Development of mucoid *Pseudomonas aeruginosa* coincides with pulmonary deterioration in cystic fibrosis

This longitudinal study correlates acquisition of non-mucoid and mucoid phenotypes of *Pseudomonas aeruginosa* with respiratory symptoms, quantitative chest radiography, pulmonary function tests, and anti-pseudomonal antibodies in cystic fibrosis (CF). 56 children identified by the Wisconsin CF neonatal screening project between 1985 and 1994 were followed from diagnosis (median age 6.9 weeks) for up to 16 years. Sputum or oropharyngeal swabs were cultured at least 6 monthly (mean 4 months). An anti-*P. aeruginosa* antibody titre of >1/256 was also defined as indicative of non-mucoid *P. aeruginosa* acquisition.

Non-mucoid and mucoid *P. aeruginosa* were acquired at median ages of 1.0 and 13.0 years, respectively, with coincident increased anti-pseudomonal antibody titres. Longitudinal analysis of the time of transition from non-mucoid to mucoid status revealed a significant abrupt increase in cough score (*p* = 0.005), deterioration in chest radiography (Brasfield score –2.34 of 25; *p*<0.001), and 12% (*p* = 0.02) and 9% (*p* = 0.007) reductions in predicted FEV₁ and FVC, respectively. Acquisition of non-mucoid *P. aeruginosa* was not associated with significant changes in these parameters.

Anti-pseudomonal antibiotic use in 30/53 children with non-mucoid *P. aeruginosa* reduced subsequent development of mucoid phenotypes (Cox hazard ratio 0.09; *p* = 0.001). However, antibiotic treatment was also associated with increased aminoglycoside resistance in mucoid cultures (27% v 11%; *p* = 0.02).

Mucoid *P. aeruginosa* expresses exopolysaccharide/alginate which confers resistance to phagocytosis and antibiotics. This study demonstrates the greater pathogenicity of mucoid *P. aeruginosa* and supports current strategies of cross infection control, early surveillance, and aggressive eradication treatment following acquisition of *P. aeruginosa* in the interval before mucoid phenotypes develop.

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LUNG ALERT

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