Congresso Nazionale
Società Italiana di Gerontologia e Geriatria
Milano, 21-24 Novembre 2012

ASSESSMENT DELLA MALNUTRIZIONE E BILANCIO ENERGETICO NEL SOGGETTO ANZIANO

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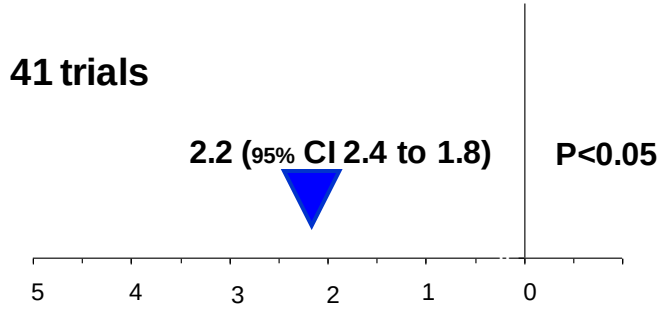
Protein and energy supplementation in elderly people at risk from malnutrition

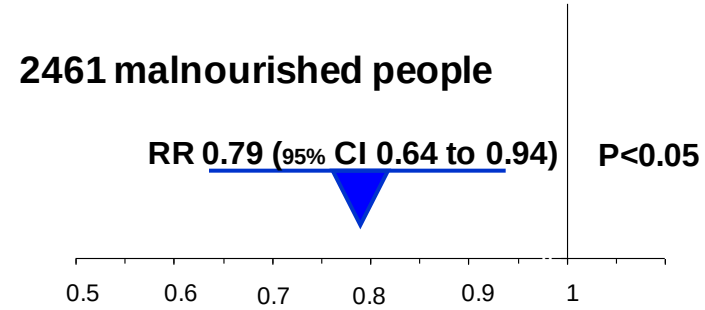
Cochrane Database Syst Rev 2009

% WEIGHT CHANGE

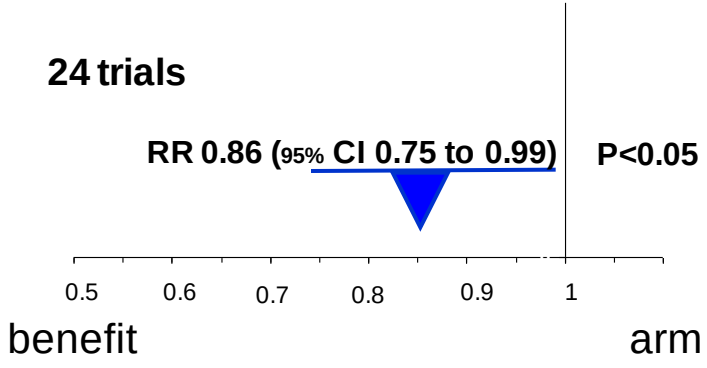


62 trials
10,187 participants
commercial “sip-feeds”
intervention < 18 months

MORTALITY



COMPLICATIONS



PROPOSTA DI "SCREENING" NUTRIZIONALE INIZIALE

Tipo di diagnosi

Valutazione delle condizioni (tipo, gravità, durata) associate a rischio di malnutrizione

Valutazione dell'introito di alimenti e/o di perdite di nutrienti

Rischio con apporto alimentare insufficiente, attuale o prevedibile, per un periodo :

≥ 5 gg in pazienti già malnutriti

≥ 10 gg in pazienti normonutriti

≥ 7 gg in pazienti con ipercatabolismo moderato (azoturia 11-15 g/die) o severo (azoturia >15 g/die)

oppure con:

Vomito / diarrea quotidiani > 5-7 gg

Valutazione del calo ponderale

Rischio grave con perdita non intenzionale ≥ 5% in 1 mese o ≥ 10% in 3-6 mesi

Esami di laboratorio

Rischio con:

Albuminemia < 3,5 mg/dl

Numero linfociti < 1500/mm^3

Giudizio clinico

Basato sull'anamnesi e sull'esame obiettivo (cachessia, edemi,

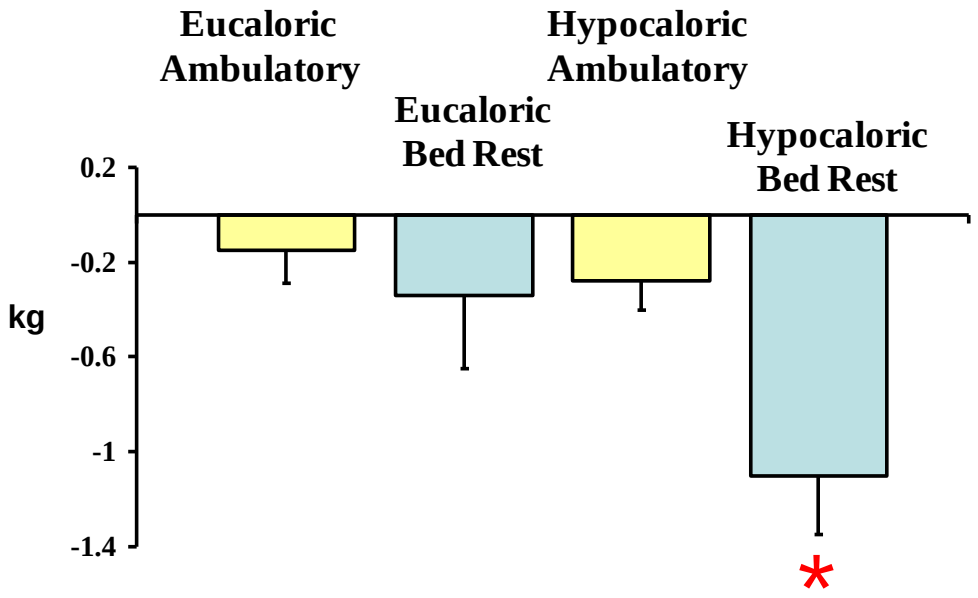
INACTIVITY ± INFLAMMATION ± ANOREXIA

Calorie restriction accelerates the catabolism of lean body mass during 2 wk of bed rest[1–3]

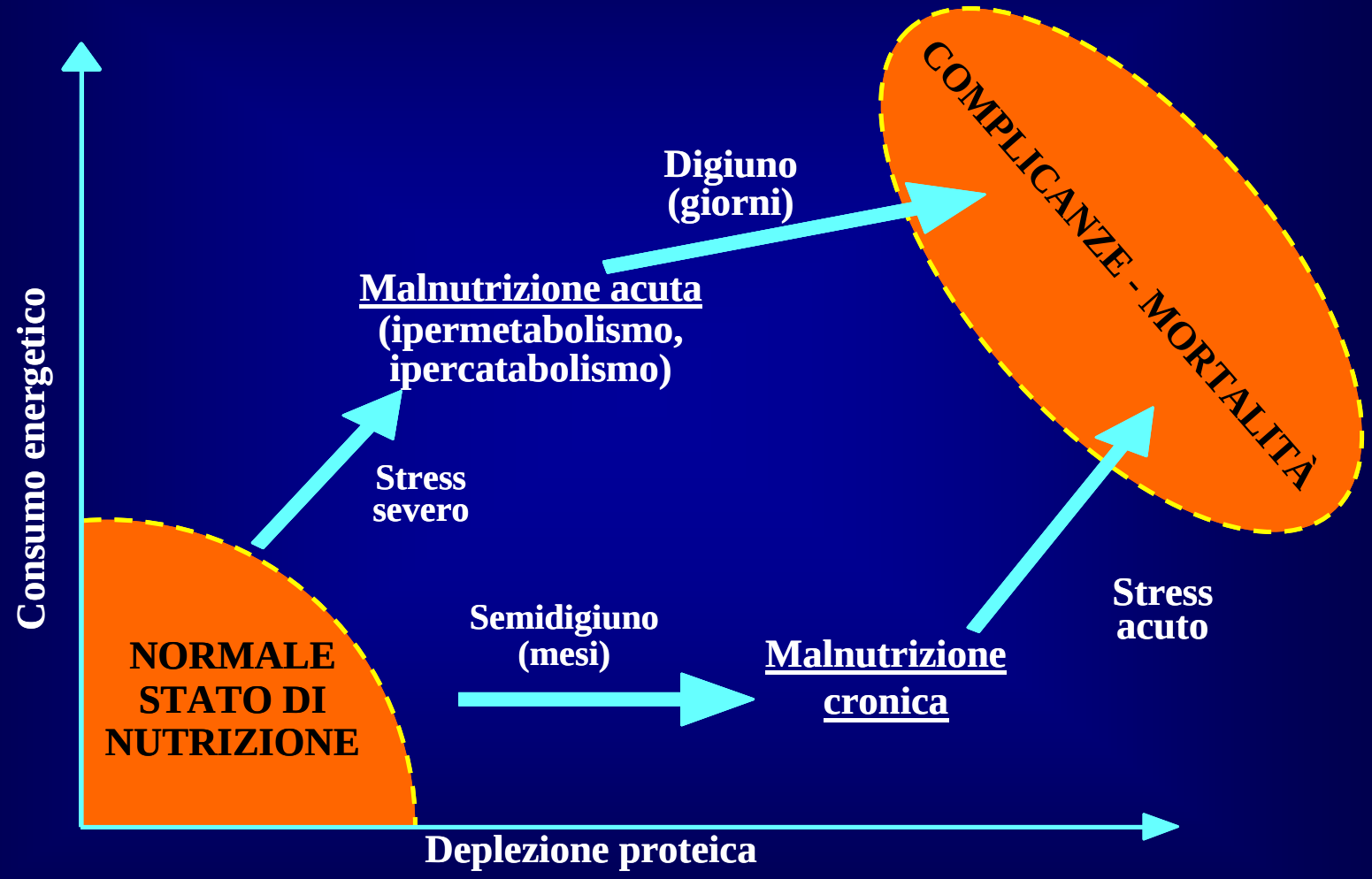
Gianni Biolo, Beniamino Ciocchi, Manuela Stulle, Alessandra Bosutti, Rocco Barazzoni, Michela Zanetti, Raffaella Antonione, Marion Lebenstedt, Petra Platen, Martina Heer, and Gianfranco Guarnieri

Am J Clin Nutr 2007;86:366–72.

CHANGES IN LEAN MASS (DEXA)



SOVRAPPOSIZIONE DI MALNUTRIZIONE ACUTA O CRONICA E STRESS METABOLICO E LORO SIGNIFICATO PROGNOSTICO



Modificata, da Pettigrew RA, Clin Gastroenterol, 1988

INACTIVITY ± INFLAMMATION ± ANOREXIA

PRE-CACHEXIA

Chronic disease + ↑CRP + anorexia + weight loss ≤5%

CACHEXIA

Chronic disease + ↑CRP + anorexia + weight loss >5kg (or BMI <20 kg/m^2) + at least three of the following: dynapenia, fatigue, anorexia, ↓FFM index, abnormal biochemestry (↑CRP, anemia, ↓albumin)

INACTIVITY ± INFLAMMATION - ANOREXIA

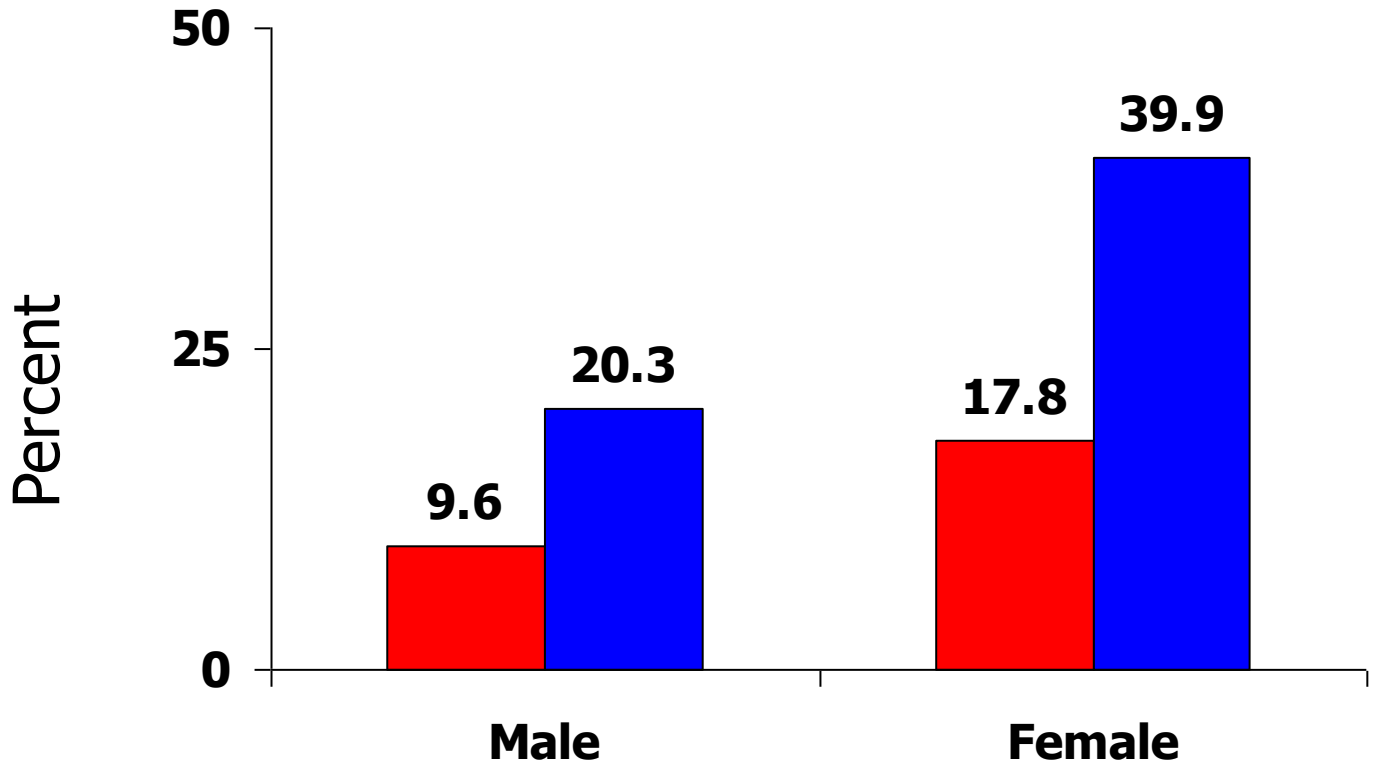
NUTRITIONAL ASSESSMENT

- **Body weight**
- **Body mass index (kg/m^2)**

- **Lean body mass (DEXA)**
- **Fat-free mass (bio-impedance; anthropometry)**
- **Fat-free mass index (kg/m^2)**

Prevalence of nutritional depletion in a large out-patient population of patients with COPD

Vermeeren et al., Respir Med 2006



Malnutrition was defined as:

- **body mass index ≤21 kg/m²**
- **fat-free mass index ≤15 (females) or ≤16 (males) kg/m²**

INACTIVITY ± INFLAMMATION ± ANOREXIA

MUSCLE DEPLETION

FFM index <16 kg/m^2 for men and <15 kg/m^2 for women

CONTRACTILE IMPAIRMENT

Dynapenia
Fatigue
Disability and falls
Impaired ventilation
Osteoporosis
Bone fractures

METABOLIC IMPAIRMENT

Anabolic resistance
Insulin resistance
Dyslipidemia
↓ glutamine
↓ myokines
Impaired immunity

Prevalence and clinical implications of sarcopenic obesity in patients with solid tumours of the respiratory and gastrointestinal tracts: a population-based study

Carla M M Prado, Jessica R Lieffers, Linda J McCargar, Tony Reiman, Michael B Sawyer, Lisa Martin, Vickie E Baracos

Lancet Oncol 2008; 9: 629–35

2115 cancer patients

↓

15% obesity

↓

15% sarcopenic obesity

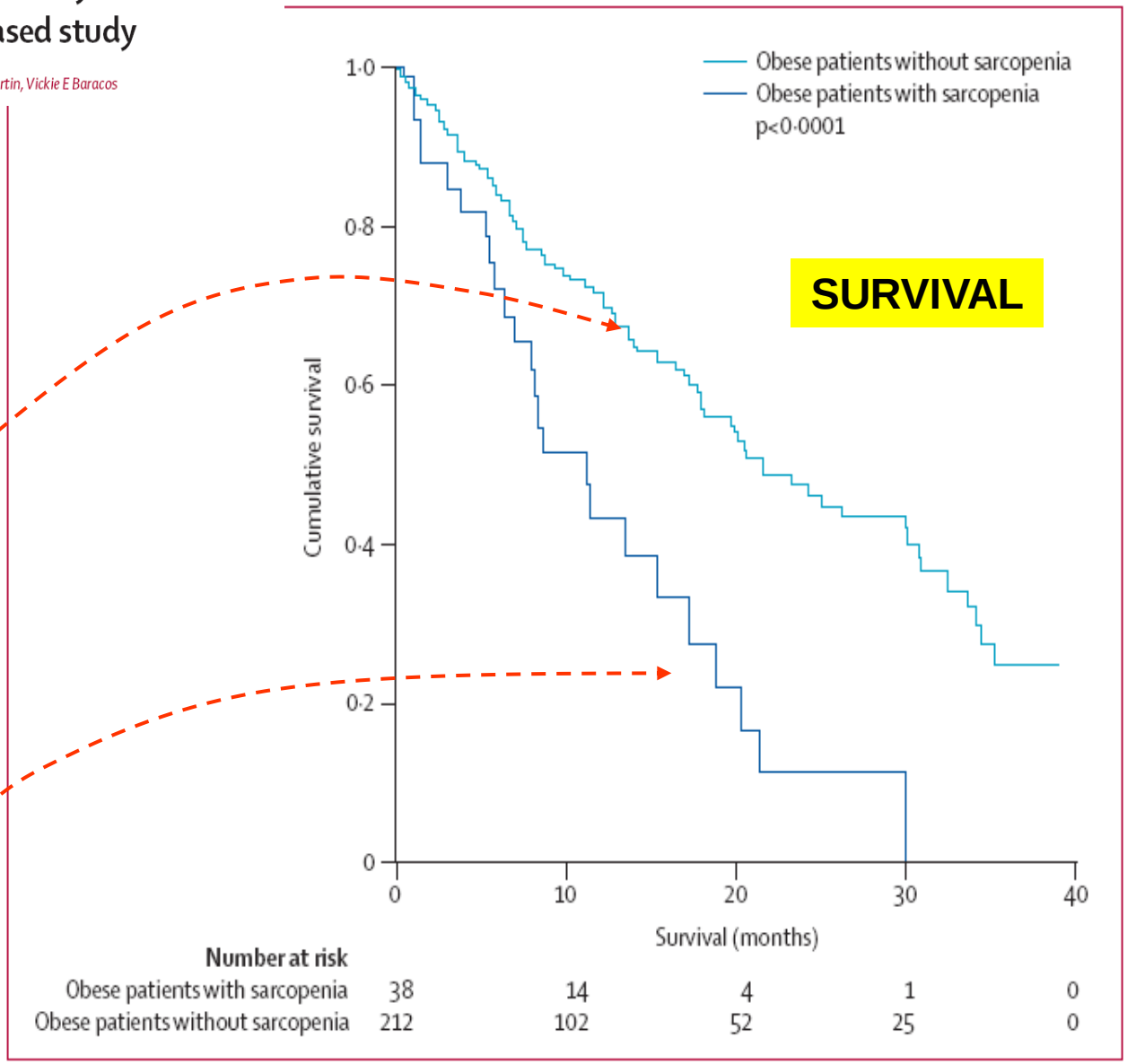


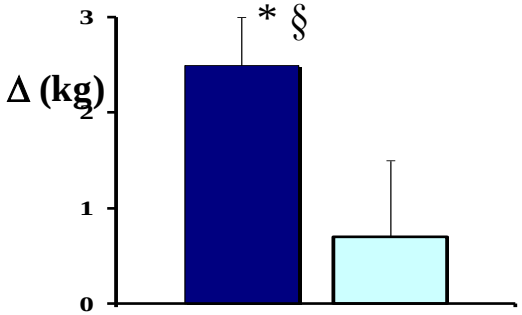
Figure 3: Survival of obese patients who had sarcopenia and obese patients who did not have sarcopenia

Positive energy balance is associated with accelerated muscle atrophy and increased erythrocyte glutathione turnover during 5 wk of bed rest[1–3]

Gianni Biolo, Francesco Agostini, Bostjan Simunic, Mariella Sturma, Lucio Torelli, Jean Charles Preiser, Ginette Deby-Dupont, Paolo Magni, Felice Strollo, Pietro di Prampero, Gianfranco Guarnieri, Igor B Mekjavic, Rado Pišot, and Marco V Narici

Am J Clin Nutr 2008;88:950–8.

Changes in fat mass (bioimpedence)



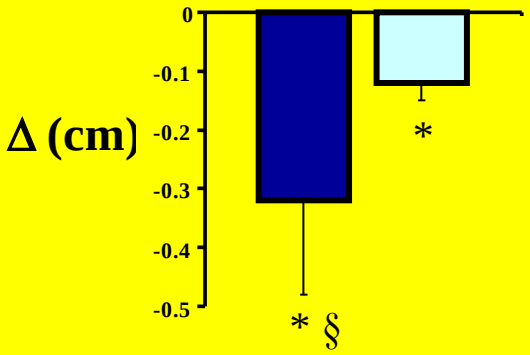
Positive Energy Balance

Near-neutral Energy Balance

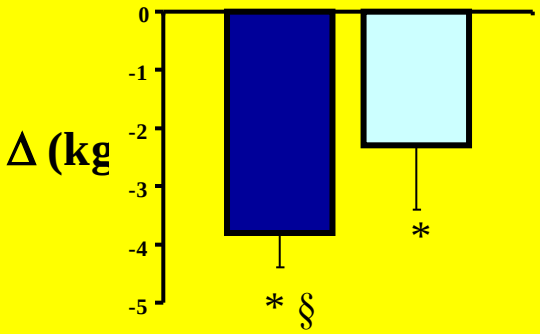
***, p<0.05 significant different from zero;**
§, p<0.05 versus near-neutral energy balan

EFFECTS OF POSITIVE ENERGY BALANCE ON BED REST-MEDIATED MUSCLE ATROPHY

Changes in vastus lateralis thickness (ultrasounds)



Changes in fat-free mass (bioimpedence)



Positive energy balance is associated with accelerated muscle atrophy and increased erythrocyte glutathione turnover during 5 wk of bed rest[1–3]

Am J Clin Nutr 2008;88:950–8.

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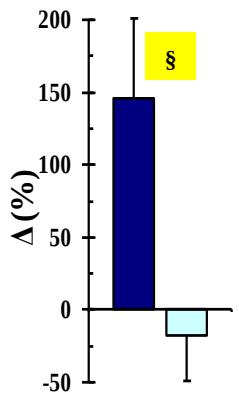
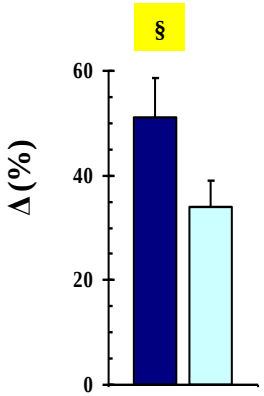
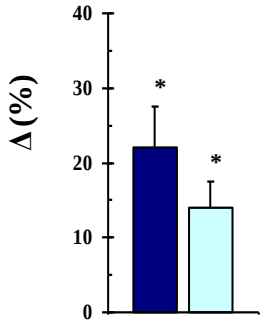
CRP



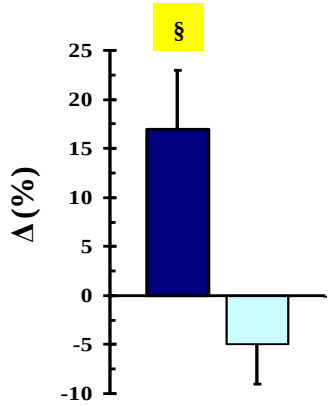
LEPTIN



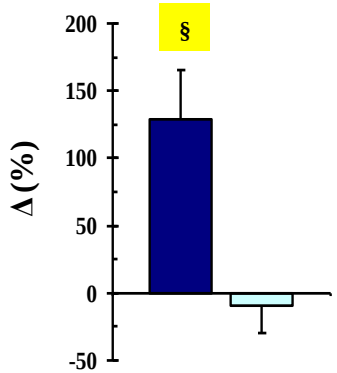
GHRELIN



PLASMA MYELOPEROXIDASE



ERYTHOCYTE GLUTATHIONE SYNTHESIS RATE



***, p<0.05 significant different from zero;**
§, p<0.05 versus lower energy balance

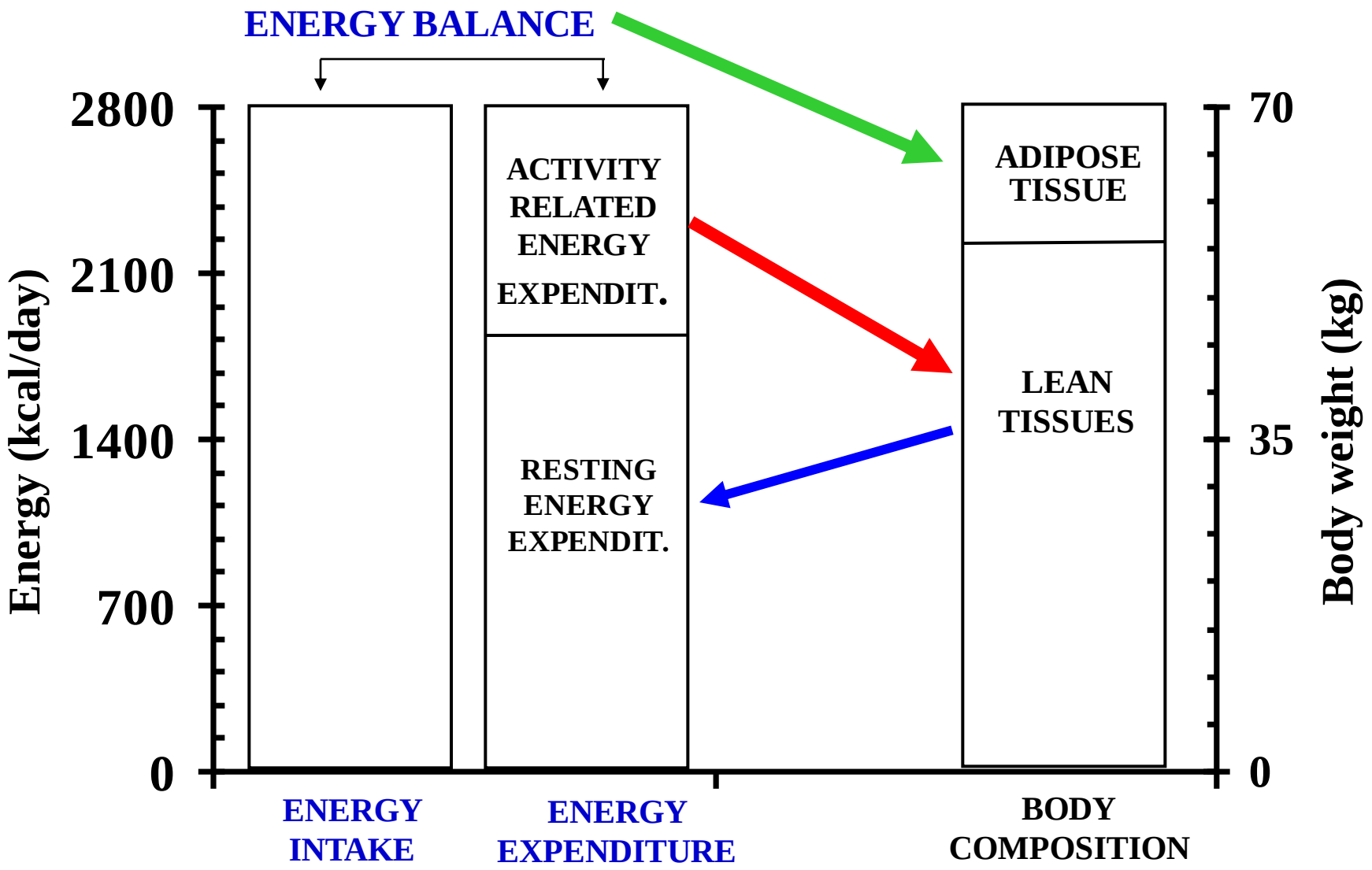
CROSS-TALK BETWEEN FAT AND MUSCLE DURING INACTIVITY AND AGING

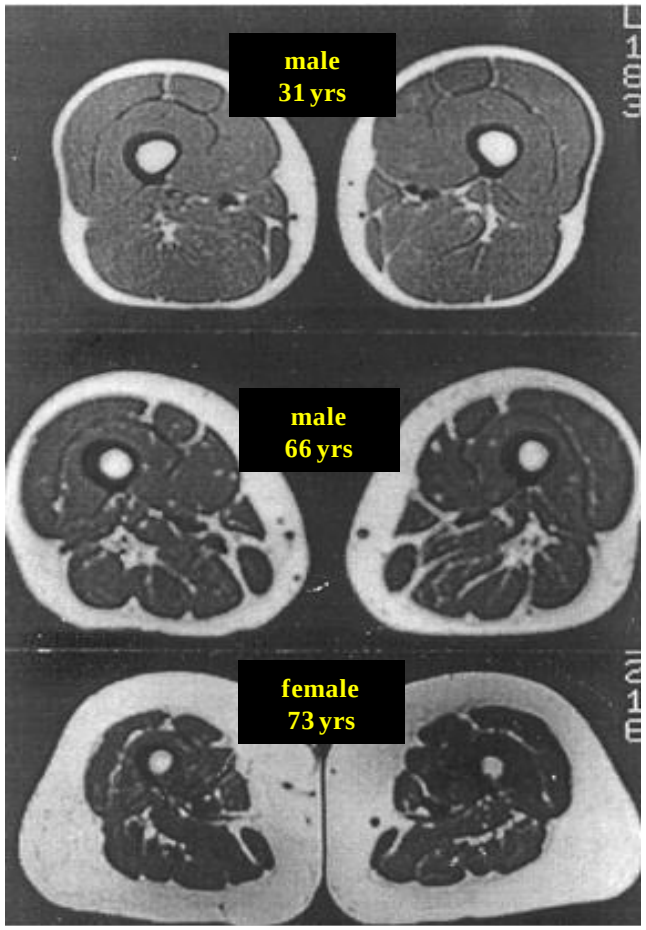
POSITIVE ENERGY BALANCE

MUSCLE ATROPHY

INFLAMMATION REDOX UNBALANCE

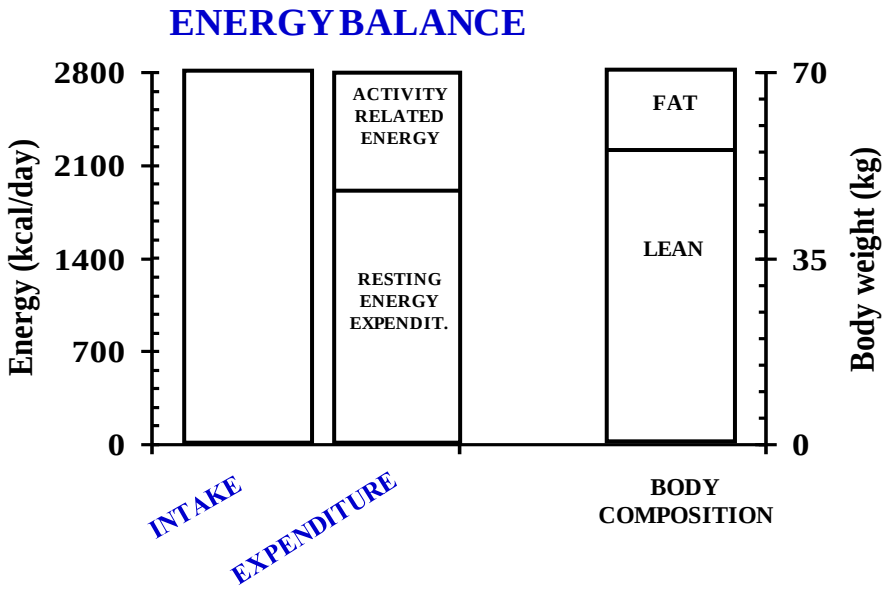
ENERGY METABOLISM AND BODY COMPOSITION

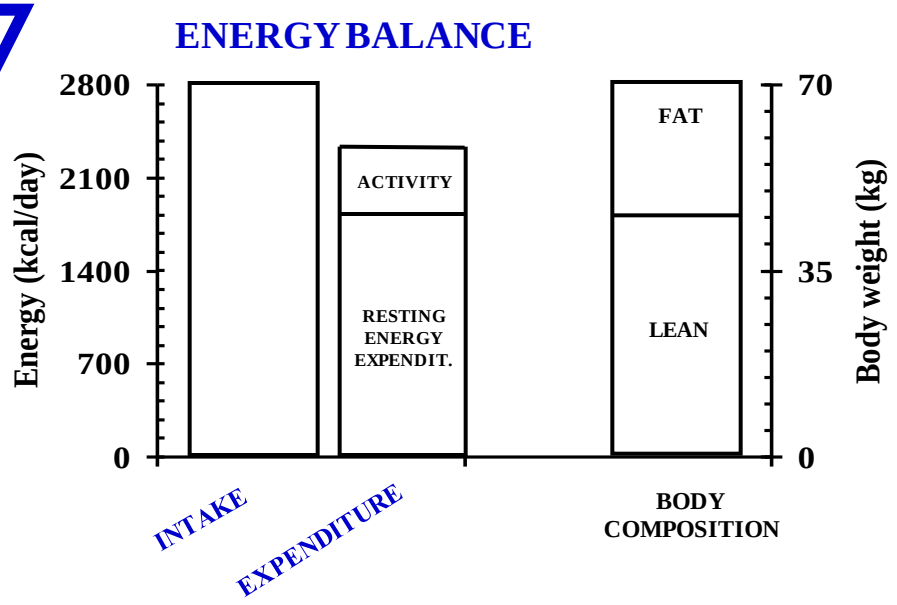




AGEING

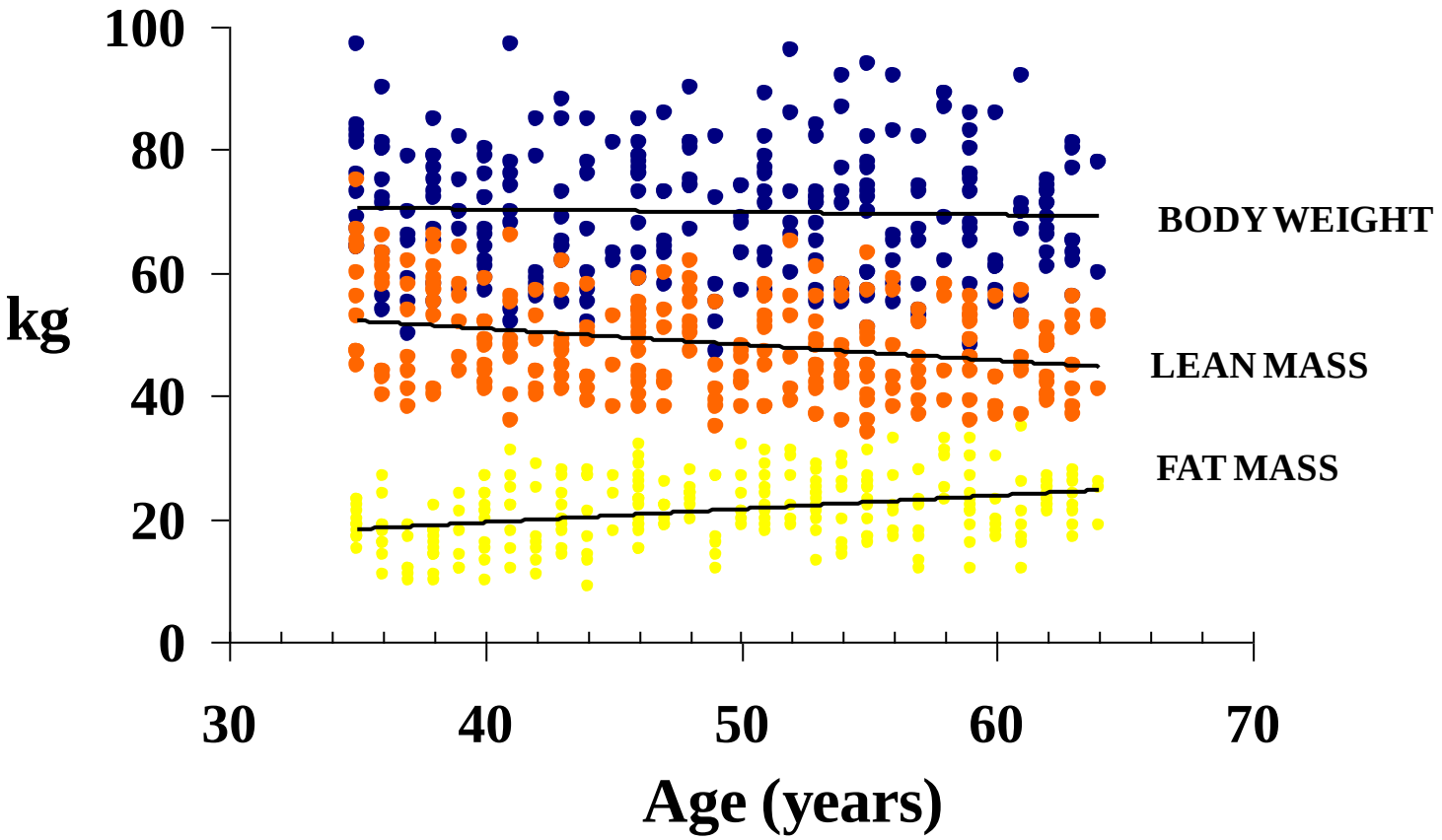
MUSCLE DEPLETION
&
INCREASED FAT MASS



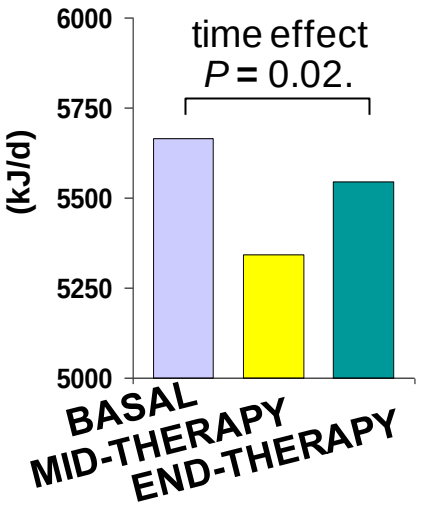


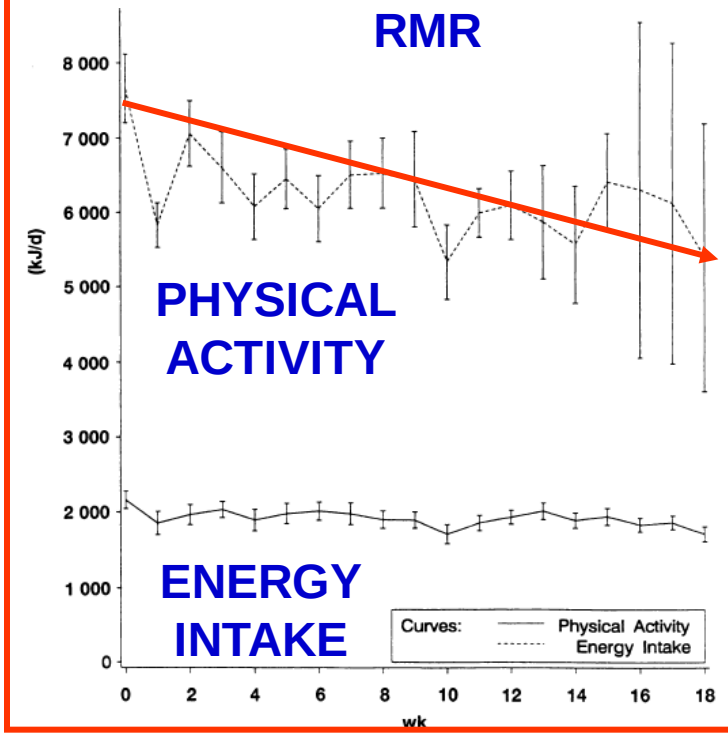
CROSS-SECTIONAL STUDY
252 healthy subjects with normal body mass index, 35 to 65 years

BODY WEIGHT AND COMPOSITION



Reduced rates of metabolism and decreased physical activity in breast cancer patients receiving adjuvant chemotherapy[1–3] *Am J Clin Nutr* 1997;65:1495–501

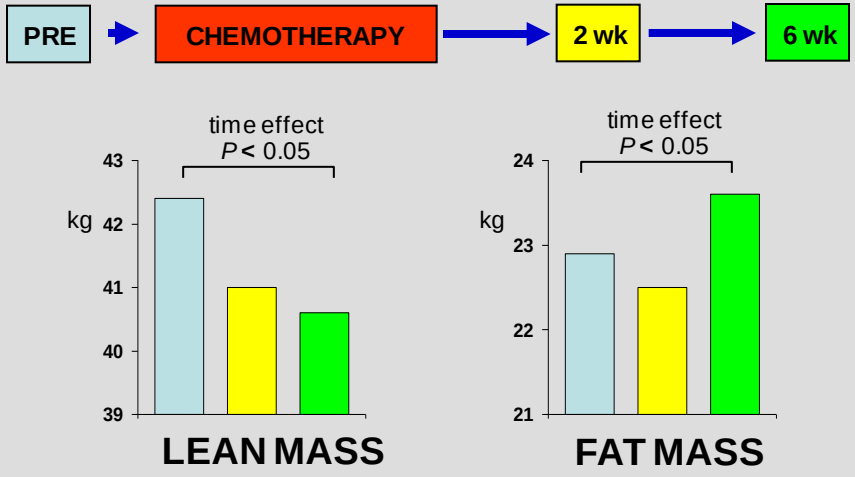




REDUCED ENERGY REQUIREMENT IN CANCER PATIENTS

Weight and Body Composition Changes during and after Adjuvant Chemotherapy in Women with Breast Cancer

J Clin Endocrinol Metab 2004



ENERGY EXPENDITURE ≈ **ENERGY REQUIREMENT**

- **Indirect calorimetry (O_2 consumption)**
- **Equations**

  based on
  - **Body weight**
  - **Body composition (proportional to lean mass)**
  - **Correction factors for physical activity**
  - **Correction factors for degree of systemic inflammation activation**

Clinical Nutrition (2006) **25**, 330–360

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http://intl.elsevierhealth.com/journals/clnu

ESPEN GUIDELINES

ESPEN Guidelines on Enteral Nutrition: Geriatrics ☆

The majority of sick elderly patients require at least 1 g protein/kg/day and around 30 kcal/kg/day of energy, depending on their activity.

Clinical Nutrition 28 (2009) 461–466

Contents lists available at ScienceDirect

Clinical Nutrition

journal homepage: http://www.elsevier.com/locate/clnu

ESPEN Guidelines on Parenteral Nutrition: Geriatrics

In designing the programme, it should be remembered that the majority of sick elderly patients require at least 1.0–1.2 g protein/kg per day and 20–30 kcal/kg per day of non-protein energy,[4,5] depending on the severity of the disease, the degree of current inflammation/catabolism, the physical activity level and the need and time course of rehabilitation.

4. Wolfe RR, Miller SL, Miller KB. Optimal protein intake in the elderly. *Clin Nutr* 2008;**27**:675–84.
5. Alix E, Berrut G, Boré M, Bouthier-Quintard F, Buia JM, Chlala A, et al. Energy requirements in hospitalized elderly people. *JAGS* 2007;**55**:1085–9.

Aging is associated with diminished accretion of muscle proteins after the ingestion of a small bolus of essential amino acids[1–3]

Christos S Katsanos, Hisamine Kobayashi, Melinda Sheffield-Moore, Asle Aarsland, and Robert R Wolfe

Am J Clin Nutr 2005;82:1065–73.

ANABOLIC RESISTANCE OF AGEING

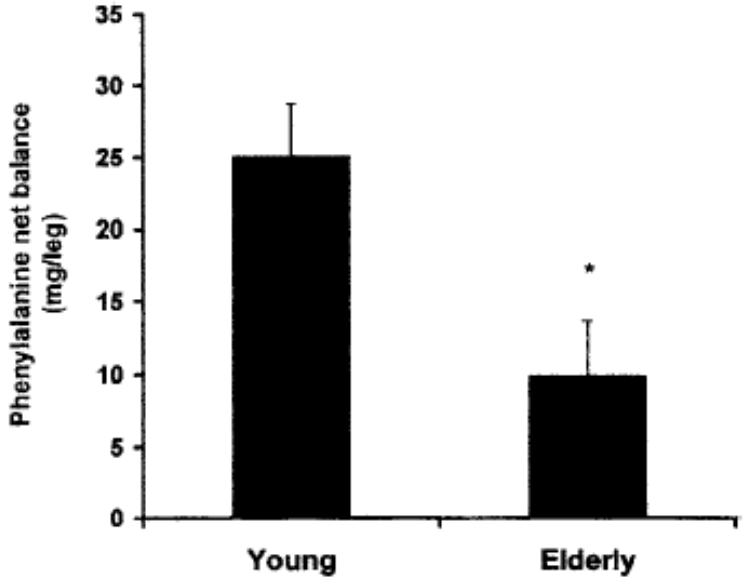


FIGURE 5. Mean (±SEM) leg phenylalanine net balance 3.5 h after the ingestion of essential amino acids calculated by measuring the area under the phenylalanine net balance response curve (in the calculations, basal net balance was taken as zero) in the elderly ($n = 11$) and the young ($n = 8$). Data were analyzed with a t test. *Significantly different from the young, $P = 0.010$.

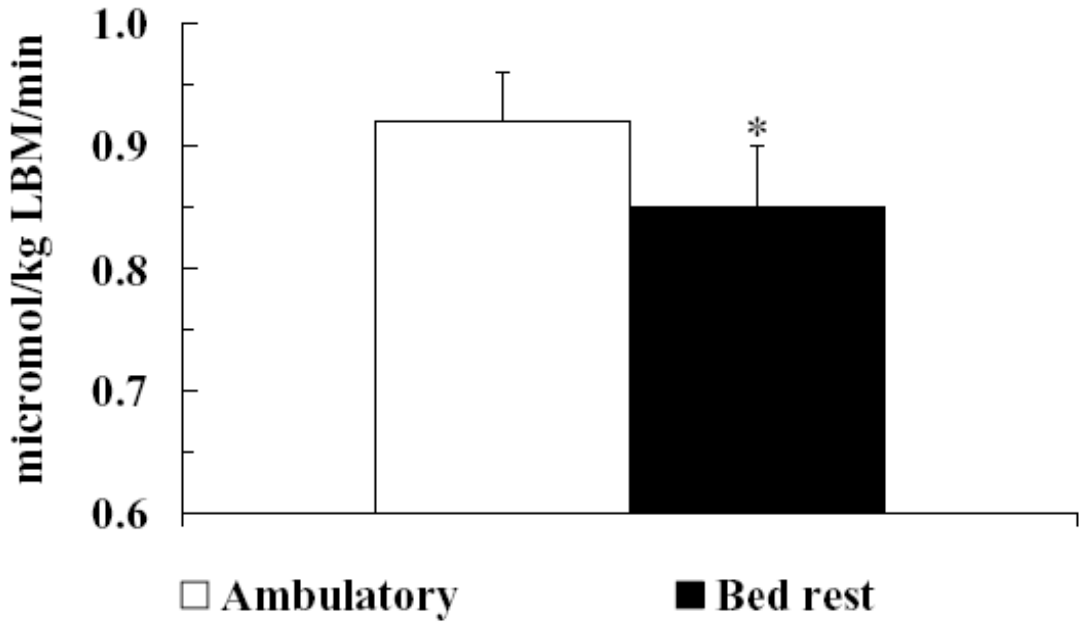
J Physiol 558.2 (2004) pp 381–388

RAPID REPORT

Short-term bed rest impairs amino acid-induced protein anabolism in humans

Gianni Biolo[1], Beniamino Ciocchi[1], Marion Lebenstedt[2], Rocco Barazzoni[1], Michela Zanetti[1], Petra Platen[2], Martina Heer[3] and Gianfranco Guarnieri[1]

[1]*Department of Clinical, Technological and Morphological Sciences, Division of Internal Medicine, University of Trieste, Italy*
[2]*Institute of Cardiology and Sports Medicine, German Sport University, Cologne, Germany*
[3]*DLR-Institute of Aerospace Medicine, Cologne, Germany*



ANABOLIC RESISTANCE → **INCREASED PROTEIN REQUIREMENT**

- **INACTIVITY**
- **AGEING**
- **ACUTE AND CHRONIC DISEASE STATES WITH ACTIVATION OF SYSTEMIC INFLAMMATION**

Clinical Nutrition (2006) **25**, 330–360

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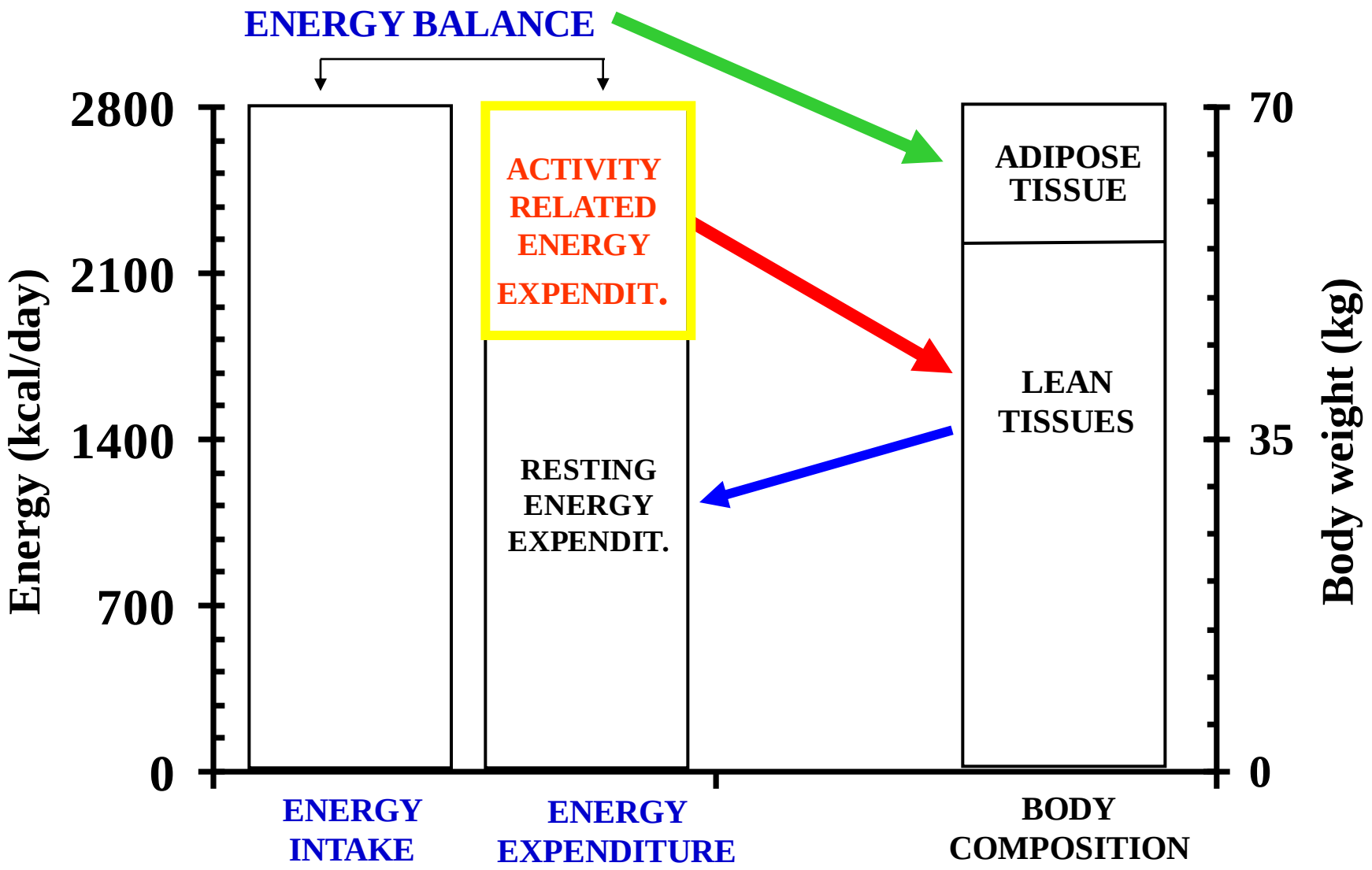
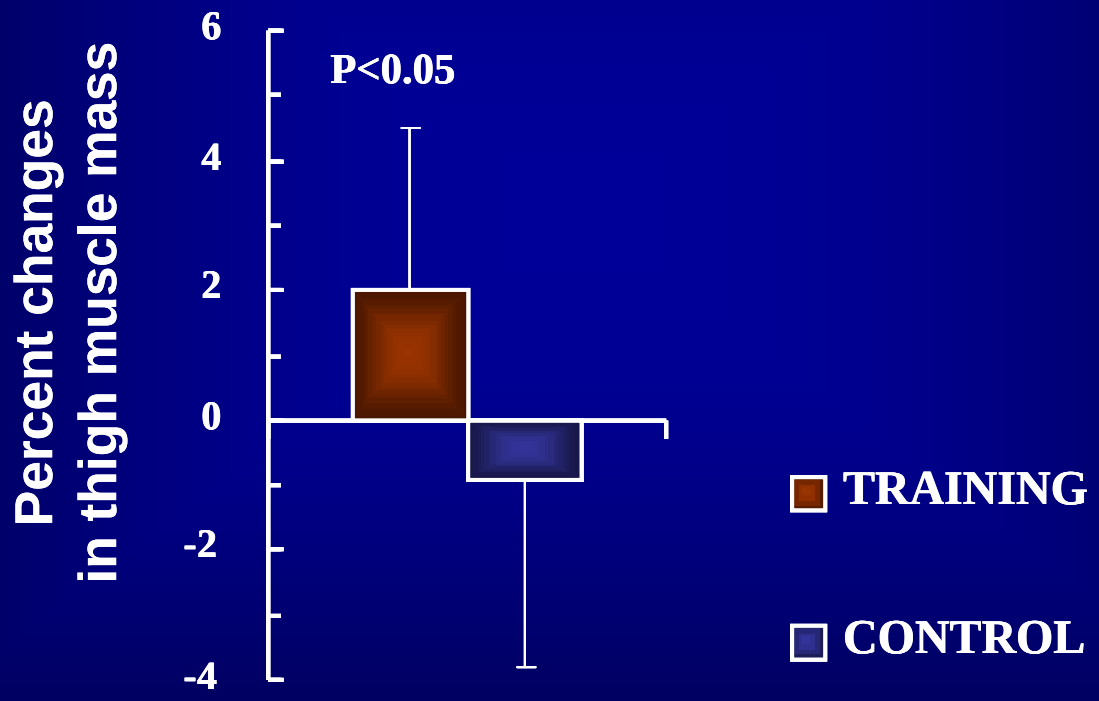
ENERGY METABOLISM AND BODY COMPOSITION



Exercise Training for Physical Frailty in Very Elderly People

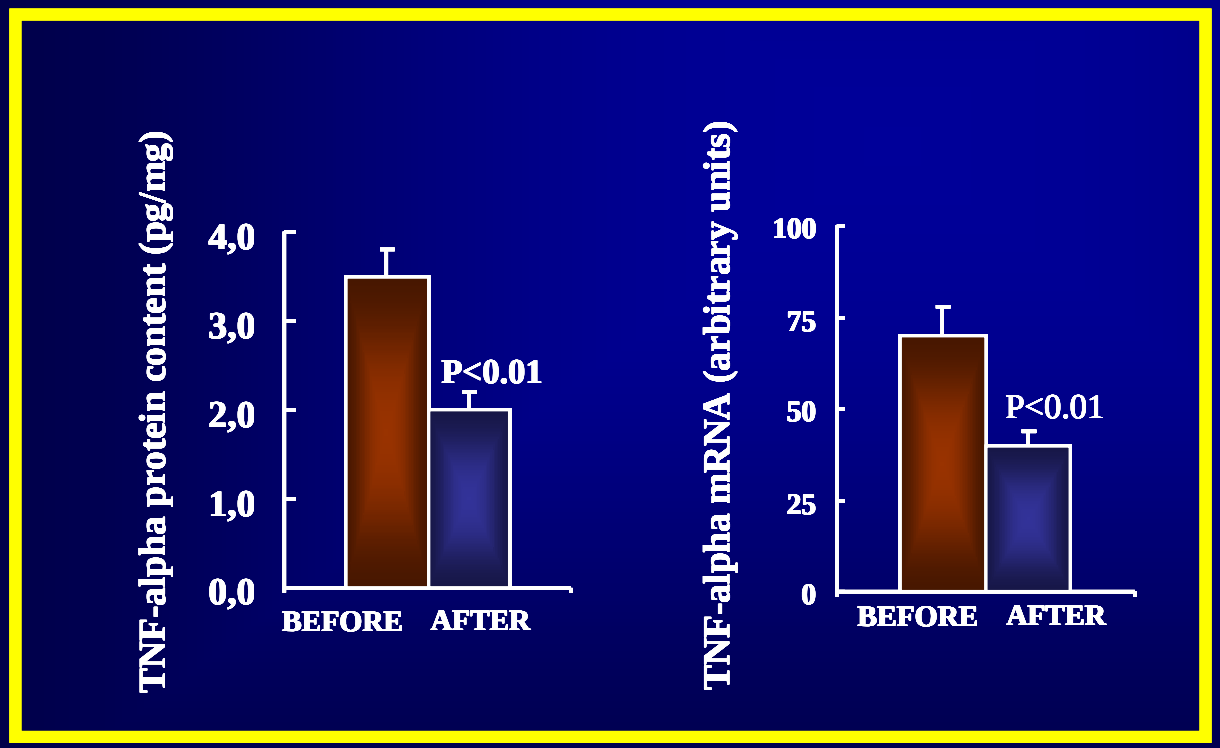
Fiatarone et al., New Engl J Med 1994

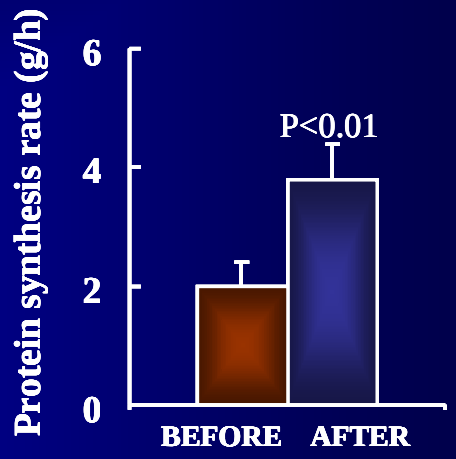
Randomized, placebo -controlled trial. 100 frail nursing home residents. Progressive resistance exercise training over a 10 -week period.



RESISTANCE EXERCISE TRAINING DECREASES SKELETAL MUSCLE TNF-alpha IN FRAIL ELDERLY HUMANS

Greiwe et al., The FASEB Journal 2001





AMERICAN JOURNAL OF
Respiratory and
Critical Care Medicine® 2007

Regular Physical Activity Modifies Smoking-related Lung Function Decline and Reduces Risk of Chronic Obstructive Pulmonary Disease

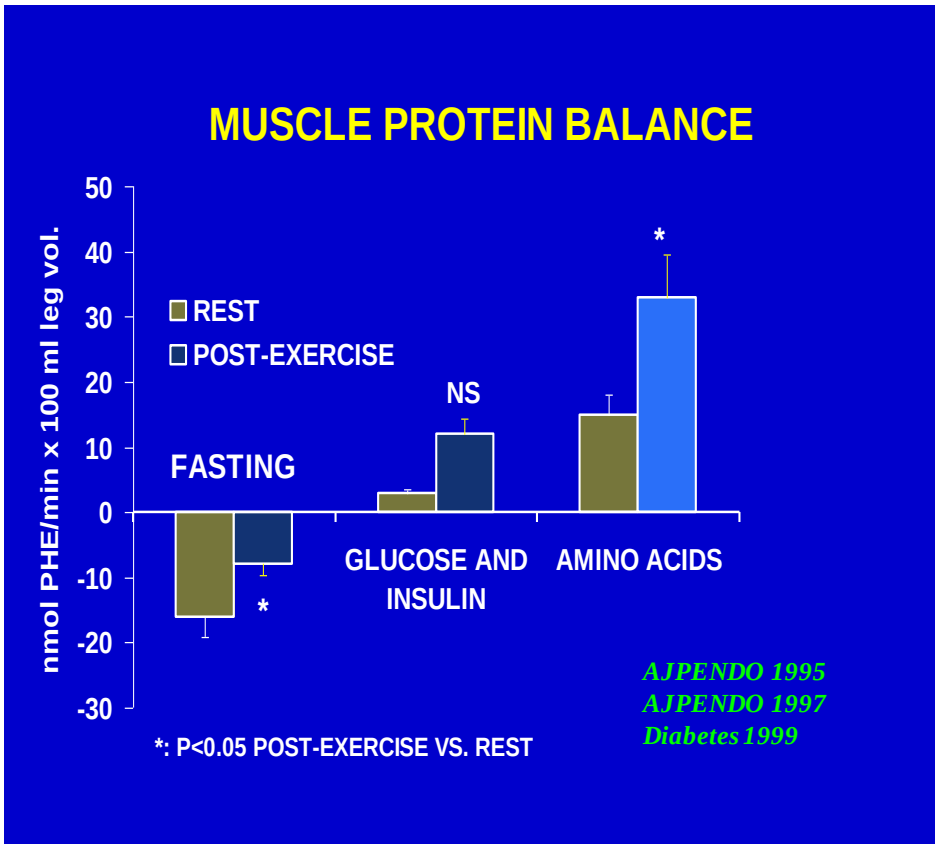
A Population-based Cohort Study

	Active Smokers (n = 3,654)[§]	
	Coefficient (95% CI)	P Value
Physical activity		
Low (reference)	−20.3	
Moderate	2.6 (−1.0 to 6.2)	0.159
High	4.8 (1.3 to 8.3)	0.008
P for linear trend		0.006

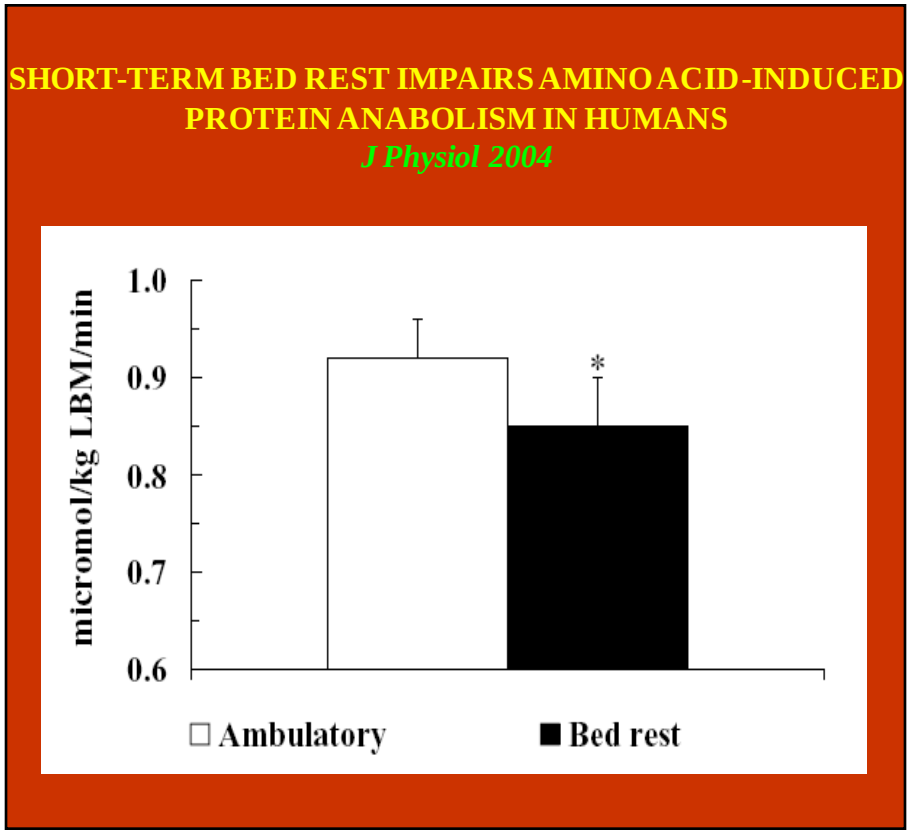
AVERAGE ANNUAL CHANGE IN FEV1 (ML/YR) IN THE LOW PHYSICAL ACTIVITY GROUP, AND ADDITIONAL RELATIVE CHANGE† (95% CI) IN THE MODERATE AND HIGH PHYSICAL ACTIVITY GROUPS (LINEAR REGRESSION MODEL)

ANABOLIC SENSITIVITY AND RESISTANCE IN EXERCISE AND BED REST

EXERCISE



BED REST



Protein-containing nutrient supplementation following strength training enhances the effect on muscle mass, strength, and bone formation in postmenopausal women

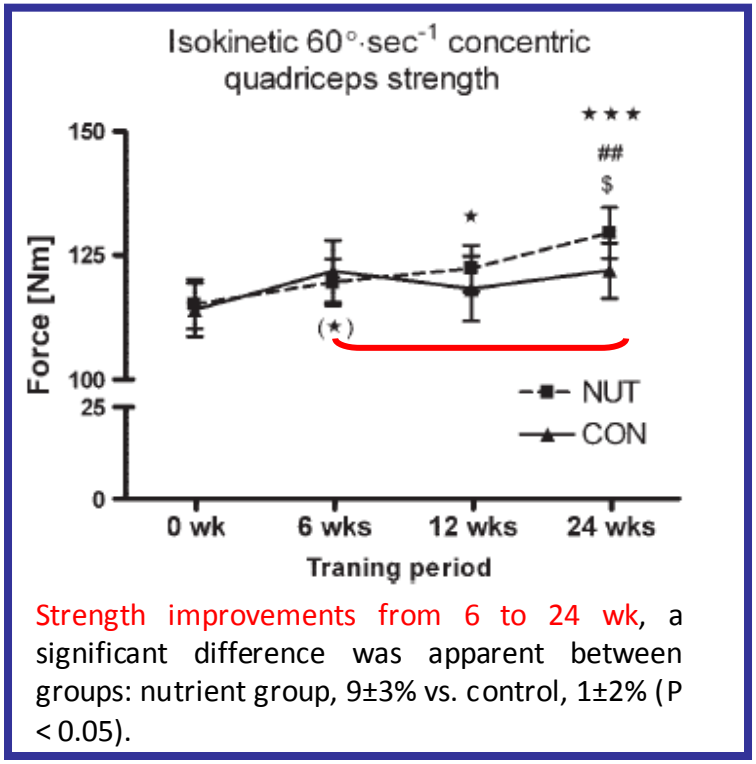
J Appl Physiol 105: 274–281, 2008.

Table 4. *Bone mineral density*

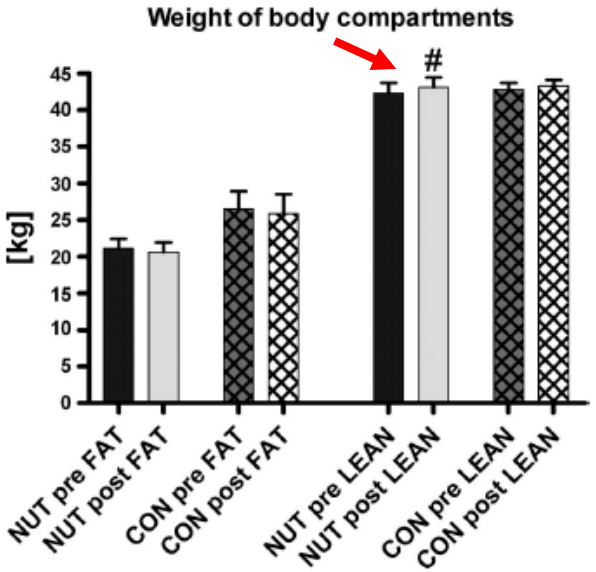
	Control Group	Nutrient Group
Total BMD, g/mm^3		
0 wk	1.117±0.022	1.113±0.027
24 wk	1.122±0.023	1.116±0.027
Femoral neck BMD, g/mm^3		
0 wk	0.943±0.028	0.953±0.051
24 wk	0.930±0.024	0.978±0.043
L2–L4 BMD, g/mm^3		
0 wk	1.043±0.032	1.084±0.053
24 wk	1.068±0.038*	1.108±0.049*

Values are means ± SE of bone mineral density (BMD) at whole body, femoral neck, and lumbar spine (L2–L4). *P < 0.05 compared with 0 wk.

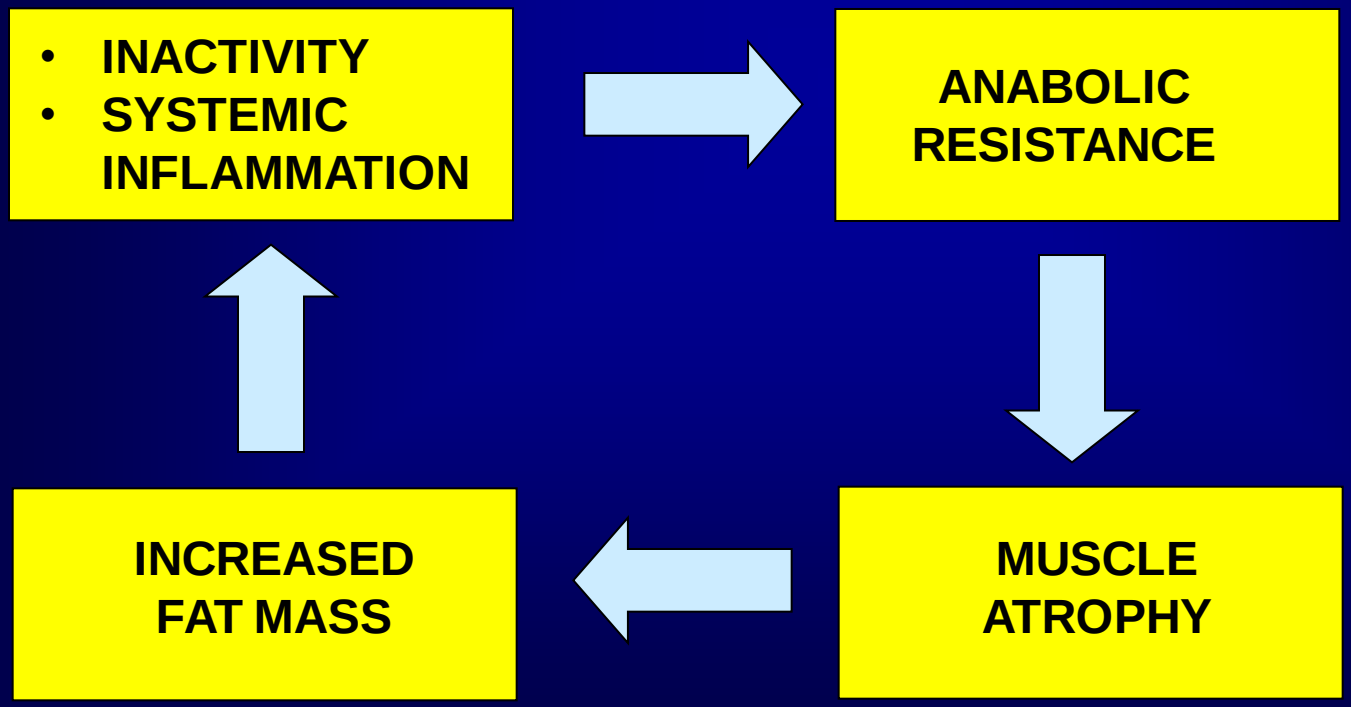
Adjusting for covariates (age at inclusion, BMI at inclusion, and BMD of the femoral neck at inclusion) a significant (P < 0.05) difference was seen in the response to training between the two groups.

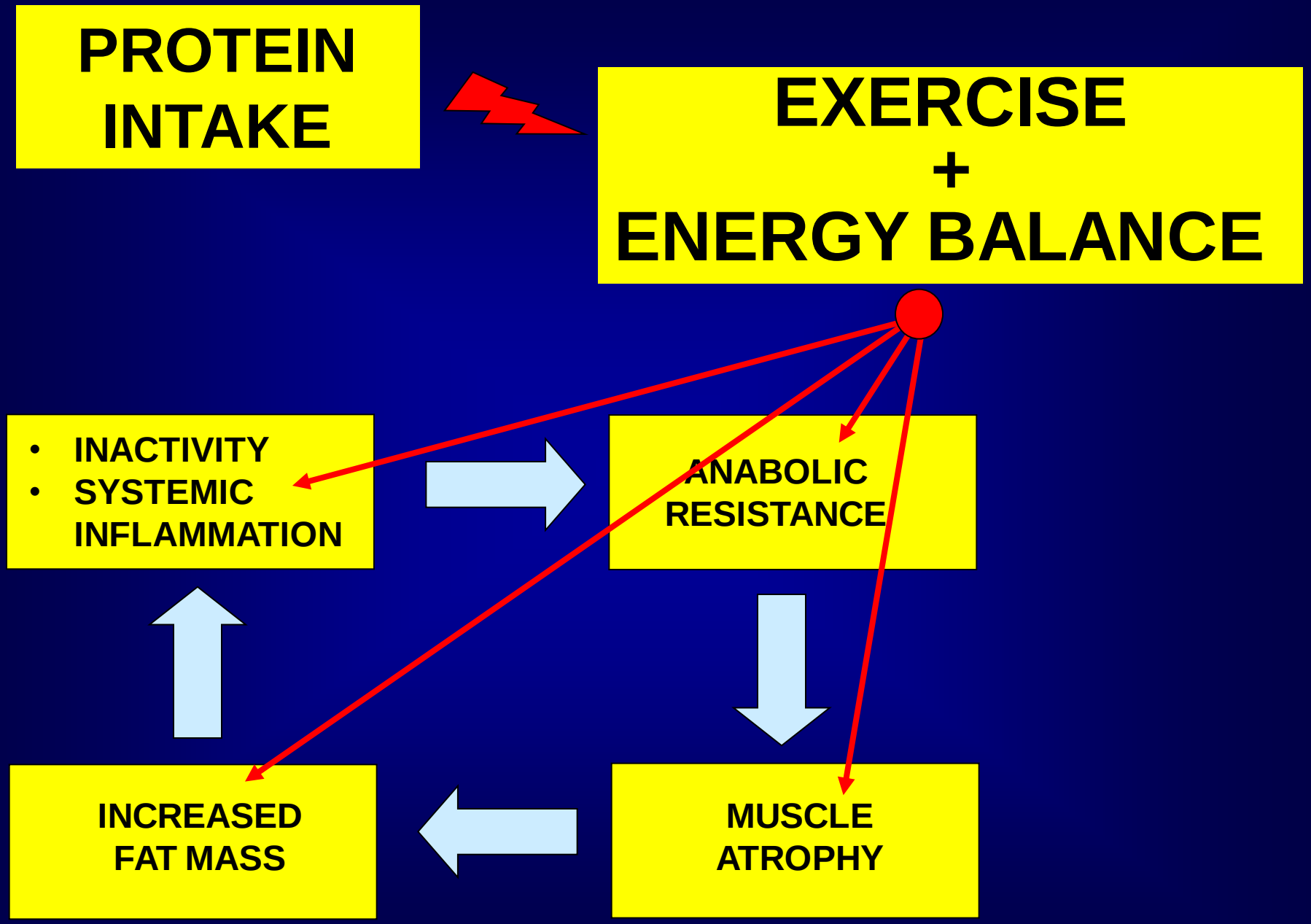


Strength improvements from 6 to 24 wk, a significant difference was apparent between groups: nutrient group, 9±3% vs. control, 1±2% (P < 0.05).



METABOLIC VICIOUS CYCLE IN AGEING AND CHRONIC DISEASES




PROTEIN INTAKE
EXERCISE + ENERGY BALANCE
• INACTIVITY
• SYSTEMIC INFLAMMATION
ANABOLIC RESISTANCE
INCREASED FAT MASS
MUSCLE ATROPHY