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Title: How farming exposure affects lung development in young adults

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Body: Exposure to organic dust in agricultural work has been associated with lower lung function. Longitudinal studies on lung function decline in agricultural workers are few. We studied 1,964 farming students and 407 controls in 1992/4, and 963 and 172 of these again in 2007/8. Spirometry, a health questionnaire, smoking and occupational history were collected each time. Cumulative dust and endotoxin exposures were estimated from job-exposure matrices based on personal dust measurements. Lung function was expressed as z-scores using the LMS equations (Stanojevic S, et al. AJRCCM 2008; 177: 253-60). In 1135 subjects with longitudinal data and aged <25 yrs at baseline the FEV1 z-score change ($\Delta zFEV1$) was positive (i.e. was an increase) for female farmers (mean \pm SD of 0.08 \pm 0.78), male farmers (0.09 \pm 0.69) and controls (0.17 \pm 0.68) with the same for $\Delta zFVC$ (0.18 \pm 0.80, 0.39 \pm 0.76 and 0.54 \pm 0.67, respectively, p<0.001 ANOVA). This confirms that longitudinal lung function change is less than that estimated from cross sectionally derived equations such as LMS. Current farming had an adverse effect on $\Delta zFVC$ versus never farming (-0.19, 95% CI of -0.33 to -0.06) and the effect of 3rd quartile dust and 3rd quartile endotoxin exposure versus 1st quartile was also adverse (-0.15, -0.27 to -0.03) and (-0.19, -0.31 to -0.07) in multivariate linear regression controlling for age, height, smoking, weight, farm upbringing, bronchial hyperresponsiveness and atopy. This effect was not seen for the 4th quartiles. There was no effect modification by smoking or sex. We conclude that moderate farming exposures had a significant effect on lung development. This was not seen in those most heavily exposed which could reflect healthy workers selection.