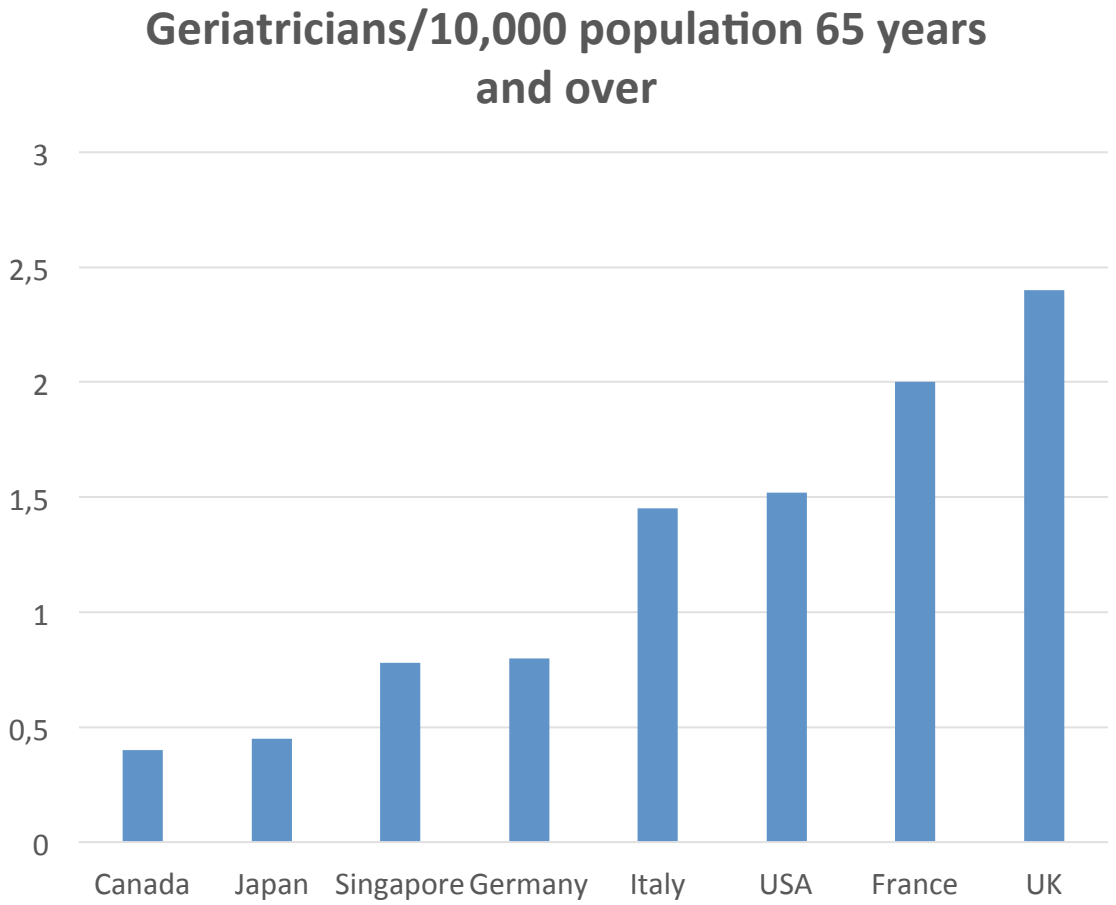
Patient Centered Precision(P4) Medicine Is the Future of Geriatric Medicine

Gateway Geriatric Education Center

Saint Louis University
Division of Geriatric Medicine

SAINT LOUIS UNIVERSITY

Geriatric Workforce



Decline in Geriatricians in United States

	1988	2030
Geriatricians	7,128	7,750
Geriatricians per older adult	1 for every 2,546	1 for every 4,254
Geropsychiatrists	1,596	1,659
Geriatric psychiatrists per older adult	1 for every 11,372	1 for every 20,195

George Edward Day
(1815-1872)

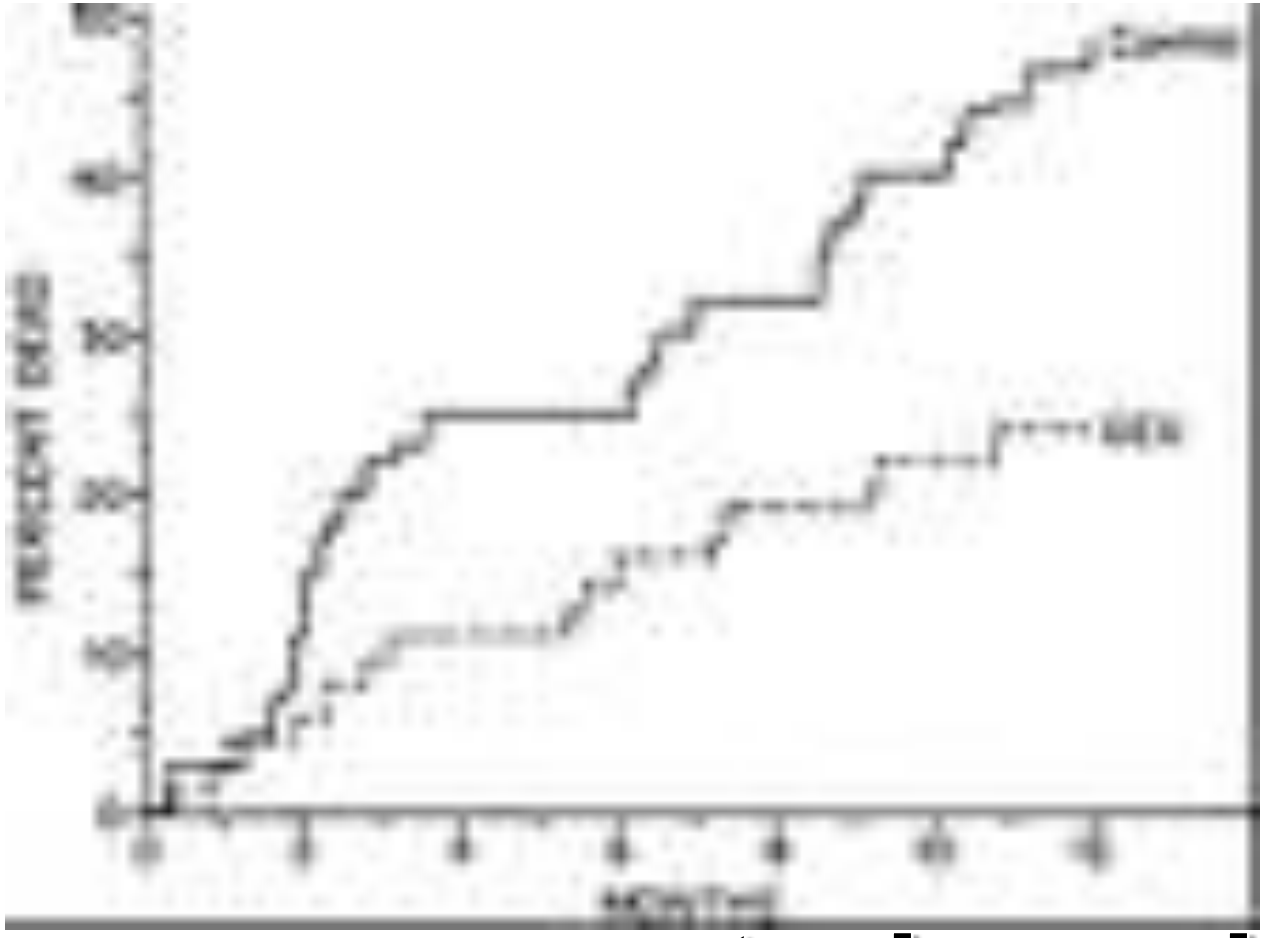
GERIATRICS

"I offer no apology for the publication of this volume. The subject is one of the highest importance, and yet it has been strangely overlooked during the last half-century by the physicians of all countries."

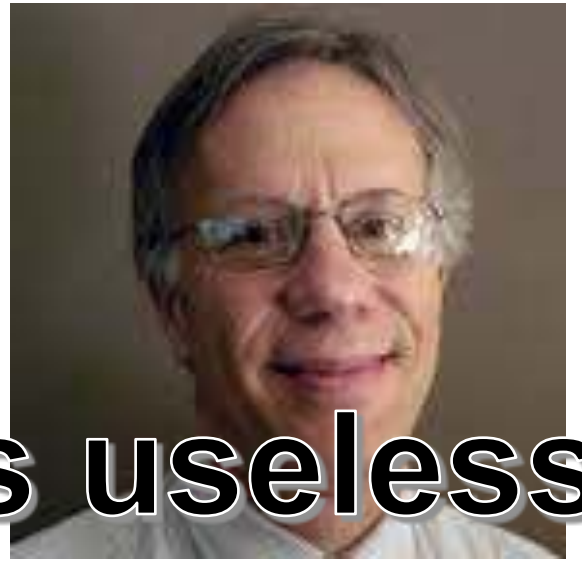
N Engl J Med. 1984 Dec 27;311(26):1664-70.

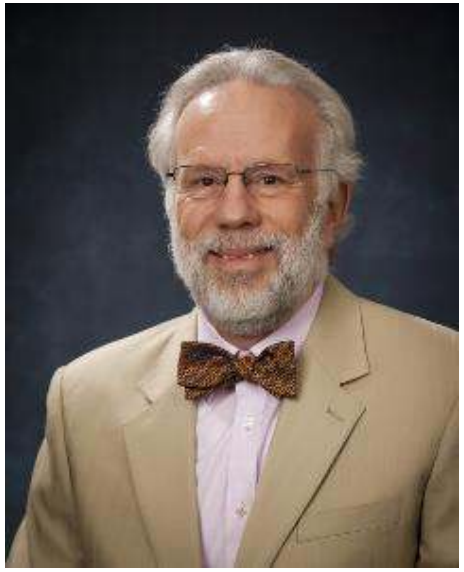
Effectiveness of a geriatric evaluation unit. A randomized clinical trial.

Rubenstein LZ, Josephson KR, Wieland GD, English PA, Sayre JA, Kane RL.



At **one year**, patients who had been assigned to the geriatric unit had much **lower mortality than controls (23.8 vs. 48.3 per cent, P less than 0.005)** and were less likely to have initially been **discharged to a nursing home (12.7 vs. 30.0 per cent, P less than 0.05)** or to have spent **any time in nursing home (26.9 vs. 46.7 per cent, P less than 0.05).**





Assessment alone is useless

“The Geriatric Giants” Professor Bernard Isaacs(1924-1995)

- Instability (Falls)
- Incontinence
- Immobility
- Intellectual impairment

“Geriatricians are certain they are specialists, but uncertain of what they are specialists in”(1981)

Modern Giants of Geriatrics

Frailty

Sarcopenia

Anorexia of Aging

Cognitive Impairment

Precision Medicine

"I am launching a new Precision Medicine Imitiative to bring us closer to curing diseases like cancer and diabetes - and to give us all access to personalized information we need to keep ourselves and our families healthier"

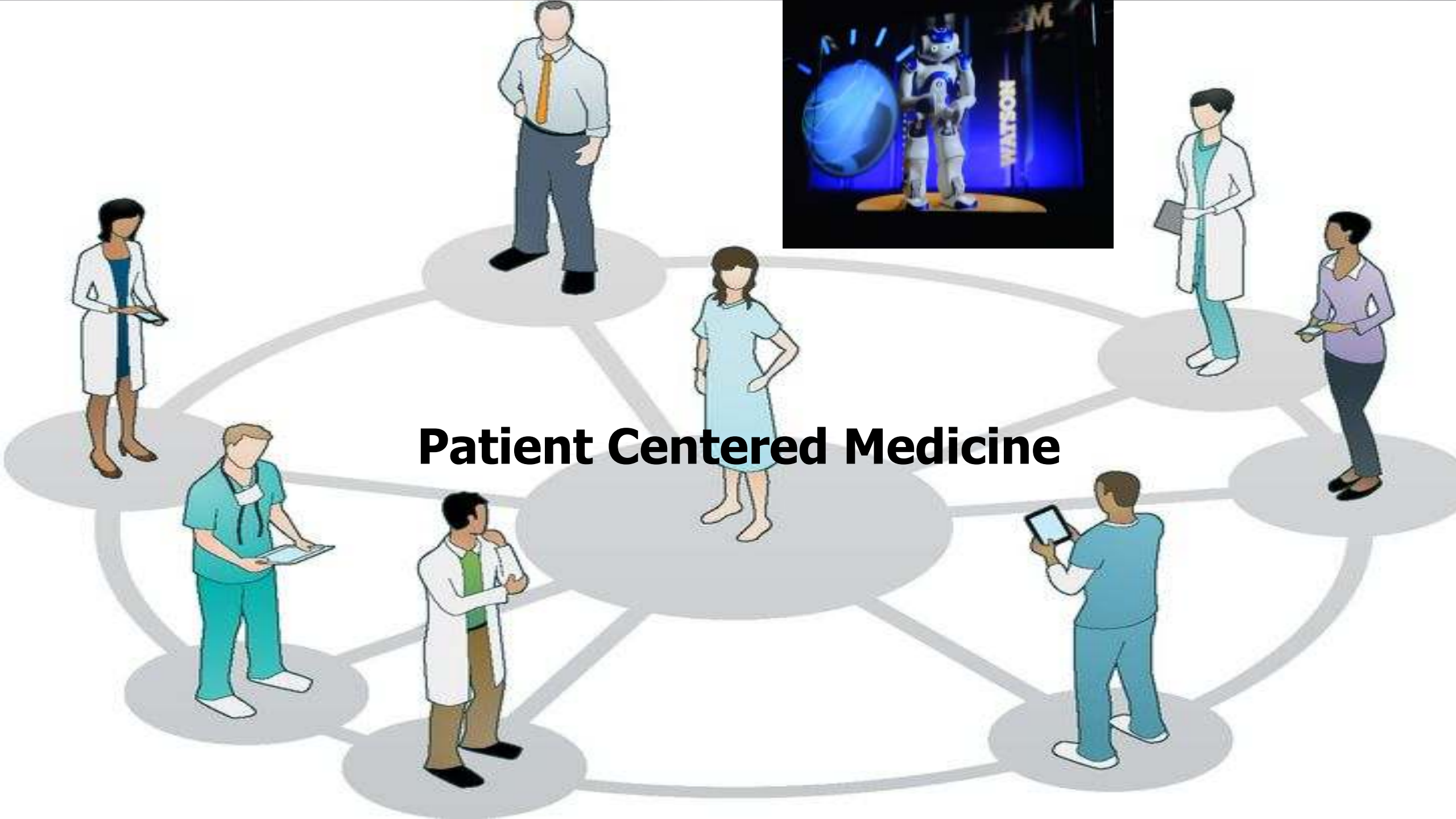
President Obama

State of the Union

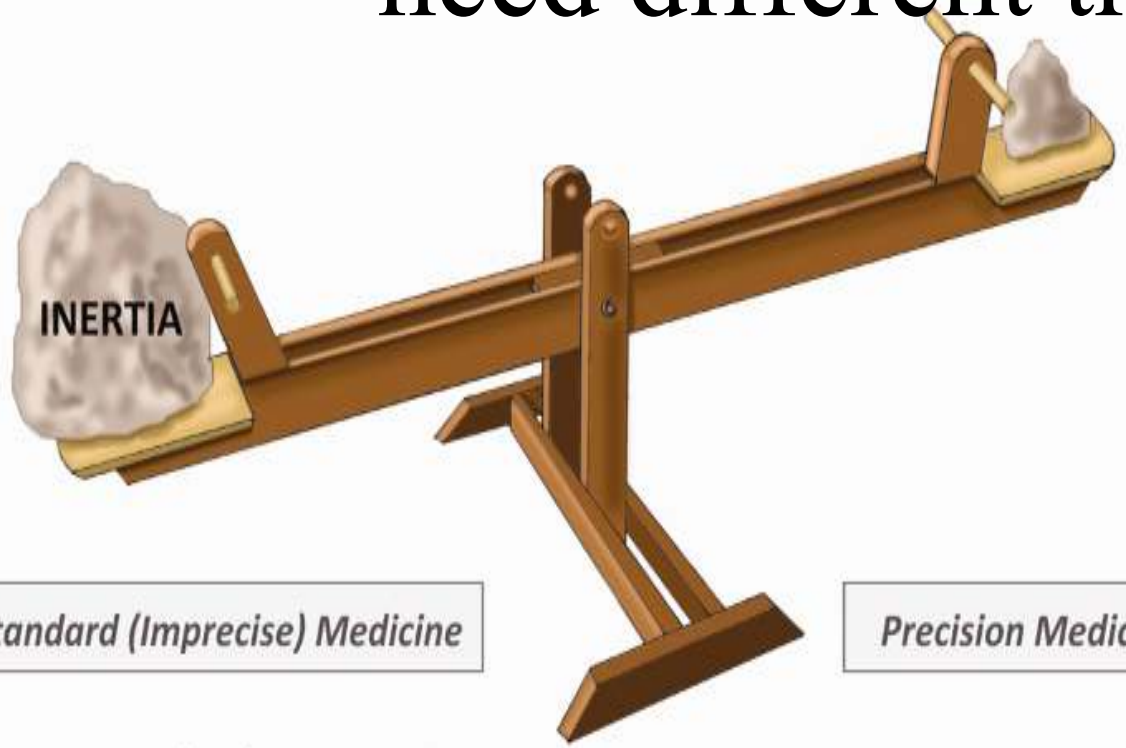
January 20,2015

"An emerging approach for disease treatment and prevention that takes into account individual variability in genes.environment and lifestyle for individuals"

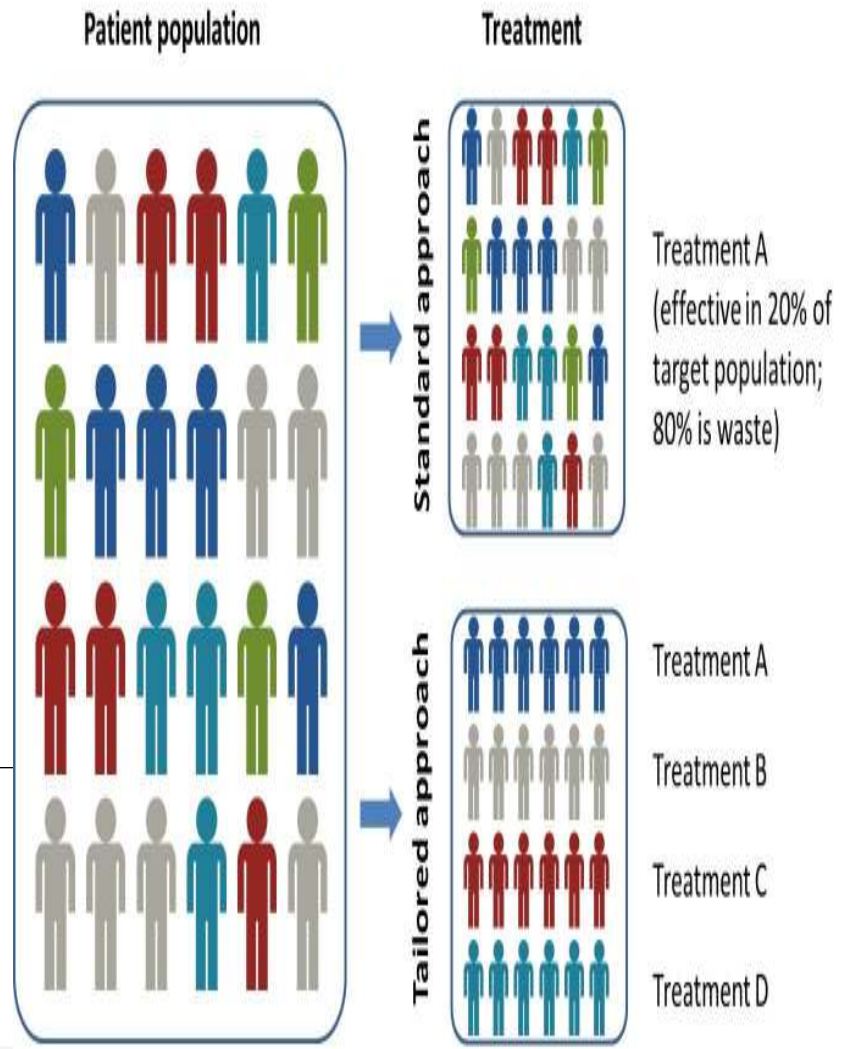
National Institutes of Health


Patient Centered Medicine

Precision Medicine recognizes that different patients need different treatment approaches



Standard (Imprecise) Medicine	*Precision Medicine*
Same approach to heterogeneous clinical presentation and variable clinical outcomes	Greater understanding of individual variations in disease pathology
One-fits-it-all treatment	More precise disease and patient classification
Morbidity and mortality remain high	Targeted and tailored therapeutics

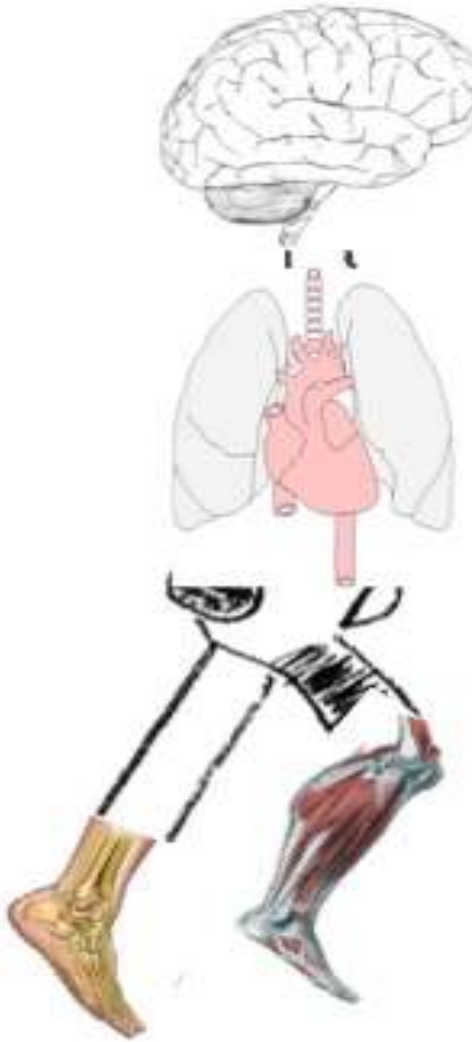


P4 MEDICINE

- Predictive
- Preventive
- Personalized
- Participatory

- Proactive, not reactive
- Focuses on individuals not populations

Components of successful ageing



Lopez-Otin et al., Cell, 2016

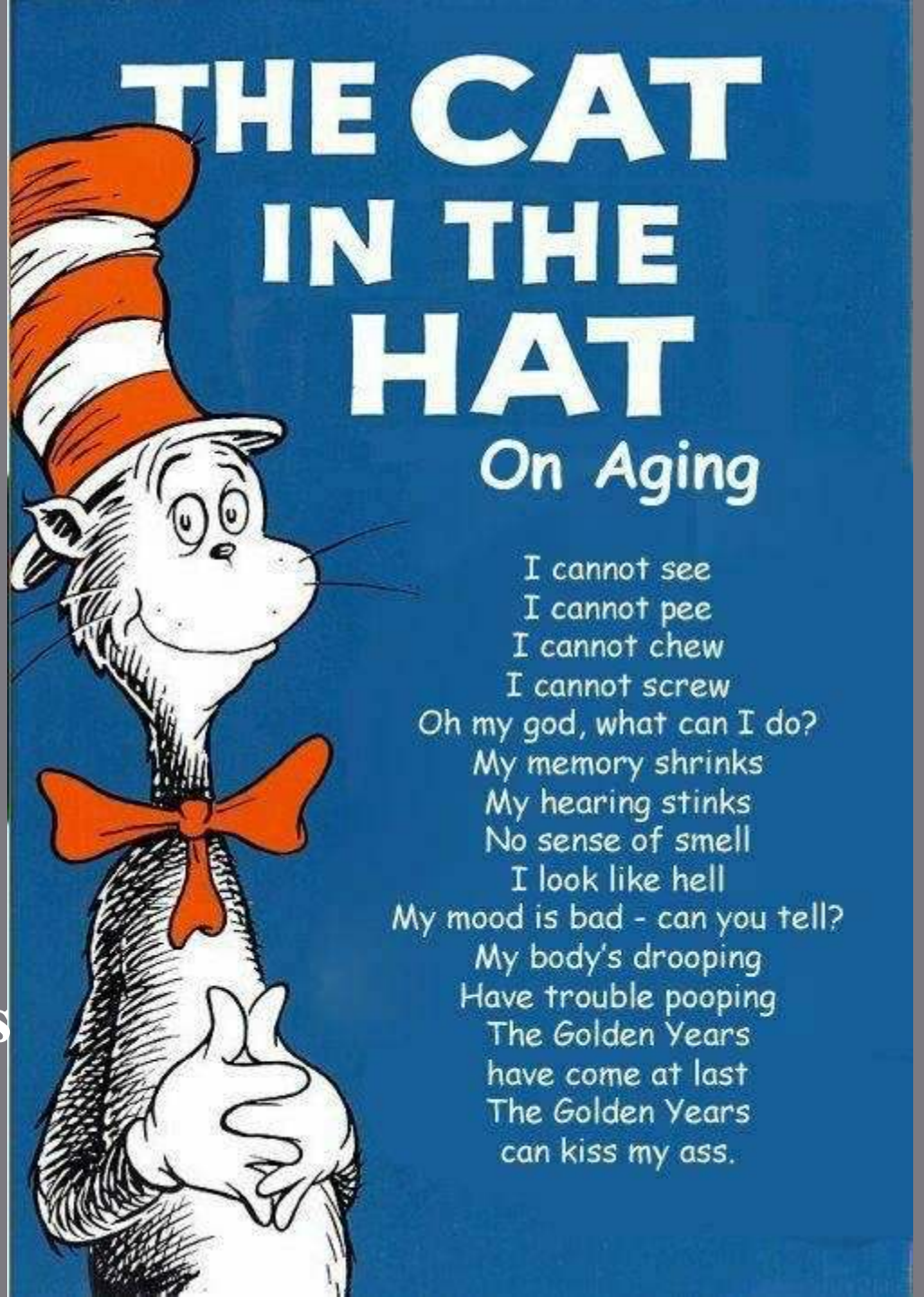
RESILIENCE

the capacity to recover quickly from difficulties; toughness

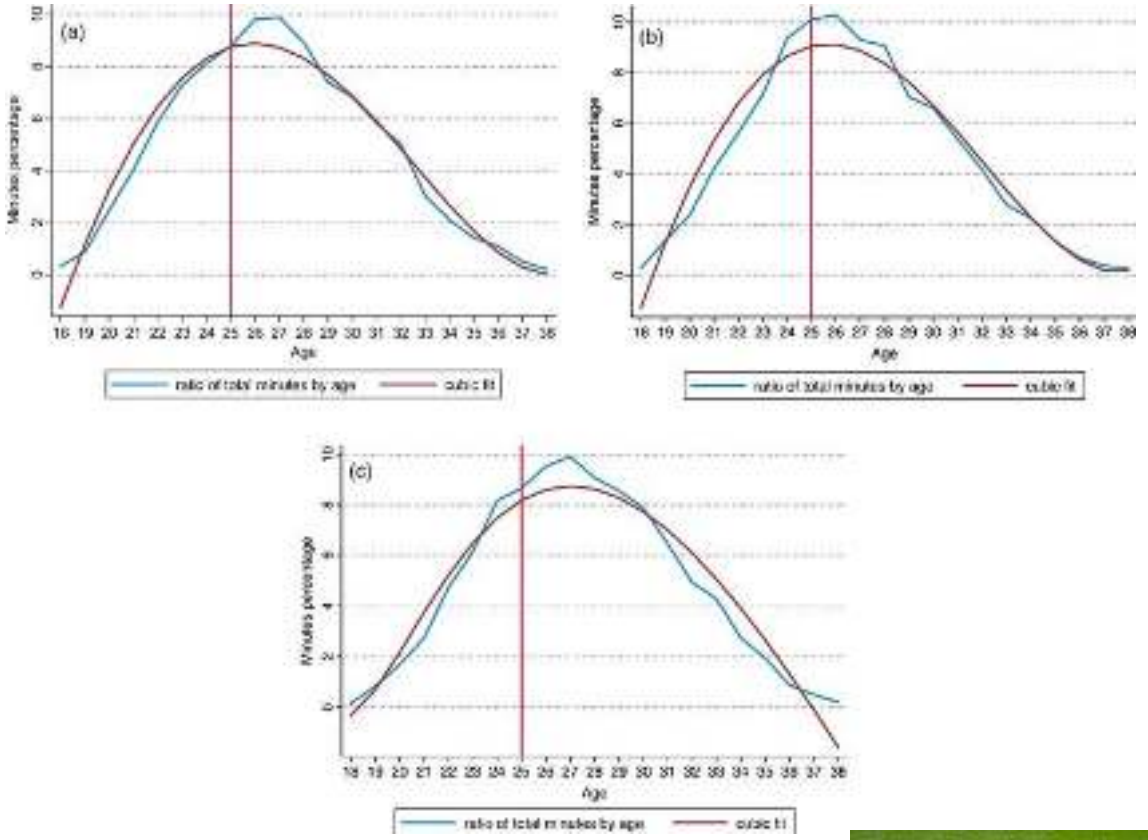
Physical function → Successful ageing

FRAILTY

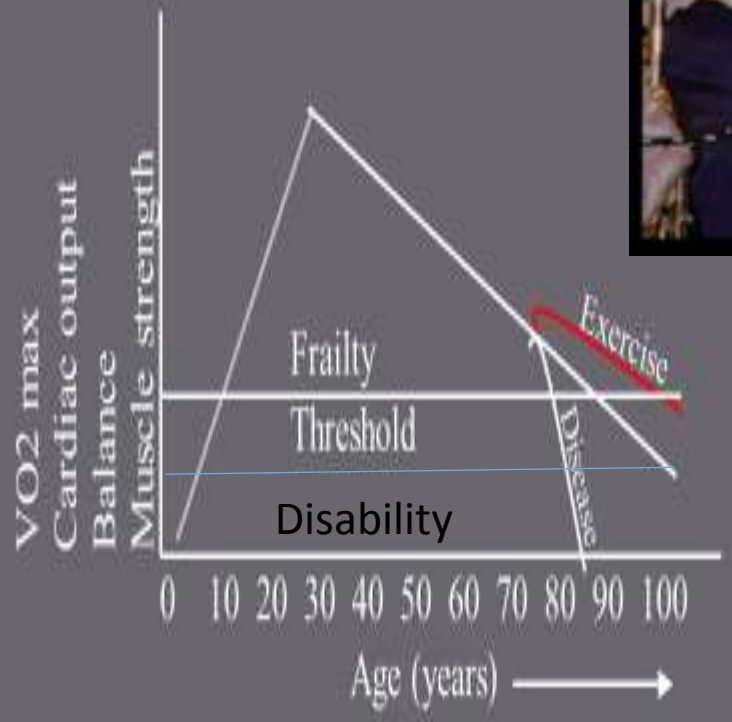
An International Consensus and Assessment for Frailty



Age at which footballers peak



The analysis in this paper employs data from the four major European top flight leagues – **the Bungesliga (Germany), Premier League (England), Serie A (Italy) and La Liga (Spain).** We use data from the last five seasons, 2010/11 through 2014/15.



FRAILTY DEFINITIONS

“Occurs when under stressful conditions the person has diminished ability to carry out important practiced social activities of daily living.It needs to be distinguished from disability”

Renoir, 1915
Blonde a la rosa

FRAILTY DEFINITION OBJECTIVE

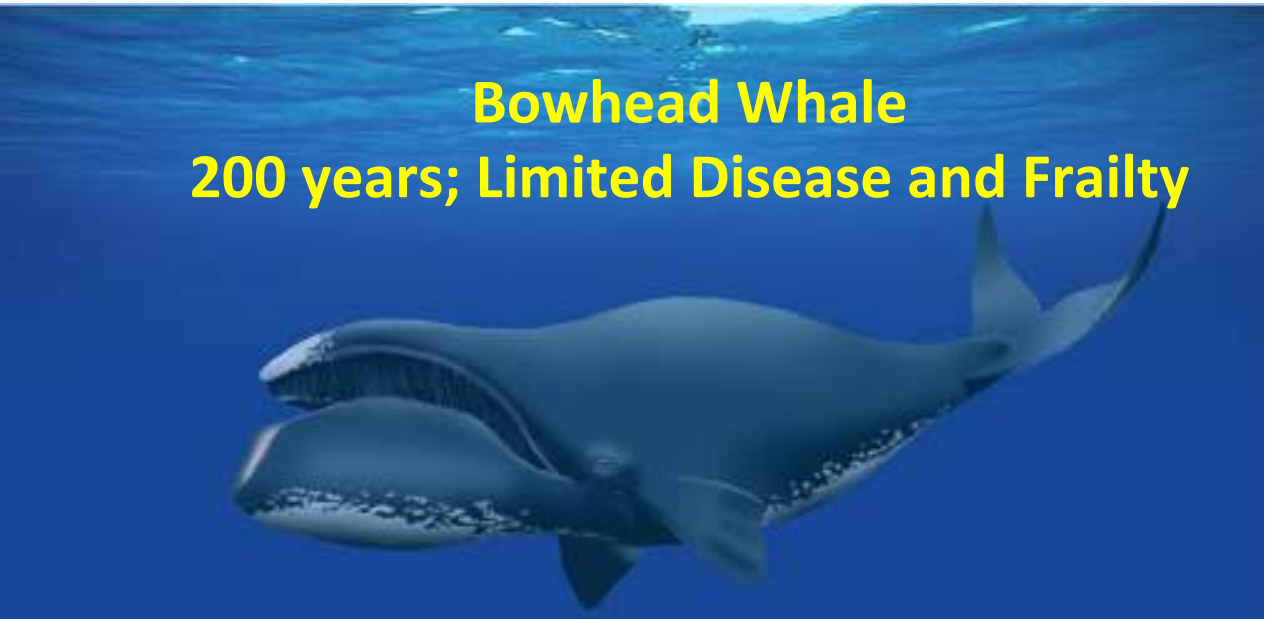
Fried et al J Gerontol 56A M146,2001

- Weight Loss(10 lbs in 1 year)
- Exhaustion(self-report)
- Weakness (grip strength;lowest 20%)
- Walking speed(15 feet; slowest 20%)
- Low Physical Activity(Kcals/week;lowest 20%)

Female >

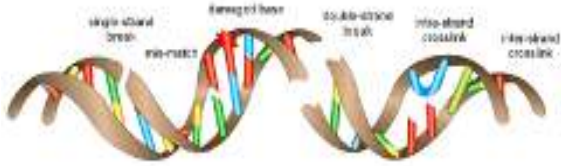
Male

6.9%

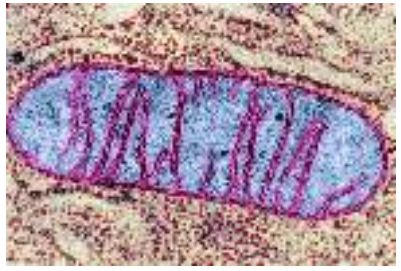


ERCC1 gene and the proliferating cell nuclear antigen (PCNA) gene are linked to DNA repair as well as increased cancer resistance.

Biochemistry of Frailty

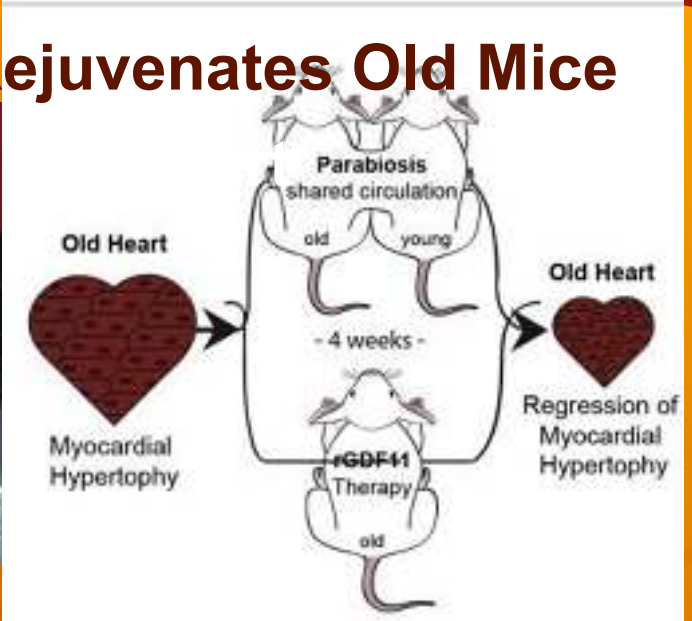


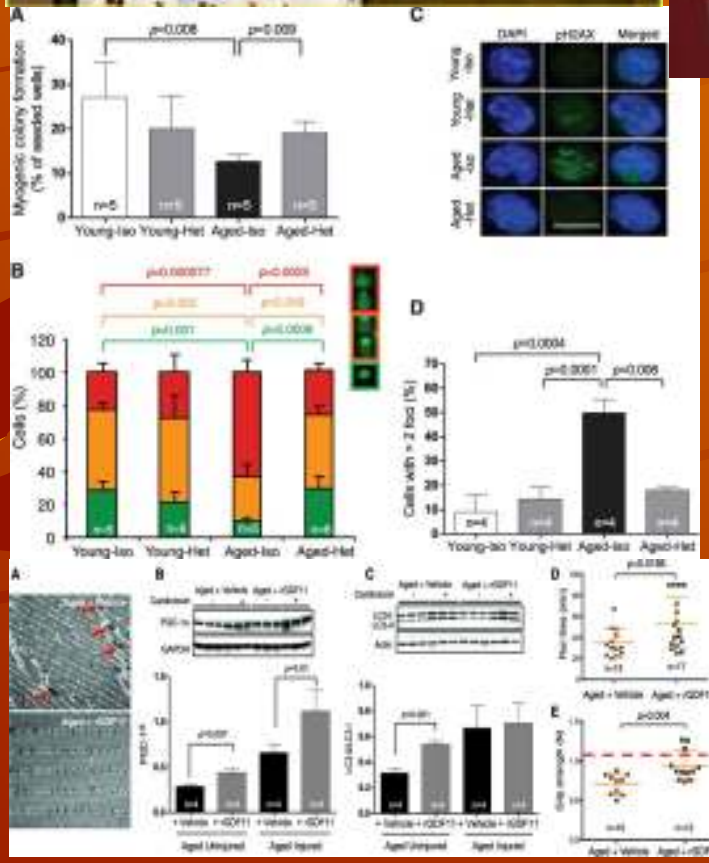
- Genetic instability
- Telomere attrition
- Epigenetic alterations
- Loss of proteostasis
- Deregulated nutrient sensing
- Mitochondrial dysfunction
- Cellular senescence
- Stem cell exhaustion
- Altered intercellular communication

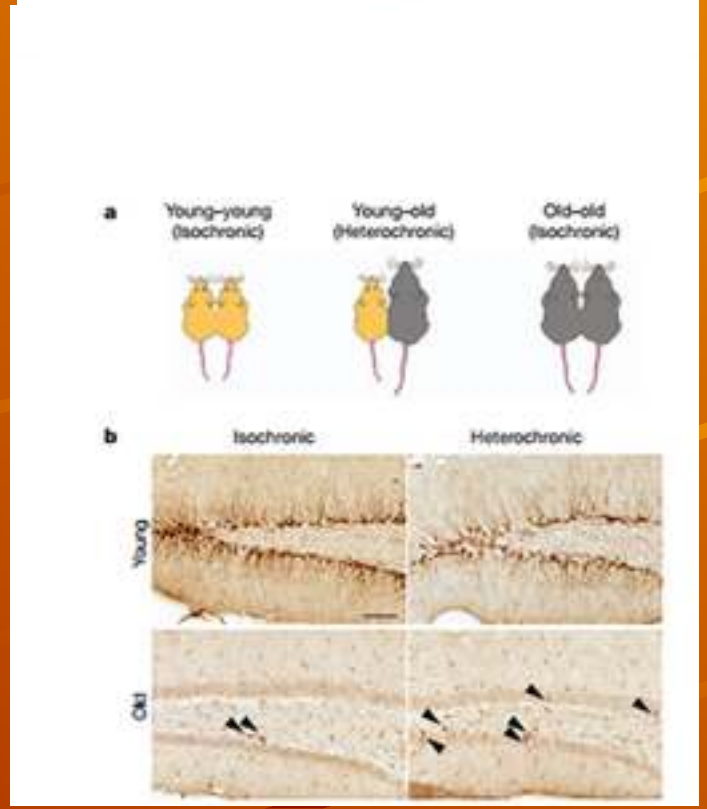


PREDICTIVE

Parabiosis Rejuvenates Old Mice







Muscle

Preventive

FRAIL (IANA)

Fatigue

Resistance (Climb 1 flight stairs)

Aerobic (Walk one block)

Illnesses (more than 5 illnesses)

Loss of weight(>5% in 6 months)

1 or 2 PreFRAIL

3 or more FRAIL

>25 VALIDATIONS

Australia(6)
Hong Kong(2)
St Louis(2)
Chicago
China
Chicago
Louisville
Baltimore
Europe (2)
Turkey
Korea
Taiwan
Mexico(2)
Singapore
Brazil
Thailand

9-year OR of ADL deficit or Mortality in persons not lacking ADLs

ADLs

	PreFrail	Frail	p
FRAIL	2.74	20.76	.001
SOF	3.09	3.48	.001
CHS	2.40	6.47	.001
Rockwood	2.36	5.65	.001

MORTALITY

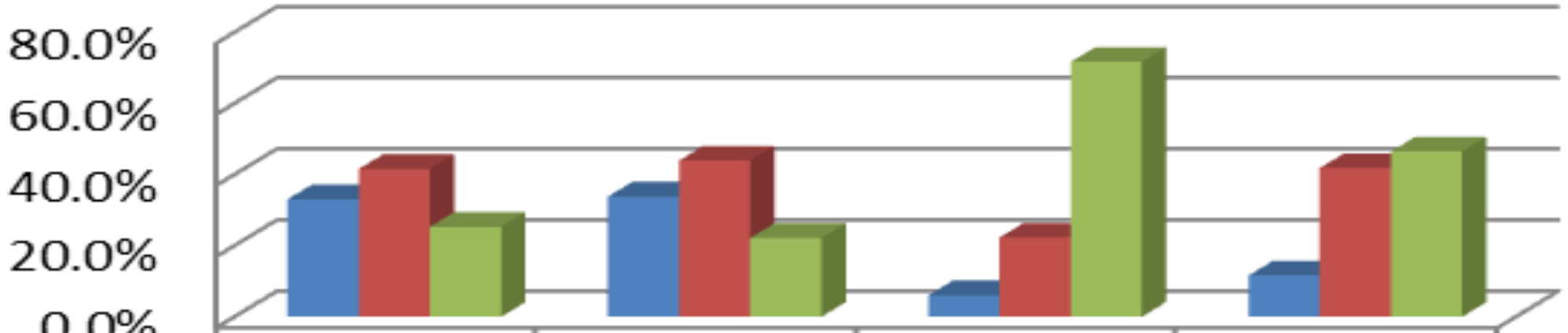
PreFrail	Frail	p
1.58	3.99	.001
1.47	1.40	NS
1.35	2.42	.01
2.50	2.66	.001

Specificity of Scales in Hong Kong Study

	MALE	MALE	FEMALE	FEMALE
	MORTALITY	Physical Limit	MORTALITY	Physical Limit
Rockwood	96.4%	98.4%	93.8%	98%
CHS	99.2%	100%	99.4%	99.9%
FRAIL	99.1%	99.4%	99.9%	100%
Hubbard	98%	99.6%	96.1%	95.1%

All had poor Sensitivity

FRAIL Results
7/1/2015 - 6/30/2017



	Physician/ Case Finding	Screening/ Non-Physician	Nursing Home	PACE
Not Frail	33.1%	33.8%	6.0%	11.6%
Pre-Frail	41.6%	44.0%	22.3%	41.9%
Frail	25.3%	22.2%	71.7%	46.5%

Algorithm for Management of Frailty

PERSONALIZED

Fatigue
- SLU "AM SAD" for depression
- Do you stop breathing while asleep? Sleep apnea
- TSH for hypothyroid
- Vitamin B12
- Hemoglobin for anemia
- Blood pressure for hypotension/orthostasis

Resistance
Aerobic

SARCOPENIA

- Resistance exercise
- Aerobic exercise
- Protein supplement daily
- 1000 IU vitamin D daily

} 3 to 5 x week

Illnesses
- Review medication list for unnecessary side effects and drugs whose side effects may be contributing to frailty, e.g., anticholinergic drugs

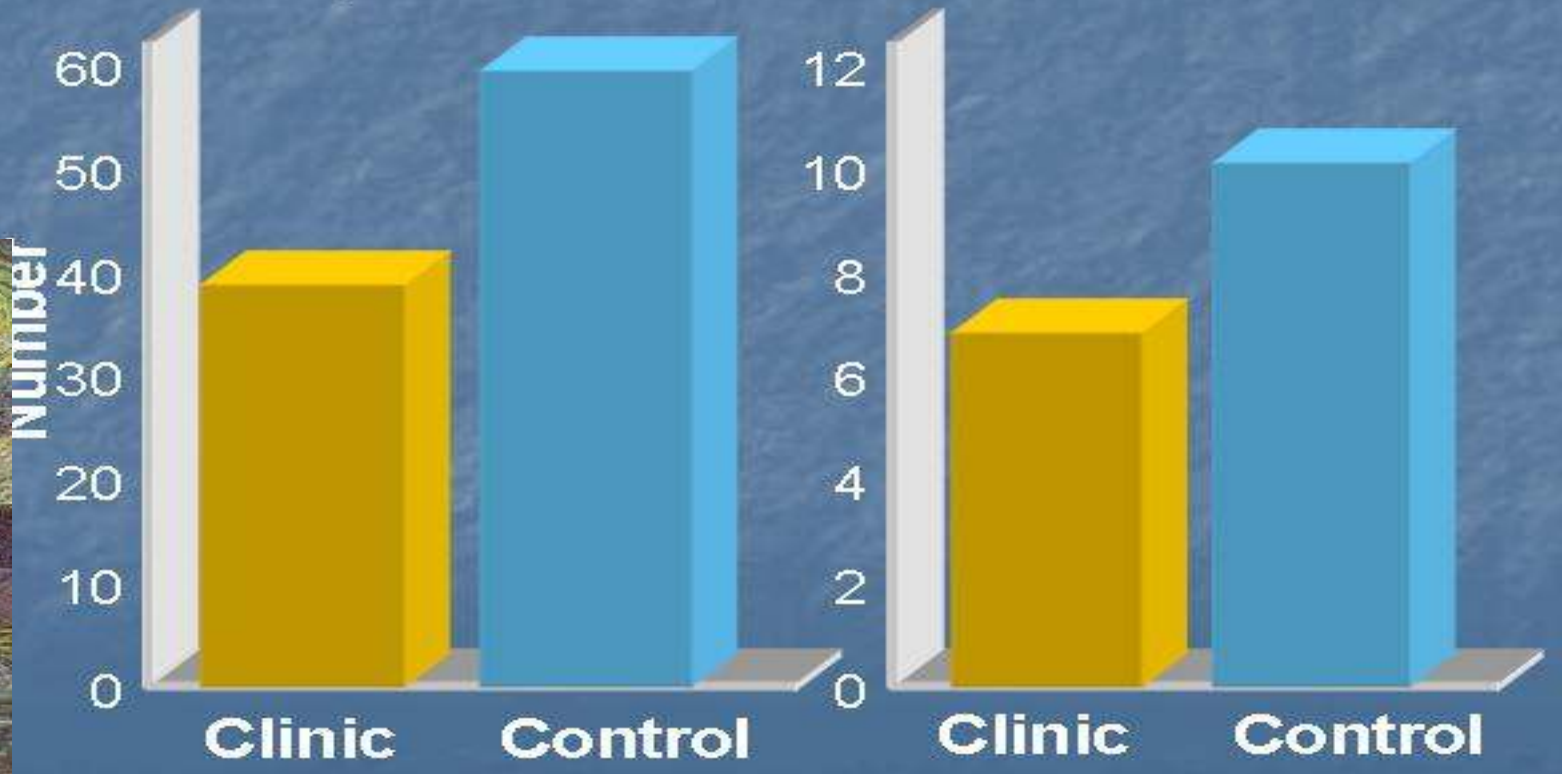
Loss of Weight
- **M**edications producing anorexia
- **E**motional – depression
- **A**buse, elderly, alcoholism
- **L**ate life paranoia
- **S**wallowing problems
- **O**ral problems
- **No**socomial infections, eg, *H Pylori*
- **W**andering and other dementia-related problems
- **H**yperthyroidism, hypercalcemia, hyperglycemia, hypoadrenalism
- **E**nteral problems, eg, celiac disease
- **E**ating problems
- **L**ow salt, sugar and cholesterol diets
- **S**tones - cholecystitis

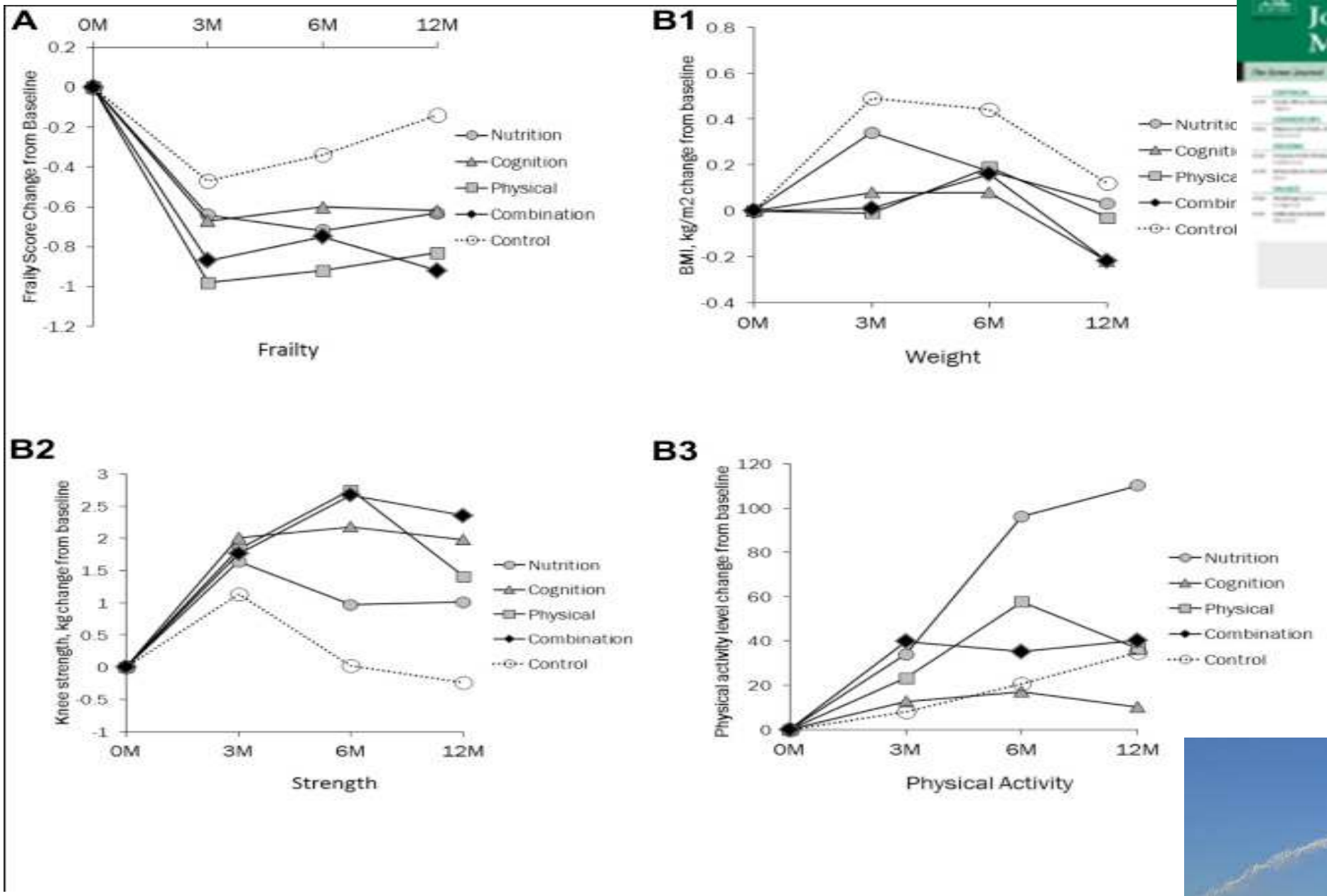
Caloric Supplementation

The Polypharmacy Conundrum

Effect of Medication Reduction

Meds reduced from 13.1 to 8.2



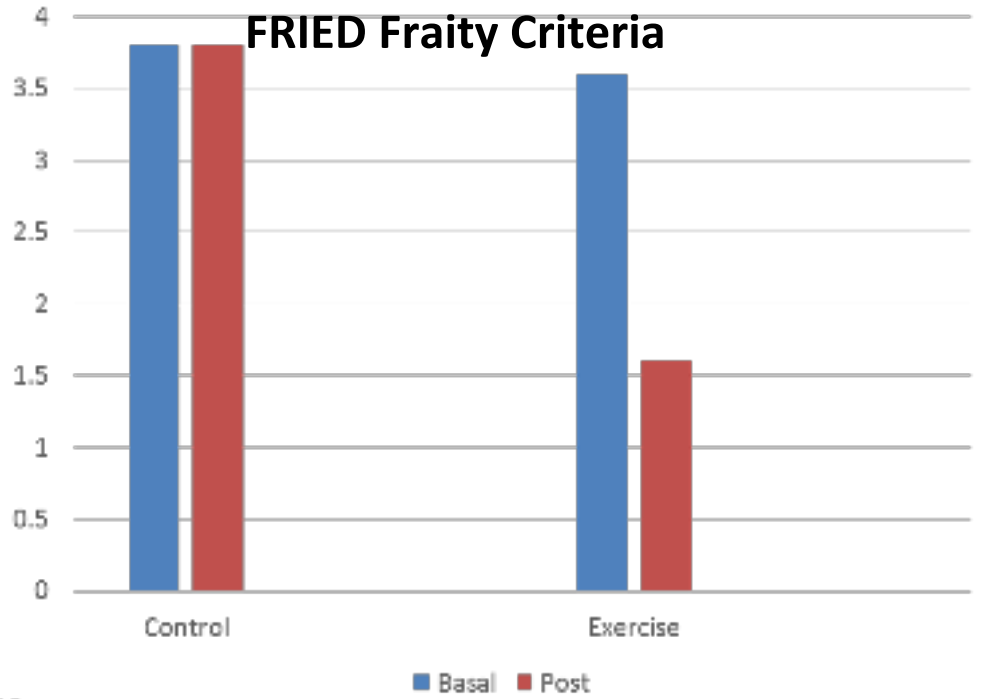


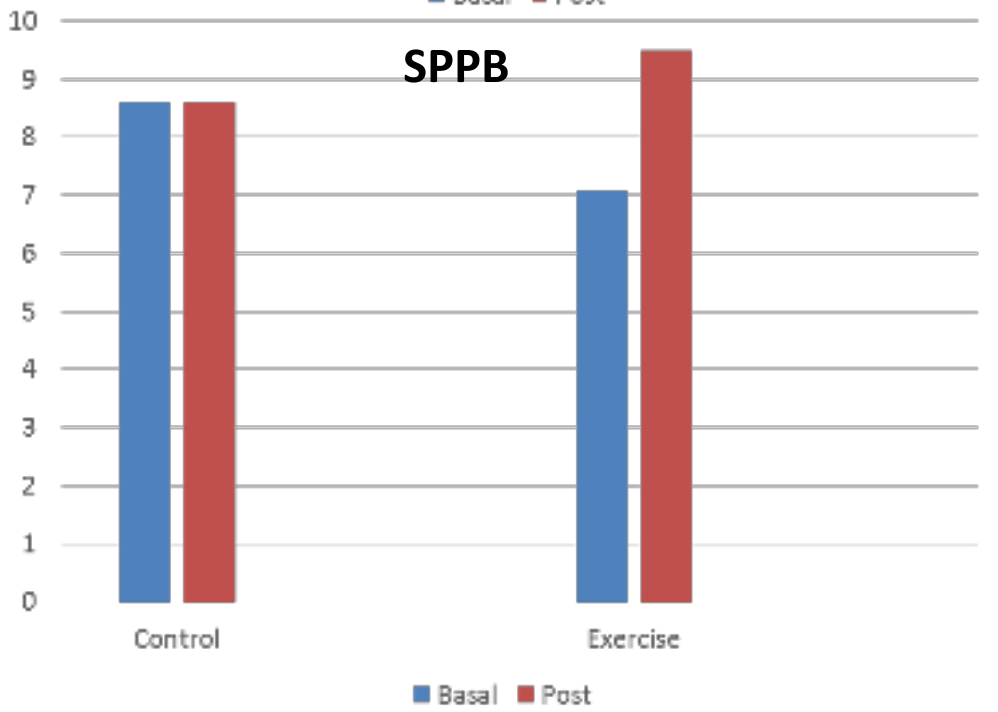
Nutritional, Physical, Cognitive, and Combination Interventions and Frailty Reversal Among Older Adults: A Randomized Controlled Trial

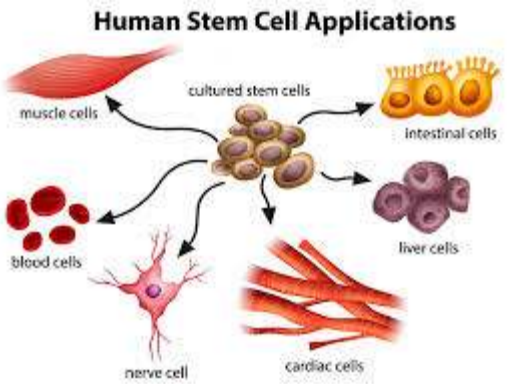
The American Journal of Medicine, Volume 128, Issue 11, 2015, 1225–1236.e1

A multicomponent exercise intervention that reverses frailty

Tarazona-Santabalina et al, JAMDA

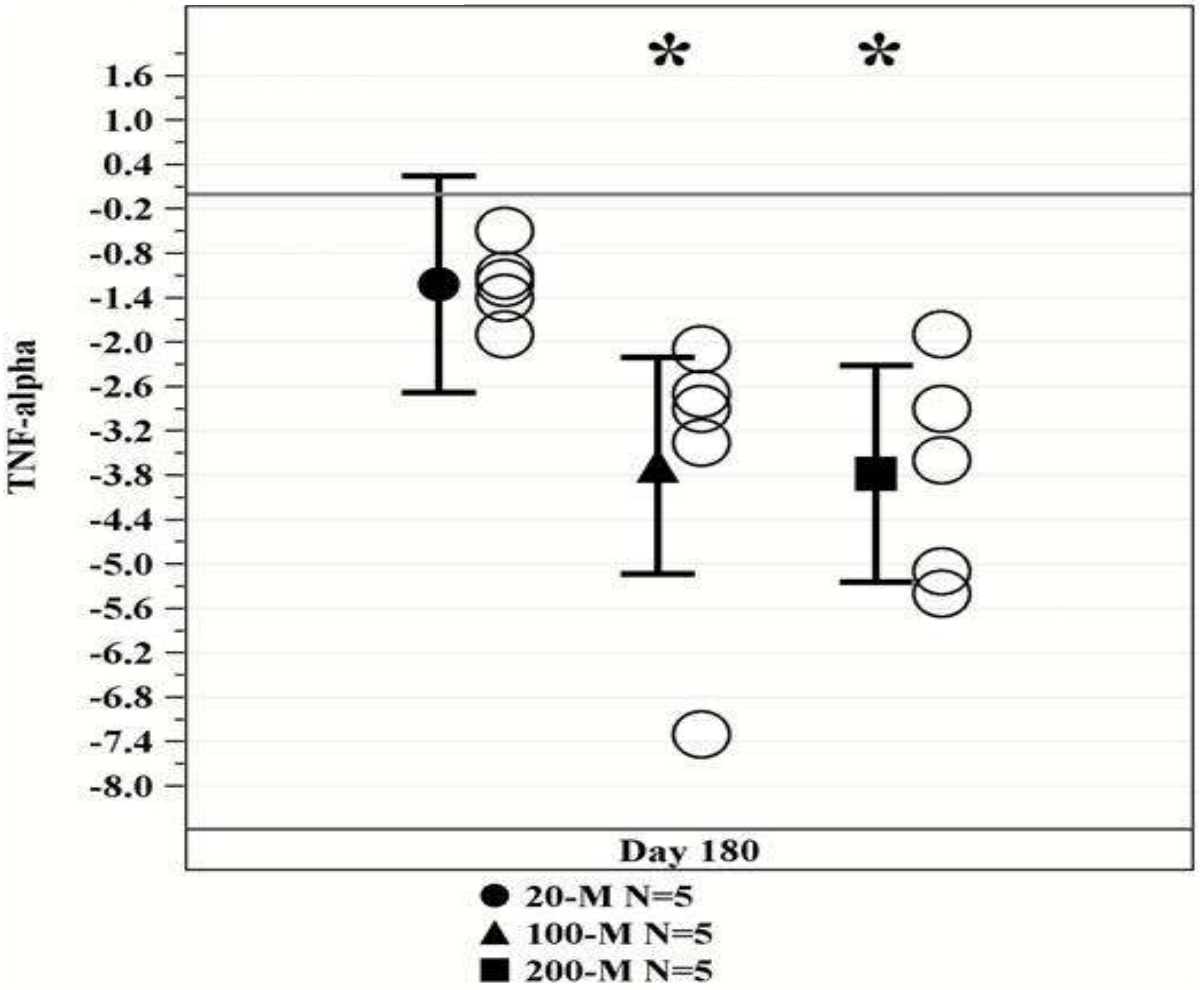


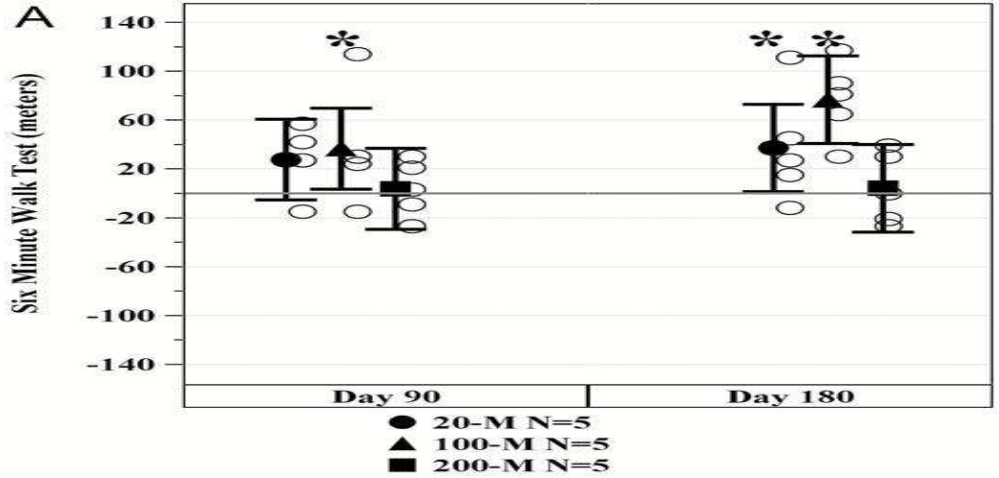


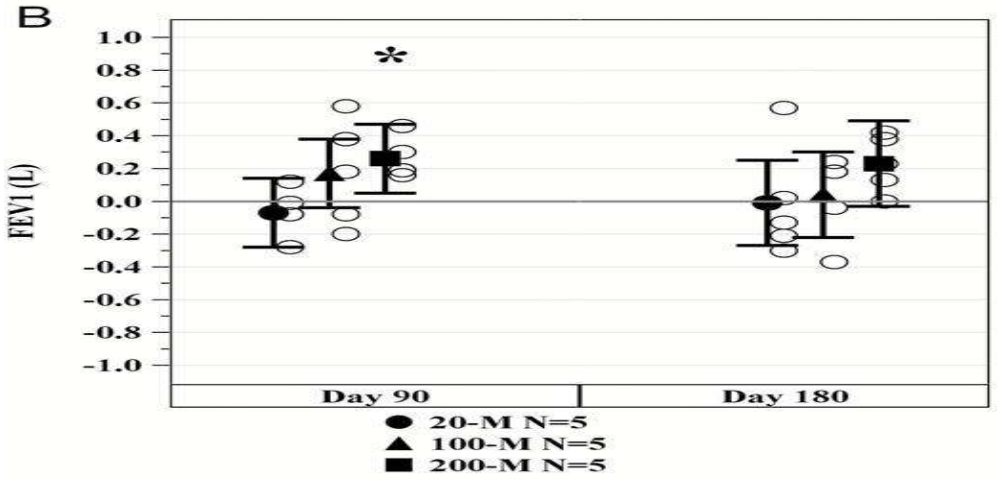


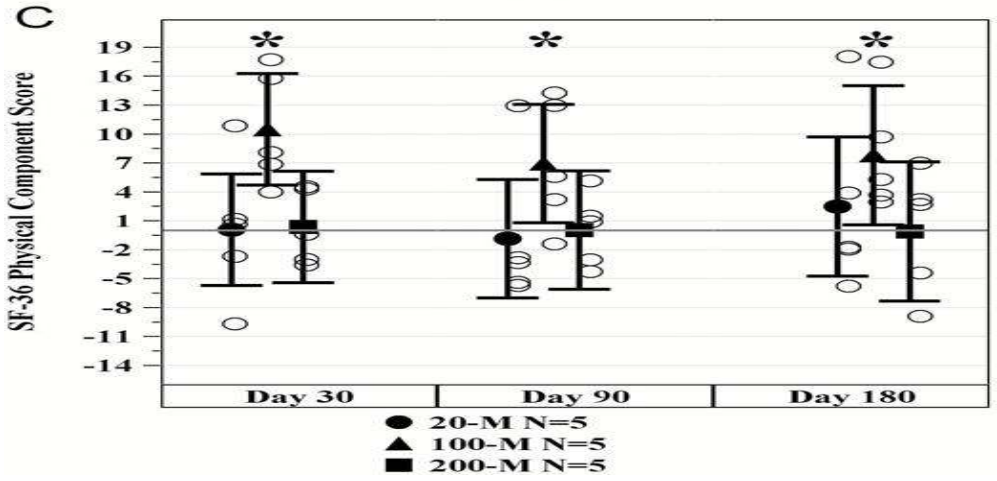
J Gerontol A Biol Sci Med Sci. 2017 Apr 21

Allogeneic Human Mesenchymal Stem Cell Infusions for Aging Frailty.










FEBRUARY 21, 2011
Revolution in Egypt
Joe Klein: What the U.S. should do
On the Street: Hope meets anxiety
Muslim Brotherhood: What it wants
Oscars: Portraits of star power
TIME
2045
The Year Man Becomes Immortal*
BY LEV GROSSMAN
*If you believe humans and machines will become one. Welcome to the Singularity movement.
www.time.com


Robotic Inventions around the world
Robotic Exoskeleton at Football World Cup - 2014
12 JUNE 2014
Juliano Pinto, 29-year-old male paraplegic, kicked the inaugural soccer ball wearing a robotic exoskeleton
Cap on head picked up signals from brain as he mentally visualized kicking the ball
BRAZIL
Inauguration of the Football World Cup
Corinthians Arena, Sao Paulo
Signals transmitted to the exoskeleton's legs, which are moved by hydraulic forces
Developed by Walk Again Project, headed by Dr. Miguel Nicolelis of Duke University and a team of 150 researchers
© MapsofWorld 2014
PROPHETIC LETTER
Benjamin Franklin, in a 1780 letter to scientist Joseph Priestly said of the future:
"all diseases may by sure means be prevented or cured, not excepting that of old age, and our lives lengthened at pleasure even beyond the (current) standard..."
SENOLYTICS

The Asia-Pacific Clinical Practice Guidelines for the Management of Frailty.

Dent E1, Lien C2, Lim WS3, Wong WC3, Wong CH4, Ng TP5, Woo J6, Dong B7, de la Vega S8, Hua Poi PJ9, Kamaruzzaman SBB9, Won C10, Chen LK11, Rockwood K12, Arai H13, Rodriguez-Mañas L14, Cao L15, Cesari M16, Chan P17, Leung E18, Landi F19, Fried LP20, Morley JE21, [illegible] Flicker L22

Clinical Practice Guidelines for the Management of Frailty

Strong Recommendations

1.We strongly recommend that frailty be identified using a validated measurement tool.
2.We strongly recommend that older adults with frailty be referred to a progressive, individualized physical activity program that contains a resistance training component.
3.We strongly recommend that polypharmacy be addressed by reducing or deprescribing any inappropriate/superfluous medications.

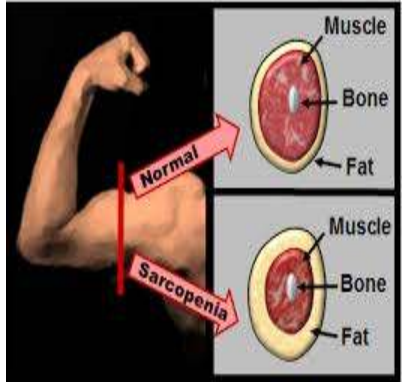
Conditional Recommendations

4.We conditionally recommend that persons with frailty are screened for causes of fatigue.
5.We conditionally recommend that older adults with frailty who exhibit unintentional weight loss should be screened for reversible causes and considered for food fortification/protein and caloric supplementation.
6.We conditionally recommend that vitamin D be prescribed for persons found to be deficient in Vitamin D.

No Recommendation

7.We have no recommendation for the provision of an individualized support and education plan for older adults with frailty.

PARTICIPATORY



P4 medicine in Sarcopenia : P1 PREDICIVE

Allelic Variations Associated with Strength and Body Mass

- **Myostatin (GDF8, K133R)**
- **CNTF and its receptor**
- **Vitamin D receptor (VDR Bsm1)**
- **Angiotensin Converting Enzyme**
- **Androgen receptor gene (CAG-repeats)**
- **Cyclin dependent kinase inhibitor 1A**
- **MYOD1**
- **P53 – decreases satelite activation**

HERTFORDSHIRE COHORT STUDY

SARCOPENIA ORIGINATES AT BIRTH

Sayer et al J Gerontol A 59:930,2004

GRIP STRENGTH CORRELATES WITH BIRTH WEIGHT NOT INFANT GROWTH

PREVENTIVE

Table 1. SARC-F screen for sarcopenia

Component	Question	Scoring
Strength	How much difficulty do you have in lifting and carrying 10 pounds?	None = 0
		Some = 1
		A lot or unable = 2
Assistance in walking	How much difficulty do you have walking across a room?	None = 0
		Some = 1
		A lot, use aids, or unable = 2
Rise from a chair	How much difficulty do you have transferring from a chair or bed?	None = 0
		Some = 1
		A lot or unable without help = 2
Climb stairs	How much difficulty do you have climbing a flight of 10 stairs?	None = 0
		Some = 1
		A lot or unable = 2
Falls	How many times have you fallen in the last year?	None = 0
		1–3 falls = 1
		4 or more falls = 2

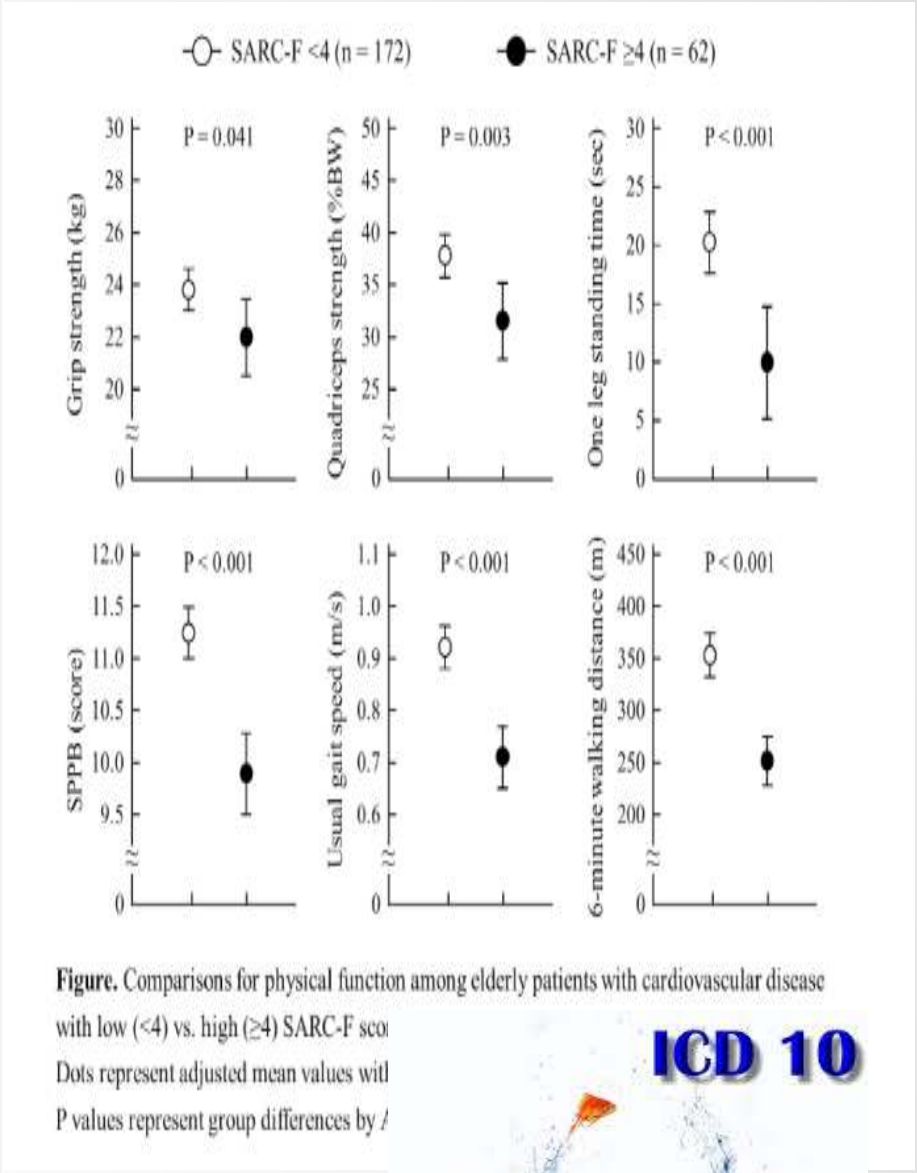


Figure. Comparisons for physical function among elderly patients with cardiovascular disease with low (<4) vs. high (≥4) SARC-F sco
Dots represent adjusted mean values witl
P values represent group differences by

Participants with a total score higher than 4 were classified as having sarcopenia

Gerontology. 2017;63(5):411-416. **The SARC-F Questionnaire: Diagnostic Overlap with Established Sarcopenia Definitions in Older German Men with Sarcopenia.**

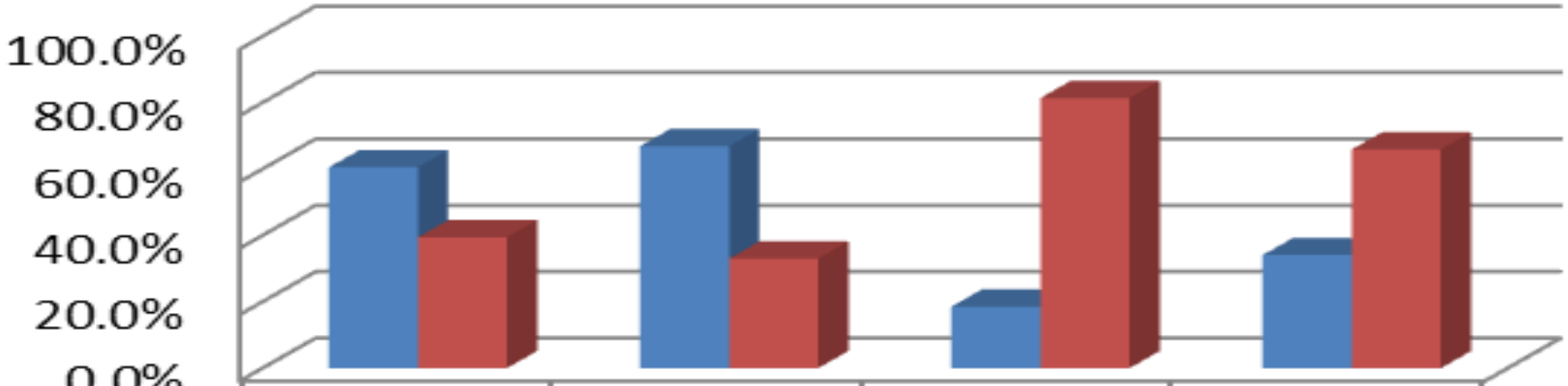
Kemmler W[1], Sieber C, Freiberger E, von Stengel S.

Variable	SARC-F:		*p* value
	without sarcopenia ($n = 49$)	with sarcopenia ($n = 25$)	
Sarcopenia according to EWGSOP, %[a]	61	76	0.204
Sarcopenia according to IWGS, %[b]	35	80	0.001
Sarcopenia according to FNIH, %[c]	39	52	0.277
EWGSOP sarcopenia Z-score	−0.35±1.07	1.34±1.22	<0.001
IWGS sarcopenia Z-score	0.35±1.74	2.07±1.77	<0.001
FNIH sarcopenia Z-score	−0.19±2.23	1.37±2.08	0.008
Habitual gait velocity, m/s	1.03±0.21	0.83±0.13	<0.001
Handgrip strength, N	27.1±5.2	23.6±4.3	0.004
SMI, kg/m^2[d]	6.99±0.36	6.89±0.62	0.404
SMI-FNIH, kg/BMI[e]	0.783±0.115	0.764±0.95	0.242

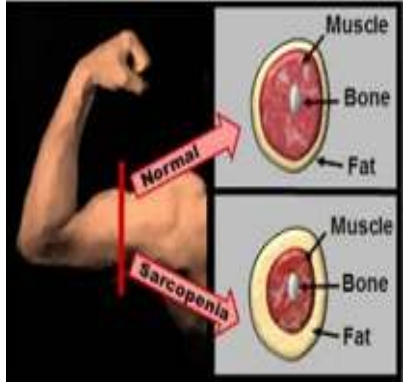
SMI, skeletal muscle mass index. [a] Criteria included gait velocity, handgrip strength, and SMI. [b] Criteria included gait velocity and SMI. [c] Criteria included grip strength and SMI. [d] SMI according to IWGSOP and IWGS, i.e., appendicular skeletal muscle mass (kg)/height (m^2). [e] SMI according to FNIH, i.e., appendicular skeletal muscle mass (kg)/body mass index (BMI) (kg/m^2).

- The lack of a unique mandatory definition or gold standard for sarcopenia complicates the reliable determination of the predictive power of the SARC-F.
- The diagnostic overlap between the SARC-F and presently applied sarcopenia consensus definitions was higher than among these definitions themselves.
- SARC-F can be used as a first simple screening method for sarcopenia

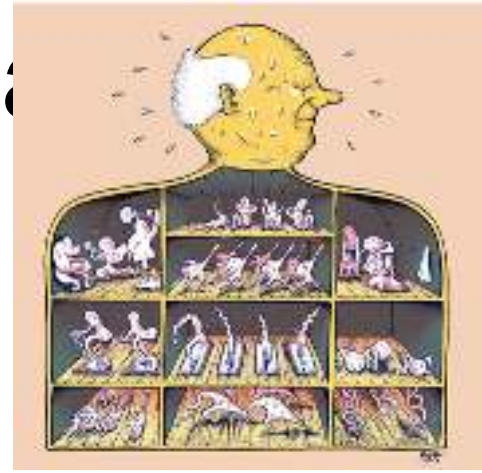
SARC-F Results
7/1/2015 - 6/30/2017

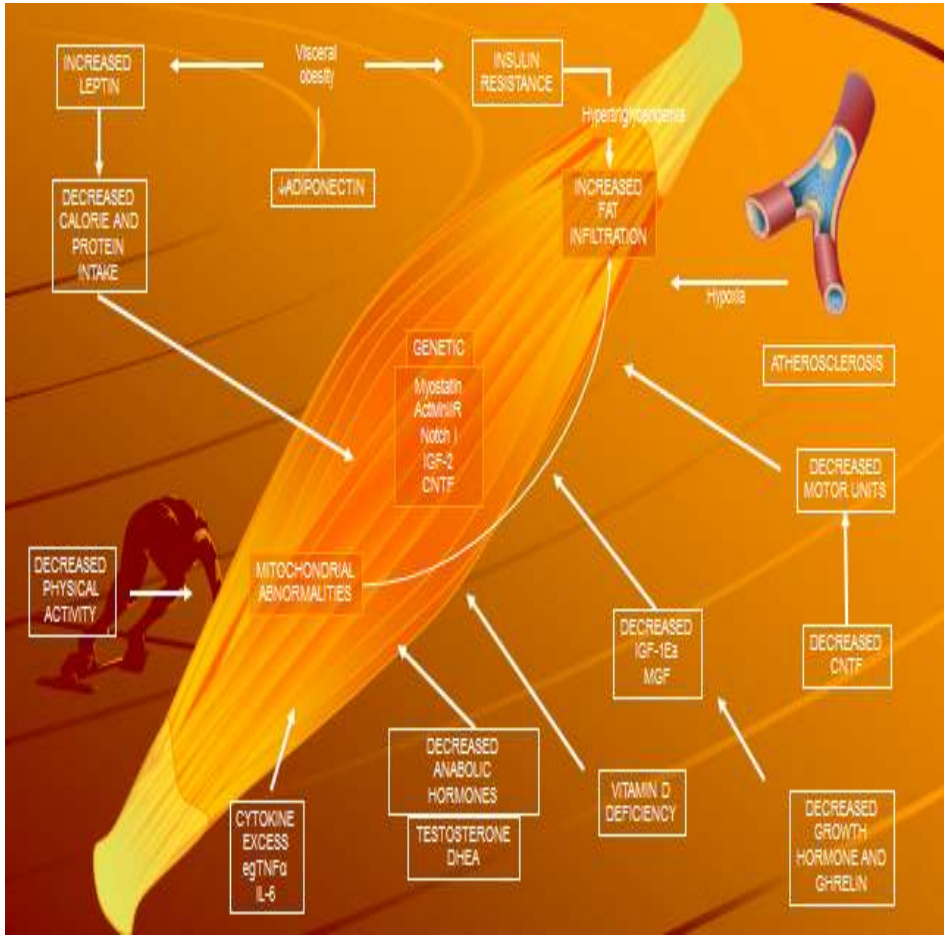


	Physician /Case Finding	Screening / Non-Physician	Nursing Home	PACE
No Sarcopenia	60.6%	67.0%	18.6%	34.1%
Sarcopenia	39.4%	33.0%	81.4%	65.9%



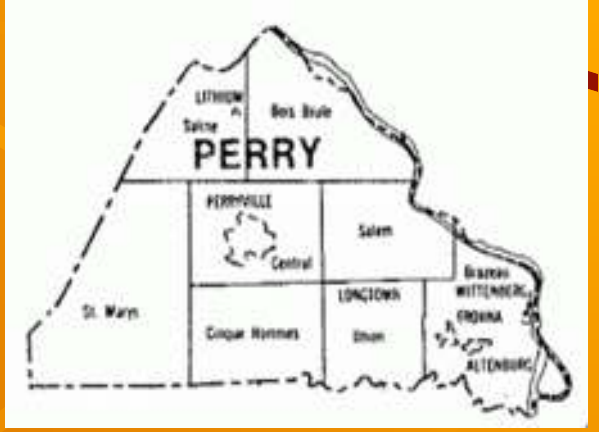
P4 medicine in Sarcopenia
P3 PERSONALISED





- Resistance Exercise
- Leucine enriched essential amino acids or HMB
- Vitamin D
- Testosterone
- Myostatin peptobodies

Perry County: Exercise Program



	Pre (41) mean	Range min-max		3m (41) Mean	Range Min-max	6m (31) mean	Range Min-max	9m (25) mean	Range Min-max	12m (14) Mean	Range Min-max
TUG	15	47-8		12	30-6	13	28-7	12	21-7	13	26-8
FR	6	2-11		7	1-12	7	3-12	8	4-11	7	4-12
FTST	15	32-8		14	39-8	13	23-6	13	23-6	13	21-9

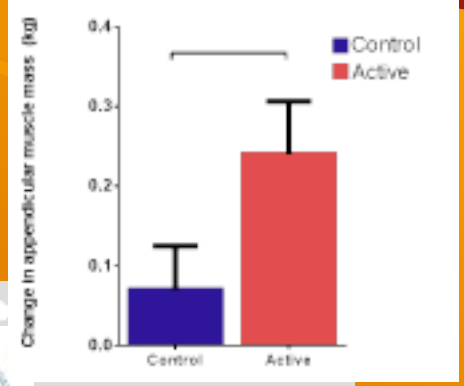
Measures high risk for falling, disability, and morbidity in older adults

TUG: ≥12 seconds

FR: 6 inches or less

FTST: > 13.6 seconds

PROVIDE (PROTEIN) STUDY CENTRES ACROSS EUROPE



Newcastle University

DUNDEE

UPPSALA UNIVERSITET

MANCHESTER 1824
The University of Manchester

Universität zu Köln

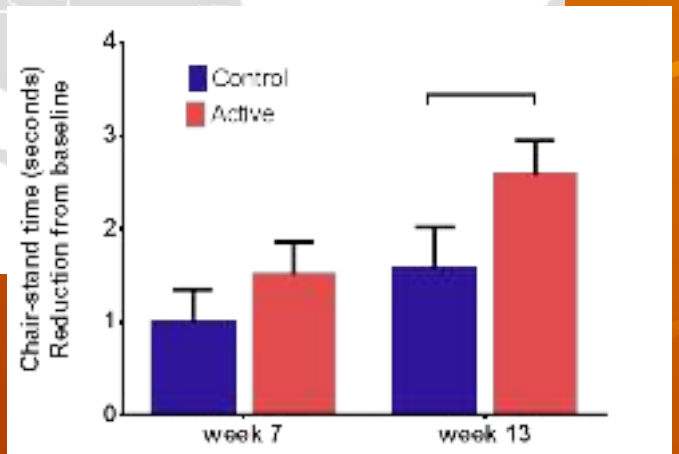
FAU FRIEDRICH-ALEXANDER UNIVERSITÄT ERLANGEN-NÜRNBERG

UCD DUBLIN

SYNEXUS

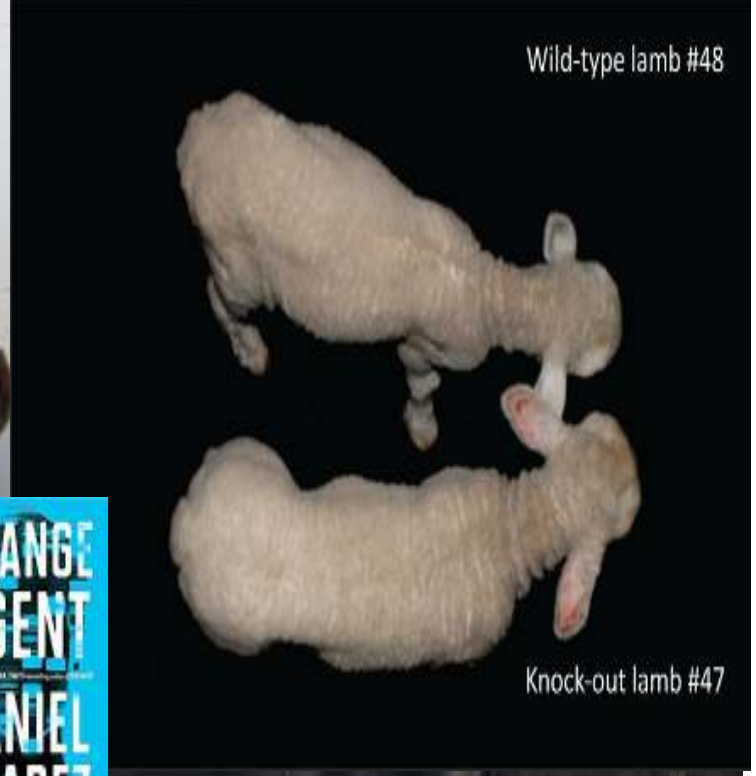
femicare

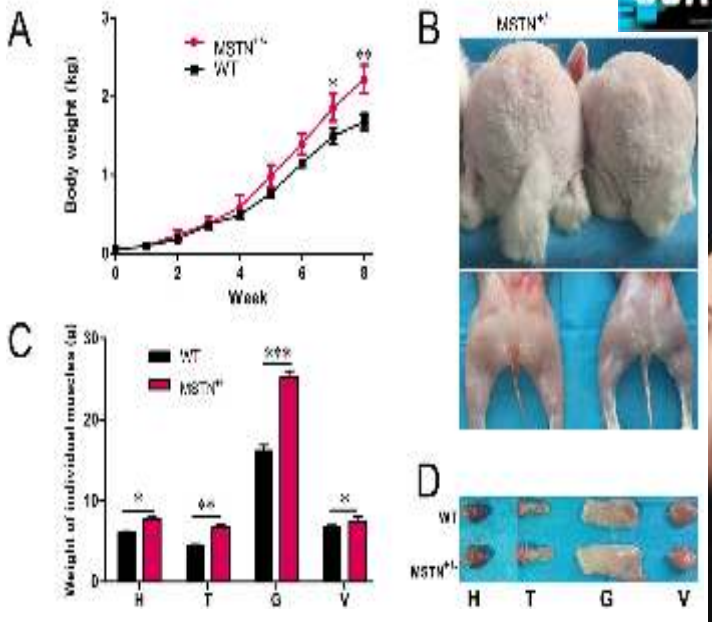
Vrije Universiteit Brussel



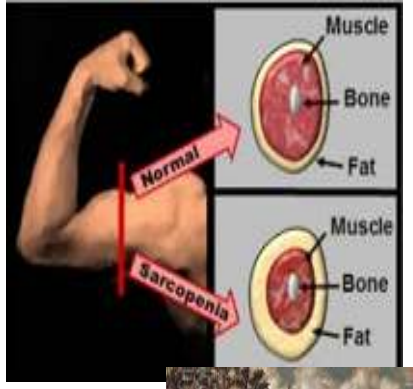
MYOSTATIN

CRISPR



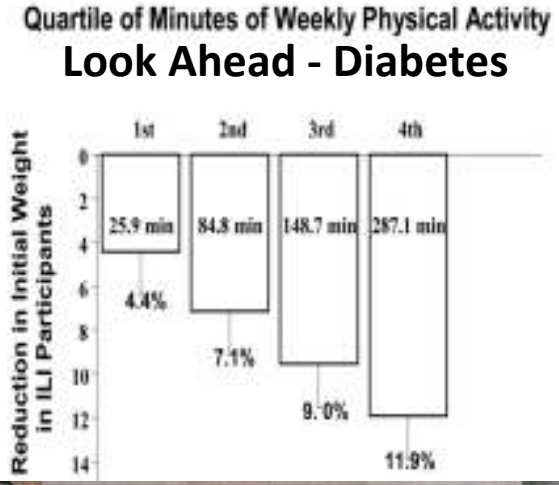


TALEN



P4 medicine in Sarcopenia : P4 PARTICIPATORY

"What fits your busy schedule better, exercising one hour a day or being dead 24 hours a day?"



Compliance

Anorexia Independently Predicts Mortality

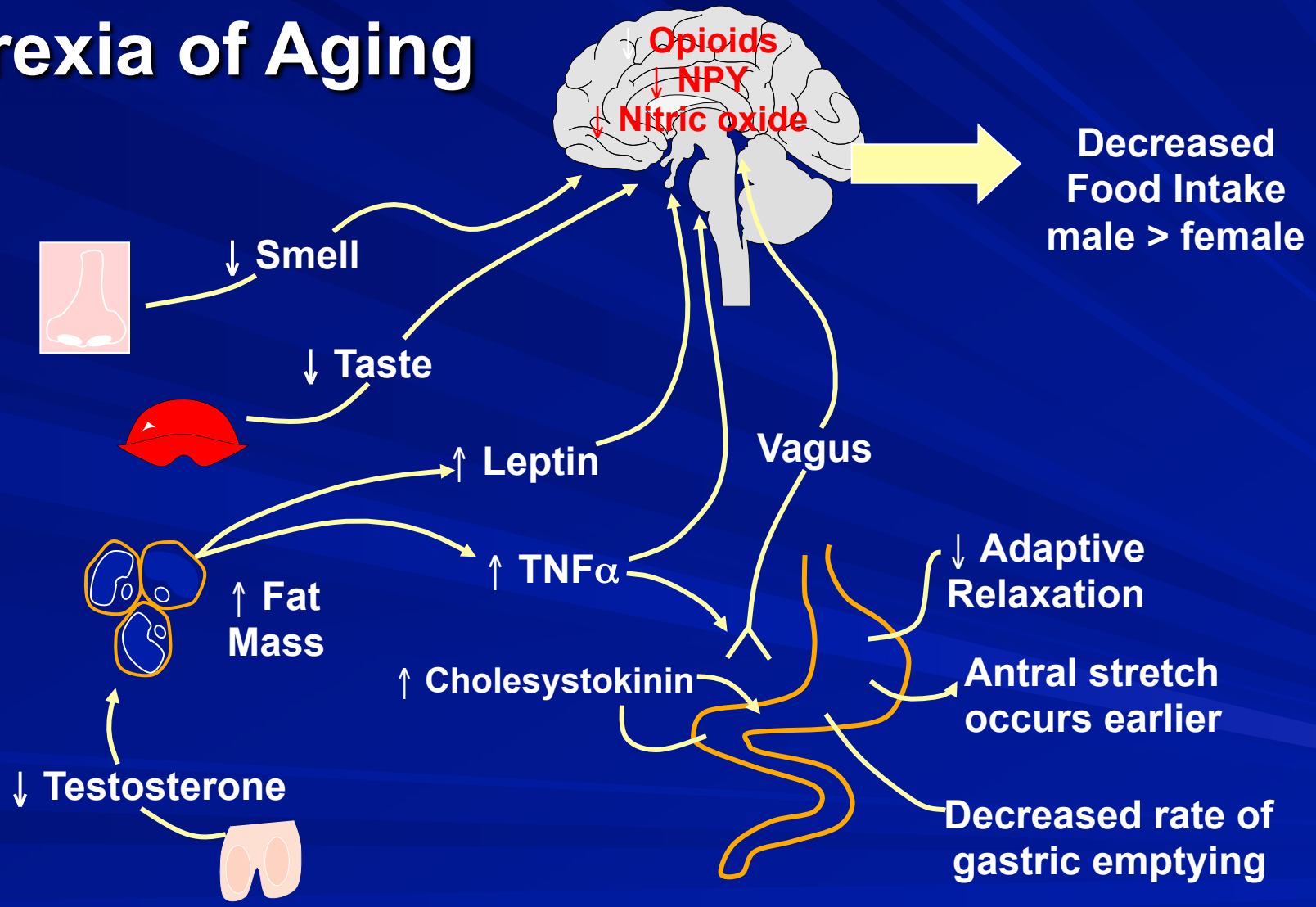
- Hazard Ratio 2.9 (1.1-7.4)

Cornali et al JAGS 53 354, 2005

PREDICTIVE

Cachexia
Vs
Protein Energy Malnutrition

Anorexia of Aging



Morley JE, et al.. Pharm, Biochem Behavior. 50(3):369-73, 1995

S.N.A.Q

	Sensitivity (%)	Specificity (%)
5% weight loss	81.3	76.4
10% weight loss	88.2	83.5

1) My appetite is

1. Very poor
2. Poor
3. Average
4. Good
5. Very good

2) When I eat, I feel full after

1. Eating only a few mouthfuls
2. Eating about a third of a plateful
3. Eating over half a plateful
4. Eating most of the food
5. Hardly ever

3) Food tastes

1. Very bad
2. Bad
3. Average
4. Good
5. Very good

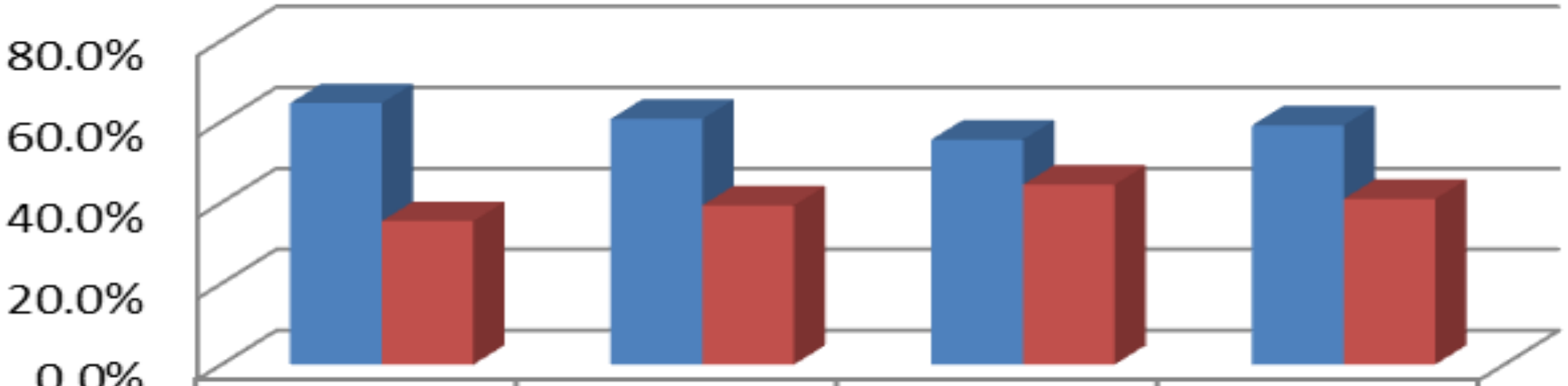
< 15 predicts significant weight loss within 6 months

4) Normally I eat

1. Less than one full meal a day
2. One meal a day
3. Two meals a day
4. Three meals a day
5. More than three meals a day, including snacks

PREVENTIVE

SNAQ Results
7/1/2015 - 6/30/2017



	Physician /Case Finding	Screening/ Non-Physician	Nursing Home	PACE
No	64.6%	60.7%	55.6%	59.1%
Yes	35.4%	39.3%	44.4%	40.9%

Glasgow Prognostic Score

	Points allocated
The GPS	
CRP ≥10 mg/l and albumin ≥35 g/l	0
CRP >10 mg/l	1
Albumin <35 g/l	1
CRP >10 mg/l and albumin <35 g/l	2
The mGPS	
CRP ≤10 mg/l and albumin ≥35 g/l	0
CRP >10 mg/l	1
CRP >10 mg/l and albumin <35 g/l	2

CRP=C-reactive protein, GPS=Glasgow prognostic score, mGPS=Mo
glasgow prognostic score

TABLE 1: "MEALS ON WHEELS": A MNEMONIC FOR COMMON TREATABLE CAUSES OF UNINTENTIONAL WEIGHT LOSS IN OLDER ADULTS

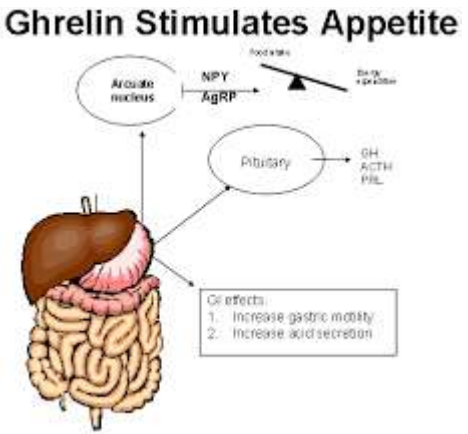
M	Medication effects
E	Emotional problems, especially depression
A	Anorexia nervosa, alcoholism
L	Late-life paranoia
S	Swallowing disorders
O	Oral factors (e.g., poorly fitting dentures, caries)
N	No money
W	Wandering and other dementia-related behaviors
H	Hyperthyroidism, hypothyroidism, hyperparathyroidism, hypoadrenalism
E	Enteric problems
E	Eating problems (e.g., inability to feed self)
L	Low-salt, low-cholesterol diet
S	Stones, social problems (e.g., social isolation, inability to obtain preferred foods)

Data from Morley, J. E., & Silver, A. J. (1995). Nutritional issues in nursing home care. *Annals of Internal Medicine, 123*(11), 850-859 and Wallace, C. M. (1995). Involuntary weight loss. *Medical Clinics of North America, 79*, 299-311.

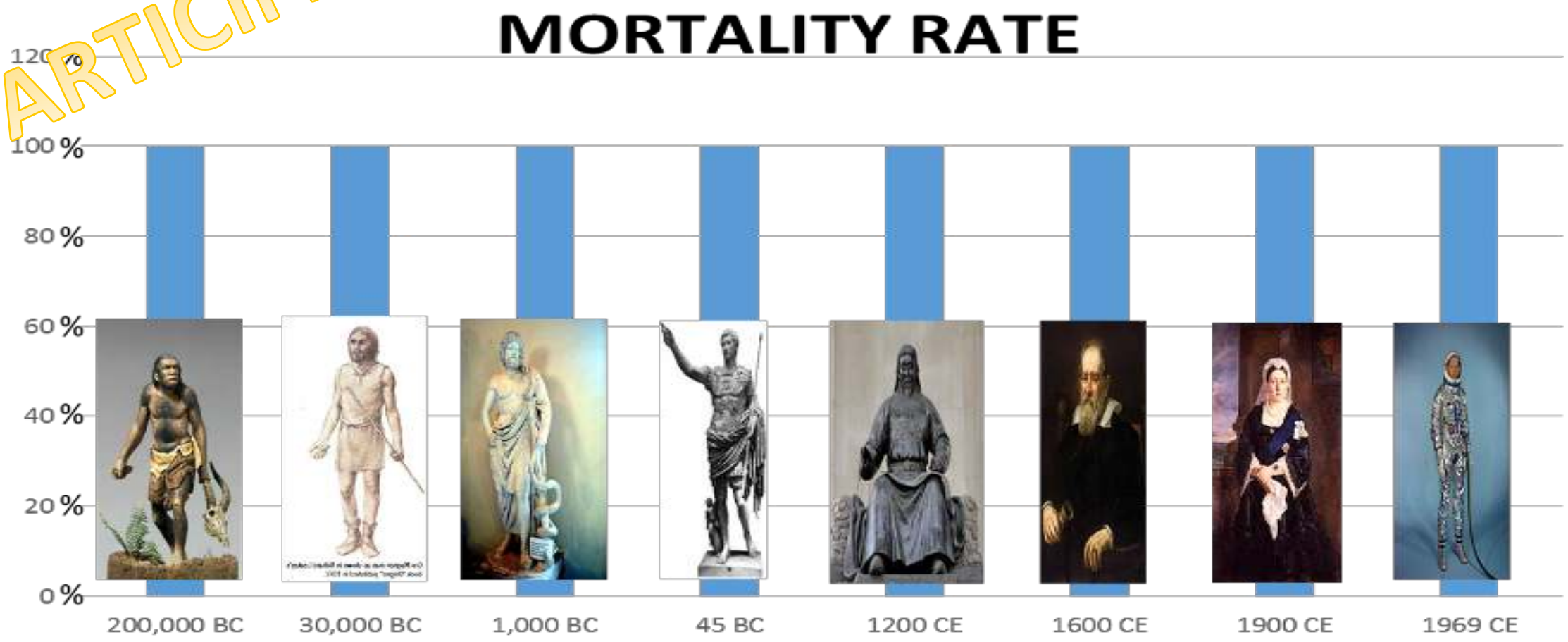
ROMANA 3:
A phase 3 safety extension study of anamorelin in advanced non-small cell lung cancer (NSCLC) patients with cachexia.

Anamorelin versus placebo:

- significantly increased body weight from baseline of original trials at all time points ($P < 0.0001$)
- improved anorexia–cachexia symptoms at weeks 3, 6, 9, 12, and 16 ($P < 0.05$).
- No significant improvement in hand grip strength was seen in either group



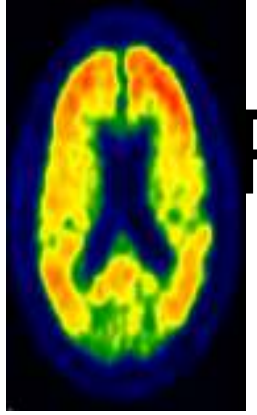
PARTICIPATORY



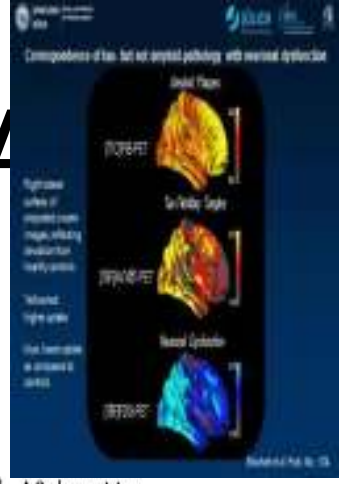
U. Michigan – Hospice of Michigan

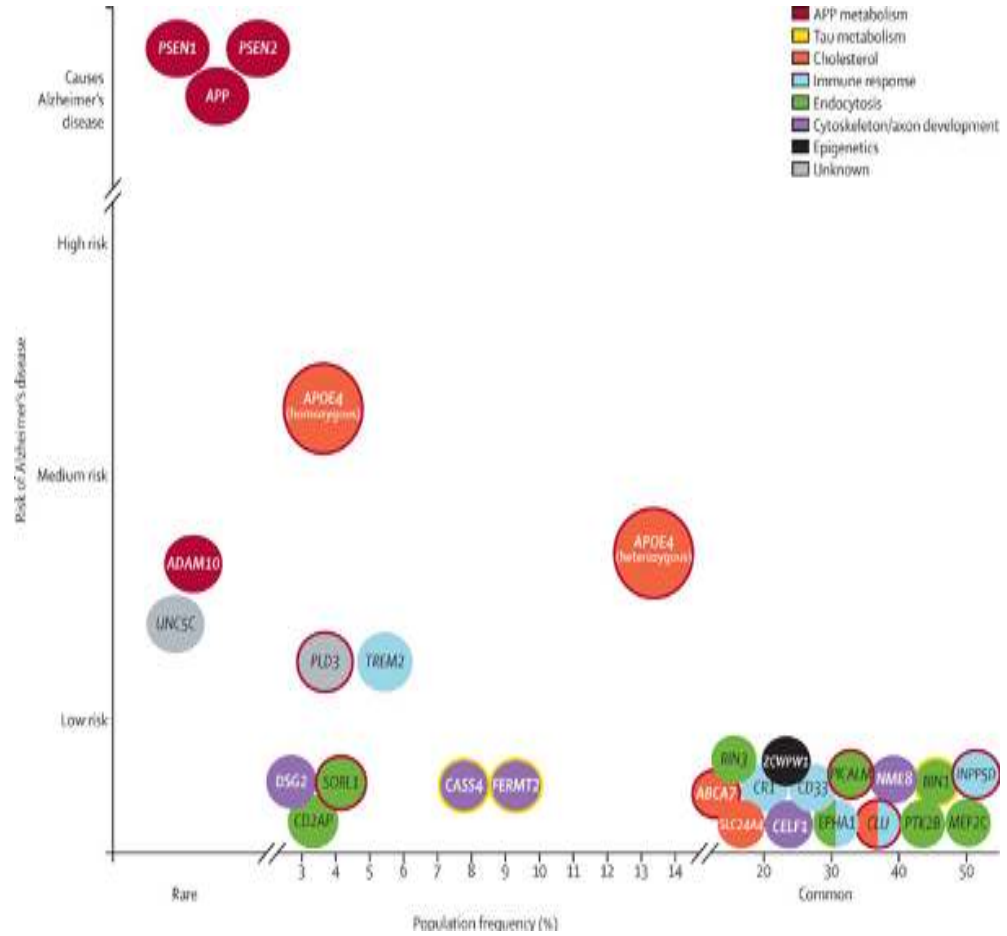
The Palliative Care Trial Group Is Living *Longer* than the Usual Care Group (p NS)

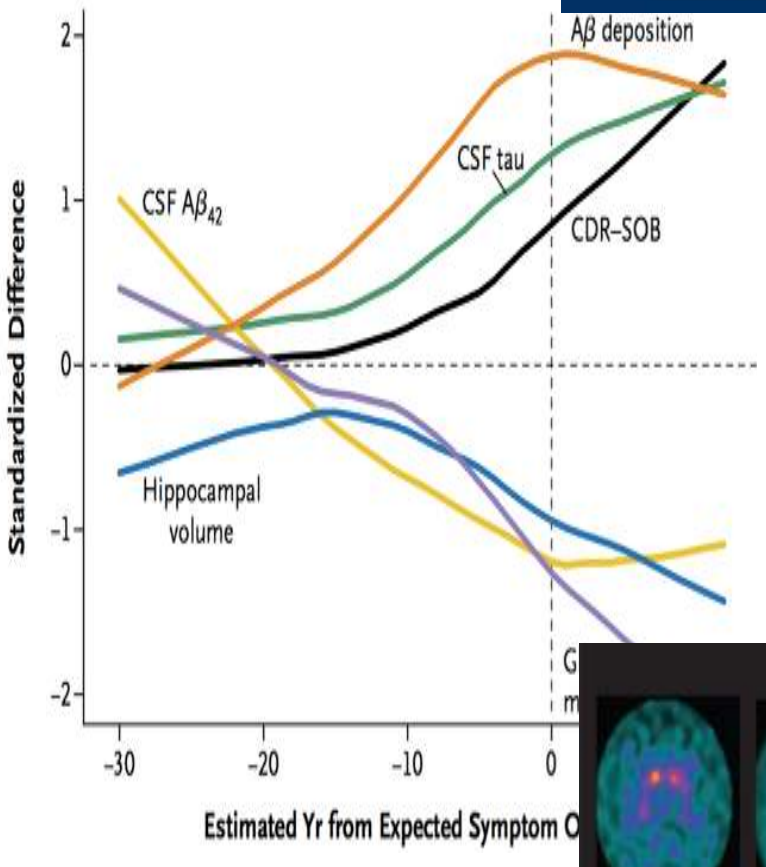
	Palliative Care	Control
Average Days in Study	266 days	227 days

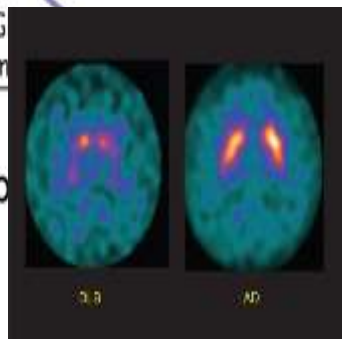


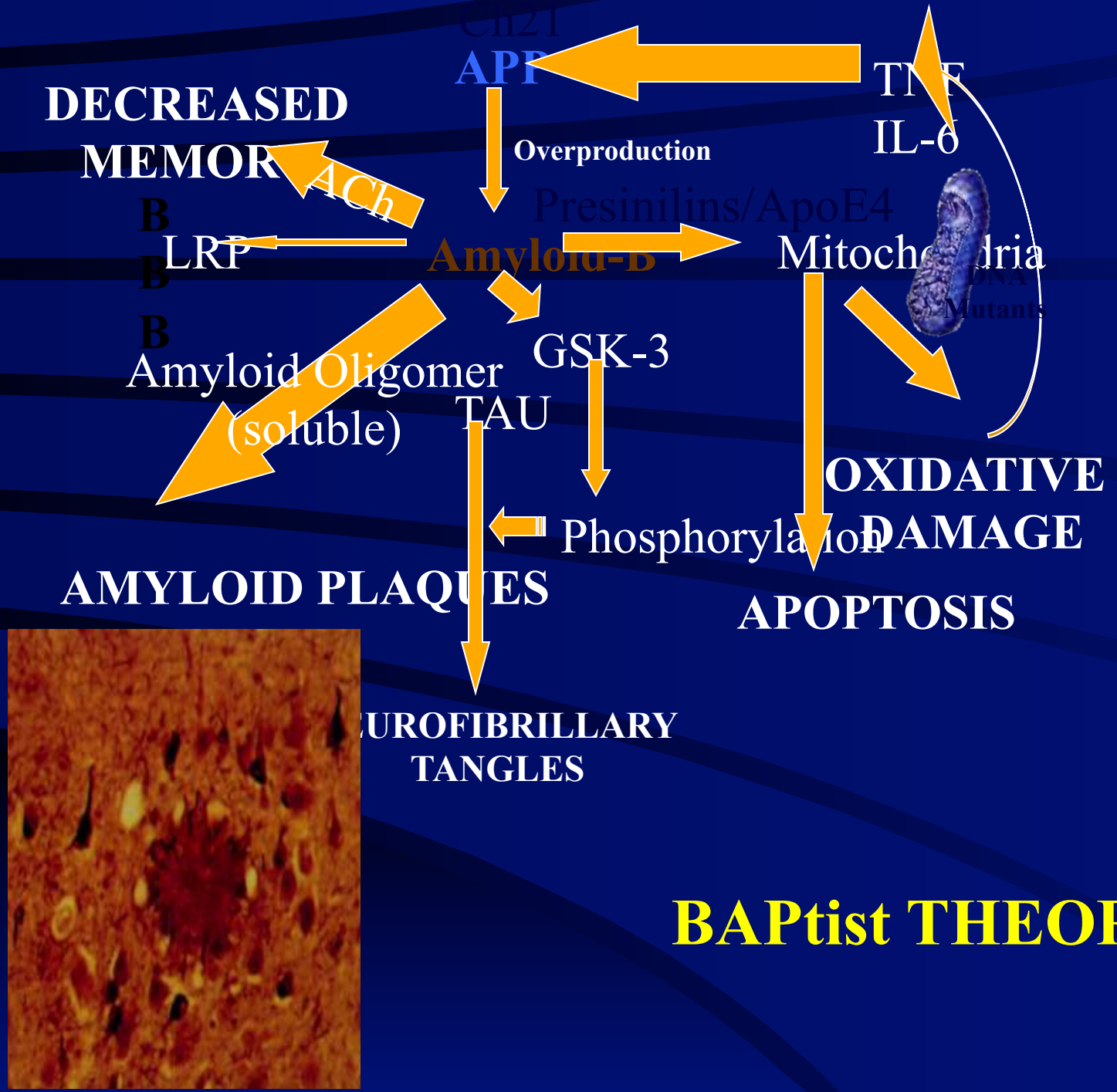
P4 medicine in DEMENTIA
P1 PREDICTIVE





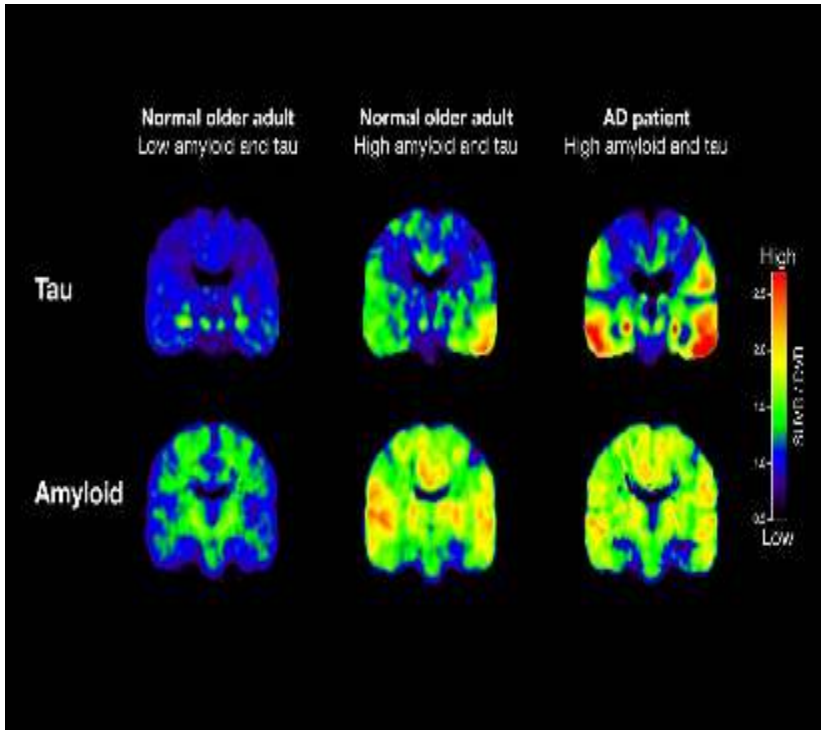






BAPtist THEORY

Normal older persons have amyloid-beta plaques



- Ann Neurol. 1988 Feb;23(2):138-44.
- **Clinical, pathological, and neurochemical changes in dementia: a subgroup with preserved mental status and numerous neocortical plaques.**
- Katzman R[1], Terry R, DeTeresa R, Brown T, Davies P, Fuld P, Renbing X, Peck A.
- Postmortem examination was performed on 137 residents (average age 85.5 years) of a skilled nursing facility whose mental status, memory, and functional status had been evaluated during life.
- **Ten subjects** whose functional and **cognitive performance was in the upper quintile** of the nursing home residents, as good as or better than the performance of the upper quintile of residents without brain pathology (control subjects), showed the pathological features of mild Alzheimer's disease, with **many neocortical plaques**. Plaque counts were 80% of those of demented patients with Alzheimer's disease.
- The unexpected findings in these subjects were higher brain weights and greater number of neurons (greater than 90 micron 2 in a cross-sectional area in cerebral cortex) as compared to age-matched nursing home control subjects.

Seattle-based Adult Changes in Thought study

- Alzheimer's disease……. 45%
- Vascular based lesions……. 33%
- Lewy Body Dementia…… 10%

Table 3. Cognitive Function, by Age Range, 2000 and 2012 Cohorts

Cognitive Function	No. (%) [95% CI][a] 65-74 y 2000 (n = 5566)	65-74 y 2012 (n = 4983)	75-84 y 2000 (n = 3668)	75-84 y 2012 (n = 3991)	≥85 y 2000 (n = 1312)	≥85 y 2012 (n = 1537)	Total (Age >65 y) 2000 (n = 10 546)	Total (Age >65 y) 2012 (n = 10 511)
Normal	4320 (78.1) [76.5-79.7]	3931 (82.8) [81.1-84.4]	2231 (62.0) [60.1-64.0]	2603 (67.5) [65.6-69.3]	415 (32.8) [30.3-35.4]	580 (40.8) [38.0-43.6]	6966 (67.2) [65.8-68.6]	7114 (72.4) [71.1-73.6]
CIND	942 (16.5) [15.2-17.8]	837 (14.0) [12.7-15.4]	924 (24.4) [23.0-25.9]	936 (22.6) [20.9-24.3]	427 (32.9) [29.5-36.5]	451 (29.9) [27.4-32.6]	2293 (21.2) [20.1-22.3]	2224 (18.8) [17.8-19.9]
Dementia	304 (5.4) [4.7-6.3]	215 (3.2) [2.7-3.8]	513 (13.6) [12.1-15.1]	452 (9.9) [9.0-10.9]	470 (34.4) [31.2-37.6]	506 (29.3) [26.9-31.8]	1287 (11.6) [10.7-12.7]	1173 (8.8) [8.2-9.4]
Age- and Sex-Standardized to 2000 Population								
Normal	4320 (78.1) [76.5-79.7]	3931 (**82.9**) [81.1-84.4]	2231 (62.0) [60.1-64.0]	2603 (**67.6**) [65.6-69.3]	415 (32.8) [30.3-35.4]	580 (**40.7**) [38.0-43.6]	6966 (67.2) [65.8-68.6]	7114 (**72.6**) [**71.2-73.7**]
CIND	942 (16.5) [15.2-17.8]	837 (14.0) [12.7-15.4]	924 (24.4) [23.0-25.9]	936 (**22.5**) [20.9-24.3]	427 (32.9) [29.5-36.5]	451 (**29.7**) [27.4-32.6]	2293 (21.2) [20.1-22.3]	2224 (18.8) [17.8-19.9]
Dementia	304 (5.4) [4.7-6.3]	215 (3.2) [2.7-3.8]	513 (**13.5**) [12.1-15.1]	452 (9.9) [9.0-10.9]	470 (**34.3**) [31.2-37.6]	506 (**29.6**) [26.9-31.8]	1287 (11.6) [10.7-12.7]	1173 (**8.6**) [**8.1-9.3**]

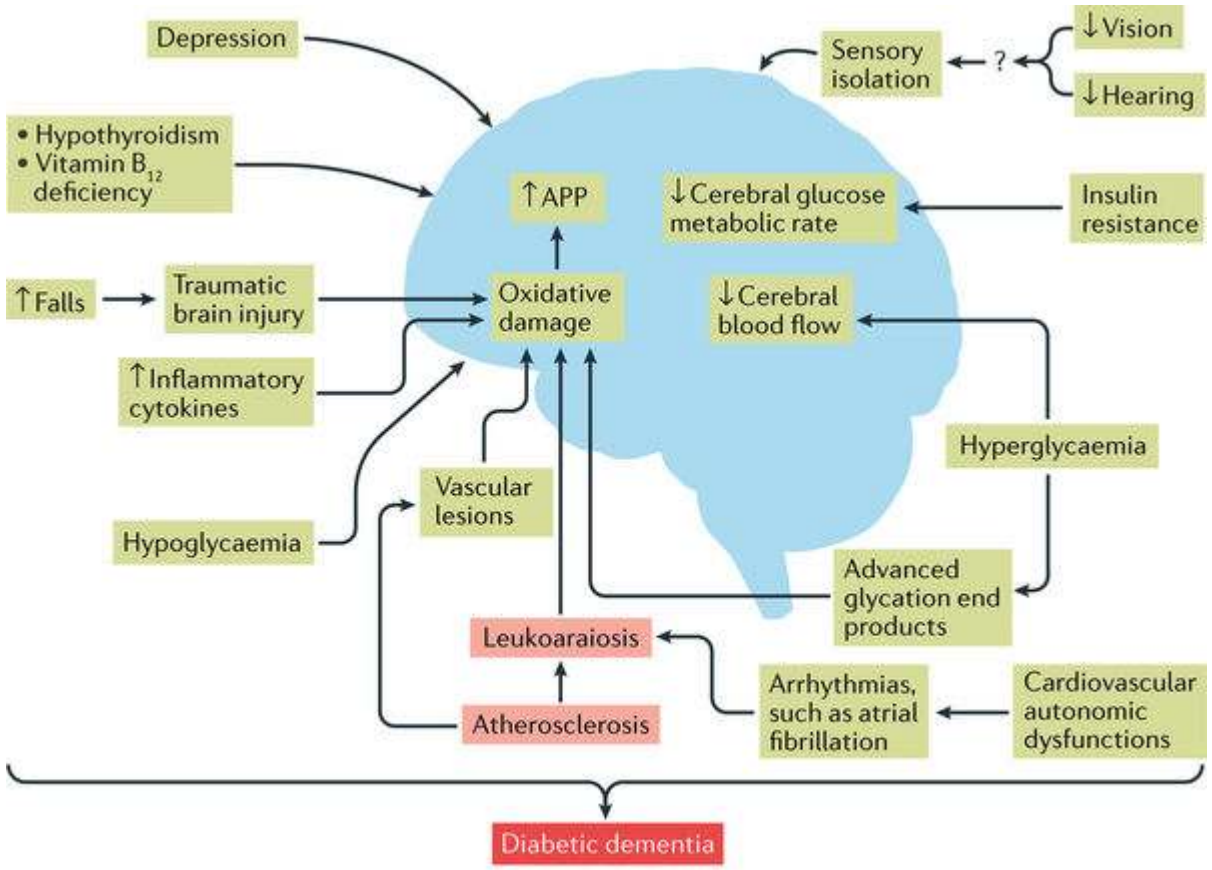
Abbreviations: CIND, cognitive impairment–no dementia; HRS, Health and Retirement Study.[16]

[a] Values in parentheses are weighted percentages (95% CIs) derived using the HRS sampling weights to adjust for the complex design of the HRS survey.

Values for 2012 weighted percentages in the lower half of the table are age- and sex-standardized to the 2000 population using direct standardization. Boldface values differ from those in the non-age- and sex-standardized data.

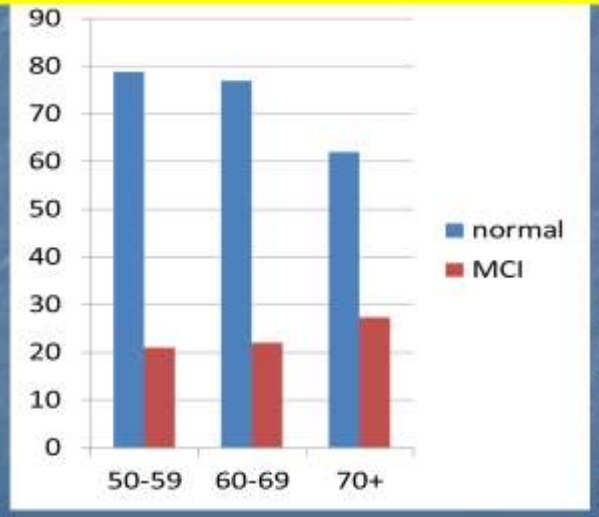
DEMENTIA is DECREASING in the United States

Diabetic Brain



Nature Reviews | Endocrinology

Metformin, Cognitive Dysfunction and Diabetics



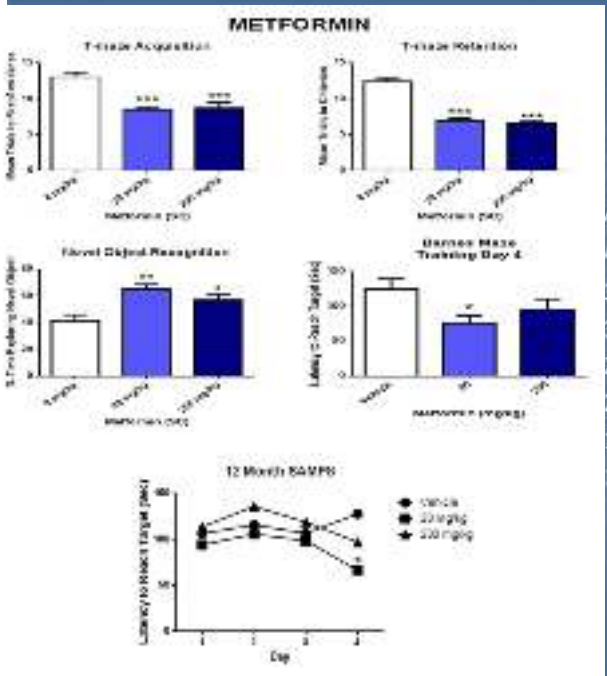
OD in Diabetics Receiving Metformin

O.51 (0.22-0.99); P<.05

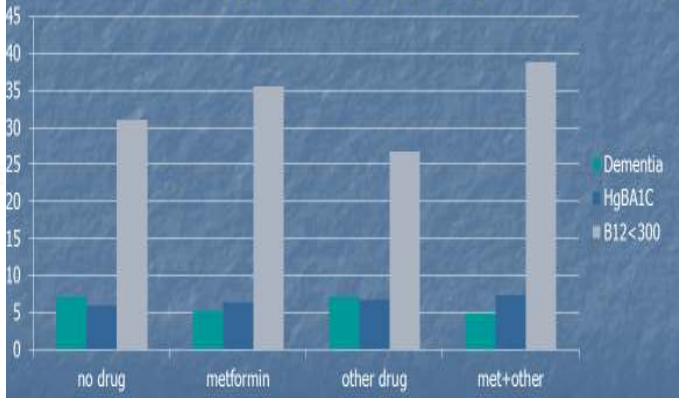
J Alzheimers Dis. 2014;41(1):61-8.

Long-term metformin usage and cognitive function among older adults with diabetes

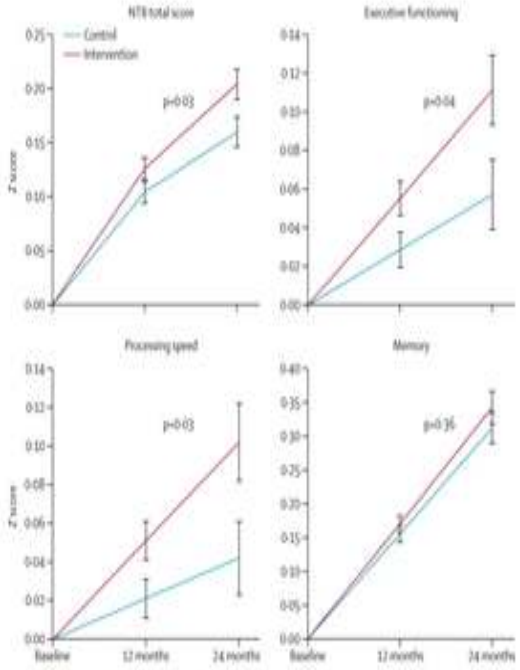
Metformin use showed a significant inverse association with cognitive impairment in longitudinal analysis (OR = 0.49, 95% CI 0.25-0.95).



Dementia in Diabetes (VA)
11 year follow up, n=61010
HR for metformin 0.82



P4 medicine in Dementia:
P2 PREVENTIVE



FINGER STUDY

Aged 60-77 years recruited from previous national surveys.

A 2 year multidomain intervention (diet, exercise, cognitive training, vascular risk monitoring), or a control group (general health advice).

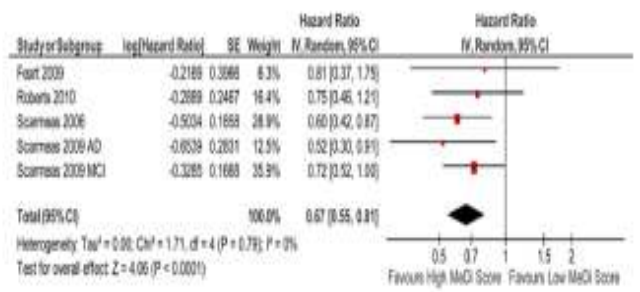
1260 to the intervention group (n=631) or control group (n=629).

A 2 year multidomain intervention of diet, exercise, cognitive training, and vascular risk monitoring versus control to prevent cognitive decline in at-risk elderly people (FINGER): a randomised controlled trial

Tia Ngandu , Jenni Lehtisalo , Alina Solomon , Esko Levälahti , Satu Ahtiluoto , Riitta Antikainen , Lars Bäckma...

Journal of Alzheimer's Disease xx (20xx) x–xx
DOI 10.3233/JAD-130830
IOS Press

Association of Mediterranean Diet with Mild Cognitive Impairment and Alzheimer's



RESEARCH PAPER

Mediterranean diet improves cognition: the PREDIMED-NAVARRA randomised trial

Elena H Martínez-Lapiscina,[1,2] Pedro Clavero,[3] Estefanía Toledo,[1,2] Ramon Estruch,[4,5] Jordi Salas-Salvadó,[4,6] Beatriz San Julián,[1] Ana Sánchez-Tainta,[1] Emilio Ros,[4,7] Cinta Valls-Pedret,[4,7] Miguel Á Martínez-González[1]

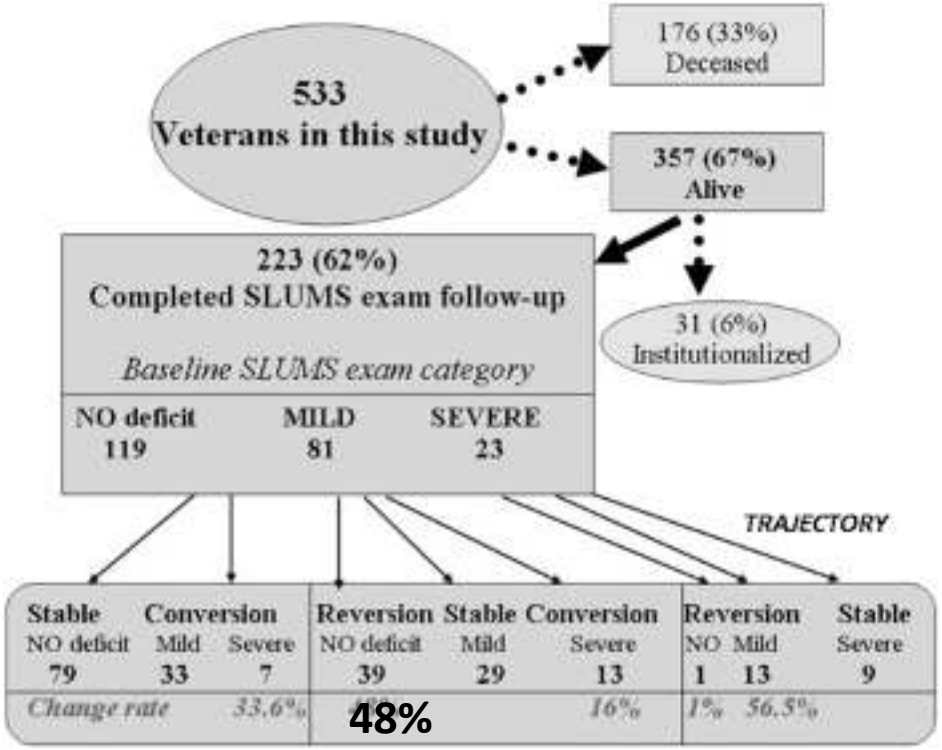
Table 4 Multivariable-adjusted means after a 6½-year follow-up and differences versus control (95% CIs) in each intervention group

	MedDiet+EVOO (n=224)		MedDiet+Nuts (n=164)		Control (low-fat diet) (n=132)
	Mean (95% CI)	p Value (vs control)	Mean (95% CI)	p Value (vs control)	Mean (95% CI)
MMSE	27.73 (27.27 to 28.19)		27.68 (27.20 to 28.16)		27.11 (26.61 to 27.61)
Adjusted diff. versus control (95% CI)	+0.62 (+0.18 to +1.05)	0.005	+0.57 (+0.11 to +1.03)	0.015	0 (reference)
CDT	5.31 (4.96–5.64)		5.19 (4.78–5.47)		
Adjusted diff. versus control (95% CI)	+0.51 (+0.20 to +0.82)	0.001	+0.33 (+0.003 to +0.67)	0.048	

P4 medicine in Dementia : P3 PERSONALIZED

- Drugs
- Emotional
- Metabolic
- Eyes and ears
- Normal Pressure Hydrocephalus
- Trauma
- Infection
- Atrial fibrillation/alcohol
- Sleep apnea

- Alzheimer disease
- Vascular Dementia
- Frontotemporal dementia
- Lewy-Body dementia
- Creutzfeld-Jaeger
- Primary Age Related TAUopathy
- Hippocampal Sclerosis
- Traumatic Brain Injury
- Diabetes related dementia
- **ETC ETC ETC ETC**



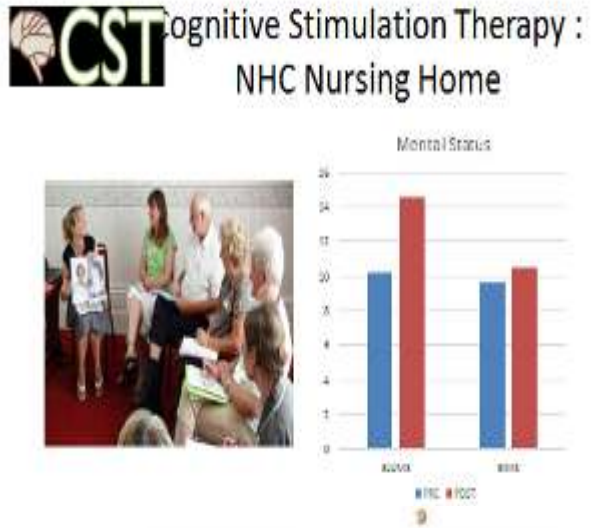
Correction of visual loss		
Stability	1 [Reference]	
Conversion	1.12 (0.27–4.71)	.877
Reversion	4.65 (1.58–13.70)	.005
Discontinuation of anticholinergic		
Stability	1 [Reference]	
Conversion	1.88 (0.69–5.13)	.218
Reversion	4.57 (1.87–11.18)	.001

Cognitive Deficit Reversal as Shown by Changes in the Veterans Affairs Saint Louis University Mental Status (SLUMS) Examination Scores 7.5 Years Later

Journal of the American Medical Directors Association, Volume 15, Issue 9, 2014, 687.e5–687.e10

P4 medicine in DEMENTIA : P4 PARTICIPATORY

- Medication Adherence
- Exercise
- Mediterranean Diet/Olive oil
- Don’t drive
- Attend with caregiver
- No guns
- Frequent toileting
- Socialisation



Is it time for geriatricians to teach about Robo Sapiens ?

Saint Louis University
Rapid Geriatric Assessment*

*There is no copyright on these screening tools and they may be incorporated into the Electronic Health Record without permission and at no cost.

SAINT LOUIS UNIVERSITY

The Simple "FRAIL" Questionnaire Screening Tool
(3 or greater = frailty; 1 or 2 = prefrail)

Fatigue: Are you fatigued?
Resistance: Cannot walk up one flight of stairs?
Aerobic: Cannot walk one block?
Illnesses: Do you have more than 5 illnesses?
Loss of weight: Have you lost more than 5% of your weight in the last 6 months?

From Morley JE, Vellas B, Abellan van Kan G, et al. J Am Med Dir Assoc 2013;14:392-397.

Table I: SARC-F Screen for Sarcopenia

Component	Question	Scoring
Strength	How much difficulty do you have in lifting and carrying 10 pounds?	None = 0 Some = 1 A lot or unable = 2
Assistance in walking	How much difficulty do you have walking across a room?	None = 0 Some = 1 A lot, use aids, or unable = 2
Rise from a chair	How much difficulty do you have transferring from a chair or bed?	None = 0 Some = 1 A lot or unable without help = 2
Climb stairs	How much difficulty do you have climbing a flight of ten stairs?	None = 0 Some = 1 A lot or unable = 2
Falls	How many times have you fallen in the last year?	None = 0 1-3 falls = 1 4 or more falls = 2

From Malmstrom TK, Morley JE. J Frailty and Aging 2013;2:55-6.

SNAQ (Simplified Nutritional Assessment Questionnaire)

My appetite is
a. very poor
b. poor
c. average
d. good
e. very good

Food tastes
a. very bad
b. bad
c. average
d. good
e. very good

When I eat
a. I feel full after eating only a few mouthfuls
b. I feel full after eating about a third of a meal
c. I feel full after eating over half a meal
d. I feel full after eating most of the meal
e. I hardly ever feel full

Normally I eat
a. less than one meal a day
b. one meal a day
c. two meals a day
d. three meals a day
e. more than three meals a day

Rapid Cognitive Screen (RCS)

1. **Please remember these five objects. I will ask you what they are later.** [Read each object to patient using approx. 1 second intervals.]
   Apple Pen Tie House Car
2. [Give patient pencil and the blank sheet with clock face.] **This is a clock face. Please put in the hour markers and the time at ten minutes to eleven o'clock.** [2 pts/hr markers ok; 2 pts/time correct]
3. **What were the five objects I asked you to remember?** [1 pt/ea]
4. **I'm going to tell you a story. Please listen carefully because afterwards, I'm going to ask you about it.**

Jill was a very successful stockbroker. She made a lot of money on the stock market. She then met Jack, a devastatingly handsome man. She married him and had three children. They lived in Chicago. She then stopped work and stayed at home to bring up her children. When they were teenagers, she went back to work. She and Jack lived happily ever after.

What state did she live in? [1 pt]

From Malmstrom TK, Voss VB, Cruz-Oliver DM et al. J Nutr Health Aging 2015;19:741-744.

Miscellaneous

Are you constipated? Y/N
Do you have worrisome incontinence? Y/N
Do you have an advanced directive? Y/N

MISSOURI GATEWAY GWEP
Trained : 12,943
Screened : 6,037
Social Media: 104,368/ TV: 338703

Taiwan

China

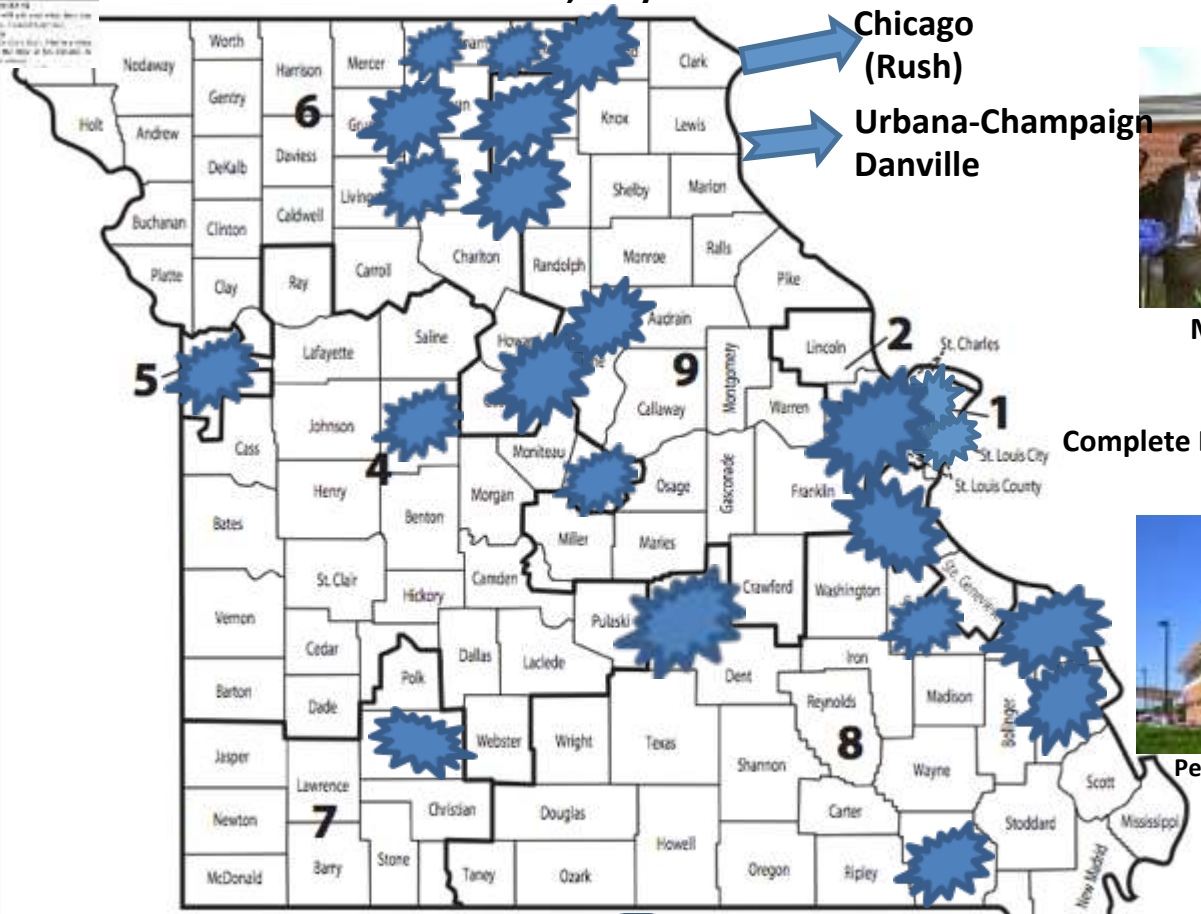
Hong Kong

Singapore

New Zealand

Brazil

France



Chicago (Rush)

Urbana-Champaign
Danville

Myrtle Hilliard Davis

Complete Demonstration Programs

Perry County Memorial Hospital

CST

Cardinals Reminiscence League

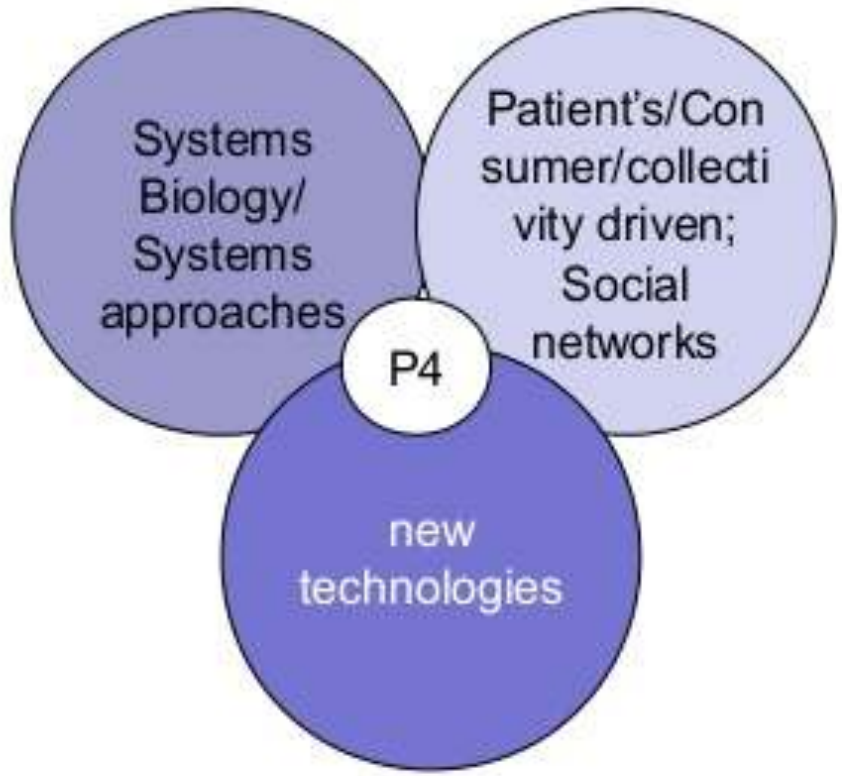
San Diego Alzheimer's

National Training Phoenix AMDA

Shelby County Nashville

The 4 Ps of P4 Medicine

- Predictive
- Preventive
- Personalized
- Participatory



Education

@meddocslu

By Twitter

- Sulfonylureas and Insulin increase mortality in diabetics; metformin doesn't
- Diabetics with autonomic neuropathy are at increased risk for sudden death. Need an implantable loop recorder?
- Sleep apnea causes hypertension, hyperglycemia and cognitive dysfunction