Dietary vitamin K2 supplement improves bone status after lung and heart transplantation

Liv Forli, Norway

ESPEN 2009, Vienna

Background

- Bone disease after transplantation
  - recognized clinical problem
- Improved treatment
  - ongoing need
- Strong indications
  - vitamin K in optimal bone health

Possible influence of vitamin K2 on bone loss after transplantation

- **Hypothesis**
- Vitamin K2 supplement vs. placebo,
  - Primary endpoints:
    - Higher p-vitamin K2 (MK-7)
  - Secondary endpoints:
    - Less reduction in BMD

Baseline characteristics

	Lung				Heart			
	Placebo N=19		**Vitamin K2** N=16		**Placebo** N=29		**Vitamin K2** N=30	
	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Gender (m/f)	**8/11**		**6/10**		**25/4**		**26/4**	
Age (years)	**48.7**	**9.3**	**48.4**	**13.1**	**55.3**	**9.9**	**53.8**	**10.4**
BMI (kg/m^2)	**20.9**	**3.7**	**20.7**	**3.8**	**24.1**	**3.6**	**25.8**	**3.3**
L2-L4 T score	**-1.9**	**1.3**	**-1.6**	**1.1**	**-0.4**	**1.7**	**-0.4**	**1.8**
Calcidiol (ng/mL)*	**25.4**	**12.3**	**24.7**	**6.1**	**16.8**	**9.0**	**20.5**	**10.1**

All lung patients compared with heart patients: p<0.001 for L2-L4 T score; p=0.004 for calcidiol

***Deficiency <15 ng/mL** (37,5 nmol/L)

***Insufficient 15-30 ng/mL** (37.5 nmol/L-75 nmol/L)

- Advise
  - Vitamin D 10-20 ug/day
    - If diet not sufficient
    - 1. cod liver oil

  - Ca 1000 mg
    - 3 glas milk

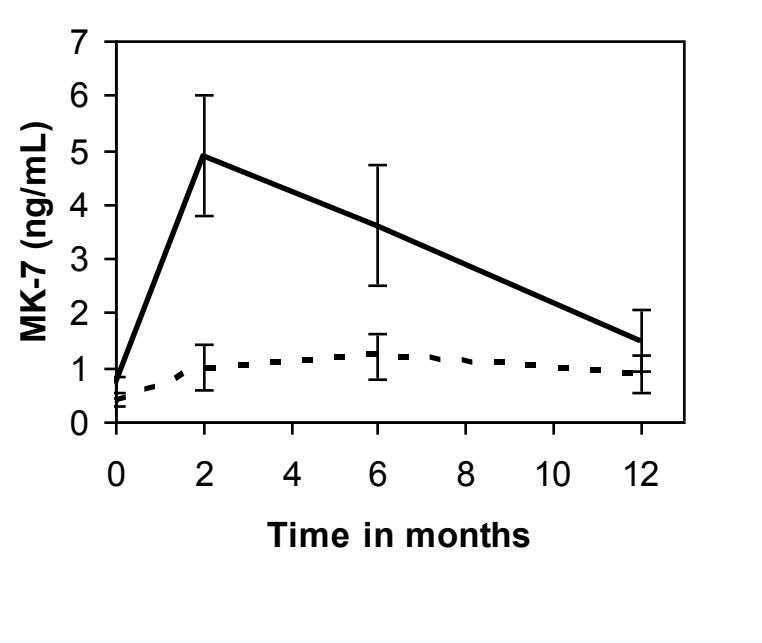
- Supplement:
  - 180 ug MK-7

MenaQ7

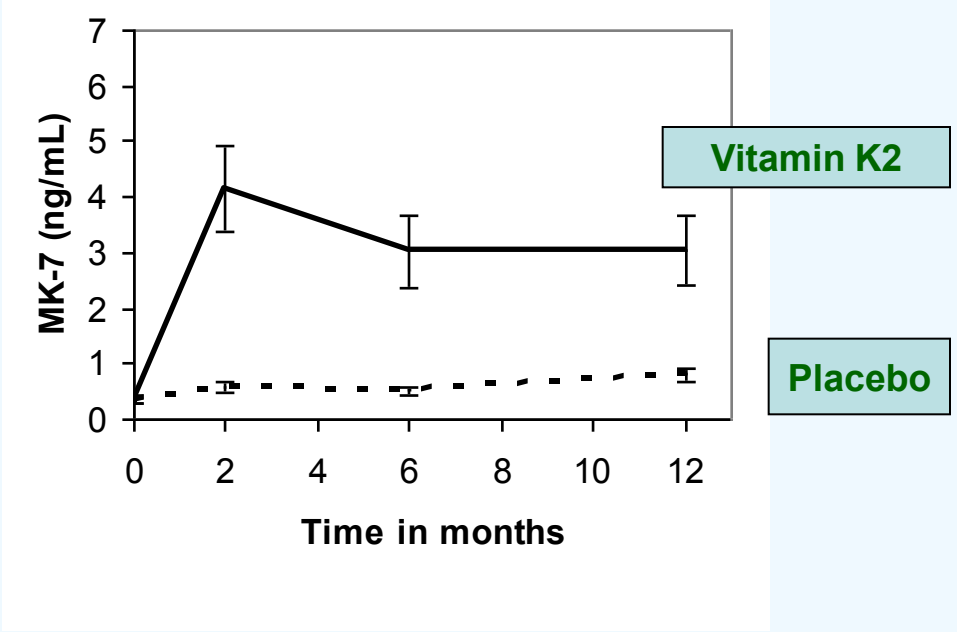
Primary endpoints: Plasma vitamin K2

MenaQ7

Lung

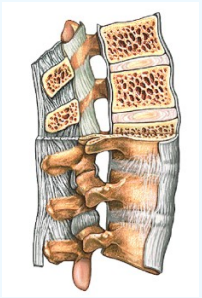


Heart

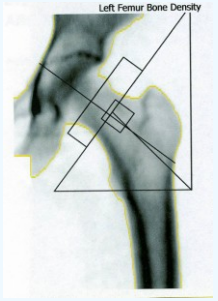


Secondary endpoints

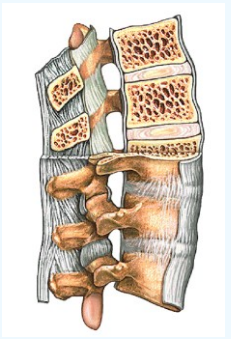
(intention to treat)



- **<u>1 year after tx:</u>**
  - Dif. in BMD between vitamin K2 and placebo controled baseline was for
    - L2-L4 0.028 g/cm^2 (p=0.055)
    - Femur neck 0.005 g/cm^2 (p=0.7)



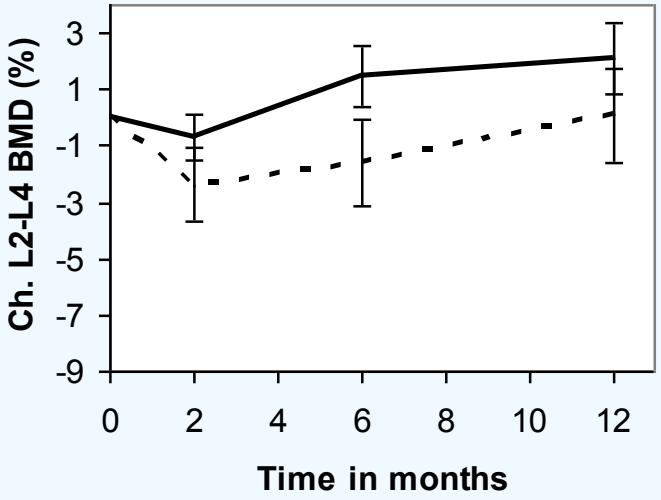
Change L2-L4 BMD (%) 1 year after tx:



Lung

Vitamin K2 2.1 %
Bisphos. 44%

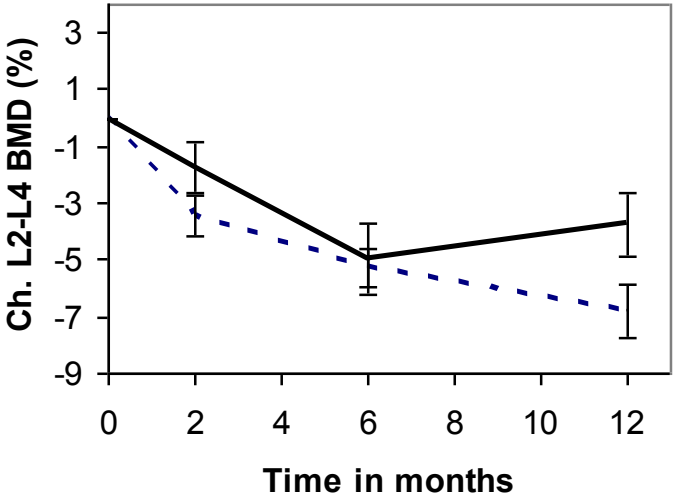
Placebo 0.1 %
Bisphos. 37%



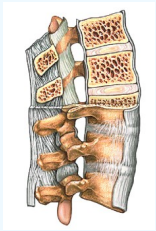
Heart

Vitamin K2 -3.7 %
Bisphos. 4%

Placebo -6.8 %
Bisphos. 2%

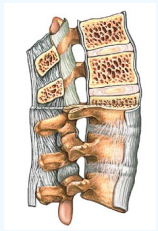


Full linear regression model (intention to treat)

	Dependent variable **dif. L2-L4 BMD 1 year**		
	Beta	SE	p
L2-L4 BMD baseline	**-0.055**	**0.047**	**0.2**
Organ (Lung=0, heart=1)	**-0.043**	**0.025**	**0.08**
If vitamin K2 capsules	**0.030**	**0.010**	**0.045**
BMI (kg/m^2)	**0.001**	**0.002**	**0.8**
Calcidiol (ng/mL)	**0.000**	**0.001**	**1.0**
Cum. prednisolone (mg/kg)	**0.000**	**0.000**	**0.7**
Cum. Sandimun (mg/kg)	**0.000**	**0.000**	**1.0**
If bisphosphonates treated	**0.024**	**0.022**	**0.3**
If anticoagulant treated	**-0.103**	**0.064**	**0.1**

The only significant predictor for differences in lumbar BMD was use of vitamin K2 capsules

Linear regression model with stepwise analysis

	Dependent variable dif. L2-L4 BMD 1 year after tx		
	Beta	SE	p
Organ (Lung=0, heart=1)	**-0.065**	**0.014**	**<0.001**
If vitamin K2 capsules	**0.034**	**0.014**	**0.019**

The only significant predictors for differences in lumbar BMD were use of vitamin K2 capsules and organ, with the greates effect in the heart patients

Vitamin D status (n, %) and PTH (mean (SD)) one year after tx

	Lung				Heart			
	Placebo		MK-7		Placebo		MK-7	
Deficiency (<15 ng/mL)	0		2 (13%)		4 (14%)		4 (16%)	
Insufficiency (15-<30 ng/mL)	9 (50%)		6 (38%)		18 (64%)		13 (52%)	
Sufficient (≥30 ng/ml)	9 (50%)		8 (50%)		6 (21%)		8 (32%)	
PTH (pg/mL)[e]	44.2[d]	19.8	78.9[d]	56.8	70.5	39.9	83.5	45.9

[d]p=0.021 PTH in lung patients, placebo compared with vitamin K2

[e]p=0.024 PTH in all patients, placebo compared with vitamin K2

Conclusion

- One year of dietary supplementation with vitamin K2 (MK-7) after lung and heart tx
  - Our results suggest a favourable effect of vitamin K2 on trabecular bone
  - Higher PTH in the MK-7 supplemented group than in the placebo group indicated an insufficient vitamin D status and a higher need for vitamin D in the vitamin K2 supplemented group