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Title: Lung function trajectories from birth through puberty reflect atopic disease phenotypes

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Body: Background: Asthma heterogeneity challenges identification of scientifically and clinically meaningful childhood asthma phenotypes. We asked if lung function trajectories from birth to 16 years reflected time-based (TBP) or atopic-disease (ADP) phenotypes. Methods: Lung function (z-scores) was measured in the “Environment and Childhood Asthma” birth cohort study in Oslo by tidal flow-volume ratios (time to peak expiratory flow by total expiratory time (tPTEF/tE)) in awake neonates (mean age 2 days) and by forced expiratory flow-volume loops at 10 and 16 years. Data from the 0-2, 10 and 16-years investigations were used to classify all 550 children (52% boys) by recurrent (≥ 2) bronchial obstruction (rBO) 0-2 years, or asthma (≥ 2 of doctor diagnosis, asthma symptoms or –medication use) from 2-10 and 10-16 years for the TBP and rBO/asthma with atopic dermatitis and/or allergic rhinitis from 10-16 years as ADP. Results: Compared to children without asthma 10-16 years, the lung function trajectory for the phenotype asthma, AD and AR from 10-16 years, but not for TCP (figure 1) was significantly reduced from birth ($p < 0.02$) through 10 years by mid-flow values ($p < 0.001$) and FEV1/FVC ($p = 0.002$), and by FEV1 and mid-flow values ($p < 0.001$) and FEV1/FVC ($p < 0.04$) at 16 years.

Conclusions: Persistently reduced lung function through childhood was reflected in atopic disease- but not time of symptom presentation based phenotypes.