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 dysfunction. Localized cardiac MR-spectroscopy (CMRS) is the only method that could facilitate non-invasive localization and quantification of triglycerides within cardiomyocytes. 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 navigator. 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-package. 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