Vitamin K2 treatment reduces undercarboxylated osteocalcin by 69% in the bone marrow

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BACKGROUND

• Clinical studies have suggested, that vitamin K2 prevents bone loss and protects against fractures
• Vitamin K2 is suggested to affect bone through the bone matrix protein osteocalcin (OC)
• OC is produced by the osteoblast in an undercarboxylated form (ucOC) that is carboxylated with vitamin K as a cofactor
• Carboxylated OC promotes mineralization of bone

AIM

• The aim of the study is to investigate the effects of vitamin K2 on bone metabolism
• In this substudy, the effect vitamin K2 for 3 months on bone formation markers in the bone marrow is investigated

DESIGN

Design
• A randomized double blinded placebo-controlled clinical trial
Participants
• 142 postmenopausal women (age 60-80 years) with osteopenia
Intervention
• Vitamin K2 (375 µg MK-7) or placebo
• Both groups: 38 µg vitamin D and 800 mg calcium

METHODS - BONE MARROW

• Bone marrow reflects the environment near the bone tissue
• 55 women at baseline and after 3 months
• Bone marrow serum analyzed for bone formation markers: OC, ucOC*, P1NP

RESULTS

Bone formation markers in bone marrow serum

<table>
<thead>
<tr>
<th></th>
<th>Δ K2</th>
<th>Δ Placebo</th>
<th>Between Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>ucOC</td>
<td>-60.3±10.2 %*</td>
<td>9.1±22.3 %</td>
<td>-69.4±26.1 %*</td>
</tr>
<tr>
<td>OC</td>
<td>4.0±8.6 %</td>
<td>1.5±8.5 %</td>
<td>2.5±12.2 %</td>
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<tr>
<td>P1NP</td>
<td>33.8±44.0 %</td>
<td>8.6±15.1 %</td>
<td>25.2±43.4 %</td>
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* Δ = between groups difference

CONCLUSION

• Treatment with vitamin K2 for 3 months reduced ucOC in the bone marrow, suggesting an increase in carboxylated OC
• The treatment did not change bone formation markers (totOC and P1NP)
• The results suggest that the effect of vitamin K2 is not mediated by stimulation of bone formation
• The effect may be through changes in the bone matrix

PERSPECTIVE

• DXA, HRpQCT and biochemical bone markers in blood serum after 1 year are currently being analysed.
• The study will provide new knowledge about the effects of vitamin K2, and the role of osteocalcin