

Longitudinal Changes of Bone Mineral Content in Children with Cystic Fibrosis

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Aim: to examine factors that may determine longitudinal changes in bone mineralisation in children with Cystic Fibrosis (CF).

Methods:

100 children (50 females) had DXA performed - the data were expressed as expected bone mineral content for Bone Area SDS (BMCSDS).
 → 49 children had a second DXA
 → 24 had three DXA, during the 10-yr period.

Results:

	T ₀ (n=100)	T ₁ (n=48)	T ₂ (n=24)	P (ANOVA)
	mean	mean	mean	
Decimal age (years)	11.5	13.2	14.1	0.000
Age at PHV (years)	12.1	12.0	13	0.618
Height SDS	-0.2	0.1	0.0	0.125
BMI SDS	-0.1	0.2	-0.2	0.363
Vitamin D (ng/ml)	16.0	18.0	17.8	0.345
PTH (pg/ml)	38.6	43.4	45.3	0.547
Vitamin D/PTH ratio	0.4	0.5	0.4	0.495
LS BMC SDS	-0.3	-0.4	-0.5	0.046
TB BMC SDS	0.1	-0.1	-0.1	0.006
FEV1%	85.9	89.8	84.8	0.157
	number	number	number	
Impaired glucose tolerance (yes/no)	25	11	8	
Supplemental feeding (yes/no)	11	5	5	
Oral corticosteroids use (yes/no)	4	1	0	
Inhaled corticosteroids (yes/no)	45	15	6	

Table 1. Descriptive features of all children at T₀, T₁ and T₂.
 PHV=peak height velocity; SDS = standard deviation score; PTH=parathyroid hormone; BMC = bone mineral content; LS=lumbar spine; TS=total body; FEV1%= Forced expiratory volume in one second percent.

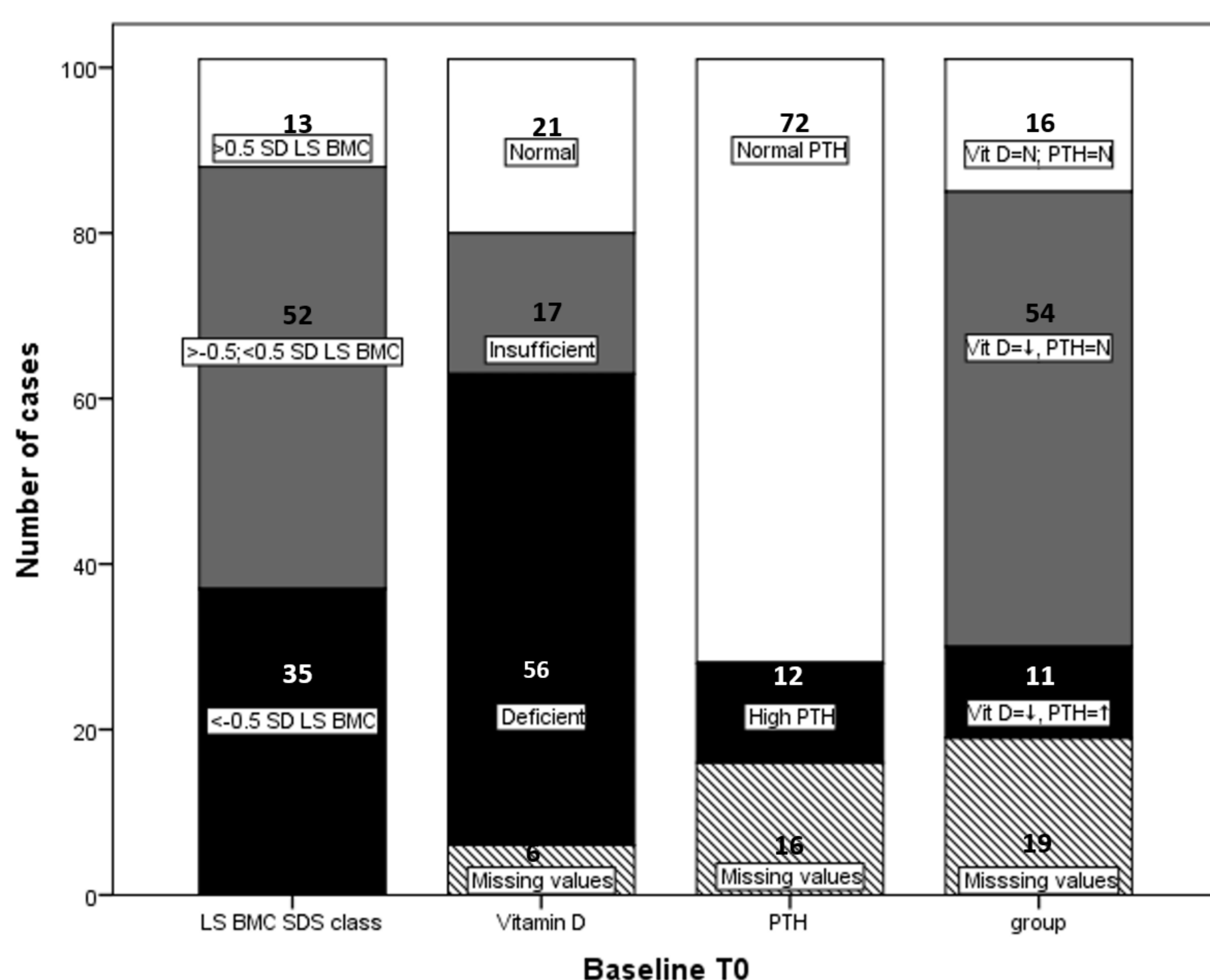


Figure 1. Baseline bone mass, vitamin D and PTH status
 Vit. D deficiency <20ng/mL, insufficiency 21–29ng/mL, normal ≥30ng/mL. High PTH levels if ≥70ng/L, normal PTH if <70ng/L. N=normal; Vit D=↓ if vit. D deficient & insufficient; PTH = N if <70ng/L; PTH=↑ if ≥70ng/L

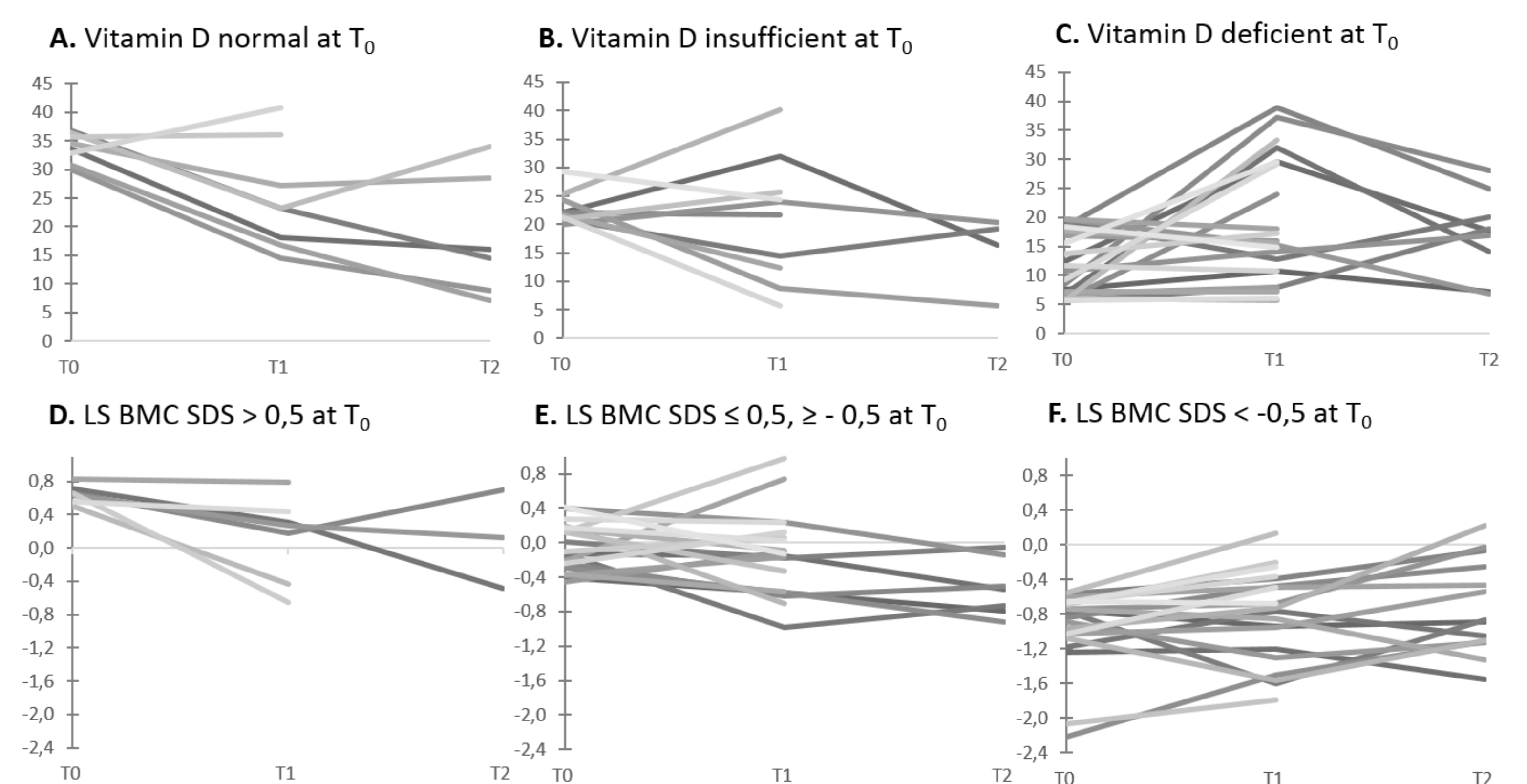


Figure 2.

A. Longitudinal changes at T₀, T₁, T₂ in cases categorised by baseline vitamin D status.
B. Longitudinal changes in LS BMC SDS at T₀, T₁ and T₂ categorised by baseline status of LS BMC SDS

		Δ LS BMC SDS			
		<-0.5SD Worsened	-0.5 to 0.5 SD stationary	>0.5SD improved	p
		n=15	n=19	n=14	
T ₁ -T ₀	Time between assessments (years)	2.29	1.67	1.73	0.048
T ₀	BMI SDS	-0.31	-0.13	0.58	0.040
T ₁	BMI SDS	-0.03	-0.11	0.78	0.053
T ₀	Vit D:PTH group (1, 2, 3, 4)	3.27	2.28	2.77	0.010
T ₀	FEV1%	74.06	90.62	91.81	0.010
T ₁	FEV1%	78.19	92.74	96.62	0.012

Table 2. Factors influencing bone mineral content change by ANOVA.

Median LS BMC SDS decreased from T₀ to subsequent assessments (-0.3; -0.4; -0.5; p=0.053).
 Factors decreased bone mineral content:
 - longer time between DXA assessments
 - lower FEV1%
 - lower BMI SDS
 - low Vitamin D associated with high PTH.

Conclusions: Bone mineralisation as assessed by DXA decreases with time in children with CF. Lower FEV1%, poorer nutritional status and low vitamin D with high PTH were factors found to be associated with worsening BMC SDS.