

A low carbohydrate and high fat diet causes excessive myocardial lipid content.

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Purpose / Introduction

During the last years a diet with low carbohydrate and high fat content (LCHF) has become very popular in Sweden and has helped a lot of people to lose weight. Non-scientific papers have reported that as much as 20% of the Swedish citizens eat accordingly to a LCHF diet. However, little is known about the internal or long term effects of this diet. Recent research has found support for the so-called lipotoxicity hypothesis stating that an excess storage of triglycerides within non-adipose tissue may lead to cell dysfunction¹. Localized cardiac MR-spectroscopy (CMRS) is the only method that could facilitate non-invasive localization and quantification of triglycerides within cardiomyocytes². In this work, CMRS was used to study the myocardial lipid content for volunteers on a LCHF diet.

Subjects and Methods

¹H-MRS of human myocardium was performed in 10 healthy male volunteers; aged 22-30 years and with a BMI of 20-35 kg/m². Three of the volunteers had been on a LCHF diet for at least 6 months, the 7 other volunteers had no diet restrictions. CMRS were performed using a 5-channel cardiac coil on a 1.5T Philips Intera/Achieva system equipped with an MRS research package. PRESS (TE/TR=35/3000ms) and CHESS was used for volume selection and water suppression respectively. 128 water suppressed dynamics and eight non-water suppressed dynamics (TR=6000ms) were acquired. The spectroscopy scans were cardiac triggered to end systole and respiratory triggered at end expiration using a pencil-beam navigator³. The VOI (4.5cm³) was planned within the ventricular septum. The methylene (CH₂) and water peak were quantified using the AMARES algorithm of the jMRUI-package⁴. The result was expressed as the quotient between CH₂ and water. For all volunteers body mass index (BMI) and the waist to hip ratio (WHR) were determined.

Results

In both groups a clear dependence between the myocardial lipid/water ratio and BMI, and WHR, was found (Fig.1). Volunteers on a LCHF diet showed much higher lipid/water ratios compared to non-dieting volunteers (Fig.1).

Discussion/Conclusion

This small observational study showed a much higher myocardial lipid content for the three volunteers on a low carbohydrate and high fat diet compared to non-dieting volunteers. Provided that an excess storage of triglycerides within non-adipose tissue does lead to cell dysfunction this diet might cause myocardial dysfunction.

References

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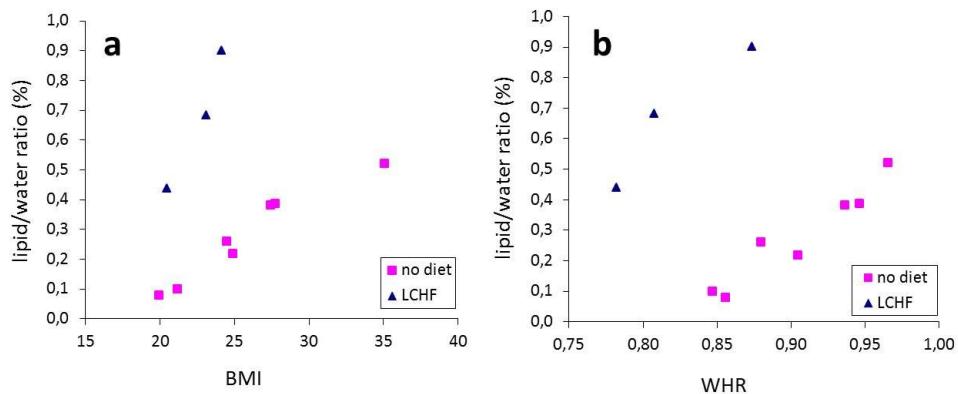


Figure 1. Lipid to water ratios for volunteers on LCHF diet compared to non-dieting volunteers in relation to the BMI (a) and the WHR (b).