Abstract

Asthma is a common, genetically complex human disease. Elevated serum immunoglobulin E (IgE) levels, elevated blood eosinophil counts, variably reduced spirometric measures and increased airway responsiveness (AR) are physiological traits which are characteristic of asthma. We investigated the genetic and environmental components of variance of serum total and specific IgE levels, blood eosinophil counts, the forced expiratory volume in one second (FEV1) and forced vital capacity (FVC), and AR in an Australian population-based sample of 232 Caucasian nuclear families. With the exception of FVC levels, all traits were closely associated with clinical asthma in this population. Loge total serum IgE levels had a narrow-sense heritability (h2N) of 47.3% (SE = 10.0%). Specific serum IgE levels against house dust mite and Timothy grass, measured as a RAST Index, had a h2N of 33.8% (SE = 7.3%). FEV1 levels had a h2N of 6.1% (SE = 11.6%), whilst FVC levels had a h2N of 30.6% (SE = 26.8%). AR, quantified by the loge dose-response slope to methacholine (DRS), had a h2N of 30.3% (SE = 12.3%). These data are consistent with the existence of important genetic determinants of the pathophysiological traits associated with asthma. Our study suggests that total and specific serum IgE levels, blood eosinophil counts and airways responsiveness to inhaled agonist are appropriate phenotypes for molecular investigations of the genetic susceptibility to asthma.