

# The Association Between Diabetes, Bone Mineral Density, Trabecular Bone Score and Vertebral Fractures

FJORDA KOROMANI<sup>1,2</sup>, TAULANT MUKA<sup>2</sup>, LING OEI<sup>1,2</sup>, CAROLA ZILLIKENS<sup>1</sup>, ALBERT HOFMAN<sup>2</sup>, OSCAR H. FRANCO<sup>2</sup>,

ANDRE G. UITTERLINDEN<sup>1,2</sup>, EDWIN OEI<sup>3</sup>, DIDIER HANS<sup>4</sup>, FERNANDO RIVADENEIRA<sup>1,2</sup>

<sup>1</sup>Department of Internal Medicine; and <sup>2</sup>Department of Epidemiology, Erasmus MC, Rotterdam, The Netherlands; <sup>3</sup> Department of Radiology, Erasmus MC, Rotterdam, The Netherlands; <sup>4</sup> Department of Bone & Joint, Centre of Bone Diseases, Lausanne University Hospital, Lausanne, Switzerland

## OBJECTIVES

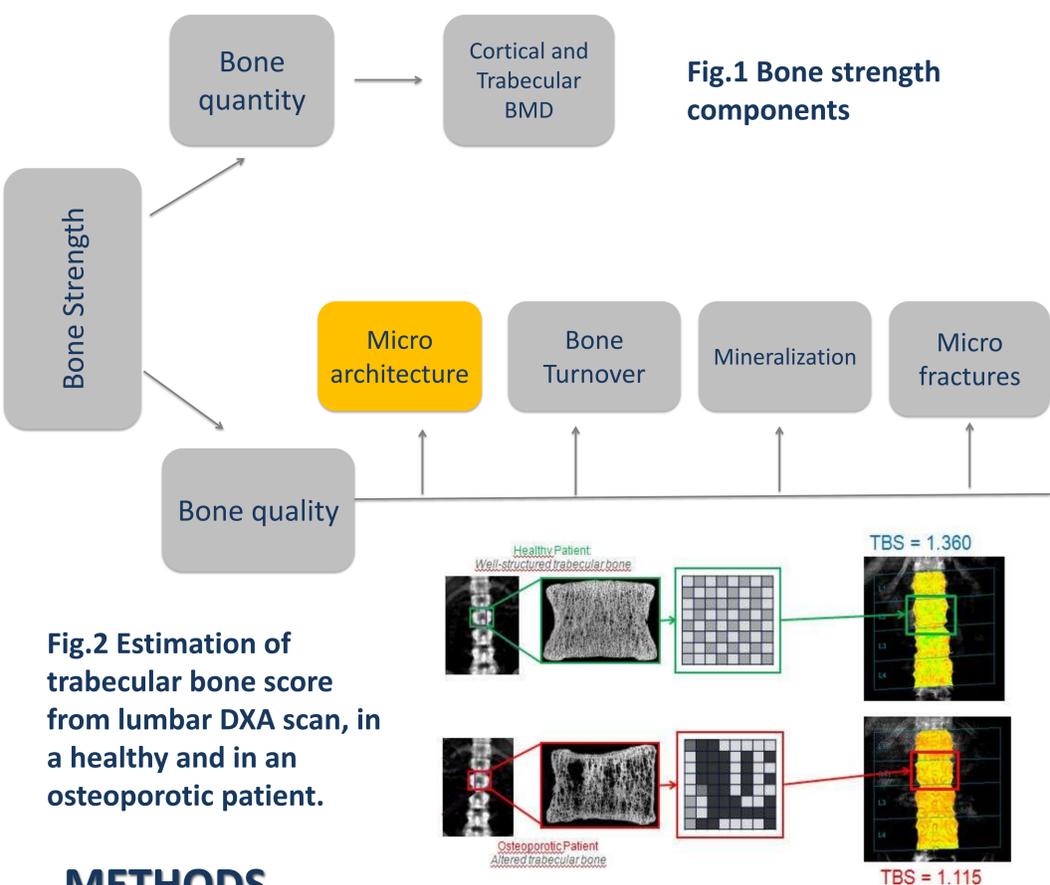
We aimed to compare lumbar spine trabecular bone score (LS-TBS) and lumbar spine bone mineral density (LS-BMD) values across individuals with and without 1) vertebral fracture (VFs), 2) Type 2 Diabetes (T2D); and 3) the relation between T2D and VFs risk.

## CONCLUSIONS

1. LS-TBS is positively associated with T2D and negatively associated with VFs despite higher levels of BMD in diabetics.
2. LS-TBS constitutes an indicator of micro architectural deterioration in diabetics; which is not captured by BMD

## BACKGROUND

- Fracture risk is increased in T2D individuals.
- BMD is inversely associated with fracture risk but paradoxically high in T2D individuals.
- TBS reflects bone microarchitecture and predicts fracture risk.



**Fig.2 Estimation of trabecular bone score from lumbar DXA scan, in a healthy and in an osteoporotic patient.**

## METHODS

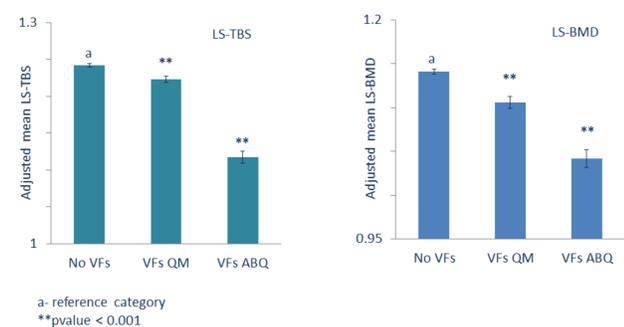
- We derived LS- TBS and LS-BMD from DXA and vertebral fractures from x-Ray measurements in 2,895 participants of the Rotterdam Study, a prospective cohort, assessed during the follow-up visit of 2002-2005.
- Fractures were scored with both quantitative morphometry (QM) and the algorithm based morphometry (ABQ) method.
- T2D was defined as glucose levels higher than 7.0 mmol/L or being on antidiabetic treatment.
- Multivariate linear and logistic regression models adjusted for age, sex, height, BMI and falling history were used.

## RESULTS

**Table1. Characteristics of the study population across VFs groups**

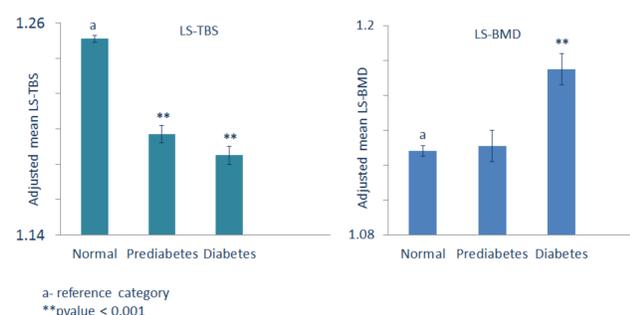
	VFs ABQ			VFs QM		
	Controls (n=2698)	Cases (n=161)	p-value	Controls (n=2152)	Cases (n=532)	p-value
Age	61.4 (8.9)	66.9 (11.6)	<0.001	61.0 (8.9)	63.1 (10.2)	<0.001
Sex (female)	1542 (57.2)	104 (64.6)	0.063	1275(59.2)	257 (48.3)	<0.001
Height	169.0 (9.3)	166.5 (10.3)	0.001	168.7 (9.3)	170.0 (10.3)	0.003
Weight	75.5 (14.1)	77.5 (13.1)	0.062	77.1 (13.2)	79.1 (12.9)	0.002
BMI	27.04 (3.4)	27.14 (3.8)	0.728	26.9 (3.4)	27.3 (3.8)	0.067
Bone treatment	39 (1.4)	23 (14.3)	<0.001	31 (1.4)	28 (5.3)	<0.001
Diuretic use	222 (8.2)	23 (14.3)	0.025	174 (8.1)	59 (11.1)	0.084
LS- BMD	1.156 (0.19)	1.073 (0.22)	<0.001	1.157 (0.18)	1.135 (0.21)	<0.001
LS- TBS	1.284 (0.11)	1.253 (0.12)	<0.001	1.289 (0.11)	1.266 (0.12)	<0.001
Diabetes	246 (9.1)	19 (11.8)	0.262	203(9.5)	46(8.7)	0.584
Prediabetes	237 (8.7)	17 (10.5)	0.378	191 (8.9)	44 (8.2)	0.627

**Fig.3 Adjusted mean LS- TBS and mean LS- BMD in VFs cases and controls**



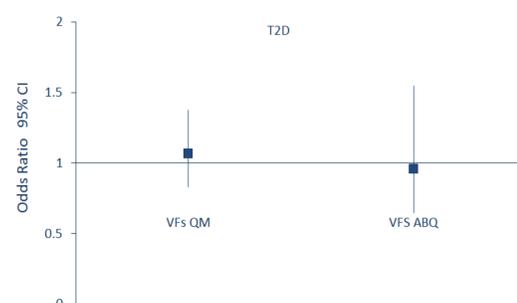
As compared to non-cases, VFs cases had lower LS-TBS and lower LS-BMD levels, where in ABQ cases differences were more prominent than in QM.

**Fig. 4. Adjusted mean LS- TBS and mean LS- BMD across glucose groups**



As compared to non-cases, T2D cases had significantly lower LS-TBS whereas they had significantly higher LS-BMD

**Fig.5 Association between T2D and VFs as scored by QM and ABQ**



There was not a significant association between T2D and VFs scored with either methods.