Health Volunteers Overseas

Improving Global Health Through Education

IT'S A WAMI-3!

APPLICATION OF A WELLNESS AGING MODEL

Wellness Aging Model Illness, Injury, and Immobility (WAMI-

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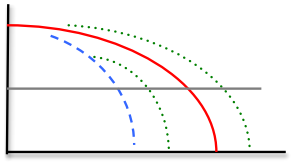
Mariana Wingood, University of Vermont, Burlington, VT
Rajiv Sawhney, Chatham University + Pivot Physical Therapy, Pittsburgh, PA



Biographies

- Michelle (Missy) Criss: Received her physical therapy training at Virginia Commonwealth University, transitional DPT from the University of Pittsburgh, and is currently a doctoral student at Nova Southeastern University. Missy is board certified in geriatric physical therapy and is faculty at Chatham University. Her clinical experience spans several practice settings (IRF, HH, adult day program, out pt), but her expertise is in SNF. She is an active member of PPTA and the Academy of Geriatric Physical Therapy.

- Melissa Bednarek: Received her entrylevel physical therapy training at MCP Hahnemann University, PhD from Virginia Commonwealth University and transitional DPT from Chatham University; Board certified in Cardiovascular and Pulmonary Physical Therapy; teaches at Chatham University and has clinical experience in acute care, outpatient pulmonary rehabilitation and home health.

- Barbara BillekSawhney: Received her undergraduate and advanced master's degrees from the University of Pittsburgh, doctoral degree in education from Duquesne University; doctor of physical therapy from Chatham University. She is a board certified from the American Physical Therapy Association in geriatric physical therapy and is a full professor at Slippery Rock University, Slippery Rock, PA where she teaches neuromuscular, geriatric, adult rehabilitation, education, prevention, and wellness.

- Rajiv Sawhney: Received his undergraduate and advanced master's degrees from the University of Pittsburgh, doctor of physical therapy from Chatham University. He is a board certified from the American Physical Therapy Association in orthopedic physical therapy. He practices at Pivot Physical Therapy, is the former coowner of Allegheny Chesapeake Physical Therapy, Pittsburgh, PA. He teaches at Chatham University.

- Mariana Wingood: graduated from SUNY Upstate Medical University in 2012 and is a full time clinician, with experience in various settings, including ortho outpatient, neuro outpatient, a falls clinic, SNF, and IRF. She is an active member of the VT Falls Coalition, GSA, VTAPTA, and Academy of Geriatrics (member of the GeriEDGE Taskforce, Chair of the Balance and Falls SIG). Mariana's focus is on fall prevention and exercise prescription for older adults.

Learning Objectives

- Summarize the Wellness Aging Model Illness, Injury, and Immobility (WAMI-3).

- Synthesize the application of the WAMI-3 model to the musculoskeletal, cardiopulmonary, neurological, and endocrine systems.
- Integrate the WAMI-3 model into clinical decision making related to complex patient cases with multiple morbidities.
- Incorporate Physical Activity as Vital Sign (PAVS) into clinical practice and describe its impact on an individual's conceptual wellness model.

Changing Demographics in Rwanda

Population in Rwanda is CHANGING

Rwanda may seem like a small country

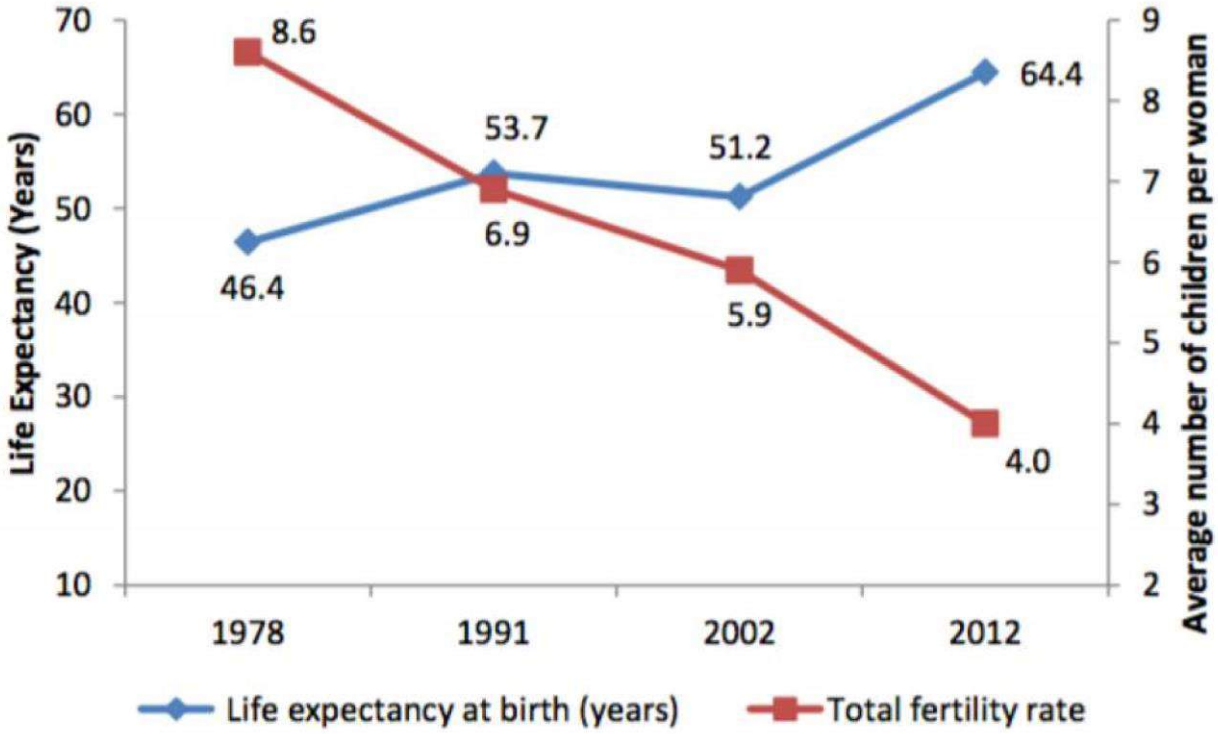
BUT

- *Population has more than doubled last 36 years*
- *11.2 million in 2018 (4.8 in 1978)*
- *13% - >60 years of age (WHO)*

2 key indicators explain change:

- Life expectancy has surged
- 1978 - 46 years
- 2012 –65 years
- Average number of children per woman has decrease sharply decreased
- 1978 - 8.6 children
- 2012 - ~4 children

Figure 1: Life Expectancy and average number of children per woman (TFR)



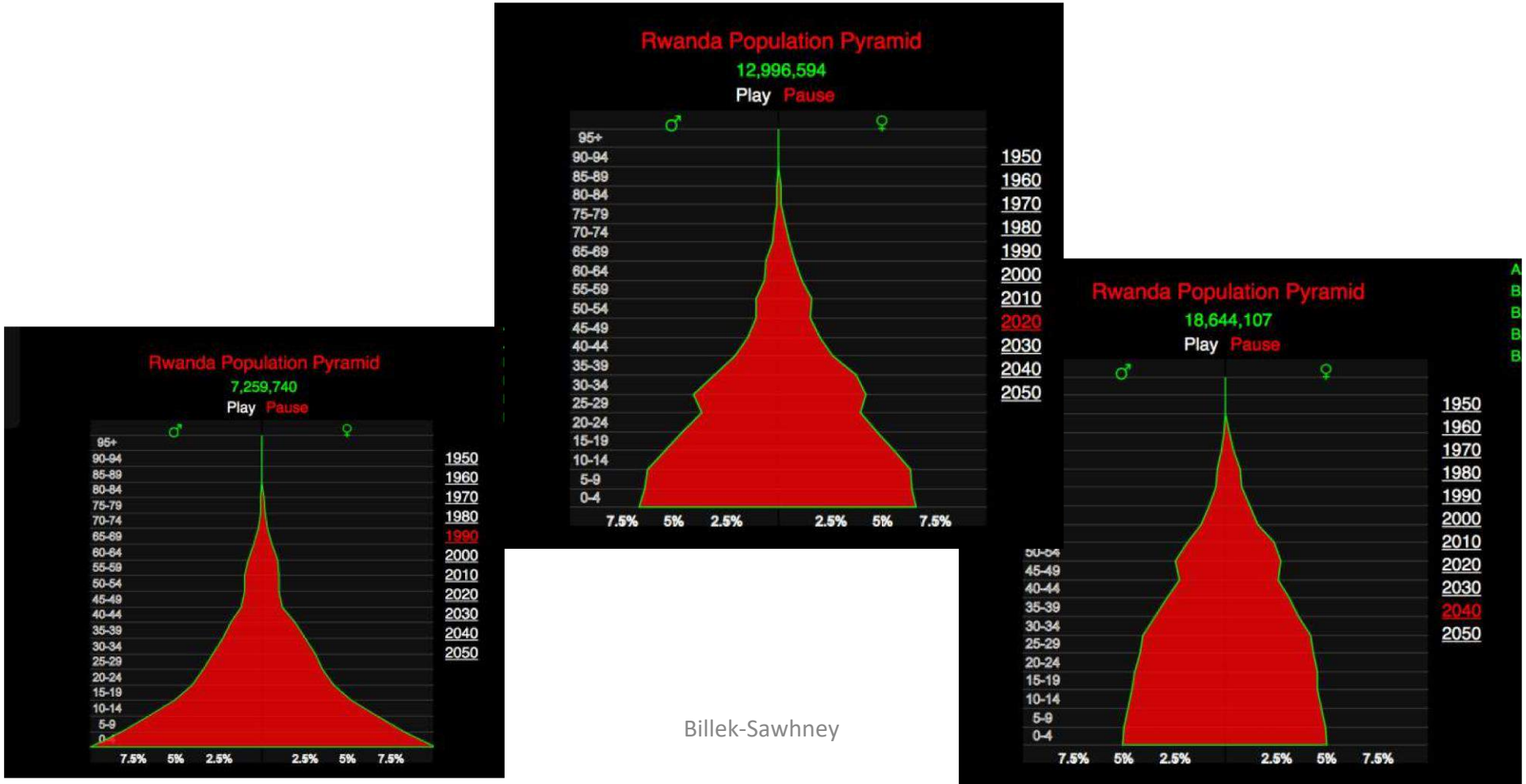
Source 1: Rwanda Statistical Yearbook 2013

(Rwanda Ministry Health NCD report)

World Health Rankings

https://www.worldlifeexpectancy.com/country-health-profile/rwanda

Changing Population Pyramid: Far left 1990, Center 2020, Far right 2040



Changes occurring in Africa

Rwanda Mortality Report 2012

Urbanization

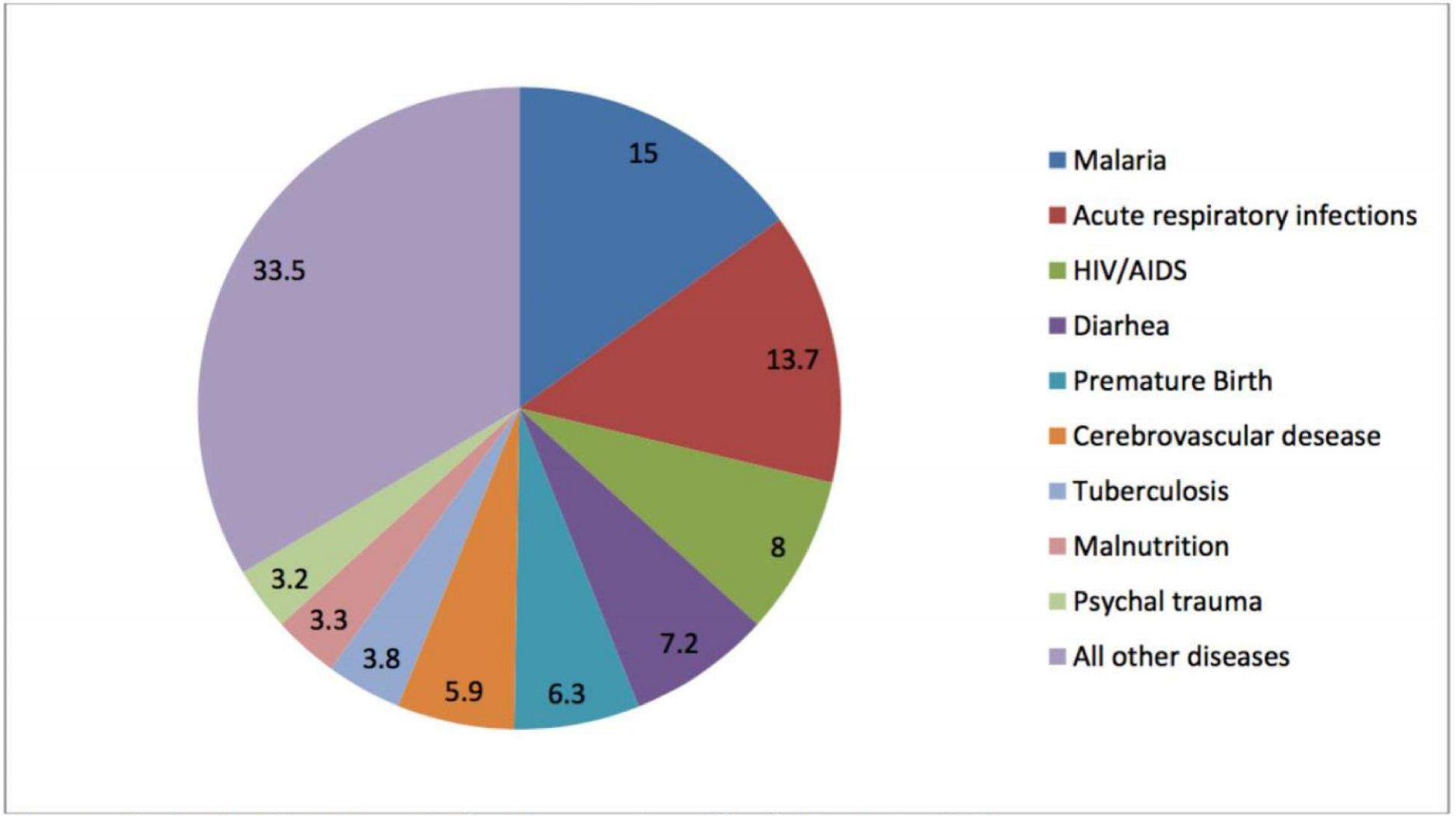
Socio-economic changes

Lifestyle changes preventive measures - increase

Without

NCDs will

Figure 1: Causes of deaths in Rwanda (2008)



Source: Center for disease control and prevention office in Rwanda, 2008

Historical Perspective - Cancer

Billek-Sawhney, B, and Wells, CL: Oncology implications for exercise and rehabilitation. J Acute Care Phys Ther. Winter 2009; 18(4):12–19.

BillekSawhney, B, and Wells, CL: Oncology implications for exercise and rehabilitation. J Acute Care Phys Ther. Winter 2009; 18(4):12–19.

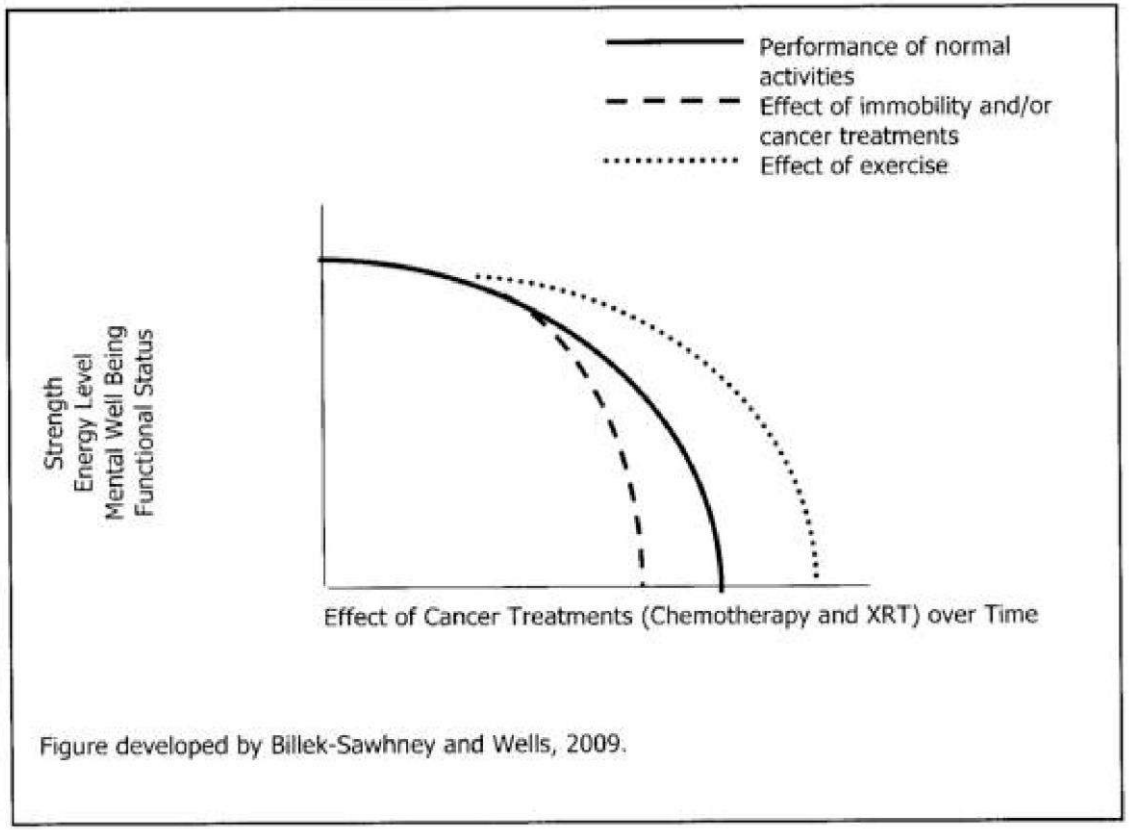
Cancer

prevention/risk/obesity/physical-activity-fact-sheet?redirect=true#q1 , accessed April 5, 2019 National Cancer Institute, Physical Activity and Cancer, January 2017, https://www.cancer.gov/about-cancer/causes-

Lauby-Secretan B, Scoccianti C, Loomis D, et al. Body Fatness and Cancer--Viewpoint of the IARC Working Group. *New England Journal of Medicine* 2016; 375(8):794-798. doi: 10.1056/NEJMsr1606602

- Physical activity related to lower risk of 13 different cancers
  - Lauby-Secretan B, Scoccianti C, Loomis D, et al. Body Fatness and Cancer--Viewpoint of the

Figure 3. Effect of Cancer Treatments (Chemotherapy or XRT) on strength, energy level, mental well being, and functional status.



IARC Working Group. *New England Journal of Medicine* 2016; 375(8):794-798. doi: 10.1056/NEJMsr1606602

Higher Levels of Physical Activity are Linked to Lower Risks of Cancer

1. *Colon*
2. *Breast*
3. *Endometrial*

4. *Esophageal adenocarcinoma*
5. *Liver*
6. *Gastric cardia (type of stomach)*
7. *Kidney*
8. *Myeloid leukemia*
9. *Myeloma*
10. *Cancers of the head*
11. *Cancers of the neck*
12. *Rectum*
13. *Bladder*

Breast Cancer and Physical Activity

Weight gain
Quality of life
Nausea/Vomiting
Lymphedema
CA recurrence or progressio

- Physically active women have a lower risk of breast cancer than inactive women
- 2013 meta-analysis of 31 prospective studies, the average breast cancer **risk reduction associated with physical activity was 12%**
- The evidence for an association is stronger for postmenopausal breast cancer
- Women who increase their physical activity after menopause may also have a lower risk of breast cancer than women who do not
- Better breast cancer outcomes in women who exercise moderately
- (equivalent of walking 3 to 5 hours per week at an average pace) •

  ~40-50% lower risks of breast cancer recurrence, death from breast cancer, and death from any cause compared with more sedentary women
- Most effective in women with hormone receptor –positive tumors

How might physical activity be linked to reduced risks of cancer?

Exercise has a number of biological effects on the body, some of which have been proposed to explain associations with specific cancers, including:

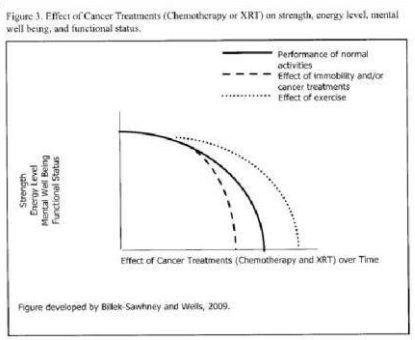
- Lowering the levels of hormones (such as insulin and estrogen) and of certain growth factors that have been associated with cancer development and progression *[breast, colon]*
- Helping to prevent obesity and decreasing the harmful effects of obesity, particularly the development of insulin resistance (failure of the body's cells to respond to insulin)
- Reducing inflammation
- Improving immune system function
- Altering the metabolism of bile acids, resulting in decreased exposure of the GI tract to these suspected carcinogens *[colon]*

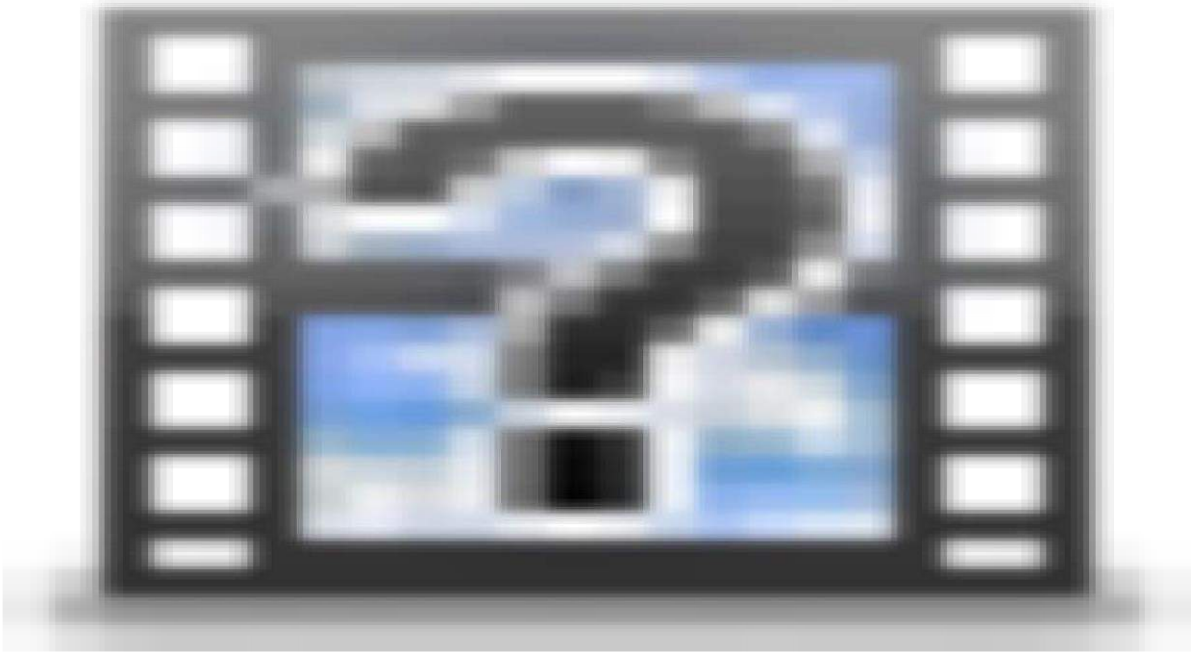
- Reducing the amount of time it takes for food to travel through the digestive system, which decreases gastrointestinal tract exposure to possible carcinogens *[colon]*

AGING, ILLNESS, INJURY, AND IMMOBILITY

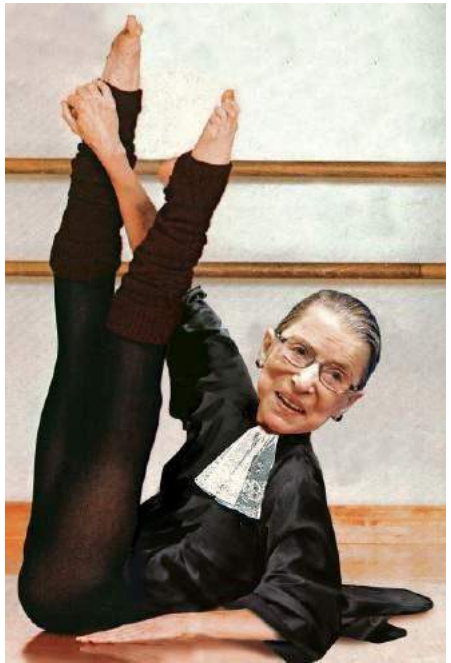
Why WAMI-3?

- Historical • Cancer + prevention
- Billek-Sawhney and Wells (2009)
- Schwartz (1997) – Slippery Slope of Aging
- Dempsey, Seals (1995)





Ruth Bader Ginsburg, 86 y/o
U.S. Supreme Court
Cancer → colorectal, pancreatic, lung; exercises regularly!



- Kauffman, Barr, and Moran (2014)
- Mithal, Bonjour, Boonen et al (2012)

Primary Aging → Senescence of EVERY System of the Body

- Linear Model
- 54,274 individuals to describe rate of loss on every system of the body
- 13 organ systems
- Between ages of 30 and 70
- Up to 3% loss of function of EVERY system of the body
- Sehl & Yates, 2001

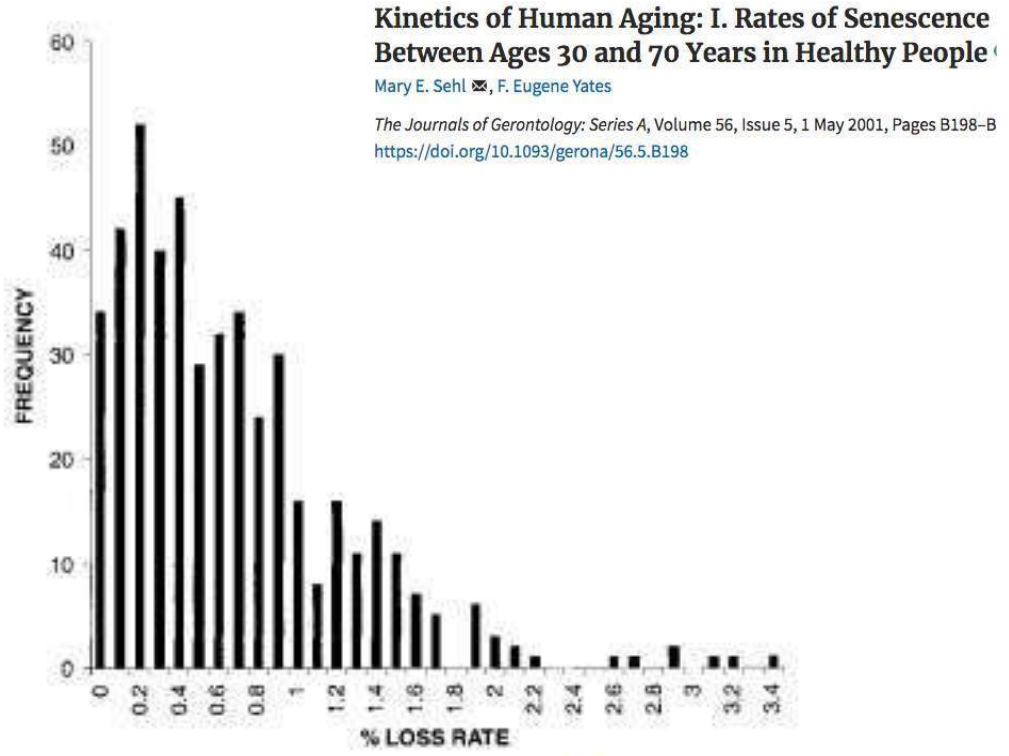


Figure 2. Frequency distribution of linear loss rates among the variables examined for all of the systems. A given value for a loss rate represents a constant, negative slope in percentage per year. This overall distribution appears to have a unimodal, right-skewed shape. The number of studies is 469. The median, mean, and mode values for this distribution are 0.5, 0.64, and 0.2% per year, respectively. The standard deviation among these rates is 0.56% per year.

https://academic.oup.com/biomedgerontology/article/56/5/B198/554581

Effects of Aging on the Musculoskeletal System

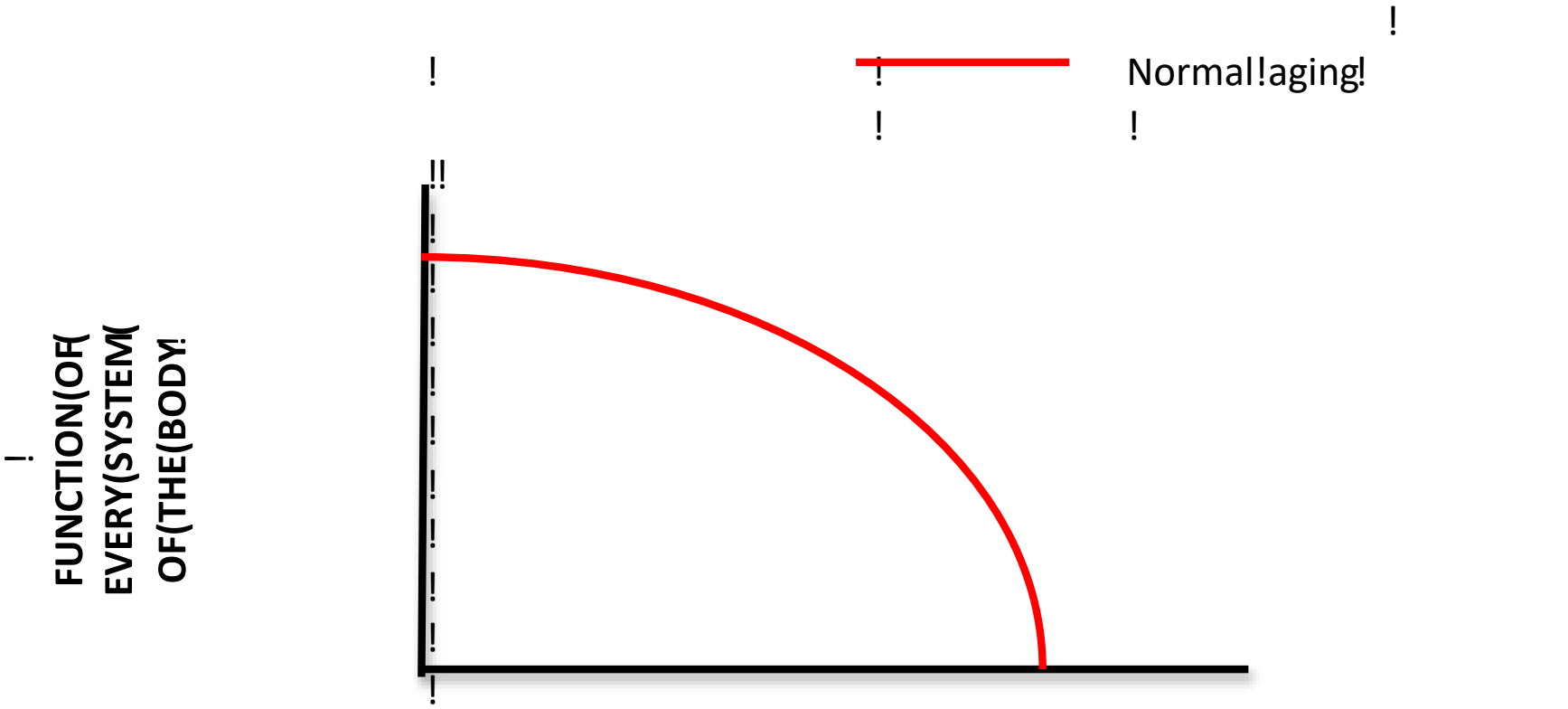
Adapted from Wingood & Billek-Sawhney, 2019

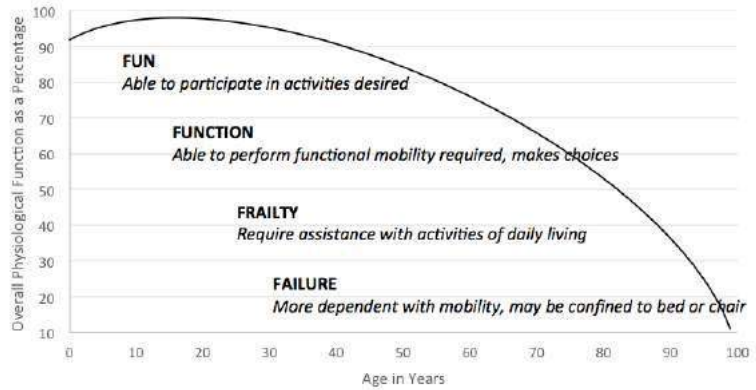
Muscle Changes	Rate of muscle loss varies between studies from 0.4 - 2.6% / year[Mitchell, 2012; McGregor, 2014]
Strength	Loss of muscular strength 1-3% / year year[Mitchell, 2012; McGregor, 2014]
Muscle Mass	Loss in muscle mass from age 18 to 80 is 8-49%[Mitchell, 2012] Median rate of peak mass loss per decade is 4.7% for men and 3.7% for women [Mitchell, 2012] May lose 25-40% of thigh musculature cross sectional area[Nilwik, 2013] Lower limb muscle loss occurs at more than twice the rate of upper limb muscle loss[Mitchell, 2012]

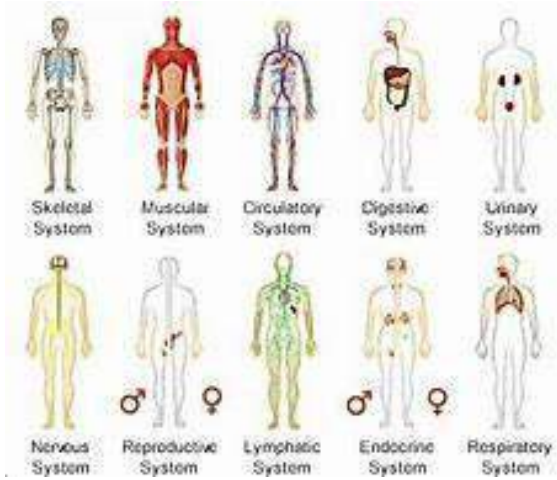
Power	Losses begin at age 30 Comparison of mid-old adults (^{3}70 years of age) to younger adults 50% decrease in strength 75% decrease in power Power losses occur at a faster rate than strength, 20-30% loss/decade Bosco, 1980 and Henwood 2008

AGING MODEL

-appearance similar to Slippery Slope of Aging, Schwartz, 1997







Between ages of 30 and 70
Up to 3% loss of function of
EVERY system of the body

Sehl & Yates, 2001

!!!!!!!!!!

– !!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!!**Age(!**

Immobility, Sedentary Behavior, or Hypokinesis

- *Hypokinesis (Greek) 'under' and kinesis or 'movement'*
- ***Aging does not cause hypokinesis→Lifestyle choice***

In U.S.

- ~60% of older adults spend >4 hours/day sitting
- 67% of the older adults are sedentary more than 8.5 hours every day[Harvey et al,2013]

- Older adults who spend 9 hours/day being sedentary - 46% greater odds of disability related to ADLs and ↑ risk of developing co-morbidities and mortality Dunlop, 2015

- If <8 hours sitting/day - lower risk of all-cause mortality Mechado de Rezendo (2014)

Every System is Negatively Effected by

A. Cardiovascular system
B. Respiratory system
C. Musculoskeletal
D. Nervous system
E. Metabolic

28% of adults, ≥50 years report no physical activity outside work

<u>Musculoskeletal – Effects of Immobility</u>

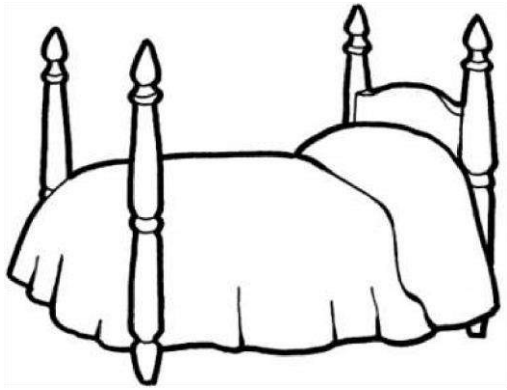
- *Variable from 3-5% ¯/day to as high as 20% (NASA)*
- *Within 1 week of disuse, loss of ~1/8 of mm's*

IMMOBILITY

F. Gastrointestinal *strength*
G. Integumentary• *Bed rest*
H. Urinary*greater lean tissue*
I. Psychological*10in 28 days (*

age 67) have

Porterbine)



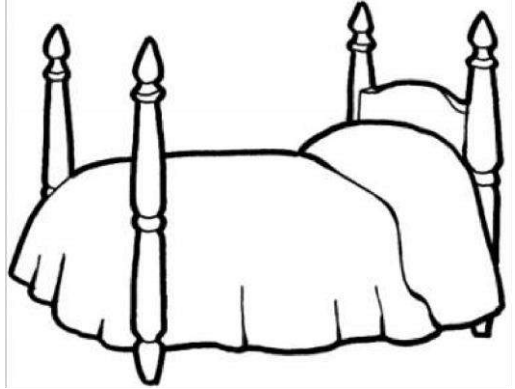
study of 12 older adults (mean

loss in

days than younger adults

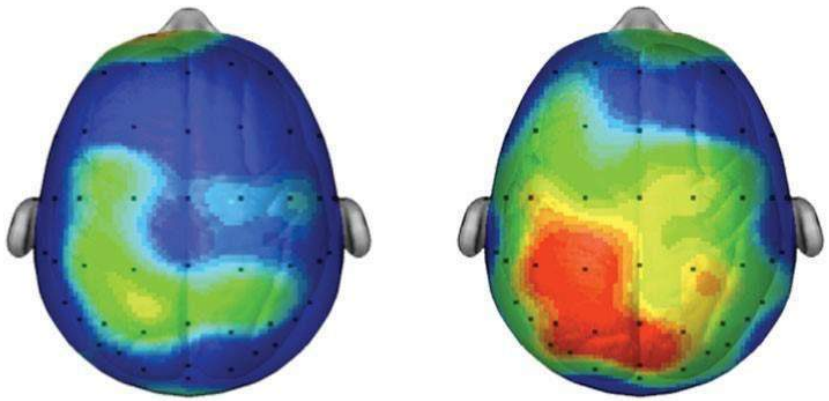
- *Other resources*
- *1-3%/day; 10-15%/week (Halar, 1988)*

Bed Rest, Immobility – Various Complications



- Generalized weakness
- Orthostatic intolerance
- Atelectasis
- Pneumonia
- Thromboemboli
- Urinary retention
- Constipation
- Muscle atrophy
- Osteoporosis
- Impaired sensory perception
- Skin breakdown

Chuck Hillman, 2009, University of Illinois

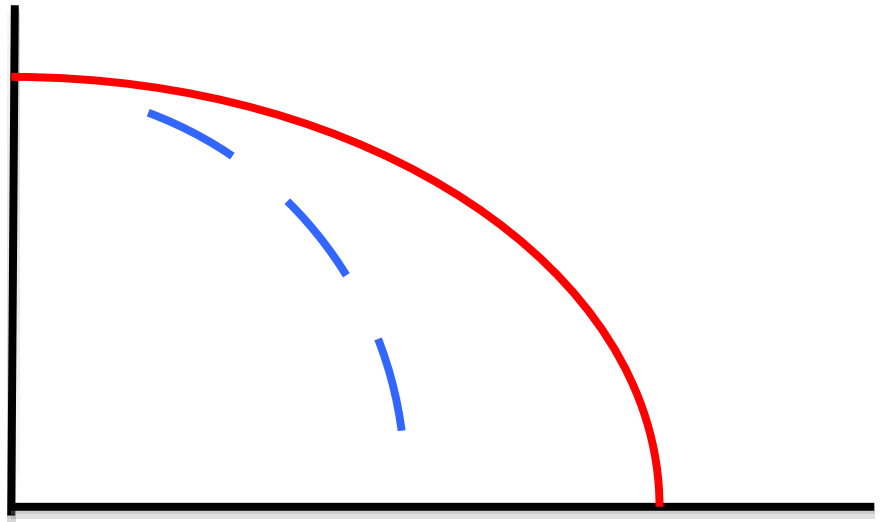


The Body is Negatively Impacted by INJURY

Normal aging

INJURY

Cardiovascular Effectiveness
Pulmonary
Integumentary
Musculoskeletal
Psychological



- Falls
  - 1 out of 4 older adults
  - Every 19 mins an older adult dies from a fall
  - Leading cause of fatal and nonfatal injuries
  - If add neuro

diagnosis, fall risk is much greater!

30 40 50 60 70 80 Years of Age

Effect of INJURY

The Body is Negatively Impacted by ILLNESS

•

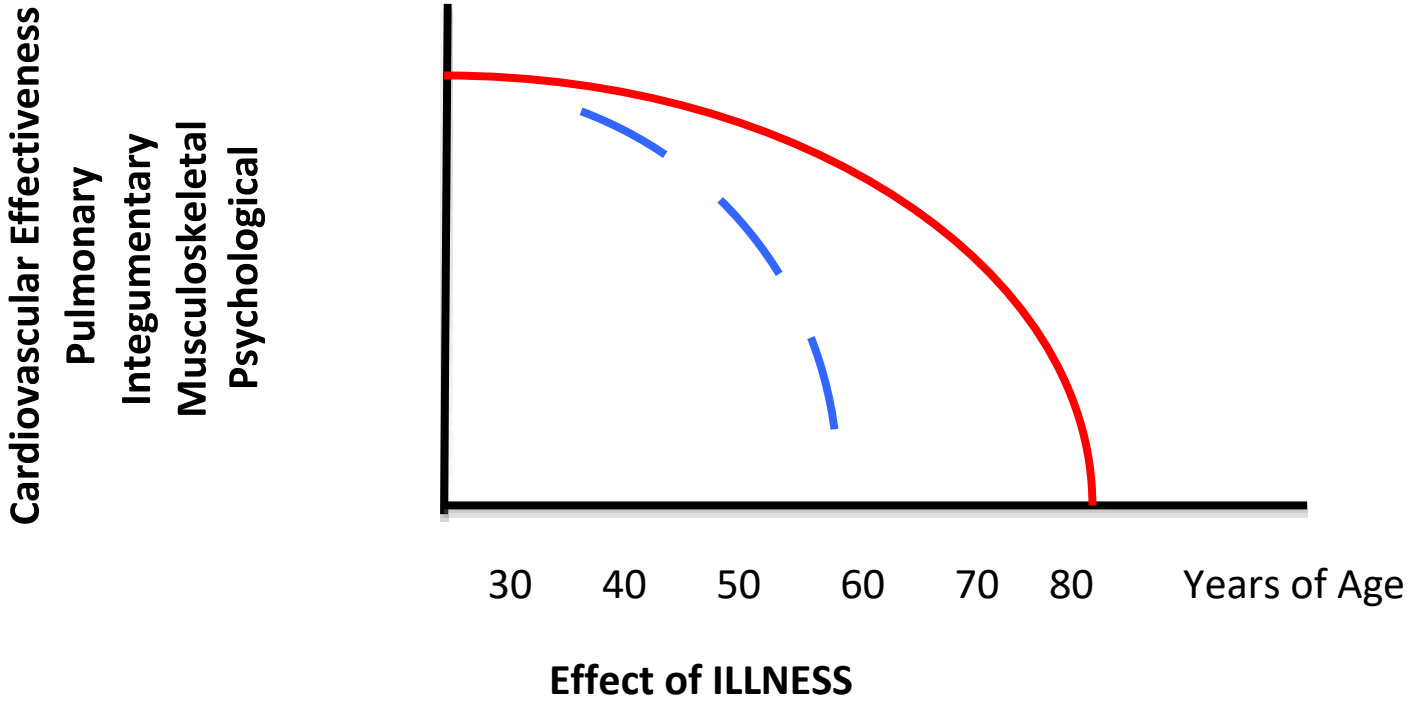
In U.S.

- **80% of older adults have at least 1 chronic disease**
- **70% have ≥2 chronic diseases**

Normal aging

IILLNESS

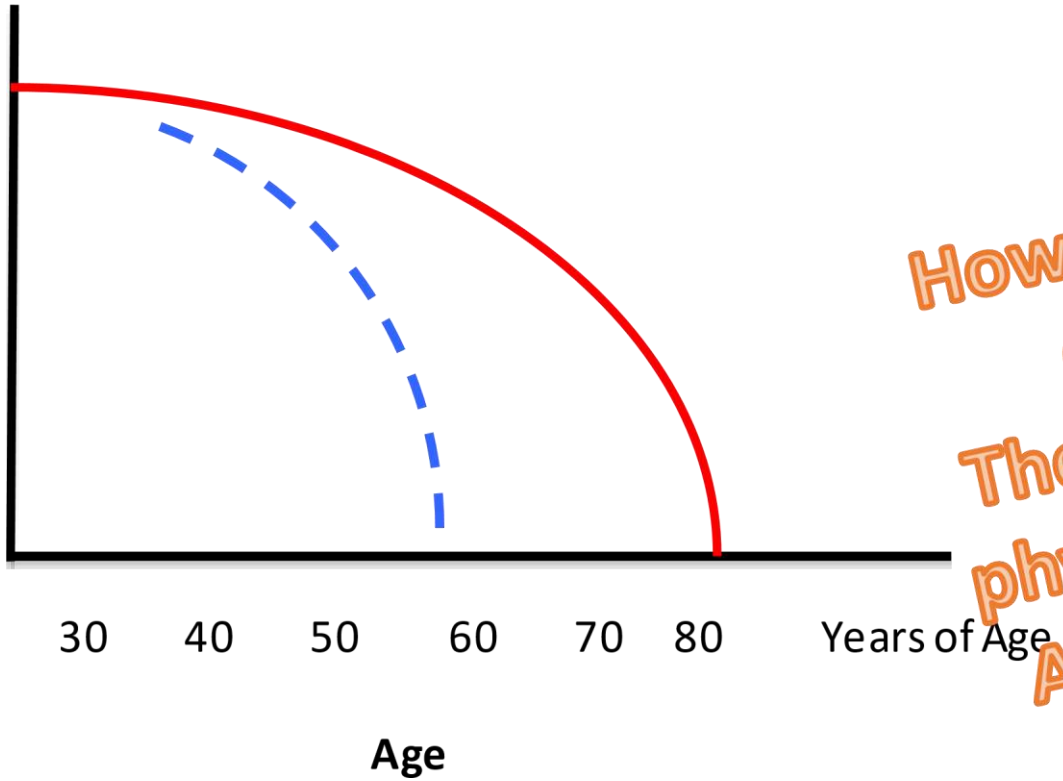
- NCOA, 2018 (National Council on Aging)



The Body is Negatively Impacted by IMMOBILITY

Normal aging

Effect of immobility

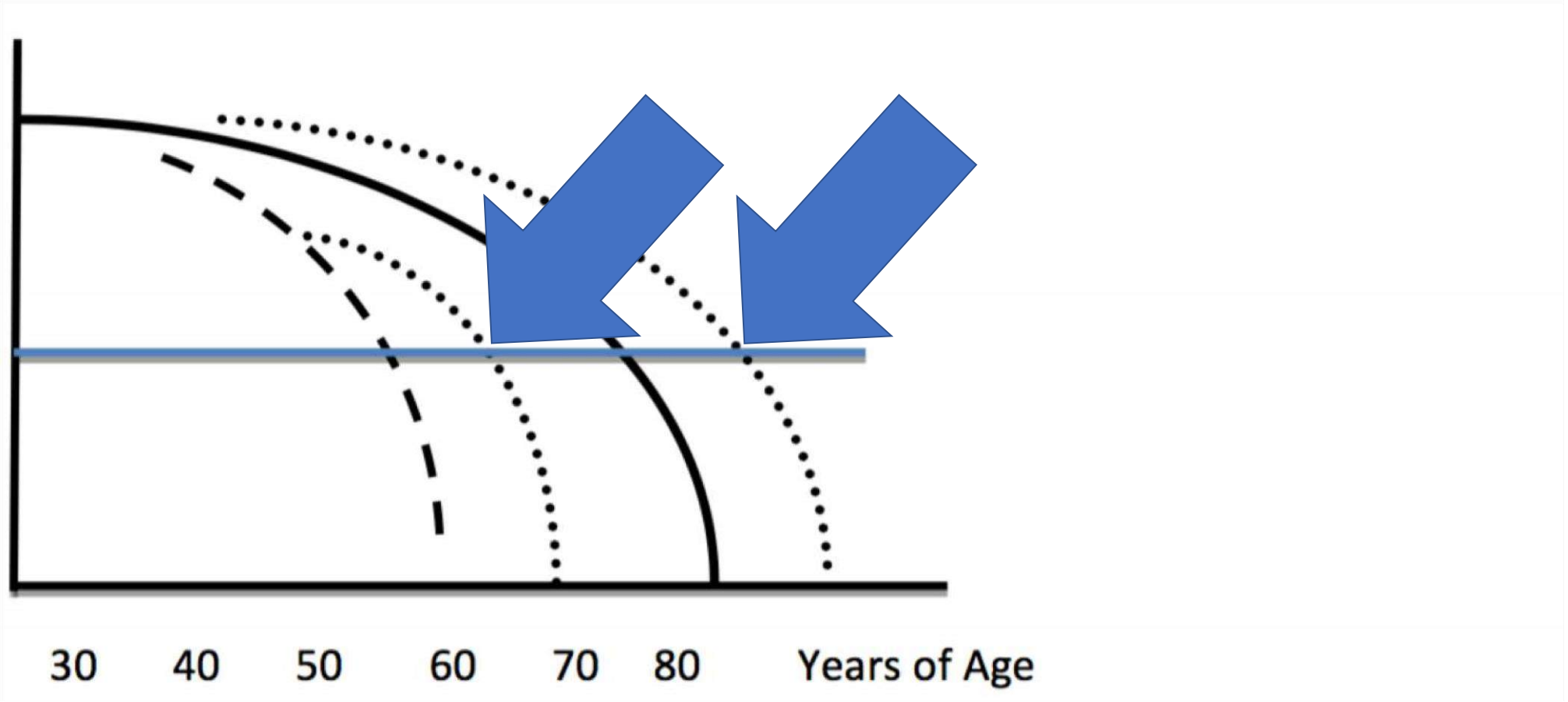


How would you diagram The benefits of physical activity And exercise?

- US see 24-48 hours post admission
- Standard Protocol
- VEM (very early mobilization)
- Patients better outcomes
- Less complications
- Bernhardt et al, 2008
- Evidence-Based Review of Stroke Rehabilitation, Systematic Review, Ch 6, Teasell et al, March 2018

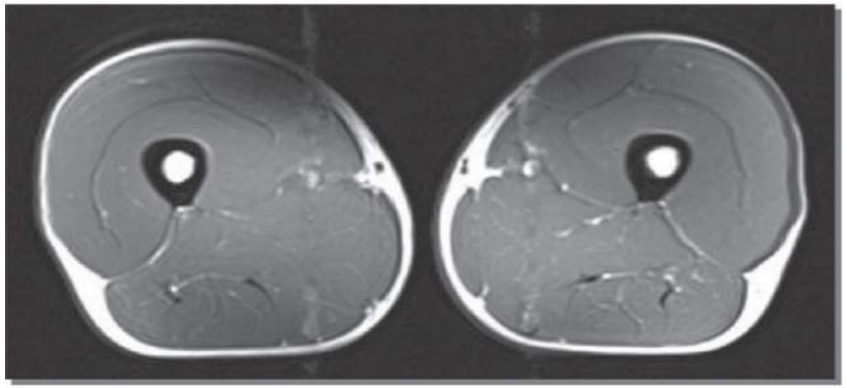
Clinical Practice Guidelines are developing For example Stroke

When we apply prevention, - rightward shift!

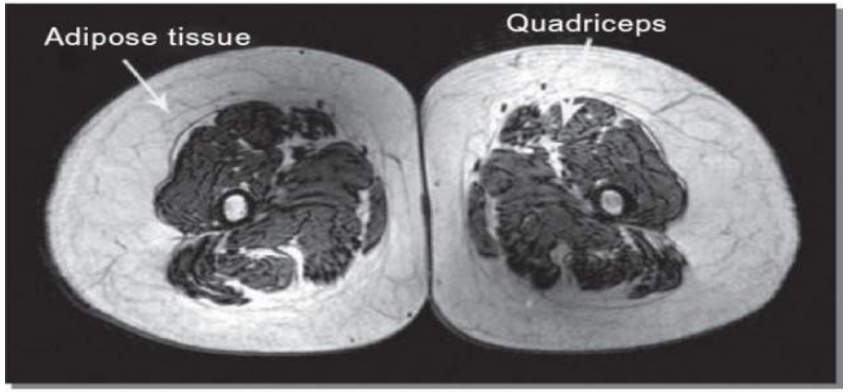


Visualization of

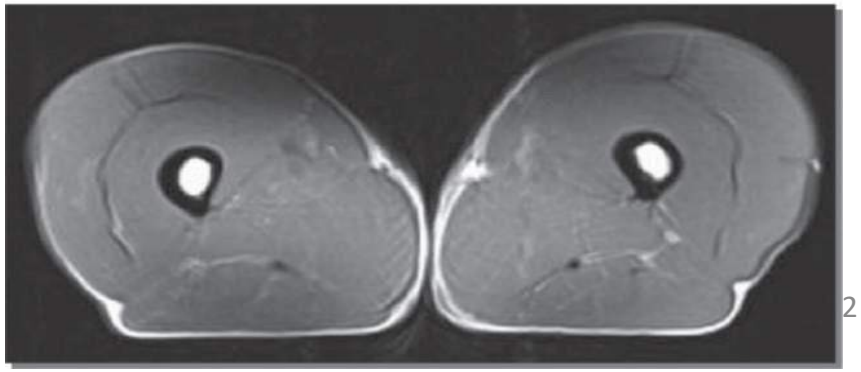
40-year-old triathlete



74-year-old sedentary man



70-year-old triathlete



Sarcopenia and the Effect of Exercise

→ Thighs

From Wroblewski A, Amati F, Smiley MA et. al. Chronic exercise preserves lean muscle mass in masters' athletes. *The Physician and Sports Medicine*. 2011;39(3):172-178.

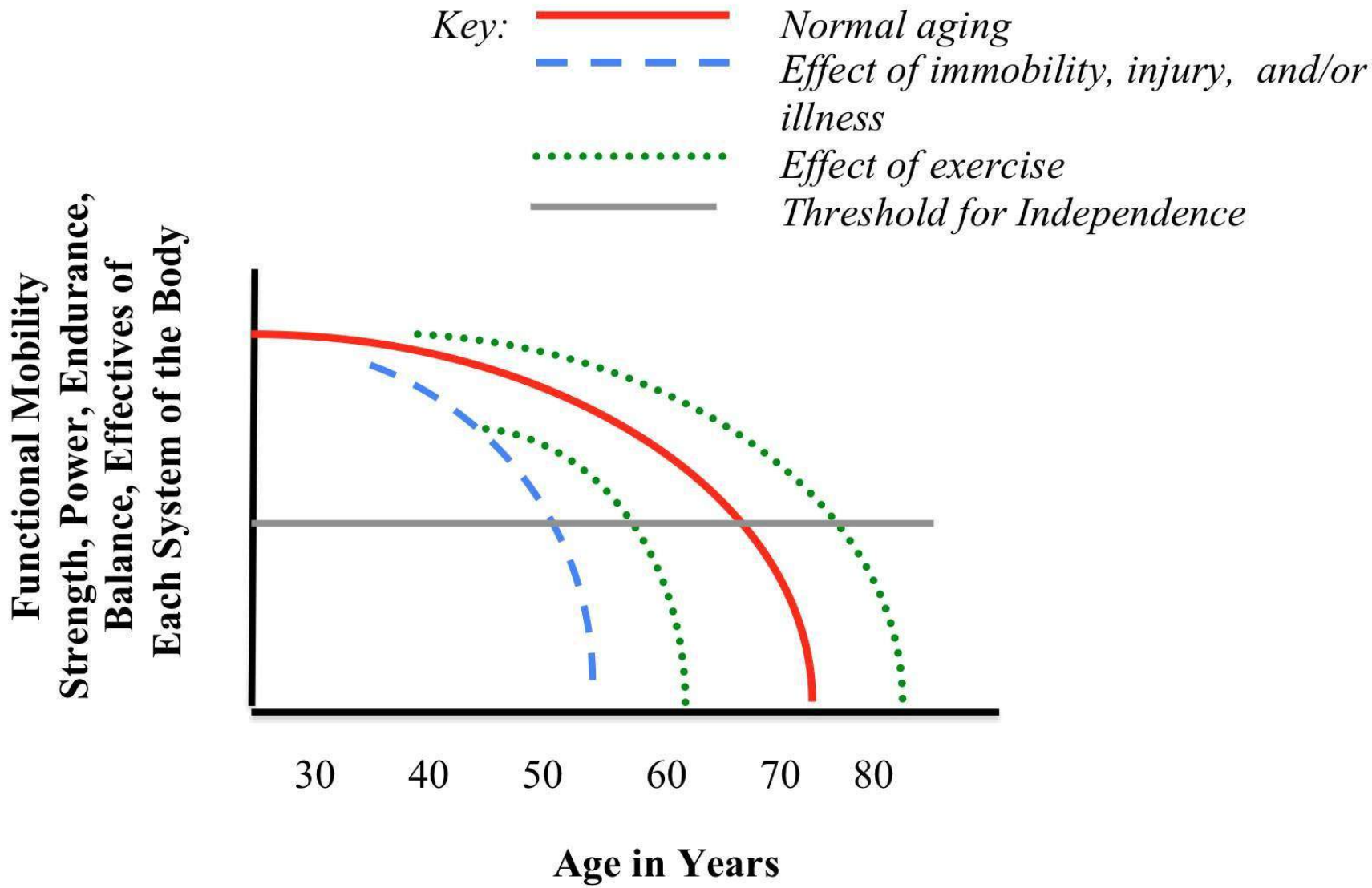
? Who is the 40 y/o triathlete?

? Who is the 74 y/o sedentary man?

? Who is the 70 y/o triathlete?

? Which are your legs?

Figure 2. Wellness Aging Model Related to Illness, Injury, and immobility (WAMI-3), adapted from Billek-Sawhney and Sawhney, 2017[70]



Incorporating Physical Activity as a Vital Sign with the WAMI-3

Exercise is Medicine (EIM)®

- GLOBAL Health Initiative!
- Developed by the American College of Sports Medicine (ACSM)
- Focus of EIM is based on the premise that PHYSICAL ACTIVITY is integral for the prevention and treatment of disease

Physical Activity Vital Sign (PAVS)

Global Health Initiative by the ACSM

<1 minute to ask 2 questions

Provides an average number of minutes of physical activity/week

1. “How many days a week do you engage in moderate to strenuous exercise (like a brisk walk)?”

2. “On average, how many minutes per day do you exercise at this level?”

Ex:

Walks 5 days/week for 30 minutes → 5 x 30 = 150 mins/week

Walks 2 days/week for 15 minutes → 2 x 15 = 30 mins/week

Compare to Recommendations

BARIERS to Physical Activity

If the patient is not engaged in physical activity, it is critical to understand why

Recommend asking: ***1. 'Is there a reason that you are not active or do not exercise?***

2. 'Are you willing to start exercising? If not, why?'

Wingood M, Billek-Sawhney B (2019) in conjunction with the Academy of Geriatric Physical Therapy, Educational Monograph, Physical Activity and Exercise: Needs and Prescription for Older Adults.

BENEFITS OF EXERCISE

Benefits (Strong to Moderate) of Physical Activity and Exercise for Older Adults. *Reprinted* from the Office of Disease Prevention and Health Promotion, Physical Activity Guidelines Chapter 2: Physical activity has many benefits. Office of Disease Prevention and Health Promotion, 2008. http:// health.gov/paguidelines/guidelines/chapter2.aspx

Based on systematic reviews

BENEFITS OF EXERCISE

STRONG EVIDENCE

- Lower risk of early death
- Lower risk of coronary heart disease
- Lower risk of stroke
- Lower risk of hypertension
- Lower risk of adverse blood lipid profile
- Lower risk of Type II Diabetes Mellitus
- Lower risk of metabolic syndrome
- Lower risk of colon cancer*
- Lower risk of breast cancer*
- Prevention of weight gain
- Weight loss, particularly when combined with reduced calorie intake
- Improved cardiorespiratory and muscular fitness
- Prevention of falls
- Reduced depression
- Better cognitive function (for older adults)

MODERATE TO STRONG EVIDENCE

- Better functional health (for older adults)
- Reduced abdominal obesity

MODERATE EVIDENCE

Office of Disease Promotion and Health Prevention

- Lower risk of hip fracture
- Lower risk of lung cancer
- Lower risk of endometrial cancer
- Weight maintenance after weight loss
- Increased bone density
- Improved sleep quality

**The Physical Activities Guidelines for Americans 2nd ed, highlights 8 cancers, which have a lower risk with physical activity including: bladder, breast, colon, endometrium, esophagus, kidney, lung, and stomach*

Health Benefits of Regular Physical Activity in People with Chronic Health Conditions and Disabilities

Adapted from Physical Activity Guidelines, 2nd ed, Table 2-4, 2018.

Cancer Survivors	Improved health-related quality of life Improved fitness

Breast Cancer + Colorectal Cancer Survivors	Lower risk of dying from primary cancer Lower risk of all-cause mortality
Prostate Cancer Survivors	Lower risk of dying from prostate cancer
People with Type II Diabetes Mellitus	Lower risk of cardiovascular disease mortality Reduced progression of disease indicators: hemoglobin A1C, blood pressure, body mass index, and lipids
People with Dementia	Improved cognition
People with disease or d/o's that impair cognitive function (including ADHD, schizophrenia, PD, and CVA)	Improved cognition

OTHER BENEFITS

- Fall risk decreased (de Sousa, 2013; Lee & Park, 2013; Orr, Raymond, & Singh, 2008; Avin, 2015; Sousa & Mendes, 2015, Liu-Ambrose et al, 2014)
- Immune function enhanced through aerobic exercise impacts chronic inflammation (Haaland, 2008)
- Intermittent claudication less symptomatic (Parmenter, 2013)
- Psychological status and well-being (Bauman, 2016)
- Range of motion increased, thought to be related to exercise performance rather than resistance exercise (Raymond, Bramley-Terefos et al, 2013)
- Social benefits (Bauman, 2016)

- Spatial awareness, visual and physical reactions improved with

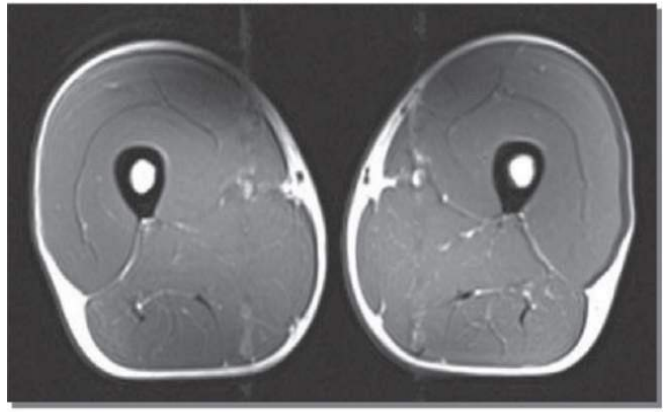
resistance training (Fregala et al, 2014)

Sarcopenia and the Effect of Exercise

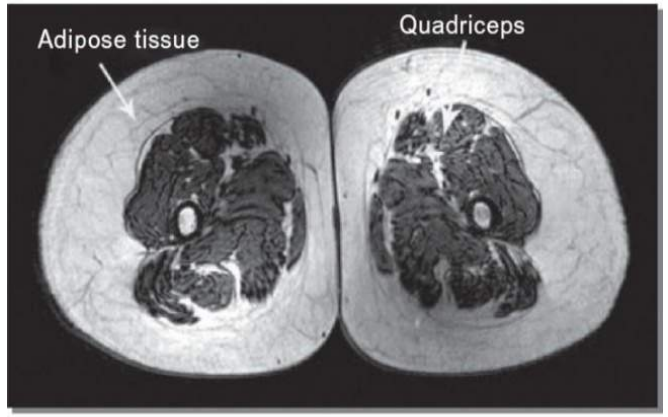
- Wroblewski A, Amati F, Smiley MA et. al. Chronic exercise preserves lean muscle mass in masters athletes. *The Physician and Sports Medicine*. 2011;39(3):172-178.
- https://carrerasdemontana.files.wordpress.com/2008/03 /chronic-exercise-prevents-aging-wroblewski-amatisep2011.pdf

Protective Effects of Exercise on Cognition and Brain Health in Older Adults

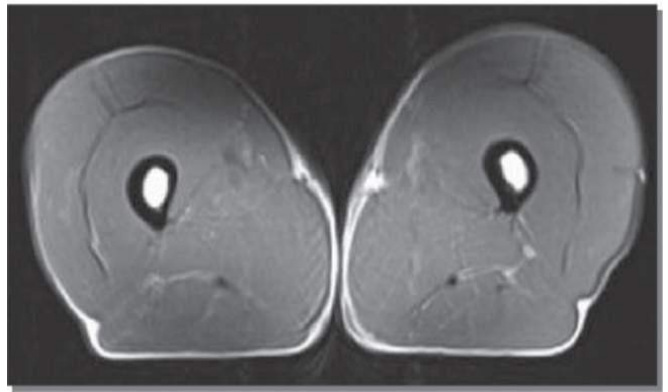
40-year-old triathlete



74-year-old sedentary man



70-year-old triathlete



Tyndall AV, Clark CM, Anderson TJ et al. *Exerc Sport Sci Rev*. 2018, 46(4):215-223. DOI: 10.1249/JES.0000000000000161

- Multiple factors influence ageassociated cognitive decline and the risk of developing Alzheimer disease and related dementias
- Lifestyle interventions such as exercise influence the trajectory
- ~60% of older adults do not engage in enough physical activity and exercise to promote maintenance or improvements in overall cognitive and brain health

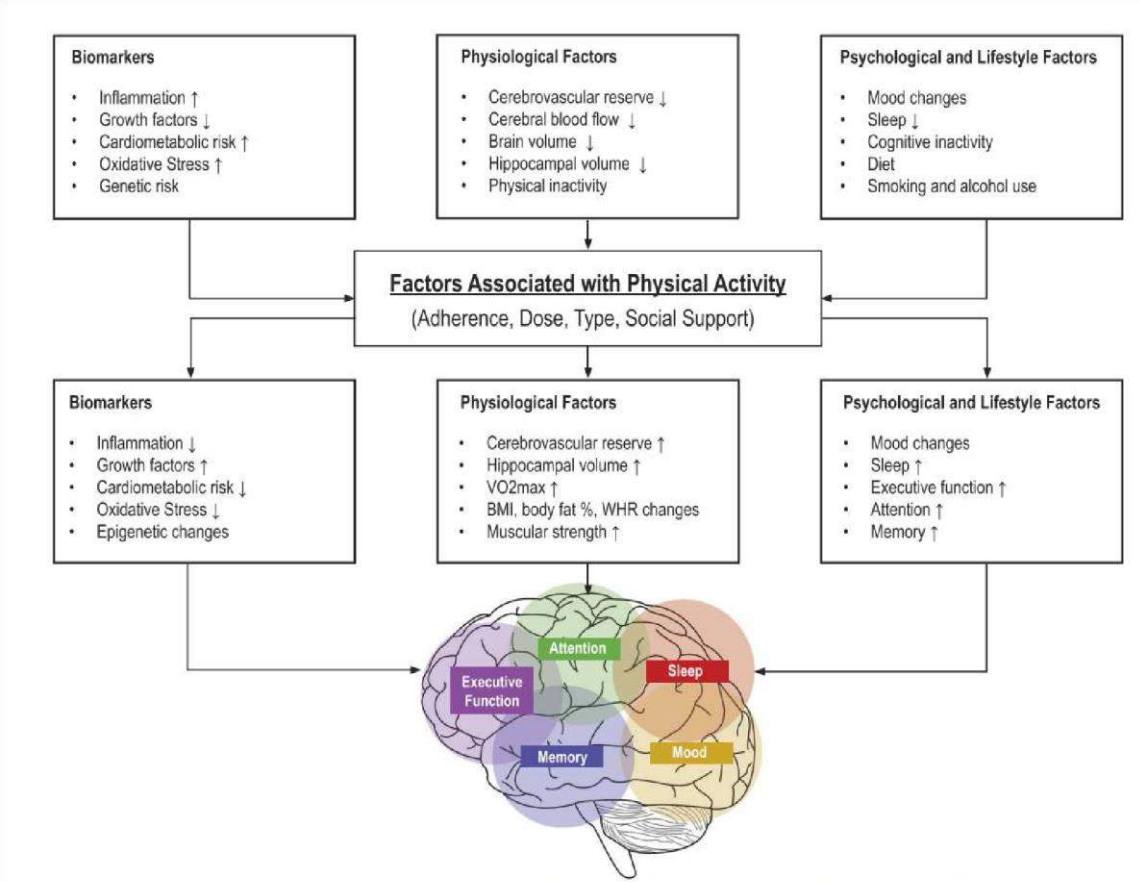
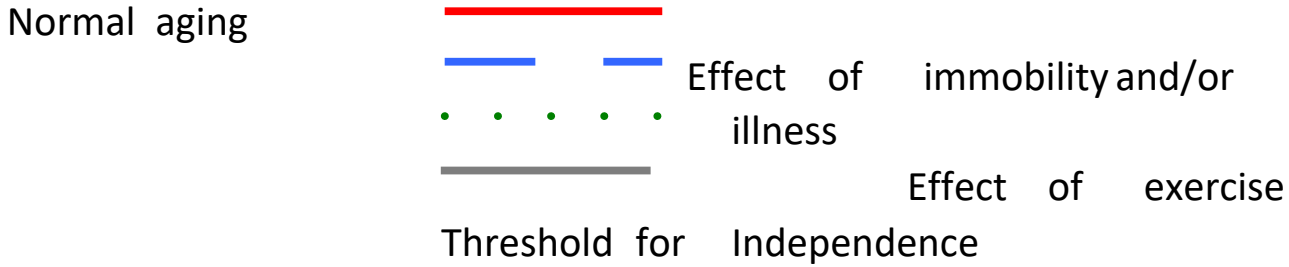
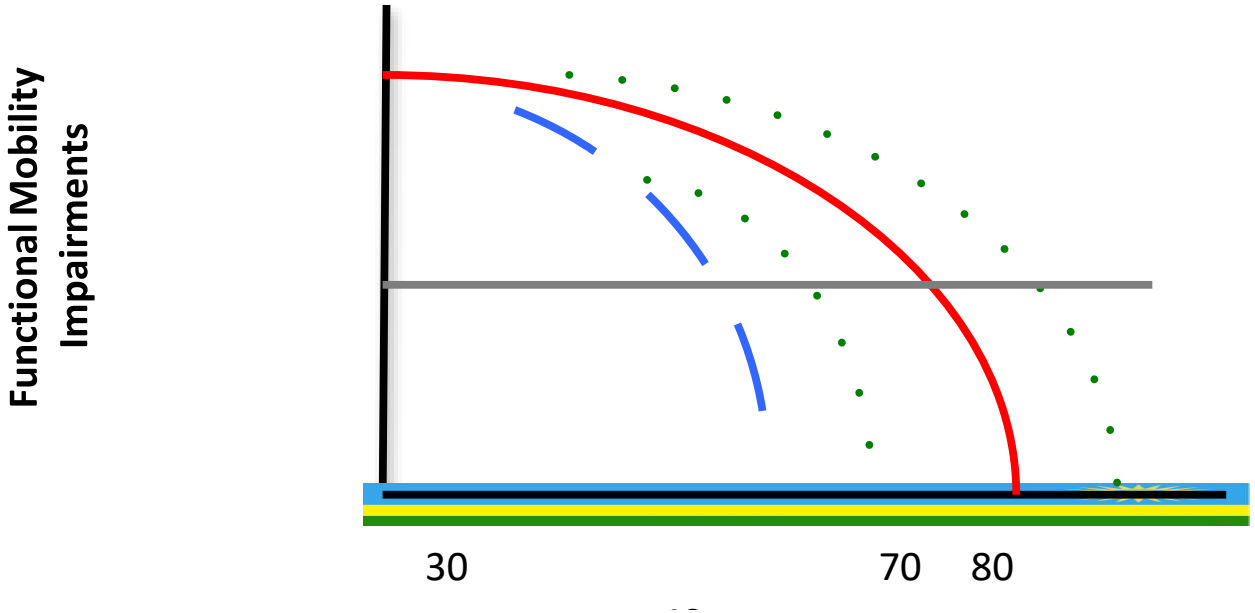


Figure. Proposed mechanisms underlying cognitive decline with aging and influence of physical activity on cognitive health. Each box in the top panel represents a broad category of proposed biomarkers, physiological factors, and psychological and lifestyle factors of cognitive aging with the specific subcategories. Each of the subcategories describes with an arrow the association of age with that category. Factors associated with physical activity include adherence to a physical activity program, dose of the activity, type of activity, and social support in the activity. Biomarkers and physiological factors are proposed to be the driving factors that improve brain function through the increase or decrease of the specific subcategory (arrows designate influence of physical activity on the factor). The mechanisms are proposed to influence brain functions and health behaviors including attention, executive function, memory, mood, and sleep. Furthermore, we propose that there is an interplay between

Figure 1: WAMI-3 Wellness Aging Model – Illness, Injury, and Immobility - The effect of age, illness, and physical inactivity on muscular strength and power, longevity, mental well-being, fall risk, functional mobility and capacity, aerobic fitness, balance, coordination, bone density, and the function of cells, tissues, organs, and systems of the body.

Figure revised by Billek-Sawhney and Wells (2009), modified from Dempsey, Seals (1995), Kauffman, Barr, and Moran (2014), and Mithal, Bonjour, Boonen et al (2012).





Effect of Injury, Illness, and Wellness, Age

PREVENTION

PREVENTION	DEFINITION
Primary	“Identify risk factors and implement services to reduce risk in individuals and populations”
Secondary	“Prevent or slow the progression of functional decline and disability and enhance activity and participation in chosen life roles and situations in individuals and populations with an identified condition”

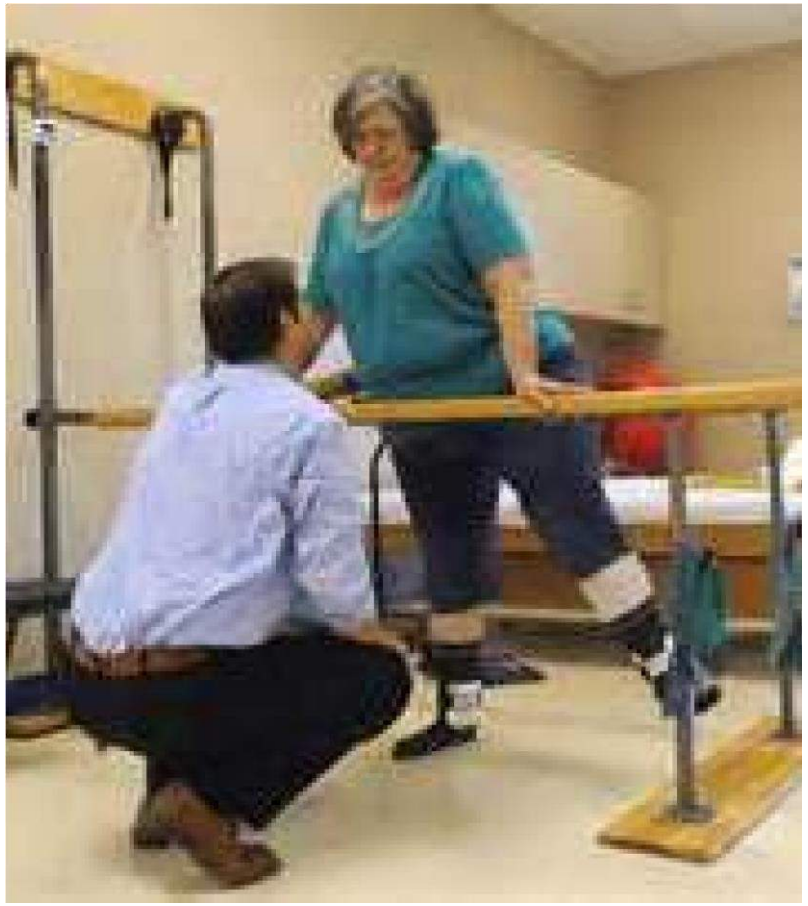
Tertiary	“Reduce the degree of disability by restoring—or by preventing the deterioration of—skills and independence in individuals and populations with chronic health conditions to allow optimal activity and participation”

Primary Prevention

Outpatient PT setting, 58 y/o F /c knee OA

- Direct access patient
- CC knee pain after prolonged sitting, descending stairs
- Medical history – GERD, hypothyroidism, carpal tunnel
- Family history – CAD, CVA, DM2

Primary Prevention – "preventing a target condition in a susceptible or potentially susceptible population



through such specific measures as general health promotion efforts”

Secondary Prevention

Acute Care Hospital, NIHSS 1, partial visual field loss

- 48 y/o F seen day after admission via ED, R/O CVA
- Resolved numbness, weakness L hemibody

2 prevention of a stroke

- Exercise
- Stress management
- Weight loss
- HTN management
- Patient education

- Exercise prescription Billlinger, 2014; Tang & Eng, 2014

Secondary – "decreasing duration of illness, severity of disease, and number of sequelae through early diagnosis and prompt intervention"

Tertiary Prevention

IRF, 60 y/o M, L CVA, R hemiparesis, Broca's aphasia…

- Each discipline may impact!
- Educate • PT
- Recognition of signs seek emergency care • Medical adherence meds, appts, advice
- Lifestyle changes!
- Initiate process
- Nursing
- Medical

Tertiary- "limiting the degree of disability and

promoting rehabilitation and restoration of function in patients with chronic & irreversible diseases”

MUSCULOSKELETAL

Rajiv Sawhney, PT, MS, DPT

Board-Certified Orthopedic Clinical Specialist

Osteoarthritis (OA)

- Most common joint disorder in US
- 10% men age 60 and older are symptomatic
- 13% women age 60 and older are symptomatic
- OA affects over 30 million in the US
- THA estimated to grow by 174% to 572,000 annually by 2030
- Kurtz S, Ong K et al
- TKA estimated to grow 673% to 3.48 million annually by 2030 • Kurtz S, Ong K et al
- Full thickness RTC tear incidence increase as we age

- 25% in 60’s
- 50% in 80’s
- Edwards P, Ebert J et al

Exercise for OA of the Knee – Cochrane Review

http://www.cochrane.org/CD004376/MUSKEL_exercise-for-osteoarthritis-of-the-knee

- Osteoarthritis starts to affect your joints before you even notice any symptoms
- By the time the first symptoms of stiffness and pain occur, changes in the joint may have already reached beyond the initial stages
- Affects 1 in 2 persons

Cochrane

- Exercise POSITIVELY effects

- Level of pain
- Physical function
- Quality of life

Key Points Exercise for OA of the Knee – Cochrane Review

http://www.cochrane.org/CD004376/MUSKEL_exercise-for-osteoarthritis-of-the-knee

- PAIN scale of 0 to 100 points (lower scores mean reduced pain).
  - People who completed exercise program rated their pain at 12 (10 to 15) points lower at end of treatment (12% absolute improvement) compared with people who did not exercise.
  - People who completed an exercise program rated their pain at 32 points.
  - People who did not exercise rated their pain at 44 points.

- PHYSICAL FUNCTION - Scale of 0 to 100 points (lower score means better physical function).
  - People who completed an exercise program rated their physical function at 10 points (8 to 13 points) lower at end of treatment (10% absolute improvement) compared with people who did not exercise.
  - People who completed an exercise program rated their physical function at 28 points.
  - People who did not exercise rated their physical function at 38 points.

- QUALITY OF LIFE – Scale of 0 to 100 points (higher score means better quality of life).

Cochrane

- Overall, people who completed an exercise program rated their quality of life at 4 points (2 to 5 points) higher at the end of treatment (4% absolute improvement).
- People who completed an exercise programme rated their quality of life at 47 points.
- People who did not exercise rated their quality of life at 43 points.

Review of Literature: Exercise and OA

Exercise & Prevention of Disability in ADLs in Older Adults with OA
Pennis, Messier, Williamson et al, 2001

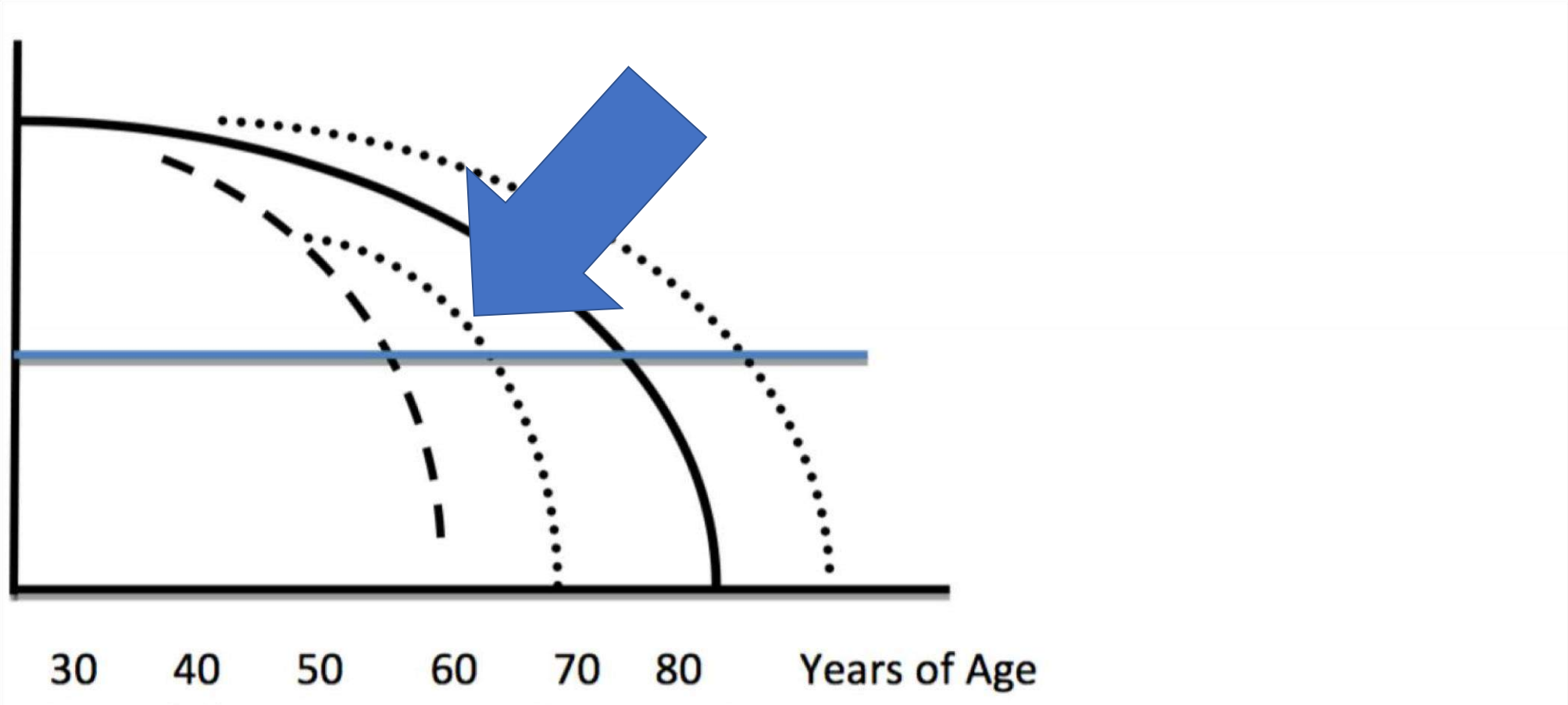
- Physical exercise and the prevention of disability in activities of daily living in older persons with OA
- 2 center randomized, single blind controlled trial
- 439 community dwelling adults ≥60 years of age with diagnosis of OA
- Aerobic exercise program and resistive program vs control group
- Results: cumulative incidence of ADL disability was lower in the exercise group

(37%)

- Control group (52.2%) (P=.02)

ADL = activities of daily living

When we apply exercise to knee OA, (secondary prevention) - rightward shift!


30
40
50
60
70
80
Years of Age

ENDOCRINE

Michelle Criss, PT, DPT

Board-Certified Geriatric Clinical Specialist

WAMI^3 - ILLNESS with DM

- Higher rates of comorbidities in age with DM • Increased geriatric syndromes
- Polypharmacy
- Cognitive impairment
- Urinary incontinence
- Injurious falls
- Persistent pain
- Higher risk of cognitive impairment • Impacts med/dietary management abilities
- Both age and DM increase risk of CVD

Am Diab Assoc, *Standards*, 2018

COMPOUNDED RISK!!

WAMI-3 – INJURY with DM

- Falls
- Combination of age and DM increases risk of recurrent falls by 67% (Pijpers et al.,
  2012)
- 2 x risk of injurious falls (de Mettelinge et al, 2013)
- Neuropathy, metabolism in mm, cognition, visual/vestib. fxn (Hewston et al, 2016)
- Wounds
- Normal changes in skin from age + risks from DM (neuropathy, poor healing, infection risk)
- MUCH higher amputation risk

COMPOUNDED RISK!!!

WAMI-3 – IMMOBILITY with DM

- DM is INDEPENDENT risk factor for low muscular strength & accelerated decline in strength and function (Chen L et al, 2013; Anton et al, 2013; Park et al, 2009)

- Sedentary time especially BAD • Muscle use = insulin-independent method of glucose uptake
- More sitting = worse glycemic control and increased CV risks (Healy et al, 2008)

COMPOUNDED RISK!

Exercise Benefits in Individuals with DM (Colberg et al, 2016)

Aerobic Exercise Benefits

- Mitochondrial density increased
- Insulin sensitivity increased
- Oxidative enzymes increased
- Compliance and reactivity of blood vessels increase
- Lung function & Immune function enhanced
- Cardiac output increase
- Lower cardiovascular and overall mortality risks in both type 1 and type 2 diabetes
- Type 1 increases cardiorespiratory fitness, decreased insulin resistance and improved lipid levels and endothelial function
- Type 2 reduces A1C, triglycerides, blood pressure, and insulin resistance

Resistance Exercise Benefits

- Improved muscle mass, body composition, strength, physical function, mental health, bone mineral density, insulin sensitivity, blood pressure, lipid profiles, and cardiovascular health
- Type 1 – can minimize risk of exercise-induced hypoglycemia
- Type 2 – improved glycemic control, insulin resistance fat mass, blood pressure, strength, and lean body mass

Benefits of Other Forms of Physical Activity

- Stretching to increase range of motion
- Balance and gait
- Combined RT and aerobic = better reduction

A1C, BMI, waist circumference, BP, strength

What are some key points to remember?

- DM exercise guidelines the same as for everyone!
- Controversy with pre-exercise medical clearance…
- Type 1 – all ages, blood glucose response to exercise highly variable
- Exercise-induced hypo- and hyperglycemia more common
- Resistance training (doing first) could lead to less hypoglycemia
- Older adults with DM – avoid ex outside on humid/hot days (Colberg et al, 2016)

- Recent SR - did not have sufficient #s to analyze effect on falls • Exercise significantly improves LE strength, gait speed/cadence, static balance in age with DM (Chapman et al, 2017)

NEUROMUSCULAR

Mariana Wingood, PT, DPT

Board-Certified Geriatric Clinical Specialist

Implication for Function and Fall Prevention

(Wang, 2015)

Population: community dwelling, mean age= 72

Intervention:

- Squat-> moving from 180 degrees to 90 degrees knee angle and back
- 3/week for 8 weeks • Intensity: ~ 85–90% of 1RM **Conclusion:**
- Increased work efficiency
- Type II skeletal muscle fiber percentage and size
- Improved Physical Function
- Decreased Fall Risk

Balance

(Donath, 2016)

Duration: 25-30 minutes/day

Intensity: Moderate- very challenging

Components: anticipatory, reactive, and sensory

Progression:

- Reducing the base of support
- Incorporating dynamic movements that perturb the center of gravity when appropriate
- Stressing postural muscle groups
- Reducing sensory input

42% reduction of falls for the high dose/intensity balance exercise group[57]

Cognition

(Saez de Asteasu, 2017)

Aerobic Training

- Improvements in neuro-cognitive functioning in older adults with and without cognitive impairments
- Minimal improvements in memory
- Significant improvements in executive function Resistance Training
- Inconsistency on benefits of resistance training
- Found significant improvements in executive function

SUMMARY / CLINICAL PEARLS

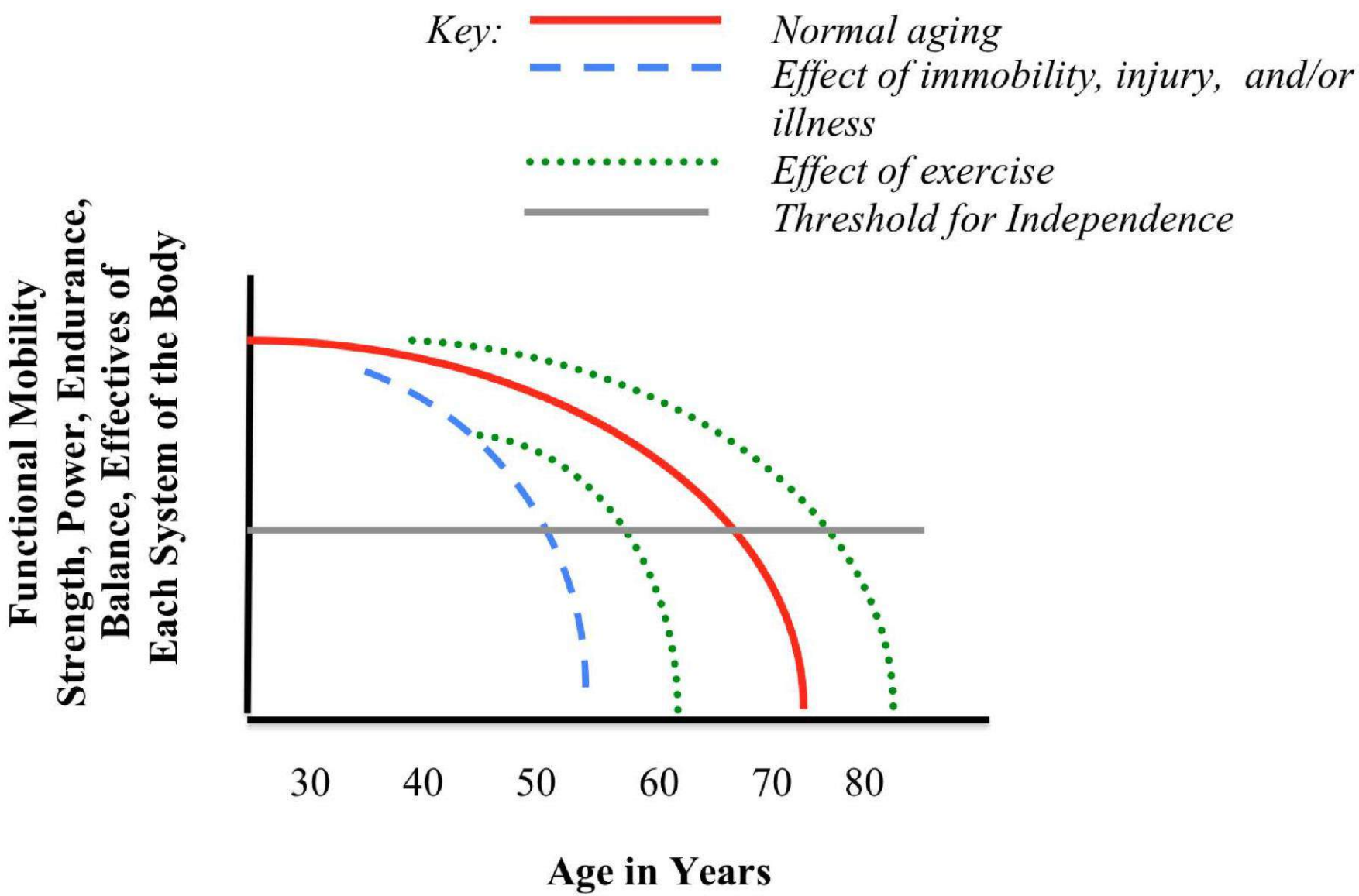
Key Guidelines for Older Adults

adapted from Physical Activity Guidelines for Americans, 2nd ed, page 68 and 81

SAME Guidelines for Adults and Older Adults	ONLY for Older Adults

- ✓ Move MORE, sit less ✓ 150-300 minutes moderate intensity OR 75-150 minutes vigorous intensity OR an equivalent combination aerobic activity spread throughout the week
- ✓ Muscle-strengthening of moderate intensity or greater of all major muscle groups ≥2 days/week
- ✓ Multicomponent activity including balance, aerobic, and muscle strengthening
- ✓ With chronic conditions, modify under guidance of a physical therapist or appropriate physical activity specialist
- ✓ Employ safety
- ✓ If unable to do recommended requirement, be as physical active as possible

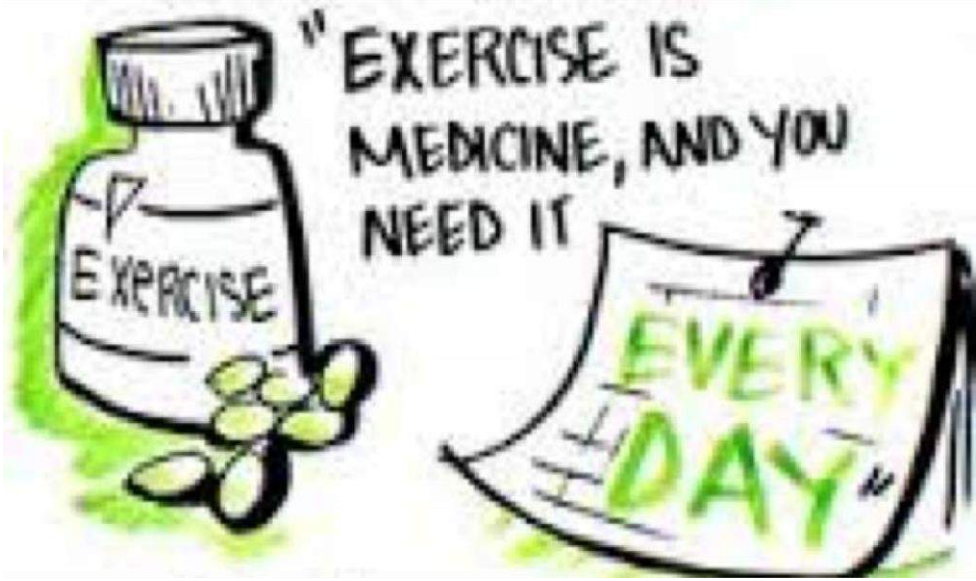
Figure 2. Wellness Aging Model Related to Illness, Injury, and immobility (WAMI-3), adapted from Billek-Sawhney and Sawhney, 2017[70]



"If **exercise** could be purchased in a **pill**, it would be the single most **widely prescribed** and **beneficial medicine** in the nation."

—**Robert H. Butler**

Don't Forget 1 in 6!
As HCPs we are not immune!



As health care providers, we are not immune to illness and disease…

Take care of you!

So you can take care of others!

THE WALL STREET JOURNAL.

WHAT'S YOUR WORKOUT?

She's Powerlifting at 76, So You're Officially Out of Excuses

A retiree joins a group of devoted weightlifters known as the Golden Girls at her Baltimore gym

Secondary/Tertiary Prevention: Exercise!

- Its more than just walking! (Wootten et al. 2017)

- Pulmonary rehabilitation:
- "Pulmonary rehabilitation is a comprehensive intervention based on a thorough patient assessment followed by patient-tailored therapies that include, but are not limited to, exercise training, education, and behavior change, designed to improve the physical and psychological condition of people with chronic respiratory disease and to promote the long-term adherence to health-enhancing behaviors." (ATS/ERS Statement, 2013)

- Maintenance of behavioral change may be key (Beauchamp et al. 2013)

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