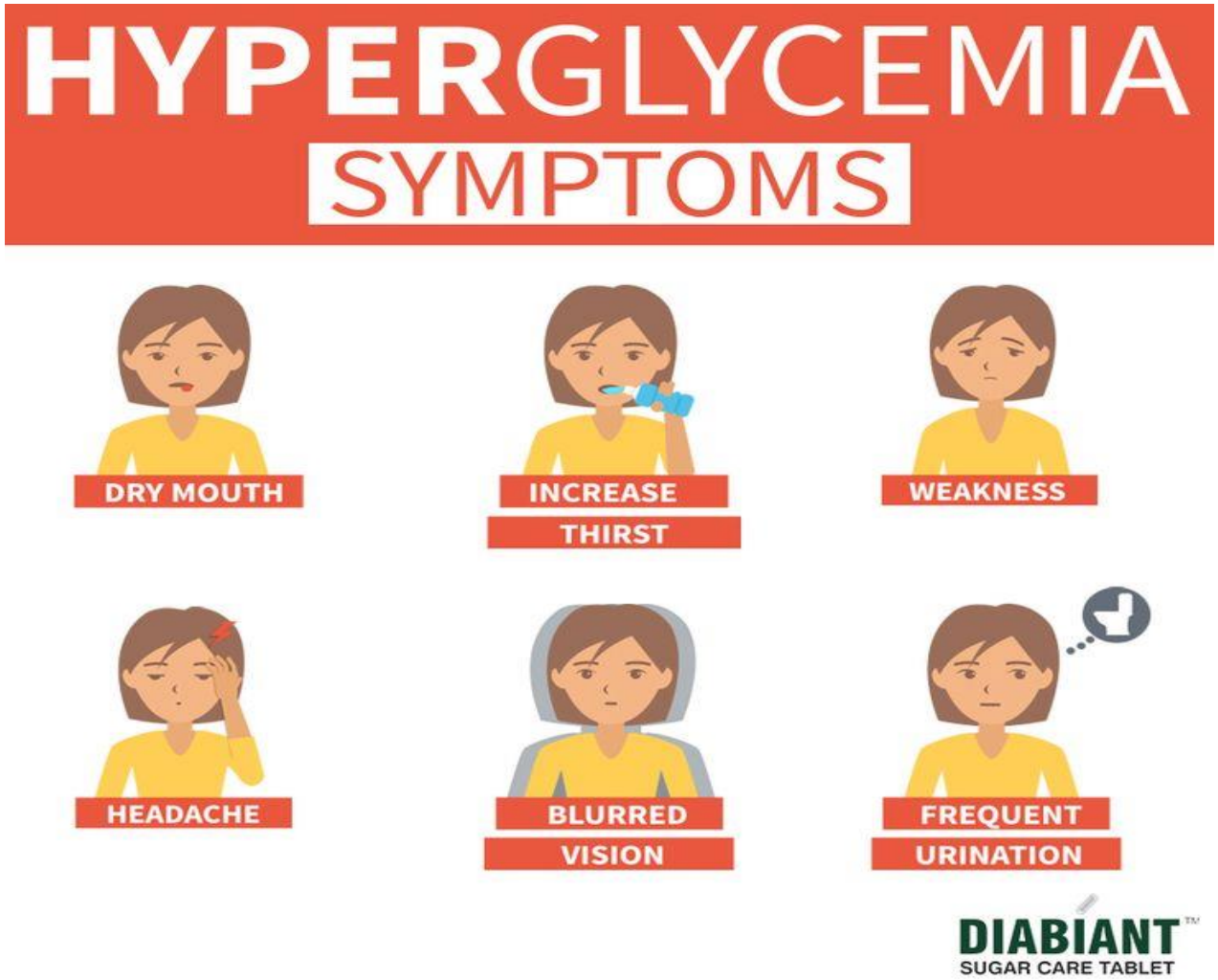
Treatment of Hyperglycemia

- Check blood glucose.
- Use sliding scale insulin.
- Check ketones as needed.
- Determine and treat cause.
- If blood glucose is >180 for 2 days, call health care provider (H C P).
- Call H C P if ill or vomiting.

Hypoglycemia

- Blood glucose <70
- Causes
  - Too much insulin
  - Exercise
  - Not enough food

HYPERGLYCEMIA MNEMONIC



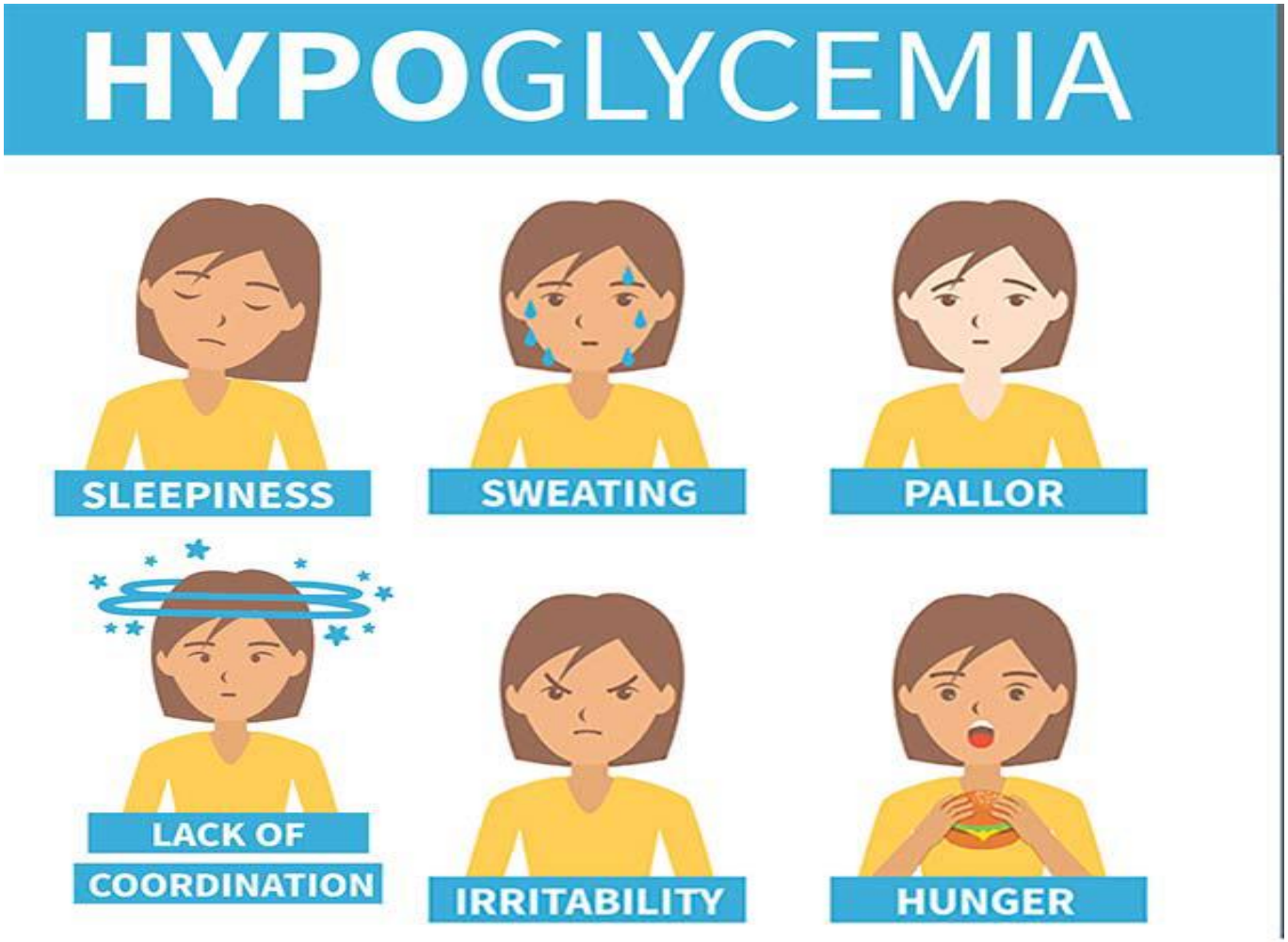
Symptoms of Hypoglycemia

- Headache
- Hunger
- Fight or flight
  - Shaky
  - Cold sweat
  - Palpitations
- Neuroglycopenia
  - Irritability
  - Confusion
  - Seizures, coma
- CAUTION
  - Autonomic neuropathy = no symptoms

Treatment of Hypoglycemia

- Check blood glucose.
- Administer 15 to 20 gram fast-acting carbohydrates.
- Recheck in 15 minutes.
- Repeat as needed.
- Snack if longer than 1 hour until meal.

Hypoglycemia Mnemonic



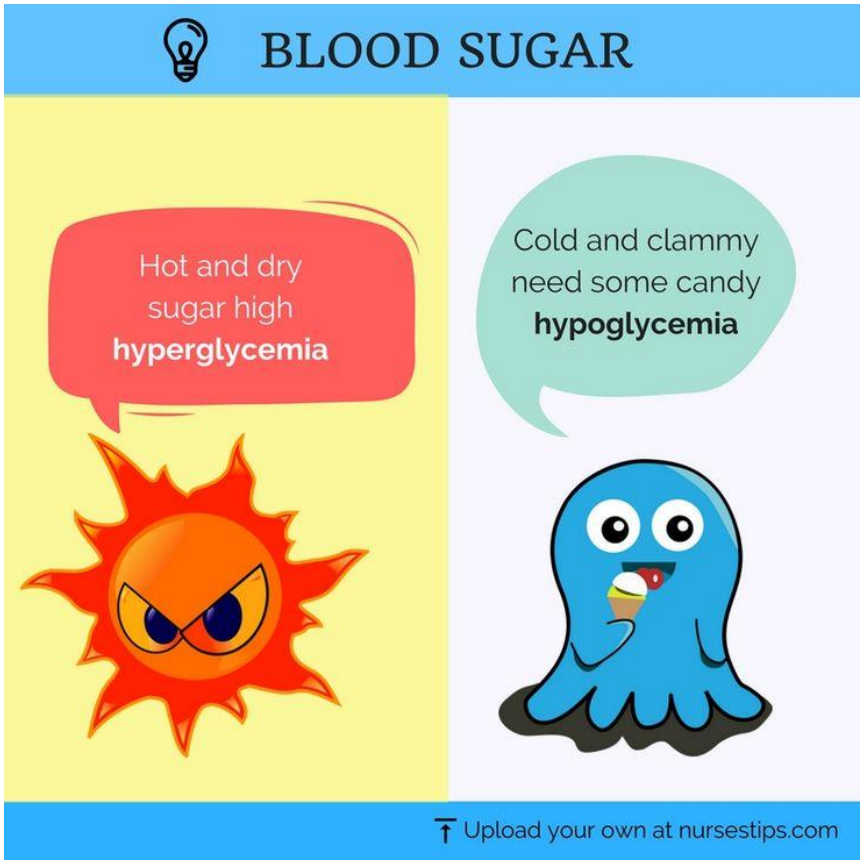
Fast Sugars

- 4 ounce orange juice
- 6 ounce regular (not diet) soda
- Miniature box of raisins
- Commercial glucose tablets
- 6 to 8 life savers

Acute Treatment

- IV dextrose 50%
- SQ glucagon
- Glucose tables – *if patient is able to swallow*

Comparing Hypo/hyperglycemia



Diabetic Ketoacidosis

- Causes
  - High blood glucose
    - Most common in type 1
  - Stress
  - Illness

Diabetic Ketoacidosis (continued_1)

- Pathophysiology
  - Insulin deficiency
  - Cells starving
  - Fat breaks down
  - Byproduct of fat breakdown is ketones
  - Ketones are acidic

Diabetic Ketoacidosis (continued_2)

- Signs and symptoms
  - Flu-like symptoms
  - Symptoms of hyperglycemia
  - Kussmaul respirations
  - Fruity breath
  - Electrolyte imbalance
  - Dehydration
  - Coma
  - Death

Diabetic Ketoacidosis (continued_3)

- Therapeutic interventions
  - I V fluids
  - I V insulin drip
  - Frequent glucose monitoring
  - Electrolyte monitoring

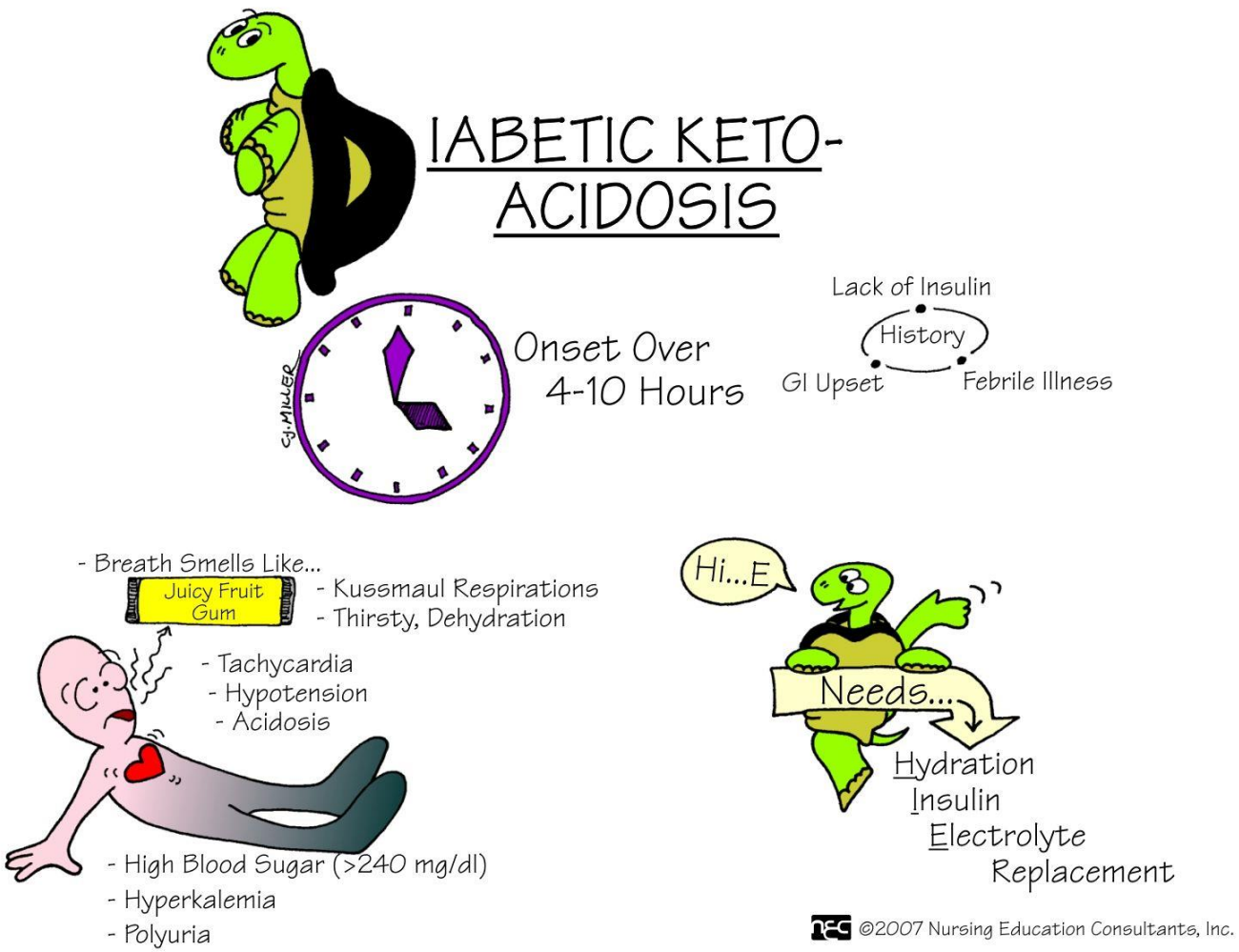
Diabetic Ketoacidosis (continued_4)

- Prevention
  - Check urine ketones.
    - Blood sugar elevated
    - During stress or illness
  - Good diabetes control!

Hyperosmolar Hyperglycemic State

- Causes
  - Hyperglycemia in type 2 diabetes
  - Stress
  - Illness
  - Most common in elderly

DKA Mnemonic



Hyperosmolar Hyperglycemic State (continued_1)

- Pathophysiology
  - Blood glucose elevated
  - Polyuria
  - Profound dehydration
  - No nausea and vomiting, so slower to get help
  - High mortality

Hyperosmolar Hyperglycemic State (continued_2)

- Signs and symptoms
  - Extreme dehydration
  - Lethargy
  - Blood glucose may be 1,000 to 1,500 milligrams per deciliter
  - Electrolyte imbalance
  - Coma
  - Death

Hyperosmolar Hyperglycemic State (continued_3)

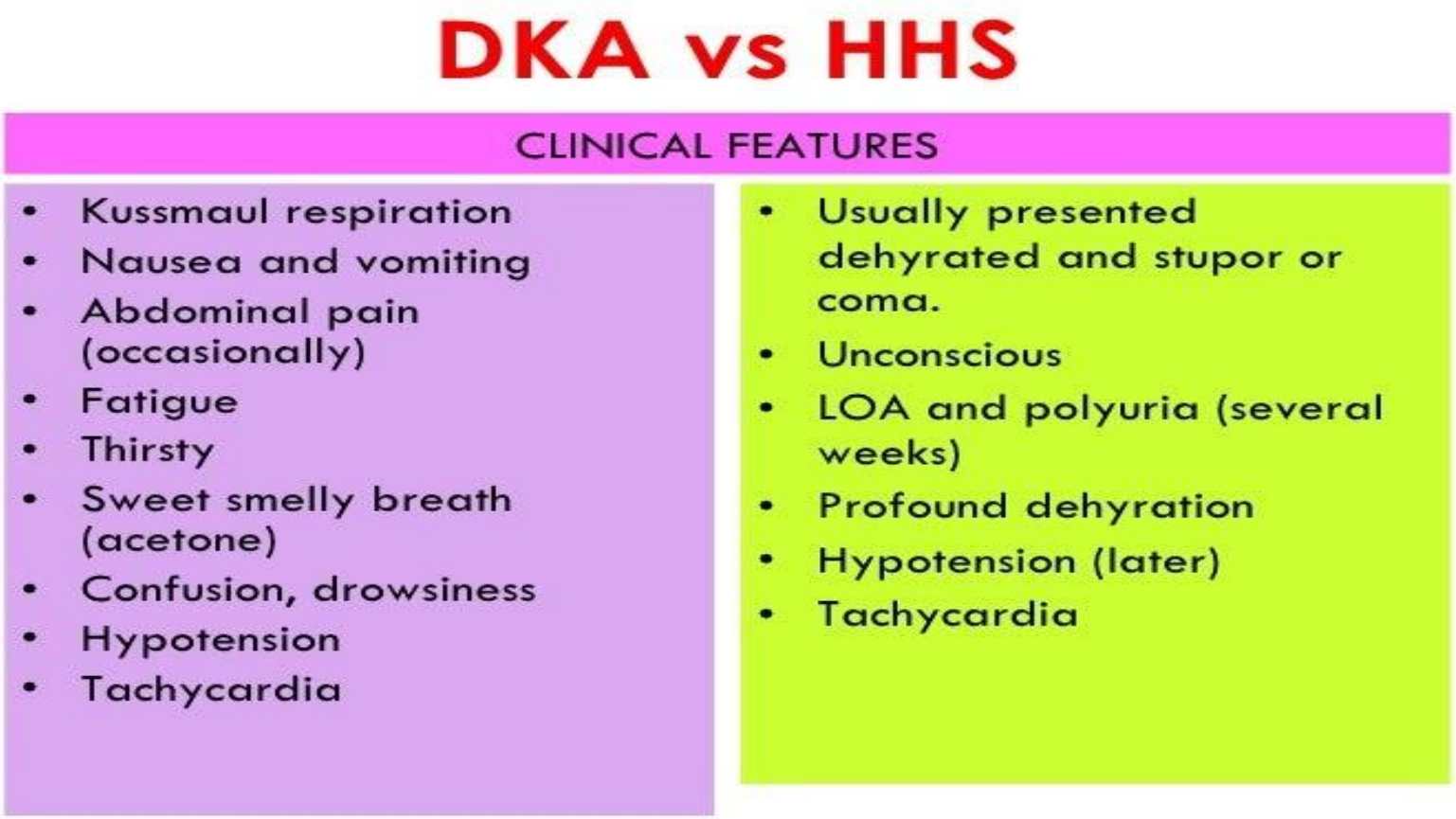
- Therapeutic interventions
  - I V fluids
  - I V insulin drip
  - Frequent glucose monitoring
  - Electrolyte monitoring

Hyperosmolar Hyperglycemic State (continued_4)

- Prevention
  - S M B G
  - If glucose rising
    - Drink fluids
    - Lower glucose

DKA vs HHS

Simple Nursing- DKA vs HHS https://youtu.be/99KimaS6tTU



Long-Term Complications

- Macrovascular changes
  - Stroke
  - Heart attack
  - Peripheral vascular disease
- Microvascular changes
  - Retinopathy
  - Nephropathy

Long-Term Complications (continued)

- Neuropathy
- Infection
- Foot problems

Diabetic Foot Ulcer

Foot Care

- Inspect feet daily.
- Wash and dry feet daily.
- Wear well-fitting shoes.
- Protect feet from injury.
- Avoid crossing legs.
- Use caution with nail care.
- See H C P immediately if lesion develops.

Care of Patient Undergoing Surgery

- Frequent glucose monitoring
- Sliding scale insulin or insulin drip
- Maintain glucose 140 to 180 milligrams per deciliter in critically ill.

Nursing Diagnosis

- *Risk for Unstable Blood Glucose Level*

Diabetes Self-Management Education

- Disease process and treatment
- Nutrition therapy
- Exercise
- Medications
- S M B G
- Acute complications
- Chronic complications
- Psychosocial adjustment
- Health promotion

Reactive Hypoglycemia

- Overreaction of pancreas
- Low glucagon levels
- Low blood glucose
- Sympathetic “fight-or-flight” response
- Therapeutic interventions
  - Frequent small meals
  - High-protein, low-carbohydrate diet

Review Question

What is a desirable premeal blood glucose for a patient with diabetes?

1. 70 to 100 milligrams per deciliter
2. 70 to 130 milligrams per deciliter
3. 100 to 130 milligrams per deciliter
4. 140 to 180 milligrams per deciliter

Review Question Answer

Correct Answer: **2**

Review Question (continued_1)

What are risk factors for type 2 diabetes?
Select all that apply.

1. Obesity
2. Heredity
3. Islet cell antibodies
4. Metabolic syndrome
5. Insulin resistance

Review Question Answer (continued_1)

Correct Answer: **1, 2, 4, 5**

Review Question (continued_2)

Which patient should be monitored for Kussmaul respirations?

1. Patient with type 1 diabetes out of control
2. Patient with new diagnosis of type 2 diabetes
3. Patient with metabolic syndrome
4. Patient with gestational diabetes

Review Question Answer (continued_2)

Correct Answer: **1**

Review Question (continued_3)

What are classic symptoms of diabetes mellitus? ***Select all that apply.***

1. Polymorphia
2. Polycythemia
3. Polyuria
4. Polydipsia
5. Polyphagia

Review Question Answer (continued_3)

Correct Answer: **3, 4, 5**

Review Question (continued_4)

What meal plan is best for a patient with reactive hypoglycemia?

1. Plate method
2. Low fat, low protein
3. Low carbohydrate
4. Frequent small meals

Review Question Answer (continued_4)

Correct Answer: **4**