

A Decrease in Body Mass Index is associated with Faster Progression of Motor Symptoms and Shorter Survival in ALS

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Introduction

Several studies have indicated an increased risk of developing ALS in association with low BMI. Some other studies suggest that changes in BMI may be related to the pathophysiology of ALS rather than being a risk factor

Methods

Subjects (n=285)

Baseline Clinical Assessment

Demographics

Disease variables (age of onset, baseline motor severity through Appel ALS score, site of onset)

Baseline BMI categorized into six WHO categories: underweight (<18.5), normal (18.6-24.9), overweight (25.0-29.9), obese class I (30.0-34.9), Obese class ii (35.0-39.9), Obese class iii (40.0 and above)

Follow up Assessment

Motor severity (AALSS)

Rate of motor disease progression (AALSS/month)

Changes in BMI over two years (<1, no change, >1)

Survival

Results

Disease characteristics of different BMI groups at baseline

WHO BMI Classification	Underweight (n=3)	Normal (n=92)	Overweight (n=114)	Obese Class I (n=45)	Obese Class II (n=14)	Obese Class III (n=6)
Age at onset (yrs)*	61.6±11.1	53.6±14.3	52.2±14.3	49.9±12.0	52.9±14.2	56.7±14.6
Rate of progression (AALSS/month)*	1.66±1.23	2.64±2.50	2.66±2.36	2.69±1.87	2.05±1.74	2.98±1.70
Survival (yrs)*	3.59±1.44	4.47±2.75	4.82±3.09	4.32±2.59	4.28±1.19	4.32±1.40

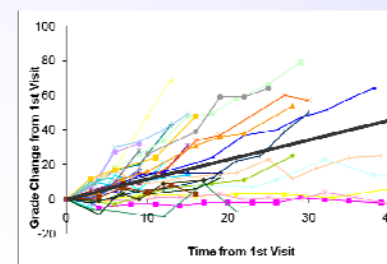
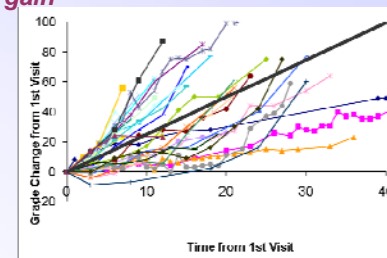
Comparison (ANOVA) of survival and rate of disease progression between different BMI change groups

	BMI loss >1 (n=131)	BMI stable (n=88)	BMI gain >1 (n=57)	F	p value
Survival (yrs)	4.04±1.90	5.41±3.53	4.89±3.21	4.24	0.02
Rate of motor disease progression (AALSS/month)	3.27±2.36	2.16±2.11	1.88±2.00	10.6	0.001

Multiple pairwise comparison between changes in BMI during the first two years post ALS diagnosis and survival and rate of motor disease progression

	BMI change group	BMI change group	Mean Difference	p value	95% CI
Survival (yrs)	BMI loss >1	BMI stable	-1.36	0.02	-2.52, -0.20
	BMI loss >1	BMI gain >1	-0.85	0.43	-2.23, 0.54
Rate of progression (AALSS/month)	BMI loss >1	BMI stable	1.10	0.001	0.37, 1.84
	BMI loss >1	BMI gain >1	1.38	0.001	0.53, 2.22

Rate of motor progression for 30 patients with highest BMI loss versus highest BMI gain



Conclusions

- Baseline BMI was not associated with age of onset, rate of motor disease progression, or survival in this ALS cohort.
- Changes in BMI over first two years of ALS diagnosis were significantly associated with rate of progression and survival.
- Weight loss could be an indicator of faster neurodegeneration in ALS or alternatively could be due to hypermetabolism in ALS
- Further research is warranted to clarify the metabolic changes associated with ALS, and to investigate whether altering metabolism will change the disease course of ALS