Healthy Today, Frail Tomorrow

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Fountain of Youth Search in 1513
Was St. Augustine the Place?
The Search Continued Near Naples...
But ended in Havana 3 Weeks Later…
Fountain of Youth Search Today

• Better Understanding of Aging Biology Crucial for
  – Fighting Chronic Disease
  – Warding off Frailty
  – Maintaining Resilience
  – Facilitating a Long and Healthy Life
What Older Adults Want Now

- high energy levels
- good health
- clear thinking
- enjoyable social contacts
- meaningful activities
- to not trouble kids and grandkids with their problems
Biology of Healthy Aging Program (BoHA)

Approach not based on single disease state

- Focus on physiological systems that have broadest impact
- Requires interdisciplinary team science
  - Basic Biological
  - Clinical Physiology
  - Medicine and Surgery
  - Neurology, Psychiatry
  - Bioengineering
What We Know

• Very specific age-related changes take place at cellular, physiological, and whole person level

• Great variability exists between individuals at older ages

• Disease states, as well as environmental and genetic influences can accelerate or slow biological aging processes
Acceleration Towards Frailty

Triggers
- Biologic Aging
- Genes
- Environment
- Diet
- Activity
- Chronic Disease
  - Depression
  - Cognitive Decline
  - Cancer
  - Cardiovascular
  - Diabetes/Obesity

Physiology
- Stress Response Systems
  - Energy Metabolism

Symptoms
- Weakness
- Fatigue
- Slowness
- Weight loss

Outcomes
- Dependence
- Disability
- Chronic Disease
- Early Mortality

Walston J, 2018
Progress: Biologic Aging

- Altered intercellular communication
- Genomic instability
- Stem cell exhaustion
- Telomere attrition
- Cellular senescence
- Epigenetic alterations
- Mitochondrial dysfunction
- Loss of proteostasis
- Deregulated nutrient-sensing

Lopez-Otin et al, Cell 2013
Systems that Drive Frailty

• Energy Metabolism
  – Mitochondrial Biology
  – Endocrine Pathways

• Stress response systems
Mitochondria

- Produce energy (ATP) & free radicals in almost every cell in the body
- Poor clearance triggers free radical production in cells
Mitochondrial Aging

• Total mass decreases
• Power (ATP) generation wanes
• Excessive amounts of free radicals are generated resulting in tissue damage and chronic inflammation
Stress Response Systems Are Sometimes Activated with Aging

- Inflammation
- Sympathetic Nervous System (SNS)
- Hypothalamus Pituitary Adrenal (HPA) Axis
- Renin-Angiotensin System (RAS)
Aging Stress Response Systems

- Inflammation
- Sympathetic Nervous system
- HPA Axis
- Renin angiotensin system
Aging Stress Response Systems

- Inflammation
- HPA Axis
- SNS
- RAS
Altered Stress Response Systems Have Consequences

- Inflammation
- SNS
- HPA Axis
- Angiotensin System
- Tissue specific changes

Chronic Disease
- Depression
- Disability
If Not Fountain of Youth, Maybe Fountain of Resilience?

- Complex etiologies are different for each individual
- Diagnosis and treatment strategies will need to be individualized accordingly
- Marked need for new diagnostic and therapeutic approaches that target underlying biology
Biology of Healthy Aging Program (BoHA)

- **biologic discovery** related to the development of frailty and aging phenotypes

- **diagnostics** to find those at higher risk before conditions manifest themselves and to know which altered system to target

- **treatments** specifically designed to target and slow biological aging or aging-related disease processes
Tips for Healthy Aging

Nutrition

Activity and Exercise

Prevention of Falls and Injuries

Prevention of Cognitive Decline
‘Keep Trying New Things’
Advice from runway model Wang Deshun, at age 80

- Learn a foreign language
- Study yoga
- Volunteer to tutor kids
- Write poetry
- Explore spirituality
- Volunteer for religious organization
- Improve your computer literacy
Healthy Aging Tips on Twitter

@JeremyWalstonMD
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  – Salisbury Family Foundation
Optimizing Nutrition

• Eat fresh fruits and vegetables, beans and nuts (75% rule)
  – Provide potassium
  – Cancel out acid production from meat and fats
  – Anti-inflammatory
• Don’t add salt
• Don’t overcook
• Eat fresh berries
Optimizing Nutrition

- **Protein intake**
  - Protein helps older adults maintain muscle
  - Older adults may need more
  - Seek high quality protein
  - Eat ~30g in 2-3 hours after exercise to maximally stimulate muscle growth
Supplements: Vitamin D

- Ensures muscle, brain, bone and immune system health
- Sources: milk, oily fish, mushrooms, eggs, meat
- Can be monitored with blood test
- Direct sunlight exposure helps activation
All Types of Physical Activity Are Important

- Flexibility Training
- Aerobic Activity
- Balance & Gait Exercise
- Muscle Training
Optimizing Physical Activity

- Protect vulnerable joints
- Women: don’t forget the shoulders
- Deal with orthopedic issues promptly to prevent disabilities from developing
Optimizing Physical Activity

- Stay active
- Don’t sit for long periods of time
- Pick up activity later in the day if you are sedentary.

Schrack et al, JGMS 2014
Fall Prevention Strategies

• Be aware of risk factors
  – Too much medication
  – Balance and gait problems
  – Lower extremity weakness
  – Low lighting and cluttered living area
  – Vision problems
Fall Prevention Strategies

– Tai Chi and other balance focused exercises
– Lower extremity strengthening
– Medication review
– Housing assessment with friend or family
Cognitive Risk Factors

• Poorly controlled diabetes
• High cholesterol
• High blood pressure
• Poor hearing
• Physical inactivity
• Depression
Cognitive Protection

• Treat diseases and lipids
• Get hearing aids if needed
• Increase activity levels
• Get depression treated
• Read more
• Interact with others, make new friends, and be engaged in meaningful activities