

baseline  $PM_{2.5}$ . If included, the baseline data coefficient measures how much the effect of  $PM_{2.5}$  is time dependent.<sup>5 p. 10</sup> If the difference is not included, the coefficient of baseline  $PM_{2.5}$  is still measuring the time-dependent change in effect, but the estimate is potentially confounded by the ignored  $PM_{2.5}$  differences. Correlations between baseline data and difference data cannot be ruled out *a priori* because of regression to the mean.<sup>6</sup> In any case, the baseline  $PM_{2.5}$  coefficient tells us nothing about potential threshold effects. Therefore, I believe the interpretations of Correia et al<sup>1</sup> and Samet<sup>2</sup> are unjustified.

And here is why: the original authors and Samet failed to mention and discuss the fact that the study is ecological. Ecological analyses may be severely biased,<sup>7,8</sup> which is a weakness of the investigation and limits the “threshold findings” concluded from the study.

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#### The authors respond:

We thank Dr. Morfeld for his interest in and comments<sup>1</sup> regarding our article.<sup>2</sup> We disagree, however, with the assertion that the results are uninformative about potential threshold effects. Our findings that continued reductions in air pollution were associated with improved life expectancies even during 2000–2007, and the finding that the association between increased life expectancy and reduced air pollution was not appreciably influenced by baseline pollution levels provides important evidence regarding threshold effects. We agree with Morfeld that these findings do not exclude the possibility of a threshold at very low levels of pollution. These results do suggest, however, that even at the relatively low levels of pollution in the United States during the time-period of the study, gains in air quality had public health benefit.

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## Time Scale in Follow-up Studies: Considering Disease Prognosis

#### To the Editor:

Colonge et al’s article<sup>1</sup> on the choice of primary time scale for epidemiologic follow-up studies makes an important contribution to methods for longitudinal data analysis. We agree with their assessment that the choice of time scale should be based on “the goals of the study and the need for confounder adjustment.” As the authors say, age is the appropriate time scale in most studies of disease incidence (especially when compared with time on study). But there may be other relevant time scales for different applications.

For example, in studies of disease prognosis, time since onset or diagnosis is commonly used.<sup>2,3</sup> In a study of the association between a particular

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