Exploring *sex differences* in associations of protein intake with change in muscle mass and physical functioning in older adults

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INTRODUCTION

A lower dietary protein intake has been associated with muscle mass loss, a decline in physical performance and more mobility limitations over time in old age. Current guidelines for protein intake advise ≥0.8 g/kg body weight/d, while experts propose a higher intake for older adults (1.0-1.2 g/kg body weight/d), irrespective of sex. It is unknown whether optimal protein intake differs by sex.

Therefore, we investigated **the shape of the associations of protein intake with change in appendicular lean mass (aLM), change in gait speed and mobility limitations incidence over 3 and 6 years in community-dwelling older adults, separately for men and women**.

METHODS

Study population

- Health, Aging and Body Composition study (Health ABC Study), United States
- Community-dwelling men (*n*=1163) and women (*n*=1237), aged 70-81 years

Determinant

Dietary protein intake: 108-item food frequency questionnaire (1998/1999)

- grams per kg adjusted BW per day (g/kg aBW/d), using healthy instead of actual BW*

Outcomes

- Appendicular lean mass (aLM) (dual-energy X-ray absorptiometry) at baseline, 3y and 6y
- Usual gait speed (20-m walkway) at baseline, 3y and 6y
- Mobility limitations (2 consecutive reports of having difficulty walking ¼ mile or climbing 10 steps): incidence over 6y

Statistical analyses

- Stratified by sex
- aLM + gait speed: multiple linear regression
- Mobility limitations: Cox proportional hazards regression
- Linear and restricted cubic spline functions
- Model fit tested by likelihood ratio test
- Adjustment for socio-demographics, lifestyle factors, height, chronic conditions, and baseline outcome.

RESULTS

Table 1 – Characteristics, according to sex

	Men	Women
Protein intake (g/d)	71.3 ± 26.6	60.7 ± 22.3
Protein intake (g/kg aBW/d)	0.94 ± 0.36	0.95 ± 0.36
aLM (kg)	23.7 ± 3.5	16.5 ± 3.1
6y-change in aLM (kg)	-1.2 ± 1.5	-0.71 ± 1.1
Gaid speed (m/s)	1.2 ± 0.20	1.1 ± 0.21
6y-change in gaid speed (m/s)	-0.15 ± 0.17	-0.13 ± 0.17
Incidence of mobility limitations in 6y (%)	38.5	43.0

Mean ± SD. aLM, appendicular lean mass.

Table 2 – Prospective associations between protein intake (g/kg aBW/d) and three outcomes, according to sex

	Men		Women	
	3y	6y	3y	6y
Appendicular lean mass	B=207 P=0.27	B=-32 P=0.91	B=394 P=0.006	B=318 P=0.097
Gait speed	B=-0.04 P=0.082	B=-0.015 P=0.61	B=0.017 P=0.46	B=0.026 P=0.43
Mobility limitations	NA	HR=0.55 P=0.019	NA	HR=0.56 P=0.027

B: coefficient of regression analyses with protein intake in 1 g/kg aBW/d.
HR, hazard ratio; NA, not analysed; NS, not significant (red); borderline significant association (P<0.10) (orange); significant association (P<0.05) (green).
Adjusted for baseline outcome, age, race, site, education, height, smoking, alcohol, walking, oral steroids, no. chronic diseases, hospitalizations, depressive symptoms, kidney function, energy intake and diet quality.

- For all outcomes, spline functions did not significantly improve the models, so linear models were used (**Table 2**).
- Significant associations were found for change in aLM in women and for incidence of mobility limitations in men and women (**Table 2, Figure 1**).

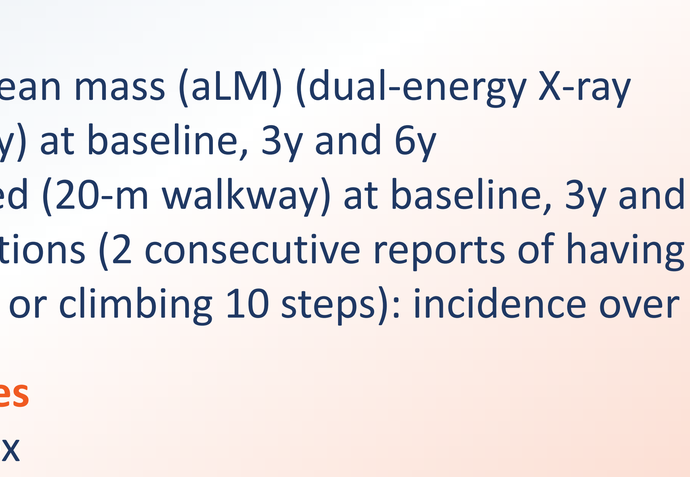
CONCLUSIONS

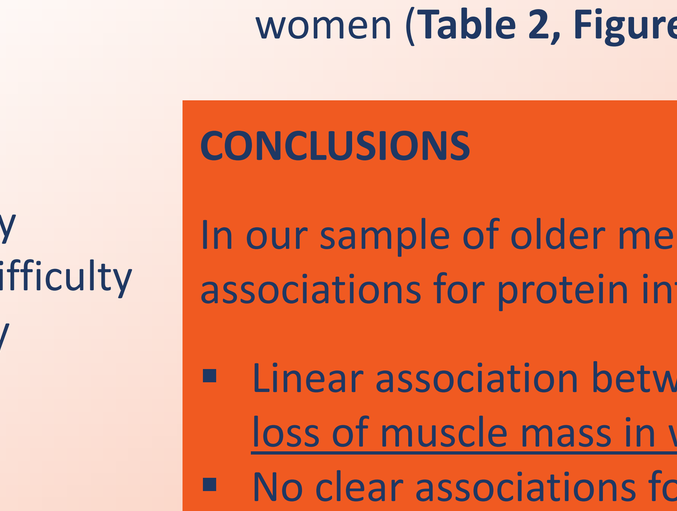
In our sample of older men and women, some sex-specific associations for protein intake were found:

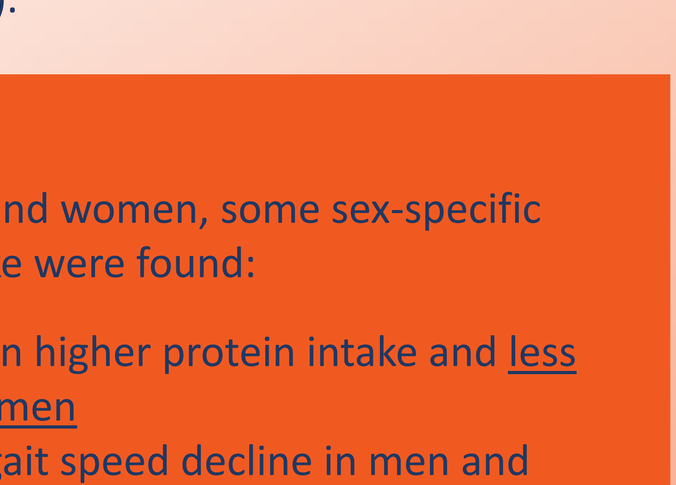
- Linear association between higher protein intake and less loss of muscle mass in women
- No clear associations for gait speed decline in men and women
- Linear association between higher protein intake and a lower risk of mobility limitations in men and women

Future studies on sex differences in protein requirements are needed. A validation study in the Longitudinal Aging Study Amsterdam (LASA) will be performed.

Figure 1. Plots of the linear associations.
A. aLM, 3 years, women.
B. Incidence of mobility limitations over 6 years, men.
C. Incidence of mobility limitations over 6 years, women.







* Adjusted body weight: this method uses the nearest body weight that would place the participant in the healthy BMI range: ≤70 years: 18.5-25.0 kg/m²; ≥71 years: 22.0-27.0 kg/m².

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