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Title: Prevalence of hyperinflation and its reversibility in asthma patients with poorly controlled disease or significant dyspnea

Thierry 30767 Perez Thierry.PEREZ@CHRU-LILLE.FR MD ¹, Pascal 30768 Chanez pascal.chanez@univmed.fr MD ², Daniel 30769 Dusser daniel.dusser@cch.aphp.fr MD ³, Daniel 30770 Vesque d.vesque@chiesifrance.com MD ⁴ and Philippe 30771 Devillier P.DEVILLIER@hopital-foch.org MD ⁵. ¹ Service Clinique des Maladies Respiratoires, CHRU de Lille - Hôpital Albert Calmette, Lille, France ; ² Département des Maladies Respiratoires, AP-HM, Laboratoire d'immunologie INSERM CNRS U 600, UMR6212, Université de la Méditerranée, Marseille, France ; ³ Service Pneumologie, Hôpital Cochin - Groupement Hospitalier Universitaire Ouest - APHP, Paris, France ; ⁴ Direction des Affaires Médicales, Laboratoire Chiesi SA, Courbevoie, France and ⁵ UPRES EA 220, Hôpital Foch, Suresnes, France .

Body: Introduction: Inflammation in asthma involves proximal and distal airways. The latter may induce a significant hyperinflation (HI). Aim: To evaluate the prevalence of HI by body plethysmography in asthmatic patients with poorly controlled disease and/or significant dyspnea. Methods: In 324 patients (age 49 ± 17 ; FEV_1 75 ± 18 % pred) insufficient asthma control was defined by an ACT score < 20 ($n = 302$) or a significant dyspnea by a MRC score ≥ 1 ($n=22$). HI was defined by either a $RV > \text{pred} + 1.64 \text{ RSD}$ ($=RV-HI$) or a $FRC > 120$ % pred ($= FRC-HI$). HI reversibility after bronchodilator was defined by a decrease of $RV > 20$ % or a reduction of $FRC > 10$ % from baseline. Change in dyspnea and chest tightness were evaluated by a VAS. Results: HI was found in 49 % (RV-HI) and 47 % (FRC-HI) of cases. Prevalence of HI was higher in patients with a $FEV_1 < 60$ % pred than in those with a $FEV_1 > 80$ % pred: 78 % for RV-HI and 70 % for FRC-HI, vs 34 % and 40 %, respectively. ACT score was lower in patients with FRC-HI (13.4 ± 4 vs 14.6 ± 4 ; $p = 0.004$). Post-bronchodilator change was -10 ± 13 % for FRC, and -12 ± 21 % for RV. HI reversibility was obtained in 59 % of cases with RV-HI and 47 % of cases with FRC-HI. Chest tightness decrease after bronchodilator was greater in patients with baseline FRC-HI (-44 ± 25 vs -37 ± 24 mm, $p = 0.02$). Dyspnea improvement was higher in those with baseline RV-HI (-45 ± 26 mm vs -38 ± 23 , $p = 0.02$). Conclusion: Hyperinflation is frequent in poorly controlled asthma, including patients with normal FEV_1 , suggesting an involvement of distal airways. It appears reversible in more than half of cases.