What's A Body To Do?

The Physiologic Changes of Aging and the Effects on Nutrition Management

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As a presenter I have no affiliations to disclose. I am pleased to be here to discuss this very interesting topic with all of you.
8000 people in the U.S. turn 65 each day.

The prevalence of CKD is growing most rapidly in the > 60 group.

Our concern for the care of this group is warranted.
Let’s Start at the Top!
The Mouth is the Gateway for Food & Nutrition
Changes to the Bones, Teeth, Soft Tissue & Muscles with Age

- **Bone**: The alveolar bone is one of the first sites for osteoporosis with aging.
- **Teeth**: Unable to regenerate or repair & flattening of the chewing surface.
- **TMJ (transmandibular joint) changes**: Arthritis may affect this joint but simple aging may as well.
- **Oral Mucosa**: Changes may not be directly related to aging but affected by smoking and other diseases.
- **Gums**: Gingivitis, the gum recedes from the tooth
- **Oral Muscles**: Reduction in tone, #, performance & size
Effects of Disease on Structures in Mouth

- Bone Loss: Resorption and Osteoporosis
- Teeth & Gums
- Issues Regarding Dentures
  - Reduced effectiveness of chewing
  - Denture related candidiasis, stomatitis, ulcers
  - Problems with partial dentures
  - May alter retronasal olfaction and alter the satiety response.
Tongue

Main muscle for bolus formation and propulsion, involved in oral (first) stage of swallowing
Taste bud numbers not changed with age, but sensitivity can be
Nutrient deficiencies can affect the tongue, esp. iron & B vitamins
Senses of Taste, Smell & Somatosensation

- Total flavor release occurs when the tongue, jaws, cheeks and throat all work together to move food around to increase temperature and release the chemicals for “flavor.”
- There is not a direct correlation between aging and chemosensory changes.
- Nasal olfaction triggers an interest in food, once it is in the mouth it is a combination of smell, taste and “feel” that creates flavor.
- More people seek help for olfactory deficits than taste deficits.
Chemosenses: “Chemicals (e.g. tastes, odors, irritants) must reach & bind to a receptor protein found on specialized cells” for a food to have flavor. These receptors have a genetic component and are also affected by early life experience.

- Taste: Remains relatively stable in aging
- Olfaction: Declines with aging; Significant changes with Alzheimer & Parkinson Disease
- Somatosensation: Mild alterations but not significant enough to affect swallow reflex.

Changes may reduce the bitterness of some foods, e.g. broccoli, for seniors.

Fat in foods may improve food acceptance by stimulating sensation of “creaminess”.

Conditions Affecting Chemosensory Dysfunction

- Upper respiratory infection
- Head trauma
- Chronic nasal & sinus disease
- Menopause
- Neurogenerative disorders
- Systemic disease
- Toxin exposure
- Medications
- Poor oral health
What can RD do?

• Interview them & listen to complaints
• Maximize the eye appeal of food, especially for people with olfactory dysfunction. Vary textures & temperatures of foods, adding fat can improve acceptance
• Maximize flavors and reduce restrictions
• Individualize therapy
Mucous Membrane and Salivary Glands

- Mucous Membrane changes more likely due to smoking or other diseases. Makes tissue thinner, more susceptible to damage. Iron deficit may play role in canker sores.
- Modify offending agent and use softer, less acid foods until healing occurs.
- Oral cancer: 98% of cases occur in >40 years old & average age is 60. Related to smoking and alcohol intake. Poor dentition & chronic trauma & diet play a role.
Salivary Glands

• Tumors of glands
• Xerostomia: Common in elderly, related to medications, dehydration, mouth breathing, many systemic diseases e.g. depression, diabetes due to neuropathy
  Dysfunction can effect the ability to taste and swallow.
  Treatment is dependent on cause:
  Medication related: adjust medication if possible
Irreversible Xerostomia

Irreversible cause such as radiation:
  Small, frequent sips of water to moisten mouth
  Moisten food with gravy, sauce, milk
  Artificial saliva with fluoride.
  Avoid lemon glycerine swabs (cariogenic & drying) & mouthwashes with alcohol.
  Minimize alcohol, tobacco, caffeine use.
  Avoid salty, dry or acidic foods
  Chew sugar free gum with xylitol or sugar free hard candy
  Need frequent dental exams
  Use pilocarpine drops

National Kidney Foundation
Swallowing Disorders

- 40% of people in institutions are dysphagic
- Study of 77 million admissions over 2 yrs showed 4.04 : 2.4 hospital days for people with dysphagia vs. without
- Study revealed major changes in eating behavior with dysphagia
Normal Swallow

• Horizontal: Tongue, buccal muscles, jaw, digestive juices mix and masticate food and move it to the back of the throat.

• Vertical: 26 pairs of laryngeal & pharyngeal muscles move food down the esophagus
Senescent Swallow

- Presbyphagia: changes in the swallowing mechanism of otherwise healthy older adults
- Swallowing time is longer. Horizontal phase more affected than vertical.
- Normal changes but it makes 65+ more susceptible to problems when challenged, e.g. feeding tube placement
Dysphagia: Normal slowed swallow is affected by comorbid condition and swallow becomes dysfunctional.
Age-related Conditions for Dysphagia

- Inadequate preparation of the food bolus due to problems with dentition & saliva
- Medications that alter saliva, peristalsis, cognition or psychomotor status
- Diminished sensory input
- Altered jaw structure or TMJ
- Diminished muscle or tongue strength
Age-related Diseases

- Stroke: 50-75% acute stroke pts have dysphagia
- Head & Neck Injury
- Alzheimer’s and other dementia
- Parkinson’s
- Diabetes
- Cancer: surgery & chemo/radiation
Dysphagia Evaluation

• Requires evaluation by a trained specialist with interview and imaging studies.

• Observers can observe signs and symptoms that may prompt evaluation and determination of the problem area.
Dysphagia Treatment

- Compensatory: Postural, Behavioral swallowing changes, sensory awareness, environmental, adaptive equipment, diet
- Nutrition support when needed
The Gut

• There is little evidence to support any change in gut function merely due to age.

• Disease states of the elderly do impact function but this is due to the disease not aging.
GERD

- Symptoms demand quick evaluation in elderly clients
- Treatment:
  - Limited antacid use due to potential for D/C, high calcium and high magnesium
  - Use H2-receptor antagonists
  - Limited use of prokinetic agents
  - Use of proton pump inhibitors
  - Surgery
  - Diet changes
Diet Changes

- Limit fat, chocolate, alcohol, peppermint
- All coffee stimulates gastric acid secretion
- Limit alcohol and fruit drinks
- Limit large meals
- Avoid meals before bed & elevate HOB
- Avoid drugs that delay gastric emptying
Stomach

- Changes in gastric pH, delayed emptying and reduced GI blood flow occur but are not solely due to age
- Altered status may affect medication dosing
Stomach

• Atrophic gastritis: Type A & B
• Peptic Ulcer Disease: decreasing on overall population but rising for older adults. Perforation is rising. Incidence related to NSAID use.
• Altered Gastric Emptying: Liquid and mixed meal may be slowed but not significant clinically
• Dyspepsia: Important to rule out organic problems, then treat pharmacologically
Small Intestine

• Integrity is not affected by age alone.
• Motility in healthy elders is normal
• Carbohydrate absorption: no difference < 80 yr
• Fat absorption: May be slightly down but not significant, well adapted
• Protein: Turnover in tissue itself is high and older adult absorption of a high protein diet may be diminished but not significant. Intake of 1 gm/kg should be adequate
Micronutrient Absorption

• Vit C and most B vitamin absorption is not usually compromised, intake is the issue
• Folic Acid, B6, B 12 can be reduced due to diseases which occur in older age, not just aging itself
• Vit D absorption and synthesis reduced
• Reduced calcium absorption (& intake)
• Iron absorption is not reduced
Colon

- Constipation: Most common functional change of aging. Basic tx is high fiber, increased fluid (limited for renal), bulk forming laxatives, individualized plans.

- Diverticular disease: Most important morphologic change. Cause is unknown but the major diet tx is increased fiber, individualized for each person. Antibiotic therapy may be used in acute phase.
Pancreas

- Chronic pancreatitis: Usually idiopathic in older adults. Disease may be painless but may produce wt loss. Treatment is enzyme replacement as needed, low fat to reduce symptoms, vitamin replacement.

Wt loss may not occur if intake is sufficient. Protein losses should be replaced.
Pancreas & Adult Onset Diabetes

• 21% of people > 60 have diabetes
• Aging leads to reduced insulin sensitivity in muscle and adipose tissue
• Diagnosis is missed in >50% of older adults. Fasting glucose may be normal, postprandial is not.
Multifactoral Causes

- Diminished beta cell function causing reduced insulin secretion
- Failure to inhibit hepatic glucose production
- High postprandial glucagon
- Insulin resistance
- Obesity
- Lack of activity
- Increased amylin levels from pancreas
- Medications that reduce insulin sensitivity, release or action
Liver

- Changes in structure and function related to aging itself are not likely significant.
- Overall body protein synthesis is reduced and the changes in albumin synthesis may be related to a change in synthesis set point rather than dependent on intake.
- Altered drug metabolism is a major concern.
Thyroid

• Levels of hormones may seem normal but there is reduced synthesis and reduced degradation.

• Hypothyroidism < 1% in < 60 yrs but 0.5-6% in > 60 yrs.

• 7-12% of people with hyperthyroid are > 60

• Atypical presentation becomes more common with age, only 10% of those with disease were suspected on exam.

• Testing recommendations
Nutritional Aspects of Thyroid Disease

- Weight changes
- Appetite diminished in 30% of older hyperthyroid adults
- Calcium metabolism & bone deposition altered
- Altered glucose utilization
- Altered fat metabolism
- Potential alteration in Vit A & D
Other Nutrition Related Hormonal Changes

• Altered ADH secretion contribute to hyponatremia
• Age is an independent variable in the development of hypo & hypernatremia
• Water balance in elderly must be monitored
• Reduced Growth Hormone basal production and in response to stimuli
• Reduced IGF-1 & elevated pro-inflammatory cytokines
Sarcopenia

• It is the loss of muscle mass, strength & performance and is not related to an underlying illness.
• Associated with increased functional impairment, disability, falls, mortality.
• Multifactorial but inadequate protein can contribute.
Interesting Immunity Facts to Consider

• Senescence stimulates changes in the cells. Lymphocytes and fibroblasts show reduced proliferative potential with age.
• DNA changes associated with telomere shortening alter the actions of the immune system and wound healing.
• Response of cells to trigger mRNA in response to physiologic stress is diminished with age. The reduction is multifactoral.
• The role of apoptosis in aging and the diseases of aging is an ongoing area of research.
Summary

There are many factors that determine the changes in the body with aging. Some are controllable and some just need to be appreciated, addressed and managed as well as possible. There are many issues needing more research as our aging population increases and the needs of this group demand attention.