Analyzing Lung Function Measures in Occupational Studies

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Spirometric pulmonary function values are used in diagnostic settings to screen for existence of obstructive and/or restrictive lung disease, and in occupational and environmental studies to assess the potential harmful effects of exposure on lung function level and annual decline. Gender- and race-specific normative lung function values based on polynomial regression models are derived from 5,042 white and black men and women paper plant workers who were never-smokers, with no respiratory symptoms or diagnoses and no history of occupational exposure to fibrogenic dusts or irritant chemicals. One sided lower 95% prediction intervals are used to derive lower limits of normal values. An application is presented where percent predicted lung function measures are related to gravimetric measures of cumulative total and respirable paint aerosol (TPA and RPA) and estimated isocyanate in total and respirable aerosols (TIA and RIA) in a cross-sectional study of 240 painters spraying polyurethane enamels at four aircraft maintenance plants. A mixed effects model is also presented for relating annual change in lung function to exposure variables.