

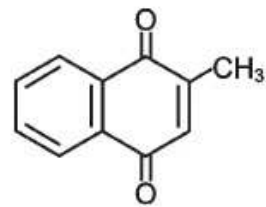
# *Ovlivňuje vitamín K kalcifikaci cév?*



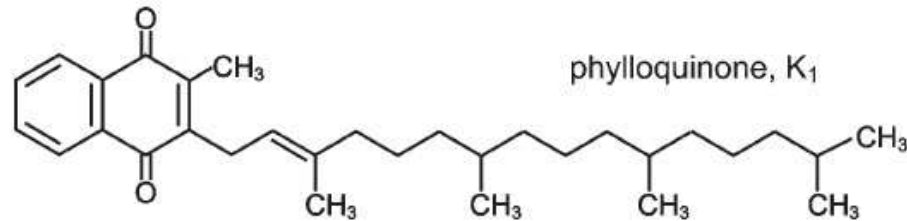
*László Wenchich*

**Karl.Studánka, 14.12.2018**

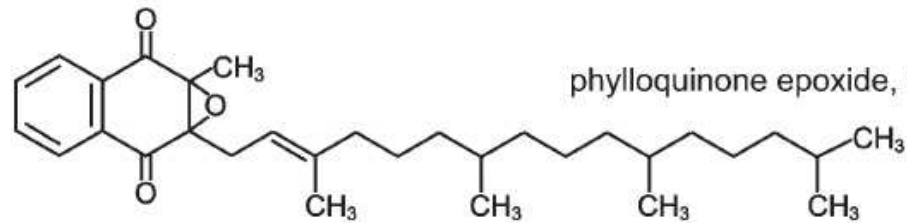
# Vitamin K



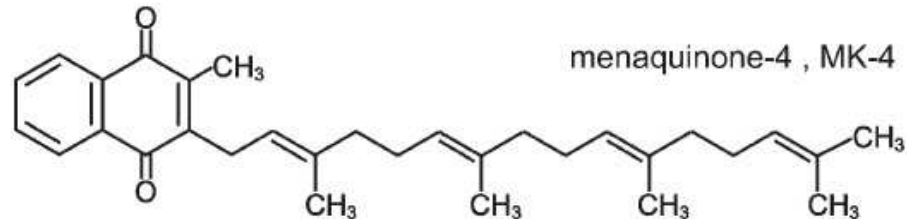
menadione, K<sub>3</sub>



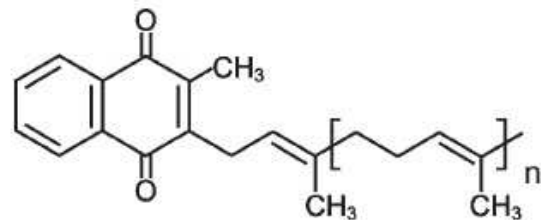
phylloquinone, K<sub>1</sub>



phylloquinone epoxide, K<sub>1</sub>O

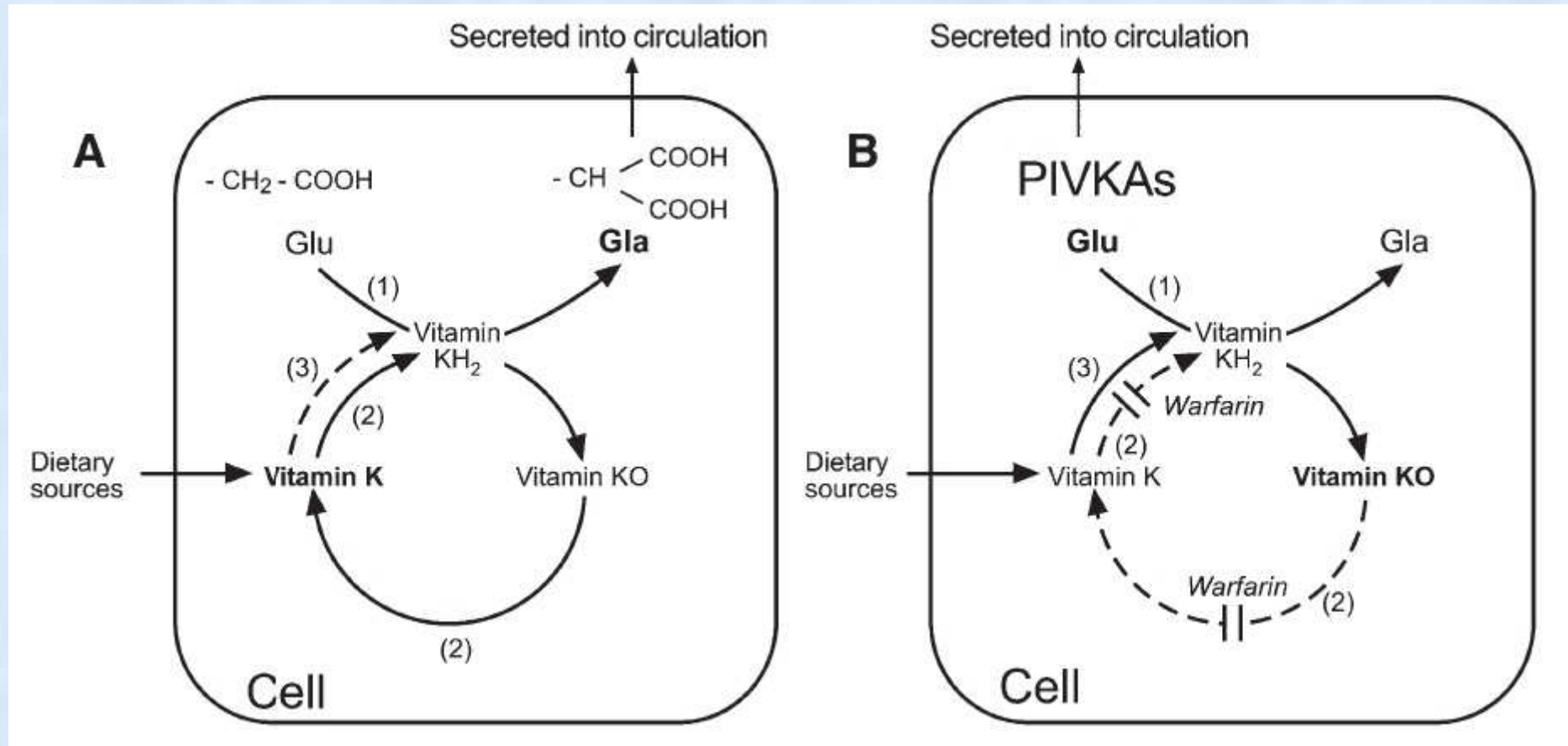


menaquinone-4, MK-4

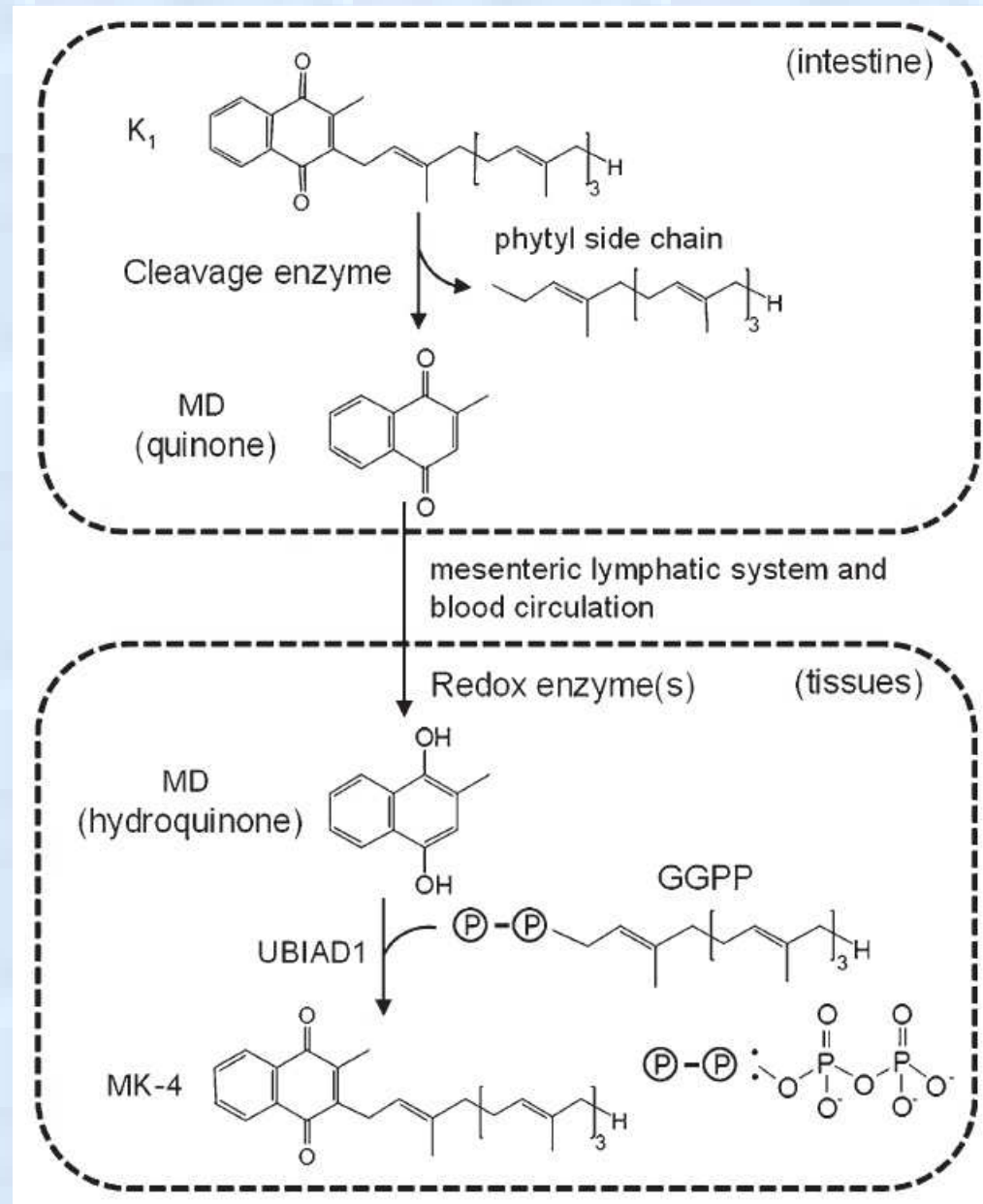


menaquinone-n, MK-n

# Vitamina K



# Vitamin K



# Vitamín K

## *Vitamín K dependentní proteiny:*

Koagulační faktory – f. II, VII, IX, X, protein C, protein S a protein Z

Ostekalcín

MGP – matrix Gla protein

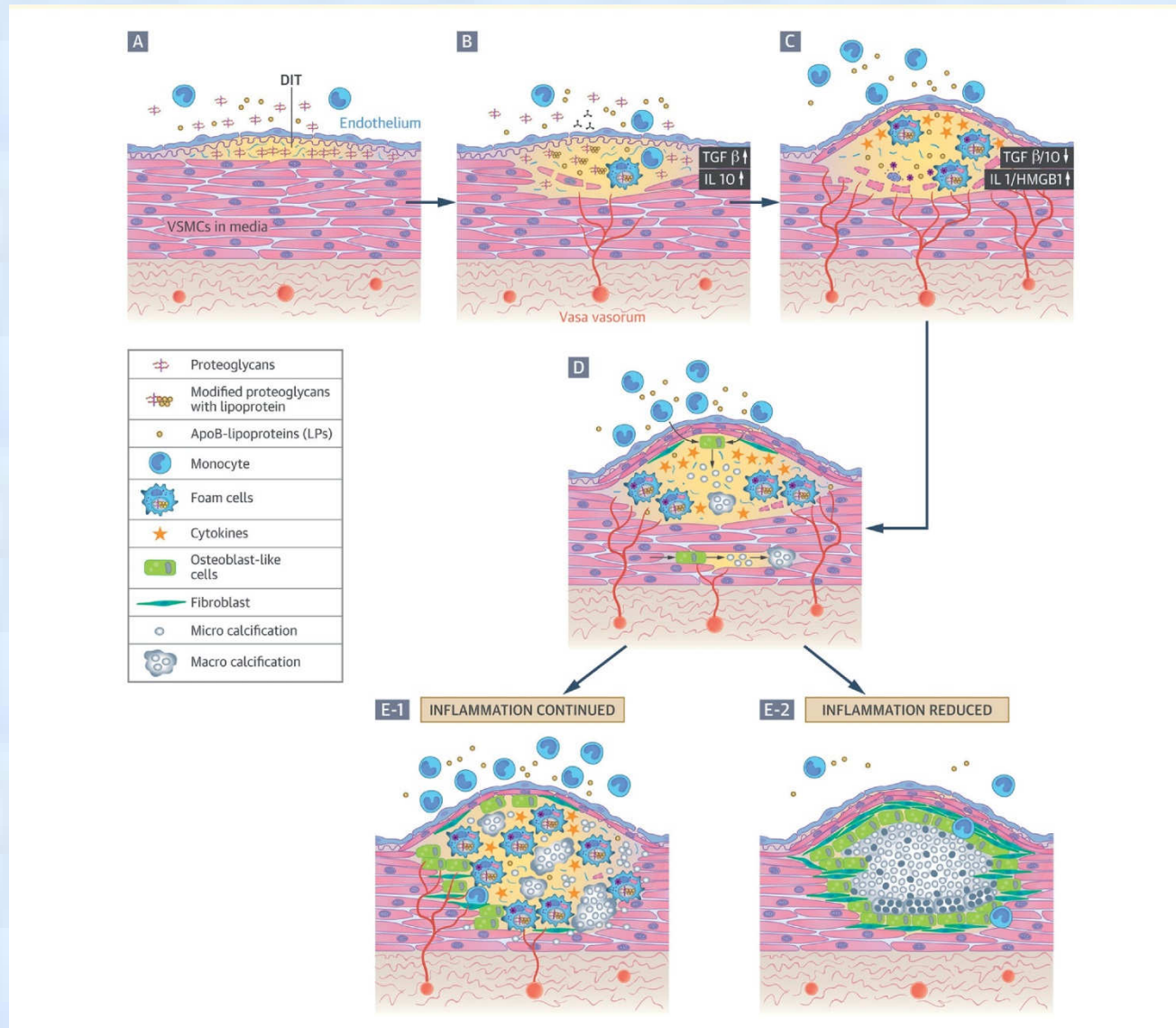
Osteopontín

GRP – Gla rich protein

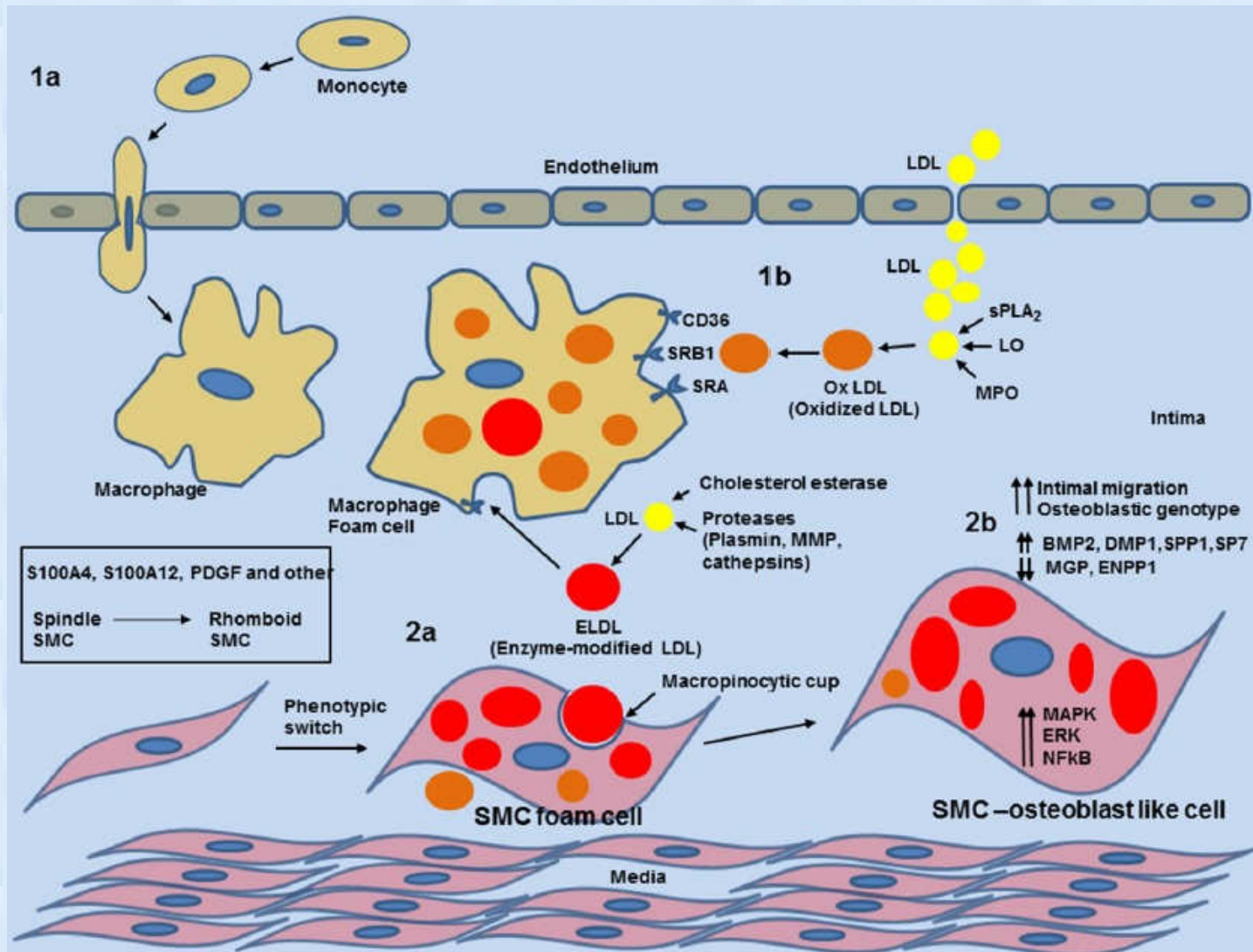
Gas6 – growth arrest-specific protein 6

4 transmembránové proteiny – *proline-rich  $\gamma$ -carboxyglutamyl protein (PRGP) 1 a 2, a transmembrane  $\gamma$ -carboxy glutamyl protein (TMG) 3 and 4*

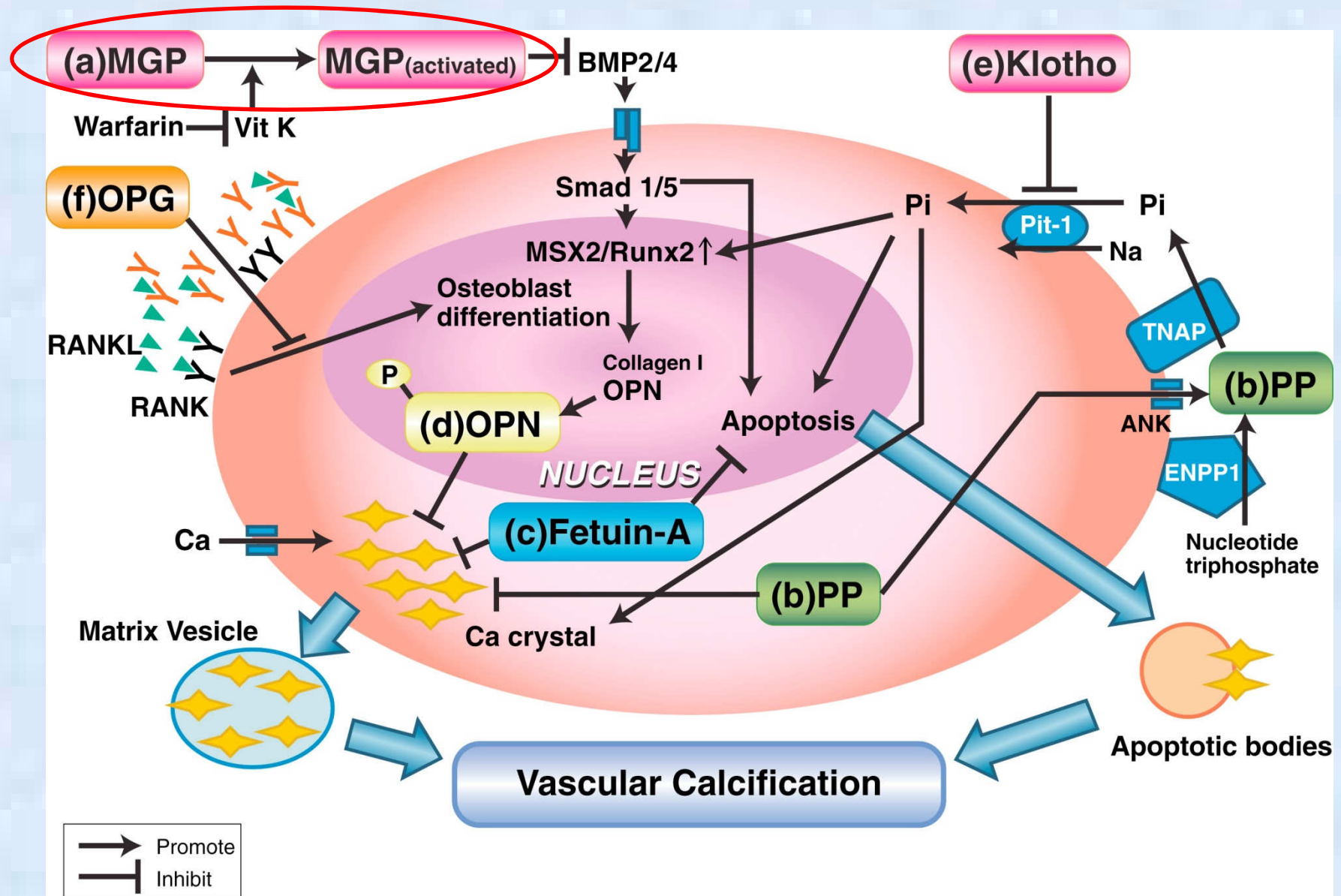
# Ateroskleróza



# Ateroskleróza



# Ateroskleróza





# MGP – matrix Gla protein

11kD protein, 84 AK

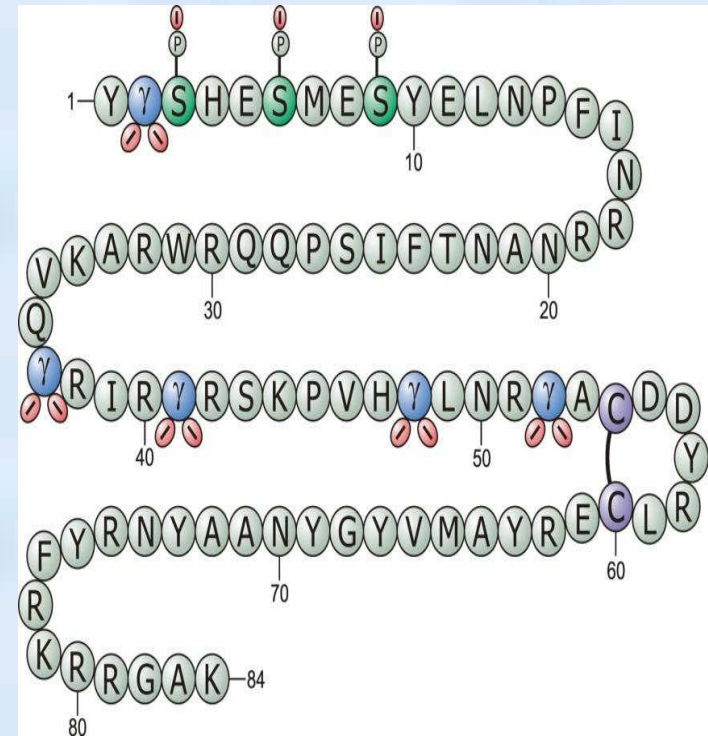
Místo syntézy:

chondrocyty

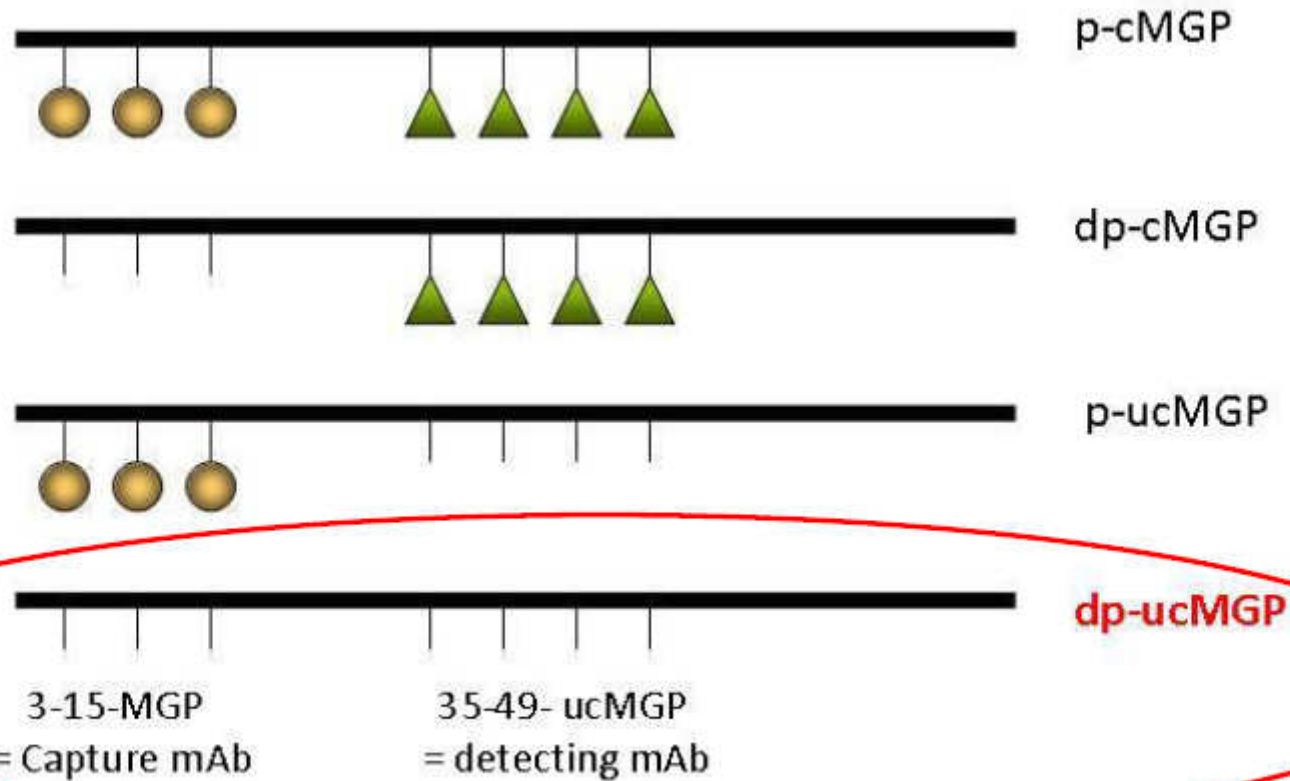
hladké sv. vl. cévní stěny

Funkce:

Inhibice kalcifikace



# MGP – matrix Gla protein

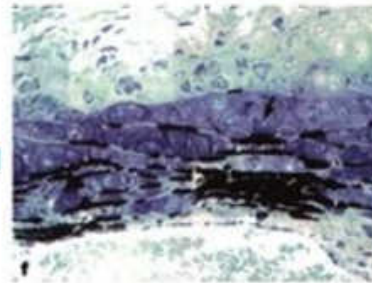


# MGP -/- myš



## Vascular Calcification in MGP Null Mice

MGP null

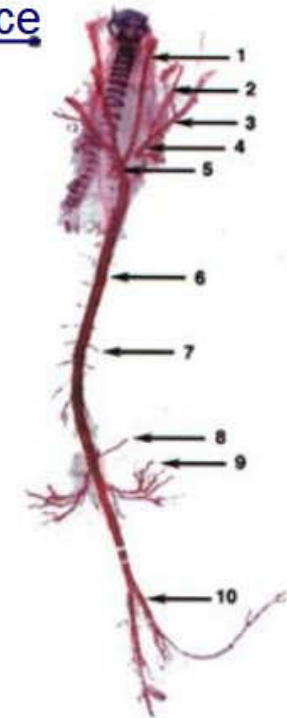


Aortic  
media

Wild type

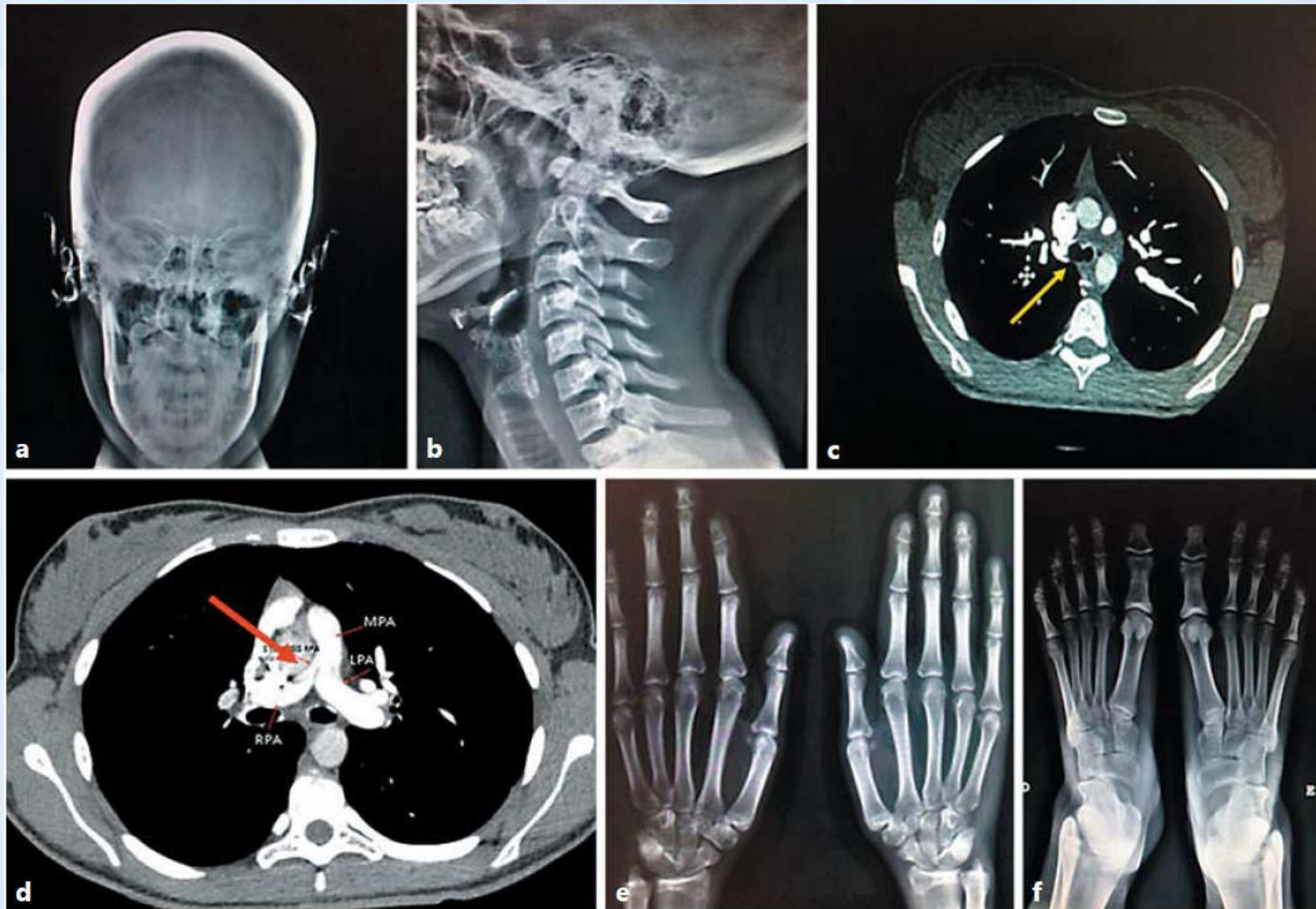


Aortic  
media



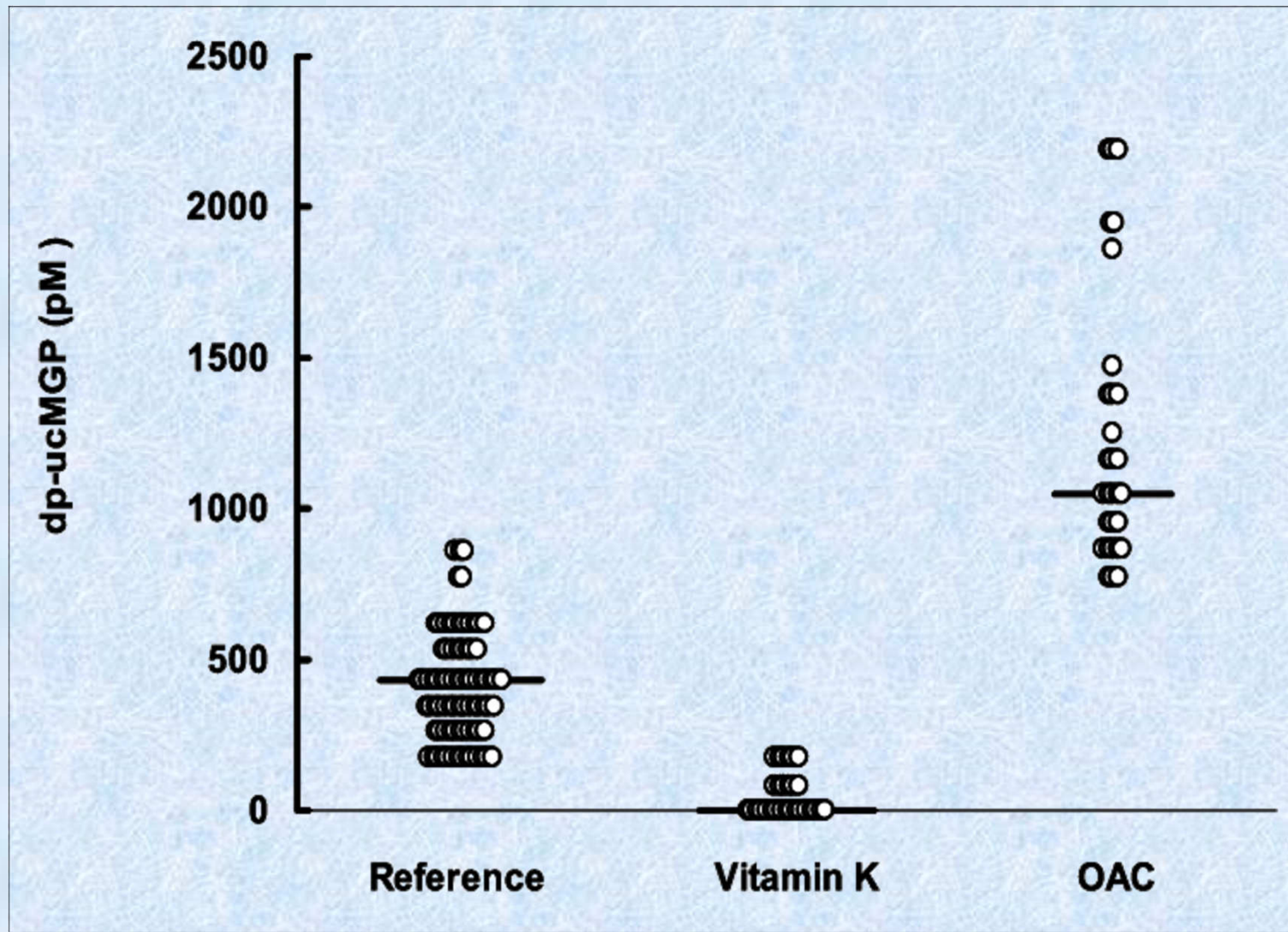
*Luo et al. Science 1997*

# Keutel syndrom



**Fig. 1.** Radiographs showing features of suspected Keutel syndrome. **a** Cranial thickness and calcifications in the ears. **b** Laryngeal calcifications. **c** Tracheal calcifications revealed by angiotomography (yellow arrow). **d** Right pulmonary artery hypoplasia (red arrow). **e** Shortening of the second, third, and fourth distal phalanges of the hands. **f** Shortening of the second, third, and fourth distal phalanges of the feet. LPA, left pulmonary artery; MPA, main pulmonary artery; RPA, right pulmonary artery.

# Vitamin K vs. MGP



# Vitamín K v populaci

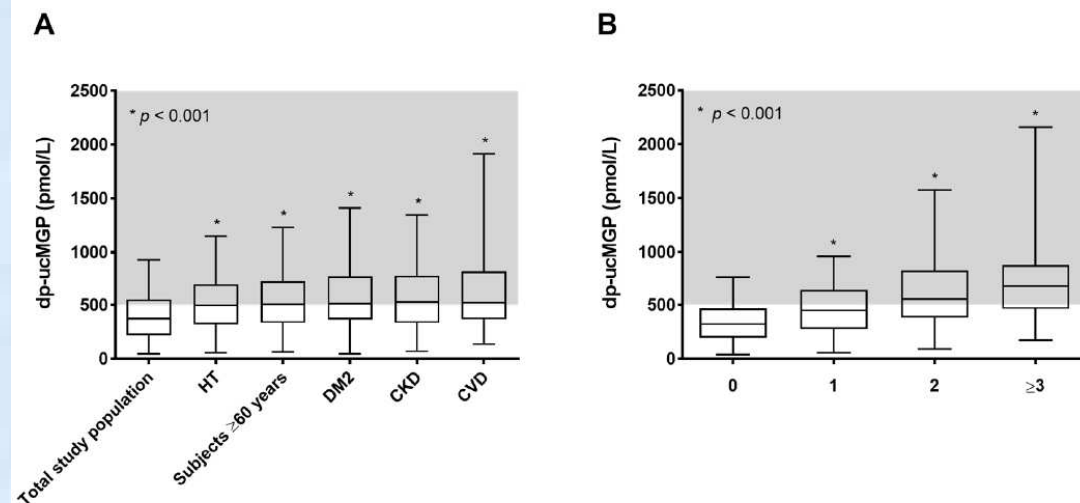
(PREVEND study)

	All Subjects ( <i>n</i> = 4275)	Tertiles of dp-ucMGP			<i>p</i> -Value
		Tertile 1 ( <i>n</i> = 1425)	Tertile 2 ( <i>n</i> = 1425)	Tertile 3 ( <i>n</i> = 1425)	
dp-ucMGP (pmol/L)	372 (221–552)	<275	275–479	≥480	-
<b>Demographics</b>					
Male gender ( <i>n</i> , %)	1966 (46.0)	570 (40.0)	669 (46.9)	727 (51.0)	<0.001
Age (years)	53 ± 12	49 ± 11	52 ± 11	59 ± 12	<0.001
Race					0.03
Caucasian ( <i>n</i> , %)	4041 (94.5)	1333 (93.5)	1343 (94.2)	1365 (95.8)	
Black ( <i>n</i> , %)	42 (1.0)	21 (1.5)	13 (0.9)	8 (0.6)	
Asian ( <i>n</i> , %)	100 (2.3)	36 (2.5)	36 (2.5)	28 (2.0)	
Other ( <i>n</i> , %)	59 (1.4)	27 (1.9)	21 (1.5)	11 (0.8)	

# Vitamín K v populaci

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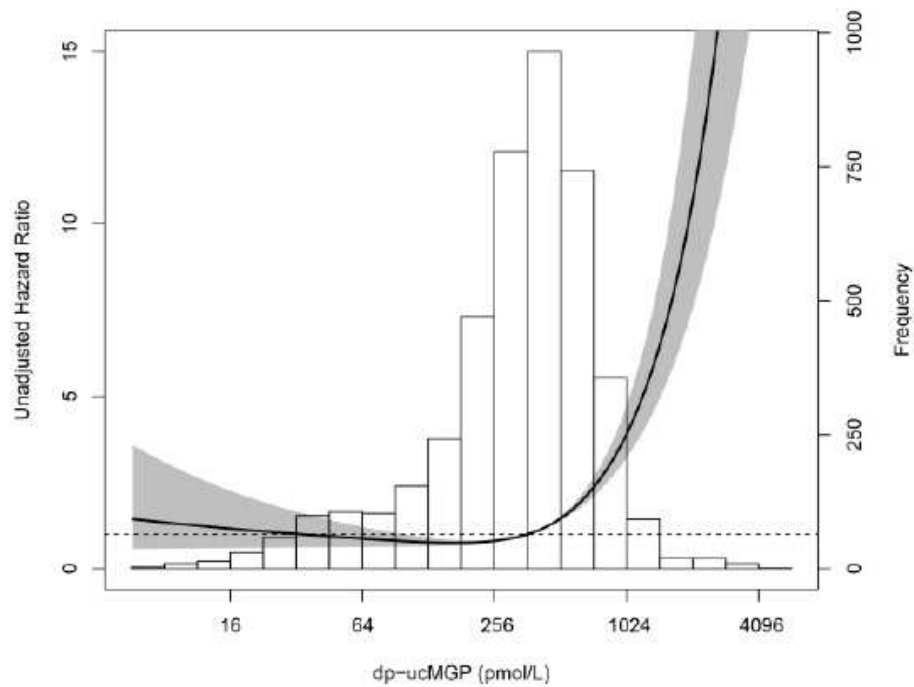


**Figure 1.** Dp-ucMGP levels in the total study population and for subjects with hypertension (HT), ≥60 years of age, type 2 diabetes (DM2), chronic kidney disease (CKD) and history of cardiovascular disease (CVD) (A); and dp-ucMGP levels according to the number of comorbidities (i.e., HT, DM2, CKD, and/or CVD) (B).

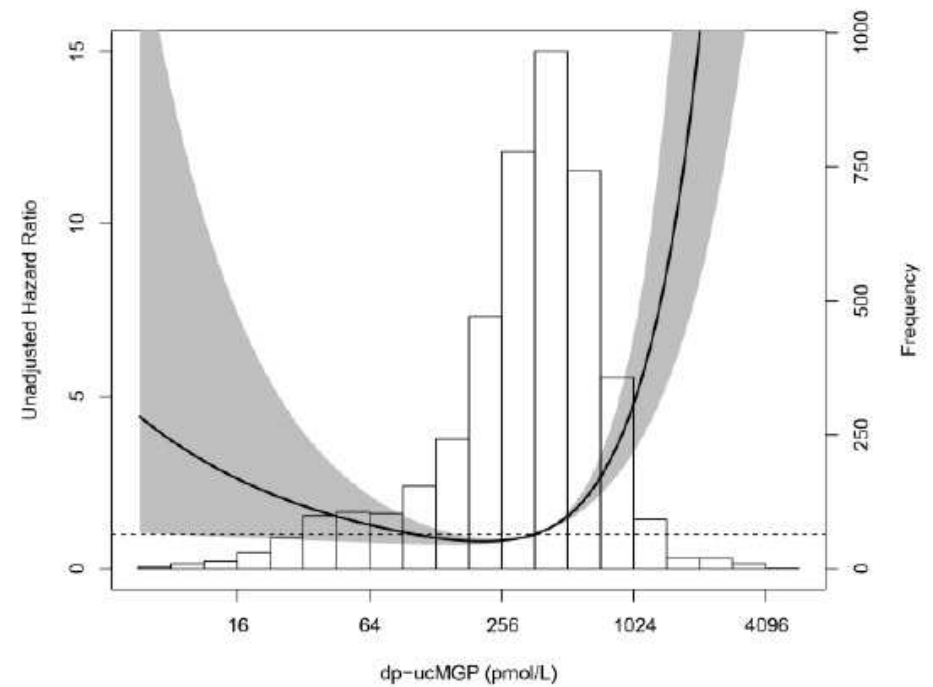
# Vitamín K v populaci

(PREVEND study)

All-Cause Mortality

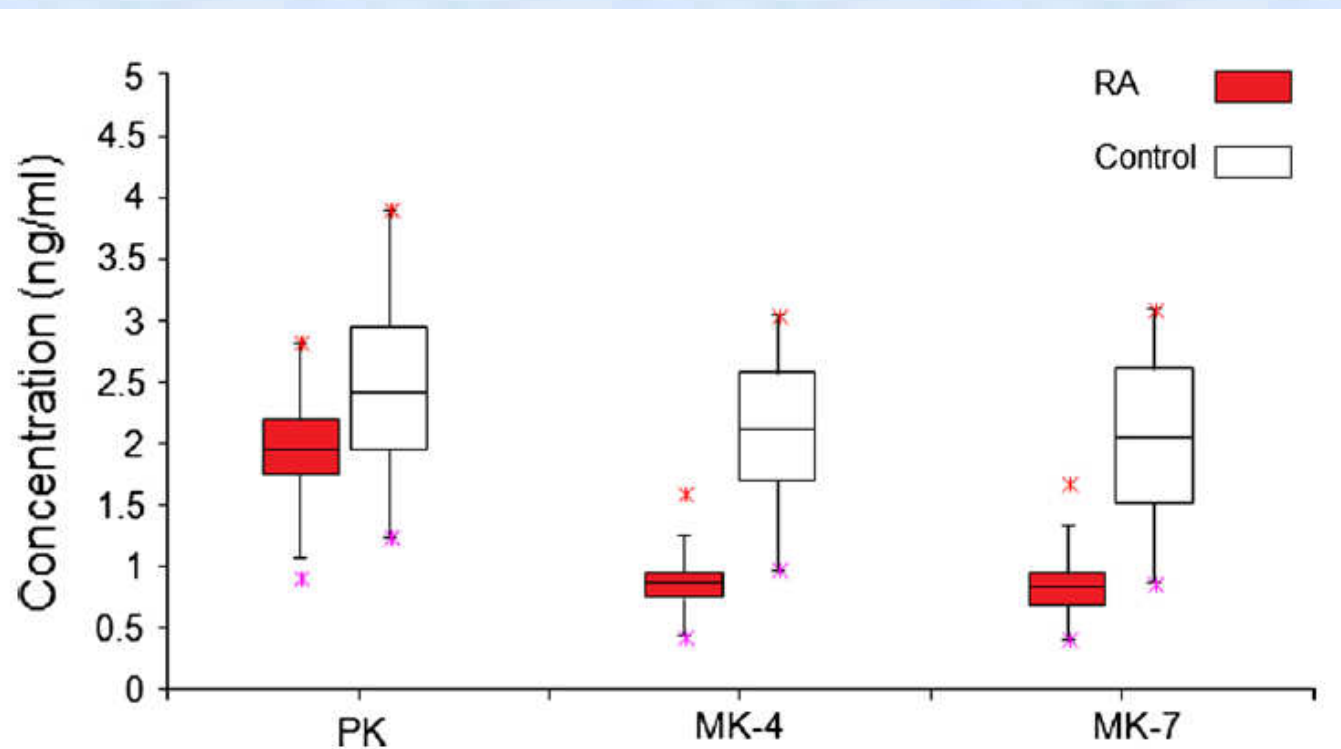


Cardiovascular Mortality





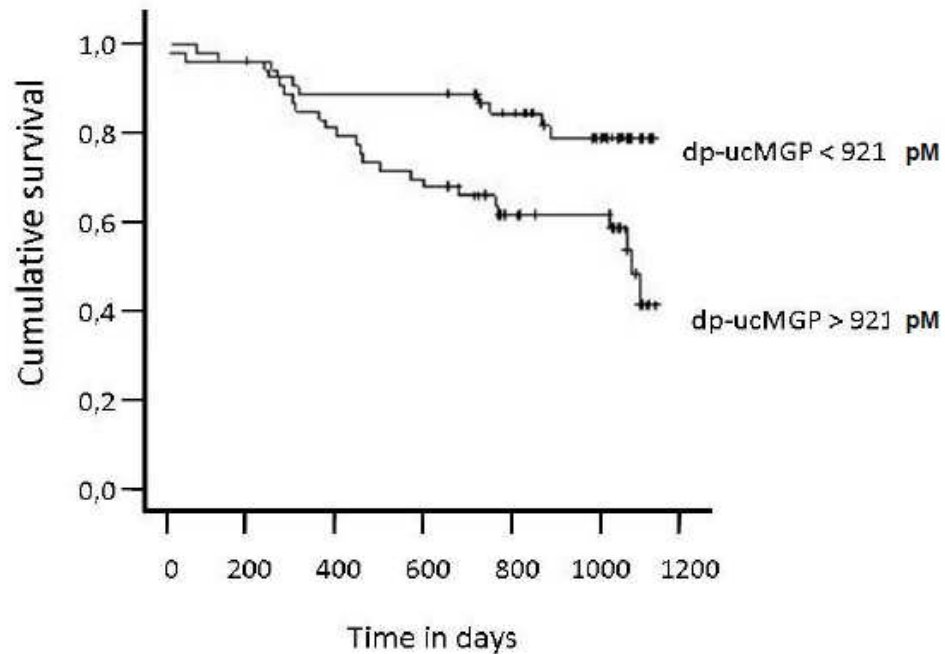
# Vitamín K u nemocných



**Fig. 2** Box and whisker plot for serum levels of MK-4, MK-7 and PK in RA patient and healthy control groups

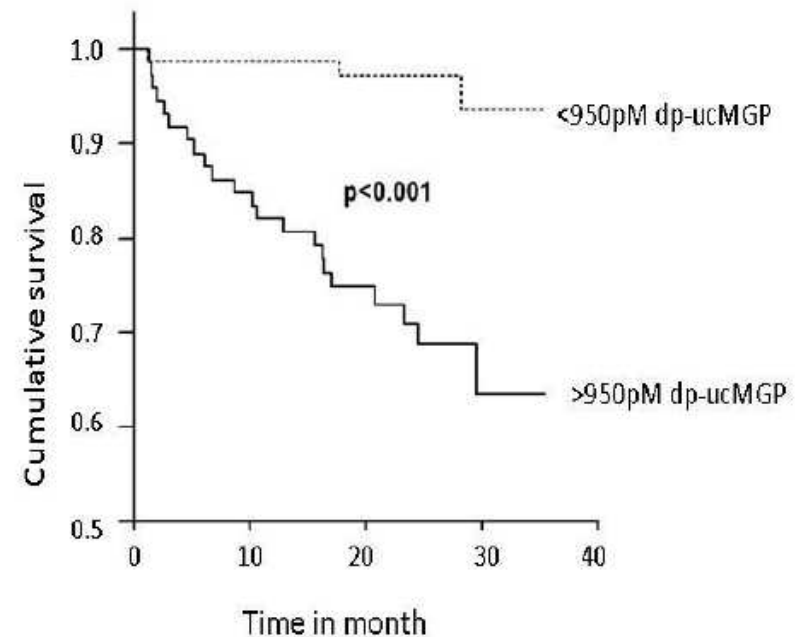
# Vitamín K – prognostický faktor?

CKD5



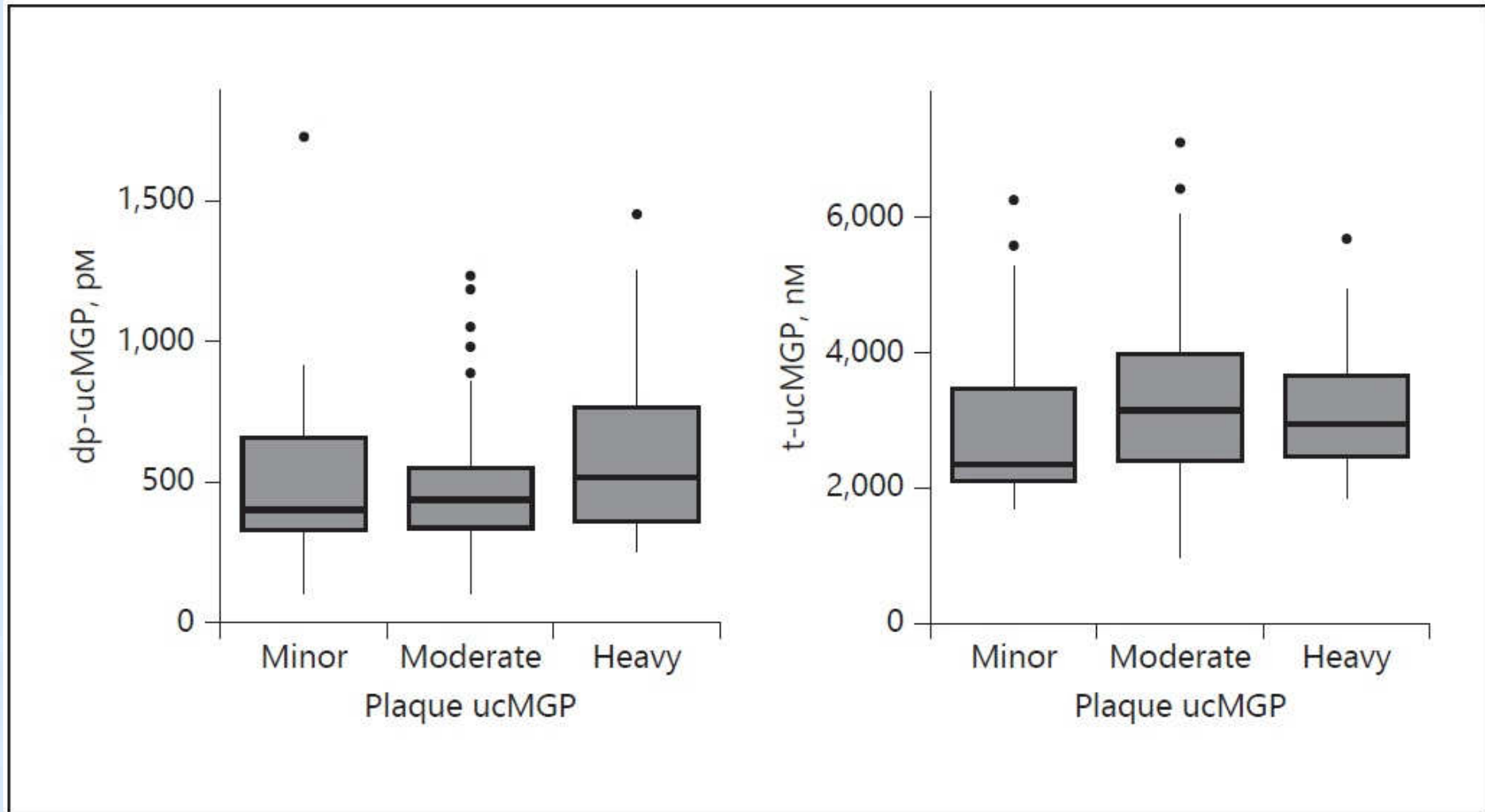
Schurgers LJ et al. 2010

AS



Ueland T et al. 2014

# ucMGP plazma vs. aterosklerotický pl.





# *Závěr*

Představuje kalcifikace cév zlo pro lidský organizmus?

Ovlivňuje vitamín K kalcifikaci cév?

Lze podáváním vitamínu K snížit rozsah kalcifikace?

Děkuji za pozornost!

