Endocrine

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Endocrine

I. INTRODUCTION

Disorders of the Endocrine System are Related to Either an Excess or a Deficiency of a Specific Hormone or Defect at its Receptor Site.

PCCN Test Plan

*Endocrine, GI, Heme & Renal: 18%

- Diabetes Mellitus
- Diabetic Ketoacidosis
- Hyperglycemic Hyperosmolar Syndrome (HHS)
- Hypoglycemia
- Metabolic Syndrome

Every Cell in the Body is Under Endocrine Influence

II. DIABETES MELLITUS

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Type I</th>
<th>Type II</th>
</tr>
</thead>
<tbody>
<tr>
<td>Etiology</td>
<td>Destruction of beta cells</td>
<td>Insulin resistance</td>
</tr>
<tr>
<td>Prevalence</td>
<td>10-15%</td>
<td>80-90%</td>
</tr>
<tr>
<td>Insulin</td>
<td>No insulin production</td>
<td>Insulin deficiency and/or resistance</td>
</tr>
<tr>
<td>Age</td>
<td>Before age 35</td>
<td>After age 35</td>
</tr>
<tr>
<td>Onset</td>
<td>Rapid</td>
<td>Gradual</td>
</tr>
<tr>
<td>Ketosis</td>
<td>Common</td>
<td>Uncommon</td>
</tr>
<tr>
<td>Glucose Goal</td>
<td>Fasting 100-125mg/dl, Pre-prandial 70-130, Post-prandial &lt;180, Hgb A1C &lt; 6%</td>
<td>Same</td>
</tr>
<tr>
<td>Signs &amp; Symptoms</td>
<td>Polyuria, Polydipsia, polyphagia</td>
<td>Polyuria, Polydipsia, Polyphagia, Blurred vision, Fatigue</td>
</tr>
<tr>
<td>Treatment</td>
<td>Diet &amp; weight management, Exercise, Glucose control, Insulin</td>
<td>Diet &amp; weight management, Exercise, Glucose control, Oral medications, GLP-1 agonist injectables (exenatide, liraglutide), Insulin</td>
</tr>
</tbody>
</table>
Severe Hyperglycemia • Diabetic Ketoacidosis • Hyperglycemic Hyperosmolar Non Ketotic Syndrome

Complications of Diabetes Mellitus (increased risk of)

a. Stroke
b. Retinopathy, cataracts, blindness
c. Heart Disease
d. Vascular Disease (arterial and venous)
e. Hypertension
f. Renal Insufficiency/Failure/Disease
g. Peripheral neuropathy
h. Immunosupression (increase risk of infection)

Treatment

a. Nutrition: balance diet – primarily low carb and calorie
b. Exercise: improves insulin utilization and increases metabolism
c. Insulin:

<table>
<thead>
<tr>
<th>Insulins</th>
<th>Type</th>
<th>Brand</th>
<th>Onset</th>
<th>Peak</th>
<th>Duration</th>
<th>Pearls</th>
</tr>
</thead>
</table>
|          | Very Rapid| Novolog (Aspart) | < 15 min | 30min – 2 hr | 3-5 hr   | “Seefood”
|          |          | Humalog (Lispor)  |          |              |          | MUST take w food.
|          |          |                  |          |              |          | Used to Correct                            |
|          | Rapid    | Humulin R (regular) | 30-60 min | 2-4hr      | 4-8hr    | Can be used for IV infusion
|          |          | Novolin R (regular) |       |             |          | Meal time dosing                           |
|          | Intermediate | NPH             | 2-4hr   | 4-12hr      | 12-16hr  | Basal dosing                               |
|          |          | Humulin N       | 1-4hr   | 4-14hr      | 15-25hr  |                                              |
|          |          | Novolin N Lente |         |             |          |                                              |
|          |          | Lumulin L       |         |             |          |                                              |
|          |          | Novolin L       |         |             |          |                                              |
|          | Long     | Lantus (glargine) | 1-2hr   | No real Peak | 24hr    | Basal dosing                               |
|          |          | Levemir (detemir) |         |             |          |                                              |

Acute Hypoglycemia

Serum Glucose ≤ 50mg/dL

**Causes**
a. Too Much Insulin
b. Not Enough Calories
**Signs & Symptoms**

a. Tachycardia
b. Δ LOC: Irritable, Confused, Unconscious
c. Skin: Pale, Cool, Clammy
d. Seizures
e. Blurred Vision

**Treatment**

a. Give Glucose
b. Enteral
c. Parental (if BG < 20mg/dL)
d. Determine Cause

**Diabetic Ketoacidosis (DKA)**

**Diagnosis**

a. Metabolic derangement resulting from absolute or relative insulin deficiency
b. Blood Glucose > 500mg/dl
c. pH < 7.32
d. HCO$_3^-$ < 15mEq/L
e. Increase Anion Gap
f. + Ketones in Urine
g. Azotemia

**Signs & Symptoms**

a. Hypotension
b. Tachycardia
c. Tachypnea
d. Kussmaul’s Respirations
e. Decreased Skin Turgor
f. Dry Mucous Membranes
g. Abdominal Pain, Nausea & Vomiting

**Fluid Therapy**

a. Restore Circulating Volume
b. 1-2 L of Isotonic Saline in 2 hr
c. D$_5$.45%NS after BS down to 250mg/dl
d. May get 8-10L in 1$^{st}$ 24 hr

**Drug Therapy**

a. Continuous IV or Bolus Regular Insulin
b. Lower 100mg/dl/hr
c. Monitor K$^+$ levels Carefully
d. Bicarbonate for Severe Acidosis
Hyperglycemic Hyperosmolar Syndrome (HHS)
A hyperosmolar state from severe hyperglycemia without ketosis. Predominantly older adults and type II DM.

**Diagnosis**
- a. Glucose > 800mg/dL
- b. Osmolality > 350mOsm
- c. Ketones neg
- d. pH > 7.3
- e. Severe Dehydration

**Fluid Therapy**
- a. 2 L of Normal Saline in 1 hr
- b. Followed by Fluid Replacement

**Drug Therapy**
- a. Continuous IV Regular Insulin (10U/hr)
- b. Monitor K⁺ Closely

**III. METABOLIC SYNDROME**
A term used for a collection of physical assessment findings that carry with them an increased risk of developing DM and cardiovascular disease. A dx is confirmed when a person has three or more of the following conditions.
- a. Fasting Blood Glucose ≥ 100mg/dL
- b. HDL < 40mg/dL in Men, < 50 mg/dL in Women
- c. Triglycerides ≥ 150mg/dL
- d. Waist Circumference ≥ 102cm (41in) in Men, ≥ 88cm (35in) in Women
- e. SBP ≥ 130mmHg or DBP ≥ 85mmHg, or on medication for HTN