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Weightmatters
A REGULAR DIGEST OF OBESITY RELATED NEWS FOR HEALTH PROFESSIONALS • OCTOBER 2008

Bad knees are no excuse for failure to lose weight

Effective weight loss is possible in obese people with knee osteoarthritis regardless of the severity of the arthritis

Danes with osteoarthritis living around Copenhagen recently had the opportunity to volunteer for a study of the effect of weight loss on their symptoms, knee MRI scans and gait. Funded by a consortium of donors including the Velux Foundation, the Danish Rheumatism association and Cambridge Health & Weight Plan, the study was run by a research team headed by rheumatologist, Professor Henning Bliddal, based at The Parker Institute at Frederiksberg Hospital. Dietitians Pia Christensen and Elisabeth Grill Haaber managed the patients through an eight week Cambridge very low-calorie diet or low calorie diet followed by an eight week dietary preparation prior to re-randomisation for a one year maintenance programme of Cambridge maintenance diet, exercise or control.

In a preliminary presentation made at the Rome Congress on Osteoarthritis (Osteoarthritis Research Society International [OARSI]) in late September Dr Birgit Falk Riecke used data on weight changes in the first cohort of 48 subjects [total subject numbers will be 192] to address the question of whether the initial severity of the radiographic changes influenced the weight loss outcome. Using the K-L scale (The Kellgren-Lawrence arthrosis scale) she and her colleagues showed that there was no effect of the severity of the knee changes on the amount of weight lost. Individual experience in clinical practice might lead to an expectation that more

'Body weight dropped by an average of 11.4kg in 8 weeks.'

continues. over

The Parker Institute team photographed in the gait laboratory

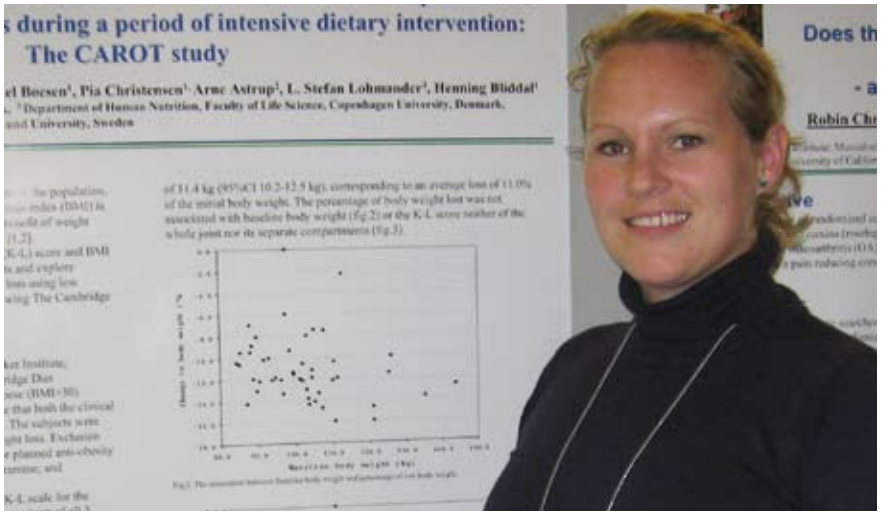
A typical radiograph from a patient with knee osteoarthritis. The medial compartment is reduced to about half of its original width and osteophytes have formed at the joint margins. The subchondral zone of the bones has a more dense structure (sclerosis).

severely affected patients might lose less weight because of more limited energy expenditure, but this proved not to be the case. The body weight of the 44 women and three men aged 50 to 75 years (initial average BMI was 38 kg/m2) dropped an average of 11.4 kg (11% of initial weight) in eight weeks from a mean of 102.4kg. Only one subject dropped out. Whereas knee osteoarthritis may often be perceived as a barrier to successful weight loss, these patients achieved meaningful weight loss on the Cambridge Health & Weight Plan. Concluding the presentation the authors wrote: 'the results showed that radiographic knee status is not important for weight loss: in other words, bad knees are no excuse for not losing weight.'

In a second presentation PhD student Jens Aaboe and gait analysis specialist Dr Marius Henriksen, also from the Parker Institute, presented preliminary data from gait analyses which confirmed that weight loss significantly reduced knee joint loads during walking. They showed that the changes in medial compartment loads following weight loss were more closely related to changes in extensor moments than in adduction moments.

Study design is provided by biostatistician Robin Christensen from The Parker Institute: Musculoskeletal Statistics Unit - statistical editor in the Cochrane Musculoskeletal Group (CMSG), as well as a member of the Cochrane Statistical Methods Group.

Pia Christensen and Elisabeth Grill Haaber have now started the last cohort of subjects bringing the total to the needed 192 and commented informally on what patients had said to them. The diet had been easier to follow than the patients had expected, they liked the diversity of the products and many said that they did not feel hungry while on the programme.



Dr Birgit Falk Riecke at the Rome Congress on Osteoarthritis, September 2008

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Aaboe J, Henriksen M, Bliddal H, Relationships between knee joint loads and moments during walking following weight loss in obese osteoarthritis patients. Proceedings of the 2008 World Congress of Osteoarthritis, Rome, September 2008. *Osteoarthritis and Cartilage (2008), 16 (S4): S68.*

Acknowledgement:

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Further reading:

Christensen R, Bartels EM, Astrup A, Bliddal H. Effect of weight reduction in obese patients diagnosed with knee osteoarthritis: a systematic review and meta-analysis. Ann Rheum Dis. 2007 Apr;66(4):433-9.

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Footnote:

The Kellgren-Lawrence arthrosis scale is as follows: grade 1, doubtful narrowing of joint space and possible osteophytic lipping; grade 2, definite osteophytes and possible narrowing of joint space; grade 3, moderate multiple osteophytes, definite narrowing of joints space, some sclerosis, and possible deformity of bone contour; grade 4, large osteophytes, marked narrowing of joint space, severe sclerosis, and definite deformity of bone contour. Kellgren JH, Lawrence JS. Radiological assessment of osteo-arthrosis. Ann Rheum Dis. 1957; 16(4):494-502.

Osteoa non-sur

Type of treatment
Lose and maintain weight
Exercise (muscle strengthening, aerobic)
Education
Knee brace if appropriate
Phone contact
Insoles for knee OA
Heat relieves symptoms
Trans-cutaneous nerve stimulation (TENS)
Acupuncture
Physical therapy
Walking aids

Non-pharmacological treatments for osteoarthritis of the hip and knee (modified from ref 2)

Weight Matters

Dr Anthony R Leeds

Cambridge Medical Director

rthritis: non-drug, rgical treatments

	Level of evidence	Level of consensus
	Ia	100
	Ia (knee), Ib (hip, water-based), IV (hip)	100
	Ia	92
	Ia	92
	Ia	77
	Ia	92
	Ia	77
	Ia	69
	Ia	69
	IV	100
	IV	100

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1. Krasnokutsky S, Samuels J, Abramson SB. Osteoarthritis in 2007 Bulletin of the NYU Hospital for Joint Disease 2007; 65(3): 222-8

2. Zhang W, Moskowitz RW, Nuki G etal OARSI recommendations for the management of hip and knee osteoarthritis, PartII: OARSI evidence-based, expert consensus guidelines Osteoarthritis and Cartilage 2008; 16: 137-162

Osteoarthritis is the most important cause of physical disability and poor quality of life in the developed world. Research has, in the past, focussed on cartilage damage but it is now recognised as a disease of the synovium and of bone as well[1]. There has been little progress with the development of disease modifying drugs and treatment still focuses on relief of symptoms. Increased understanding of the molecular pathogenesis of osteoarthritis is now leading towards development of disease modifying drugs and a reconsideration of the importance of the inflammatory component of the condition. However for the time being management focuses on symptom reduction, maintaining mobility, limiting progression of joint damage and educating patients, thereby improving quality of life.

In February 2008 the Osteoarthritis Research Society International (ORSI) issued recommendations for the management of hip and knee osteoarthritis based on an evidence and expert consensus[2]. The level of evidence was classified in the usual way [Ia - meta-analysis of randomized controlled trials, Ib - at least one randomized controlled trial, IIa - at least one well-designed controlled study, but without randomization, IIb - at least one well designed quasi-experimental study, III - at least one descriptive study, IV - expert reports, experienced opinions][2]. Noting that management requires a combination of drug and non-drug treatments, the treatment modalities were reviewed in terms of scientific evidence and level of consensus and classified as such (see table). Among non-pharmacological treatments only weight loss shared both the highest level of evidence and 100% consensus. Since obesity is now recognised as an inflammatory disease weight reduction,in addition to reducing load, may have some impact on the inflammatory component of osteoarthritis, though this remains to be demonstrated.

In this issue we report the first preliminary results from the 'CAROT study' currently underway at The Parker Institute, Frederiksberg Hospital, Denmark. In clinical practice the development of osteoarthritis is often an additional difficulty set before the patient and the physician, making physical activity and weight loss just that little bit more difficult.

'I have seen their evident joy at being lighter, more mobile and in less pain than before treatment.'

The Cambridge Health & Weight Plan team have been fortunate in being able to help to support this study, providing product and funding, and in so doing being able to contribute to building up the evidence for non-surgical treatment of knee osteoarthritis. I have met some of the research subjects and I have seen their evident joy at being lighter, more mobile and in less pain than before treatment. I have heard them say that they have every intention of staying on the Cambridge maintenance programme indefinitely and I hope that they will be able to do this.

Osteoarthritis is just one of several clinical situations where an effective weight loss can make an important contribution to the patient's quality of life as well as, in some cases, reduce the risk of morbidity and mortality. A systematic review of opportunities has shown that effective weight loss in those with sleep apnoea, in those preparing for bariatric surgery and in those with type 2 diabetes, in whom therapy has failed, can improve clinical outcome. Studies from Finland and the USA have demonstrated that very low-calorie diets (VLCDs) can quite dramatically improve patients with sleep apnoea. VLCDs are used in several countries to achieve liver volume reduction and metabolic improvement before bariatric surgery – Australian centres of excellence have contributed particularly strongly to this area. Each of these areas will be explored in coming issues of 'Weight Matters' which will now appear quarterly.

Reflecting the transient or not so transient rise of body weight seen over the Christmas holiday period and post-feast somnolence, the January 2009 issue will review the evidence for weight loss in sleep apnoea. The April issue will review pre-operative use of VLCDs and the July issue will begin to explore weight management issues in diabetes. The Cambridge Health & Weight Plan medical team welcome feedback on practitioners' clinical experiences with the programme, on the research evidence, clinical guidelines and management issues, and appreciate opportunities to discuss research and clinical applications.

What is the Cambridge Diet?

The term 'Cambridge Diet' is synonymous in the minds of many health care practitioners with very low-calorie diets (VLCDs). The Cambridge Diet was developed by Dr Alan Howard as a formula VLCD and indeed this remains the greater part of its present day usage. However about ten years ago it evolved into a more flexible series of dietary energy intake levels (1500, 1200, 1000, 810, 615, 415 kcal/d) allowing titration of energy intake against the client or patient's response.

This is interesting historically because in the late nineteenth century a step-wise titration upwards of dietary energy was offered to people with diabetes following a fast to clear the urine of reducing sugars. Now, this remarkably precise titration process (precise because it includes formula food products rather than non-formula foods alone) can be applied with a step-wise reduction or increase of energy intake according to need.

Very low calorie diets give the most effective weight losses but sometimes a part formula and part food diet can achieve remarkable weight loss. Dietary adherence tends to be less good at the higher energy intake levels and patients tend to be more hungry but nevertheless energy intake levels above 800kcal/d can give good results.

The gradually accumulating scientific literature on the efficacy of VLCDs indicates that it is highly likely that the potential applications of VLCDs and part-food, part formula food low calorie diets [LCDs above 800kcals/d] will be more widely appreciated.

The 2000s may well be the decade of bariatric surgery but the 2010s could be the decade of effective diets.

Star Citation

Hammer S, Snel M, Lamb HJ, etal Prolonged caloric restriction in obese patients with type 2 diabetes mellitus decreases myocardial triglyceride content and improves myocardial function. J Am College Cardiology 2008; 52: 1006-12

Since obesity is associated with triglyceride (TG) deposition in other tissues and may impair myocardial function this research group based in Leiden, Netherlands sought to determine whether a sixteen week very low-calorie diet (VLCD) would reduce myocardial TG and improve function. Seven men and five women who were obese (mean BMI 35.6 kg/m^2) and had type 2 diabetes followed the sixteen week caloric restriction, 450 kcal/d (VLCD – Modifast, Belgium). They were subject to proton magnetic resonance spectroscopy of the heart and liver to determine TG content and imaging by MRI of the heart was used to calculate variables reflecting left ventricular function. Anthropometric and blood biochemistry data was also collected.

After 16 weeks of caloric restriction the Body Mass Index was reduced from 35.6±1.2 to 27.5±1.3 kg/m^2, fasting blood glucose fell from 11.4±0.6 to 6.7±0.6 mmol/l, HbA1c fell from 7.9±0.4 to 6.7±0.6%, liver enzymes fell*, total cholesterol fell from 5.7±0.5 to 4.8±0.3 mmol/l, high-sensitive C-reactive protein fell from 18.5±4.2 to 7.5±2.0 mg/l, leptin fell from 21.5±4.3 to 7.6±3.4 μg/l and adiponectin rose from 5.2±0.7 to 7.8±1.1 μg/l. All changes were statistically significant.

Based on data from 11 subjects myocardial TG fell from 0.88±0.12 to 0.64±0.14% ($p=0.019$) and hepatic TG fell from 21.2±4.2 to 3.0±0.9% ($p<0.001$). Systolic blood pressure decreased from 144±8 to 118±6 mmHg ($p<0.001$) and diastolic blood pressure from 81±2 to 71±2 mmHg. Cardiac output decreased from 7971±601 to 6508±401 ml/min ($p=0.001$) and left ventricular mass decreased from 118±7 to 99±6g ($p<0.001$).

Accumulation of TG in the myocardium has been associated with impaired function in other published studies. In this study a reduction of myocardial TG was associated with improved function but the authors noted that the study was descriptive rather than designed to determine the contribution of myocardial TG to function. They noted that other changes seen on weight loss such as decreased HS-CRP and the change in insulin sensitivity, not measured directly in this study but obvious by calculation, probably facilitated improvement in myocardial function.

Noting the metabolic flexibility of the diabetic heart they concluded that prolonged caloric restriction in obese type 2 diabetes mellitus patients decreased BMI, improved gluco-regulation and improved diastolic heart function.

**[AST 44±5 to 27±3 mmol/l, ALT 52±12 to 23±3 mmol/l, γGT 38±5 to 18±2 mmol/l]*

Cambridge Health & Weight Plan, Medical Department, Hatton House, Hunters Road, Corby, Northants, NN17 5JE, England.
Tel: 01536 403344 Email: medical@cambridge-health-plan.co.uk **www.cambridge-diet.co.uk**