GROWING UP:
AGING AND IT’S EFFECT ON THE BODY

WHO IN THE WORLD AM I?
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Exercise Physiologist – American College of Sports Medicine
Medical Exercise Specialist – American Council on Exercise
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Over 20 years as Health and Fitness Professional
Eight years in Clinical Environment at VOI
Equinox PT Manager and later GM
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Specializing in Fitness over 40 and Post-Rehabilitation

COURSE OUTLINE
1. AGING AND ITS EFFECTS ON THE BODY... LEFT UNCHECKED
2. HOW MOVEMENT AND EXERCISE FIGHT THE EFFECTS OF AGING
   2.1 ON OUR MUSCLES AND SKELETAL SYSTEMS
   2.2 ON OUR MOBILITY, FLEXIBILITY AND POSTURE
   2.3 ON BALANCE, AGILITY AND FALL PREVENTION
   2.4 ON OUR CARDIOVASCULAR SYSTEM AND THE BRAIN
   2.5 PUTTING IT ALL TOGETHER AND THE ROLE OF NUTRITION
TODAYS OUTLINE
AGING AND ITS EFFECTS ON THE BODY... LEFT UNCHECKED
TYPES OF AGING
AGING AND THE CARDIOVASCULAR AND RESPIRATORY SYSTEMS
IMPACT OF AGING ON:
...BONES AND JOINTS
...DISCS AND VERTEBRAE
...FLEXIBILITY AND MOBILITY
...MUSCLE
...POSTURE, GAIT AND BALANCE
...THE BRAIN
...BODY COMPOSITION

GOALS
TO PRESENT AN ALTERNATIVE, AND GIVE YOU THE TOOLS TO ACHIEVE IT
TO ATTAIN AND/OR PRESERVE INDEPENDENCE YOU NEED
STRENGTH, AEROBIC CAPACITY, POWER, MOBILITY, FLEXIBILITY AND BALANCE

"THE MIND, ONCE STRETCHED BY A NEW IDEA, NEVER RETURNS TO IT'S ORIGINAL DIMENSIONS"
RALPH WALDO EMERSON

NOT ALL AGING IS THE SAME
DR KENNETH COOPER
EXERCISE AS MEDICINE, AVOID AND DELAY DECLINE
"When Health is absent, Wisdom cannot reveal itself, Art cannot manifest, Strength cannot fight, Wealth becomes useless, and Intelligence cannot be applied."

Herophilus, Greek Physician - (widely regarded as the father of anatomy)

THE MOST IMPORTANT TOPIC YOU REALLY NEED TO GRASP

WHATEVER ELSE YOU LEARN, KNOW OR ACQUIRE IS USELESS UNLESS:

- You can benefit and enjoy the fruits of it
- Live with as little pain, frailty and dependence
- Live as long with as much quality of life as possible to see the impact and outcomes of your influence

"So many people spend their health gaining wealth and then have to spend their wealth to regain their health." A.J. Mather

TYPES OF AGING

Chronological
Outdated method of using age alone

Biological
Natural process that occurs over time to varying degrees

Functional/Relative
Extent compared to others of same chronological group
AGING...NOT IF BUT HOW?

*Primary*
Natural process at the cellular level
Increases susceptibility to disease, injury and mortality over time.
Hard wired, natural and inevitable.

AGING...NOT IF BUT HOW?

*Secondary*
Lifestyle based: activity, alcohol, tobacco, diet
Disease impact: CV, Diabetes, Cancer, etc...
Injuries and Illness
Environmental exposure
Dynamic: can be accelerated or slowed even dramatically by actions taken.

NOT ALL AGING IS THE SAME
OK, SO WHAT HAPPENS

1. Cardiovascular and Respiratory Systems

- VO2 Max drops ~10% per decade after 25 to over 20% between 70-80[1]
- Elasticity carotid artery decreases by ~50% from 25-75yrs[2]
- Aorta and branches stiffen
- Blood vessels and valves thicken and stiffen
- Heart changes-stiffer and max HR decline.

Relevant changes in the lungs[13]

+25%
- Lung Capacity about same
- Residual Volume (left after forced exhale)
- Functional Residual Capacity (left after passive)
- Vital Capacity (greatest exhale deepest breath.)

Fatigue, Work Capacity and Efficiency

- Lungs ability to take in oxygen
- How well heart pumps blood
- Muscles ability to extract oxygen during work
- Loss of muscle as important as change in heart in using oxygen for work
- Can be improved. Lowest function most gain.
2. Bone and Joints

Diet and Aging

Bone is reservoir of calcium for other uses
Loss of muscle mass and strength contribute.

2. Bone and Joints

90% of peak for boys age 20, 18yrs for girls
Peak bone mass ~age 30
Women minimal change from 30 to menopause
First years after- rapid loss, slows but continues

2. Bone and Joints

BD declines 1% per yr. from 40-50
Women lose 2-3% yr. during and 5-10yrs after menopause
Women lose ~ 1/3 of BD during this time
Men don’t see significant loss until 80’s
Bone weakening unchecked can manifest in spine with hairline fractures: pain & up to 20% height reduction.

2. Bone and Joints

Bone weakening unchecked can manifest in spine with hairline fractures: pain & up to 20% height reduction.

2. Bone and Joints

Degenerative changes in joints
Reduced synovial fluid
Breakdown of cartilage, bone on bone, spurs
Weight, muscle weakness and loss exacerbates
Osteoarthritis most common. 50% over 65 and 85% over 75 have it.[2]
Most often in Knees, Hips and Back
Leading cause of disability in US.
3. Discs and Vertebrae

Disc Degeneration
Outer layer of disc annulus weakens
Disc becomes thinner
Supportive disc ligaments weaken

4. Flexibility and Mobility

Tendons and Ligaments lose elasticity
Alters ROM, can lead to pain and dysfunction
Loss of strength
Inflamed and/or arthritic joints
Compensatory Patterns

4. Flexibility and Mobility

Excessive flexibility
Purpose between flexibility and stability
Type II (fast twitch) are lost at greater rate, force loss
Impact on glycemic control and insulin sensitivity
22-53% will develop Sarcopenia[23]
Very definition of use it or lose it
Associated with fat mass gain
Impact on posture, gait and pain.

Young adults 50% weight, by 75-80yrs ~25%[7]
In Sedentary starts early as 30yrs 3-5% decade. Then[9]
to 1-2% per year after 50
Multiple factors, most prominent inactivity[10]
Definition of use it or lose it, easier to preserve[12]
Loss linked with protein deficiency[14]
Current .8g per kg RDA. Older adults 1.0-1.2g even[15,16]
more cases of sarcopenia and illness.

of life, disability, hospitalization and mortality is loss of muscle!
6. Posture, Gait and Balance

Loss of BD contributes as do muscles
Becomes bent forward, knees and hips
flexed, neck tilted, shoulders round
Movement slows, shorter steps
Arm swing less
Impact of how and how long we sit
Head weight, lumbar, gluteal amnesia.

What is Balance, really?
Those 65-84yrs, falls account for 87% of all fractures
(2nd cause of spinal cord and brain injury)
Reaction time slows, power to catch self
Blood pressure drops when standing
Medications, dehydration
Muscle loss and weakness especially in legs
Changes in vision, sensory feedback.

But...
Physical Activity can reduce the risk of falling
Tai Chi study of 256 adults 70-92yrs. [17]
After 6 months 52% fewer falls in Tai Chi group.
Meta Analysis of 1,016 adults 65-97yrs, [18]
strength and balance work reduced risk of falls 35-45%
7. THE BRAIN
Common belief of aging and cognitive decline. More associated with secondary effects of lifestyle than primary aging process.
While 2% of body wt., brain receives 20% blood supply (NIA).
Greatest influence outside disease: Lifestyle and medication.
Brain atrophy progresses with aging.
Gray matter 15% decrease from 20s to 70s.

Study of 381 Men and 393 Women (aged 53-68): Tracked Physical activity and frontal lobe atrophy during 8 year period (MRI used).

Results? “Physical Activity and Total Energy Expenditure are Significant Predictors of Frontal Lobe Atrophy”
Also...
“Promoting participation in activities may be beneficial for attenuating age-related frontal lobe atrophy and for preventing dementia.”

8. BODY COMPOSITION, OBESITY & DIABETES
Normal part of aging, less to age than inactivity and disuse.
With muscle loss, basal metabolic rate decreases by 20-70yrs.
Cannot judge by scale, composition more important.
Risk of diabetes also increased by loss of lean muscle.
Of Americans over 65yrs, 26% have diabetes (ADA).
8. BODY COMPOSITION, OBESITY & DIABETES

Loss of smell, 75% of 80yrs+ have major smell impairment \[26\]
Taste loss is more rare, impacted by smell.
Loss of appetite, wt loss, malnutrition, impaired immunity
Tendency for higher salt and sugar intake \[27\]
Reported 2-3 x salt concentration to detect in tomato soup \[28\]

Excess weight complicates and increases pain of arthritis, joint replacements, harder to move and balance, downward spiral.
Flip side don't go too far, excess weight loss
Need health reserve for illnesses, events and injuries

CDC 2015 Noninstitutionalized individuals with Obesity

**REMEMBER THAT BELL CURVE**
LIVE LOVING WHAT YOU DO
STAY AS HIGH FUNCTIONING AS POSSIBLE
FIGHT BACK

“Live your life and forget your age.” – Richard"
REFERENCES


