The Insulin Connection

8:30 A.M.–11:30 A.M. Morning Session

INSULIN: THE BRAIN-BODY CONNECTION

Insulin Resistance (IR)

- What does it mean to be insulin resistant?
- The molecular and physiologic basis of IR: pre-receptor, receptor, postreceptor defects.
- Obesity and inactivity - powerful modulators of IR.
- Role of prenatal programming – setting the stage for IR in the womb.

The Brain –The Command Center

- The insulin-brain connection: a key regulator of glucose and energy homeostasis.
- Understanding how insulin signaling in the CNS effects the development of obesity and metabolic problems.
- Leptin and insulin: connecting central imbalances with body fat alterations.

Diagnosis: Insulin Resistance Syndrome (IRS) vs. Metabolic Syndrome

- The connection between insulin production and brain cell regulation. Could Alzheimer's be a form of diabetes?

Obesity and Insulin Resistance

- The fat cell - a new endocrine organ.
- Fat cell hormones: metabolic controllers of insulin resistance (e.g. adiponectin and retinol binding protein 4).
- Visceral vs. subcutaneous fat. Understanding ectopic fat storage. Lipotoxicity - a major perpetuator of IR.
- Abdominal fat and chronic inflammation – a major culprit underlying IR.

THE CLINICAL IMPACT OF INSULIN RESISTANCE

- Type 2 Diabetes: Current AACE and ADA guidelines for diagnosis and management.
- Cardiometabolic Risk: Hyperinsulinemia and dyslipidemia, hypertension, clotting, and endothelial dysfunction.
- Cancer: Relationship between IR and malignancy. A look at the mechanisms of action.
- Cognitive Impairment and Alzheimer's Disease
  - Insulin and normal brain function. Link between IR and brain inflammation and β-amyloid accumulation.
- Polycystic Ovary Syndrome:the most common metabolic abnormality in young women today.
- Fatty Liver Disease NAFLD: the link between IR and fatty liver.
- Obstructive Sleep Apnea Syndrome: Intermittent hypoxia and whole-body insulin resistance.

11:45 A.M.–2:45 P.M. Afternoon Session

IMPROVING INSULIN SENSITIVITY- REDUCING CHRONIC DISEASE

Weight Loss

- Physiological barriers – metabolic, neuroendocrine, autonomic and behavioral changes that favor weight regain.
- The 5% effect - reducing insulin levels and improve insulin sensitivity.
- Prevention and management of childhood obesity: AAP recommendations.

Diet

- What is the optimal diet for improving insulin resistance?
- Effects of macronutrient content (CHO, fat, protein) and specific dietary components (saturated and trans fatty acids, fiber, glycemic load, high fructose corn syrup, alcohol).
- The anti-inflammatory diet. Diet modification to reduce postprandial dysmetabolism.

Physical Activity

- Improvement in insulin sensitivity even without weight loss. Mechanisms.
- How much and what type of exercise do we need?

Sleep Hygiene and Stress Management

- How sleep patterns effect glucose and insulin levels during the day and night.
- Effects of sleep and sleep deprivation on interleukin-6, growth hormone, cortisol, and melatonin levels.

Pharmacologic Interventions

- Insulin sensitizing medications: metformin and thiazolidinediones. Glitazones and heart failure?
- Anti-obesity therapies that target appetite, energy storage and energy utilization.
- Existing therapies and potential strategies on the horizon (CB-1 antagonists, NPY antagonists, etc.).
- Overcoming central leptin resistance: intranasal leptin and leptin receptor agonists.

Surgery/Bariatric Approaches

- Mechanisms for weight loss. Benefits vs. risks.
- Long-Term effectiveness of exercise therapy in patients with osteoarthritis of the hip or knee.
- Acupuncture as an adjunct to exercise based physiotherapy for osteoarthritis of the knee: A look at the research.
- Effects of obesity on joint biomechanics. Dietary recommendations for joint preservation.

Course Objectives

- Identify the physiological actions of insulin on the body and in the brain.
- Discuss the clinical impact of insulin resistance.
- Identify pharmacologic interventions for treating insulin resistance.
- Design a lifestyle intervention plan that can effectively improve insulin sensitivity and utilization.