

that of a lifelong nonsmoker, even 20 or more years after cessation of smoking.<sup>63</sup> These factors must be considered in evaluating the role of asbestos exposure in the development of carcinoma of the lung in an exsmoker.

#### ROLE OF FIBER TYPE

Epidemiologic data indicate that carcinoma of the lung may develop in response to exposure to any of the types of asbestos.<sup>4,9,14,27,54,64</sup> However, there is considerable controversy regarding the relative potency of the various fiber types for the production of pulmonary neoplasms.<sup>25</sup> Individuals who believe that chrysotile is less potent as a lung carcinogen than the amphiboles, amosite and crocidolite, cite as evidence the relatively low rate of carcinoma of the lung among chrysotile miners and millers,<sup>22,65</sup> asbestos cement workers,<sup>16,66</sup> and friction-product manufacturers.<sup>36,39</sup> On the other hand, some chrysotile asbestos textile plants have reported extremely high lung cancer rates, with exceptionally steep dose-response curves.<sup>27,29,67</sup> Although it has been suggested that contamination of the asbestos fibers with mineral oil might explain the high rate of carcinoma of the lung among asbestos textile workers,<sup>9</sup> the steep dose-response relationship among these workers also holds for asbestosis, which is difficult to explain on the basis of contaminating oil. One major difficulty for studies trying to assess the relative potency of asbestos fiber types is the inaccuracy of historic estimates of asbestos exposure.<sup>25,68</sup> In this regard, Newhouse<sup>69</sup> noted that chrysotile textile plants were particularly dusty when compared with other types of occupational exposure to chrysotile. Furthermore, in comparing the cancer mortality for two different asbestos textile plants,<sup>29,67</sup> Finkelstein concluded that the risk of death from asbestos-associated cancer in factories manufacturing similar products is unrelated to the type of asbestos fiber used.<sup>68</sup> More work is required to resolve this issue, but the authors suspect that much of the variation in lung cancer rates among chrysotile workers can be explained on the basis of dose and relative fiber size, with longer fibers being more potent. For example, the low rate of lung cancer among automotive maintenance and brake repair workers<sup>70,71</sup> can be explained on the basis of relatively low dust levels, the low proportion of asbestos in the dust generated, and the preponderance of very short chrysotile fibers in brake-line dust.<sup>72</sup>

#### PATHOLOGY OF ASBESTOS-RELATED CARCINOMA OF THE LUNG