



# What characterize hip fracture in AGES study Icelandic heart association

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# PhD prodject

- Bone mineral density and hip fracture in AGES study Icelandic heart association
- Vitamin D in serum blood and hip fracture in AGES study
- Conferences that I have attended with this material are :
- 24NKG, EuSEM, FFN, EuGSM, Hrumleiki-frumleiki, SUMS





# Background

what we know about hip fracture

- 90% are older than 50 years
- The incidence of hip-fractures 2-3 fold higher in females than males
- Hip fractures severely impact quality of life
- The associated mortality 1-y after fracture is high (~30 % for males and ~20% for females)





# Methods

## AGES-Reykjavík study

- AGES study Icelandic heart association
  - 30 795 male and female
- Age, Gene/Environment Susceptibility-Reykjavik study (AGES-Reykjavik)
- Longitudinal study
  - (age range 66-98 years)
  - 58% female
- Started as Reykjarvik- study 1967
  - Participants in AGES 2002 was 5764





# First paper

Characterising differences between  
hip fracture cases and non-cases





# Methods

## AGES-Reykjavík study

- For the 5764 participants a total of 486 hip-fracture cases occurred between recruitment (2002-2006) and end of follow-up in 2012 (mean 8.9 years)
  - 144 male and 342 female cases
- Compared differences in physical function, lifestyle and health between hip-fracture cases and non-cases
- In these analyses we accounted for age of participants and bone health (BMD), the latter representing risk factors for fractures independent of bone health





# Hip fracture-BMD

Average different between male

	Model A		Model B	
	Hip fracture vs. no fracture $\Delta$ (95% CI)	HR (95% CI)	Hip fracture vs. no fracture $\Delta$ (95% CI)	HR (95% CI)
BMI (kg/m <sup>2</sup> )	-0.49 (-1.20, 0.23)	0.86 (0.72, 1.04)	0.13 (-0.71, 0.74)	1.08 (0.88, 1.32)
Muscle thigh area(cm <sup>2</sup> )	<b>-5.64 (-10.21, -1.08)</b>	<b>0.66 (0.51, 0.85)</b>	-2.27 (-6.83, 2.29)	0.78 (0.59, 1.03)
25(OH)D (nmol/L)	<b>-5.94 (-10.61, -1.27)</b>	<b>0.72 (0.60, 0.88)</b>	-4.58 (-9.34, 0.02)	<b>0.82 (0.67, 1.00)</b>
Hemoglobin (g/L)	-0.21 (-0.44, 0.02)	<b>0.70 (0.59, 0.83)</b>	-0.19 (-0.43, 0.05)	<b>0.78 (0.63, 0.95)</b>
Albumin (g/L)	<b>-0.88 (-1.58, -0.17)</b>	<b>0.64 (0.51, 0.79)</b>	<b>-0.78 (-1.50, -0.07)</b>	<b>0.68 (0.51, 0.90)</b>
Leg strength (New)	<b>-27.78 (-48.81, -6.75)</b>	<b>0.56 (0.43, 0.72)</b>	-19.40 (-40.73, 1.94)	<b>0.70 (0.53, 0.92)</b>
Grip strength (New)	-0.57 (-18.98, 17.84)	<b>0.79 (0.64, 0.99)</b>	1.95 (-16.78, 20.68)	0.89 (0.70, 1.22)
Time up and go (sek)	<b>1.05 (0.45, 1.65)</b>	<b>1.51 (1.33, 1.73)</b>	0.97 (0.36, 1.58)	<b>1.53 (1.31, 1.79)</b>





# Hip fracture-BMD

Average different between Female

	Model A		Model B	
	Brot vs. ekki brot $\Delta$ (95% CI)	HR (95% CI)	Brot vs. ekki brot $\Delta$ (95% CI)	HR (95% CI)
BMI (kg/m <sup>2</sup> )	-1.49 (-2.09, -0.88)	0.72 (0.64, 0.82)	-0.99 (-1.58, -0.38)	0.80 (0.69, 0.92)
Muscle thigh area(cm <sup>2</sup> )	-4.38 (-6.45, -2.31)	0.66 (0.57, 0.76)	-3.21 (-5.27, -1.14)	0.66 (0.55, 0.81)
25(OH)D (nmol/L)	-4.83 (-7.77, -1.90)	0.87 (0.77, 0.98)	-4.56 (-7.52, -1.60)	0.82 (0.72, 0.94)
Hemoglobin (g/L)	-0.15 (-0.28, -0.02)	0.83 (0.75, 0.92)	-0.13 (-0.26, -0.00)	0.84 (0.74, 0.95)
Albumin (g/L)	-0.19 (-0.62, 0.25)	0.83 (0.75, 1.02)	-0.19 (-0.63, 0.25)	0.88 (0.73, 1.06)
Leg strength (New)	-15.68 (-24.99, -6.37)	0.75 (0.65, 0.87)	-13.51 (-22.89, -4.12)	0.76 (0.65, 0.89)
Grip strength (New)	-5.42 (-13.72, 2.89)	0.71 (0.61, 0.83)	-4.77 (-13.17, 3.62)	0.73 (0.62, 0.85)
Time up and go (sec)	0.17 (-0.29, 0.64)	1.28 (1.16, 1.41)	0.14 (-0.33, 0.60)	1.25 (1.12, 1.40)







# Second paper

We know that vitamin D is an important determinant of bone health

But in our first paper vitamin-D was also associated with fracture risk independent of bone health

Our aim is to explore those findings further





# Hip fracture-Vitamin D

## Characteristics (Mean (SD))

	n fracture/non frac	Hip fracture	Non fract	P-value
Age in y	448/5017	79 .0 (5.2)	75.8 (5.2)	<0.001
Male (%)	132/2207	30 %	44 %	
Female (%)	316/2810	70 %	56 %	<0.001
25(OH)D(nmol/L)	448/5017	57.4 (18)	53.2 (19)	<0.001
BMD (mg/cm <sup>3</sup> )	387/4395	213 (41)	252 (50)	<0.001
BMI (kg/m <sup>2</sup> )	446/5011	25.7 (4.5)	27.2 (4.4)	<0.001
Time up and go (Sek)	427/4880	13.8 (4)	12.5 (4)	<0.001





# Results for Vitamin-D

- Different between fracture and non fractures for all variable
- Risk factors is clustering

...but take a better look at vitamin-D

and association with other effect

- Model to see association
- Correlation for other effect sides





# Risk of Hip fracture Model C

	HR	95 % CI		P- gildi
25(OH)D*	0.82	0.74	0.92	<0.001
Age*	2.16	1.91	2.44	<0.001
Female	1.17	0.93	1.47	0.185
Time up and go*	1.29	1.18	1.42	<0.001
BMD *	0.49	0.44	0.56	<0.001





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