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Title: Evaluating the impact of genotype on the relationship between impaired lung growth and chronic exposure to traffic derived pollutants

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Body: Background: Small deficits in lung growth have been reported in children with high exposures to traffic-related pollutants. Aim: To investigate the relationship between lung volume (FVC) and long term exposures to NO_x, NO₂, PM_{2.5} and PM₁₀ and establish whether polymorphisms in xenobiotic metabolism genes modify this association. Methods: FVC was measured in 887 8-9 year-old children in East London during the Winter periods 2008–2012 and related to annual pollutant exposures modeled at the residential address. 18 SNPs were investigated, either reflecting previously published, or hypothesized susceptibility loci, including the following genes: glutathione S-transferase pi 1 (GSTP1), glutathione S-transferase mu 1 (GSTM1), glutathione S-transferase theta (GSTT1) and cytochrome P450 1A1 (CYP1A1). Results: We found significant negative associations (P=0.05) between FVC and each of the examined pollutants: using NO₂ as an illustration: -3.0 (-5.0-0.0) mL per µg/m³. Polymorphisms in GSTP1 and possession of the GSTM1 and GSTT1 null genotype did not modify this relationship. Of the remaining polymorphisms we found evidence of effect modification associated with snps in CYP1A1 (rs2606345 and rs2198843), with losses of FVC in heterozygotes and homozygotes compared with wild type. Conclusions: These data demonstrate decreased lung volumes in children with high pollutant exposures. We were unable to replicate previously reported modification of the air pollutant, lung function interaction by polymorphisms in GST genes, but provide preliminary evidence that polymorphisms CYP1A1 may modify this effect.