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**Air pollution and poverty: a deadly mix in idiopathic pulmonary fibrosis?**

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Disparities in respiratory health can be partly explained by environmental exposure (in particular to air pollution), and socioeconomic inequalities[1]. Although idiopathic pulmonary fibrosis (IPF) is a rare disease, there has been growing interest over the last years in the role of air pollution in its incidence and natural history.

In a recent issue of the *European Respiratory Journal,* Yoon *et al.* provide new evidence on the impact of air pollution on IPF mortality in a large retrospective monocentric cohort of Korean patients, using a validated pollution dispersion model to estimate individual-residential-level air pollution exposure[2]. After adjustment for individual and area-level potential confounders, they found an adverse effect of long-term exposure to $NO_2$ but not to $PM_{10}$ on survival. Conversely, in a French prospective multicentric cohort, our team found an association between IPF mortality and long-term exposure to $PM_{10}$ and $PM_{2,5}$ but not to $NO_2$[3]. While discussing carefully this discrepancy in results and raising in particular the methodological differences regarding the exposure assessment, both in terms of measurement (dispersion model *versus* air quality stations) and exposure-period (one year *versus* cumulative exposure during follow-up), the authors did not consider the difference in pollutant levels between the two countries. Due to differences in observed air pollutant levels between Korea and France, there would be a gradient in the health effects due to air pollution exposure and thus a varied health impact.

Air quality assessment faces many difficulties in estimating exposure of patients suffering from respiratory diseases, and possibly even more in the case of IPF. Indeed, it is not uncommon for an IPF patient to have relocated at the time of IPF diagnosis, either to get closer to their healthcare referral center or to move to another region for retirement as the disease affects older people. This may be really problematic, because exposure in IPF patients should be studied over prolonged periods of time

starting prior to the onset of disease such as in asbestosis, in which remote past exposure to pro-fibrosing asbestos fibres is important to consider [4]. Furthermore, IPF is a rare disease and in order to enrol a significant number of patients, the inclusion period of studies needs to be quite long. Finally, the quality of air has improved on average over time in many countries, as the authors pointed out, which makes it difficult to evaluate the risk associated with exposure.

Interestingly, Yoon *et al.* observed the association between $NO_2$ and IPF mortality when area-level covariates (educational level and gross regional domestic product as a proxy for income) were considered in addition to individual-level covariates. Indeed, socioeconomic factors are important to take into account because they have a significant impact on health [2]. Income is a social indicator of life expectancy [5], and educational level captures childhood socioeconomic conditions and largely determines income [6]. It is well known that socioeconomic position is related with air pollution. Areas with low socioeconomic status communities suffer greater air pollution, and some ethnic groups are more likely to live closer to major sources of pollution [7]. In our French cohort we recently showed that IPF patients with lower area-level income were more likely to be of non-European origin, to have occupational exposure, and they tended to have a higher cumulative exposure to $PM_{2.5}$ compared to higher area-level income [8]. Importantly yet, poorer IPF patients had a worse survival even after adjusting for geographical origin, and occupational exposure[8]. These observations suggest that income is a multifactorial social marker in which a variety of factors potentially important in IPF are embodied, including delayed access to medical care or inadequate education about preventive measures regarding health habits, comorbidities or IPF itself (e.g. vaccinations, smoking cessation, control of cardiovascular risk factors). For all those reasons, the respective impact of area-level education and income on IPF survival in the Korean cohort should be uncovered.

Air pollution and poverty constitute a deadly mix in idiopathic pulmonary fibrosis. Precariousness can potentiate the deleterious effect of environmental exposures as well as certain genetic predispositions such as telomere length [9]. Moreover, the socioeconomic level may influence co-exposures in pre-natal period and throughout life, and intervene on primary, secondary and tertiary disease prevention [1]. And by the time IPF appears, social conditions and environmental exposures have already been at work for many years. Thus, as suggested by some authors, an exposome approach, involving research in life and social sciences, would provide a better understanding of the influence of the environment on the genesis and severity of IPF[10].

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