[redacted]

there was 1 milligram per gramme of nickel in the lung even 8 years after cessation of exposure. If Løken's results were correct, there must have been some 1·2 grammes of nickel in the lungs—a wellnigh incredible figure—completely out of harmony with Barnes and Denz's conception of non-retention unless there was very great difference, as seems likely, in the physical form and states of the nickel.

ASBESTOS

The association of what appears to be purely mechanical trauma with a later development of neoplastic change has a long history both in the experience of myriads of medical observers and in that of theorists who invoked it in the exposition of a theory of cancer. If such an association is looked at askance it is not because it is denied that it can occur, but rather that it is too facile and even sterile an explanation. Of the tens of millions of mechanical traumas occurring daily, the number which can be later recognized as having possibly initiated a neoplastic process *in situ* is minute. Most pathologists would sum the matter up by saying that if trauma is followed by the development of a tumour at the site of the original trauma, then that site was not normal at the outset.

Co-carcinogenesis

The classical experimental basis for the effect of the super-imposition of trauma on an abnormal site is the *Deelman phenomenon.* Deelman showed in 1923 that if a tarred area of animal skin is injured by wounding or other physical effect, tumour formation might be hastened and its location thereby determined. This observation was later confirmed by other workers who used pure carcinogens and laid the foundation of what is now called co-carcinogenesis. Co-carcinogenesis may be defined as the augmentation of the action of a carcinogen by some suitable additional treatment which shows itself in increased numbers of induced tumours and/or shortening of the induction time. In general the term co-carcinogenesis is applied to an effect produced by local application of an agent to a tissue (Berenblum, 1947). A co-carcinogen is not itself a carcinogen although Anderson (1948) appears to think otherwise, regarding co-carcinogenesis as a synergy between subliminal doses of two or more carcinogens. Such mechanical irritation as strongly brushing the skin, and foreign body fibrosis, have been shown to be effective as co-carcinogens. Heat, cold, radioactive radiations, croton oil and resin, all possess co-carcinogenic power.

The precise nature of co-carcinogenesis is difficult to understand except as an expression of certain experimental facts. The significant matter from our present viewpoint is that for a co-carcinogen to produce its effects it must be applied after a preparation of the tissue has taken place by a carcinogen, or even after an overt carcinogenic response has regressed.

Although the whole conception of co-carcinogenesis has arisen from