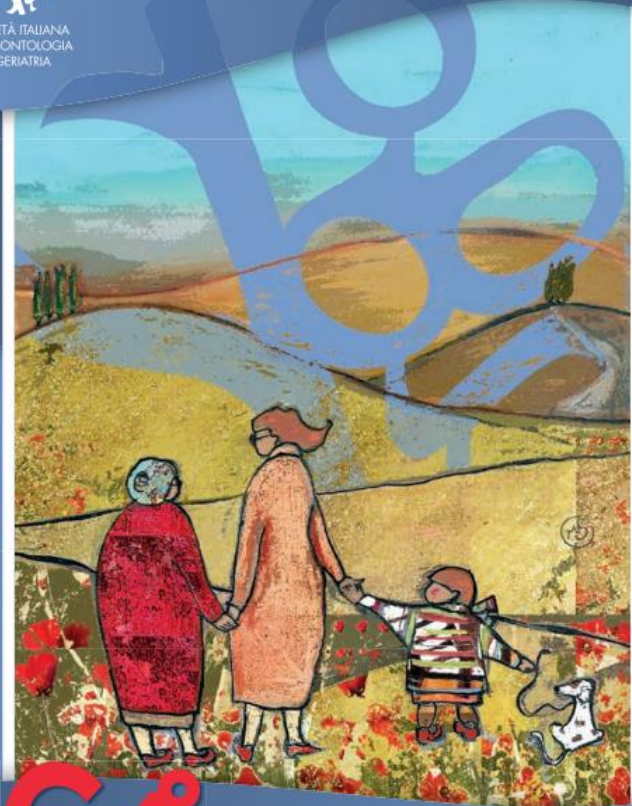




SOCIETÀ ITALIANA
DI GERONTOLOGIA
E GERIATRIA

PROGRAMMA DEFINITIVO



64

CONGRESSO
NAZIONALE SIGG

Continuità di affetti, continuità di cure

ROMA, 27/30 NOVEMBRE 2019 - AUDITORIUM DELLA TECNICA



UNIVERSITÀ
CATTOLICA
del Sacro Cuore

INFIAMMAZIONE E MALNUTRIZIONE NELL'ANZIANO

Francesco Landi, MD, PhD

Catholic University,

Geriatric Center, Gemelli Hospital

Rome, Italy

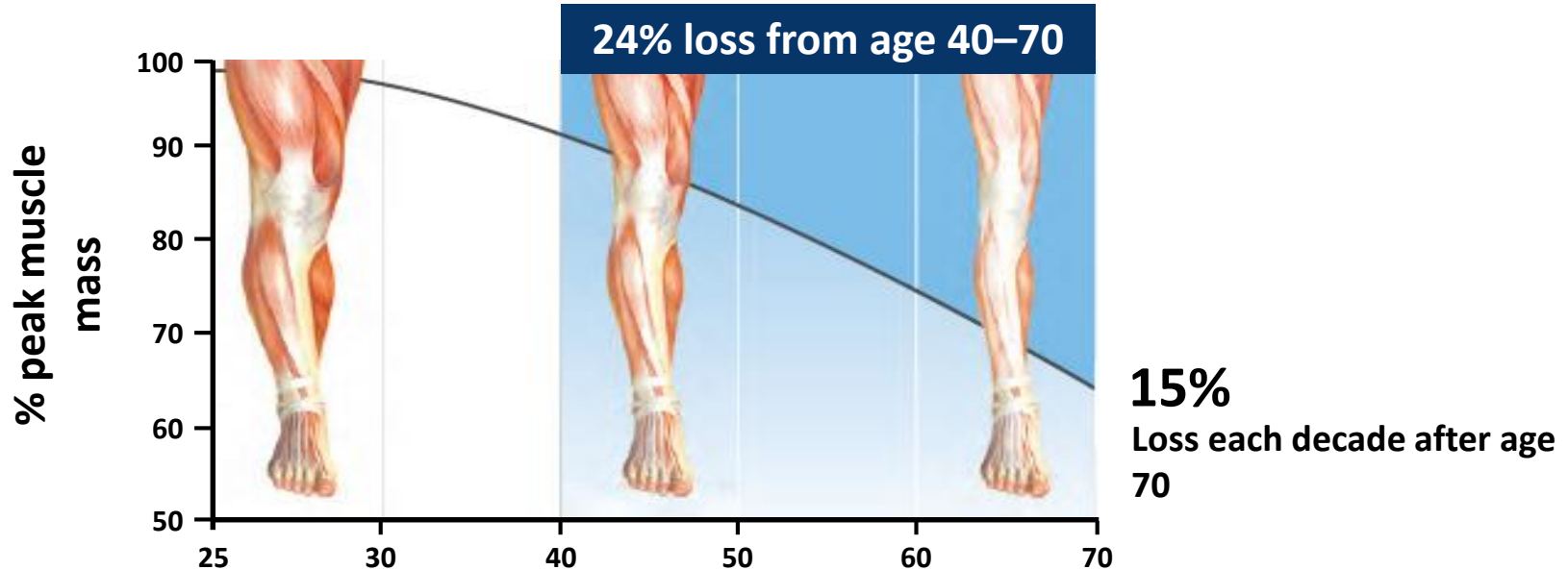


UNIVERSITÀ
CATTOLICA
del Sacro Cuore

Body composition modification

Loss of muscle mass and strength, a natural part of aging

- After age 40, healthy adults can lose 8% of muscle every 10 years¹⁻⁴
- Between 40 to 70 years old, healthy adults lose an average of 24% of muscle¹⁻⁴



JAMDA 18 (2017) 88.e17–88.e24



JAMDA

journal homepage: www.jamda.com



Original Study

Age-Related Variations of Muscle Mass, Strength, and Physical Performance in Community-Dwellers: Results From the Milan EXPO Survey



Francesco Landi MD, PhD*, Riccardo Calvani PhD, Matteo Tosato MD, PhD, Anna Maria Martone MD, Domenico Fusco MD, PhD, MD, Alex Sisto BA, Elena Ortolani MD, Giulia Saveria BS, Sara Salini MD, Emanuele Marzetti MD, PhD

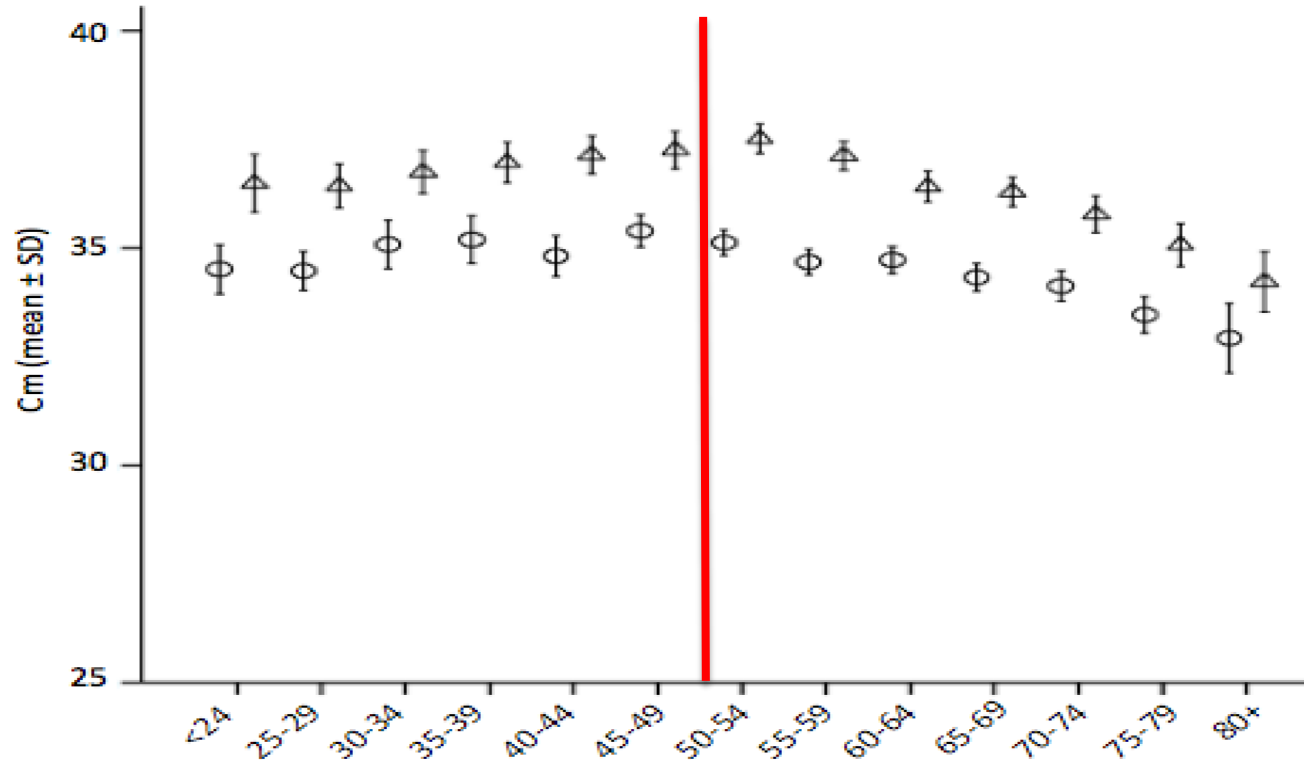
Department of Geriatrics, Neurosciences, and Orthopedics, Catholic University of the Sacred Heart, Rome, Italy

Aging and muscle

Loss of muscle mass and strength, a natural part of aging



UNIVERSITÀ
CATTOLICA
del Sacro Cuore

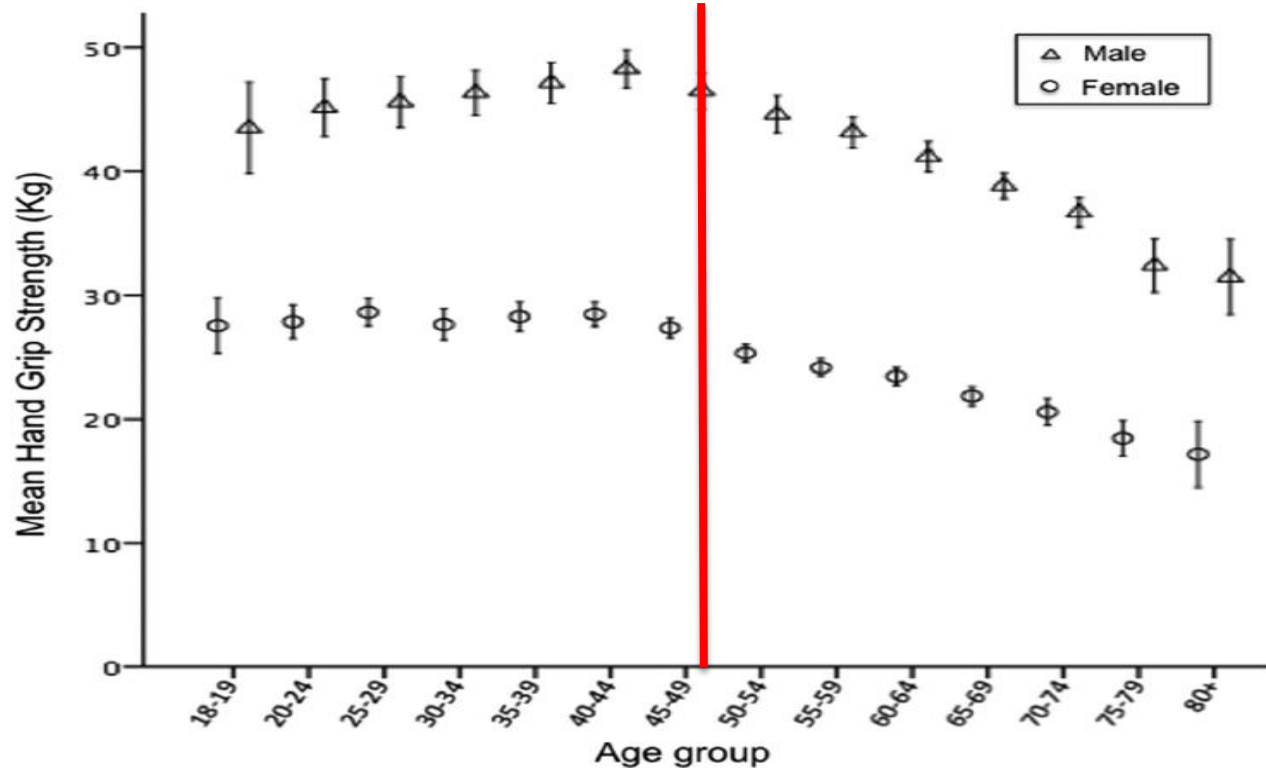


Aging and muscle

Loss of muscle mass and strength, a natural part of aging



UNIVERSITÀ
CATTOLICA
del Sacro Cuore

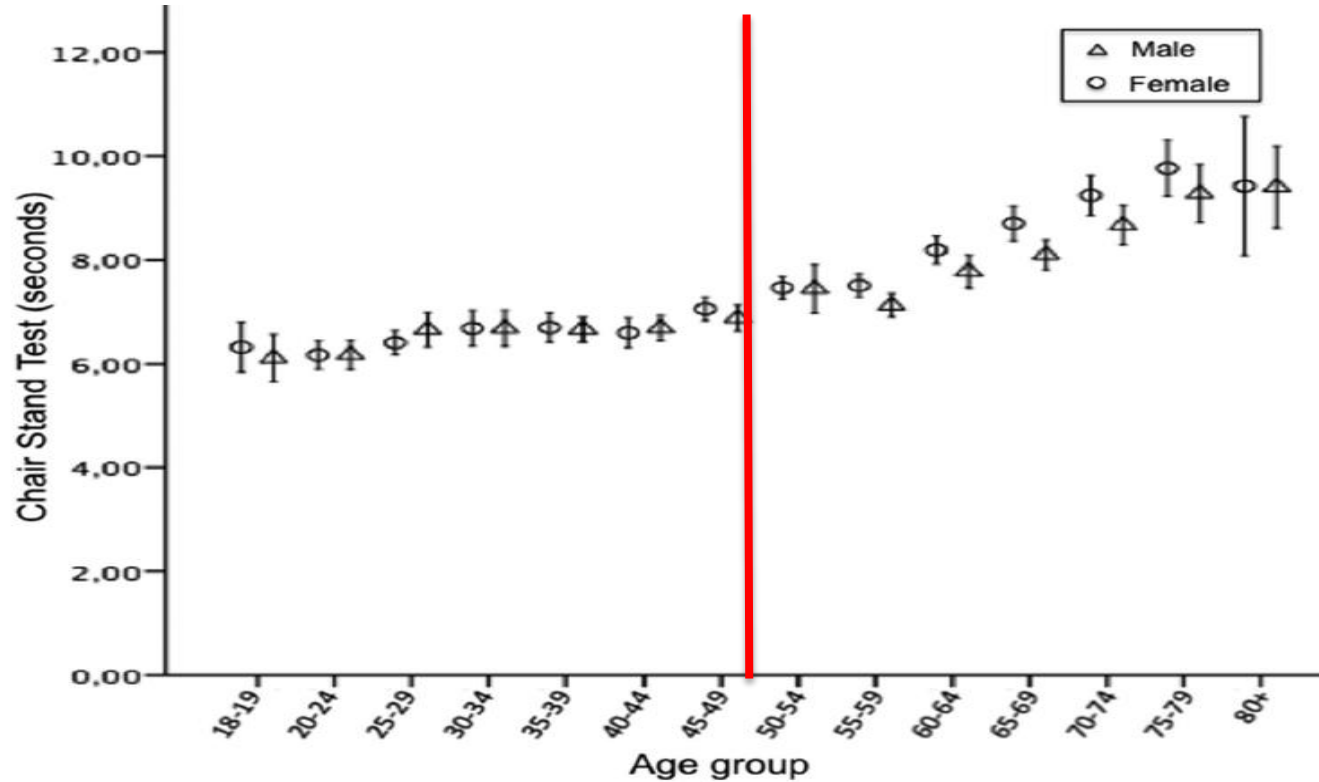


Aging and muscle

Loss of muscle mass and strength, a natural part of aging



UNIVERSITÀ
CATTOLICA
del Sacro Cuore

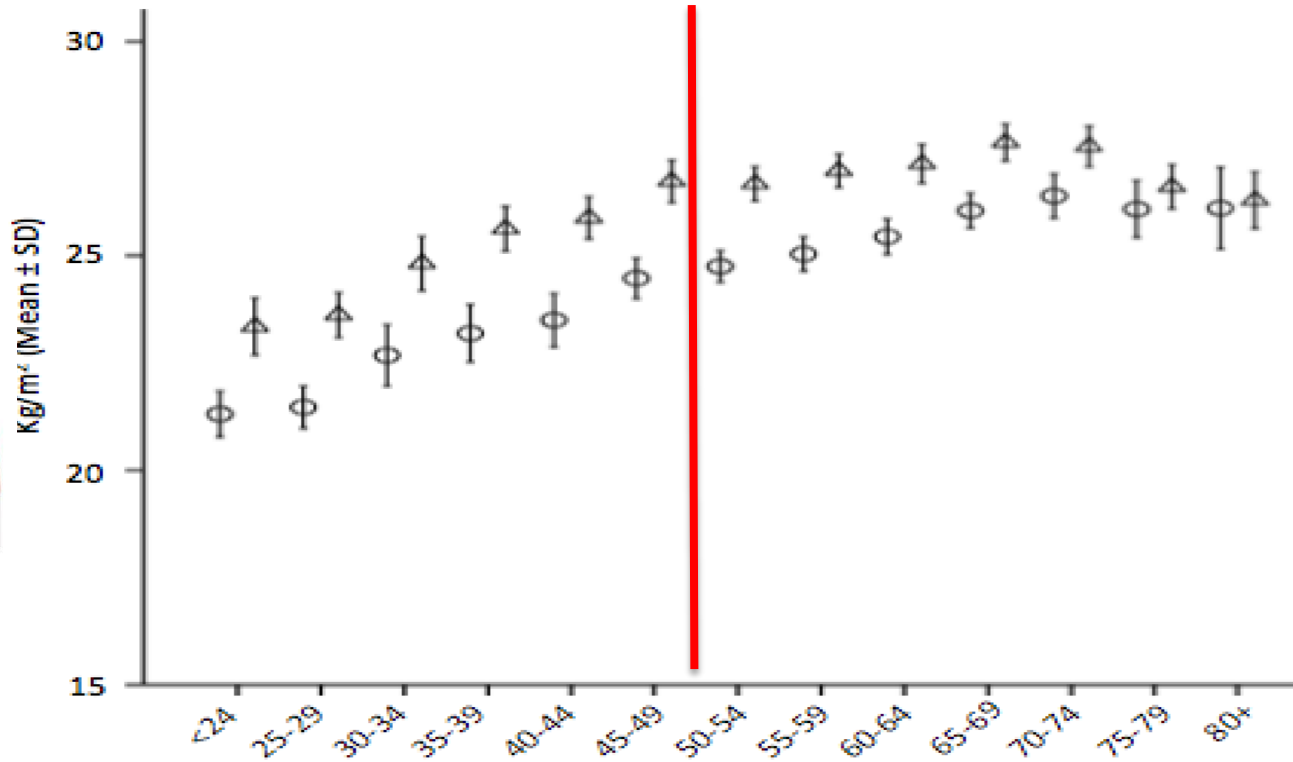
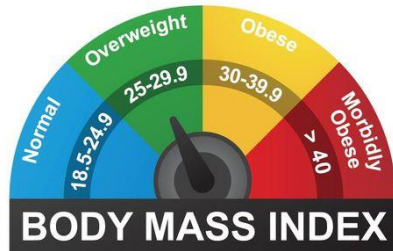


Aging and muscle

Beyond BMI



UNIVERSITÀ
CATTOLICA
del Sacro Cuore



Aging and muscle

Body composition



UNIVERSITÀ
CATTOLICA
del Sacro Cuore

% Body composition
(by weight)¹

Fat Mass

25%

Muscle is a major component of LBM and plays a vital role in maintaining health¹

- Strength
- Energy
- Mobility
- Skeletal support and balance
- Wound healing
- Immune function
- Digestive function
- Skin health

Lean Body Mass (LBM)

75%

Water 70%

Protein 20%

Minerals 10%

60%

— Muscle

20%

— Visceral tissue

15%

— Connective tissue

5%

— Other



UNIVERSITÀ
CATTOLICA
del Sacro Cuore

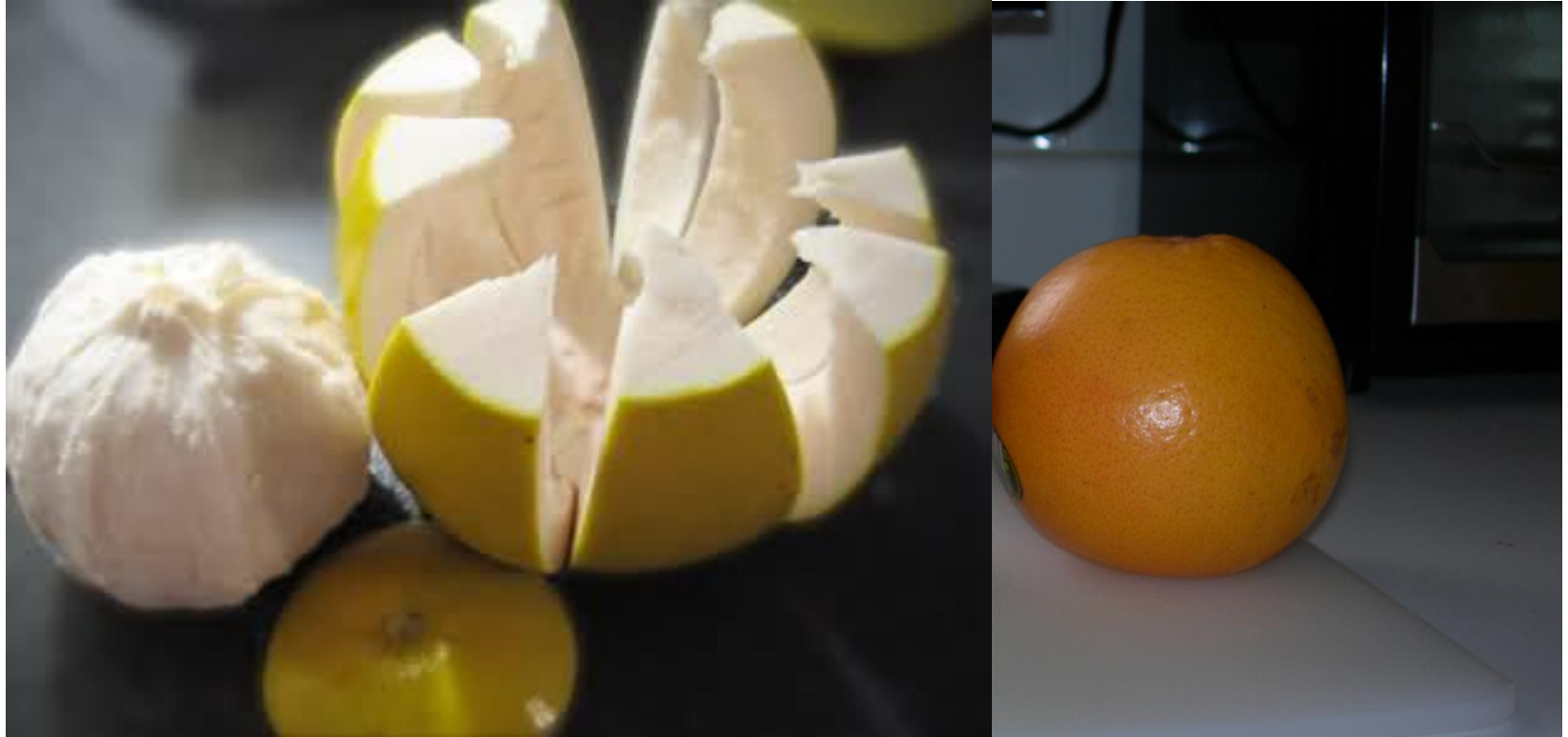
Low Lean Mass Is Masked By BMI

Aging and muscle

Low Lean Mass is hidden condition: BMI Can Be Deceptive



UNIVERSITÀ
CATTOLICA
del Sacro Cuore



Aging and muscle

Low Lean Mass is hidden condition: BMI Can Be Deceptive



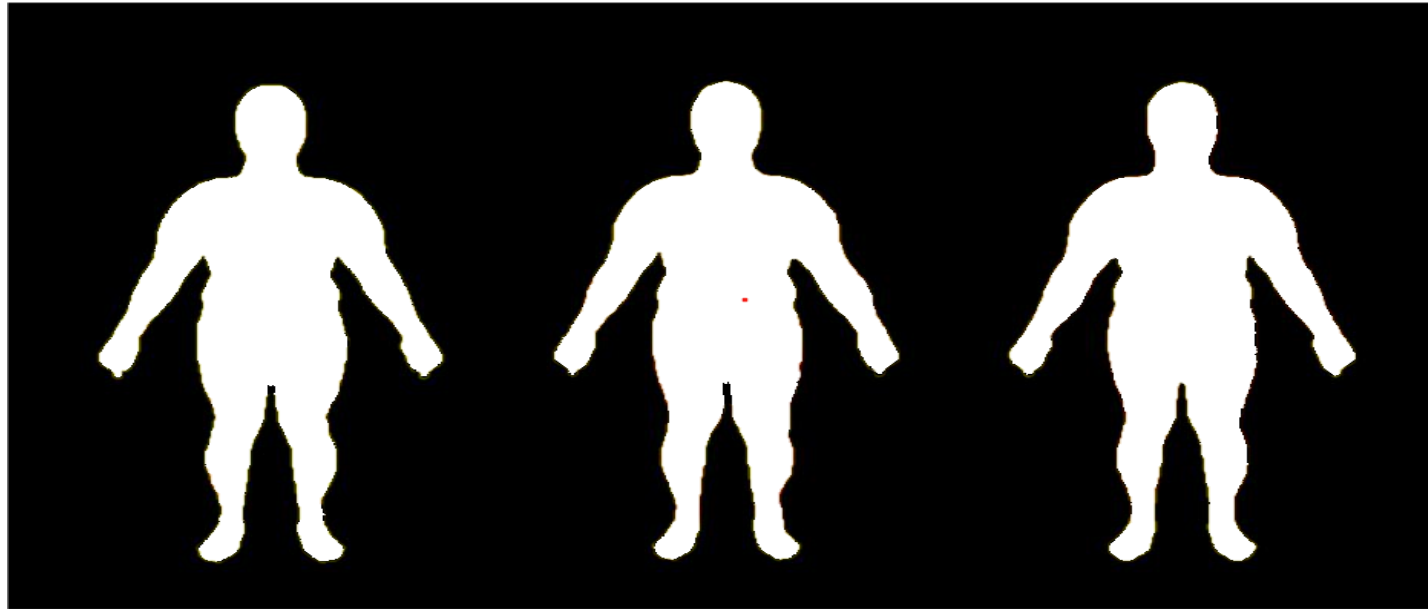
UNIVERSITÀ
CATTOLICA
del Sacro Cuore



Same Body Weight



UNIVERSITÀ
CATTOLICA
del Sacro Cuore



Person A

Person B

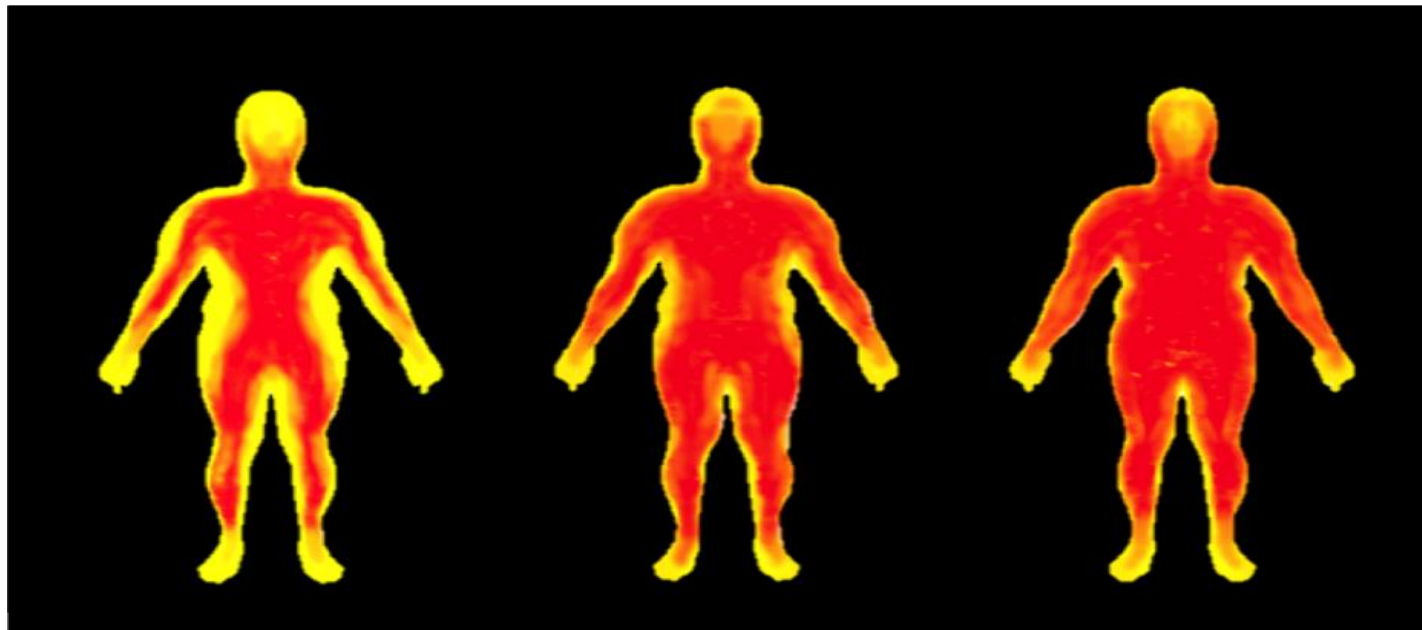
Person C



Same Body Weight



UNIVERSITÀ
CATTOLICA
del Sacro Cuore



Muscle Mass



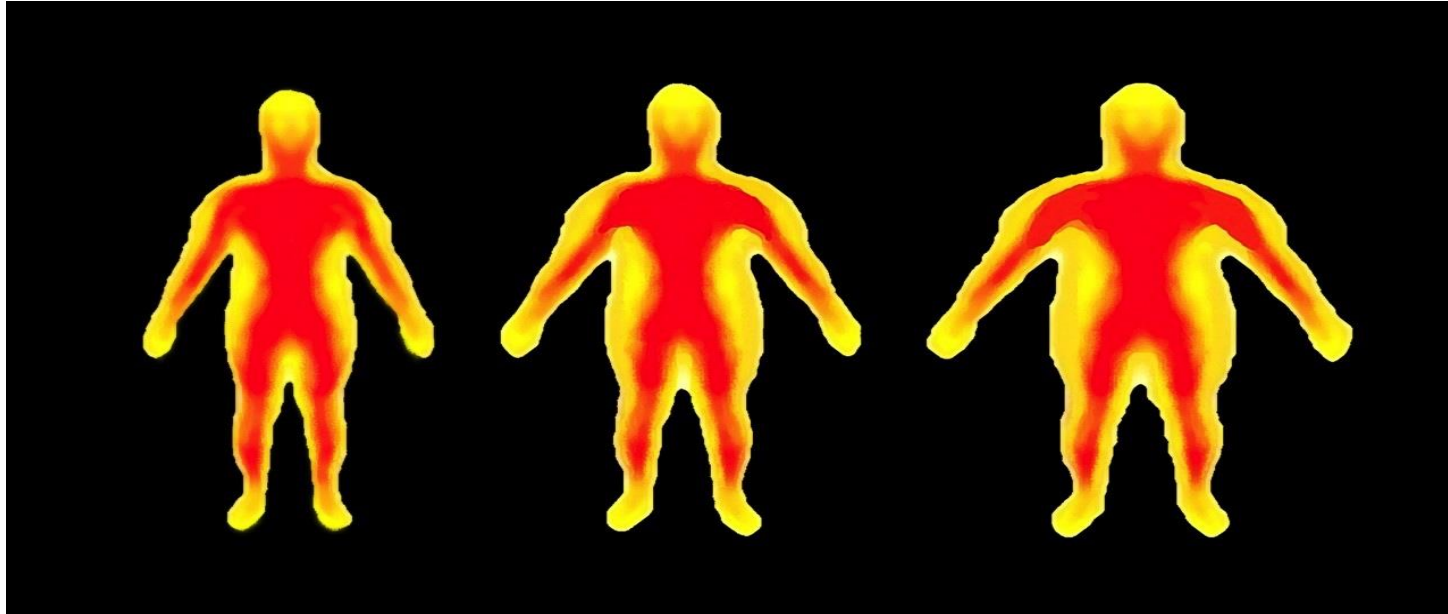
Fat Mass



Different Body Weight, same Muscle Mass



UNIVERSITÀ
CATTOLICA
del Sacro Cuore



Muscle Mass



Fat Mass



Which person may have low muscle?



UNIVERSITÀ
CATTOLICA
del Sacro Cuore



Both



A high body weight/ BMI does not
preclude the presence of low lean
mass





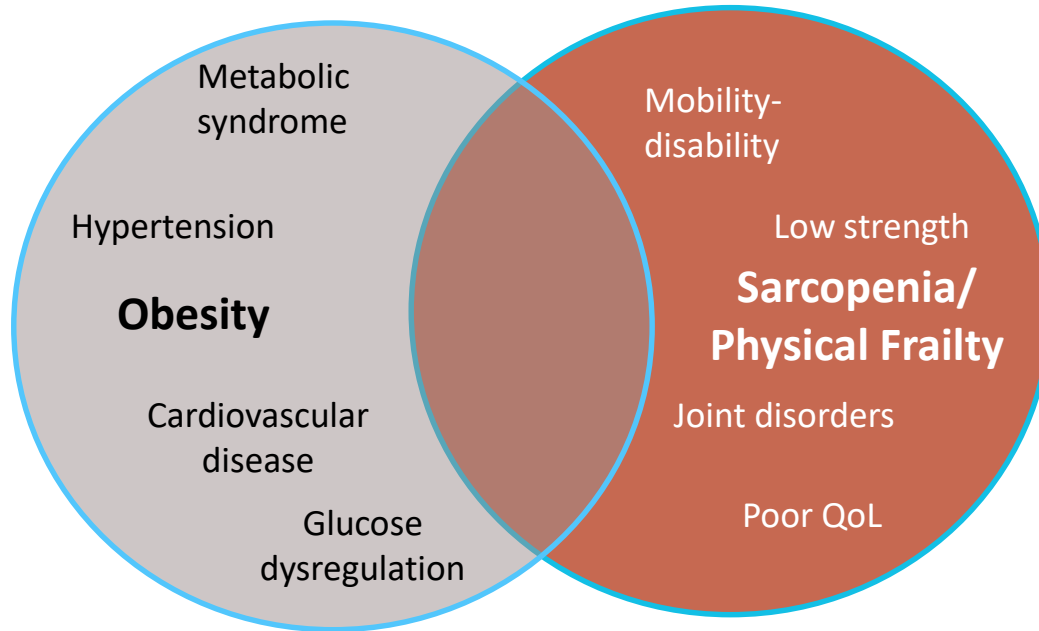
UNIVERSITÀ
CATTOLICA
del Sacro Cuore

Inflammatory status Malnutrition/Sarcopenia/Frailty

Sarcopenic Obesity (SO): Low Lean Mass, High Fat Mass



UNIVERSITÀ
CATTOLICA
del Sacro Cuore



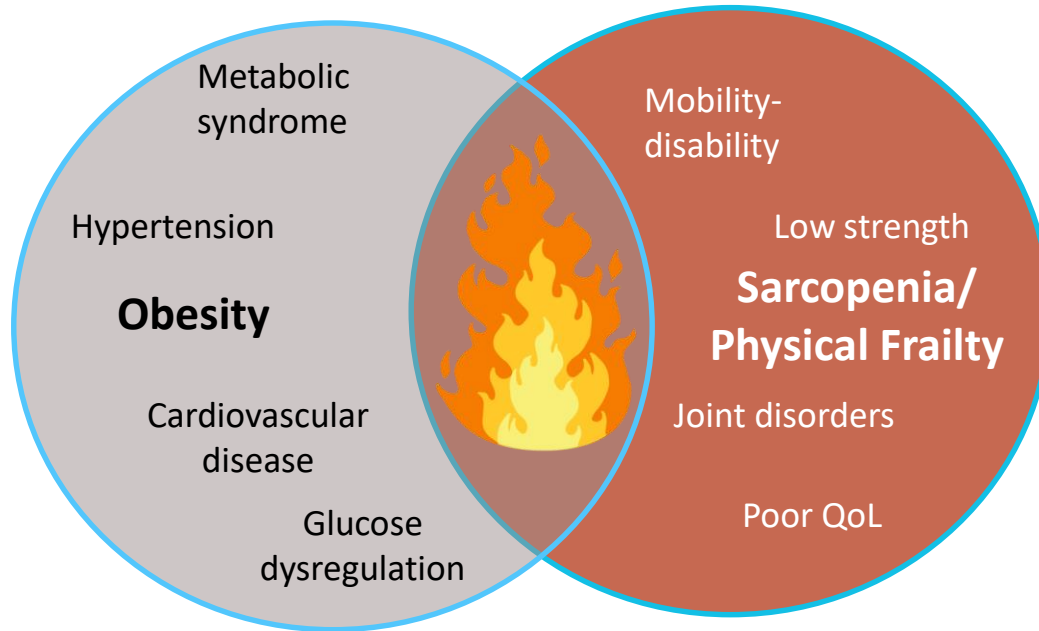
- 23% higher incidence of CVD¹
- Higher risk of frailty and poorer quality of life²
- Longer hospitalization³

1. Stephen WC & Janssen I. *J Nutr Health Aging* May 2009;13(5):460e6
2. Villareal DT, et al. *Obes Res* Jun 2004;12(6):913e2
3. Kyle UG et al. *Clin Nutr* Feb 2005;24(1):133e42.

Sarcopenic Obesity (SO): Low Lean Mass, High Fat Mass



UNIVERSITÀ
CATTOLICA
del Sacro Cuore



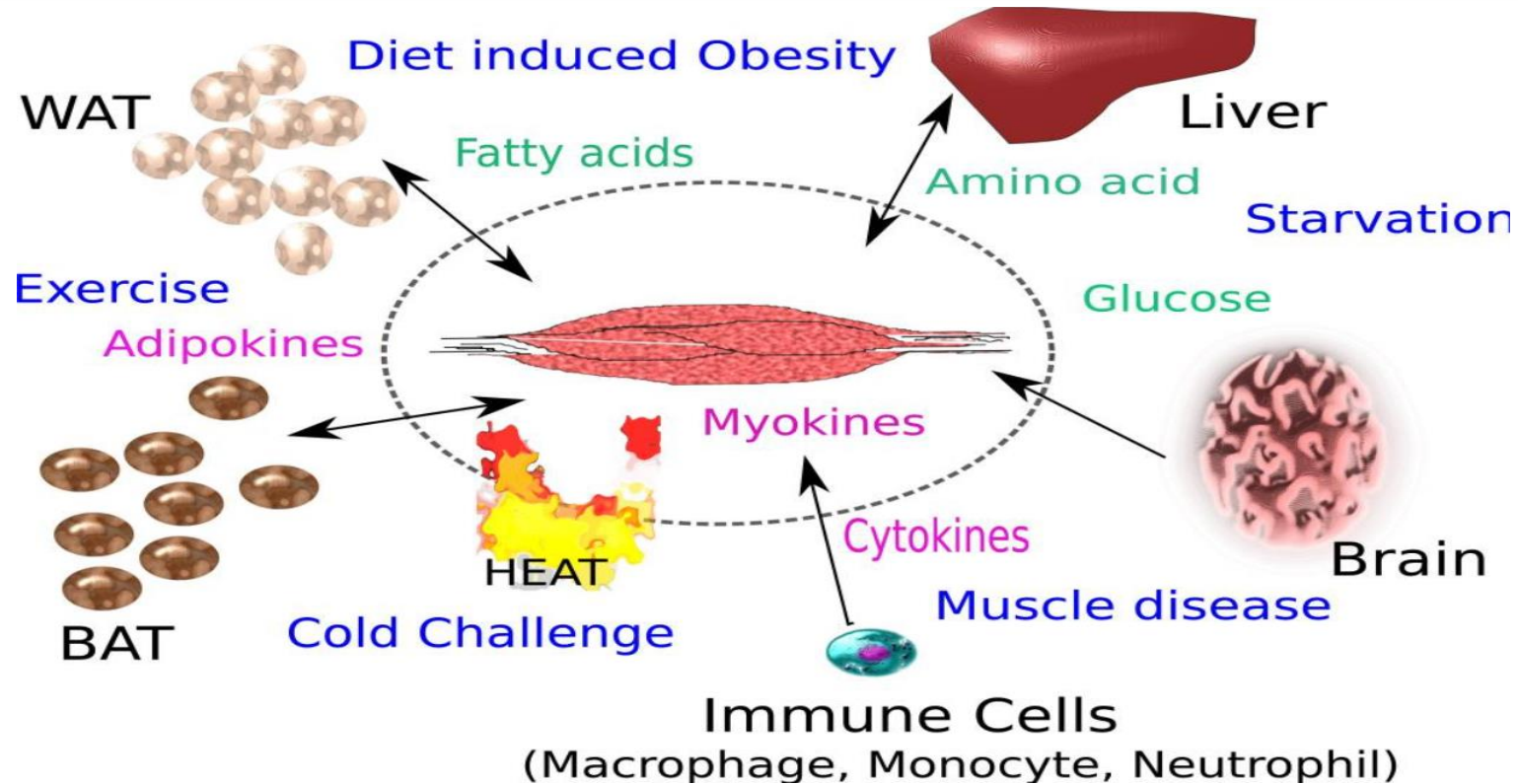
- 23% higher incidence of CVD¹
- Higher risk of frailty and poorer quality of life²
- Longer hospitalization³

1. Stephen WC & Janssen I. *J Nutr Health Aging* May 2009;13(5):460e6
2. Villareal DT, et al. *Obes Res* Jun 2004;12(6):913e2
3. Kyle UG et al. *Clin Nutr* Feb 2005;24(1):133e42.

Low Lean Mass, High Fat Mass = Inflammation



UNIVERSITÀ
CATTOLICA
del Sacro Cuore



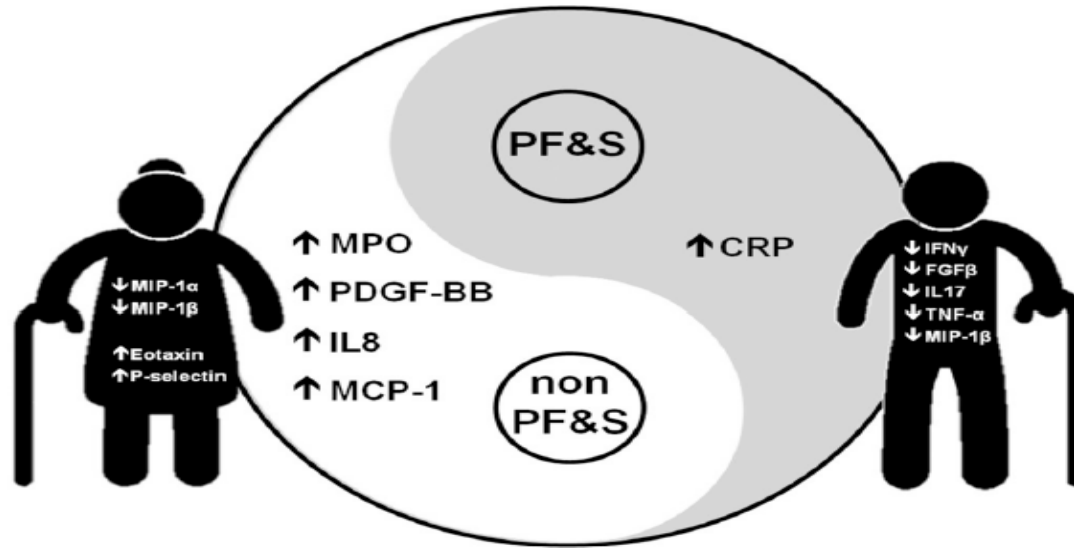
Low Lean Mass, High Fat Mass = Inflammation



UNIVERSITÀ
CATTOLICA
del Sacro Cuore

Inflammatory signatures in older persons with physical frailty and sarcopenia: The frailty “cytokinome” at its core

Emanuele Marzetti^a, Anna Picca^{a,b,*}, Federico Marini^c, Alessandra Biancolillo^c,
Hélio José Coelho-Junior^{b,d}, Jacopo Gervasoni^{a,b}, Maurizio Bossola^{a,b}, Matteo Cesari^{e,f},
Graziano Onder^{a,b}, Francesco Landi^{a,b}, Roberto Bernabei^{a,b,*}, Riccardo Calvani^{a,b}





UNIVERSITÀ
CATTOLICA
del Sacro Cuore

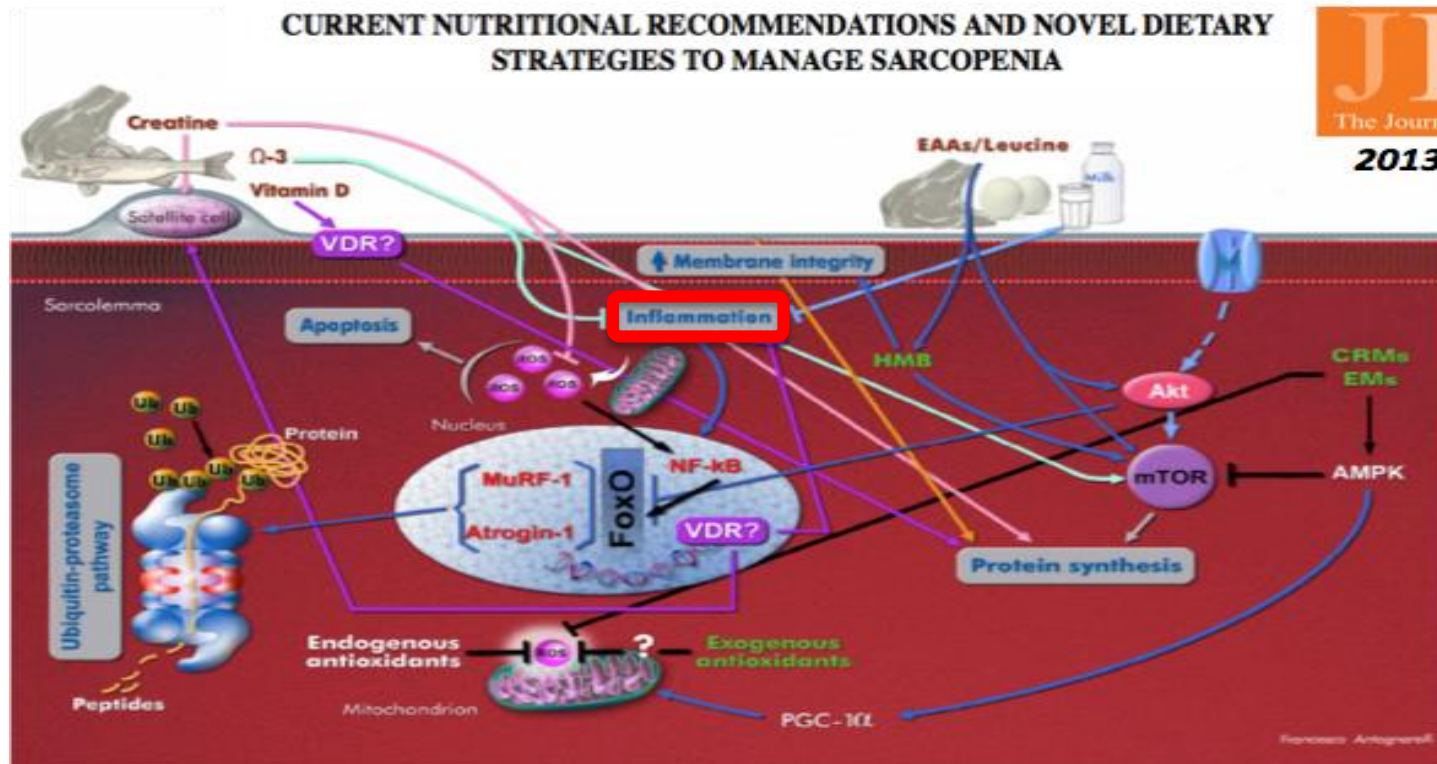
Inflammatory status and Nutrition

Nutrition-Inflammation-muscle connection



UNIVERSITÀ
CATTOLICA
del Sacro Cuore

JFA
The Journal of Frailty & Aging
2013;2(1):38-53



Key Factors contributing to muscle dysfunction



UNIVERSITÀ
CATTOLICA
del Sacro Cuore

Ageing

Hyper-catabolic conditions

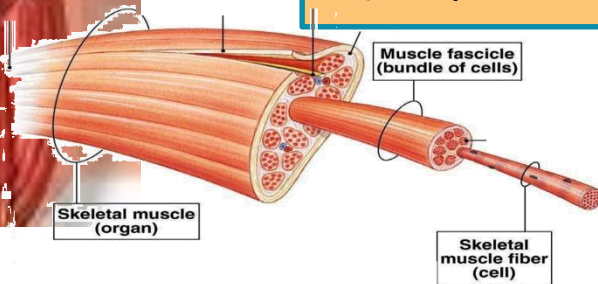
Disuse Cancer AIDS Diabetes COPD

1. Decrease in muscle fiber protein
(impaired protein turnover)

2. Decrease in muscle cell number
(cell proliferation, differentiation and death)

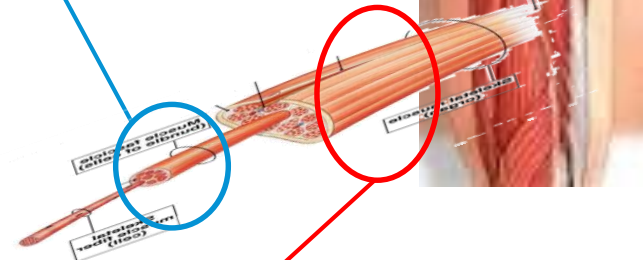


Skeletal muscle
(organ)



Muscle fascicle
(bundle of cells)

Skeletal
muscle fiber
(cell)



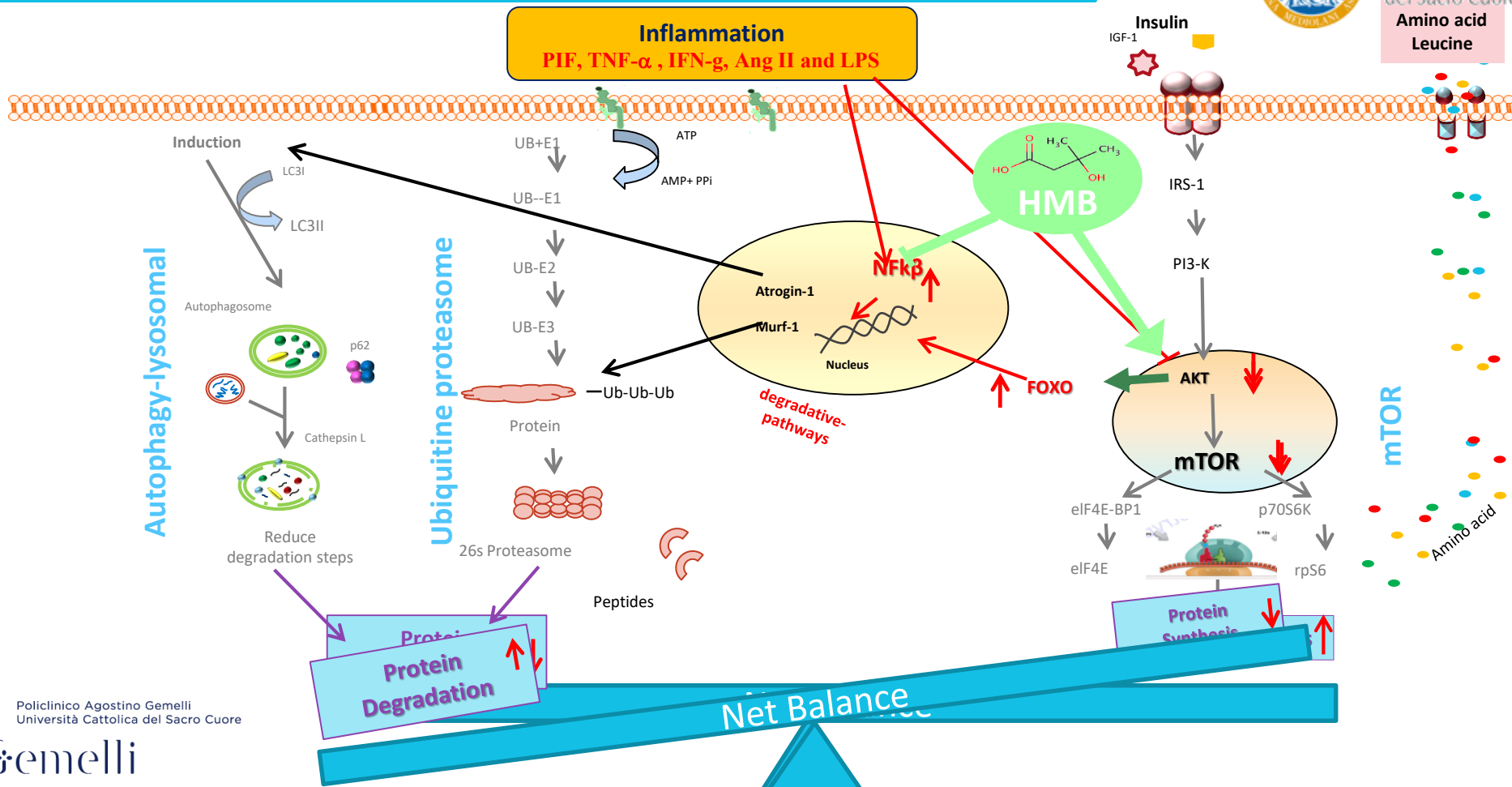
Muscle atrophy, anabolic resistance and metabolic
dysfunction

1. Decrease in muscle fiber protein (impaired protein turnover)

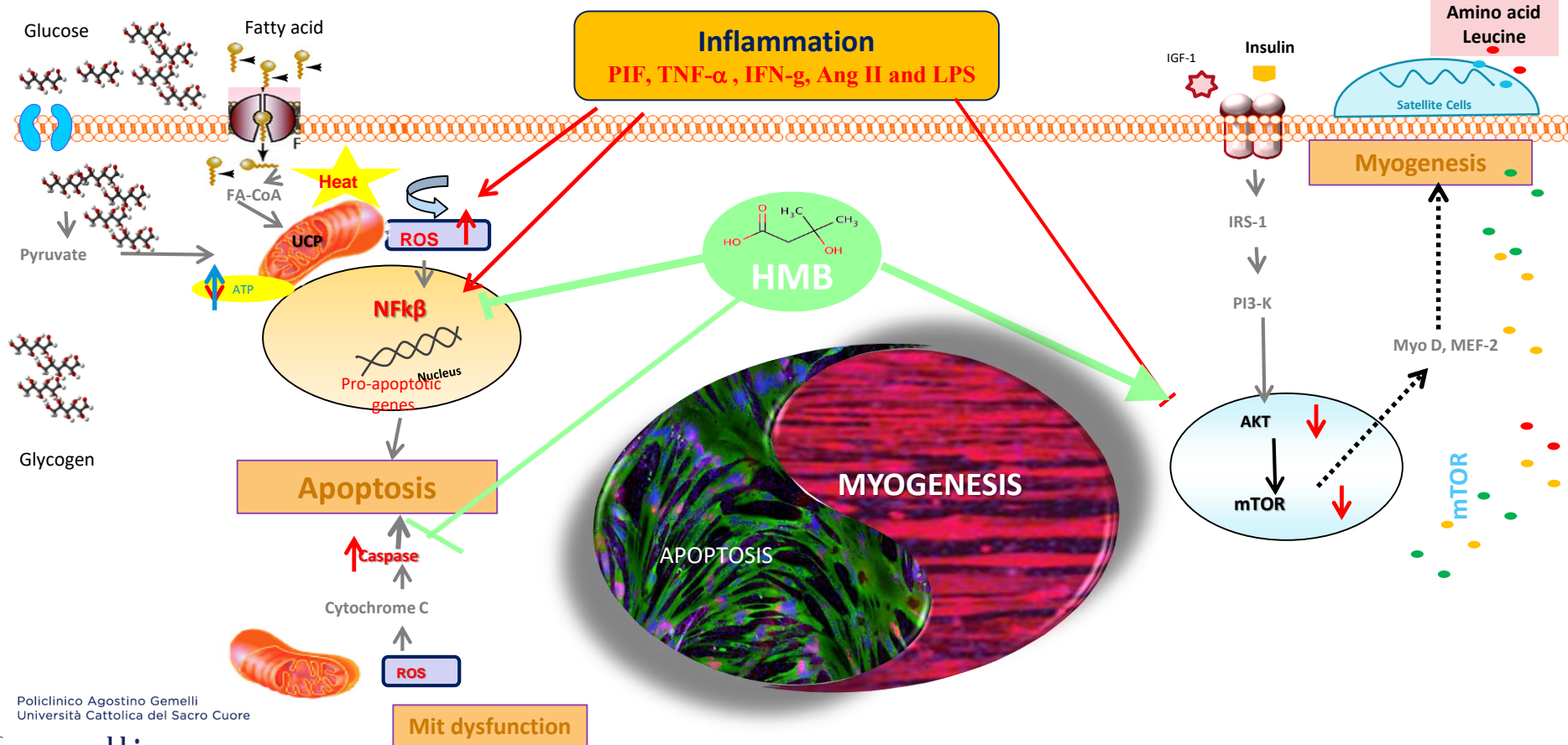


UNIVERSITÀ
CATTOLICA
del Sacro Cuore

Amino acid
Leucine



2. Decrease in muscle cell number (cell proliferation, differentiation and death)





UNIVERSITÀ
CATTOLICA
del Sacro Cuore

The complexity of the system

Potential therapeutic strategies

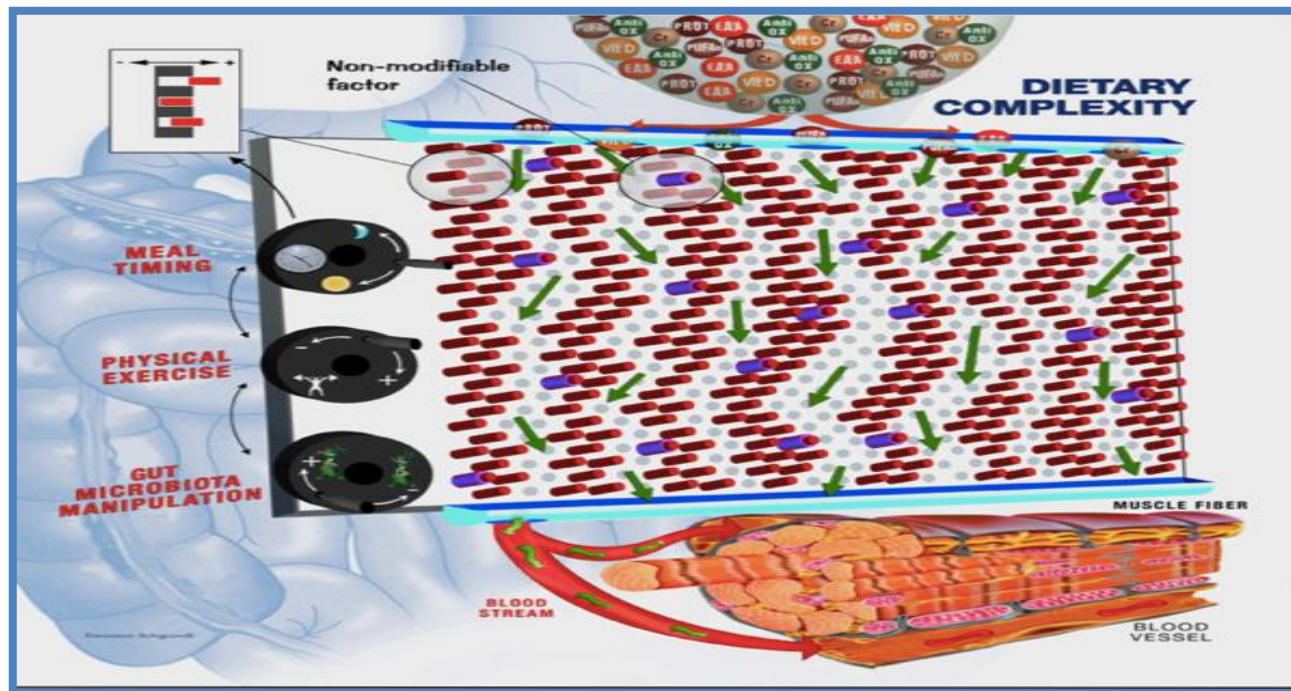


UNIVERSITÀ
CATTOLICA
del Sacro Cuore

Nutrition-muscle connection The “Pachinko Model”



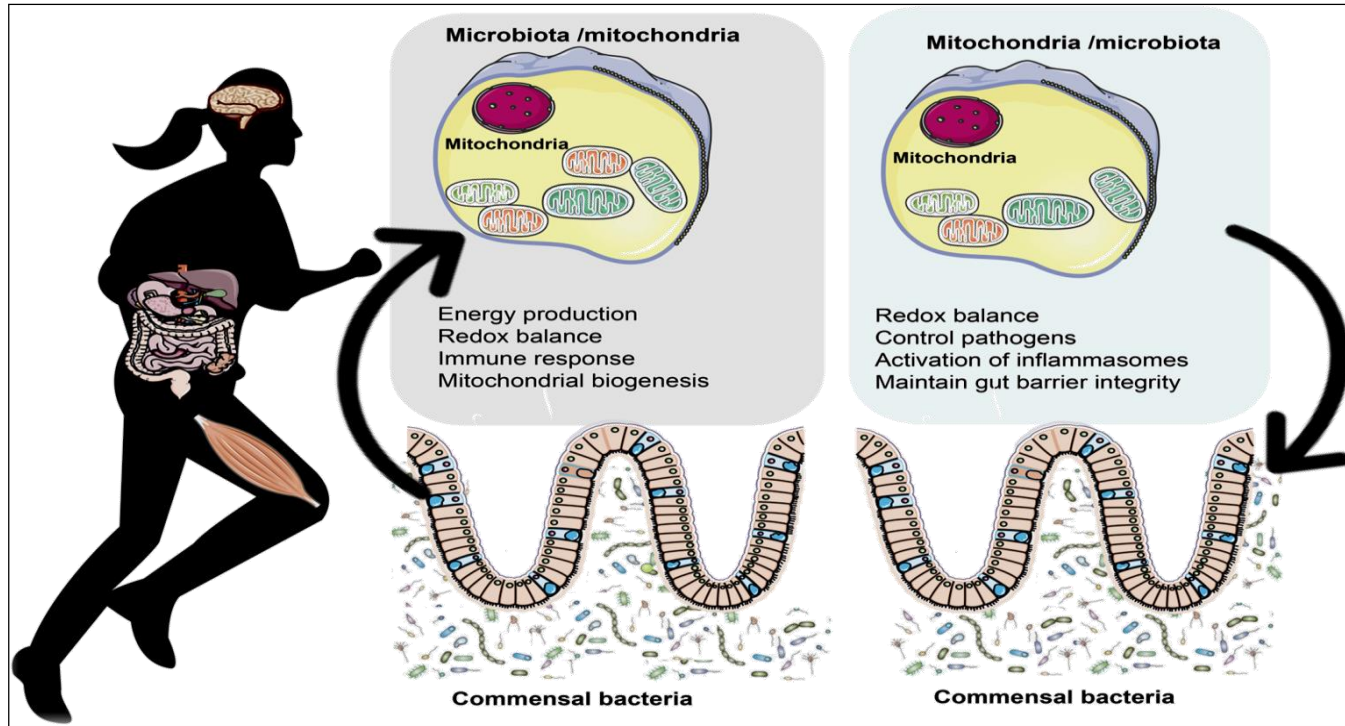
2013;2(1):38-53



**CURRENT NUTRITIONAL RECOMMENDATIONS AND NOVEL DIETARY
STRATEGIES TO MANAGE SARCOPENIA**

The Crosstalk between the Gut Microbiota and Mitochondria during Exercise

Allison Clark^{1*} and Núria Mach^{1,2}



Gut microbiota as a part of the gut barrier



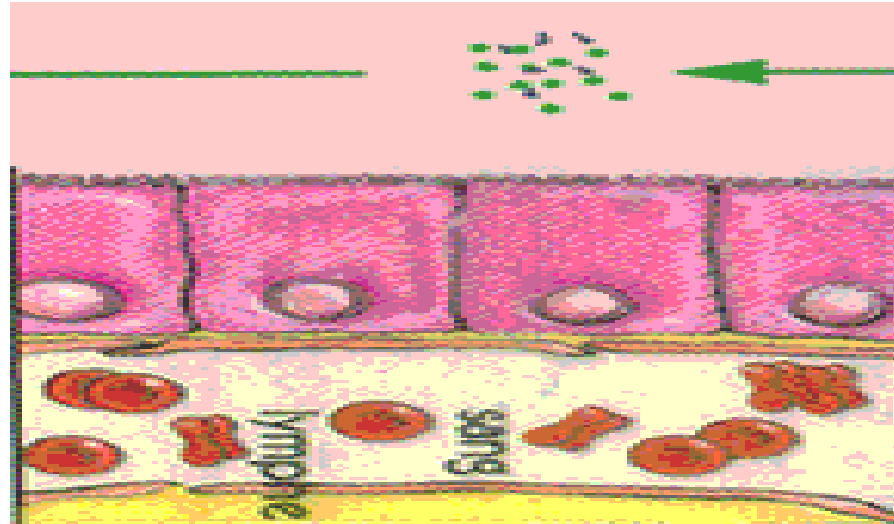
UNIVERSITÀ
CATTOLICA
del Sacro Cuore

Microbiota

*Mucosal
Barrier*

*Epithelial
barrier*

*Endocrine
system*



*Acquired
and
Innate
immunity*

*Vascular and
lymphatic systems*

Digestive enzymes

The gut barrier



UNIVERSITÀ
CATTOLICA
del Sacro Cuore



The human gut microbiote: facts and figures

- The total weight of the microbiota biomass in the human gut may reach up to 1.8 kg
- The number of bacteria in the human gut exceeds the number of somatic cells in the body by 10-fold
- The gut microbiome includes 100-fold more genes than the human genome

(Sommer & Bäckhed. Nat Rev Microbiol 2013;11:227–238; Tremaroli et al., Nature 2012;489:242–9)



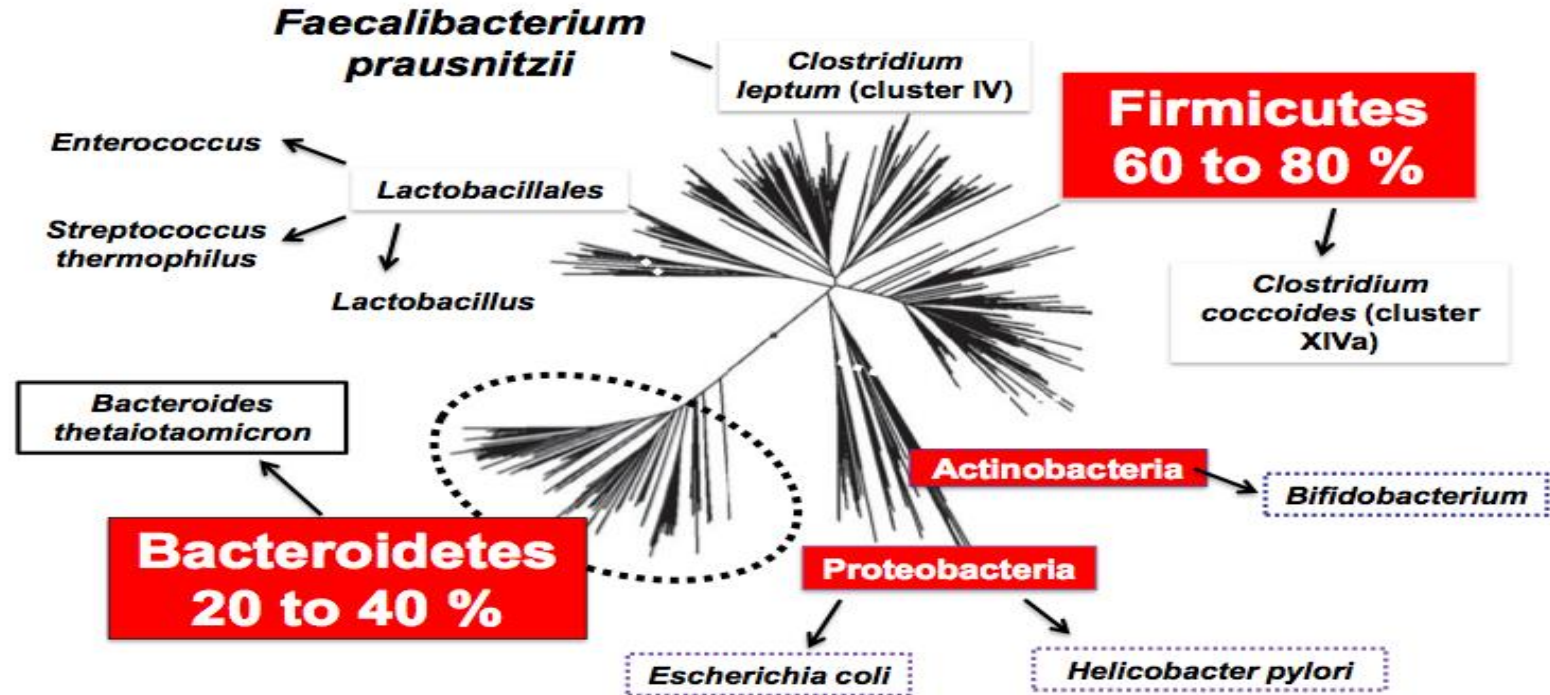
UNIVERSITÀ
CATTOLICA
del Sacro Cuore

Gut microbiota – Inflammation – Malnutrition

Phylogenetic diversity of human gut microbiota



UNIVERSITÀ
CATTOLICA
del Sacro Cuore

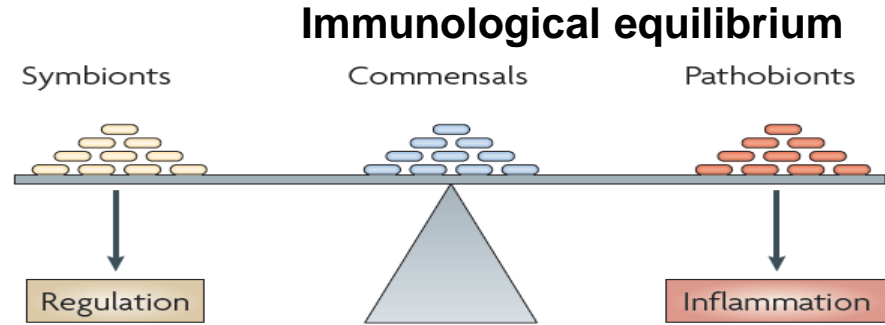


2 major phyla: Firmicutes and Bacteroidetes (>70%)

Inflammation associated with dysbiosis



UNIVERSITÀ
CATTOLICA
del Sacro Cuore



Inflammation associated with dysbiosis



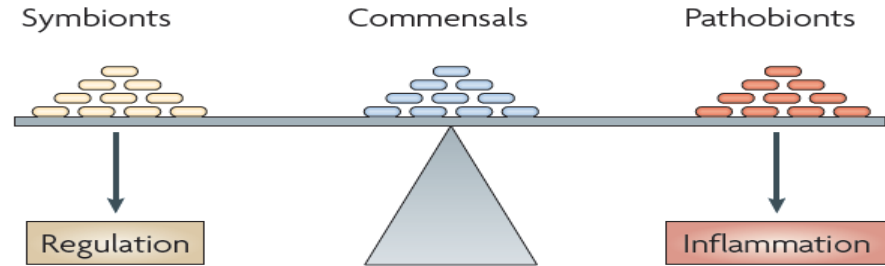
UNIVERSITÀ
CATTOLICA
del Sacro Cuore



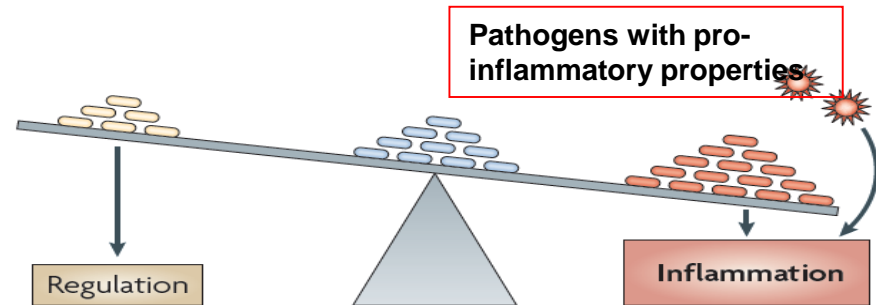
Policlinico Agostino Gemelli
Università Cattolica del Sacro Cuore

Gemelli

Immunological equilibrium



Immunological dysequilibrium

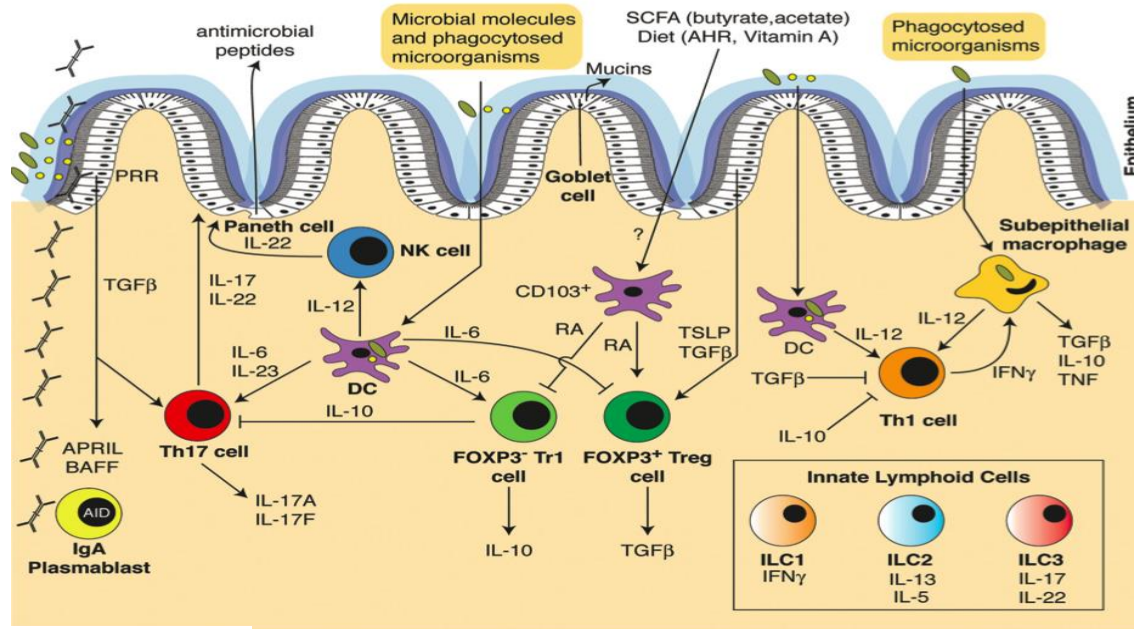


GMB as master Regulator of Inflammation

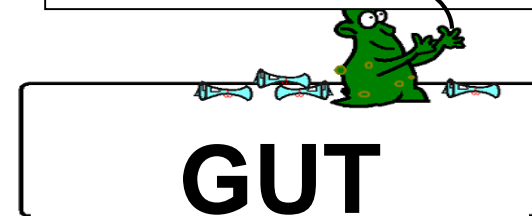


UNIVERSITÀ
CATTOLICA
del Sacro Cuore

- ✓ Activation of complement C1q
- ✓ Inflammation signals Receptors



GMB metabolites and
inflammation signals
into systemic
circulation



EUBIOSIS



***Modification of MICROBIOTA-HOST equilibrium
during lifetime***

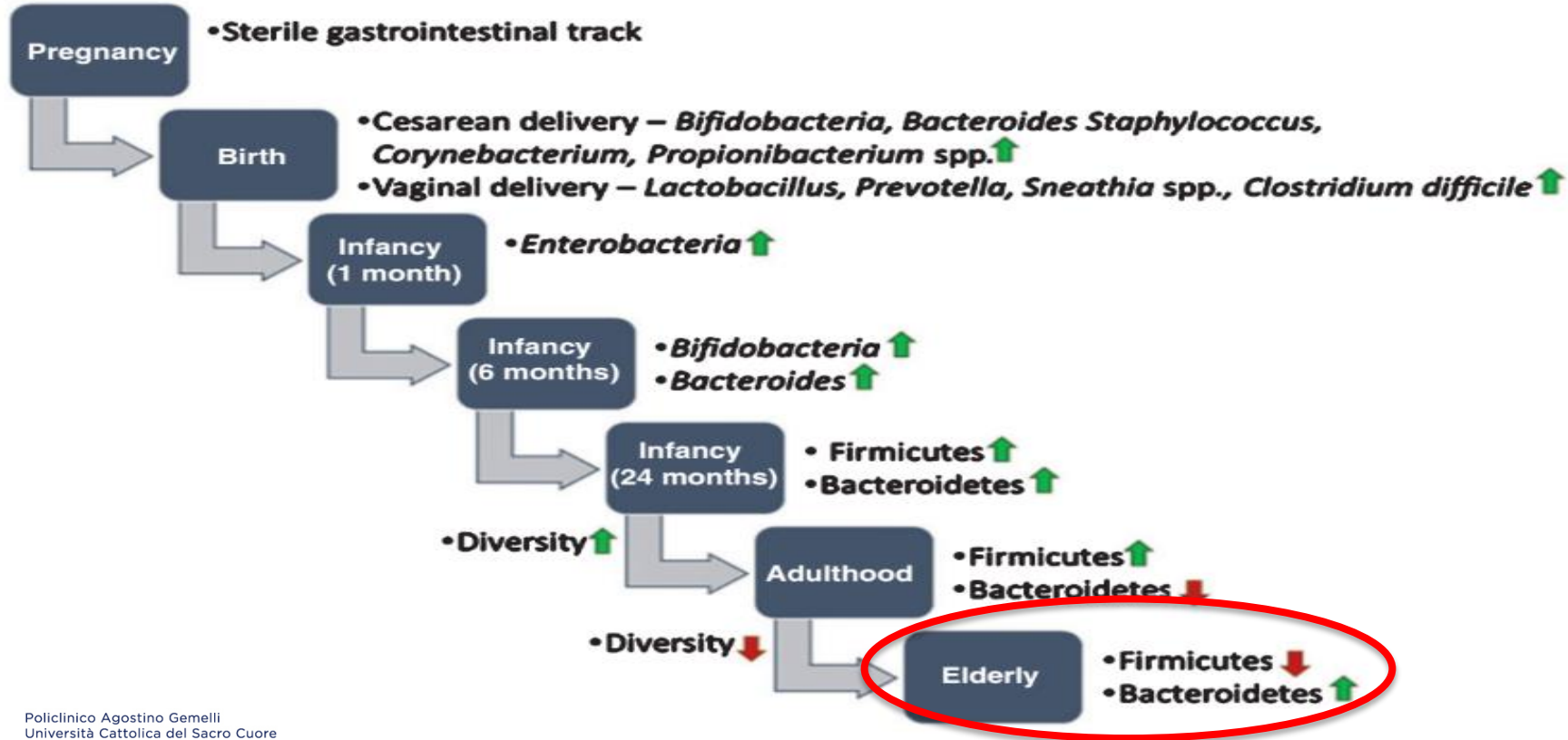


***Quali-quantitative alteration of
gut microbiota and its functions***



“AGED” GUT MICROBIOTA

Gut microbiota from prenatal to elderly

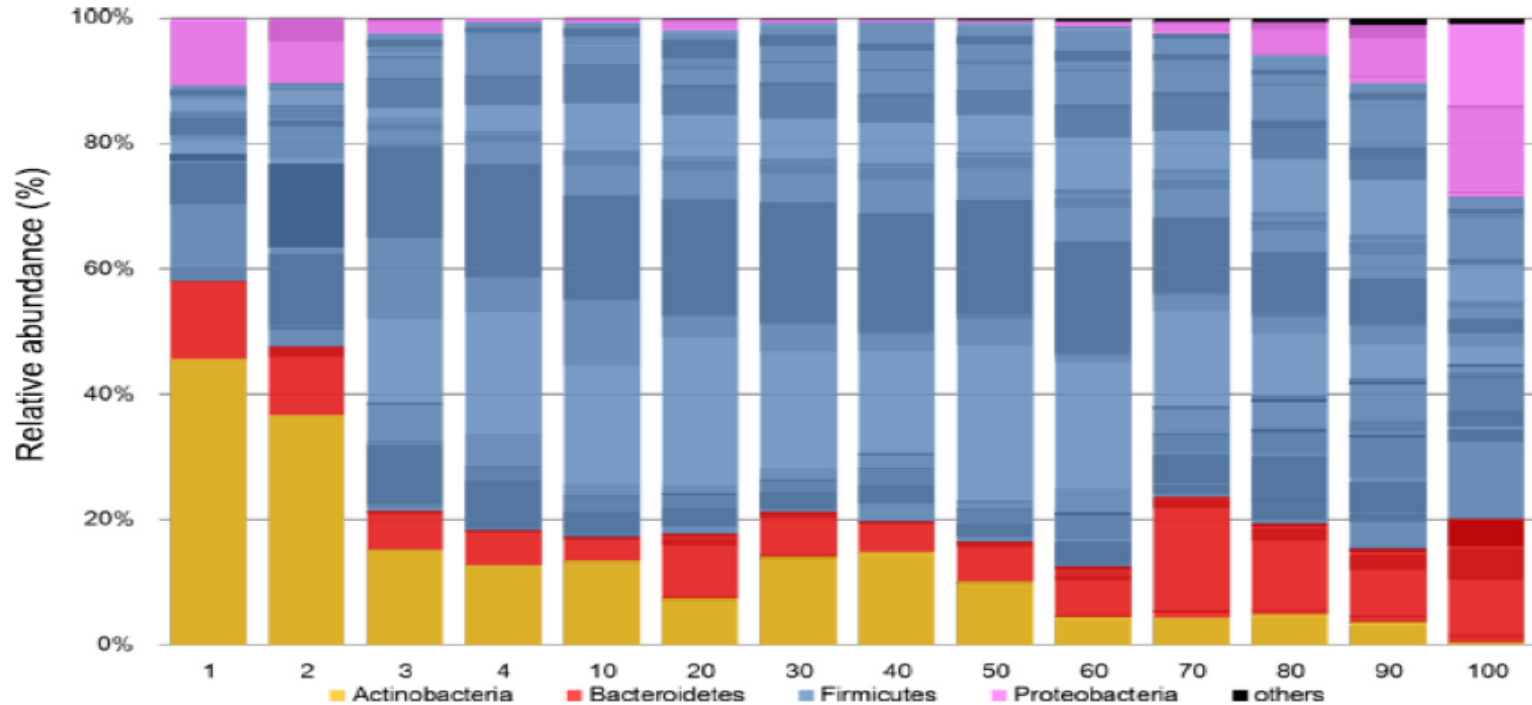


Aging compromise the homeostatic equilibrium between microbiota and host



UNIVERSITÀ
CATTOLICA
del Sacro Cuore

367 Japanese individuals: 6 centenarians (100-104 years old) and 7 individuals >95 years



UNIVERSITÀ
CATTOLICA
del Sacro Cuore



Claesson et al, Nature 2012

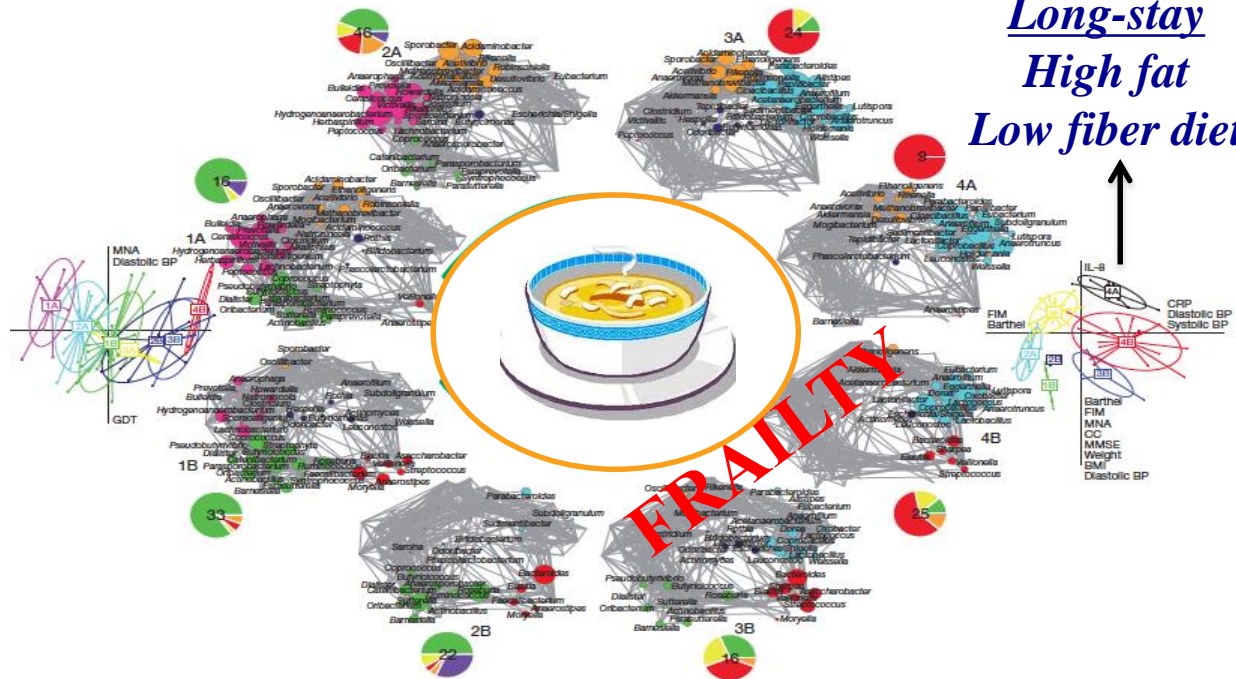
The composition of the microbiota is determined by the composition and diversity of the diet



UNIVERSITÀ
CATTOLICA
del Sacro Cuore



Policlinico Agostino Gemelli
Università Cattolica del Sacro Cuore



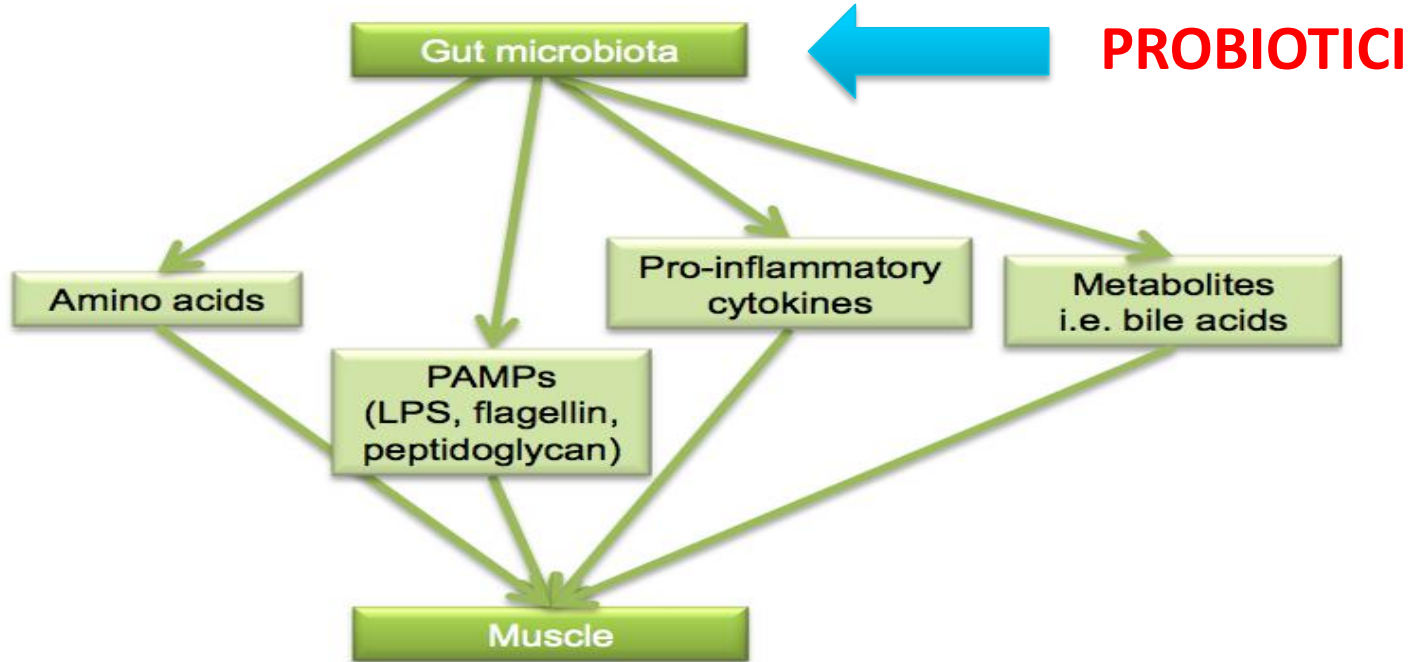
The most discriminating food types were vegetables, fruit and meat

Claesson et al, Nature 2012

Muscle wasting and Malnutrition: the gut microbiota as a new therapeutic target?



UNIVERSITÀ
CATTOLICA
del Sacro Cuore



Laure B. Bindels and Nathalie M. Delzenne

The International Journal of Biochemistry & Cell Biology

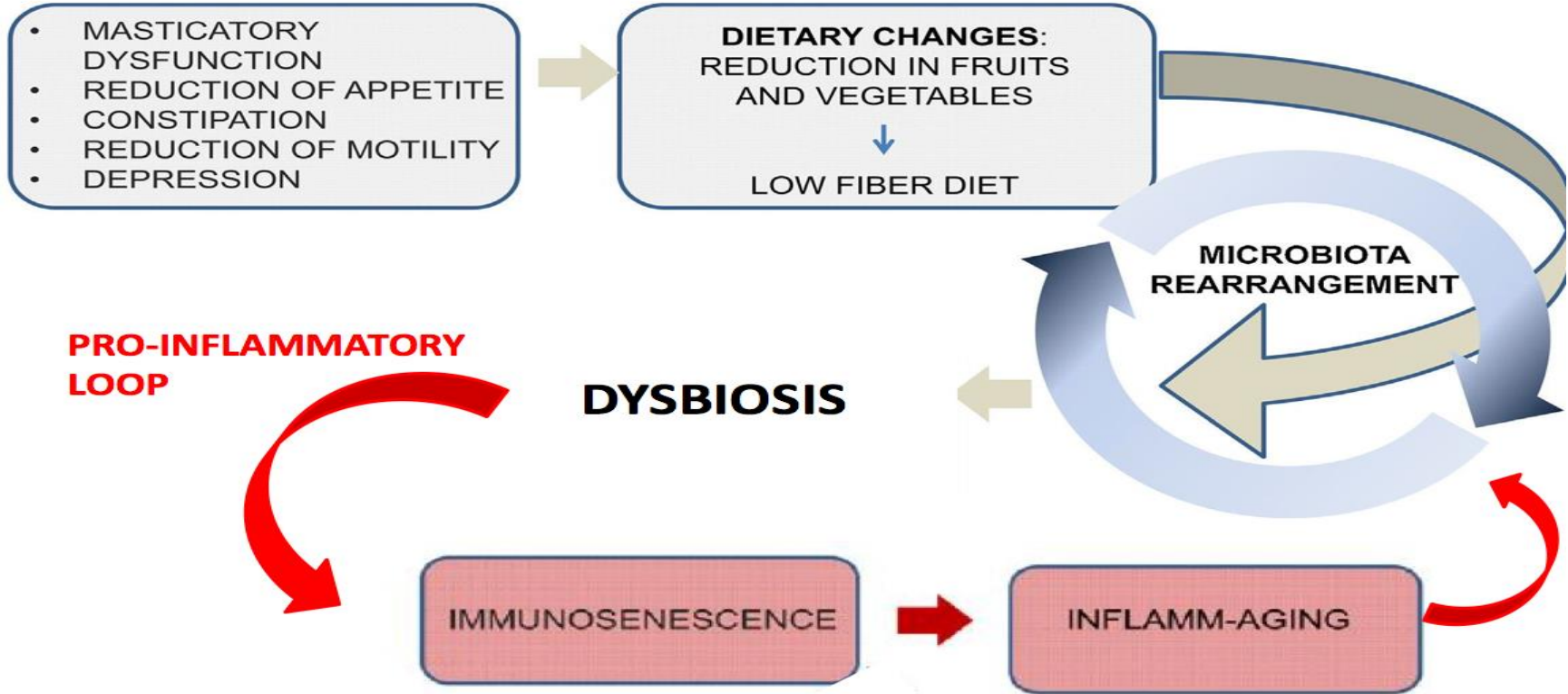
<http://dx.doi.org/doi:10.1016/j.biocel.2013.06.021>



UNIVERSITÀ
CATTOLICA
del Sacro Cuore

Take Home Message

Malnutrition and inflammation



Take Home Message



UNIVERSITÀ
CATTOLICA
del Sacro Cuore

- Currently available inflammatory biomarkers are weakly associated with malnutrition/sarcopenia and its clinical outcomes
- No *single* biological marker may track pathophysiological contributors and phenotypes of malnutrition/sarcopenia
- Multivariate/multidimensional modeling of a panel of complementary biomarkers is needed



ONGOING PROJECTS



Sarcopenia and Physical fRailty IN older people: multi-component Treatment strategies



Biosphere

BIOMarkers associated with Sarcopenia and PHysical frailty in EldeRly pErsons



Shift

Sarcopenia in HIp FracTure



ACKNOWLEDGEMENTS



UNIVERSITÀ
CATTOLICA
del Sacro Cuore

Dr. Emanuele Marzetti (UCSC, Rome)

Dr. Riccardo Calvani (UCSC, Rome)

Dr. Anna Picca (UCSC, Rome)

Prof. Matteo Cesari (University of Milan, Italy)

Dr. Federico Marini (Sapienza University of Rome, Italy)

Dr. Hélio J. Coelho-Junior (University of Campinas, Brasil)

Prof. Marco Pahor (UFL, USA)

Prof. Roger Fielding (Tufts University, USA)