

# Nutrition for Frail Elderly



## 8<sup>th</sup> APOLLO INTERNATIONAL CLINICAL NUTRITION UPDATE – 2016

COLOMBO, SRI LANKA -13 & 14 AUGUST, 2016

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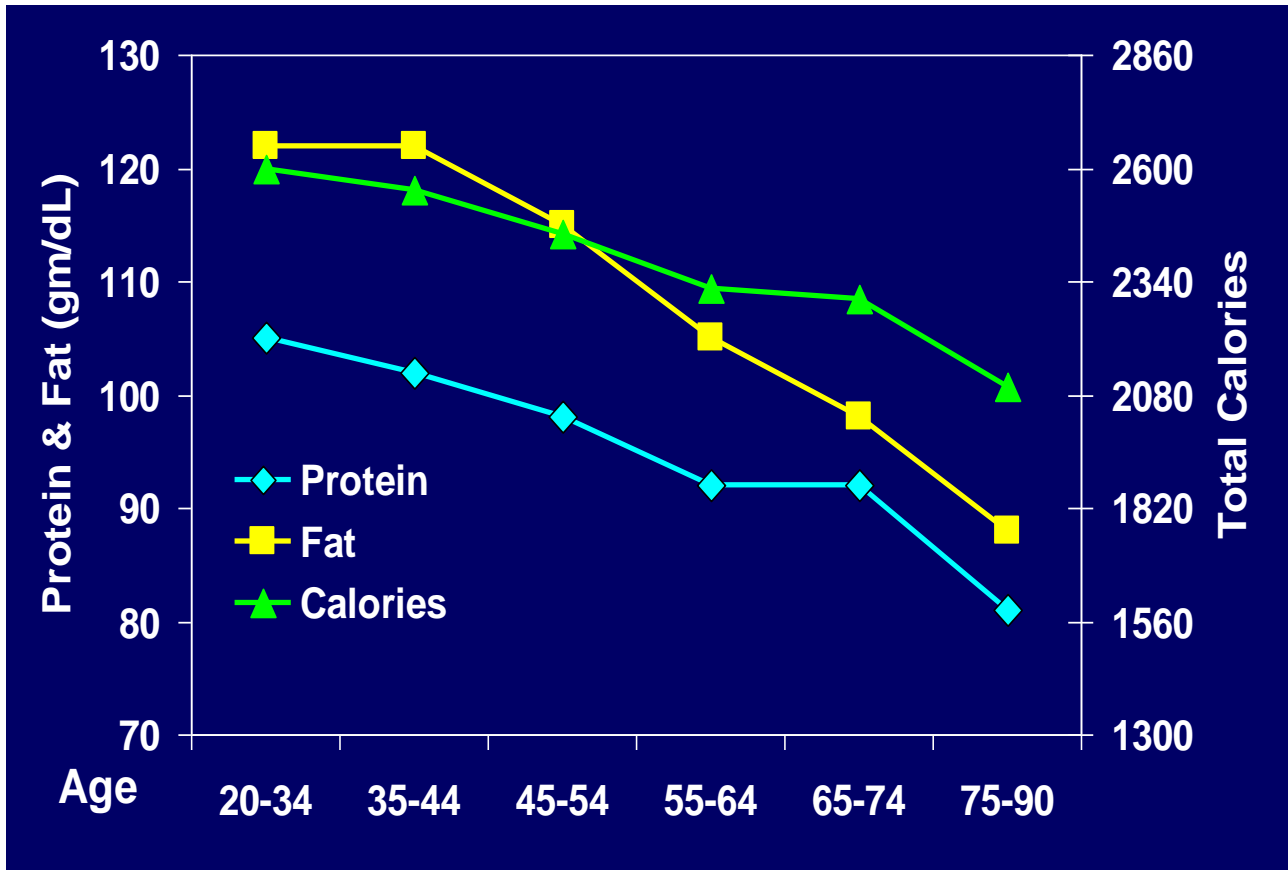
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# People age at different rates, defining frailty & fitness



# Protein, Fat & Calorie Intake



- Nutrition intakes decrease with aging
- Energy and Protein intakes of the elderly are 30% less than younger adults

# Factors Affecting Nutrition Intake with Aging

- Altered taste and smell
- Oral health problems (poor teeth, chewing problem)
- Decreased physical activity and mobility
- Illnesses / chronic diseases
- Psychosocial Issues (depression, isolation)
- Financial Issues

*Diet restrictions due to my high blood pressure, heart disease and diabetes make eating less interesting*

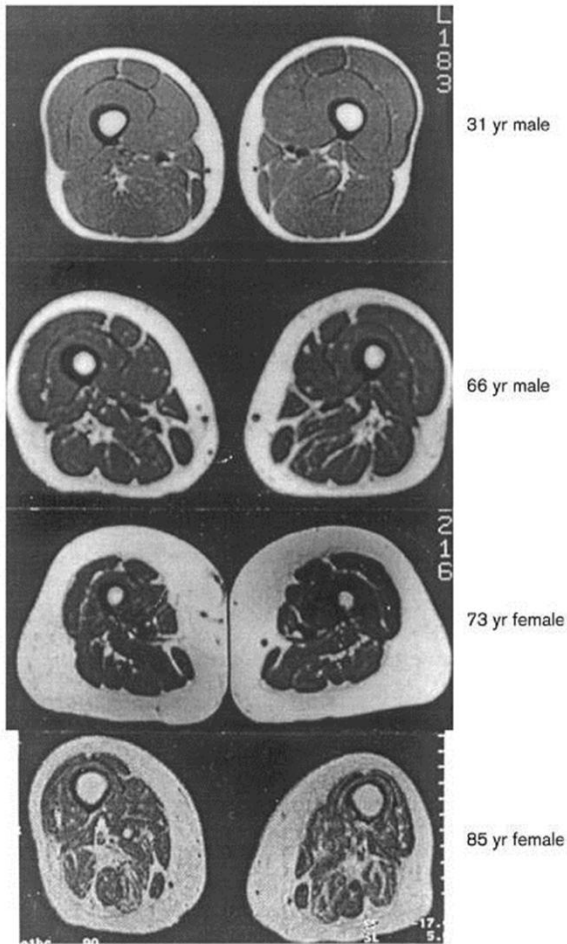


*Not eating enough due to chewing and teeth problems*

*It is difficult to walk, thus hard to shop for food*

*I often feel sad and lose my appetite*

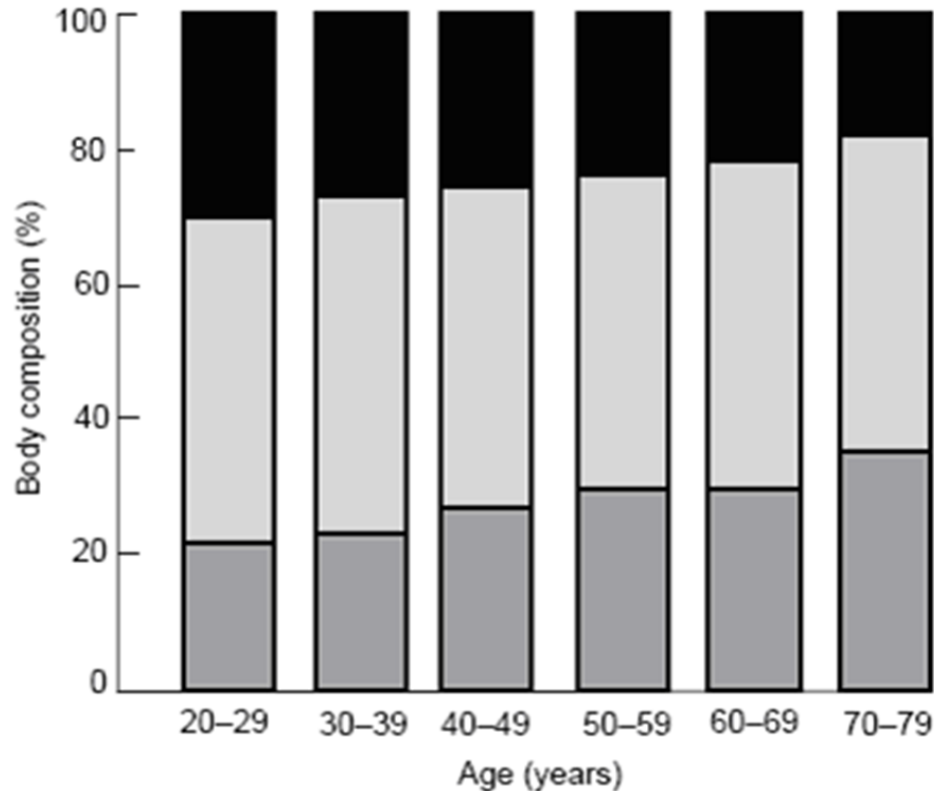
# Physiological Changes with age



- Loss of lean body mass – 0.3kg/year
- Loss of skeletal muscle – sarcopenia
- 30% decline in muscle mass from the third to eighth decade
- Increased adipose tissues
- Can also occur due to diseases, inability
- **Decreased Energy requirement**

# Sarcopenia

*The involuntary loss of muscle mass, strength and function*



Body composition in man as a function of age. ■, Muscle; ■, other tissues; ■, fat. (Adapted from Cohn *et al.* 1980.)

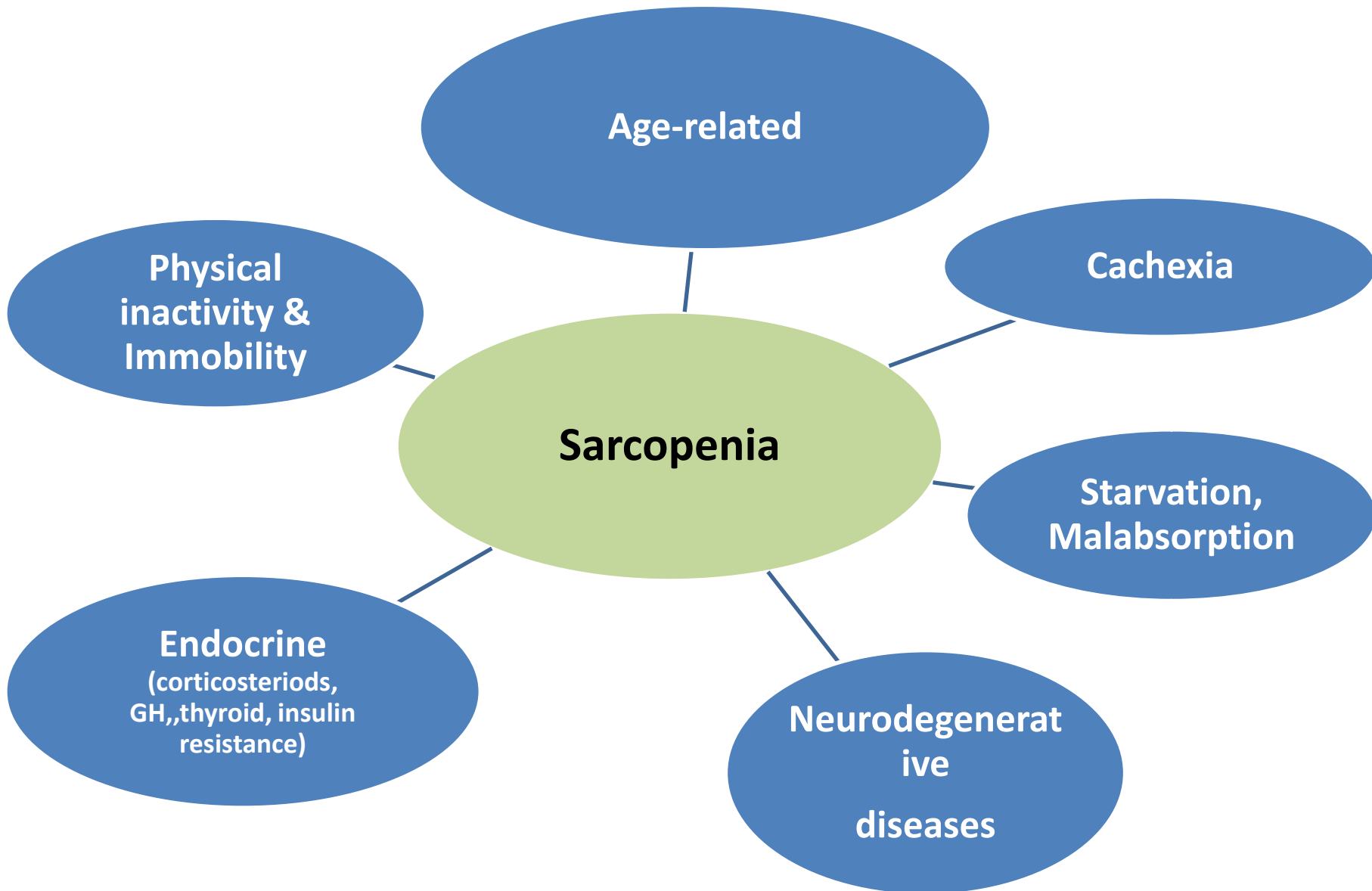
## Body Composition Changes

- Loss of muscle mass
- Increase in body fat

## Sarcopenia

- Progresses over decades
- Becomes a significant contributor to disability & loss of functional capacity

# Causes of Sarcopenia



# Outcome of Sarcopenia

- **Decrease in muscle mass, muscle strength and endurance**
- **Loss of independence**
- **Decreased insulin sensitivity**
- **Disability and functional decline**
- **Increased risk of falls, subsequent fracture**
- **Hospital admission**
- **Long term care placement**
- **Increased mortality**





# What is Frailty?

## **A geriatric syndrome**

decreased physiological reserve and resilience,

progressive functional decline,

vulnerability to stressors

elevated risk of adverse outcomes including death.

# Frailty

- Based on Phenotype -Rule based definition
- 5 criteria
  1. Weakness
  2. Slowness
  3. Low activity
  4. Exhaustion
  5. Shrinkage (loss of weight or height)

Frail- positive in 3 or more out of five

Pre frail - 1 or 2 out of five

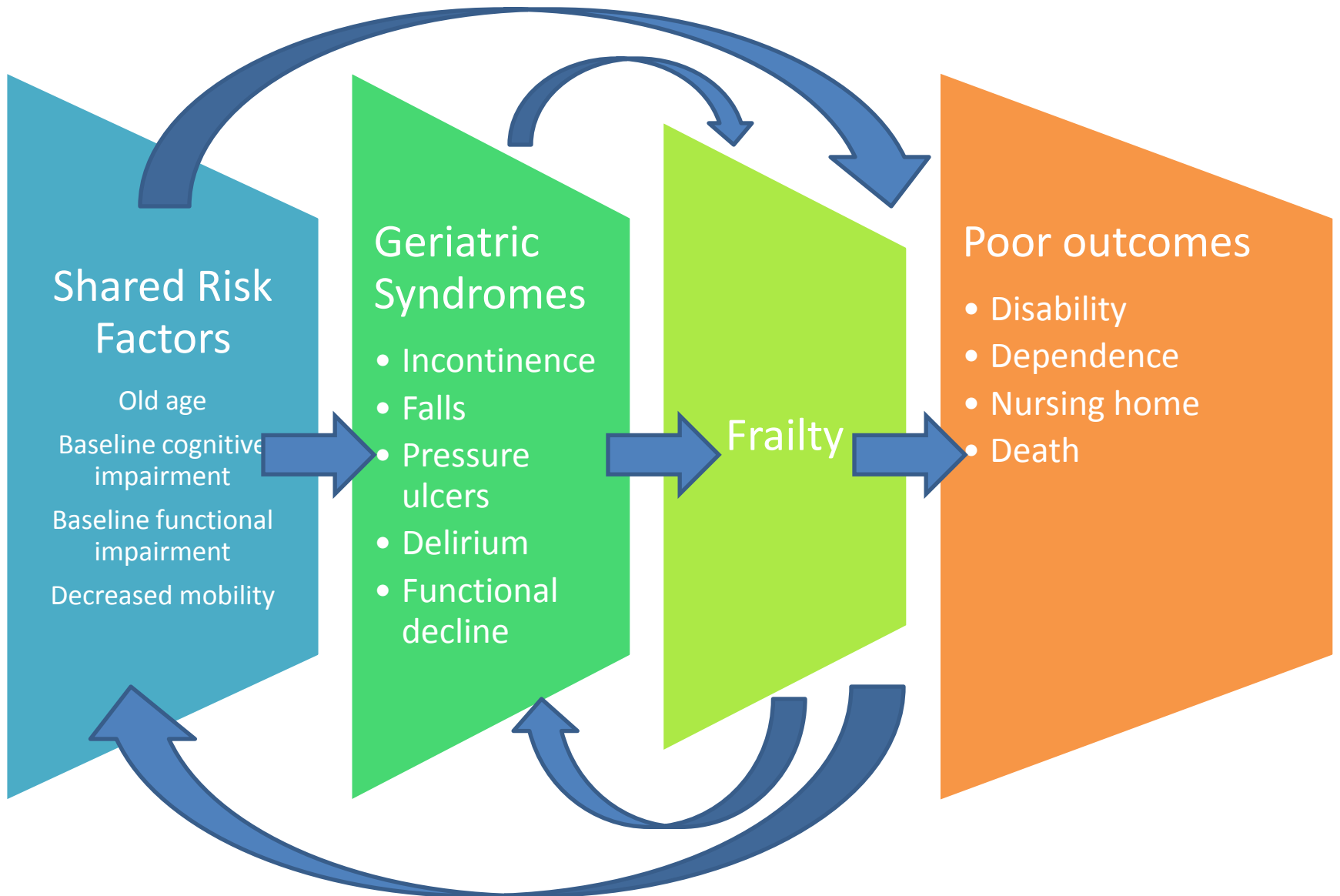
Fried et al.,. 2001;56 J Gerontol A Biol Sci Med Sci (3):M146-56

# Frailty - Phenotype

<b>FP criteria</b>	<b>Measurement</b>
Weakness	Grip strength: lowest 20% (by sex, body mass index)
Slowness	Walking time/15 feet: slowest 20% (by sex, height)
Low level of physical activity	Kcal/week: lowest 20% Males: 383 Kcal/week Females: 270 Kcal/week
Exhaustion; poor endurance	"Exhaustion" (self-report)
Weight loss	>10 lb lost unintentionally in prior year

# Deficit – Based

- The frailty index
- Frailty Index =  $\frac{\text{Number of deficits in an individual}}{\text{Total number of deficits measured}}$
- e.g. in a dataset with 50 health deficit measures, a person with 10 things wrong (10 deficits) has a frailty index of  $10/50 = 0.20$ .



## Shared Risk Factors

- Old age
- Baseline cognitive impairment
- Baseline functional impairment
- Decreased mobility

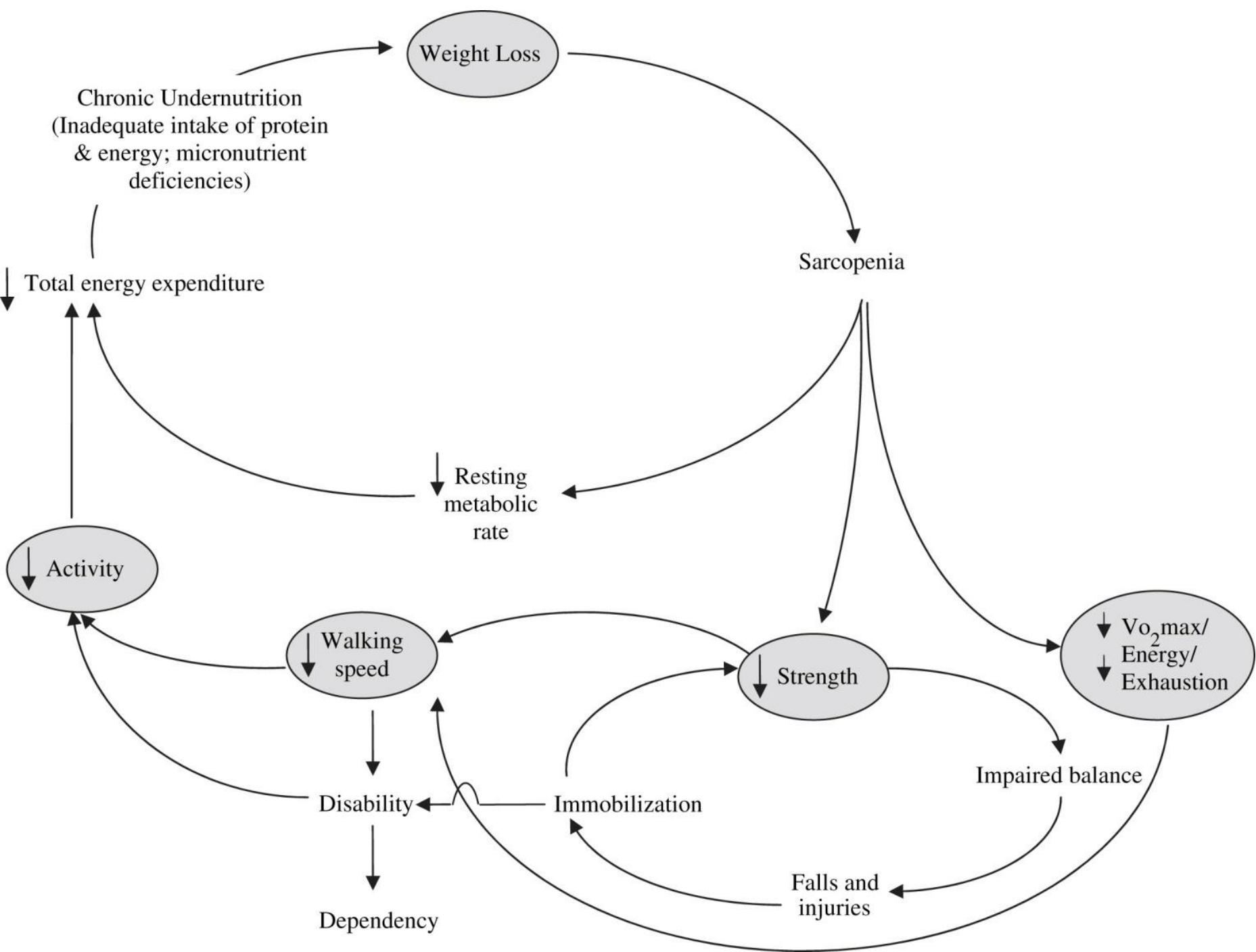
## Geriatric Syndromes

- Incontinence
- Falls
- Pressure ulcers
- Delirium
- Functional decline

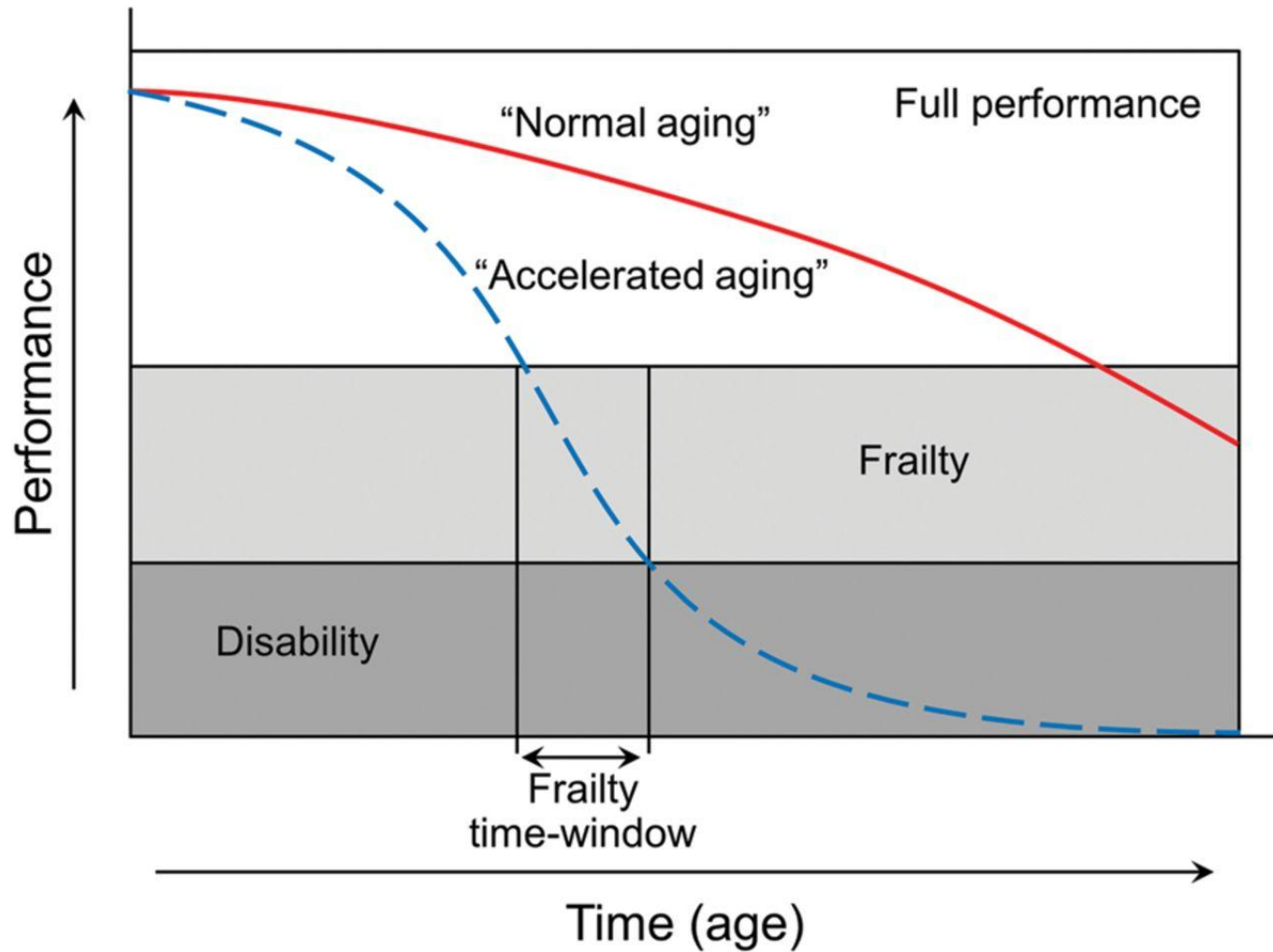
## Frailty

## Poor outcomes

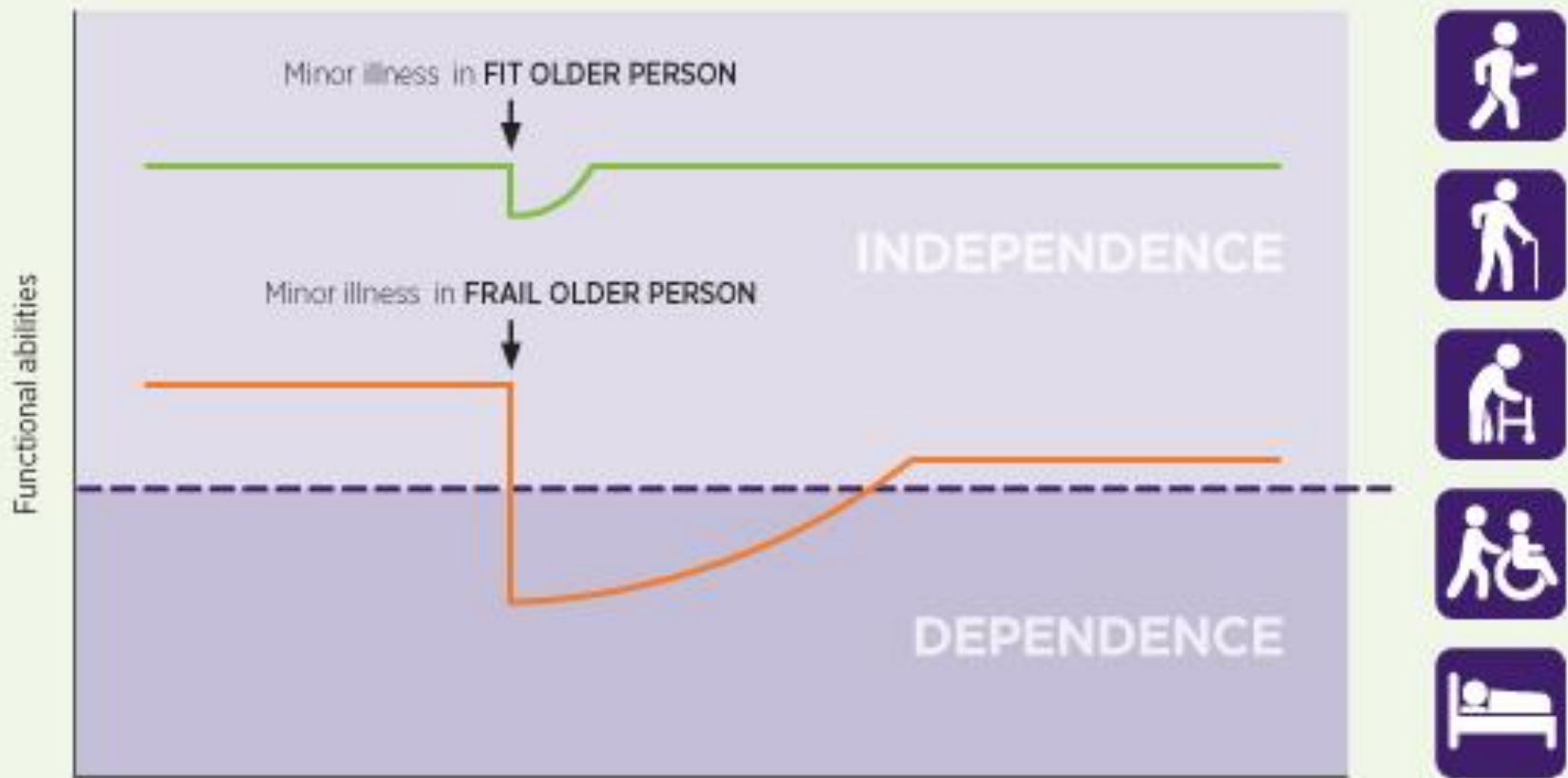
- Disability
- Dependence
- Nursing home
- Death



# Frailty



# Fit vs Frail





# Studies in Sri Lanka

## Frailty Assessment Instrument

- 34 item instrument named frailty assessment instrument (FAI) was developed to assess frailty in elderly.
- These items belong to
  - physical,
  - Psychological
  - social domains.
- Sinhala version of FAI was validated to use in Sri Lankan settings.

# Studies on prevalence of frailty

- Prevalence of frailty in Colombo district - 14.9% (95% CI: 13.17% - 16.63%).
- Males -17.7% (95% CI: 14.99% - 20.41%)
- Females - 12.4% (95% CI: 10.19% - 14.61%).
- frailty below the age of 75 years (young elders) in both sexes - 11.3% (95% CI: 9.39% - 13.21%)
- elders 75 years or above (old elders) in both sexes - 21.6% (95% CI: 18.21% - 24.99%).

# Data from Local studies

- Elders with unsatisfactory level of nutrition were having 1.6 times higher odds of being frail compared to the elders with satisfactory nutrition.
- Consumption of alcohol showed 1.5 time higher odds of being frail compared to the elders who do not consume alcohol.
- Elders who follow Buddhism bear 2.75 times higher odds of being frail compared to the other religion groups. ??tend to become vegetarians and more inactive life style towards the latter part of the life
- Unsatisfactory level of exercise 3.4 times higher odds of being frail compared to the satisfactory level of exercise

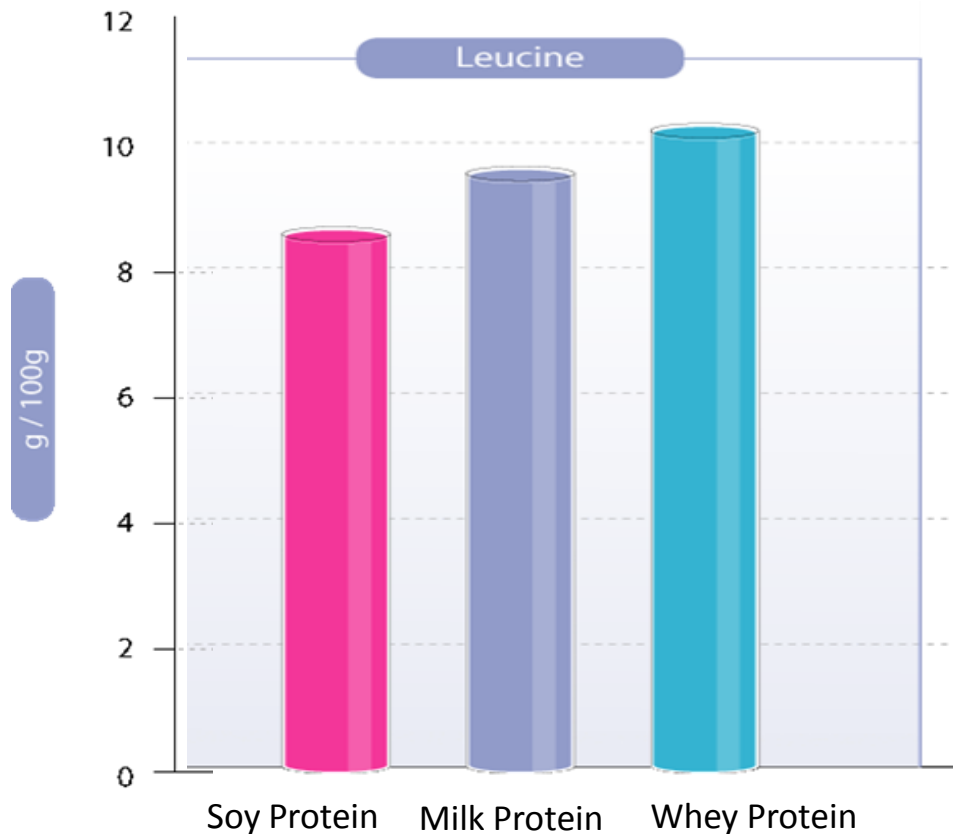
# Protein and Frailty

- studies have shown an association between inadequate protein intake and frailty
- 20% increase in uncalibrated protein intake (%kcal) was associated with a 12% (95% CI 8–16%) lower risk of frailty
- 20% increase in calibrated protein intake was associated with a 32% (95% CI 23–50%) lower risk of frailty.
- The Health, Aging, and Body Composition Study reported that over a 3-year period, those in the highest quintile of protein intake lost approximately 40% less total lean mass compared to those in the lowest quintile

Protein Intake and Incident Frailty in the Women's Health Initiative Observational Study *J Am Geriatr Soc* . 2010 June ; 58(6): 1063–1071. doi:10.1111/j.1532-5415.2010.02866.x.

# Whey protein

- An effective and efficient fuel for muscle in older age
- A natural, high quality protein source rich in essential amino acids and leucine
- A 'fast' protein, metabolized quickly and swiftly integrated into muscle



# Whey is considered as 'Fast Protein'



**Whey: soluble protein**



**Facilitates gastric emptying time**



**More accessible & faster to digest  
Easily to absorb**

**'FAST'**



**Casein: clots into stomach**



**Delays gastric emptying time**



**Slower to digest & absorb  
Slower release of amino acid**

**SLOW**

# Whey protein promotes a greater rise in MPS than casein at rest and with resistance exercise in old men.



# Standard of intake:

Older people require at least 1.0 – 1.2g/kg BW/day of dietary protein to maintain physical function & support muscle.

Most older adults who have an acute or chronic disease need more dietary protein (ie, 1.2 to 1.5 g/kg BW/d)



## PROT-AGE Recommendations For Dietary Protein Intake in Healthy Older Adults

- Older people should consume an average daily intake in the range of **1.0 to 1.2 g/kg BW/d**.  
(VS. the recommended dietary intake of protein of adults is 0.8g/kg/d)



Elderly man with 60 kg

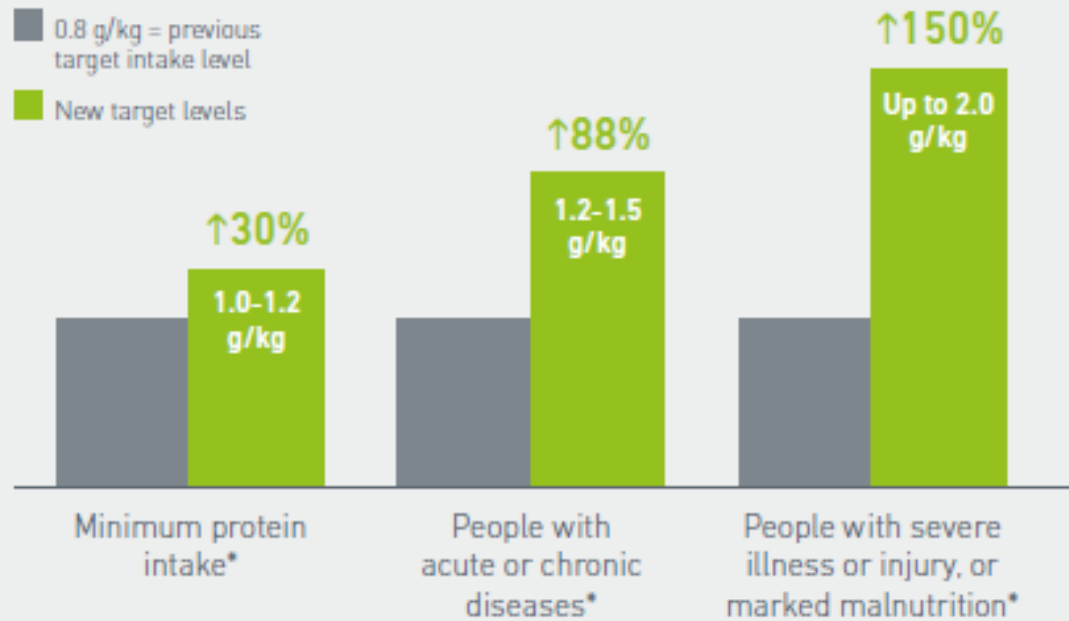
Needs 60-80 g protein per day



Elderly woman with 45 kg

Needs 45 -54 g protein per day

## New recommendations call for higher protein intake (g per kg of bodyweight) in those aged >65 years<sup>1</sup>



\*Caution needed among those with severe kidney disease (i.e. estimated GFR <30mL/min/1.73m<sup>2</sup>) calculating their needs differently.

- Most older adults who have an acute or chronic disease need more dietary protein (ie, 1.2 to 1.5 g/kg BW/d);
- People with severe illness or injury or with marked malnutrition may need as much as 2.0 g/kg BW/d.

# Sources of Protein

(general requirement: 5-8 servings /day)

Food	Serving size	Protein (g)	Energy (kcal)
Pork/ Beef (medium fat)	1 oz cooked (30g)	7	84
Fish	1 oz cooked (30g)	7	33
Cheddar Cheese	1 slice (30g)	7	114
Egg	1 whole	6	72
Tofu	1 square ( 84g)	6	52
Skim Milk	1 glass	8	83
Complete Oral Nutrition Supplement	1 glass	10	230-250
White rice	1 medium bowl	4	220



# Vitamin D and Frailty

- Low 25-hydroxyvitamin D [25(OH)D] levels are common in institutionalized frail older adults
- vitamin D supplementation has been shown to improve physical function

Low 25-hydroxyvitamin D [25(OH)D] levels have been linked to

- Falls
- Fractures
- Pain
- Sarcopenia
- poor physical function
- Disability
- and frailty

# Vitamin D

Study report extremely low vitamin D levels in older adults. Depleted vitamin D levels are associated with low muscle strength. Supplementation of vitamin D increases muscle strength. (J Am Med Dir Assoc. 2010;11(6):391-396)

Sunlight: As the ultraviolet light in sunlight can enhance the manufacturing of active Vitamin D, an exposure to sunlight of around 15 minutes per day is recommended.

Elderly tend to stay indoors, often after suffering are not getting enough vitamin D.



# Dietary source of Vitamin D



- Complete Oral Nutrition Supplement
- Egg yolks
- Saltwater fish
- Cereal
- Liver

*Dietary Reference Intakes (DRIs):*

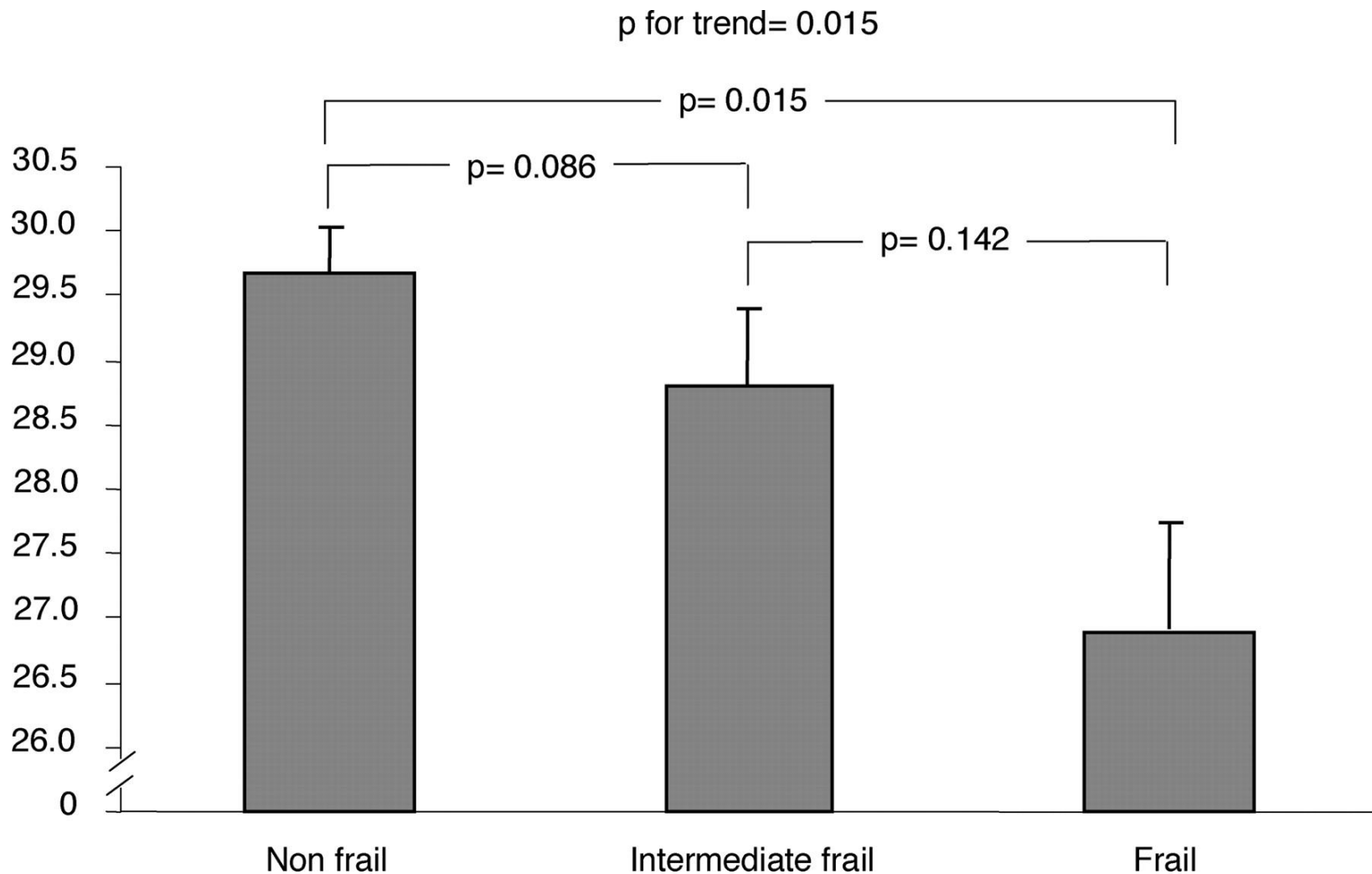
*Adult <70 y.o.: 15 $\mu$ g/day ; Adult >70 y.o.: 20 $\mu$ g/day*

## Vitamin D and calcium supplementation and falls

- Falls are a hallmark of the frail elderly.
- The results of the study indicate that vitamin D and calcium supplementation reduced the number of falls per person by 49%,
- improved musculoskeletal function,
- increased vitamin D status (both 25-hydroxyvitamin D and 1,25-dihydroxyvitamin D),
- decreased parathyroid hormone secretion
- bone resorption

Effects of Vitamin D and Calcium Supplementation on Falls: A Randomized Controlled Trial JOURNAL OF BONE AND MINERAL RESEARCH Volume 18, Number 2, 2003 © 2003 American Society for Bone and Mineral Research

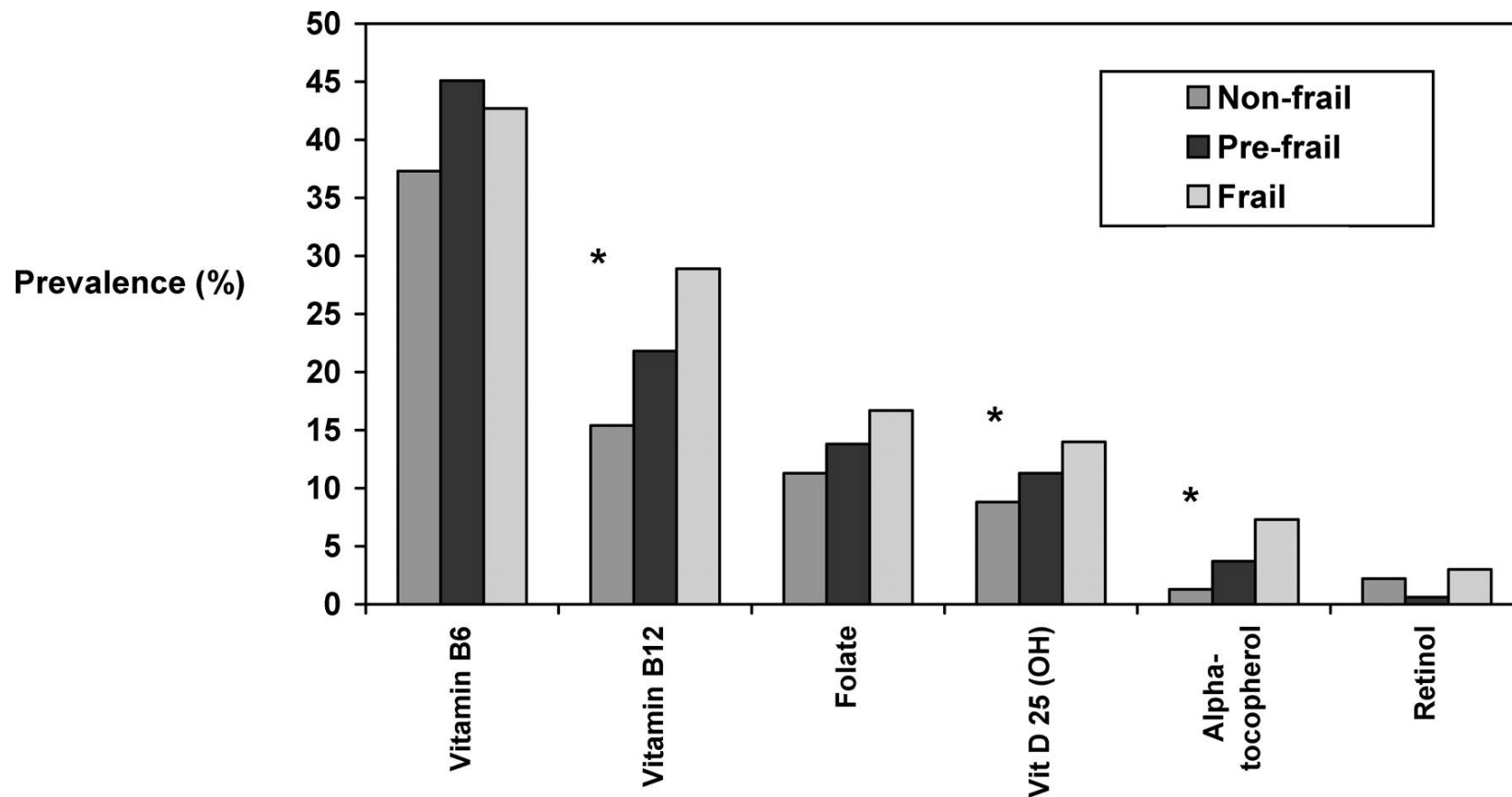
## Age- and sex-adjusted levels of vitamin E according to frailty status.



Alessandro Ble et al. J Gerontol A Biol Sci Med Sci  
2006;61:278-283

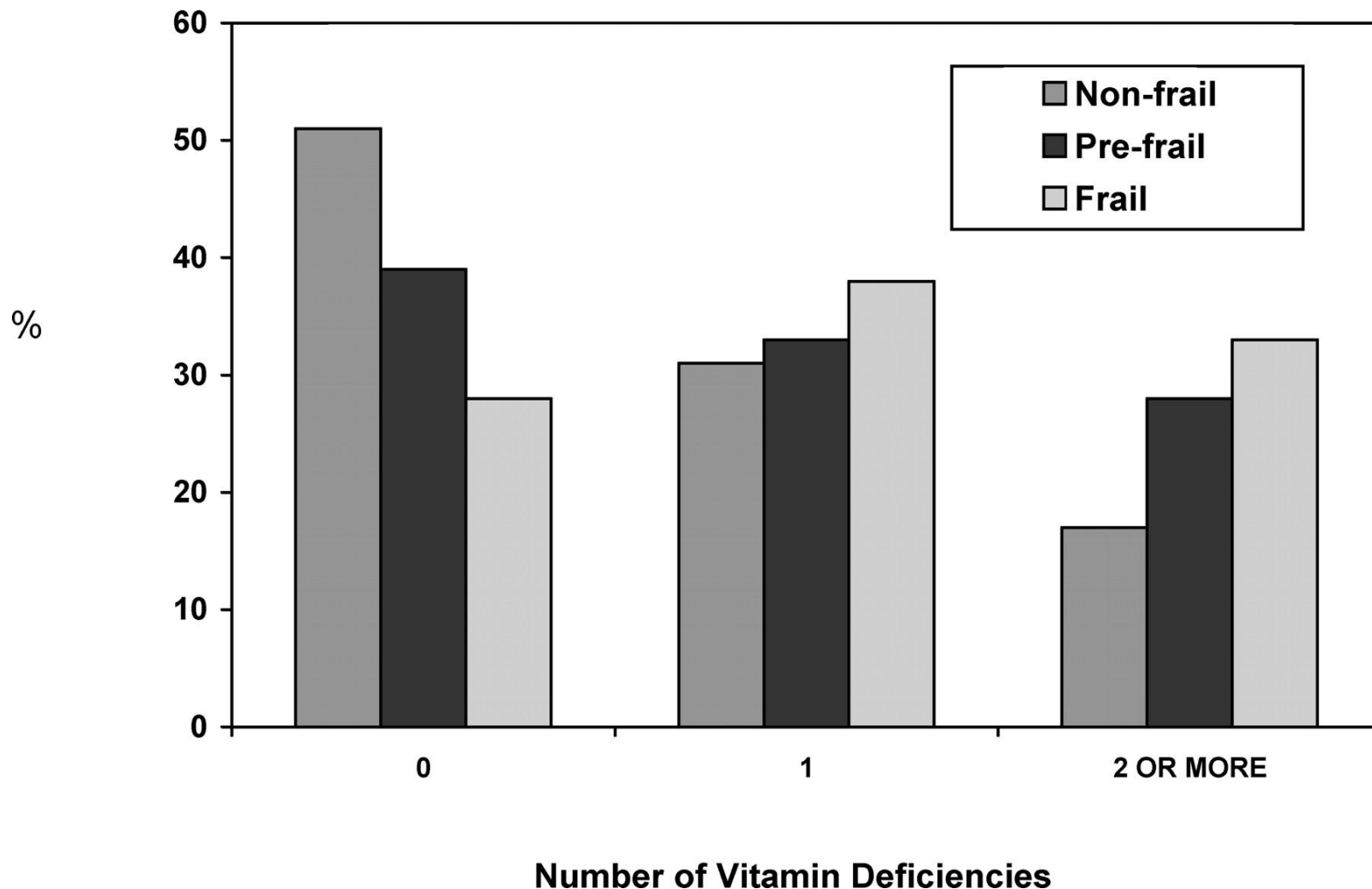


# Prevalence of specific vitamin deficiencies by frailty status. \*p <.05 by Mantel-Haenszel chi-square.



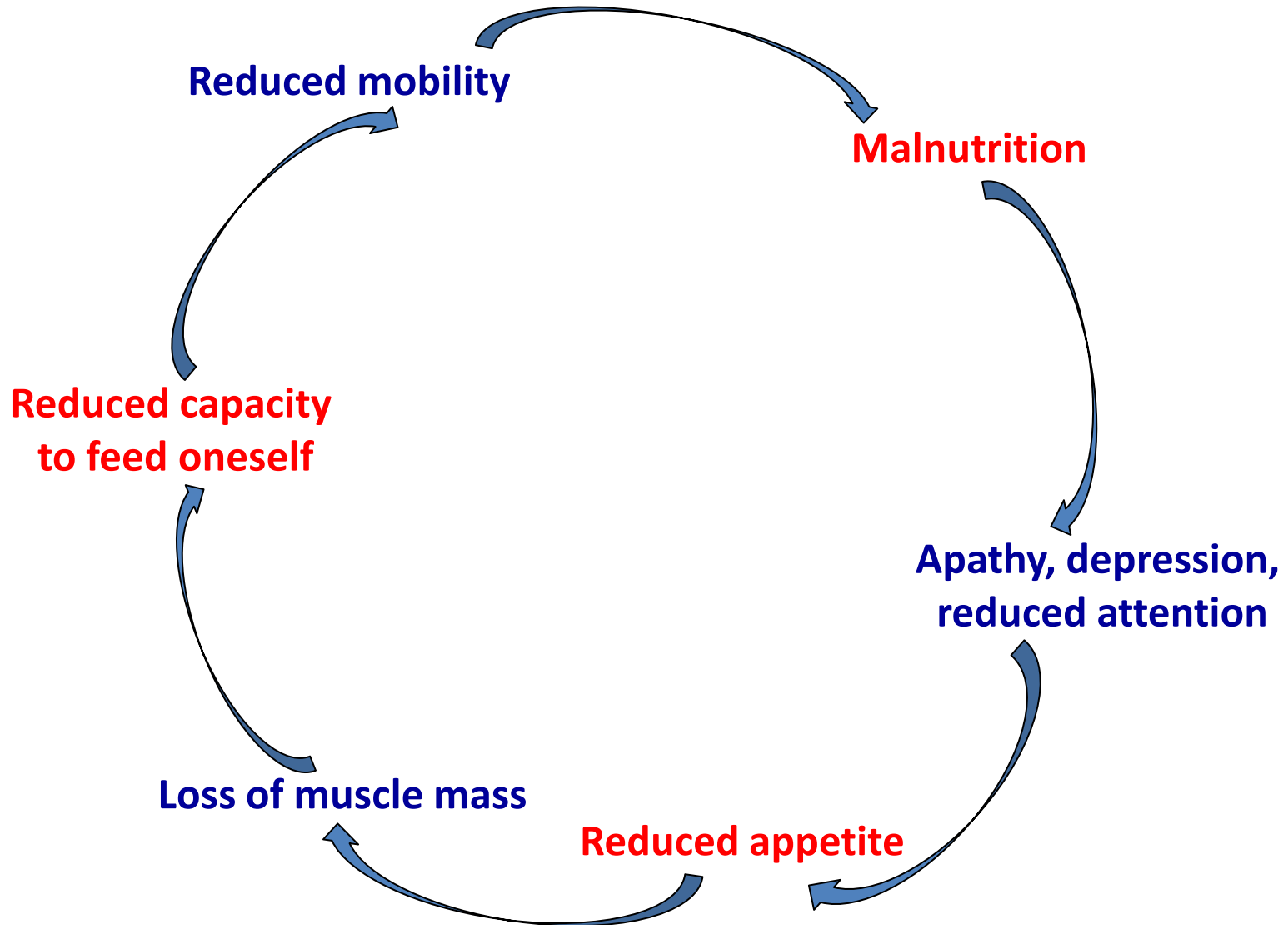
Elisabete Michelson et al. J Gerontol A Biol Sci Med Sci  
2006;61:600-607

**Number of vitamin deficiencies by frailty status. \*p <.05 by Mantel–Haenszel chi-square.**

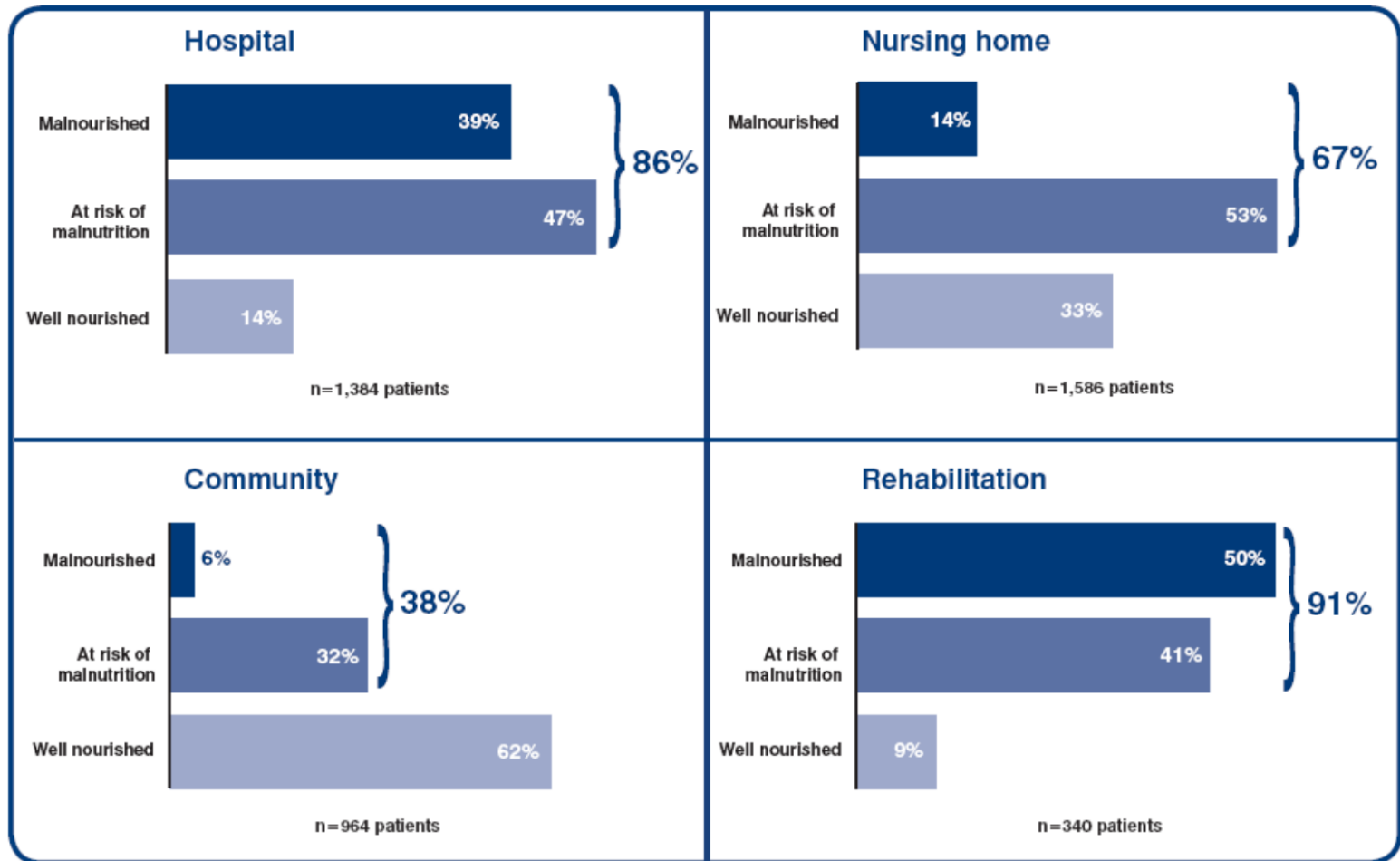


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# Malnutrition: a vicious cycle



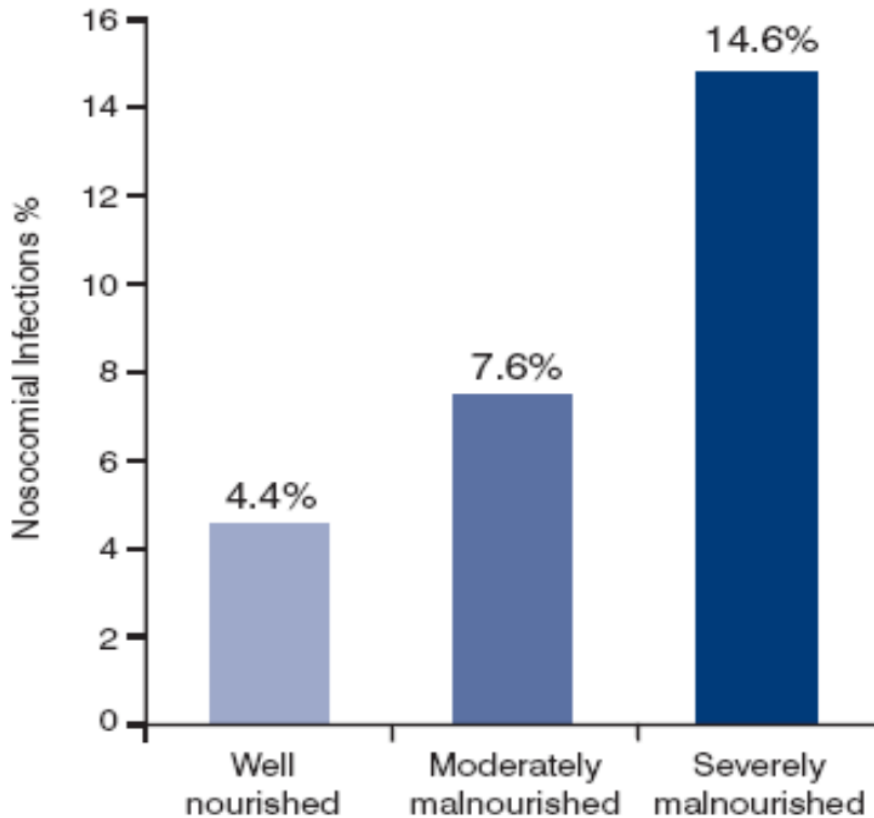
# Malnutrition in the Elderly



# Malnutrition: Increased risk of infection

Malnourished patients have:

Up to 3 times higher risk of infection<sup>20</sup>



# Nutrition and Acute illness

- Poor intake
- Increased demand
- Increase in 1C temperature – Energy requirements increase by 10%
- Escalate weight loss

Result in

- Immunodeficiency
- Impaired wound healing

# Strategies to improve the dietary intake of older people in hospitals

- Age appropriate food – culturally acceptable, personal choice
- Protected meal times – ward rounds, tests, investigations – minimized
- Ensure adequate hydration, (6-8 drinks a day), prevent constipation
- Give drinks after meals and avoid unfortified soups as a starter - prevents patients eating a more nutritious meal
- Energy dense snacks rather than fruits - milk based drinks rather than water
- Constipation – treated early as this reduces appetite or intake
- Colour coded trays to indicate need assistance, needing more time

# Nutrition Interventions

- Adding a single type of multivitamins,
- Adding a single type of nutritional supplement formula,
- Adding an extra meal,
- Meals on wheels (MOW)
- Mixed with exercise,
- Individualized dietary counseling

Nutrition and frailty a review of clinical interventional studies: B Manal.S  
Suzana, D K A Singh; Journal of Frailty & Aging - Volume 4, Number 2,  
2015 <http://www.jfrailtyaging.com/>



# Outcomes of Nutritional Interventions

- The results and outcomes varied due to the type and duration of nutrition intervention and nutritional status before the intervention
- The studies that used **energy supplements** in the intervention - significant improvements in one or more of the frailty indicators or nutritional status
- **nutritional advice and counseling** showed no significant improvement.
- **adding an extra meal to the habitual diet** showed significant improvements on dietary intake
- In the **mixed intervention of nutrition and exercise**, the exercise groups showed more improvement

Nutrition and frailty a review of clinical interventional studies: B Manal.S Suzana, D K A Singh; Journal of Frailty & Aging - Volume 4, Number 2, 2015  
<http://www.jfrailtyaging.com/>

# Conclusions from Nutritional Interventional studies

- In general, nutrition intervention showed significant effects on frailty indicators in most of the studies
- Nutritional status before the intervention had an impact on the results,
- intervention appearing to be effective in older adults with malnutrition.
- Improvement in nutritional status might possibly have led to improvement in frailty status. Mixed intervention nutrition and exercise might have been more effective than nutrition only.
- Nutrition and frailty a review of clinical interventional studies: B Manal.S Suzana, D K A Singh; Journal of Frailty & Aging - Volume 4, Number 2, 2015  
<http://www.jfrailtyaging.com/>

# Prevention of Sarcopenia

Take action to improve muscle health!

**Regular Exercise + Well Balanced diet**

# Prevention of Sarcopenia

## Regular Exercise:

- Perform progressive muscle strengthening and resistance exercises for at least 30 minutes/time and 3 times/week
- Increase muscle size, muscles strength, endurance, balance and stability, to prevent falls and to restore independency.



# Prevention of Sarcopenia

## Well Balanced diet

- Standard of intake: Older people require at least **1.0 – 1.2g/kg BW/day of dietary protein** to maintain physical function & support muscle
- Source of protein: **whey is a natural, leucine – rich, high quality protein source**, offers benefits as a fuel for muscle in older age
- **Sufficient intake of Vitamin D** :Vitamin D is essential for maintaining muscle mass in aging people.

# Nutritional status and frailty

Poor intake of energy foods

Low intake of protein

Vitamin D, E, C, folate

Vitamin D and calcium supplementation has reduced falls incidence in frail

Nutritional supplementation alone in frail elderly has shown little impact

**Multidomain approach** with supplementation (high energy and protein) and physical training, cognitive exercise, social services can modify frailty risk

# Acknowledgements

- Dr Nelum Samarathilake – Principal Author of the study on An instrument to assess frailty among community living elders: A Sri Lankan study
- Dr. Bhuvaneshwari Shankar Organising ,Vice President (Dietetics) and Group Chief Dietitian for the Apollo Hospitals Group. Chairperson , AICNU 2016
- Dr Madhu Siriwardane , Bussiness Manager, Nestle Health Science

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**Thank You**

