How Does Body Maintain Normal Blood Sugar?

Insulin Resistance and Its Consequences

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What the hell is Homeostasis?

I HAVE NO IDEA!

Well it's the way the body controls its systems

WHAT LIKE THOUGH?
Symptoms of High Sugar (Diabetes)

- Frequent urination.
- Sudden weight loss.
- Wounds that won't heal.
- Always hungry.
- Sexual problems.
- Blurry vision.
- Vaginal infections.
- Numb or tingling hands or feet.
- Always thirsty.

Symptoms of Low Sugar (Hypoglycemia)

- Headachy
- Sweaty
- Confused
- Shaky
- Dizzy
- Grumpy
Blood Sugar Homeostasis

Energy Sources and Stores

Stimulus: Blood glucose level rises after eating.

Homeostasis: 90 mg glucose/100 mL blood

Stimulus: Blood glucose level drops below set point.

Pancreas releases insulin – cells uptake sugars

Pancreas releases glucagon – liver releases sugars
Pancreas

- **Duodenum**
- Bile duct from liver
- Stomach
- **Hormones** (insulin, glucagon)
- Blood
- Duct cells secrete aqueous NaHCO₃ solution
- Acinar cells secrete digestive enzymes
- Endocrine portion of pancreas (Islets of Langerhans)
Amount of Insulin We Need Depends on What We Eat

Meals containing sugars and simple carbohydrates require more insulin
Amount of Insulin We Need also Depends on Our Body

Presentation of Insulin Resistance

<table>
<thead>
<tr>
<th></th>
<th>Blood Sugar</th>
<th>Insulin</th>
</tr>
</thead>
<tbody>
<tr>
<td>Amount 1</td>
<td>80</td>
<td>10</td>
</tr>
<tr>
<td>Amount 2</td>
<td>80</td>
<td>30</td>
</tr>
</tbody>
</table>
Larger the Waistline, Higher the Need for Insulin (Insulin Resistance)
Skin Signs of Insulin Resistance
Insulin Response to Sugar Intake

The graph illustrates the glucose and insulin levels over time for two groups: Insulin resistant and Normal. The Insulin resistant group shows a higher peak in insulin levels compared to the Normal group. The graph also indicates that the Insulin resistant group has a slower decrease in glucose levels post-sugar intake.
INSULIN RESISTANCE

NEED for EXCESS INSULIN

PANCREAS FATIGUE

TYPE 2 DIABETES
Common Cause of Insulin Resistance in Females: PCOS

- Insulin Resistance
- Cysts in the Ovaries
Polycystic Ovary Syndrome (PCOS)

- Most common endocrine condition in women
- Affects 1 out of 16 women
  - 8% of AA; 5% of White
- Causes irregular periods
- Excess facial or body hair
Menstrual cycles are a vital sign

Andrea Dunaif, MD.
What is normal?

- More than 35 days in between two periods is considered “too long”
- One year after having their first period, 65% of adolescents have more than 10 periods / year
- Three years after, more than 90% have >10 menses / year
Age 10

Infrequent periods

Acanthosis

Weight gain

Excess Hair

Difficulty in getting pregnant
What can we do about it

• We can do a lot
  – Weight control
  – Insulin sensitizers (metformin)
  – Medicines for acne, facial hair and body hair
Clinical Findings of PCOS
Effects of Weight Loss on Fertility

- 33 PCOS patients
- 25 lost 5% weight
- 11 of these lost >10%
- 15 women ovulated
- 10 became pregnant
Cysts in the ovaries decreased with weight loss

- Ovarian volume decreased by 18% with 5% weight loss, 25% with 10% weight loss

- Follicle number decreased from 23.5±11.5 to 19.9 ±9.9 with 5%, to 18.3 ±7.5 with 10% weight loss
Healthy Ways to Decrease Insulin Resistance

• Decrease simple sugar intake
  – DO NOT DRINK SWEETENED DRINKS
• Don’t overeat
• Walk, do sports
  – 150 min/wk to maintain weight
  – 250 min/wk to lose weight
• Talk to your parents and doctor
  – If you don’t have monthly periods
  – If you are getting excess hair
Treatment of Facial Hair
Suppress ovarian androgen production – contraceptives
Treatment of Facial Hair

Block androgen receptor (spriolactone)

Block conversion of testosterone to DHT (finasteride)
Management Planning

Oral Contraceptives

Lipids
Insulin resistance

Pregnancy

Facial Hair

Diabetes
Age

10

20

30

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