

Vitality capacity: what is it and why is monitoring relevant?

Ivan BAUTMANS
Vrije Universiteit Brussel
<https://fria.research.vub.be>



1

CONFLICT OF INTEREST DISCLOSURE

The research reported in this lecture was partly funded by competitively acquired grants from:

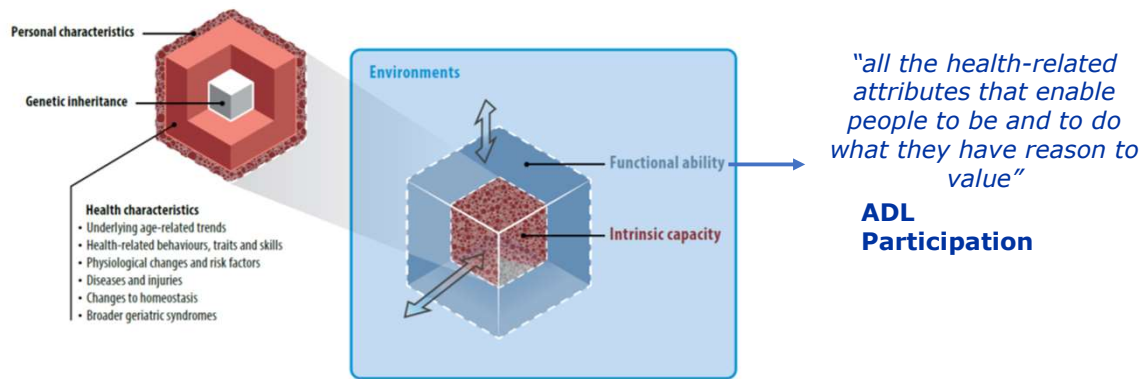
- *Research Foundation Flanders - Fundamental Research Grant*
- *Horizon 2020 & INNOVIRIS - Active Assisted Living Programme*
- *Vrije Universiteit Brussel (VUB) - Strategic research program grant*
- *Universitair Ziekenhuis Brussel (UZBrussel) - Scientific Fund Willy Gepts*



2

Healthy Ageing

The process of developing and maintaining the **functional ability** that enables **well-being** in older age.



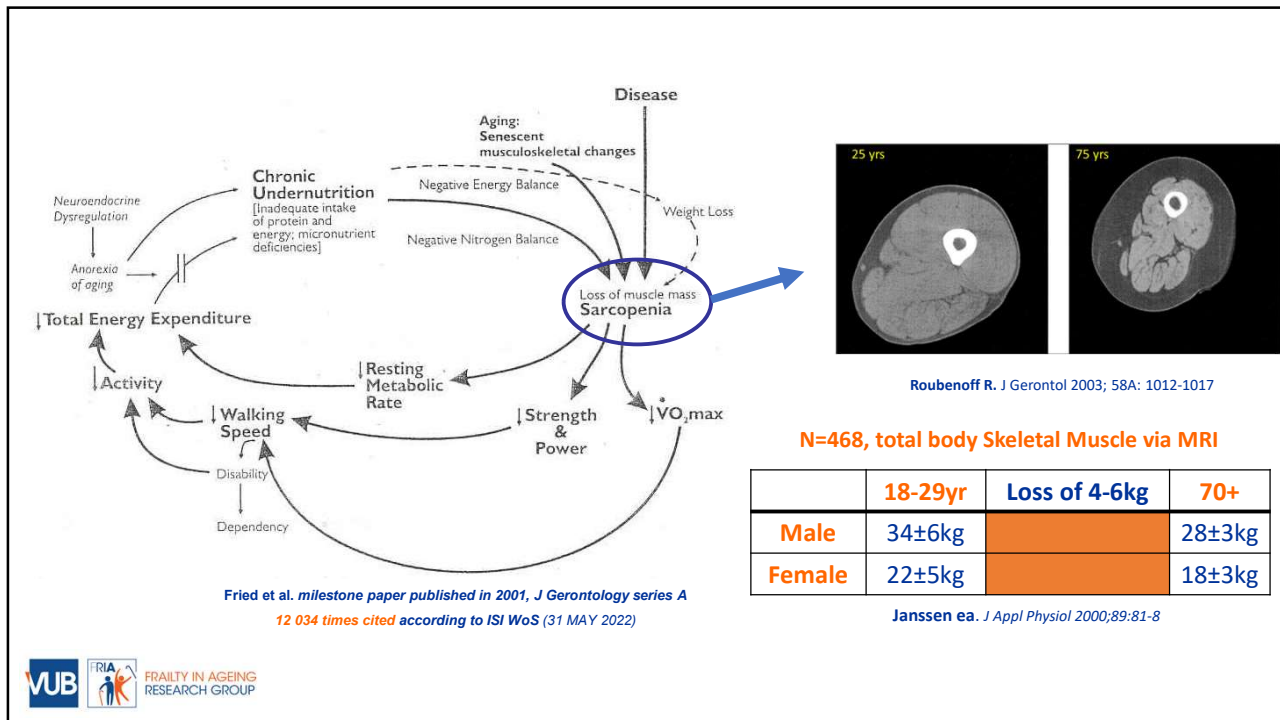
3

Frailty is the main barrier for healthy ageing

'a condition or syndrome that results from a multisystem reduction in reserve capacity, to the extent that a number of physiological systems are close to, or pass, the threshold of symptomatic clinical failure'

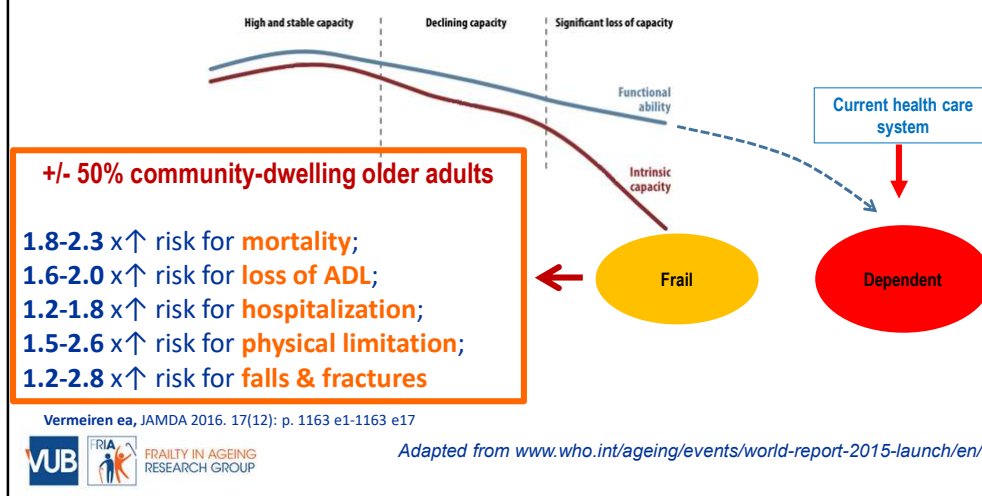
Intrinsic Capacity (WHO)

4

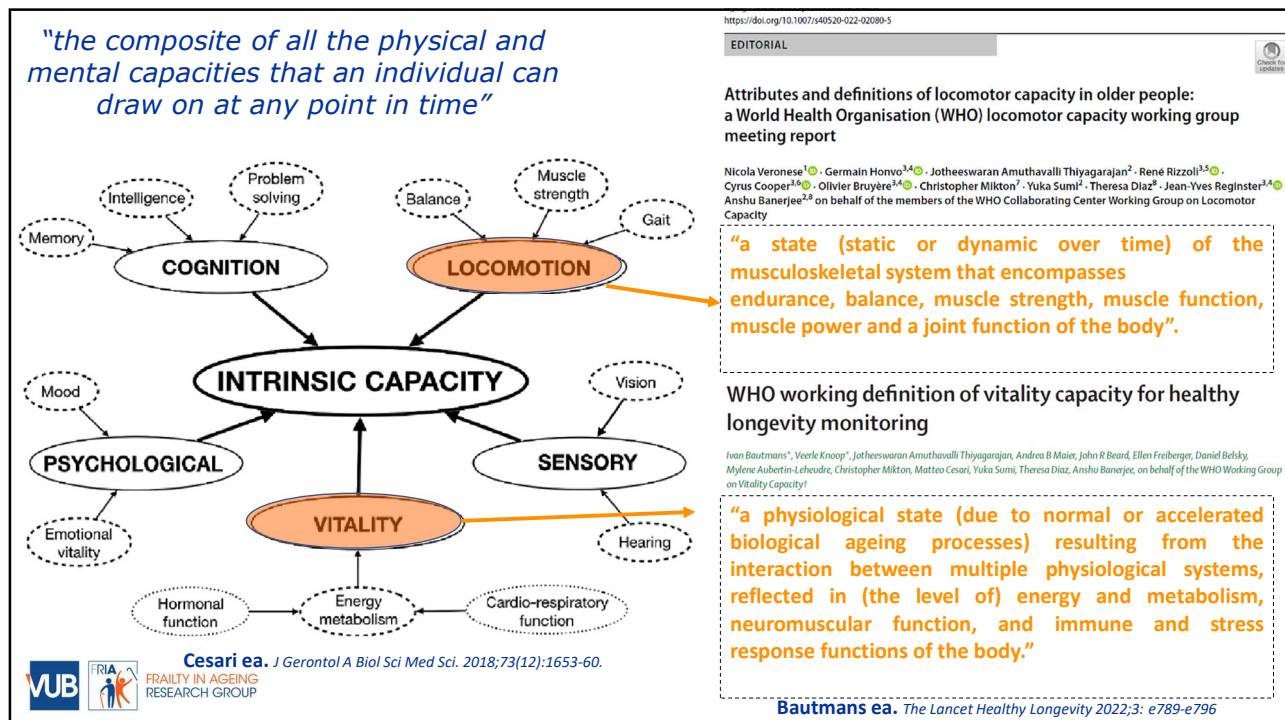


5

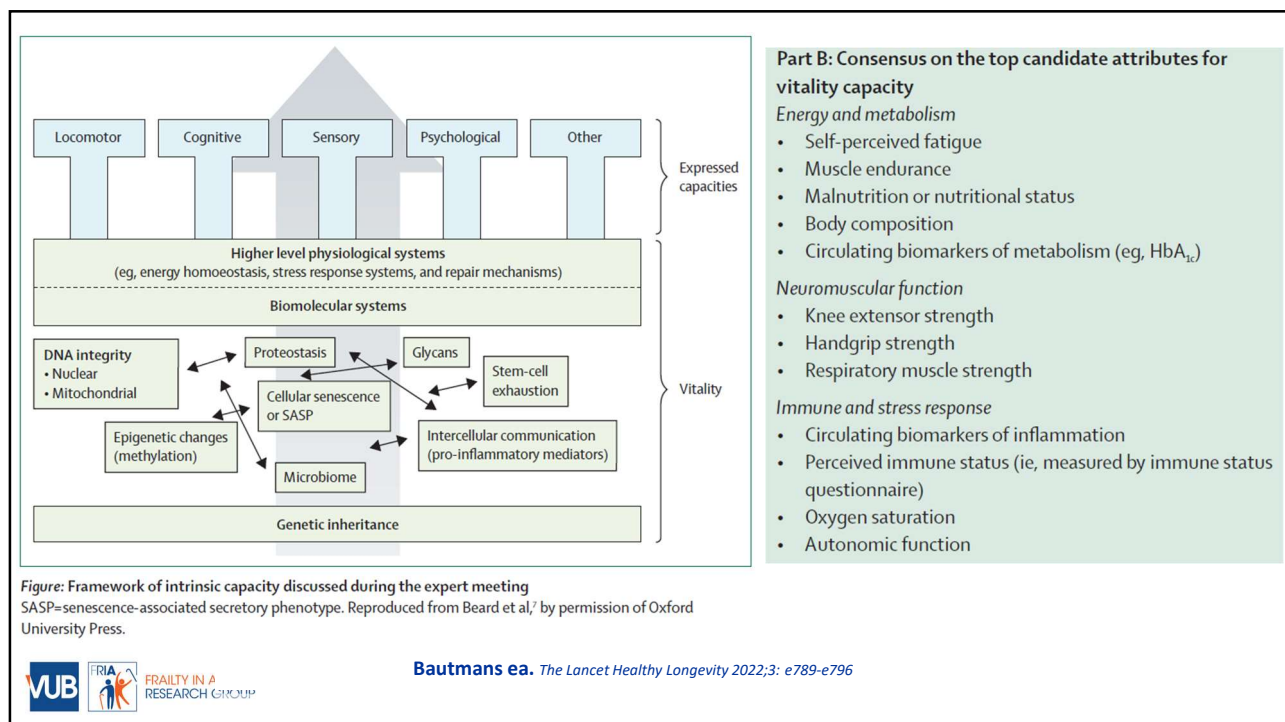
Frailty is the main barrier for healthy ageing



6



7



8

| | Feasible to quantify biomarkers or proxy biomarkers | Feasible to measure or collect in low-resource settings | Useful and informative for monitoring | Distinct attribute | Acceptable cost and resource demand | Sufficient availability and no ethical concerns | Implementable |
|--|---|---|---------------------------------------|--------------------|-------------------------------------|---|---------------|
| Energy and metabolism | | | | | | | |
| Self-perceived fatigue | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Muscle endurance | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Malnutrition or nutritional status | Yes | Yes | Yes | Neutral | Yes | Yes | Yes |
| Body composition | Yes | Neutral | Yes | Yes | Neutral | Neutral | Neutral |
| Circulating biomarkers of metabolism | Yes | No | Yes | Yes | No | Neutral | No |
| Neuromuscular function | | | | | | | |
| Knee extensor strength | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Handgrip strength | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Respiratory muscle strength | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Immune and stress response | | | | | | | |
| Circulating biomarkers of inflammation | Neutral | No | Neutral | Yes | No | No | No |
| Perceived immune status | Yes | Yes | No | Yes | Yes | Yes | Yes |
| Oxygen saturation | Yes | Neutral | Yes | Yes | Neutral | Neutral | Neutral |
| Autonomic function | Yes | Neutral | Yes | Yes | Neutral | Neutral | Neutral |

Table: Attributes and criteria applied to potential biomarkers of vitality capacity

Muscle weakness as primary indicator of sarcopenia

Age and Ageing 2018; ●: 1–16
doi:10.1093/ageing/afy169

© The Author(s) 2018. Published by Oxford University Press on behalf of the British Geriatrics Society. This is an Open Access article distributed under the terms of the Creative Commons Attribution Non-Commercial License (<http://creativecommons.org/licenses/by-nc/4.0/>), which permits non-commercial re-use, distribution, and reproduction in any medium, provided the original work is properly cited. For commercial re-use, please contact journals.permissions@oup.com.


GUIDELINES

Sarcopenia: revised European consensus on definition and diagnosis


ALFONSO J. CRUZ-JENTOFF¹, GUSTAV BAHAT², JURGEN BAUER³, YVES BOIRE⁴, OLIVIER BRUYER⁵, TOMMY CEDERHOLM⁶, CURTIS COOPER⁷, FRANCESCO LANDI⁸, YVES ROLLAND⁹, AVIN AHIE SATYR¹⁰, STEPHANE M. SCHNEIDER¹¹, CORNEL C. SEBER¹², EVA TOPPANOVA¹³, MAURITS VANDERWOUDE¹⁴, MARCOEN VISSER¹⁵, MAURO ZAMBONI¹⁶, WRITING GROUP FOR THE EUROPEAN WORKING GROUP ON SARCOFENIA IN OLDER PEOPLE 2 (EWGSOP2), AND THE EXTENDED GROUP FOR EWGSOP2

Key points

- In the updated definition of sarcopenia, EWGSOP2 elevates low strength to the forefront as a primary indicator of probable sarcopenia.




Belgian Society for
GERONTOLOGY
and GERIATRICS



MUSCLE STRENGTH


Sarcopenia Guideline 2018-2019 - Assessment




WHY?

Muscle strength is the primary parameter of sarcopenia according to European Working Group on Sarcopenia in Older People (EWGSPOR).


Muscle strength can be assessed by various measurement methods and on various parameters. To assess general muscle strength in a clinical setting, to date best evidence is available for using maximum handgrip strength of the dominant hand. The proposed recommendation is aimed at the need to drive clinical action.




$N = \sigma 1755 - \text{♀} 2194$




GRIP STRENGTH




Hydraulic dynamometer




T-SCORES



Pneumatic dynamometer






HOW?

A systematic search on reference values for muscle mass was performed:

- Population: young/healthy men & women (20-39)
- Exposure: grip strength
- Outcome: reference values
- Study design: observational / RCT (baseline)
- Quality assessment: COSMIN checklist

| MEN WOMEN | | VERY LOW | AT RISK | NORMAL |
|------------------------------------|------------|----------|---------|--------|
| REFERENCE DATA | | | | |
| Hydraulic dynamometer | [kg] | 25.11 | 38.23 | 59.51 |
| Pneumatic dynamometer | [kg] | 23.41 | 35.59 | 55.16 |
| CUSTOM CONSENSUS STATEMENTS | | | | |
| PROPOS 2 | [kg] | 27.06 | | |
| PROPOS 2 | [kg/100kg] | 26.16 | 32.52 | |
| PROPOS 2 | [kg/100kg] | | 1.0-1.6 | |



DATA HANDLING

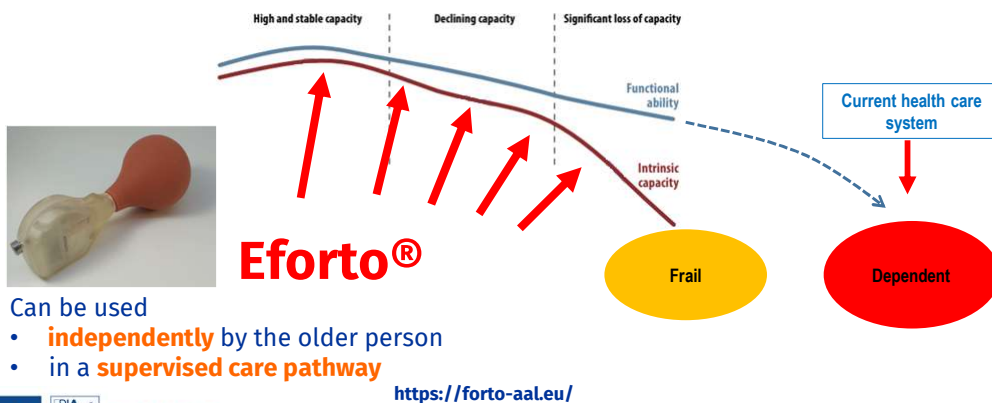
Initial umbrella review revealed no relevant systematic reviews. Subsequently, a systematic search was performed and revealed 912 eligible reviews of which 14 were finally included.

Mean, standard deviation and number of Participants was retrieved. Subsequently, standard error, pooled degrees of freedom and pooled standard deviation was calculated.

Finally, overall T-scores were calculated.

| | MEN | WOMEN | |
|-----------------|-----------------------|-----------------------|--|
| VERY LOW | < 25 kg | < 13 kg | → TREATMENT and all measures |
| | < 71 kgPa | < 41 kgPa | |
| AT RISK | 25 kg < X < 38 kg | 11 kg < X < 21 kg | → SECONDARY PREVENTION action should be undertaken to prevent worsening |
| | 71 kgPa < X < 93 kgPa | 41 kgPa < X < 59 kgPa | |
| NORMAL | > 38 kg | > 21 kg | → PRIMARY PREVENTION healthy within the norm |
| | > 93 kgPa | > 59 kgPa | |

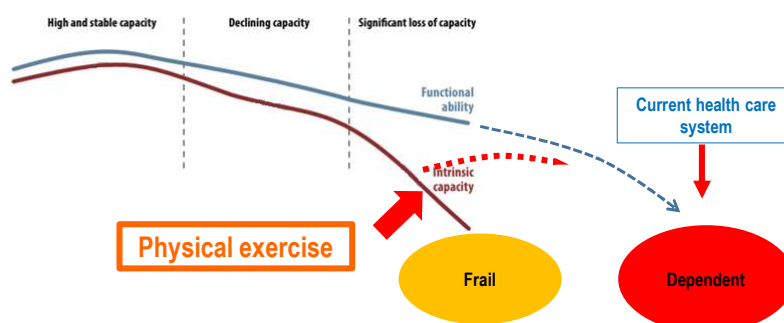
Anticipating frailty by monitoring handgrip muscle strength & fatigability as a biomarker of an older person's physical reserves.



Adapted from www.who.int/ageing/events/world-report-2015-launch/en/

11

Physical exercise to promote healthy ageing



Vermeiren ea, JAMDA 2016. 17(12): p. 1163 e1-1163 e17



Adapted from www.who.int/ageing/events/world-report-2015-launch/en/

12

J Nutr Health Aging, 2019;
© Servit and Springer-Verlag International SAS, part of Springer Nature

EXERCISE INTERVENTIONS FOR THE PREVENTION AND TREATMENT OF SARCOPENIA. A SYSTEMATIC UMBRELLA REVIEW

D. BECKWÉE^{1,2,3,4}, A. DELAERE², S. AELBRECHT², V. BAERT², C. BEAUDART³, O. BRUYERE⁵, M. DE SAINT-HUBERT⁶, I. BAUTMANS^{2,4}, ON BEHALF OF THE SARCOPENIA GUIDELINES DEVELOPMENT GROUP OF THE BELGIAN SOCIETY OF GERONTOLOGY AND GERIATRICS (BSGG)⁴

CEBAM APPROVED
Belgian Centre for Evidence-Based Medicine

PHYSICAL EXERCISE
Sarcopenia Guideline 2018-2019 - Intervention
BVGG - SBGG

WHY?
To provide an evidence-based overview of the possible physical exercise interventions for sarcopenia targeting one or more of the three sarcopenia domains (muscle mass, muscle strength or physical performance).

RESISTANCE TRAINING

- ✓ Muscle mass
- ✓ Muscle strength
- ✓ Physical performance

3 meta-analysis (75 st.)
2 systematic review
(24 studies - 100% in favour)

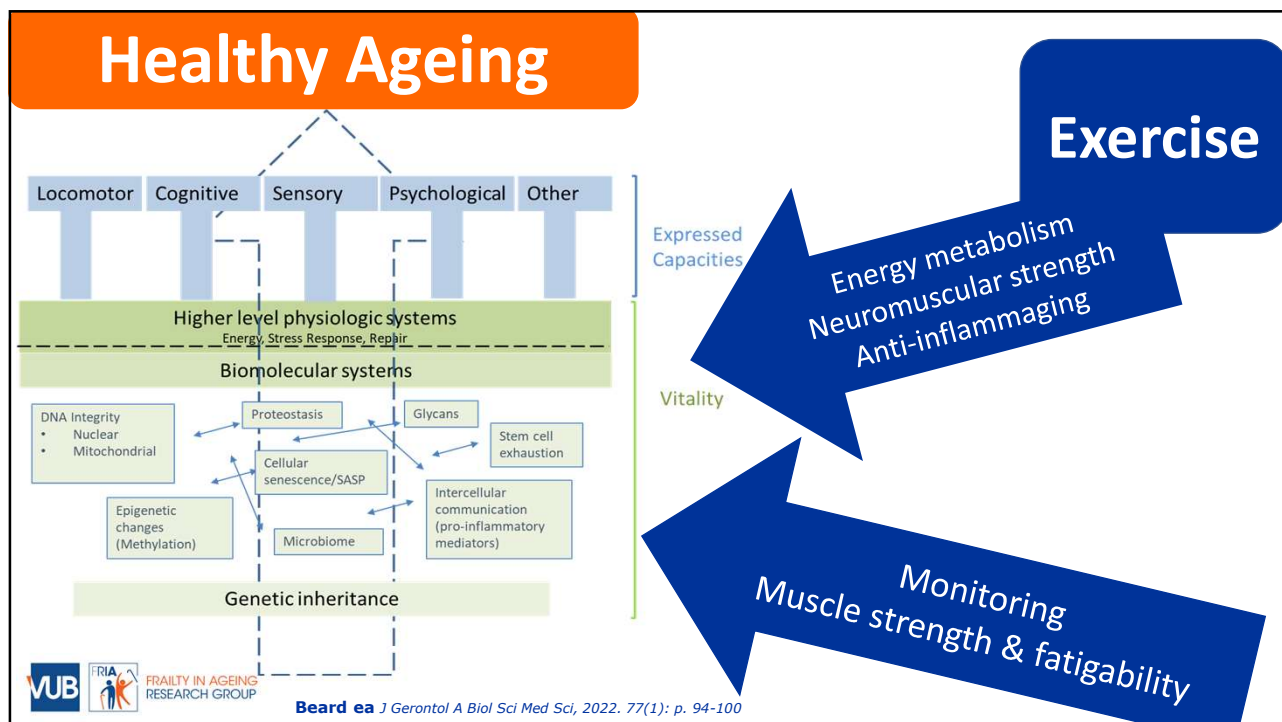
HOW?

- large muscle group training in a total body approach
- 1-4 sets of 8-15 repetitions during 2-3 training moments a week
- elastic bands can be used effectively at home to improve muscle strength

<https://geriatrie.be/the-bsgg/initiatives/works-and-contributions/sarcopenia-guidelines/>

VUB FRIA FRAILTY IN AGEING RESEARCH GROUP

13



14

NEW!!! Research Master in Gerontological Sciences

**For excellent BaSc &
MaSc students
interested in
Healthy Ageing**

| MASTER YEAR 1 | SEM | ECTS | MASTER YEAR 2 | SEM | ECTS |
|--|-----|-----------|---|-----|-----------|
| Master Classes Statistics (Quantitative & Qualitative) | 1+2 | 6 | Scientific Internship Part 1 | 1 | 18 |
| Biological and Biomedical Fundaments of Ageing | 1 | 6 | Elective Courses | 1 | 6 |
| Psychological Fundaments of Ageing | 1 | 6 | Advanced Master Classes Statistics (Quantitative & Qualitative) | 1 | 3 |
| Social Fundaments of Ageing | 1 | 6 | Writing a Research Application Part 2 | 1 | 3 |
| Ethics Related to Ageing | 1 | 3 | Master Thesis Part 2 | 2 | 24 |
| Systematic Literature Review Part 1 | 1 | 3 | Scientific Internship Part 2 | 2 | 6 |
| Systematic Literature Review Part 2 | 2 | 9 | Total | | 60 |
| Clinimetrics and Comprehensive Gerontological Assessment | 2 | 6 | Excellent preparation for PhD! | | |
| Master Thesis Part 1 | 2 | 6 | Info: | | |
| Writing a Research Application Part 1 | 2 | 6 | https://www.vub.be/en/study/research-master-gerontological-sciences | | |
| Organisational and Intercultural Aspects of Ageing | 2 | 3 | Ivan.Bautmans@vub.be | | |
| Total | | 60 | | | |

