

JOURNÉE GLN

Les lipides pour les seniors

Besoins, alimentation, physiopathologie

NUTRITION ET FRAGILITÉ : DONNÉES ÉPIDÉMIOLOGIQUES

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06 Novembre 2018

Aging of the population worldwide and increase of disability prevalence

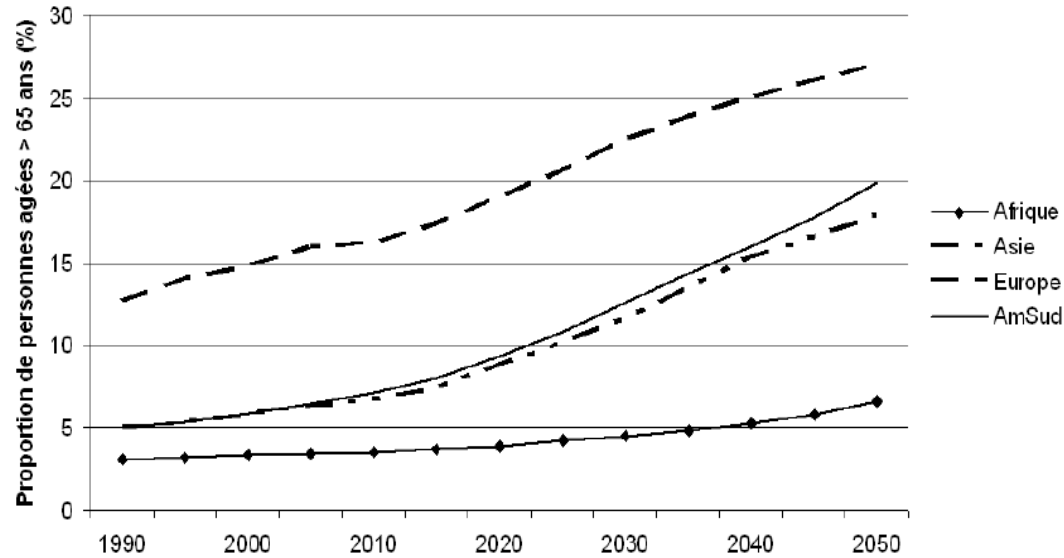
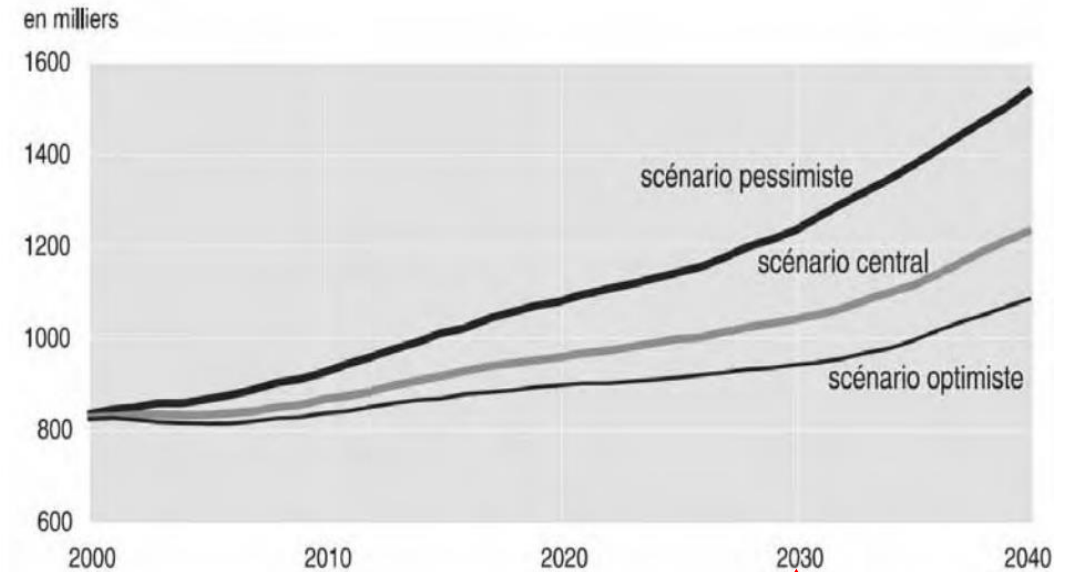


Figure 1 - Evolution de la proportion de personnes âgées de plus de 65 ans en Afrique, Asie Europe et Amérique de Sud, de 1990 à 2050 - *World Population Prospects: The 2010 Revision*. United Nations Organisation.

AmSud : Amérique du Sud

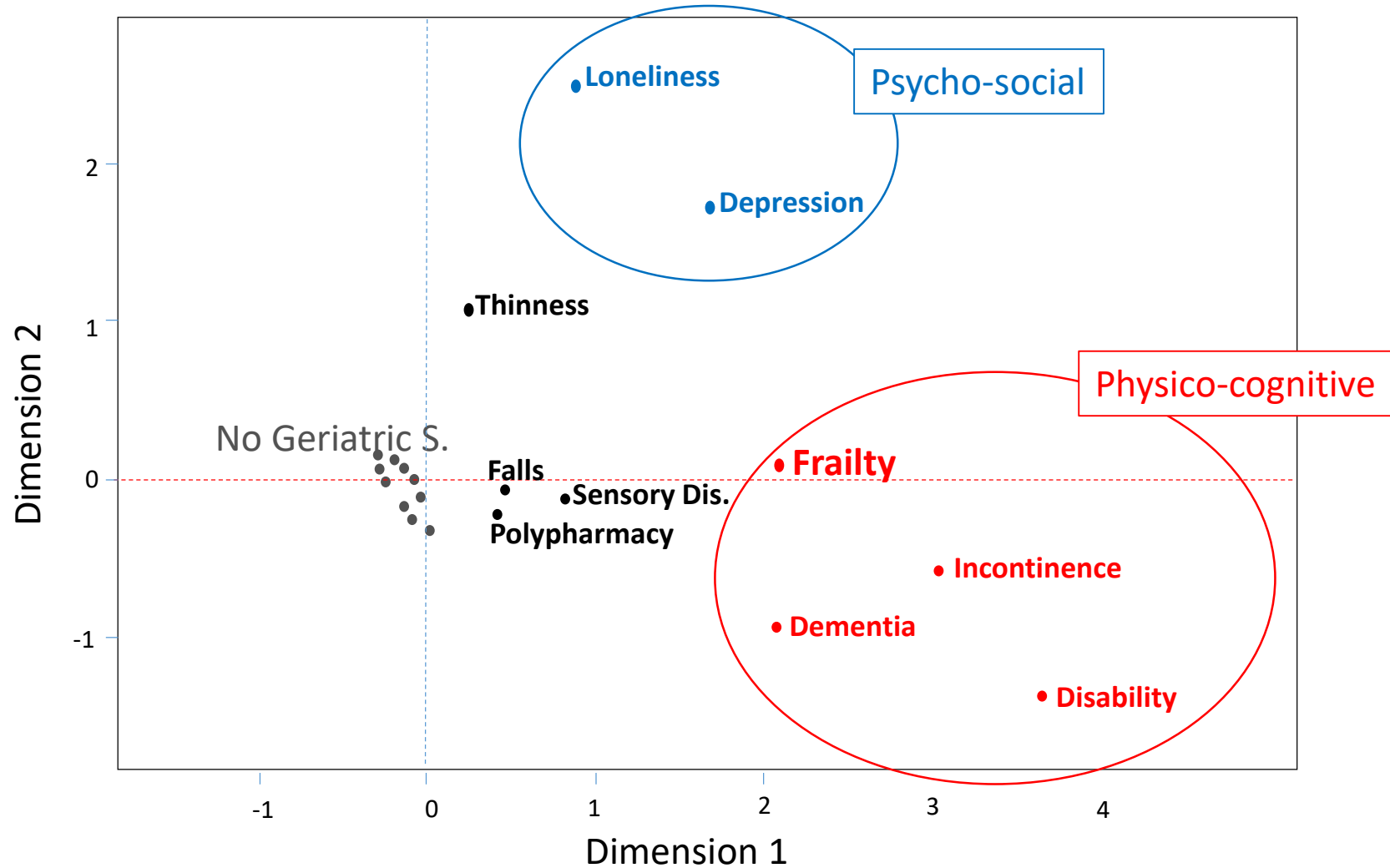
Figure 4: Évolution du nombre de personnes âgées dépendantes



Source: (Duée & Rebillard, 2006)

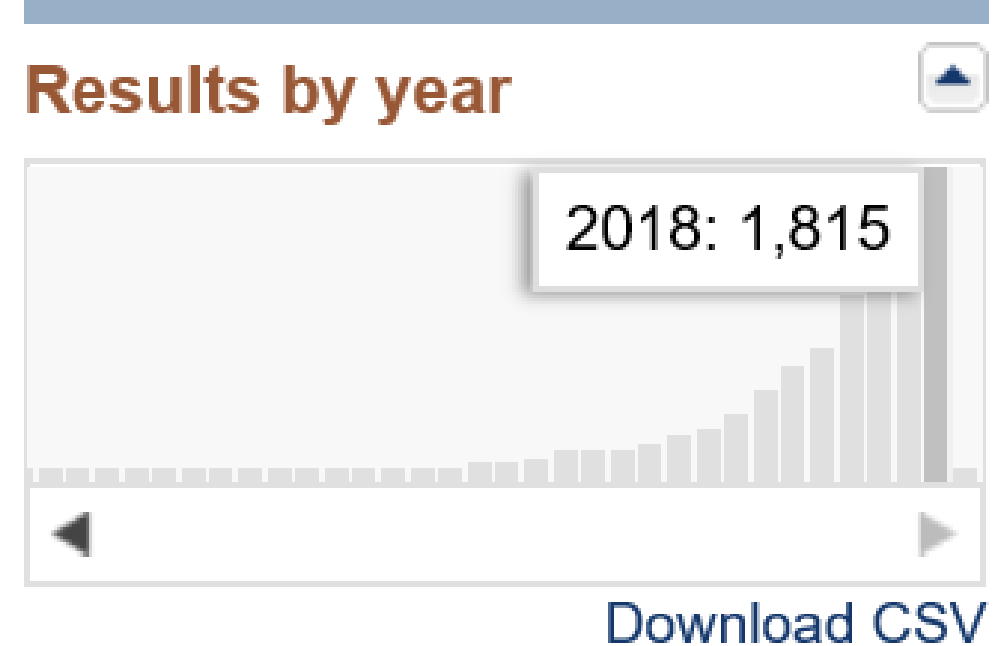
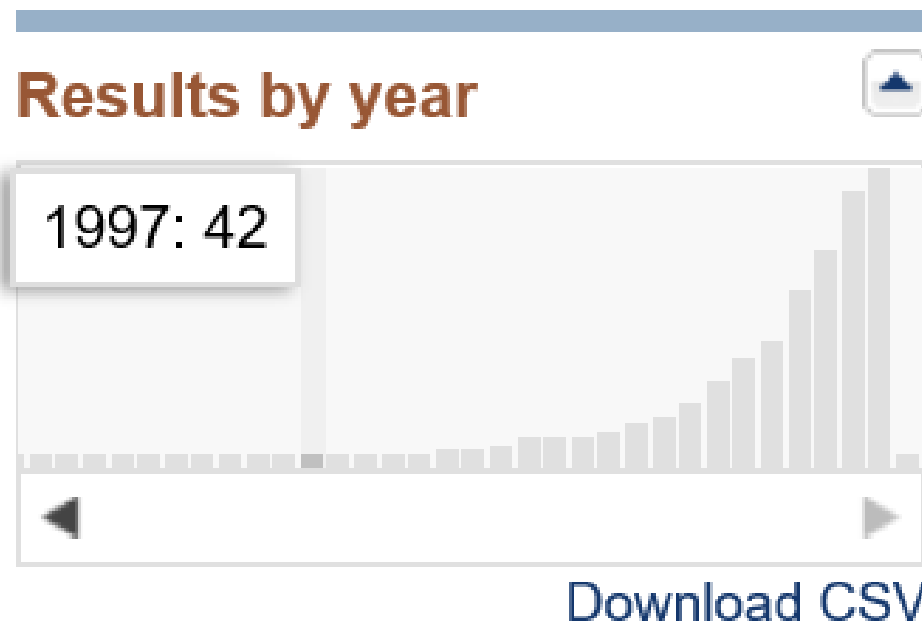
Baby-boomers 80y and over

Co-occurrence des syndromes gériatriques



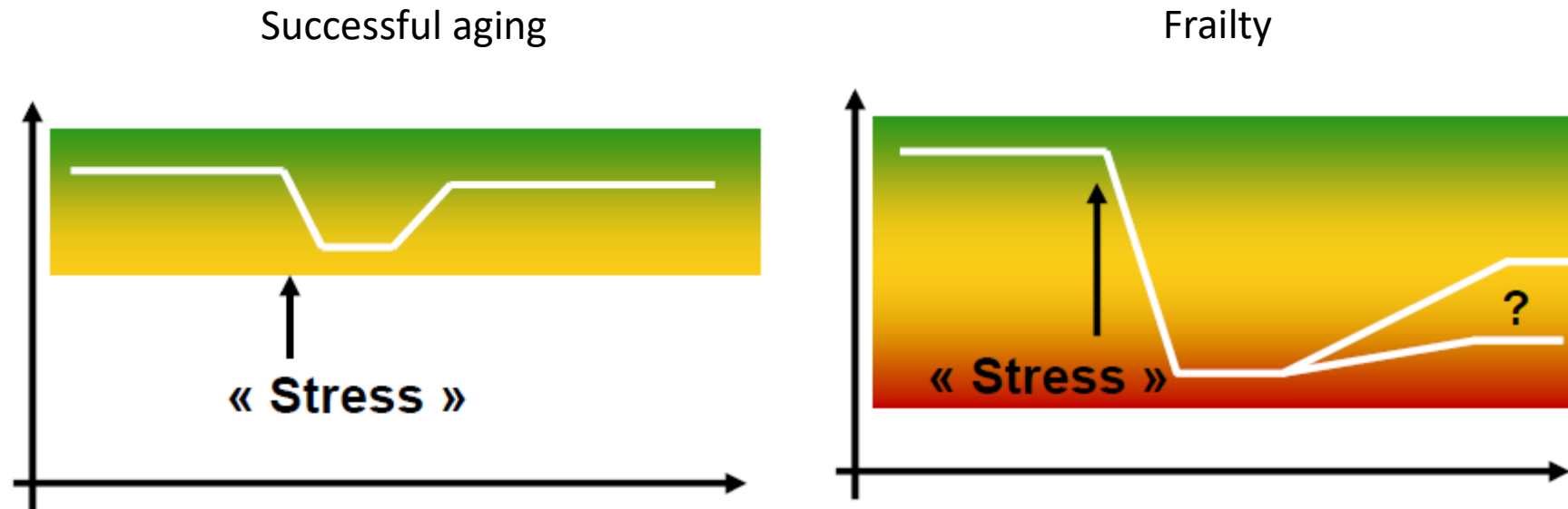
Tabue Teguo et al. J Gerontol 2017 (update H. Pella)

Intérêt pour la fragilité dans la communauté scientifique



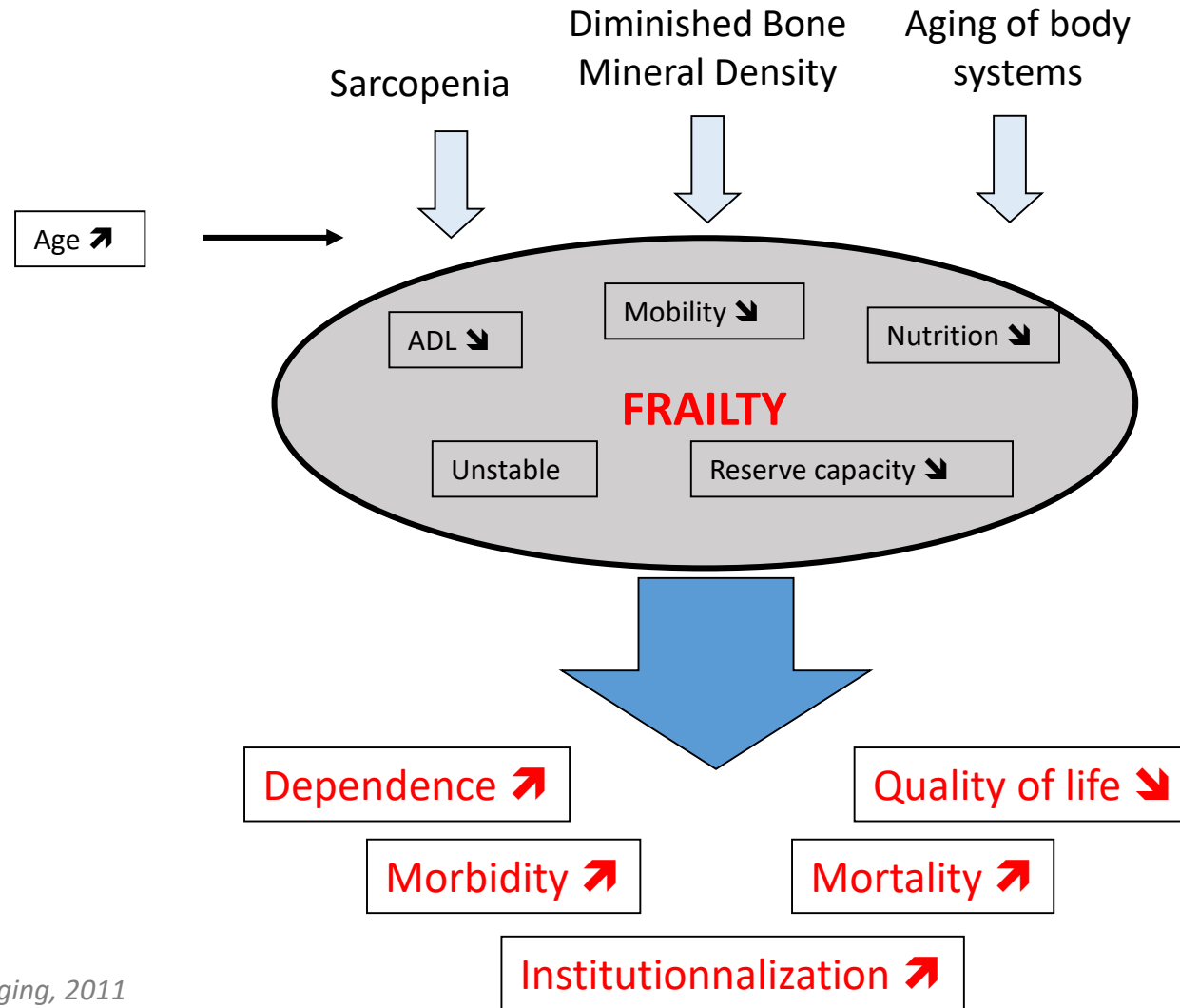
Search term: FRAILTY

Concept de fragilité



- Lack of adaptation, no compensation, to environmental changes over time
- At an integrative level: from cells to organism

Conséquences de la fragilité



Pel-Littel et al., J Nutr Health Aging, 2011

Sarcopénie : substratum physiologique

Age and Ageing 2018; 0: 1–16
doi: 10.1093/ageing/afy169

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GUIDELINES

Sarcopenia: revised European consensus on definition and diagnosis

ALFONSO J. CRUZ-JENTOFT¹, GÜLISTAN BAHAT², JÜRGEN BAUER³, YVES BOIRIE⁴, OLIVIER BRUYÈRE⁵, TOMMY CEDERHOLM⁶, CYRUS COOPER⁷, FRANCESCO LANDI⁸, YVES ROLLAND⁹, AVAN AIHIE SAYER¹⁰, STÉPHANE M. SCHNEIDER¹¹, CORNEL C. SIEBER¹², EVA TOPINKOVA¹³, MAURITS VANDEWOUDE¹⁴, MARJOLEIN VISSER¹⁵, MAURO ZAMBONI¹⁶, WRITING GROUP FOR THE EUROPEAN WORKING GROUP ON SARCOPENIA IN OLDER PEOPLE 2 (EWGSOP2), AND THE EXTENDED GROUP FOR EWGSOP2

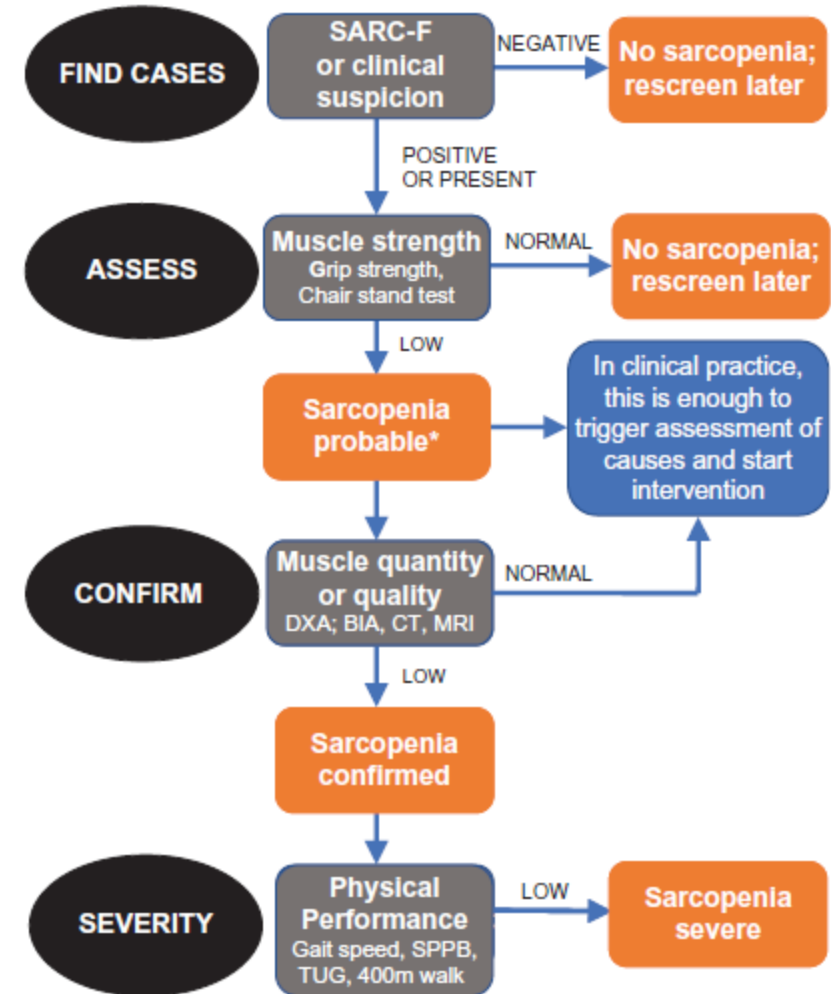


Figure 1. Sarcopenia: EWGSOP2 algorithm for case-finding, making a diagnosis and quantifying severity in practice. The

Index pour identifier la fragilité



RESEARCH ARTICLE

Comparative analysis of the association between 35 frailty scores and cardiovascular events, cancer, and total mortality in an elderly general population in England: An observational study

Gloria A. Aguayo^{1*}, Michel T. Vaillant², Anne-Françoise Doi Saverio Stranges⁴, Laurent Malisoux¹, Anna Chioti¹, Michèle Daniel R. Witte^{6,7}

Journal of Gerontology: MEDICAL SCIENCES
Cite journal as: *J Gerontol A Biol Sci Med Sci*
doi:10.1093/gerona/gls119

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Searching for an Operational Definition of Frailty: A Delphi Method Based Consensus Statement. The Frailty Operative Definition-Consensus Conference Project

Leocadio Rodríguez-Mañas,¹ Catherine Féart,^{2,3} Giovanni Mann,⁴ Jose Viña,⁵ Somnath Chatterji,⁶ Wojtek Chodzko-Zajko,⁷ Magali Gonzalez-Colaço Harmand,¹ Howard Bergman,⁸ Laure Carcaillon,^{1,9} Caroline Nicholson,⁴ Angelo Scuteri,¹⁰ Alan Sinclair,¹¹ Martha Pelaez,¹² Tischa Van der Cammen,¹³ François Beland,¹⁴ Jerome Bickenbach,¹⁵ Paul Delamarche,¹⁶ Luigi Ferrucci,¹⁷ Linda P. Fried,¹⁸ Luis Miguel Gutiérrez-Robledo,¹⁹ Kenneth Rockwood,²⁰ Fernando Rodríguez Artalejo,²¹ Gaetano Serviddio,²² and Enrique Vega²³; on behalf of the FOD-CC group (Appendix 1)

Prévalence de la fragilité en population âgée

BRIEF REPORTS

Prevalence of Frailty in Community-Dwelling Older Persons A Systematic Review

Rose M. Collard, MSc,^{*†} Han Boter, PhD,[‡] Robert A. Schoevers, MD, PhD,[§] and Richard C. Oude Voshaar, MD, PhD^{*§}

OBJECTIVES: To systematically compare and pool the prevalence of frailty, including prefrailty, reported in community-dwelling older people overall and according to sex, age, and definition of frailty used.

constitutes an important step forward. *J Am Geriatr Soc* 60:1487–1492, 2012.

Key words: frailty; prevalence; elderly

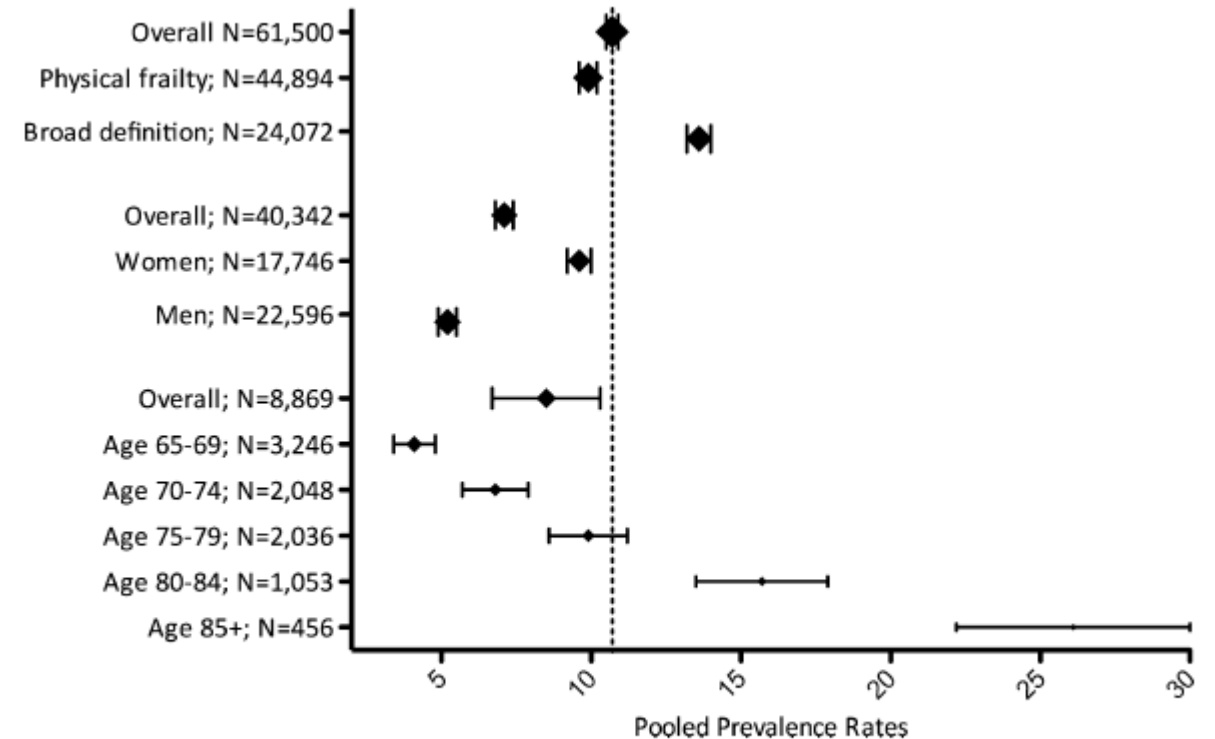
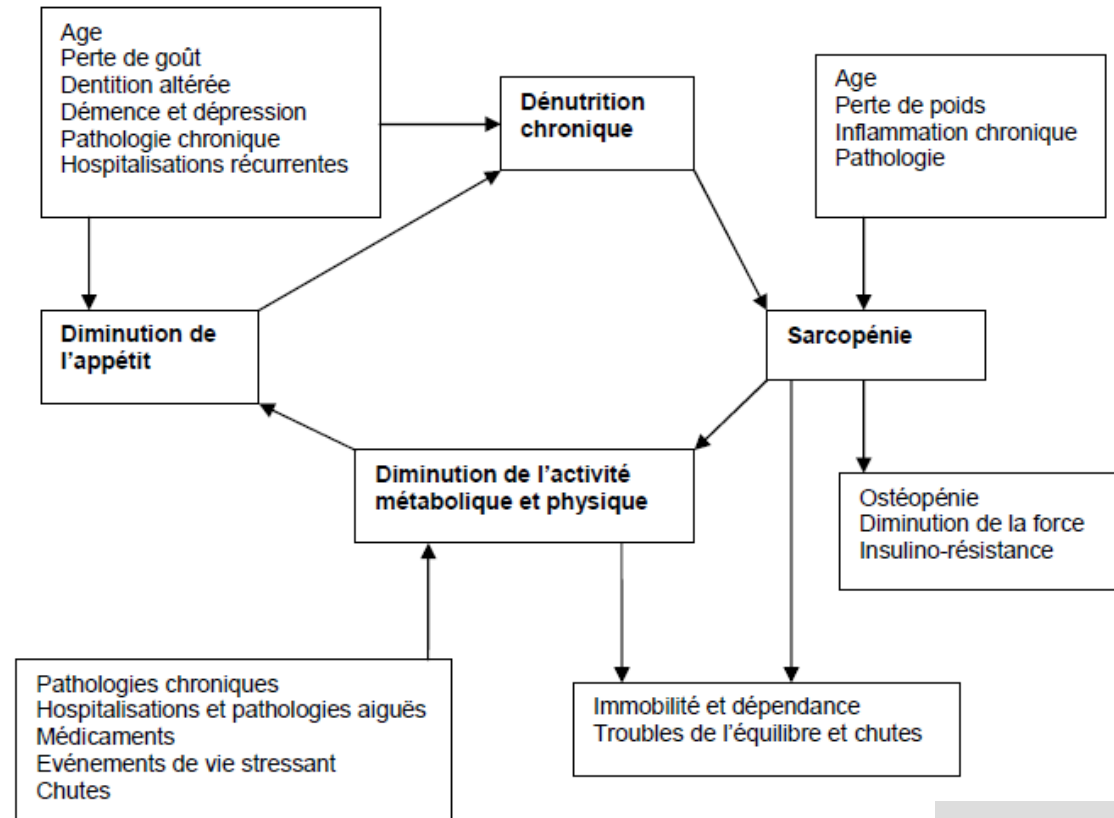


Figure 1. Prevalence of frailty and 95% confidence intervals.

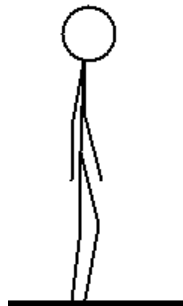
Fragilité : phénotype proposé par Fried



Fried et al. *J Gerontol*, 2001

Fragilité : phénotype proposé par Fried

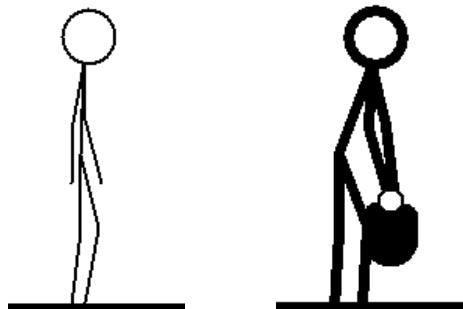
→ Unintentional weight loss



- **Weight loss > 4.5 kg/ y**
- **5% of the weight the y
n-1**
- **BMI < 21 kg/m²**

Fragilité : phénotype proposé par Fried

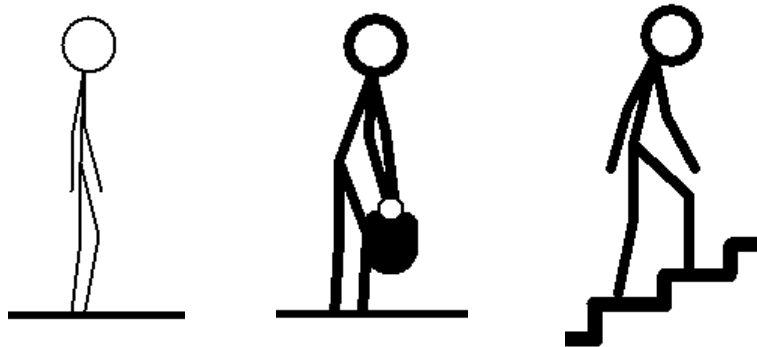
- Unintentional weight loss
- Weakness (grip strength)



- Dynamometer JAMAR (based on sex + BMI quartiles)
- Chair stand test

Fragilité : phénotype proposé par Fried

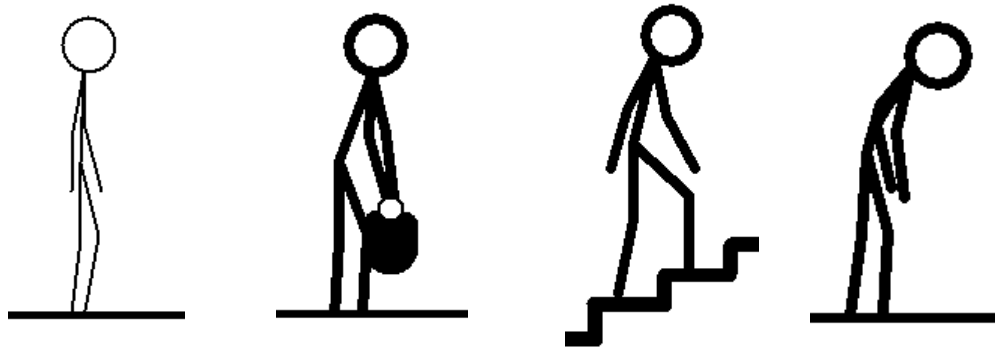
- Unintentional weight loss
- Weakness (grip strength)
- Slowness



- 4m, stratified on sex and height
- Threshold: 6 - 7 sec

Fragilité : phénotype proposé par Fried

- Unintentional weight loss
- Weakness (grip strength)
- Slowness
- Fatigue



- CES-D scale:

“I felt that anything I did was a big effort”

“I felt that I could not keep on doing things”

at least 3 to 4 days a week

Fragilité : phénotype proposé par Fried

- Unintentional weight loss
- Weakness (grip strength)
- Slowness
- Fatigue
- Low physical activity



<383 kcal / sem ♂ ;
<270 kcal / sem ♀
- Sport < 1h /w
± Leisure activities
< 3.5h /w

Fragilité : phénotype proposé par Fried

- Unintentional weight loss
- Weakness (grip strength)
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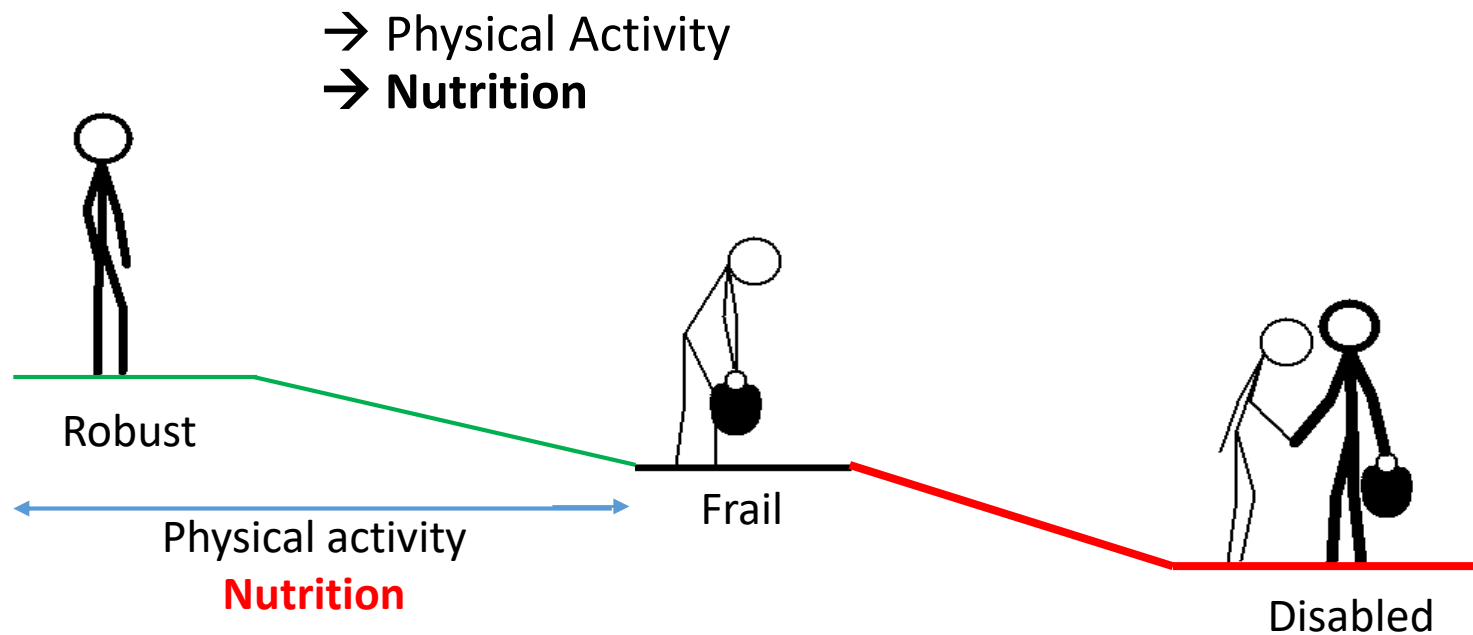
3 out of 5 = FRAILTY



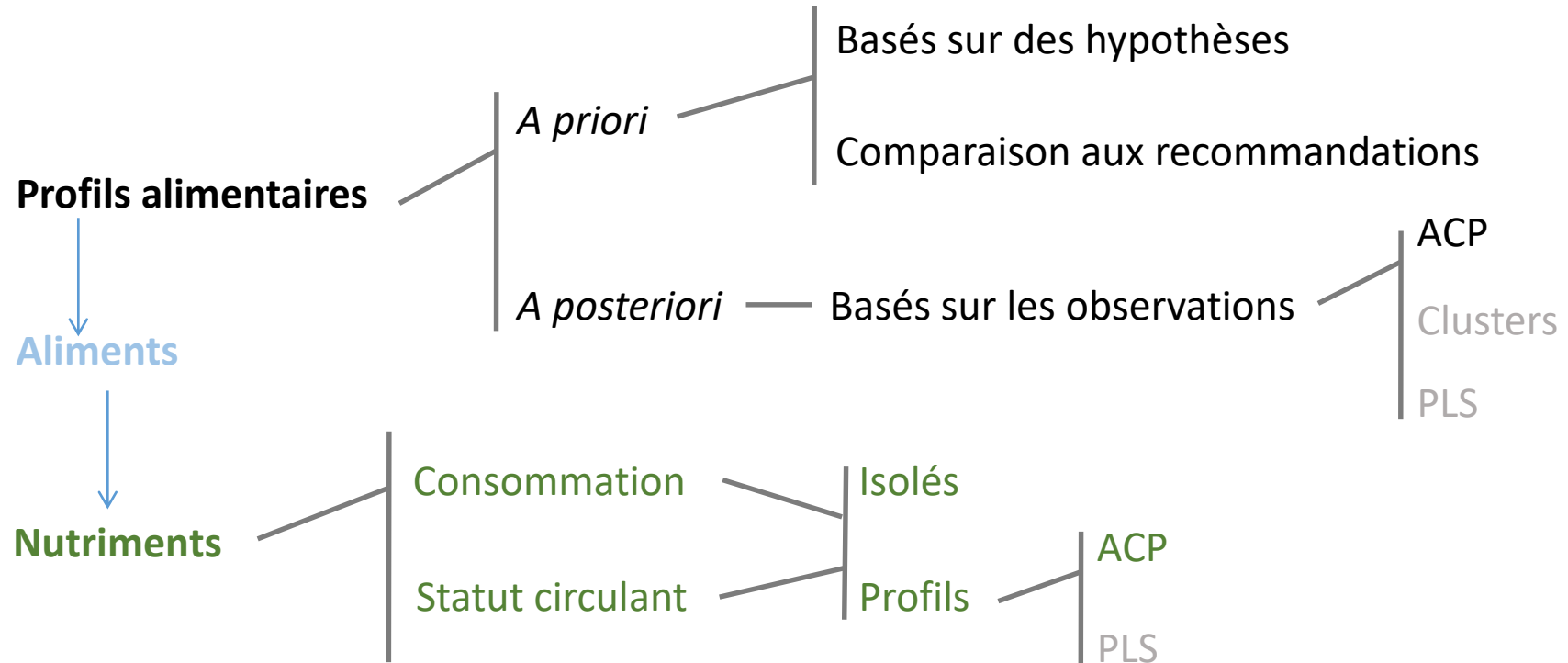
<383 kcal / sem ♂ ;
<270 kcal / sem ♀
- Sport < 1h /w
± Leisure activities
< 3.5h /w

Fragilité : Intérêt en santé publique

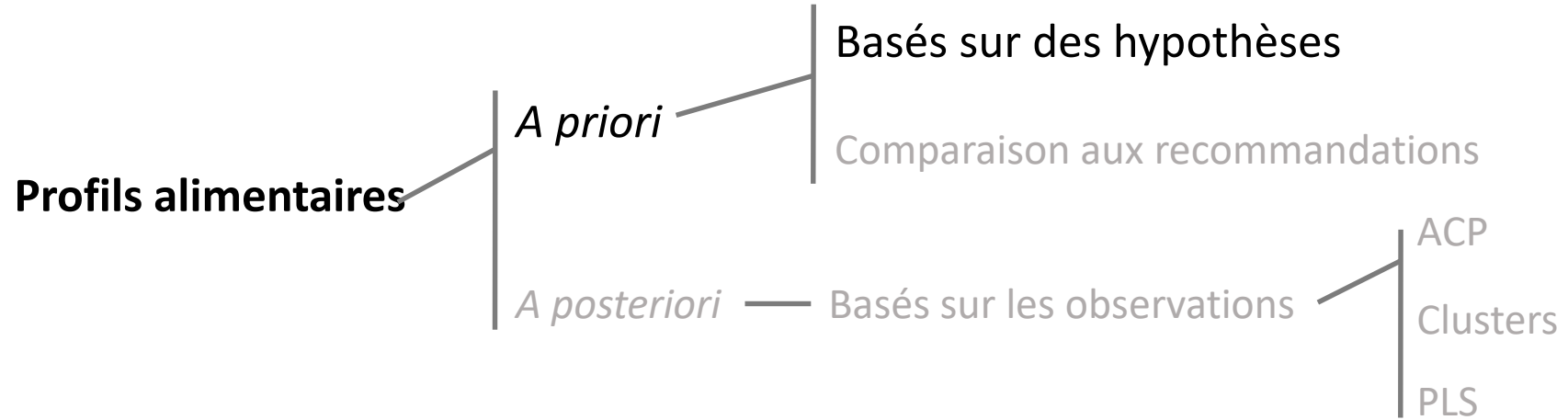
- Interest for public health: increased risk of disability, institutionalisation, death
- Possibility to reverse from frailty to robustness



Approches méthodologiques de l'évaluation de l'exposition nutritionnelle



Approches méthodologiques de l'évaluation de l'exposition nutritionnelle



	Nutrients	Food groups
Mediterranean diet ⁷³⁻⁷⁵	High intake of folate, vitamin E, carotenoids, flavonoids and other antioxidants, dietary fibre, and monounsaturated fatty acids; balanced intake of unsaturated fatty acids; reasonably high intake of n-3 fatty acids; and low intake of saturated fatty acids	High consumption of fruits, vegetables, wholegrains, and olive oil; everyday consumption of fermented dairy, nuts, seeds, herbs or spices; emphasis on plant proteins (legumes) and seafood instead of red meat; wine in moderation; and daily consumption of herbal infusions
DASH diet ⁶	High in potassium, magnesium, calcium, fibre, and protein; low in saturated fatty acids, total lipids, cholesterol, and sodium; and high intake of folate, vitamin E, carotenoids, flavonoids, and other antioxidants	High consumption of fruits, vegetables, low-fat dairy products, and wholegrains; reasonably high consumption of lean animal protein but low consumption of red meat; and emphasis on foods that are low in saturated and trans lipids, sodium, and sugar
MIND diet ⁷	High intake of folate, vitamin E, carotenoids, flavonoids and other antioxidants, dietary fibre, and monounsaturated fatty acids, and low intake of saturated and trans fatty acids	Increased consumption of green leafy or other vegetables, nuts, berries, beans, wholegrains, fish, poultry, olive oil, and wine, and decreased consumption of red meats, butter and stick margarine, cheese, pastries, sweets, and fried or fast foods

DASH=Dietary Approaches to Stop Hypertension. MIND=Mediterranean-DASH Intervention for Neurodegenerative Delay.

Table 2: Dietary patterns related to cognitive function

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MeDi

Mediterranean diet pyramid today

Mediterranean diet pyramid: a lifestyle for today guidelines for adult population

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Serving size based on frugality and local habits

Wine in moderation and respecting social beliefs



© 2010 Fundacion dieta mediterranea the use and promotion of this pyramid is recommended without any restriction

2010 edition

s = Serving

MeDi

Table 1 Food groups among the different Mediterranean countries

Sofi et al., *Curr Opin Lipidol*, 2009

	Bread	Pasta	Other cereals	Fruit	Vegetables	Fish	Legumes	Cheese	Wine	Olive oil
Italy	√	√	+	++	++	++	+	+	++	√
Greece	√	-	+	++	√	++	+	√	+	√
France	√	-	+	+	++	+	+	√	√	++
Spain	+	+	+	++	++	++	+	+	+	√
North Africa	+	-	√	+	++	+	++	+	-	++
East basin	+	-	++	+	++	+	+	+	-	++

-, not common; +, moderately common; ++, highly common; √, peculiar.

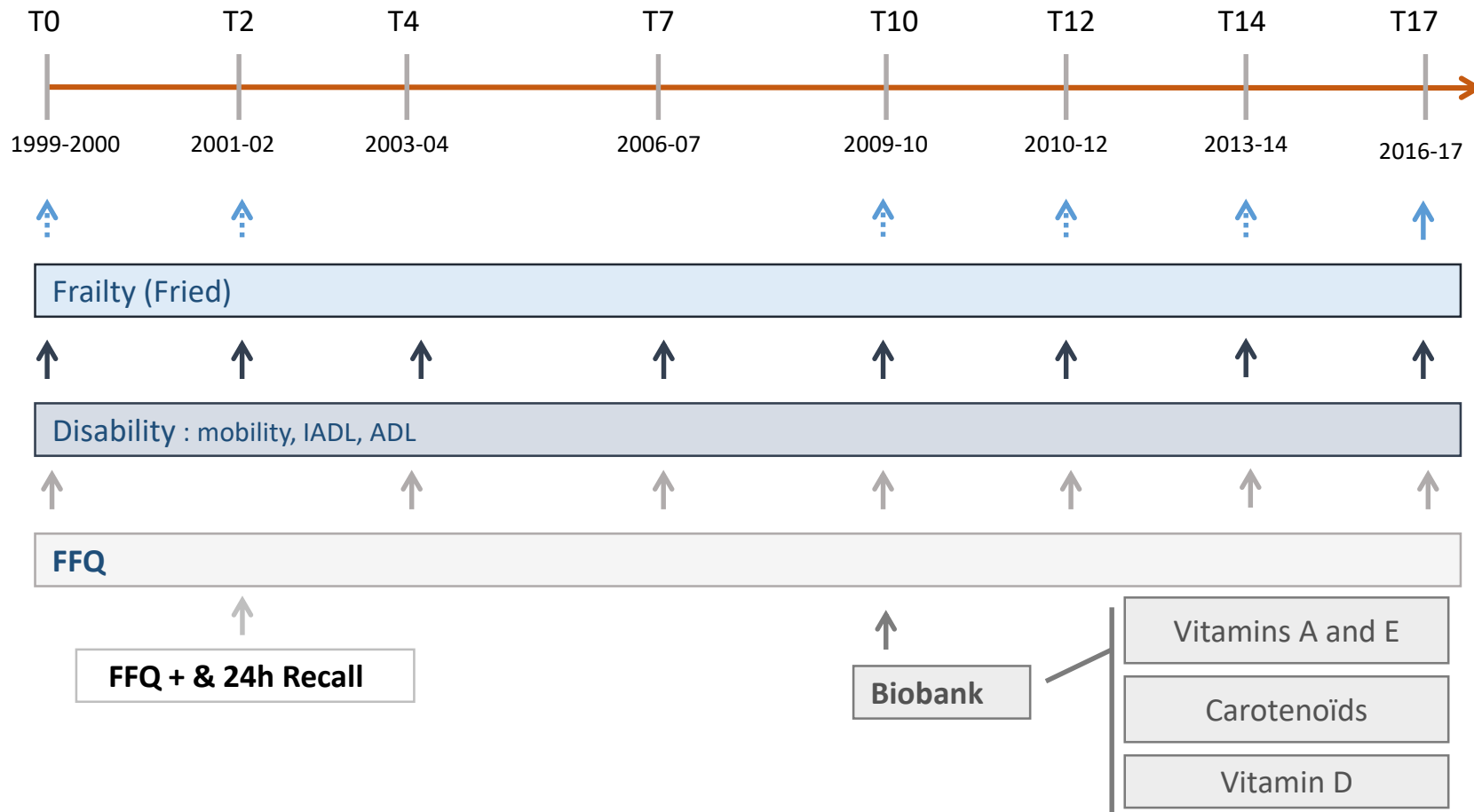


MeDi : effets + sur la santé en général

	Relative Risk	CI 95%
Death	0.92	0.91-0.93
Cardiovascular events(incidence or mortality)	0.90	0.87-0.93
Cancer (incidence or mortality)	0.94	0.92-0.96
Neurodegenerative diseases	0.87	0.81-0.94
Disability 🧠	0.50	0.32-0.78

Bach-Faig et al. *Public Health Nutrition*, 2011 ; Sofi et al. *BMJ* 2008 & *Public Health Nutr* 2014 ; Féart et al. *Eur J Epidemiol* 2011

Cohorte Trois-Cités



MeDi & Frailty

- Few longitudinal studies
 - Talegawkar et al. (2012): n=690, age 73 y on average, FU 6 y & frailty = 2/4 items
 - León-Muñoz et al. (2014): n=1815, age 60+ y, FU 3.5 y, no adjustment for major confounders (cognition)

MeDi & Frailty

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Clinical Nutrition

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



Original article

High adherence to a Mediterranean diet and lower risk of frailty among French older adults community-dwellers: Results from the Three-City-Bordeaux Study

Berna Rahi*, Soufiane Ajana, Maturin Tabue-Teguo, Jean-François Dartigues, Karine Peres, Catherine Féart



MeDi & Frailty

- Few longitudinal studies
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 - León-Muñoz et al. (2014): n=1815, age 60+ y, FU 3.5 y, no adjustment for major confounders (cognition)
- 3C: N=560, 81.3 y, 79 frail at 2y FU

	HR	CI 95%	P
MeDi score			
+ 1 unit	0.80	0.67-0.96	0.02
Low MeDi adherence	REF		0.009
Middle MeDi adherence	0.57	0.26-1.26	
High MeDi adherence	0.32	0.14-0.72	

Rahi et al. Clin Nutr 2017

MeDi & Frailty: SLR and meta-analyses

REVIEW ARTICLE

Adherence to Mediterranean Diet Reduces Incident Frailty Risk: Systematic Review and Meta-Analysis

Gotaro Kojima, MD, Christina Avgerinou, PhD, Steve Iliffe, BSc and Kate Walters, PhD

JAGS, 2018

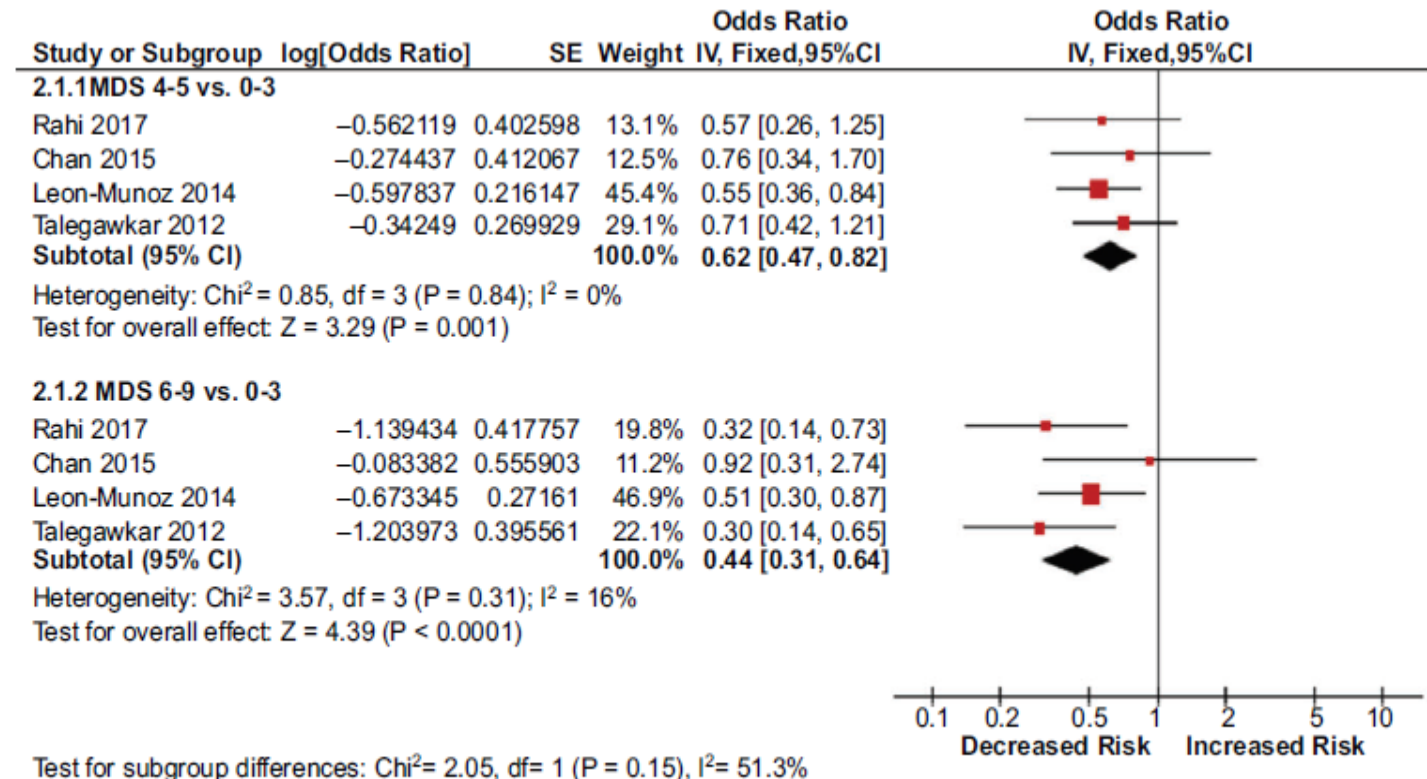


Figure 2. Forest plots of incident frailty risk according to Mediterranean diet score (4–5 vs 0–3; 6–9 vs 0–3).

MeDi & Frailty: SLR and meta-analyses

Figure 2

Adherence to a Mediterranean diet and frailty

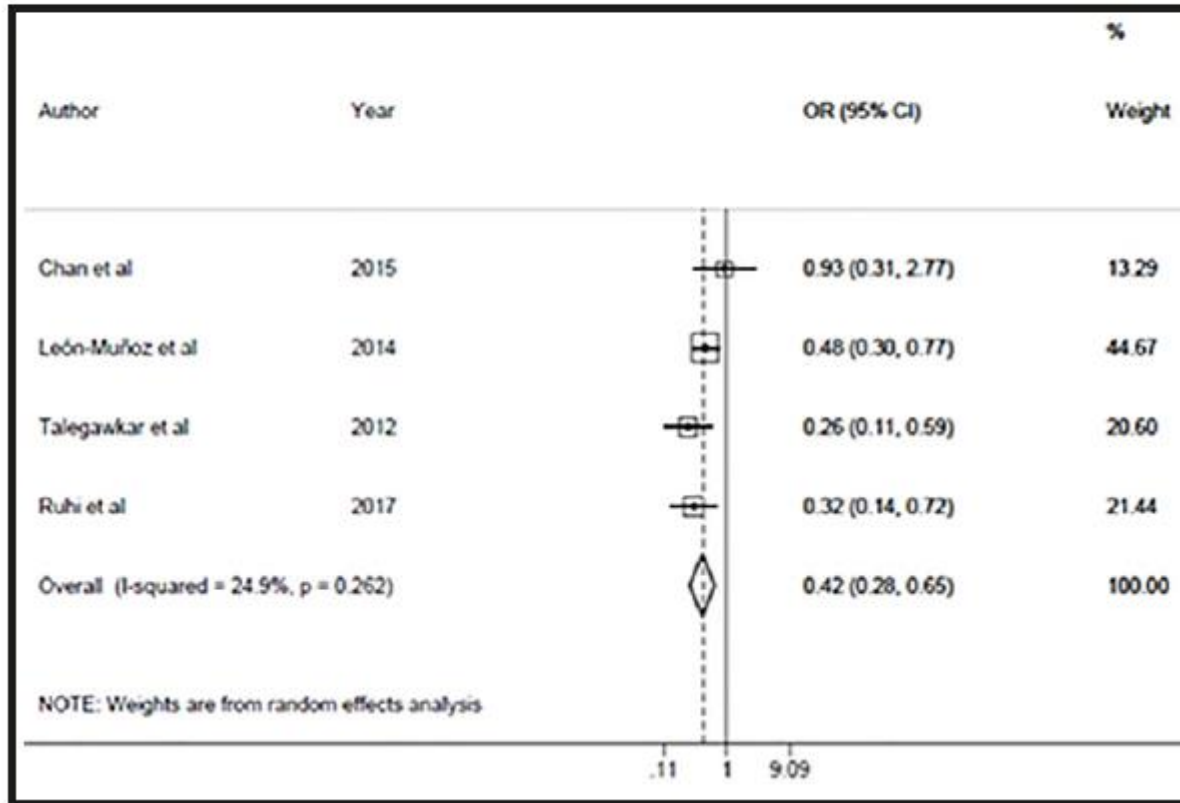
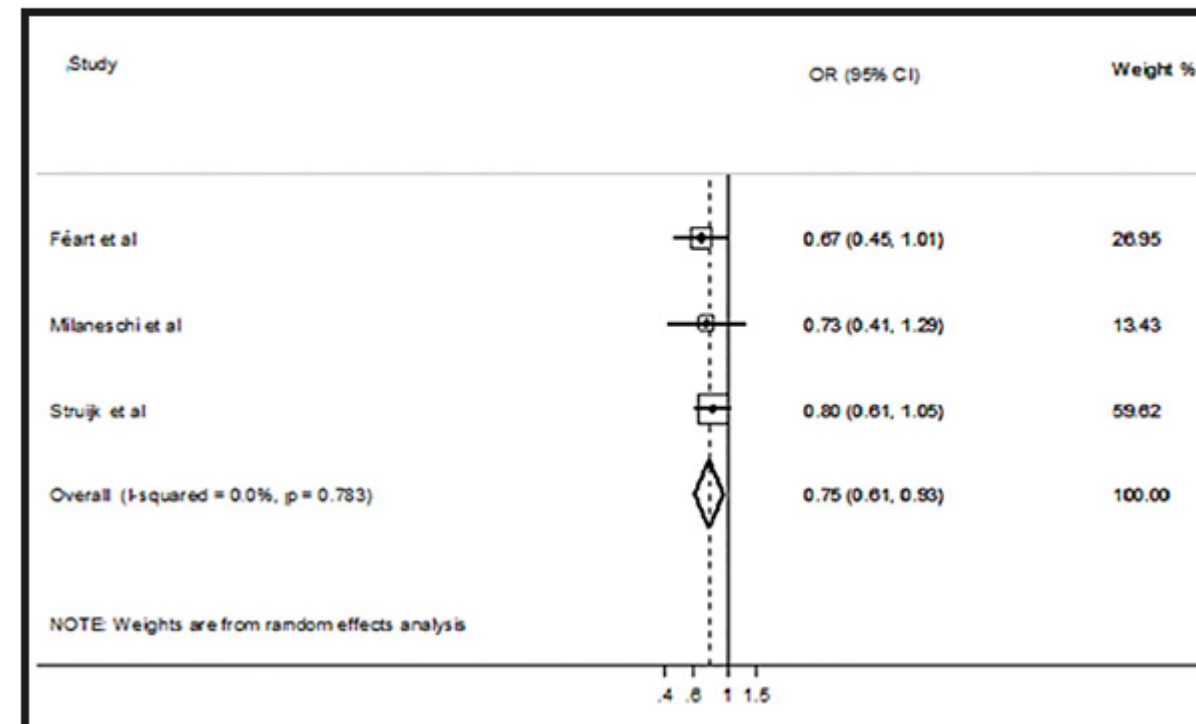


Figure 3

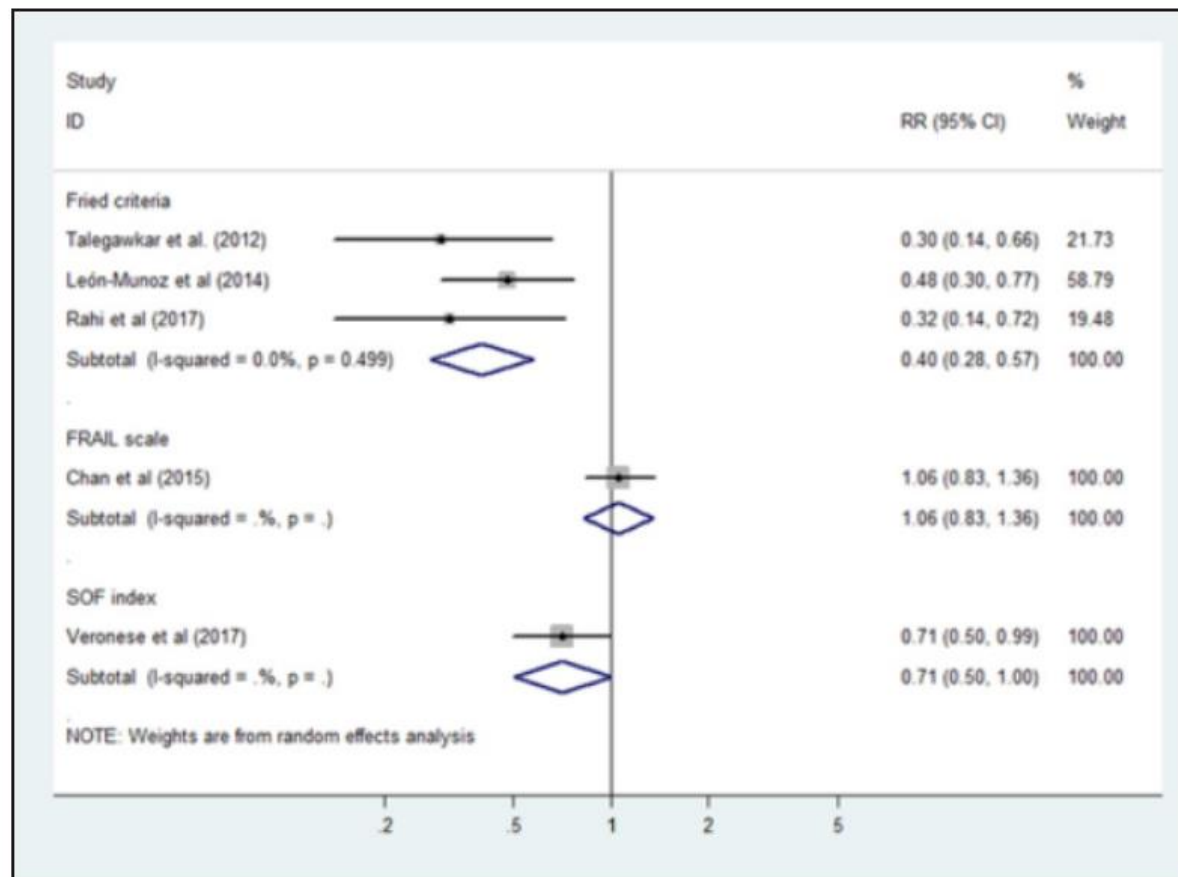
Adherence to a Mediterranean diet and functional disability



MeDi & Frailty: SLR and meta-analyses

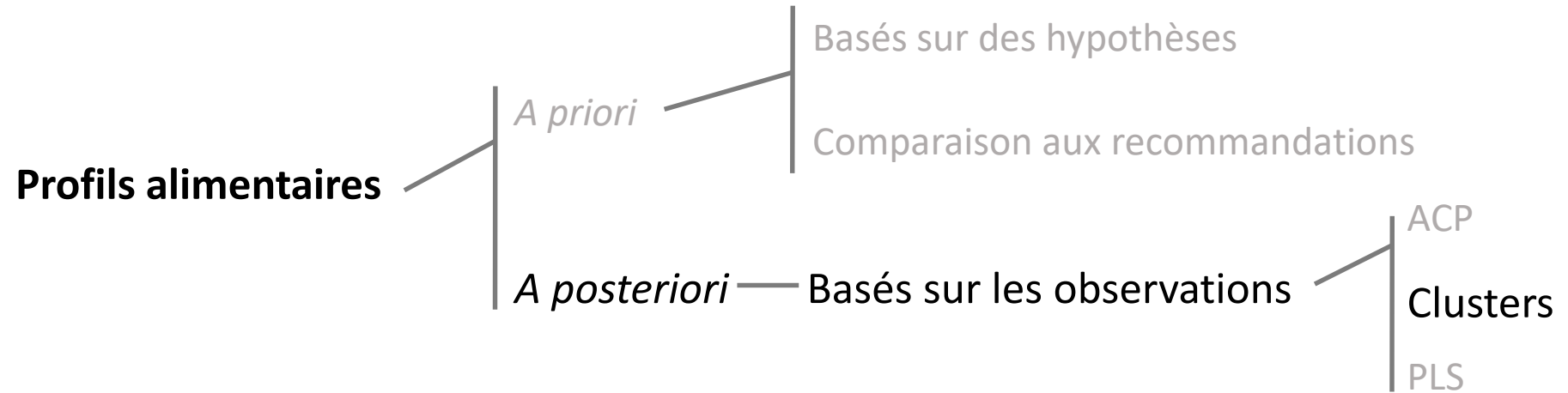
Figure 3

Subgroup analysis according to different definition for frailty



Wang et al. J Nutr Health Aging 2018

Approches méthodologiques de l'évaluation de l'exposition nutritionnelle



Données d'observation



Original Study

Dietary Patterns and 12-Year Risk of Frailty: Results From the Three-City Bordeaux Study

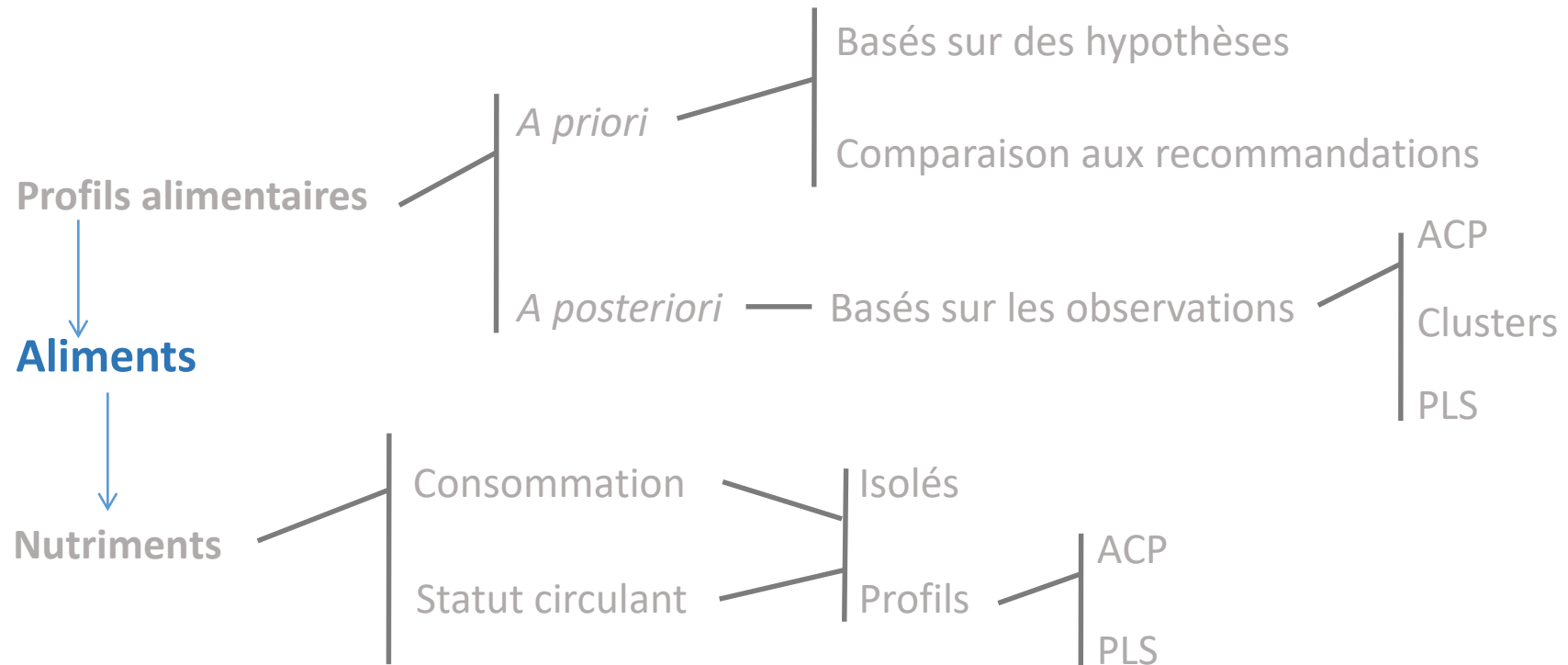
Sophie Pilleron PhD^{a,b,*}, Soufiane Ajana MSc^{a,b}, Marthe-Aline Jutand PhD^{b,c}, Catherine Helmer MD, PhD^{a,b}, Jean-François Dartigues MD, PhD^{a,b}, Cécilia Samieri PhD^{a,b}, Catherine Féart PhD^{a,b}



- 3C: N=336 ♂ et 636 ♀, 65 y baseline, FU 12y

	HR	CI 95%
Men		
Pasta Eaters	2.21	1.11 – 4.40
Women		
Biscuits & snacking	1.81	1.17 - 2.81

Approches méthodologiques de l'évaluation de l'exposition nutritionnelle



Consommation d'aliments

- Very few studies on this topic

Garcia-Esquinas et al. *Am J Clin Nutr*, 2016 ; Bouillon et al. *JAMDA*, 2013

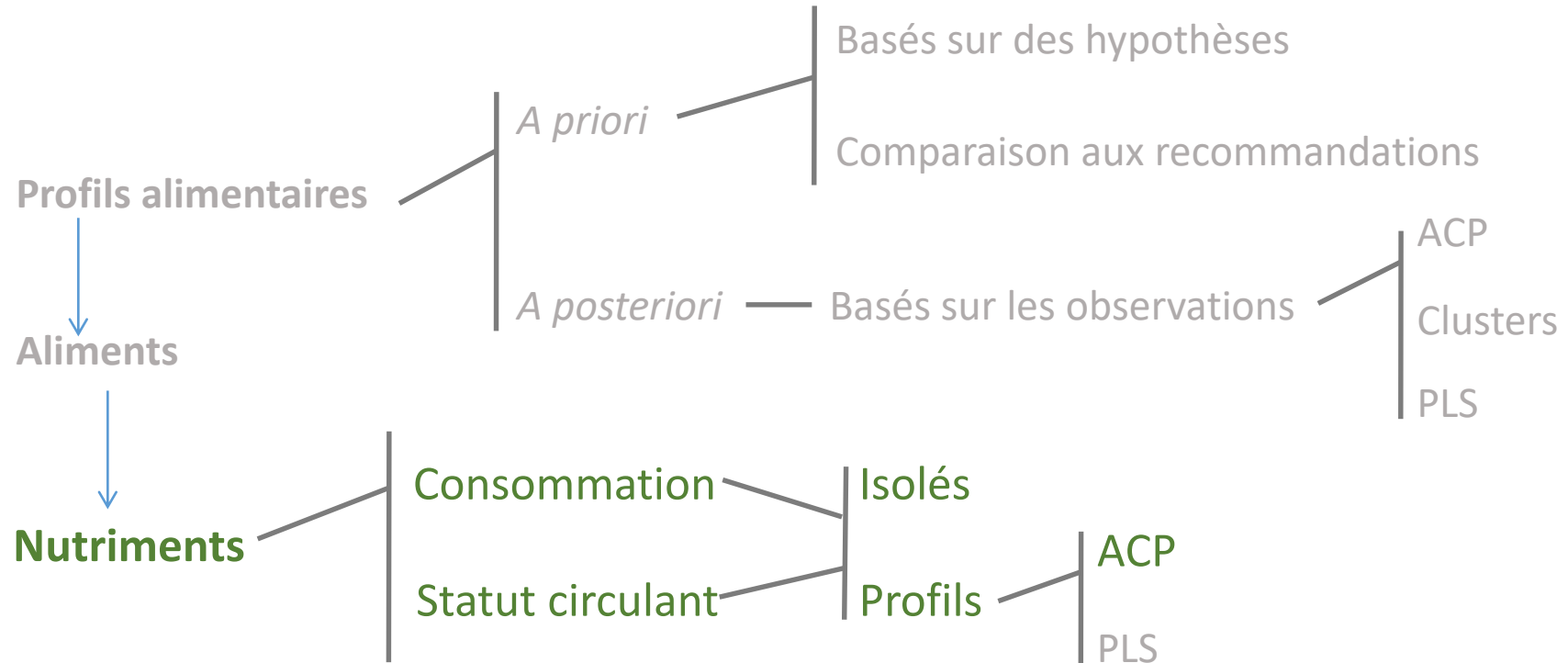
Consumption of fruit and vegetables and risk of frailty: a dose-response analysis of 3 prospective cohorts of community-dwelling older adults^{1,2}

Esther García-Esquinas,^{3-5} Berna Rahi,^{6,7} Karine Peres,^{6,7} Marco Colpo,⁸ Jean-François Dartigues,^{6,7} Stefania Bandinelli,⁹ Catherine Feart,^{6,7} and Fernando Rodríguez-Artalejo³⁻⁵*

- Collaboration FRAILOMIC (FP7 Health)
 - N=2926, 69 y, 300 cases, FU 2.5 y

Fruits & Vegetables	N	OR	[95% CI]	p global
≤1 serving/d	59/369	1.00		<0.01
2 s/d	70/629	0.41	0.21 – 0.60	
3 s/d	66/670	0.47	0.25 – 0.68	
4 s/d	67/689	0.36	0.18 – 0.53	
≥ 5 s/d	38/569	0.31	0.13 – 0.48	

Approches méthodologiques de l'évaluation de l'exposition nutritionnelle



Focus sur les protéines

- Essential for muscle strength
- Essential for muscle mass
- Animal or vegetal sources
- With aging, the protein synthesis is less sensitive to the protein intake (resistance)
→ a greater intake is required to allow the synthesis of protein after the meal
- 1 to 1,2 g/kg/d is recommended (!CKD!)

Focus sur les protéines

JAMDA 17 (2016) 072E1–072E11



JAMDA

journal homepage: www.jamda.com



Original Study

Higher Protein but Not Energy Intake Is Associated With a Lower Prevalence of Frailty Among Community-Dwelling Older Adults in the French Three-City Cohort

Berna Rahi PhD^{a,b,*}, Zoé Colombet Msc^b, Magali Gonzalez-Colaço Harmand MD^{a,b}, Jean-François Dartigues MD, PhD^{a,b}, Yves Boirie MD, PhD^{c,d,e}, Luc Letenneur PhD^{a,b}, Catherine Feart PhD^{a,b}

^aINSERM, ISPED, Centre INSERM U1219—Bordeaux Population Health, Bordeaux, France

^bUniv. Bordeaux, ISPED, Centre INSERM U1219—Bordeaux Population Health, Bordeaux, France

^cINRA, UMR 1019, UNH, CRNH Auvergne, Clermont-Ferrand, France

^dClermont University, University of Auvergne, Unité de Nutrition Humaine, Clermont-Ferrand, France

^eCHU Clermont-Ferrand, Clinical Nutrition Department, Clermont-Ferrand, France



- Protein >> energy intake
- At least 1g/kg/d

Autres macronutriments

Clinical Nutrition xxx (2015) 1–7



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



Original article

Plasma fatty acid biomarkers are associated with gait speed in community-dwelling older adults: The Three-City-Bordeaux study

Eric Frison^{a, b}, Yves Boirie^{c, d, e}, Evelyne Peuchant^{f, g}, Maturin Tabue-Teguo^{a, b}, Pascale Barberger-Gateau^{a, b}, Catherine Féart^{a, b, *}

Table 4

Baseline associations between plasma fatty acids and low gait speed in the Three-City-Bordeaux study^a (n = 982), France, 1999–2001.

	Low gait speed								
	Model 1			Model 2			Model 3		
	OR	95% CI	P	OR	95% CI	P	OR	95% CI	P
FA proportion for 1 SD increase									
AA	1.12	0.96–1.31	0.16	1.15	0.97–1.36	0.10	1.17	0.98–1.40	0.08
n-3 PUFA	0.77	0.66–0.90	0.002	0.76	0.65–0.90	0.001	0.77	0.64–0.91	0.003
EPA	0.79	0.67–0.94	0.007	0.79	0.66–0.94	0.007	0.76	0.63–0.93	0.006
DHA	0.79	0.68–0.93	0.004	0.78	0.66–0.92	0.003	0.79	0.67–0.95	0.01
FA ratios, for 1 SD increase									
n-6:n-3 PUFA	1.27	1.09–1.47	0.002	1.29	1.11–1.50	0.0009	1.31	1.11–1.54	0.001
AA:(EPA + DHA)	1.33	1.15–1.54	0.0002	1.35	1.16–1.57	0.0001	1.36	1.16–1.61	0.0002
FA pattern, for 1 unit increase ^b									
Unsaturated FA pattern	0.98	0.90–1.06	0.55	0.98	0.90–1.07	0.66	0.98	0.90–1.06	0.63
MUFA pattern	0.97	0.87–1.09	0.66	0.97	0.85–1.12	0.71	0.97	0.84–1.12	0.67
LC n-3 PUFA pattern	0.79	0.69–0.91	0.001	0.78	0.67–0.90	0.0006	0.78	0.67–0.90	0.0007

AA, arachidonic acid; FAs, fatty acids; LC n-3 PUFA, long-chain n-3 PUFA.

^a Low gait speed is gait speed <0.63 m/s. Associations are adjusted for age, sex, education, total energy intake and protein intake in model 1; covariates in model 1 plus additional adjustment for smoking status, alcohol consumption, BMI, polypharmacy, diabetes, hypertension, plasma TG, history of cardiovascular disease, cognitive disorders and depressive status in model 2 and covariates in model 2 plus additional adjustment for regular physical activity in model 3.

^b The three FA patterns were included simultaneously in the models.

Micronutriments & Fragilité

- Vitamins D, E, C, Carotenoids : consumption and/or circulating status lower among frail elderly
- Low Vit D = + Risk
- Low Vit E = + Risk
- Higher number of deficits = higher risk for frailty



FRAILOMIC: PCA patterns of fat-soluble nutrients
N=1324, including 290 frail, 78 y at baseline

- **Pattern 1** : + carotenoids & α -tocophérol
- **Pattern 2** : + vitamins A & E & – carotènes
- **Pattern 3** : + vitamin D & vitamins A & E

Yannakoulia et al. Metab Clin Exp Res 2017 ; Artaza-Artabe et al. Maturitas 2016 ; Lorenzo-Lopez et al. BMC Geriatr 2017

Micronutriments & Fragilité

Patterns of circulating fat-soluble vitamins and carotenoids and risk of frailty in four European cohorts of older adults

Sophie Pilleron¹ · Daniela Weber^{2,3} · Karine Pérès¹ · Marco Colpo⁴ · David Jean-François Dartigues¹ · Luigi Ferrucci⁷ · Stefania Bandinelli⁸ · Francisco Tilman Grune^{2,3,10,11} · Catherine Féart¹ · On behalf of the FRAILOMIC initiative

Eur J Nutr 2018

	OR	CI 95%	P
Pattern 1 (+ Caroténoïdes, a-Toc)			0.10
Quartile 1	1.98	1.10-3.56	
Quartile 2	1.83	1.07-3.13	
Quartile 3	1.62	0.95-2.66	
Pattern 2 (+ Vit E, A, - Carotènes)			0.02
Quartile 1	2.15	1.24-3.72	
Quartile 2	1.10	0.65-1.86	
Quartile 3	1.29	0.79-2.11	
Pattern 3 (+ Vit D, - Vit E, A)			0.10
Quartile 1	1.76	0.98-3.14	
Quartile 2	1.96	1.14-3.39	
Quartile 3	1.37	0.81-2.31	

→ No association with the risk for frailty (84 incident cases)

Statut nutritionnel & Fragilité

- Undernutrition & Frailty are closely associated but have to be considered as 2 distinct entities
 - Until 90% of undernourished elderly (MNA) are frail
- Being undernourished, at risk of malnutrition, weight loss, low BMI= ↗ risk for frailty

Goisser et al. *JNHA*, 2016

Lorenzo-Lopez et al. *BMC Geriatrics*, 2017

Fragilité : mécanismes sous-jacents

METABOLISM CLINICAL AND EXPERIMENTAL 68 (2017) 64-76

Yannakoulia et al Metabolism 2017

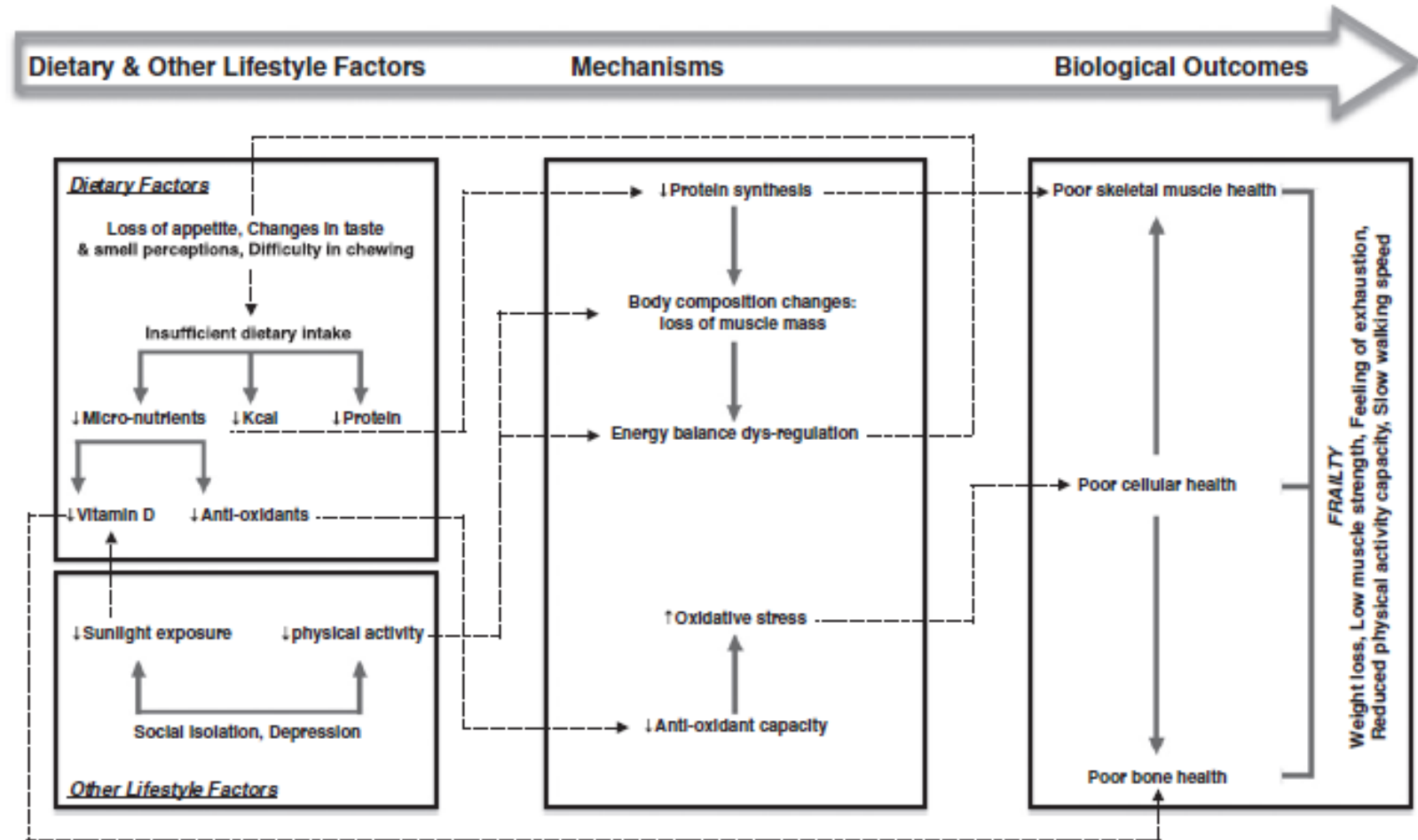


Fig. 1 - Overview of physiological, dietary and lifestyle factors that can result in the development of frailty and their interactions.

Fragilité : mécanismes sous-jacents

METABOLISM CLINICAL AND EXPERIMENTAL 68 (2017) 64-76

Yannakoulia et al Metabolism 2017

Fulop et al. *Biogerontol*, 2010

- Inflammation
- Oxidative Stress
- Insulin Resistance
- Genetic Polymorphisms
 - Transduction of inflammatory signal
 - Muscle mass maintenance
 - Endocrine system
 - Energy metabolism
 - Protein synthesis

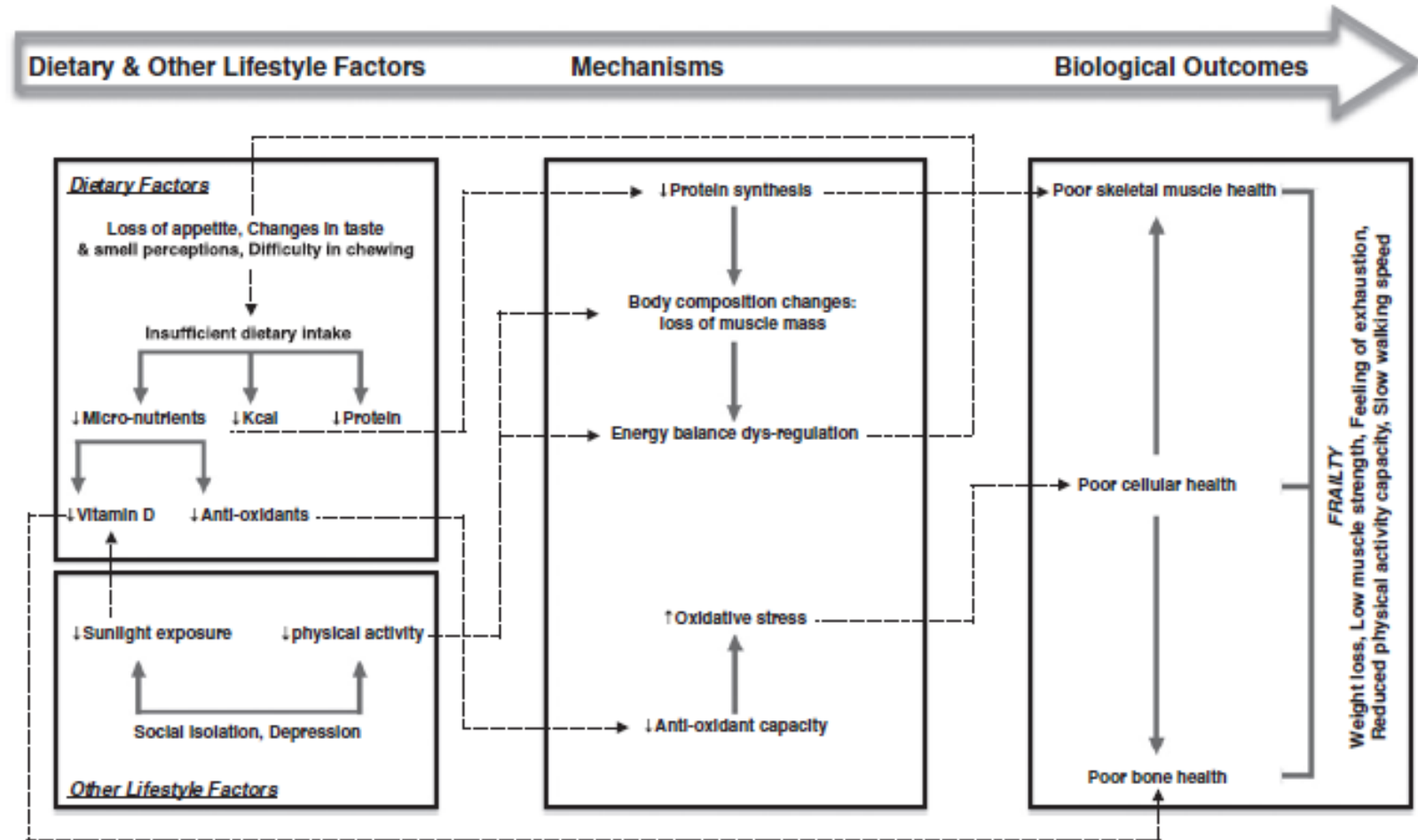


Fig. 1 - Overview of physiological, dietary and lifestyle factors that can result in the development of frailty and their interactions.

Fragilité : études d'intervention

- Include mainly frail individuals (secondary prevention)
 - Main outcome: items of frailty (separately) most of the time
 - Interventions: combination of physical activity and supplementation (protein, micronutrients) or nutritional advices
 - Primary prevention:
 - + omega 3 fatty acids = no effect on frailty, higher gait speed
 - Mixed results
- reversibility of frailty into robustness

Yannakoulia et al *Metab Clin Exp Res* 2017 ; Kelaiditi et al. *Curr Opin Clin Nutr* 2014, Goisser et al. *J Frailty Aging* 2016

Fragilité : études d'intervention

- Main limits:
 - Isolated items
 - Among frail, heterogeneous identification
 - Limited nutritional assessment
 - No control group
 - No distinction between physical activity and nutritional supplementation
 - Small sample size
 - Duration: 7 weeks to 12 months
- SPRINTT : 36 months

Yannakoulia et al *Metab Clin Exp Res* 2017 ; Kelaiditi et al. *Curr Opin Clin Nutr* 2014, Goisser et al. *J Frailty Aging* 2016

Aging Clin Exp Res (2017) 29:89–100
DOI 10.1007/s40520-016-0715-2



ORIGINAL ARTICLE

The “Sarcopenia and Physical fRailty IN older people: multi-component Treatment strategies” (SPRINTT) randomized controlled trial: design and methods

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Conclusion

- Pas de consensus sur les outils à utiliser
- Difficultés à évaluer les consommations alimentaires
- Troubles cognitifs et dépression
- Peu d'études longitudinales, effectifs parfois faibles, et de courte durée
- Etudes d'intervention encourageantes

→ manque d'homogénéité

→ peu d'études sur les taux circulants

→ à considérer ++

→ besoin de plus de travaux sur cette problématique

JOURNÉE GLN

Les lipides pour les seniors

Besoins, alimentation, physiopathologie

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MERCI DE VOTRE ATTENTION

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