response rate, even in those exposed to the heaviest doses. In addition, the response is usually the result of past, rather than current, exposures. This poor correlation has led to the current interest in "susceptibility," i.e., factors accounting for between-subject differences in response.

The concept of the dose-response relationship, insofar as it applies to exposed workers, can be explored only by studies that use epidemiologic techniques and consider all of those at risk. Of what relevance is the concept of dose-response to a physician dealing with the health problems of an individual patient? In the first place, knowledge of dose-response relationships may provide the answer to why a particular patient was at risk; second, this information may alert the physician to the potential risk to other workers; third, it may have importance in establishing prognosis and determining management. Thus, in the detailed descriptions of the various asbestos-related lung diseases that follow, their relationship to exposure dose, and possible differences in the dose-response relationships of the various fiber types will be discussed and summarized in the final section in terms of the implications to the physician.

Significance of Coated and Uncoated Fibers in Clinical Material

The presence of ferruginous bodies (so called in this section because positive identification of the fiber core has been undertaken in only a few of the more recent studies) or coated fibers in biologic material derived from persons who are occupationally exposed to asbestos has long been recognized as a hallmark of exposure (55). Their presence in routine autopsy material, first reported from Cape Town, South Africa (99), has subsequently been confirmed in many countries, in urban and rural communities, in all parts of the world, in fact, whenever sought (table 5). Prevalence tends to increase with the vigor of the search and depends on the amount

TABLE 4

LISTING OF STUDIES* THAT SHOW A DOSE RELATIONSHIP BETWEEN ESTIMATED EXPOSURE† TO ASBESTOS AND BIOLOGIC RESPONSE

Dose as Measured by \ Response	Fibrosis		Cancer	
	Lung	Pleura	Lung	Pleura
Years of exposure	Bader *et al* (65) Sluis-Cremer (66) Zedda *et al* (72)		Knox *et al* (67) Doll (68) Meurman *et al* (77)	
Years since first exposure	Selikoff *et al* (64) Regan *et al* (70)	Selikoff *et al* (64)	Selikoff *et al* (64) Selikoff *et al* (64)	
Occupation	Harries *et al* (75) Sheers and Templeton (76)	Harries *et al* (75) Sheers and Templeton (76)		
Occupation and duration	Meurman *et al* (77) Balaam and McCullagh (78)		Newhouse *et al* (30) Newhouse (29, 71) Berry *et al* (73) Maneuso and El-Attar (74) Meurman *et al* (77) Enterline and Kendrick (79) Enterline (80) Enterline and Henderson (81)	Newhouse (71)
Cumulative dust exposure	Jodoin *et al* (84) McDonald *et al* (86) Becklake *et al* (87) Rossiter *et al* (88) Weill *et al* (94, 95)	Rossiter *et al* (88)	Enterline *et al* (82, 83) McDonald *et al* (85)	
Fiber count in pathologic material (electron microscopy)				Pooley, F D. (7), p. 222

* Identified by reference number in parentheses.

† Mining (66), mining and milling (84–88, 92), manufacturing (29, 30, 64, 94, 95), and secondary use including removal of old asbestos insulation (64, 65, 75, 76).