Suppressing inflammatory disease: weight loss in osteoarthritis

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Copenhagen weight loss in knee osteoarthritis trial

Randomised controlled trial

Setting: Secondary care, Dietitian managed

192 (155 women) obese (BMI 37.3) patients with knee osteo-arthritis (8 cohorts of 8+8+8)

randomised to Cambridge Weight Plan 415kcal/d or 810kcal/d diet for eight weeks followed by a 1200kcal/d diet (including two CWP products) for eight weeks. Commenced Autumn of 2007.

Weekly education sessions with subjects in groups of eight were given.
Copenhagen weight loss in knee osteoarthritis trial

- Significant weight reduction occurred by 16 weeks (means)
  - 13.3kg in 415kcal/d group
  - 12.2kg in 810kcal/d group
  - >12% of initial body weight in both groups
- 60% good symptom response (both groups)


~ E deficit ~ 1400kcal/d VLED
~1200kcal/d LED
obese women with OA – disuse atrophy >> low lean/high fat
Baseline average weight in 2007 = 103.2kg (n=192)
VLCD group lost 13.3kg (13%) at 16 weeks
LCD group lost 12.2kg (12%) at 16 weeks

At the end of first year of Maintenance
11 kg of weight loss had been maintained in diet maintenance group

Knee-Exercise - 6.3kg
Control - 8.3kg
Diet -11.0kg

At the end of a year (16+52 weeks) (n=192)
Diet group (one product daily) maintained 11kg (11%)
Knee-exercises group maintained 6.3kg (6%)
Control group maintained 8.3kg (8%)
Average overall weight loss was 8%
Primary end point – clinical response

Significant reduction of pain occurred, thus enabling more activity (>60% ‘responders’ using OARSI criteria).

Primary end point – clinical response

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Christensen R, submitted 2013

Pain score 0, 16, 68 weeks

Exercise, Diet, Control

Christensen R et al submitted
Subchondral bone marrow lesions in osteo-arthritis

- Sagittal images demonstrate well-defined subchondral bone marrow lesions
- Bone marrow lesions are strongly associated with pain.

http://www.radsouce.us/clinic/1011
bone marrow lesions (BMLs) in the knee are strongly associated with pain.

Lesions increase in number with time as disease progresses.

Did not progress in the diet treated maintenance group at 68 weeks (16 + 52).

An increased number of bone marrow lesions (circles) from week 0 to week 68 in an individual randomised to the knee-exercise group.

Also, note the loss of fat on the sides of the knees (both medially (left) and laterally (right)), attributable to the initial weight loss prior to knee exercise.

Infrapatellar (Hoffa’s) fat pad

Jacobson JA et al Radiographics 1997; 17: 675 - 691

a. mid-line sagittal MRI scan  b. cadaver section
Fat pads: H Infrapatellar; PF pre-femoral; Q quadriceps
These results suggest that severe inflammation in the IPFP is associated with severe pain in KOA.
Patients completing the CAROT-study were invited to join the LIGHT-study

Av weight loss (from 103kg) at entry: **11.3 kg**

153 participants (BMI 33.3 kg/m²; age 63.8y, 83% women)

randomized to:

- 3 intensive periods of 5 weeks/year with a formula LED of 3400kJ/day (810kcal) [IS group]
- meal replacements daily (1 - 2 products) [MR group]
Weight loss maintained:
- IS = 10.6kg
- MR = 9.5kg (not significantly different)

about 10% weight maintenance

Total knee replacement rate:
- 8/76 = 11% in IS about 13% rate
- 12/77 = 16% in MR (not significantly different)

Economic implications of this need to be fully assessed
## Body Weight & Fat Mass kg – one year

<table>
<thead>
<tr>
<th></th>
<th>Body Wt kg</th>
<th>Diet (n=64)</th>
<th>Knee exercises (n=64)</th>
<th>Control (n=64)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Wk 0 - 16</td>
<td>-12.0</td>
<td>-13.0</td>
<td>-13.3</td>
</tr>
<tr>
<td>Fat Mass kg</td>
<td>Wk 0 - 16</td>
<td>-9.7</td>
<td>-10.3</td>
<td>-10.2</td>
</tr>
<tr>
<td></td>
<td>Wk 0 - 68</td>
<td>-11.0*</td>
<td>-6.3</td>
<td>-8.3</td>
</tr>
<tr>
<td></td>
<td>Wk 0 - 68</td>
<td>-9.0**</td>
<td>-4.8</td>
<td>-6.0</td>
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</tbody>
</table>

* p = 0.0023; ** p = 0.001

### Lean mass ***

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<thead>
<tr>
<th></th>
<th>10 %</th>
<th>15%</th>
<th>14%</th>
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Lean mass % = (Lean mass x100)/(Lean mass + Fat mass)

2013 DOI: 10.1002/oby.20413
## Blood pressure at 68 weeks

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<thead>
<tr>
<th></th>
<th>Diet (n=64)</th>
<th>Knee exercises (n=64)</th>
<th>Control (n=64)</th>
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</thead>
<tbody>
<tr>
<td><strong>Systolic Blood pressure mmHg</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wk 0 – Wk 16</td>
<td>-11.9</td>
<td>-9.4</td>
<td>-12.9</td>
</tr>
<tr>
<td>Wk 0 - Wk 68</td>
<td>-7.3</td>
<td>-9.4</td>
<td>-6.8</td>
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<tr>
<td>Diastolic Bp mmHg</td>
<td></td>
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<tr>
<td>Wk 0 – Wk 16</td>
<td>-6.6</td>
<td>-5.3</td>
<td>-7.1</td>
</tr>
<tr>
<td>Wk 0 – Wk 68</td>
<td>-4.1</td>
<td>-0.9</td>
<td>-2.1</td>
</tr>
</tbody>
</table>

DOI: 10.1002/oby.20413

2013
Copenhagen weight loss in knee osteoarthritis trial

- Weight loss (12%) assoc with effective pain reduction
- No difference between VLCD and LCD in wt loss
- Weight maintenance most effective with a partial diet replacement
- Maintenance of symptom reduction and cardiovascular risk factors.
- 1 + 3 year weight maintenance: 10% (10kg) maintained in 106/153 (106/192) for 4 years with maintenance of pain reduction and cardiovascular risk improvement.
UK Congress on Obesity 2014

University of Birmingham, Edgbaston Campus
Tuesday 16th September and Wednesday 17th September 2014