JOHNS HOPKINS
MEDICINE

Healthy Today, Frail Tomorrow

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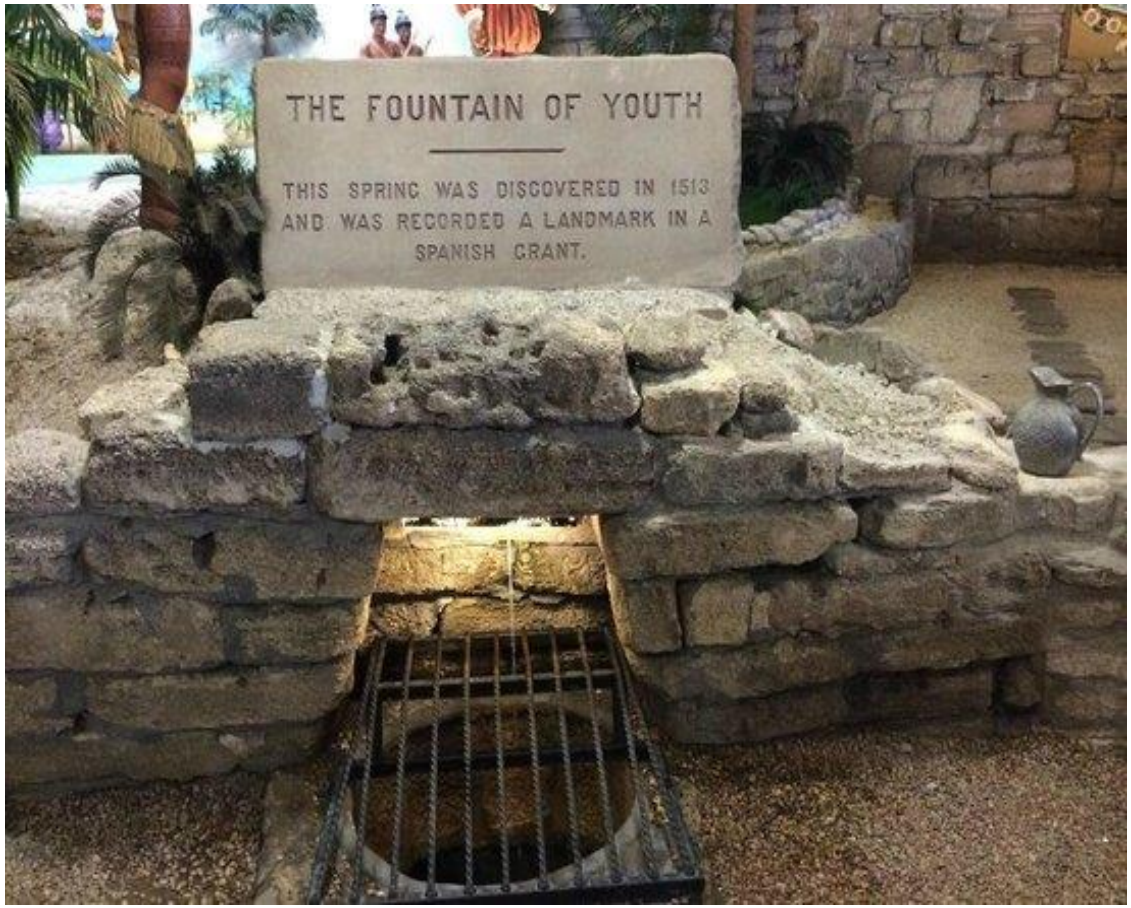
Fountain of Youth Search in 1513

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)

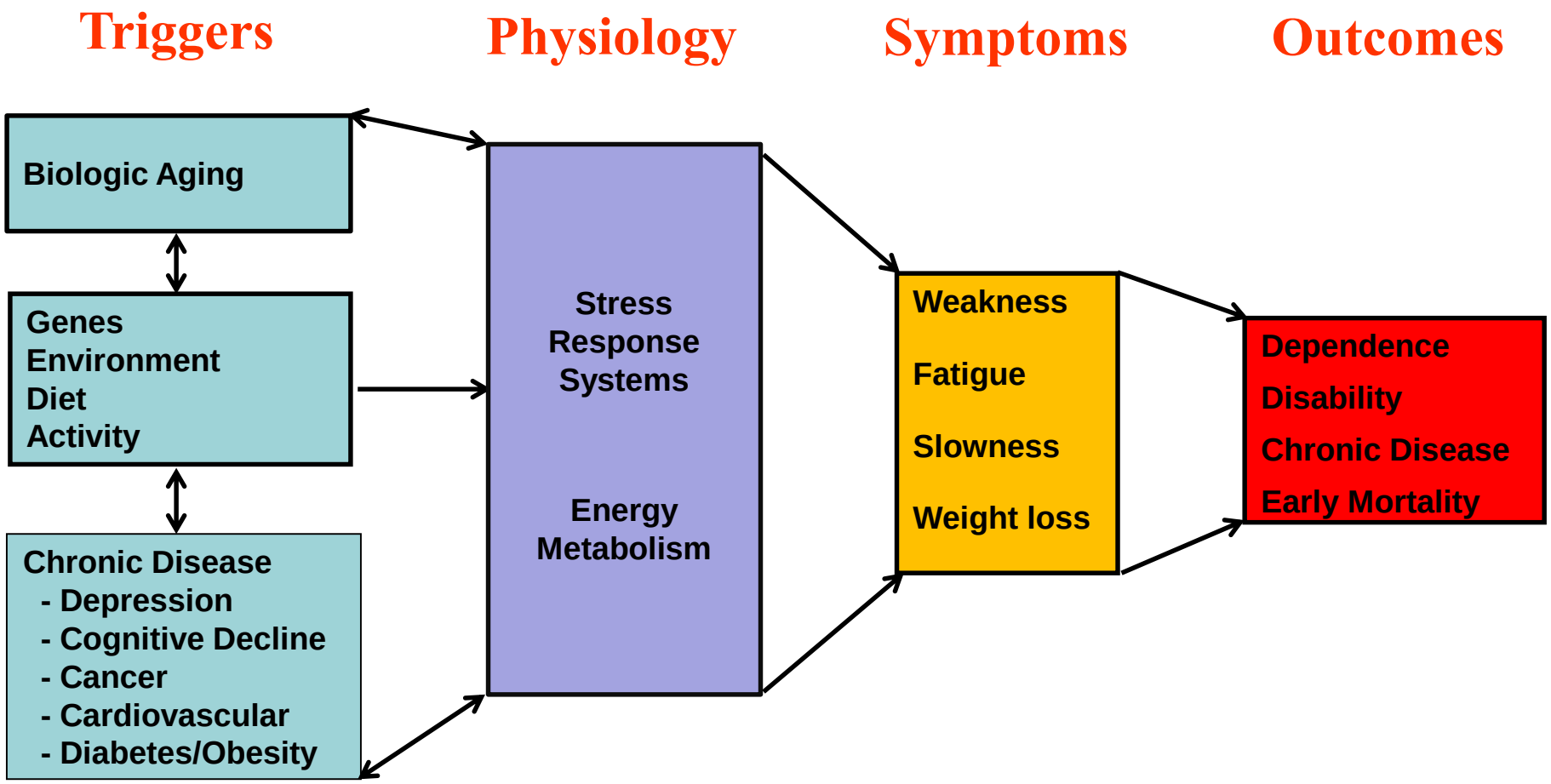
Approach not based on single disease state

- 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

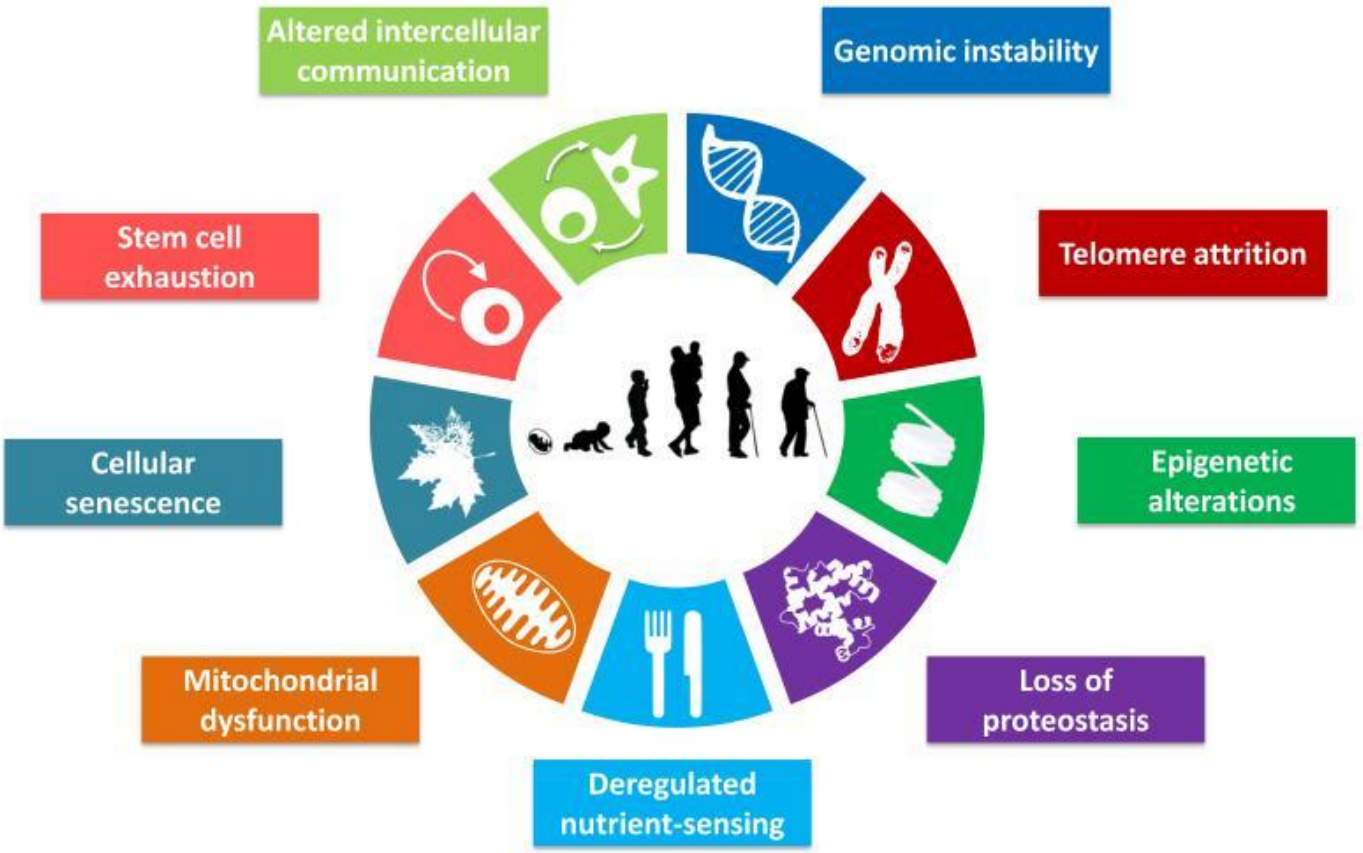
- Very specific age-related changes take place at cellular, physiological, and whole person level
- Great variability exists between individuals at older ages
- Disease states, as well as environmental and genetic influences can accelerate or slow biological aging processes

Acceleration Towards Frailty



Walston J, 2018

Progress: Biologic Aging

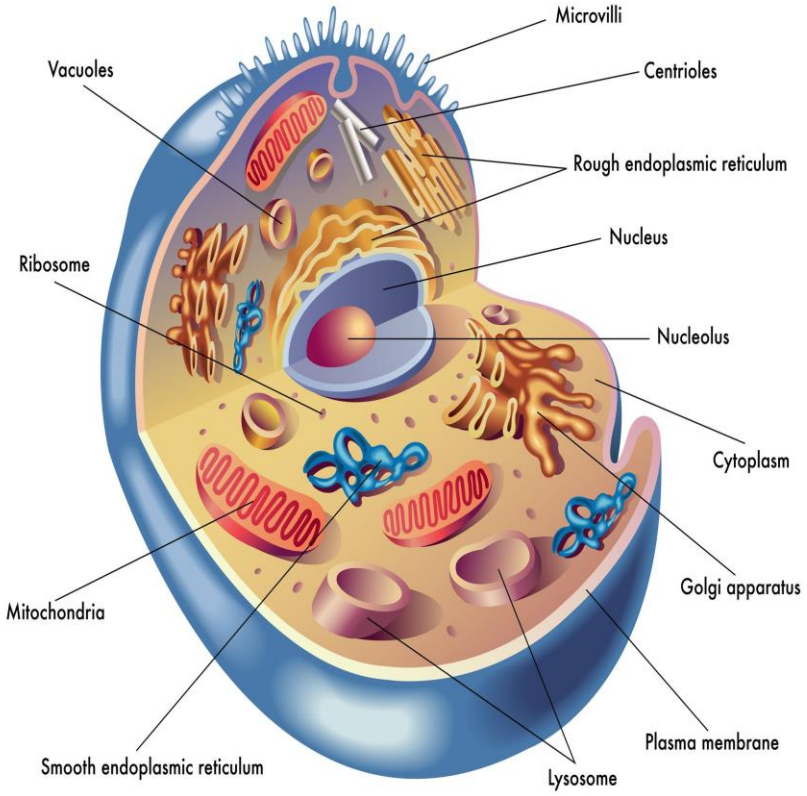


Lopez-Otin et al, Cell 2013

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

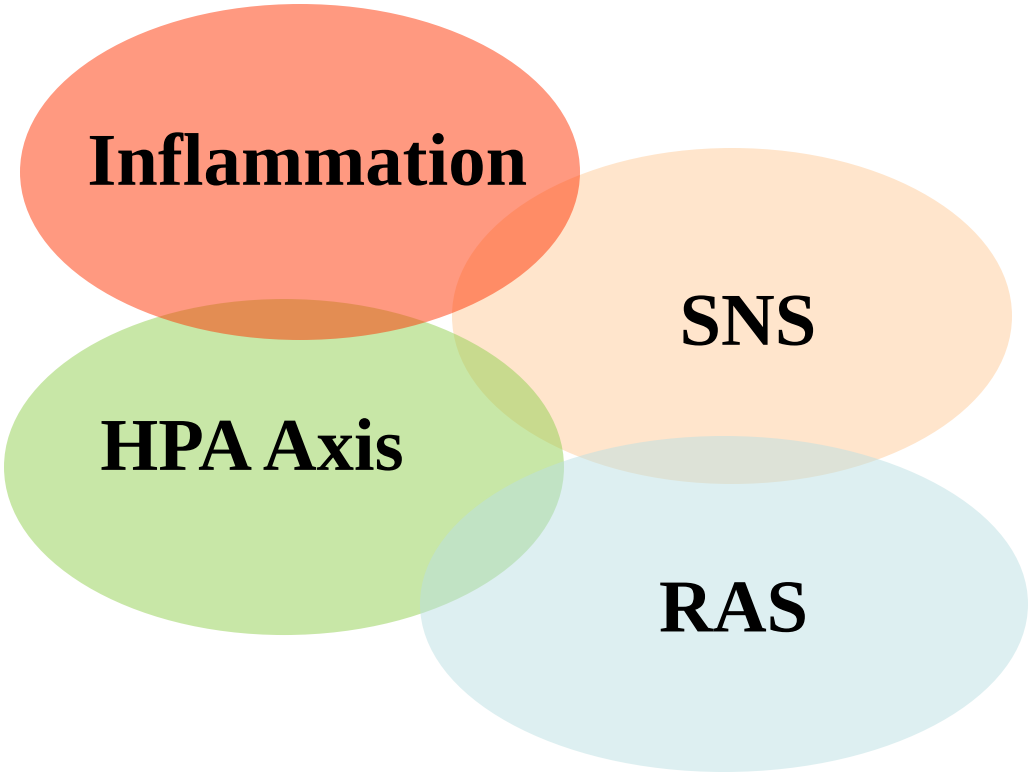
Inflammation

Sympathetic Nervous system

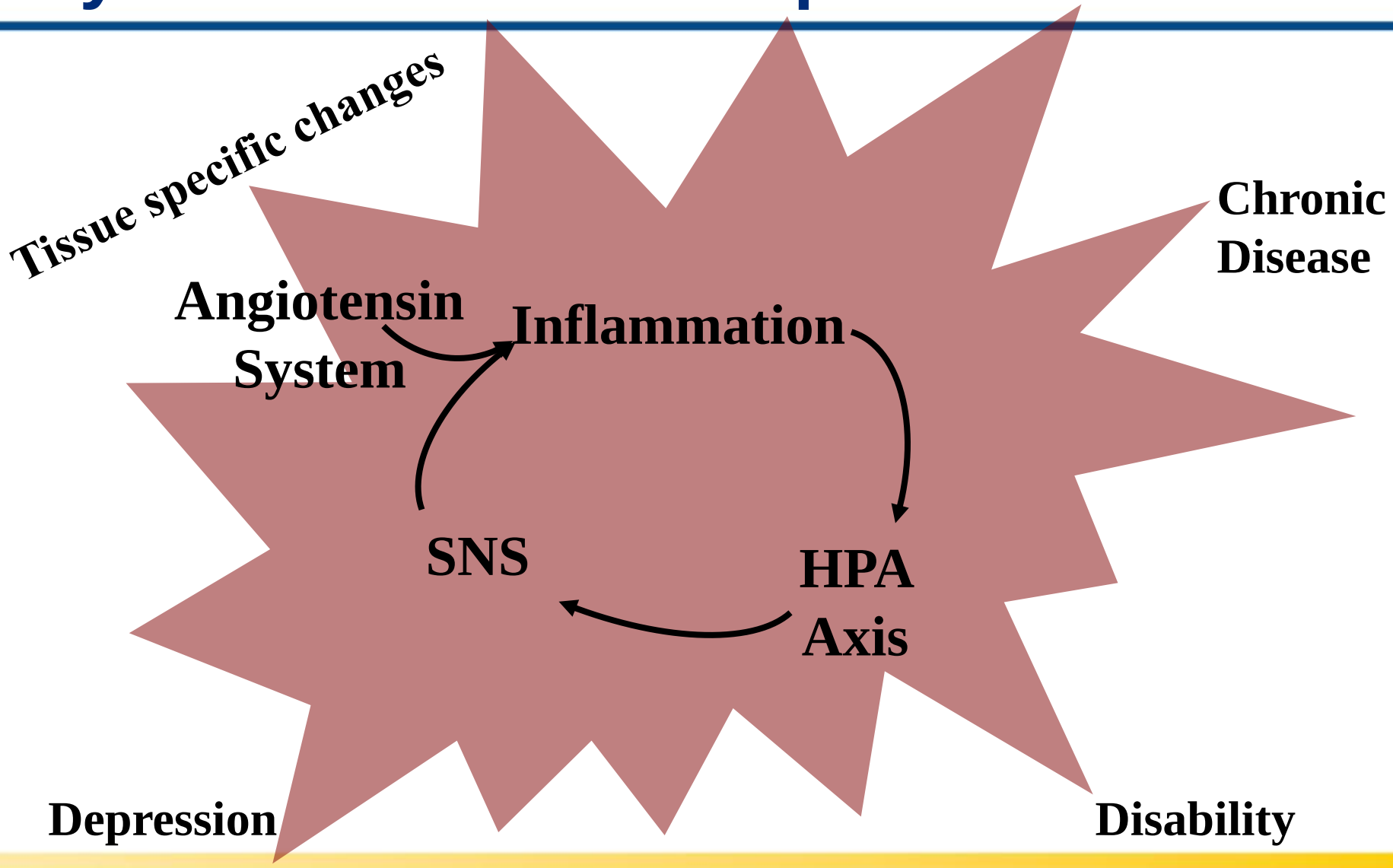
HPA Axis

Renin angiotensin system

Aging Stress Response Systems



Altered Stress Response Systems Have Consequences



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

Prevention of Falls and Injuries

Activity and Exercise

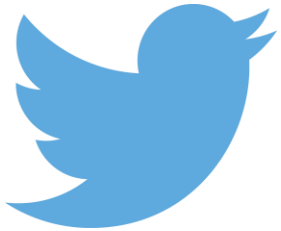
Prevention of Cognitive Decline

‘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



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- National Institute of Aging (NIA)
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- BoHA Program Faculty & Staff
- Division of Geriatric Medicine and Gerontology
- Discovery Fund for a Long & Healthy Life
  - Salisbury Family Foundation

Optimizing Nutrition

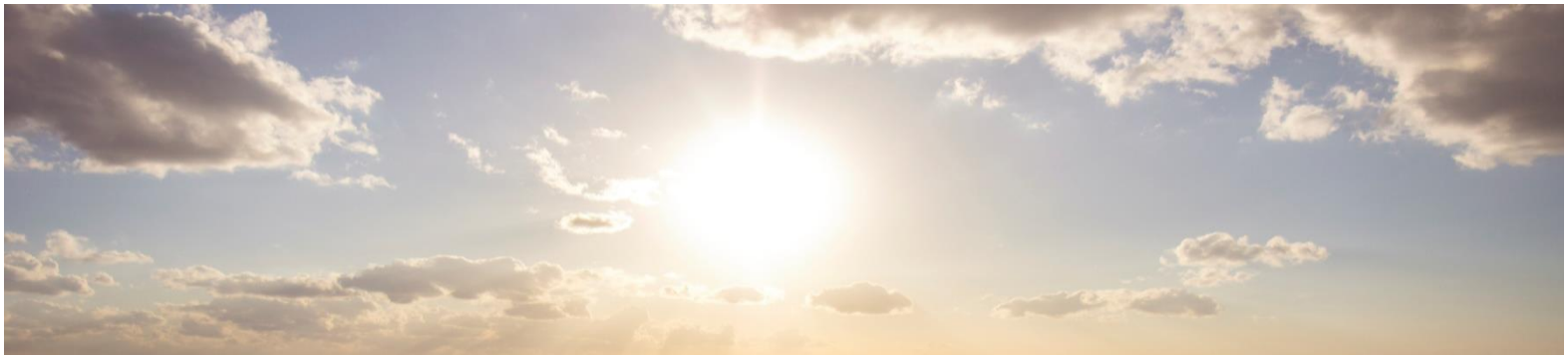
- Eat fresh fruits and vegetables, beans and nuts (75% rule)
  - Provide potassium
  - Cancel out acid production from meat and fats
  - Anti-inflammatory
- Don’t add salt
- Don’t overcook
- Eat fresh berries

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

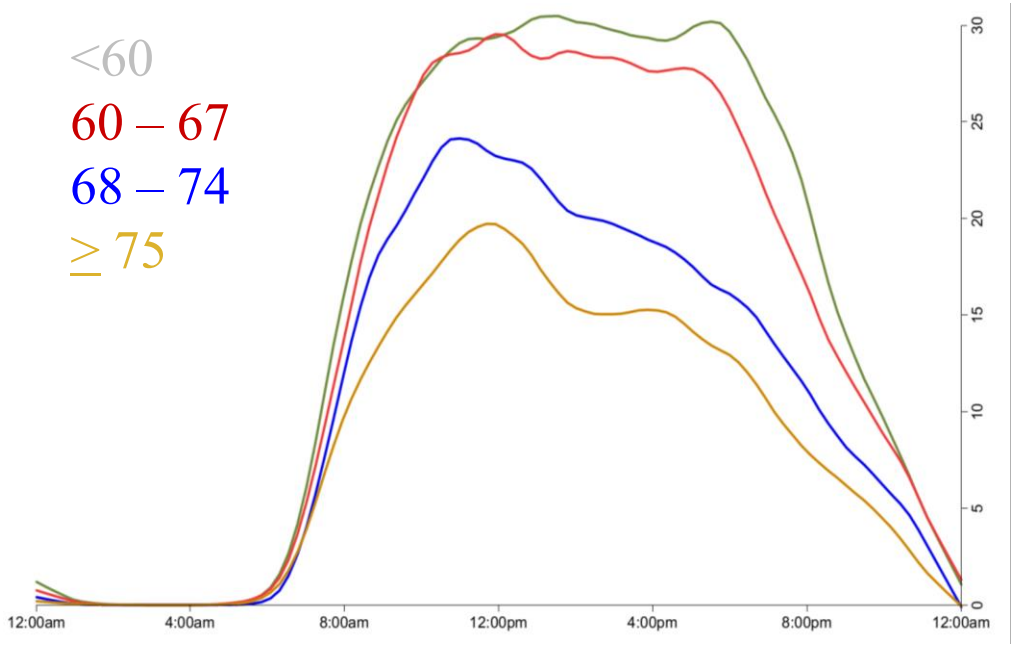
Balance & Gait Exercise

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

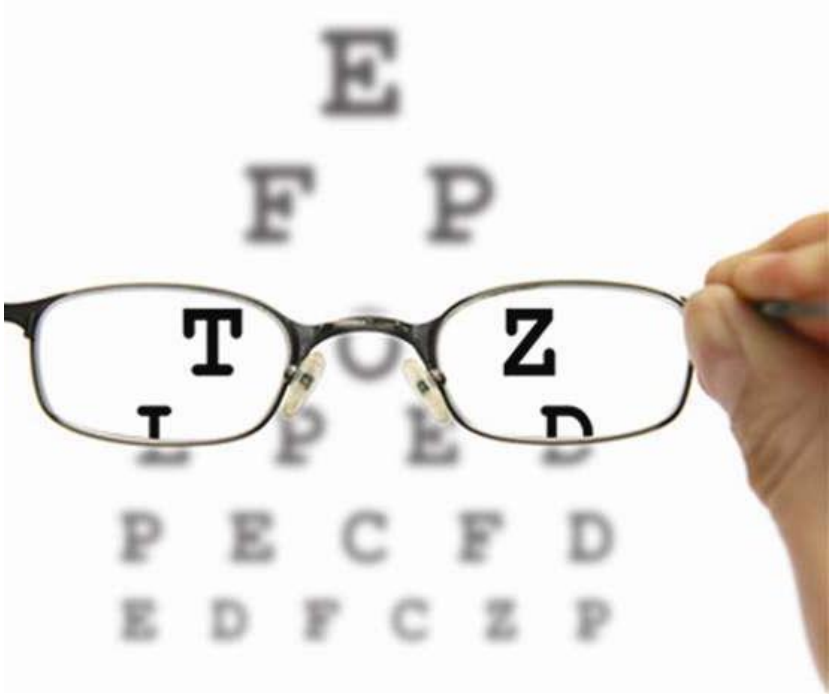


- Stay active
- Don’t sit for long periods of time
- Pick up activity later in the day if you are sedentary.

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