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Title: Low muscle mass is a strong predictor for osteoporosis in smokers with or without COPD

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Body: Rationale Reduced bone mineral density (BMD) is used to define osteopenia and osteoporosis. It is unclear if loss of bone mass exists in early COPD and if sarcopenia predisposes osteopenia and osteoporosis in early COPD. Methods 132 (ex)-smokers were stratified by spirometry in COPD and smoking controls (SC). DXA scan measured femoral neck (FN), total femur (TF) and lumbar spine BMD. Low BMD (LBMD) was defined as T-score<-1 at one of three sites. Relative Muscle Mass Index (RASM) equals (lean mass arms+legs)/ height². Sarcopenia was defined as RASM<7.26 in men and RASM<5.45 in women. Muscle weakness (MW) equals handgrip force<70% predicted. Results

	SC (N=71)	COPD (N=61)	P-value
Age (years)	60±8	64±7	0.01
Gender (% male)	65	77	0.27
FEV_1 (%pred)	100±15	81±18	<0.0001
Tiffeneau Index (%)	77±4	61±8	<0.0001
HGF (kg)	36±9	36±9	1.00
MW (N (%))	4 (6)	5 (8)	0.56

Table 1. Characteristics. p<0.05

Significant correlations were found between BMD and RASM (Figure1) and between sarcopenia and BMD (FNBMD: R=-0.25; p=0.004; TFBMD: R=-0.26; p=0.004; SBMD: R=-0.20; p=0.02). MW can act as an alternative for sarcopenia since they are correlated. (R=0.23; p=0.008). Multivariate linear regression confirmed MW to be associated with TFBMD (p=0.09), independently of COPD.

Conclusion In (ex)-smokers, BMD is associated with MW, independently of COPD. In patients with sarcopenia, training may induce additional health benefits for bone and muscle mass.