Letters to the Editor

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Quartz Exposure Can Cause Pneumoconiosis in Coal Workers

To the Editor: We read with interest the recent article by McCunney, Morfeld, and Payne entitled *What Component of Coal Causes Coal Workers' Pneumoconiosis (CWP)?*[1] The intent of the article was to identify the specific substance(s) in the underground coal mining environment that are directly responsible for causing CWP. In addressing this question, the authors use a substantial portion of their work to point out that exposure to silica does not likely contribute to CWP.

The authors are not wrong in their assessment of the role of silica in the development of CWP when it occurs at low levels. Epidemiologic studies dating back to the early 1970s showed through modeling of quantitative exposure data that mixed coal mining dust was the primary factor relating to CWP development, whereas silica's role was much smaller.[2–4] Anthracite workers in many parts of the world have long been known to suffer high rates of CWP, although anthracite usually contains very low levels of silica.

We believe that by downplaying silica in their desire to seek a more precise explanation for the cause of CWP, the authors have potentially done coal miners a great disservice. There is an important distinction that the authors fail to highlight in their report—silica may not be a major factor in the development of the clinical condition known as CWP, but silica does cause another form of pneumoconiosis among coal workers—silicosis.

Silica remains a major risk factor for coal miners. This was amply demonstrated by the rapid development of pneumoconiosis among Scottish coal miners who had been engaged in cutting through a fault composed of sandstone rock.[5] Weight for weight, silica is considerably more toxic than coal dust, and failure to control silica dust using a standard intended for coal dust can easily lead to massive overexposure to silica. In this, the approach to enforcing a silica standard in underground coal mines in the United States has been criticized as inadequate.[6–9] As easily accessible coal seams are being depleted, attention is being paid increasingly to thin seams or to seams with rock intrusions that might not have been considered economically feasible to mine in the past. Mining these seams often requires cutting the adjacent rock, the roof, the floor, and intrusions, leading to exposures rich in silica dust.[10]

It is, therefore, critically important that the role of silica not be discounted when evaluating pneumoconiosis risk among coal miners. As surface and underground thin seam mining becomes more prominent the likelihood of increased silica exposure among miners, and the development of pneumoconiosis associated with those exposures becomes increasingly important. Situations where there is a risk of silica exposure must be identified, and silica dust levels controlled to the regulated level or lower. Only in this way will the potential future tragedy of an epidemic of silicosis in coal miners be averted.

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Authors' Response

To the Editor: We thank Drs. Attfield et al for their thoughtful review of our article.[1] We also appreciate their comments about risks of silicosis among coal miners who perform certain types of coal mining activities such as drilling through siliceous rock and that they may experience higher levels of crystalline silica exposures. We also note the occurrence of a mixed dust pneumoconiosis[2] among coal miners that has been described as anthracosilicosis.[3]

The purpose of our report, however, was not to address all the pulmonary hazards potentially associated with coal mining but "to assess the scientific literature related to studies that have investigated the active agent(s) within coal responsible for causing CWP." Any "downplaying" of risks of silica exposure among coal miners was not only unintended but also inadvertent. We mentioned explicitly [1, p465] the observations of Miller et al[4] from the Scottish coalmine and concluded in the summary of our article: "The link between quartz and the development of CWP is minimal, aside from circumstances associated with high concentrations of quartz (usually >10%) in which the pulmonary response is more typical of silicosis as opposed to CWP" [1, p470]. We hope that critical readers would not be confused and that they will understand that the clear focus of the report was to identify features of coal associated with coal workers' pneumoconiosis (CWP), not downplay silica.

In light of increased energy demands in a growing world economy, we hoped to identify features of coal associated with CWP such that preventive efforts may be enhanced.

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No Interaction Between Smoking and Working as a Hairdresser With Respect to Miscarriage and Infertility

To the Editor: We read with great interest the recent article by Baste et al[1] in which the authors found that Norwegian hairdressers who were smokers or ex-smokers had a higher risk of infertility compared with hairdressers who were never smokers and control women working in nonhairdresser occupations. We also read with great interest the recent Letter to the Editor from Axmon and Rylander[2] in which the authors commented on the Baste et al.[1] study. Interestingly, Axmon and Rylander[2] conducted similar analyses to Baste et al.[1] in a Swedish population of hairdressers and controls and did not find an interaction between smoking and working as a hairdresser with respect to similar reproductive health outcomes. In response to the Letter from Axmon and Rylander,[2] Baste and Moen[3] suggested that the different findings between their study and that of Axmon and Rylander[2] may be due to differences in smoking prevalence and age between the Norwegian and Swedish study samples. Further, Baste and Moen[3] suggested that others collect or analyze data on smoking and reproductive outcomes in hairdressers, particularly in women older than 40 years of age.

Recently, we conducted a study on Reproductive Outcomes in Salon Employees (ROSE) in the US. We previously published detailed methods for the ROSE study.[4] Briefly, we collected data on reproductive health from 450 hairdressers and 511 women employed in other occupations (ie, teachers, nurses, real estate agents, sales clerks) using a 51-page survey that was mailed to registered female hairdressers and nonhairdressers aged 21 to 55 years in the Baltimore, Maryland area and its surrounding counties. Names and addresses of potential participants in the selected occupations and age range were obtained from a commercial mailing house, and recruitment proceeded via a mass mailing. To be included in the study, women had to have an intact uterus and both ovaries. All hairdressers were confirmed to be employed as hairdressers by their responses to detailed work history questions. Per the suggestion of Baste and Moen,[3] we analyzed data obtained from the mailed surveys to determine if, in our sample, there was an interaction between smoking and working as a hairdresser with respect to miscarriage and infertility. For the miscarriage outcome, each reported pregnancy was treated as the unit of observation, and occupation

TABLE 1
Miscarriage and Infertility Among Smoking and Nonsmoking Hairdressers and Nonhairdressers

		All Participants		Participants Aged 40 Yr and Older	
	Study Group	***N* (%)**	**OR (95% CI)**	***N* (%)**	**OR (95% CI)**
Smoking during pregnancy					
Miscarriage*		Interaction *P*-value = 0.25		Interaction *P*-value = 0.28	
No	Nonhairdresser	1036 (15.1)	1.00 (reference)†	657 (14.3)	1.00 (reference)†
Yes		185 (18.4)	1.32 (0.87–2.01)†	146 (17.8)	1.38 (0.86–2.22)†
No	Hairdresser	331 (15.1)	0.99 (0.67–1.46)†	237 (14.4)	1.03 (0.67–1.59)†
Yes		82 (25.6)	2.06 (1.17–3.62)†	66 (25.8)	2.25 (1.21–4.19)†
Reported ever smoking					
Infertility‡		Interaction *P*-value = 0.61		Interaction *P*-value = 0.22	
No	Nonhairdresser	290 (20.0)	1.00 (reference)§	174 (19.5)	1.00 (reference)§
Yes		215 (20.9)	1.16 (0.73–1.83)§	141 (23.4)	1.31 (0.74–2.31)§
No	Hairdresser	175 (16.0)	0.91 (0.54–1.52)§	113 (15.0)	0.90 (0.46–1.77)§
Yes		265 (16.6)	0.88 (0.55–1.40)§	204 (13.2)	0.67 (0.37–1.21)§

*Unit of observation was individual pregnancy; occupation and smoking status were assessed for each pregnancy.
†Adjusted for age at pregnancy, race, education level, current alcohol drinking.
‡Unit of observation was individual woman; occupation and smoking status history were assessed at the time of survey completion.
§Adjusted for age at survey, body mass index, race, marital status, education level, current alcohol drinking.

(hairdresser/other) and smoking status (yes/no) at the time of each pregnancy were analyzed using repeated measures analyses of variance procedures. For the infertility outcome, each individual woman was treated as the unit of observation; infertility was determined using the question "Have you ever tried to become pregnant over a period of at least a year without success?" Logistic regression procedures adjusting for age at survey, body mass index, race, marital status, educational level, and current alcohol drinking were conducted to examine the association between being a hairdresser at the time of survey and infertility.

As shown in Table 1, there was not a statistically significant interaction between being a hairdresser and smoking for either the miscarriage or infertility outcome among all women in the study and among only women aged 40 years and older at the time of the survey. As reported in a previously published ROSE article,[4] the odds ratio (OR) of miscarriage was significantly higher among women who smoked at the time of their pregnancy compared with women who did not smoke (all women: OR, 1.62; 95% CI, 1.11 to 2.38). Further, the OR of miscarriage were highest among hairdressers who smoked compared with the other study groups (nonhairdressers who did not smoke during pregnancy was the reference category). In contrast, smoking was not related to infertility in our sample nor was being a hairdresser related to either adverse reproductive outcome.

As suggested by Baste and Moen,[3] it is likely that different study population characteristics account for differences in results. Both the Baste et al.[1] and Axmon and Rylander[2] studies used European study populations. Our study was based on a US study population. Further, the reproductive outcomes that were assessed in our study differed from those assessed in the other studies. We investigated miscarriage and infertility, whereas Baste et al.[1] and Axmon and Rylander[2] examined delayed conception and spontaneous abortion. Given these study differences, it is not possible to definitively determine whether there is an interaction between smoking and working as a hairdresser with respect to all reproductive outcomes. Thus, we hope that others will collect and analyze their data as well help to determine whether an interaction exists between smoking and reproductive outcomes in hairdressers.

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