

Two week protein-enriched low-calorie diet (HEPAFAST) shows rapid improvement of fatty liver as assessed by controlled attenuation parameter

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Background

Fatty liver (FL) is one of the most prevalent liver disorders, which increases the risk of fibrosis and cirrhosis. FL occurs in more than half of diabetic patients. The aim herein was to assess for therapeutic effects of a dietary intervention on FL, as quantified using the controlled attenuation parameter (CAP).

Methods

In this prospective single center study, 66 patients with NAFLD received a 14-day low-calorie liver-specific diet containing 800 kcal/day (HEPAFAST: 41% protein, 29% carbohydrate, 24% fat and 6% fiber) plus up to 200 kcal from vegetable intake daily. The following parameters were assessed at baseline (T0) and after 14 days (T1): hepatic fat contents by controlled attenuation parameter (CAP) during transient elastography (FibroScan); body composition with bioimpedance analysis; and serum liver function tests and lipid profiles using standard clinical-chemical assays.

Results

- Overall, 66 patients (median age 56 years, range 25–78; 52% women) successfully completed the study.
- Figure 1 a-c** shows the significant reduction of CAP values, body fat mass and visceral fat index after only 2 weeks (all $P \leq 0.001$).
- Serum lipids and γ -GT levels also decreased (all $P < 0.001$). **Table 1** summarizes the effects of HEPAFAST.
- Despite improvements in body composition, 11 patients demonstrated a CAP increase, thus were classified as hepatic non-responders. In contrast, a subgroup analysis of the hepatic responders revealed a decrease of 16.6% in median CAP scores from 311 to 262 dB/m ($P < 0.001$).

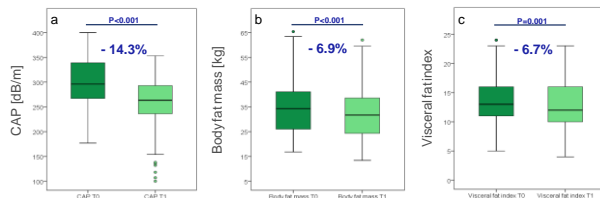


Figure 1: Reduction of hepatic steatosis as determined by CAP (a), body fat mass (b) and visceral fat index (c) as assessed by BIA in all patients (n=66).

- Body mass index (BMI) decreased significantly by 4.8% ($P < 0.001$). **Figure 2** illustrates the reclassification into a lower BMI category in 31.8% of the patients.

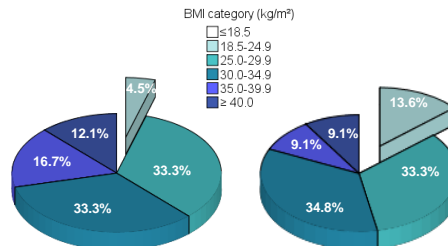


Figure 2: Effect of the dietary intervention on BMI classification according to WHO.

- When comparing diabetics with non-diabetics (24% vs. 76%), equal effects on liver fat, body composition, serum liver function tests and lipid profiles were observed (all $P > 0.05$).

Table 1: Characteristics of the cohort pre- and post-intervention.

	Baseline (T0)	After 14 days (T1)	P value
Hepatic steatosis			
CAP [dB/m]	296 (177–400)	264 (100–353)	<0.001
Body composition			
Body weight [kg]	94.2 (60.0–125.6)	90.5 (57.2–120.1)	<0.001
BMI [kg/m ²]	31.7 (22.4–46.3)	30.5 (21.3–44.7)	<0.001
Body fat mass [kg]	34.2 (16.8–65.4)	31.7 (13.4–62.0)	<0.001
Visceral fat index	13 (5–24)	12 (4–21)	0.001
Waist circumference [cm]	107 (78–127)	103 (76–128)	<0.001
Serum surrogate markers and lipid profiles			
ALT [U/l]	37 (12–118)	35 (14–150)	n.s.
AST [U/l]	24 (10–121)	23 (8–141)	n.s.
γ -GT [U/l]	37 (7–335)	26 (7–113)	<0.001
Glucose [mg/dl]	89 (63–232)	84 (60–169)	<0.001
Triglycerides [mg/dl]	128 (60–419)	82 (42–254)	<0.001
Total cholesterol [mg/dl]	209 (147–303)	157 (95–249)	<0.001
LDL cholesterol [mg/dl]	133 (78–226)	92 (45–193)	<0.001
HDL cholesterol [mg/dl]	51 (29–110)	45 (28–77)	<0.001

Conclusions

This elastography-based non-invasive study shows, for the first time, improvements in hepatic steatosis, as quantified non-invasively by CAP, after a short-term protein-enriched low-calorie diet. The dietary intervention not only reduced body weight but improved both body and liver composition in NAFLD. Compartment- and sex-specific HEPAFAST effects should be investigated further.