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EFFECT OF A HIGH PROTEIN DIET AND/OR RESISTANCE EXERCISE ON THE PRESERVATION OF FAT FREE MASS DURING WEIGHT LOSS IN OVERWEIGHT OLDER ADULTS: A RANDOMIZED CONTROLLED TRIAL

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Background

Intentional weight loss in overweight older adults is a risk factor for accelerated muscle mass loss.
We investigated whether a **high protein diet and/or resistance exercise preserve fat free mass** (FFM), reduce fat mass (FM) and improve physical performance during weight loss in overweight older adults.

Design

We included 100 overweight adults (55-80y) in a RCT with a 2x2 factorial design.
During a 10-wk weight loss program, all subjects followed a hypocaloric diet (-600 kcal/d). Subjects were randomly allocated to either a high protein diet (1.3 g/kg) or a control diet (0.8 g/kg), with or without a resistance exercise program 3 times/wk for 1 hour.

Outcome measures

Primary outcome was **change in FFM** measured with air displacement plethysmography. Secondary outcomes were change in body weight, FM, and physical performance. Data were analyzed using mixed linear models with sex and baseline value as covariates.

Results

At baseline, mean±SD BMI was 32±4 kg/m^2. During intervention, protein intake was 1.15±0.27 g/kg in the protein groups vs. 0.93±0.19 g/kg in the non-protein groups, corresponding to a 23±5 g/day ($p<0.001$) higher protein intake. Mean adherence to the exercise program was 2.8±0.3 times/week. No interaction was observed between protein*exercise for all outcomes. Overall, subjects lost weight (-3.1±2.8 kg, $p<0.01$) without significant between-group effects, and had no significant change in FFM (+0.4±1.9 kg, $p=0.12$). Effects of protein and effects of exercise on body composition are displayed in the **Table** and **Figure**.

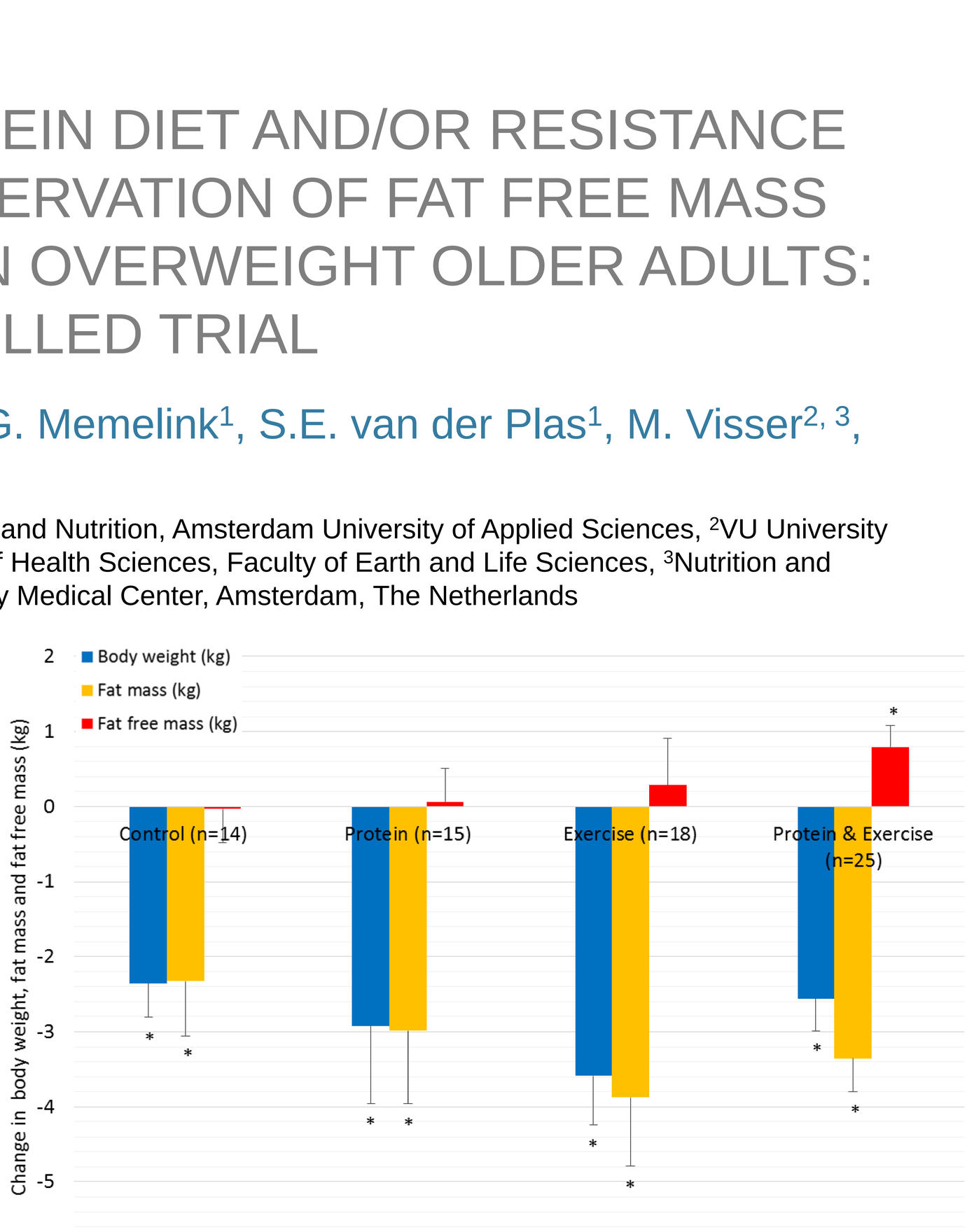

Figure: Change in body weight, fat mass and fat free mass in the four study groups. Data represent mean changes over 10 weeks with SEM. * Indicates a significant change over 10 weeks.

Table: Outcome measures for protein vs. non-protein groups and for exercise vs. non-exercise groups in means ± SD.

	Protein (n=40)		Non-protein (n=32)		Protein effect	
	Baseline	Change	Baseline	Change	Beta (95% CI)	P-value
Body weight, kg [1]	92.6 ± 13.7	-3.0 ± 3.1 *	91.1 ± 13.3	-3.2 ± 2.3 *	+0.1 (-0.9 ; 1.0)	0.86
BMI, kg/m^2 [1]	31.3 ± 3.4	-1.0 ± 1.0 *	32.3 ± 4.5	-1.1 ± 0.8 *	+0.0 (-0.3 ; 0.3)	0.94
Fat mass, kg	38.1± 8.3	-3.2 ± 2.9 *	39.8 ± 8.5	-3.2 ± 3.5 *	-0.1 (-1.2 ; 1.0)	0.81
Fat percentage, %	41.8 ± 8.2	-2.3 ± 2.1 *	44.0 ± 8.4	-2.1 ± 3.2 *	-0.3 (-1.2 ; 0.7)	0.58
Fat free mass, kg	53.6 ± 12.5	+0.5 ± 1.6 *	51.2 ± 12.4	+0.1 ± 2.3	+0.1 (-0.6 ; 0.9)	0.73
	Exercise (n=43)		Non-exercise (n=29)		Exercise effect	
Body weight, kg [2]	92.0 ± 14.8	-3.2 ± 2.6 *	91.8 ± 11.4	-2.7 ± 3.0 *	-0.4 (-1.4 ; 0.6)	0.42
BMI, kg/m^2	31.5 ± 3.8	-1.1 ± 0.9 *	32.1 ± 4.2	-0.9 ± 1.0 *	-0.2 (-0.5 ; 0.2)	0.30
Fat mass, kg	37.6 ± 7.5	-3.6 ± 3.0 *	40.6 ± 9.4	-2.7 ± 3.3 *	-1.0 (-2.1 ; 0.1)	0.07
Fat percentage, %	41.6 ± 7.9	-2.6 ± 2.7 *	44.6 ± 8.6	-1.7 ± 2.4 *	-1.0 (-2.0 ; -0.1)	**0.04**
Fat free mass, kg	53.9 ± 13.4	+0.6 ± 2.0 *	50.6 ± 10.7	+0.0 ± 1.7	+0.4 (-0.4 ; 1.2)	0.27

[1] n protein=44 and n non-protein=35 ; [2] n exercise=47 and n non-exercise=32 ; * sign. change over 10 wks

Conclusion

Although the targeted high protein diet was not completely achieved, the contrast of 23 gram protein per day had no effect on changes in FFM and FM during weight loss in older overweight subjects. Supervised resistance exercise increased the loss of relative FM but had no effect on FFM. However, in the group receiving the protein and exercise combination a significant increase in FFM was observed.

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