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I currently have, or I have had in the past 2 years an affiliation or financial interest with the below listed companies around this presentation, including:

NONE

CONFLICT OF INTEREST STATEMENT

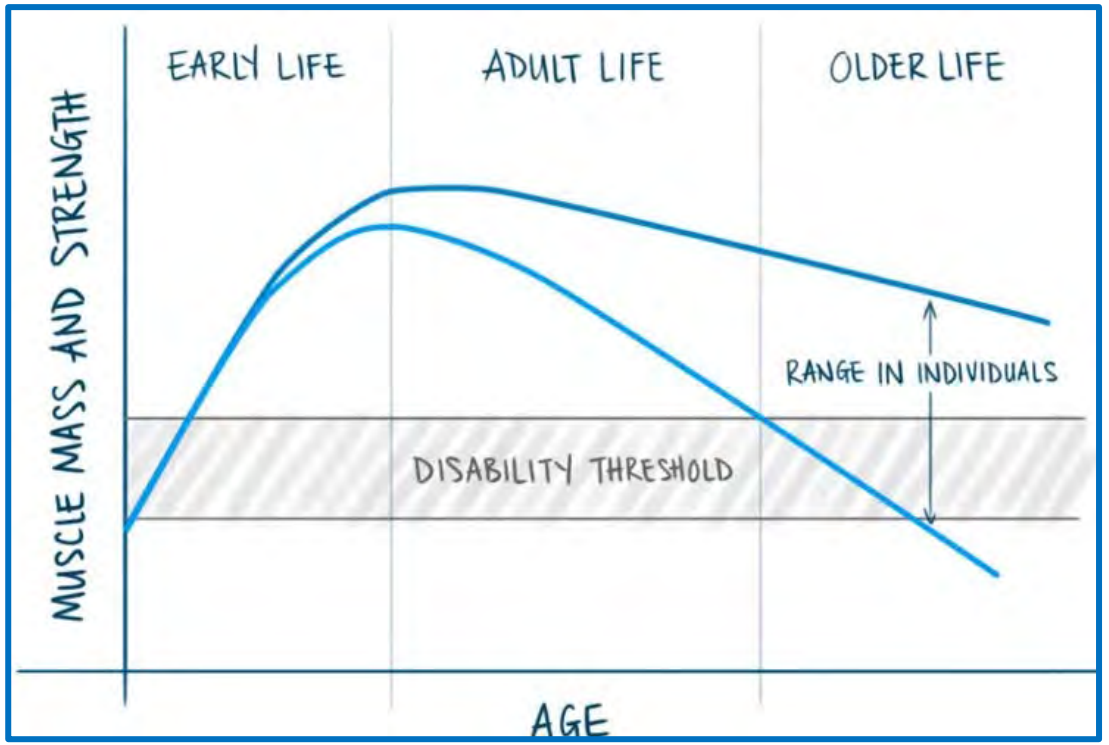
I have no actual or potential conflict of interest in relation to this presentation.

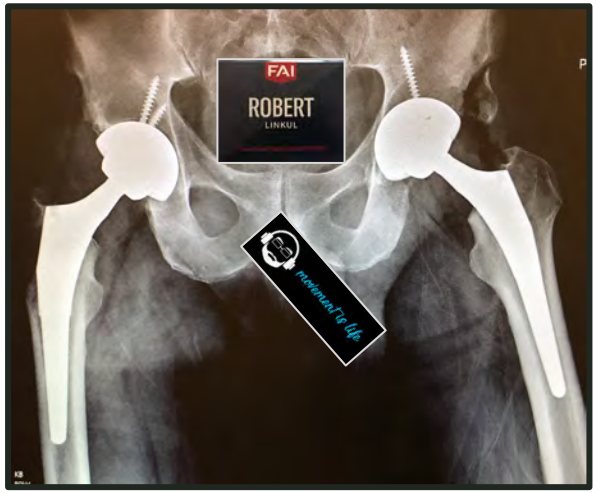
Sarcopenia & Aging

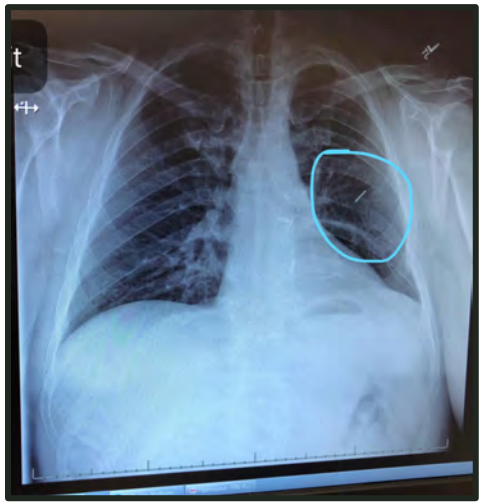
Public Enemy Number One

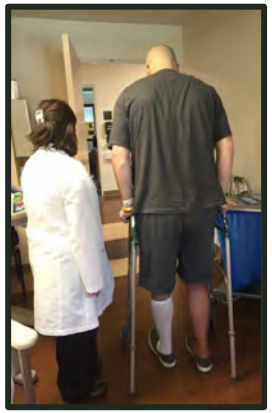
With Robert Linkul

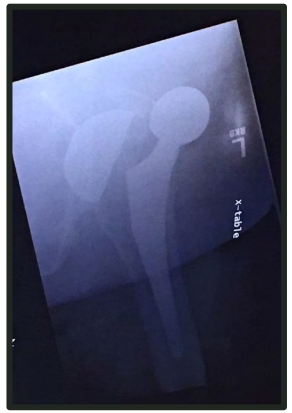
MS, CSCS,*D, NSCA-CPT,*D, FNSCA




FAI
ROBERT
LINKUL
movement is life







The Big Three

BMF = Bone Muscle Fat

Osteopenia

- Osteopenia is a condition that begins as you lose bone mass and your bones get weaker.

Sarcopenia

- Sarcopenia is a syndrome characterized by progressive and generalized loss of skeletal muscle mass, function and strength

- **Obesity**
  - Obesity is a complex disease involving an excessive amount of body fat.

Know Your Enemy:

Sarcopenia = Public Enemy Number One

Dreadful Consequences of Sarcopenia and Osteoporosis due to COVID-19 Containment

Michael Anthonius Lim, MD, MHSM[1,2], and Antonius Andi Kurniawan, MD[3,4]

Keywords: Osteoporosis, Sarcopenia, Fragility Fractures, Metabolic Bone Disorders, Geriatric Trauma

Research Article

Prevalence of Sarcopenia and Sarcopenic Obesity Vary with Race/Ethnicity and Advancing Age

STRENGTH TRAINING FOR THE OLDER CLIENT—A BLUEPRINT FOR PROGRAM DESIGN

ROBERT LINKUL, MS, CSCS,*D, NSCA-CPT,*D, RCPT,*D FNSCA

The favorable effects of a high-intensity resistance training on sarcopenia in older community-dwelling men with osteosarcopenia: the randomized controlled FrOST study

Theresa Lichtenberg, Simon von Stengel, Cornel Sieber, Wolfgang Kemmler

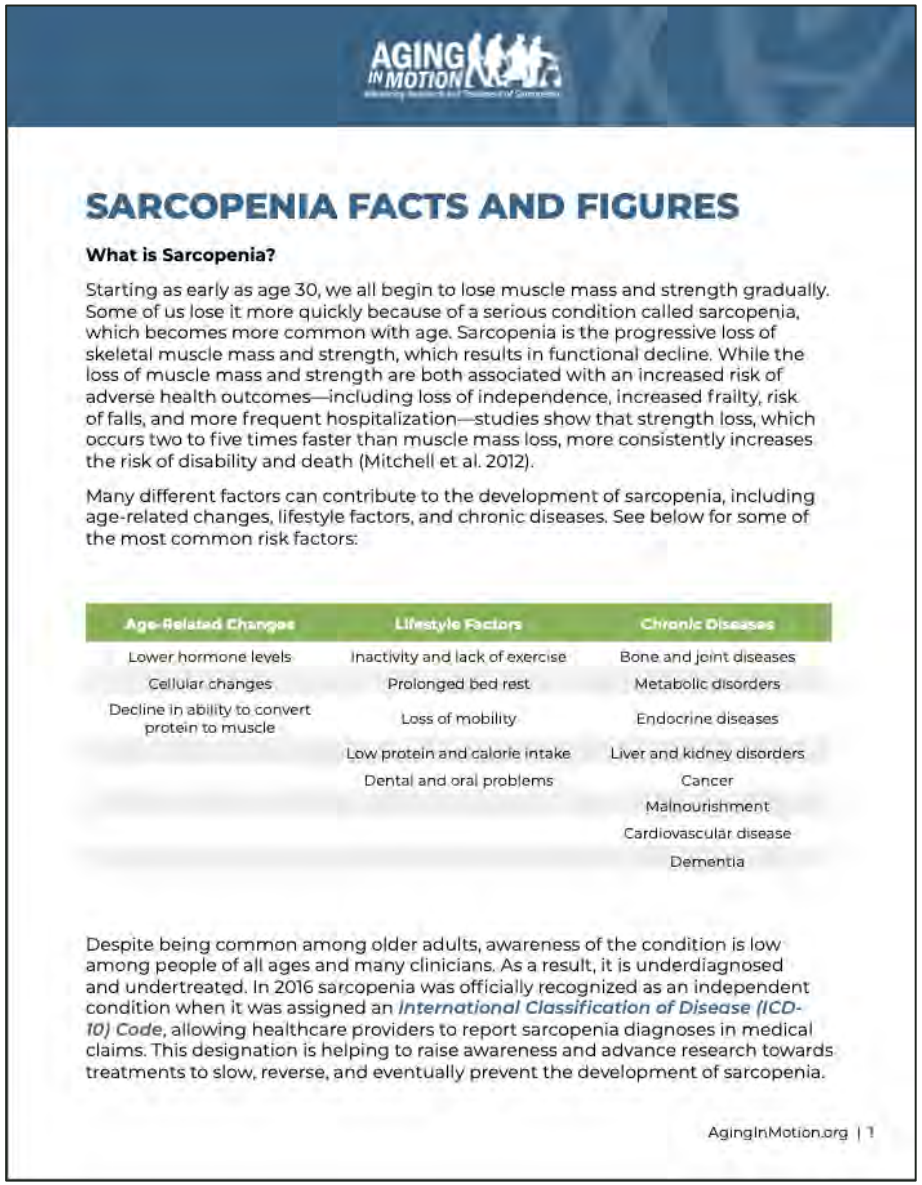
Clinical Interventions in Aging 14, 2173, 2019

Purpose

Sarcopenia, the loss of muscle mass combined with the loss of muscle function, has become a public health issue. There is an urgent need for interventions. The study aimed to determine the effect of high-intensity resistance training (HI-RT), a time- and cost-efficient training modality, on sarcopenia in osteosarcopenic (OS) older men.

Sarcopenia is the Lynchpin for Poor Quality of Life

- Poverty of the Flesh
  - Coined in 1989
- Acute Sarcopenia
  - Acute cases conditions
    - Less than six months
    - Temporary conditions like recent illness, injury or surgery
    - Without intervention, could become Chronic
- Chronic Sarcopenia
  - Chronic cases conditions
    - Present for six months or more
    - Results of a secondary lifestyle or permanent disability



AGING IN MOTION

SARCOPENIA FACTS AND FIGURES

What is Sarcopenia?

Starting as early as age 30, we all begin to lose muscle mass and strength gradually. Some of us lose it more quickly because of a serious condition called sarcopenia, which becomes more common with age. Sarcopenia is the progressive loss of skeletal muscle mass and strength, which results in functional decline. While the loss of muscle mass and strength are both associated with an increased risk of adverse health outcomes—including loss of independence, increased frailty, risk of falls, and more frequent hospitalization—studies show that strength loss, which occurs two to five times faster than muscle mass loss, more consistently increases the risk of disability and death (Mitchell et al. 2012).

Many different factors can contribute to the development of sarcopenia, including age-related changes, lifestyle factors, and chronic diseases. See below for some of the most common risk factors:

Age-Related Changes	Lifestyle Factors	Chronic Diseases
Lower hormone levels	Inactivity and lack of exercise	Bone and joint diseases
Cellular changes	Prolonged bed rest	Metabolic disorders
Decline in ability to convert protein to muscle	Loss of mobility	Endocrine diseases
	Low protein and calorie intake	Liver and kidney disorders
	Dental and oral problems	Cancer
		Malnourishment
		Cardiovascular disease
		Dementia

Despite being common among older adults, awareness of the condition is low among people of all ages and many clinicians. As a result, it is underdiagnosed and undertreated. In 2016 sarcopenia was officially recognized as an independent condition when it was assigned an *International Classification of Disease (ICD-10) Code*, allowing healthcare providers to report sarcopenia diagnoses in medical claims. This designation is helping to raise awareness and advance research towards treatments to slow, reverse, and eventually prevent the development of sarcopenia.

AgingInMotion.org | 1

- **It's the Development of:**
  - Weakness in muscles
  - Decrease in strength
  - Decrease in power
  - As the body ages
  - With the loss of physical function
  - Resulting in injuries like:
    - Osteoporosis
    - Forward head
    - Arthritis
    - Thoracic lordosis
    - Osteoarthritis
    - High Fall Risk

Joe Rogan Experience with Peter Attia

Episode #1735 - November 17th 2021

- MD from Stanford University
- Johns Hopkins Hospital General Surgery (Resident of the Year)
- National Cancer Institute
- Nutritional Interventions
- Exercises Physiology
- Sleep Physiology
- Emotional & Mental Health
- Pharmacology to Increase Life Span

Study #1 Showcased 65+ Year Old Clients

- Six Month Resistance Training Program
- Resulted in 1.7 Kilos (3.74lbs) in Muscle Mass Gained

Study #2 Showcased 65+ Year Old Clients

- 10 Days of True Bed Rest
- Resulted in 1.5 Kilos (3.3lbs) of Muscle Mass Lost

Findings

- What is Gained in Over Six Months of Hard Work
- WILL Be LOST in TEN Days!!!

www.PeterAttiaMD.com

How Soon Does Sarcopenia Take Effect?

Think About This When You Go on Vacation

Results from 14 Day Stay-At-Home Quarantine in those Over the Age of 59


JOURNAL OF THE AMERICAN GERIATRICS SOCIETY

Risk of Increased Physical Inactivity During COVID-19 Outbreak in Older People: A Call for Actions

Before Pandemic Average Person Step Count
= 6,000 steps per day

During 14 Day Stay-At-Home Quarantine
= Average was 1,500 steps per day
= Decreased by 75%
= 4% reduction in fat free body mass
= 8% reduction in muscular strength
= 6% reduction in power
Two-week Post-Rehabilitation Training Sessions
Failed to Rebuild Lost Muscle Mass

"Two weeks of inactivity has been shown to decrease muscle strength by approximately 8%, and despite a seemingly low value, 2 weeks of rehabilitation were ineffective in recovering muscle function, emphasizing the impact of abrupt reductions in physical activity in an already vulnerable population"

No Underdosing!!

Two Days of Immobilization
- Early Onset of Atrophy
- 1.7% Muscle Volume Loss

Seven Days of Immobilization
- Full Atrophy
- 5.5% Muscle Volume Loss

10 Days of Immobilization
- Early Onset of Sarcopenia

14 Days of Immobilization
- Full Sarcopenia
- 6% Decrease in Power Production
- 8%+ Decrease in Strength Production
- 5.5%+ Loss of Muscle Mass

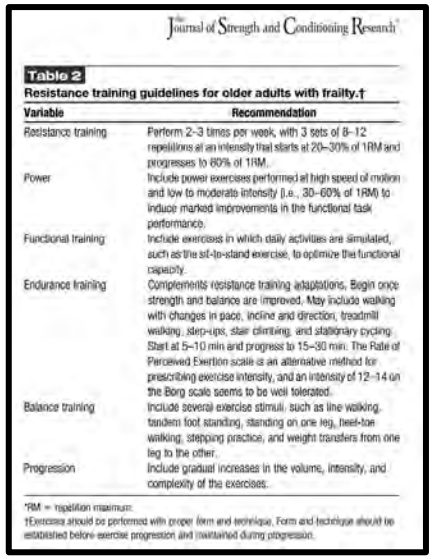
168 Hours in One Week

1.5 Hours Per Week Can Keep Sarcopenia at Bay
[3 x 30 Minutes of Resistance Training]

166.5 Hours to Do What EVER You Want!

How Do We Overcome Sarcopenia?

Resistance (Strength) & Power Training - Both Work!



Journal of Strength and Conditioning Research

Table 2

Resistance training guidelines for older adults with frailty.†

Variable	Recommendation
Resistance training	Perform 2–3 times per week, with 3 sets of 8–12 repetitions at an intensity that starts at 20–30% of 1RM and progresses to 80% of 1RM.
Power	Include power exercises performed at high speed of motion and low to moderate intensity (i.e., 30–60% of 1RM) to induce marked improvements in the functional task performance.
Functional training	Include exercises in which daily activities are simulated, such as the sit-to-stand exercise, to optimize the functional capacity.
Endurance training	Complements resistance training adaptations. Begin once strength and balance are improved. May include walking with changes in pace, incline and direction, treadmill walking, step-ups, stair climbing, and stationary cycling. Start at 5–10 min and progress to 15–30 min. The Rate of Perceived Exertion scale is an alternative method for prescribing exercise intensity, and an intensity of 12–14 on the Borg scale seems to be well tolerated.
Balance training	Include several exercise stimuli, such as line walking, tandem foot standing, standing on one leg, heel-toe walking, stepping practice, and weight transfers from one leg to the other.
Progression	Include gradual increases in the volume, intensity, and complexity of the exercises.

*RM = repetition maximum.

†Exercises should be performed with proper form and technique. Form and technique should be established before exercise progression and maintained during progression.

High-Speed Resistance Training in Elderly People: A New Approach Toward Counteracting Age-Related Functional Capacity Loss

Study of 110 Older Adults

Slow Velocity

- Three Sets of 8-12 Repetitions
- 6-8 RPE (Rate of Perceived Exertion)
- Study Showed Increase of 4-70% in Strength Production

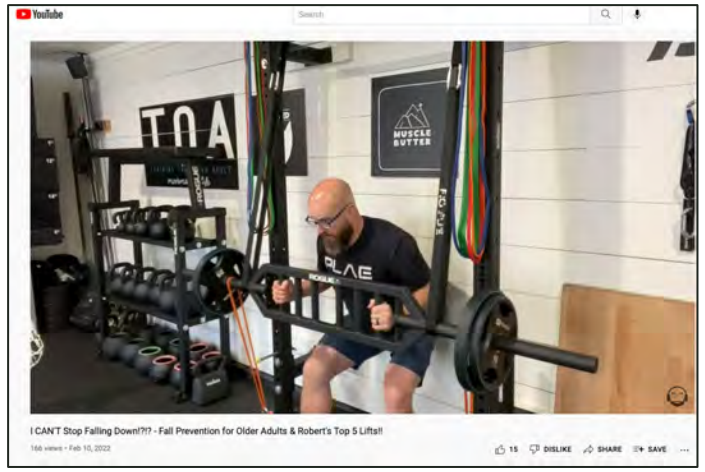
Increased Power

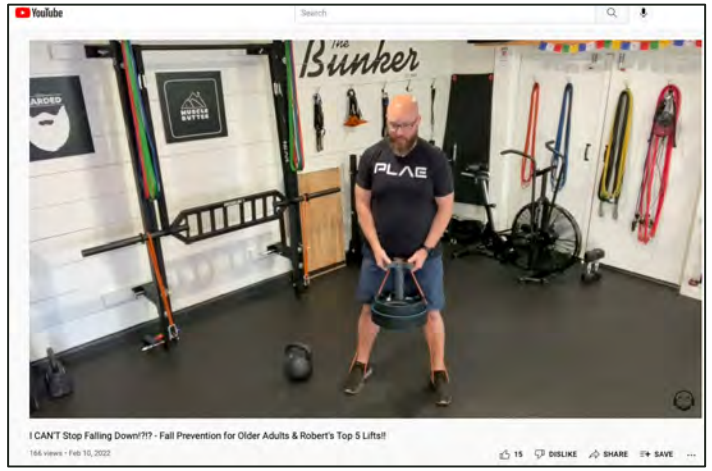
- Three Sets of 6-10 Repetitions
- 3-6 RPE (Rate of Perceived Exertion)
- Study Showed Increase of 40-60% in Power Production

How Do We Overcome Sarcopenia?

The Secret Sauce

- Sets of 12 Repetitions
- 1st Six Repetitions [2:<1]
  - Less Than :01 Concentric Acceleration Phase
  - :02 Eccentric Preparation Phase
  - Minimal Follow Through Phase
- 2nd Six Repetitions [3:1]
  - :01 Concentric Acceleration Phase
  - :03 SLOW Eccentric Preparation Phase
  - Minimal Follow Through Phase
- Learn More About This & My Top Five Lifts
  - YouTube/RobertLinkul





How Do You Properly Select Load?

Three Key Components

How to Select Load

RPE =

Rate of Perceived Exertion

How Do We Judge RPE?

1. Can the Client Perform the Number of Repetitions You Asked?
2. Can the Client Perform the Lift with the Proper Technique ALL the Way Through the Set?
3. Can the Client Maintain the Lifting Tempo You Have Programmed with EVERY Repetition?

Testing for Sarcopenia

Grip Strength
Calve Circumference
& Age

Geriatrics Gerontology Medline Indexed

Geriatr Gerontol Int 2014; 14 (Suppl. 1): 93–101

ORIGINAL ARTICLE

Development of a simple screening test for sarcopenia in older adults

Shinya Ishii,[1] Tomoki Tanaka,[2] Koji Shibasaki,[1] Yasuyoshi Ouchi,[3] Takeshi Kikutani,[4] Takashi Higashiguchi,[5] Shuichi P Obuchi,[6] Kazuko Ishikawa-Takata,[7] Hirohiko Hirano,[6] Hisashi Kawai,[8] Tetsuo Tsuji[2] and Katsuya Iijima[1]

[1]Department of Geriatric Medicine, Graduate School of Medicine, [2]Institute of Gerontology, The University of Tokyo, [3]Federation of National Public Service Personnel Mutual Aid Associations Toranomon Hospital, [4]Division of Clinical Oral Rehabilitation, The Nippon Dental University Graduate School of Life Dentistry at Tokyo, [5]Tokyo Metropolitan Institute of Gerontology, [6]Division of Health Promotion and Exercise, National Institute of Health and Nutrition, Tokyo, and [7]Department of Surgery & Palliative Medicine, Fujita Health University School of Medicine, Toyoake City, Japan

Aim: To develop a simple screening test to identify older adults at high risk for sarcopenia.

Methods: We studied 1971 functionally independent, community-dwelling adults aged 65 years or older randomly selected from the resident register of Kashiwa city, Chiba, Japan. Data collection was carried out between September and November 2012. Sarcopenia was defined based on low muscle mass measured by bioimpedance analysis and either low muscle strength characterized by handgrip or low physical performance characterized by slow gait speed.

Results: The prevalence of sarcopenia was 14.2% in men and 22.1% in women. After the variable selection procedure, the final model to estimate the probability of sarcopenia included three variables: age, grip strength and calf circumference. The area under the receiver operating characteristic curve, a measure of discrimination, of the final model was 0.939 with 95% confidence interval (CI) of 0.918–0.958 for men, and 0.909 with 95% CI of 0.887–0.931 for women. We created a score chart for each sex based on the final model. When the sum of sensitivity and specificity was maximized, sensitivity, specificity, and positive and negative predictive values for sarcopenia were 84.9%, 88.2%, 54.4%, and 97.2% for men, 75.5%, 92.0%, 72.8%, and 93.0% for women, respectively.

Conclusions: The presence of sarcopenia could be detected using three easily obtainable variables with high accuracy. The screening test we developed could help identify functionally independent older adults with sarcopenia who are good candidates for intervention. **Geriatr Gerontol Int 2014; 14 (Suppl. 1): 93–101.**

Keywords: disability, rehabilitation, sarcopenia, screening, sensitivity and specificity.

Typical Grip Strength for Healthy Individuals

AGE	MALE			FEMALE		
	Weak	Normal	Strong	Weak	Normal	Strong
10-11	<27.8	27.8-49.4	>49.4	<26.0	26.0-47.6	>47.6
12-13	<42.8	42.8-68.8	>68.8	<32.2	32.2-53.8	>53.8
14-15	<62.8	62.8-97.7	>97.7	<34.2	34.2-60.2	>60.2
16-17	<71.9	71.9-115.5	>115.5	<37.9	37.9-63.9	>63.9
18-19	<78.7	78.7-122.4	>122.4	<42.3	42.3-68.3	>68.3
20-24	<81.1	81.1-124.8	>124.8	<47.4	47.4-77.8	>77.8
25-29	<83.1	83.1-126.8	>126.8	<56.4	56.4-91.3	>91.3
30-34	<79.4	79.4-123.0	>123.0	<47.4	47.4-77.8	>77.8
35-39	<78.9	78.9-122.6	>122.6	<44.8	44.8-75.2	>75.2
40-44	<78.3	78.3-121.9	>121.9	<41.7	41.7-72.1	>72.1
45-49	<76.5	76.5-120.2	>120.2	<41.0	41.0-71.4	>71.4
50-54	<72.5	72.5-111.8	>111.8	<39.9	39.9-70.3	>70.3
55-59	<67.7	67.7-106.9	>106.9	<39.0	39.0-69.4	>69.4
60-64	<66.6	66.6-105.8	>105.8	<37.9	37.9-68.3	>68.3
64-69	<62.2	62.2-97.0	>97.0	<34.0	34.0-60.0	>60.0
70-99	<47.0	47.0-77.4	>77.4	<32.4	32.4-54.0	>54.0

Testing for Sarcopenia

Grip Strength & Age

Testing for Sarcopenia

New or Returning Clients

Grip Strength

Table 4 Score charts for estimated probability of sarcopenia

Variables	Value													
Men														
Age			<66	66	68	70	72	74	76	78	80	82	84	86≦
Score			0	+1	+2	+3	+4	+5	+6	+7	+8	+9	+10	+11
Grip strength		<20	20	23	26	29	32	35	38	41	44	47	50≦	
Score		+99	+90	+81	+72	+63	+54	+45	+36	+27	+18	+9	0	
Calf circumference	<26	26	28	30	32	34	36	38	40	42≦				
Score	+81	+72	+63	+54	+45	+36	+27	+18	+9	0				
Estimated individual probability of sarcopenia														
Sum score	70	80	90	95	100	105	110	115	120	125	130	135	140	145
Probability (%)	1	2	5	8	13	19	28	39	51	64	74	83	89	93
Women														
Age			<66	66	68	70	72	74	76	78	80	82	84	86≦
Score			0	+2	+4	+6	+8	+10	+12	+14	+16	+18	+20	+22
Grip strength		<14	14	16	18	20	22	24	26	28	30	32	34≦	
Score		+110	+100	+90	+80	+70	+60	+50	+40	+30	+20	+10	0	
Calf leg circumference			<26	26	28	30	32	34	36	38	40	42≦		
Score			+63	+56	+49	+42	+35	+28	+21	+14	+7	0		
Estimated individual probability of sarcopenia														
Sum score	80	90	95	100	105	110	115	120	125	130	135	140	145	150
Probability (%)	1	3	5	8	12	19	28	39	51	63	74	82	88	93

Values for each variable are given with such intervals that the scores show small steps, and scores for intermediate values can be estimated by linear interpolation. The exact formula to calculate the scores are as follows: score in men, $0.62 \times (\text{age} - 64) - 3.09 \times (\text{grip strength} - 50) - 4.64 \times (\text{calf circumference} - 42)$; score in women, $0.80 \times (\text{age} - 64) - 5.09 \times (\text{grip strength} - 34) - 3.28 \times (\text{calf circumference} - 42)$. The corresponding probabilities of sarcopenia are calculated with the following formulae: probability in men, $1 / [1 + e^{-(\text{sum score} / 10 - 11.9)}]$; probability in women, $1 / [1 + e^{-(\text{sum score} / 10 - 12.5)}]$.

How to Assess Their Strength & Ability:

Daily Life Function Movements

(50-80 YOA Older Adults)(Not Elderly or Frail Elders)

Can Your Clients?

- Hinge & Touch Knees
  - With No Pain
- Hinge, Round & Touch Toes
  - With No Pain
- Reach to 180 Degree Over Head
  - With No Pain
- Up & Down From the Ground
  - With Minimal Pain
  - Big Toe, Back, Wrist, Etc.
- Up & Down From Steps
  - With/Without Assistance
  - With Minimal or No Pain

How to Assess Their Strength & Ability:

Daily Life Function Movements

(50-80 YOA Older Adults)(Not Elderly or Frail Elders)

	Poor	Fair	Good
Sit to Stand	5 - 12	13 - 19	20 - 25+
Chest Press	8 - 15	16 - 24	25 - 30+
Step Ups	5 - 12	13 - 19	20 - 25+
Chest Pull	8 - 15	16 - 24	25 - 30+
Iso. Hold	:00 - :19	:20 - :39	:40 - :60+

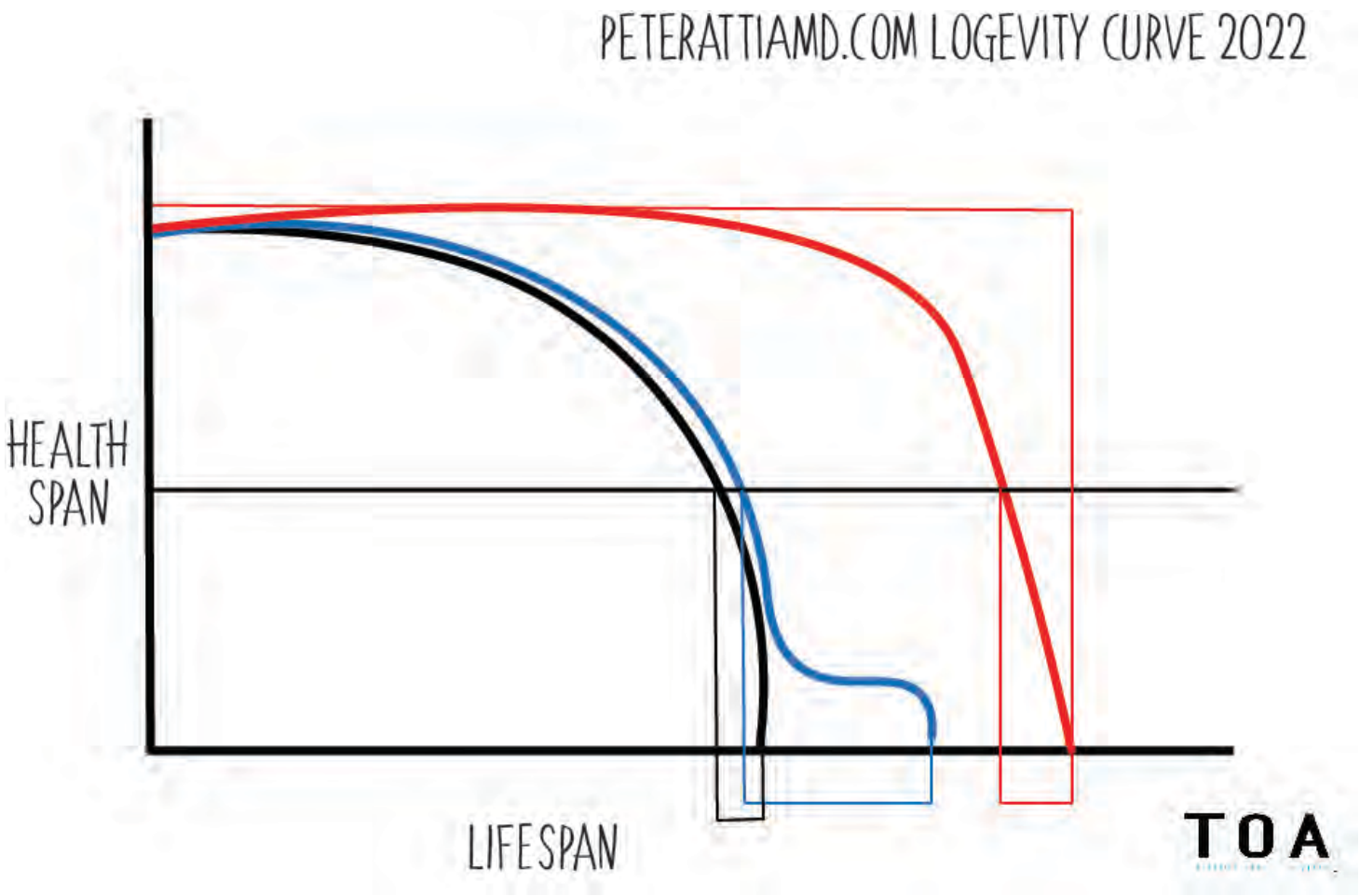
- 1:00 Body Weight Sit to Stand
- 1:00 Band Pronated Chest Press
- 1:00 Body Weight Alt. Step Ups
- 1:00 Band Supinated Chest Pull
- 1:00 Push Up/Plank Hold

Five Movements to Get Your Clients STRONG

Hinge - Row - Split Feet - Over Head Action & Carry

TOA Exercise Progressions

	Simplistic/Foundational		Mid-Range/Structural		Complex/High-Level	
Hinge/ Complex	Feet Elevated Bridges	Band Assisted Rack Pull (high anchor)	Band Displace Hinges (hip height anchor)	Band/Loaded Rack Pull (self anchor)	Band/Loaded Kickstand RDLs (self anchor)	KB Replacement Deadlifts
Row/Pull	Band/Pulley Supinated Row (high anchor)	Band/Pulley St. Arm Pull Down (high anchor)	Band/Pulley Pronated Row (high anchor)	Band/Pulley SA Pull Starts (low anchor)	Band/Pulley Pull Overs (rear facing/high anchor)	KB/DB SA Bent Row
Split Stance	Band/BW Assisted Rear Gait Steps	Band/BW Assisted Forward Gait Steps	Band/BW Board Push Back Lunges	Band/ BW Assisted Split Squats	BW/Loaded Split Squat Sit to Stands	BW/Loaded Split Squats
Over Head Action	DB^2 Shoulder Raises (Ant. Lat. Post.)	Band Reverse Push Ups (high anchor)	Band/Pulley Pull Overs (rear facing/high anchor)	DB/KB Pull Over	Pivot Point SA Over Head Press	DB^2 Over Head Press
Loaded Carry	KB SA Suitcase Sit to Stand Carry	KB Goblet Sit to Stand Carry	KB Suitcase Carry	KB^2 Farmer Sit to Stand Carry	Tank/Sled Push	Tank/Sled Drag (Rear Face)


PETERATTIAMD.COM LOGEVITY CURVE 2022
HEALTH SPAN
LIFESPAN
TOA

Thank You Very Much!!

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