Nutrition Related Hormones and Aging

Lifestyle Affects Aging
- Sedentary Lifestyle
- Poor food choices
- Use of Alcohol
- Use of Tobacco Products
- Not understanding consequences
- Lack of motivation to change

Aging and Health

Health Factors in Nutrition
- Lifestyle
- Hormones

Common Health Issues in Geriatric Populations Related to Nutrition
- Malnutrition
  - Leptin and Ghrelin related to hunger and satiety
- Diabetes mellitus (Type 2 Diabetes)
  - Insulin related to glucose levels
- Osteoporosis
  - Calcium related to sex hormones and loss of bone density
Endocrine System is Key to Regulating Hormones

• The hypothalamus coordinates endocrine activities by inhibiting or stimulating endocrine cells in the pituitary gland.

• The pituitary gland releases regulatory hormones.

What is a Hypothalamus and why is it important for Endocrine function?

• Hypothalamus is stimulated by feedback from endocrine glands that release hormone-like substances called releasing factors.

• Releasing factors turn on a specific endocrine gland to make and release a certain type of hormone

• Inhibiting factors prevent the uptake of neurotransmitters.

• Example of the relationship between the hypothalamus and pituitary involvement: Body temp Regulation

What is an Endocrine Gland?

• An organ that secretes a hormone directly into the bloodstream to regulate cellular activity of certain other organs

• There are five major endocrine glands in the human body: the pituitary, the gonads, the adrenals, the thyroid, and the parathyroids

• Many organs found in other body systems have secondary endocrine functions

Malnutrition in Aging Caused By Hormonal Changes

• Hormones responsible for hunger and satiety

  – Leptin
    • Unlike other hormones secreted by endocrine cells found in one location, leptin is excreted by adipose cells found throughout the body
    • Binds to neurons in the hypothalamus that deal with emotion and appetite resulting in the sensation of satiety thereby suppressing appetite.
    • Drugs that inhibit leptin production, i.e. antidepressants

  – Ghrelin
    • Secreted by the cell lining located in the fundus of the stomach
    • Produces the sensation of hunger
    • Ghrelin production decreases with age
    • Insulin inhibits the reuptake of ghrelin
Lifestyle Factors Responsible For Malnutrition

- Geriatrics usually waste away
  - No taste buds
  - Low energy
  - Don’t remember to eat
  - Food is just too tough to eat

- Dysphagia
  - Inability to eat due to weakened muscles in the throat making swallowing a lot harder or even impossible.

Pancreas, Alpha/Beta Cells and Insulin

- Organ in the digestive and endocrine system
  - Exocrine function
    - Produces pancreatic juice for the digestive system
  - Endocrine function
    - Produces insulin for the breakdown of glucose in the bloodstream

What is Insulin?

- Polypeptide hormone regulates metabolism in carbohydrates.
- When a cell has insulin attached to its surface, the cell activates other receptors designed to absorb glucose (sugar) from the blood stream into the inside of the cell.

Impact of High Glucose Diet

- Diets high in simple sugars exhaust the pancreas from further producing insulin in some people, resulting in diabetes mellitus (diabetes type 2).
  - If a person consumes more simple sugars and carbohydrates rather than proteins this means that the body is then compensating for the high levels of glucose. Over a long period of time this will result in diabetes mellitus.

- Lack of insulin kills off blood vessel
Estrogen, Testosterone and Osteoporosis

• Over age 45, an estimated 29% of women and 18% of men have osteoporosis.
• Estrogen is excreted by ovary follicles.
• Estrogen deficiency following menopause is correlated with a rapid reduction in bone mass density.
• Testosterone deficiency also associated with loss of bone mass density.
• This, plus the increased risk of falling associated with aging, leads to fractures of the wrist, spine and hip.

Nutrition, Lifestyle, and Osteoporosis

• Lastly, calcium and/or vitamin D deficiency from malnutrition increases the risk of osteoporosis.
• Other significant factors leading to the onset of osteoporosis include
  – smoking cigarettes
  – low levels of physical activity (weight bearing exercise)
  – family history.

Calcium, Vitamin D and Osteoporosis

• Bone remodeling is heavily influenced by nutritional and hormonal factors. Calcium and vitamin D are nutrients required for normal bone growth.
• Parathyroid hormone regulates the mineral composition of bone, with higher levels causing resorption of calcium and bone.
• Glucocorticoid hormones cause osteoclast activity to increase, causing bone resorption.
• Calcitonin, estrogen and testosterone increase osteoblast activity, causing bone growth.
• The loss of estrogen following menopause causes a phase of rapid bone loss. Similarly, testosterone levels in men diminish with advancing age and are related to male osteoporosis.

Common Health Issues in Geriatric Populations Related to Nutrition

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Hormones and Nutrition: Adolescence.

- Hormonal changes in girl.
- Hormonal changes in boys.

Hormonal Changes in Girls:
- Hormonal changes begin to occur in girls from age 10 to 11.
- Fat assumes a larger portion of body fat. Girls tend to gain an average of 15 lbs.
- The amount of calories consumed changes. For example, a 15 year old girl should only consume 1700 kcalories, compared to the necessary 2000 kcalories of a 10 year old, in order to maintain a healthy weight.

Hormonal changes in girls
- On average females grow 6 inches during puberty.
- Girls begin the growth process sooner, and attain shorter height and lower weights, therefore the energy they require to grow needs to peak earlier and decline earlier than boys.
- These physical changes are cause by hormonal changes in the body.
Hormonal changes in girls

- The pituitary gland, located in a small bony cavity at the base of the brain, sends out a message to the body telling it to start releasing hormones such as estrogen and progesterone that are necessary for growth and development.

Hormonal changes in girls:

- Vitamins:
  - The need for vitamins increases during puberty. The recommendation for many vitamins, including vitamin D, is similar to that of adults.
  - Adolescents need more vitamin D to support the skeletal growth they undergo during puberty.
  - Foods high in vitamin D include fortified rice or soy beverage, fortified margarine, canned salmon; pink, canned tuna; light.

- Other vitamins important during puberty include vitamin B2, which is responsible for helping to process proteins, fats and carbohydrates. Vitamin B2 is also necessary for proper formation of red blood cells. It helps the body produce antibodies. And it is an important part of the processes involved with cell respiration and growth. This vitamin benefits skin, hair, finger and toenails and the connective tissues.

- Foods high in vitamin B2 include liver, spelt flour, mushrooms, venison, yogurt, soybeans, spinach, beef, and cows milk.
Hormonal changes in girls:

- Iron:
- Females need a higher level of iron as they start to menstruate.
- The need for iron starts the increase at age 14. In addition, iron needs to increase during the adolescent growth spurt whether or not it happens before or after the age of 14. Girls need an extra 1.1 milligram of iron daily. However, the recommended increase of iron for girls does not consider the loss of iron during menstruation.

Hormonal changes in girls.

- Calcium:
- Low calcium intake during growth may hinder the development of peak bone mass, which is extremely important to protect you from fractures and osteoporosis.
- Females are at greatest risk because their calcium intakes tend to decline the most during puberty, which is a crucial time for growth.
- It is extremely important to get adequate amounts of calcium and physical activity during the growth process to protect your bones.

Hormonal changes is girls

- Therefore, the recommended amount of iron a girl should consume daily if they get their first period under the age of 14 is 2.5 additional milligrams.
- Iron deficiency is most common with adolescent girls.
- Foods high in iron include beef, lamb, ham, chicken, liver, raisins, peas, beans, figs, barely, oatmeal, rice and potatoes.

Hormonal changes in girls

- Foods high in calcium include milk, yogurt, cheese, beans, fortified cereal, bokchoy, kale, mustard greens, tofu and almonds.
Hormonal changes in girls

- Progesterone is a hormone produced by the adrenal glands, the gonads, the brain and during pregnancy, the placenta.
- Progesterone is a C-21 steroid hormone involved in the menstrual cycle and pregnancy.
- Progesterone can be affected by nutrition. If an adolescent does not intake the correct amount of nutrients, they will be progesterone deficient.

Hormonal changes in boys.

- In general, the growth spurts of males begin at age 12 to 13.
- Lean body mass (i.e. muscles and bones) increases much more than females.
- Boy’s energy levels need to be particularly high because they grow faster and develop a greater amount of lean body mass. A 15 year old boy will need a whopping 3500 kcalories to sustain a healthy weight.
- Boys tend to grow 8 inches taller and gain 45 lbs. during the growth process.

Hormonal changes in girls

- Estrogen is a hormone produced by the follicles in the ovaries.
- Estrogen is a steroid compound that functions primarily as the female sex hormone.
- Estrogen can be affected by nutrition. If an adolescent does not intake the recommended nutrients, their estrogen levels will be deficient resulting in more bad cholesterol, less good cholesterol, low blood pressure, depression, bone loss and other problems later in life.

Hormonal changes in boys

- the pituitary gland, located in a small bony cavity at the base of the brain, sends out a message to the body telling it to start releasing hormones such as testosterone that are necessary for growth and development.
Hormonal changes in Boys.

- Vitamin D is important for males during adolescence because it helps support skeletal growth which is crucial during puberty.
- Foods that can help give boys adequate amounts of vitamin D are fish, milk, margarine, pudding, cereal, liver, and eggs.

Hormonal changes in boys.

- Iron
  - The needs for iron increase in both males and females, but for different reasons.
  - Males need the iron for the development of lean body mass.
  - Boys during growth need an extra 2.9 milligrams per day above the recommended amount for their age.
  - After their adolescent growth spurt their iron needs go back down.

Hormonal changes in boys.

- Calcium.
  - Low calcium intakes during times of active growth especially if paired with physical activity, may compromise the development of peak bone mass, which is considered the best protection against adolescent fractured and adult osteoporosis.—Whitney and Rolfes. It is important to increase your intake of milk products during puberty.

Hormonal Changes in Boys.

- Testosterone is a steroid hormone produced in the testicles. It is the principle male sex hormone and anabolic steroid.
  - It is derived from cholesterol.
  - Testosterone is in charge of all the physical changes a boy goes through.
  - Testosterone also affects the brain. There are definite differences between the male and female brain. Testosterone is responsible for making the brain masculine.
  - Testosterone deficiencies in boys result in higher levels of the female hormones and more feminine characteristics.
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