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Title: Possible role of liver disease and respiratory insufficiency in osteopenia in cystic fibrosis patients

Dr. Benoît 1481 Godbert benoit.godbert@hp-metz.fr MD ¹, Dr. Sylvie 1482 Montcouquiol smontcouquiolkamdems@chu-clermontferrand.fr MD ², Dr. Anne-Christine 1483 Rat ac.rat@chu-nancy.fr MD ³ and Prof. Martinet 1484 Yves y.martinet@chu-nancy.fr MD ⁴. ¹ Pneumologie, Hôpitaux Privés De Metz, Metz, France, 57000 ; ² Pneumologie, CHU De Nancy, Vandoeuvre-les-Nancy, France, 54500 and ³ Rhumatologie, CHU De Nancy, Vandoeuvre-les-Nancy, France, 54500 .

Body: Background: Osteoporosis is common in cystic fibrosis (CF). Its physiopathology remains unclear. Objective: To determine the prevalence of low bone mineral density (BMD) in adults with CF and to look for possible factors associated with osteopenia/osteoporosis. Methods: A prospective cross sectional study was designed to evaluate bone health in patients at our adults CF center. Clinical data were collected (age, body mass index, medical history, genetic mutation and treatment), as usual laboratory data, abdominal abnormalities on ultrasound (hepatomegaly, splenomegaly, cirrhosis, portal hypertension), and lung function parameters. BMD was measured by dual-photon X-ray absorptiometry at lumbar spine, femoral upper extremity and femoral neck. Results: Thirty patients were included (56.7% men; mean age = 24.5 years ± 4.1). Either osteopenia or osteoporosis was found in 63.4% patients at least at one bone site. A personal history of skeleton's fracture was found in 34.5% patients (but only 1 was a low energy fracture). Liver abnormalities on ultrasound were found in 36.7% patients (but none had cirrhosis). Low BMD at least at one site was more frequent among patients with liver abnormalities on ultrasound ($p = 0.002$), and among patients with bad respiratory function, defined by low mean FEV1 ($p = 0.04$), low mean SpO₂ ($p = 0.02$), and a tendency to low mean FVC ($p = 0.09$). A tendency for more infectious respiratory exacerbations ($p = 0.08$) was also observed in this group of patients. Conclusion: several mechanisms may contribute to the bone loss seen in patients with CF: liver disease, and respiratory insufficiency as well as systemic chronic inflammation may play a central role.