A Spoonful of Sugar: Hypoglycemia in the Critically Ill

Leon Chen, DNP, AGACNP-BC, FCCP, FAANP, FCCM
Clinical Program Manager, Research and Simulated Learning
Advanced Practice Provider, Critical Care Center
Department of Anesthesiology and Critical Care Medicine
Memorial Sloan Kettering Cancer Center

Associate Professor of Nursing
Columbia University School of Nursing

Case

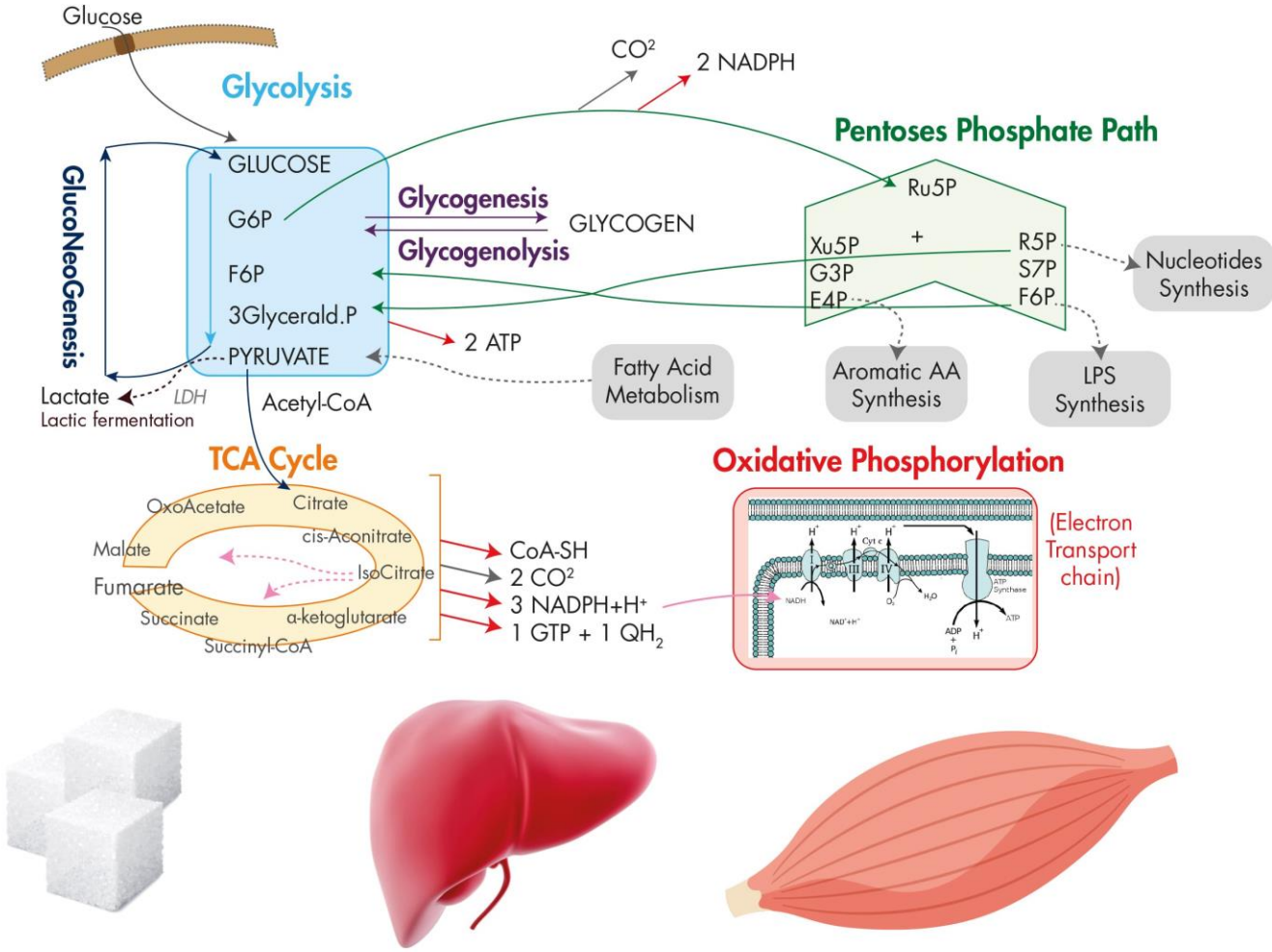
50-year-old man with a history of IDDM, chronic pain (on opioids), pancreatic neuroendocrine tumor, currently undergoing chemotherapy, brought to UCC via EMS after being found unresponsive in his room by family members. Received naltrexone in the field without effect. Fingerstick in the field was “incalculable”. Received 2 ampules of D50 with some improvement in mental status. Encephalopathic once again in the UCC and FS was incalculable again despite repeated administration of D50. Placed on a D30 infusion and was admitted to ICU for further care.

Definition and Classification of Hypoglycemia

- Blood glucose level below 70 mg/dL (3.9 mmol/L)
- Prompt recognition and treatment
- Severe complications
- Classification
  - Mild: 55-69 mg/dL (3.0-3.8 mmol/L) - symptomatic, self-treated
  - Moderate: 40-54 mg/dL (2.2-2.9 mmol/L) - symptomatic, assistance required
  - Severe: <40 mg/dL (<2.2 mmol/L) - unconscious, seizures, or coma

Physiology of Glucose Metabolism

- Glucose sources
- Glucose utilization
- Hormonal regulation
- Glycolysis, gluconeogenesis, and glycogenolysis



Causes of Hypoglycemia

- Medication-induced
- Endogenous
- Non-endogenous
- Toxicological

Causes of Hypoglycemia – Medication-induced

- Insulin
- Sulfonylureas
- Other diabetes medications

Causes of Hypoglycemia – Endogenous

- Insulinoma
- Non-islet cell tumors
- Autoimmune hypoglycemia
- Hypopituitarism
- Adrenal insufficiency
- Congenital enzyme deficiencies

Causes of Hypoglycemia – Non-endogenous

- Critical illness
- Renal failure
- Alcohol consumption
- Prolonged fasting
- Malnutrition
- Excessive physical activity

Causes of Hypoglycemia – Toxicological

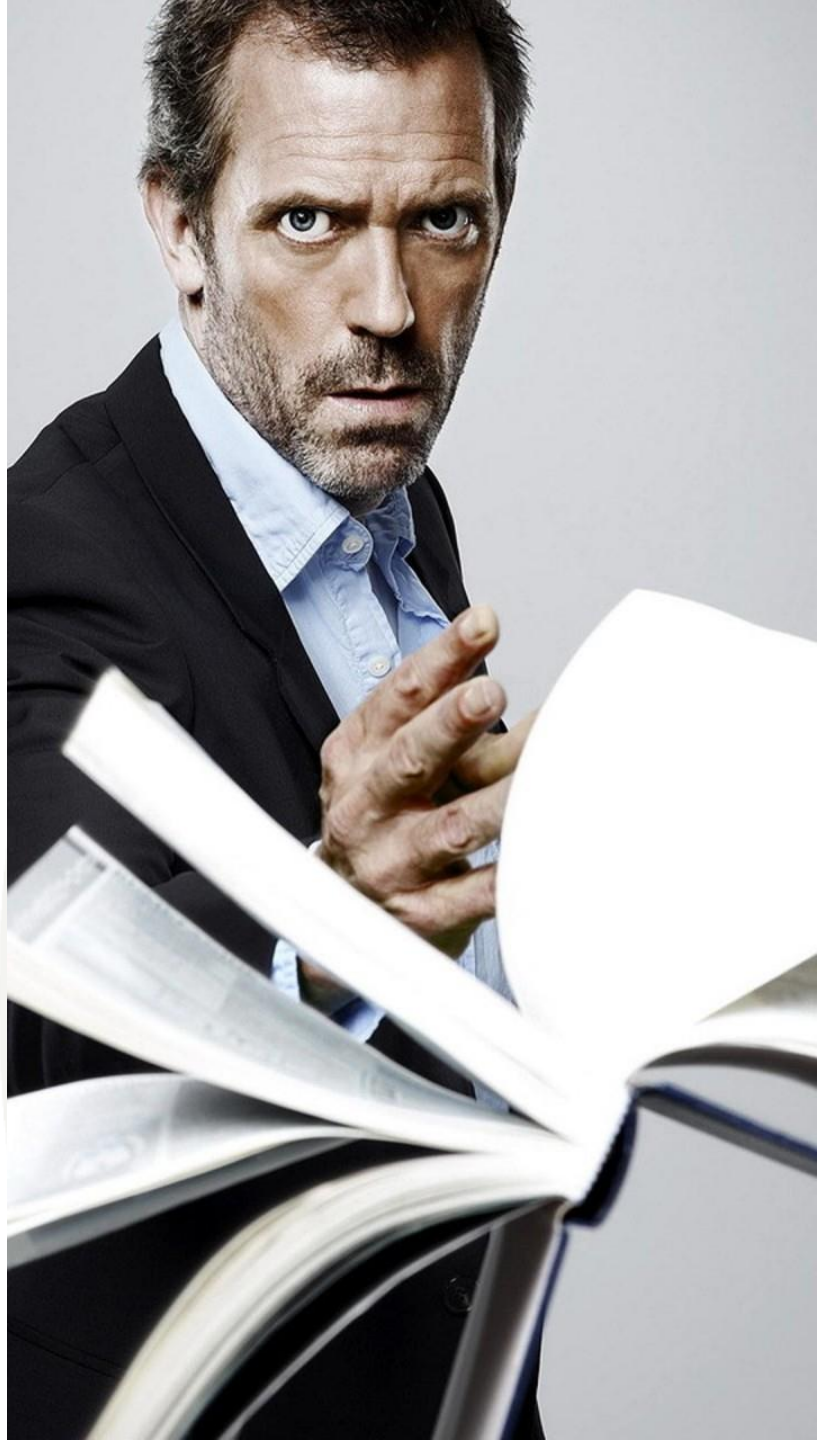
- Insulin
- Beta-blockers
- Alcohol
- Quinine
- Salicylates
- Opoioids

Clinical Presentation

- Autonomic symptoms
- Neuroglycopenic symptoms
- Hypoglycemia unawareness

Diagnostic Approach - Overview

- Clinical assessment
- Laboratory evaluation
- Focused investigations



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Diagnostic Approach – Clinical Assessment

- Medical history
- Dietary habits
- Exercise routine
- Alcohol consumption

Diagnostic Approach - Laboratory Evaluation

- Blood glucose levels
- Complete blood count
- Basic metabolic panel
- Liver function tests
- Coagulation profile
- Additional tests (e.g., cortisol, thyroid-stimulating hormone, insulin levels, C-peptide, sulfonylurea screen)
- Comprehensive drug screen

Diagnostic Approach - Imaging and Specialized Tests

- Abdominal CT or MRI
- Endoscopic ultrasound-guided fine-needle aspiration
- Dynamic hormonal tests (e.g., ACTH stimulation test, insulin tolerance test)

Management Principles

- Raise blood glucose levels
- Address underlying cause
  - Adjust medications (e.g., insulin, sulfonylureas)
  - Treat endocrine disorders (e.g., insulinoma, adrenal insufficiency)
  - Address non-endogenous factors (e.g., critical illness, alcohol consumption, malnutrition)
  - Manage toxicological causes (e.g., drug overdose, antidotes, supportive care)
  - Collaborate with relevant specialists when needed
    - Endocrinologists, toxicologists, oncologists, etc.

Back to Case

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Summary and Key Takeaways

- Recognition
- Understanding causes
- Prompt management


Any
Question