The effect of cortisol on the weight of the body, lungs and hilar lymph nodes, and its effect on the lymphatic lung clearance was studied in rats killed two and four months respectively after intratracheal (i.t.) injection with 20 mg of fine-particulate quartz. Cortisol was administered via the drinking water, in a dose of about 0.4 mg per animal per day, during two months before the animals were killed.

Cortisol causes the rats to become cachectic and reduces the weight of the hilar lymph nodes, but does not affect the lung weight. It also retards the translocation rate of quartz particles from the lungs to the hilar lymph nodes when cortisol treatment is started immediately or two months after the i.t. quartz-dust injection. This tends to increase the silica content of the lungs and to decrease it in the hilar lymph nodes. The effect on the hilar lymph-node weight is, however, more pronounced than can be explained by the cortisol-induced reduction of the silica content of these nodes.

There are no definite indications of specific "anti-quartz" or "anti-silicotic" effects of cortisol on the rat lung under the experimental conditions used.

From previous studies (Stacy & King 1954) it appears probable that the translocation of quartz dust from the lungs to their regional lymph nodes is retarded by cortisone. Since lymphatic lung clearance is an important defence mechanism against toxic agents, e.g. fibrogenous dust, deposited in the lungs (Norvitt 1959; Göthe et al. 1968; Göthe 1968a), it was considered of interest to study more closely in an experimental model, how glucocorticoids affect the translocation of fine-particulate matter from the lungs to their regional lymph
nodes. The importance of acquiring further knowledge of this problem has been emphasized by recommendations (Daniello et al. 1957; Slaviero & Gaffuri 1957; Dinischiotu et al. 1961; Casula et al. 1965a,b) to include glucocorticoids among the possible therapeutic agents against silicosis or complications of this disease.

**MATERIAL AND METHODS**

Inbred female albino rats (Sprague-Dawley) were used as experimental animals. Their body weight was about 200 g at the beginning of the experiments.

As fine-particulate matter quartz dust was used. This dust contained 98 per cent of quartz according to roentgen diffraction analysis. The mean diameter of the particles (=Martin's diameter=) was 1.2 μm and nearly all the particles were smaller than 3 μm. The quartz dust was suspended in physiological saline to a concentration of 20 mg of quartz per ml. Each quartz-treated animal was injected intratracheally (i.t.) with one ml of this suspension, according to a technique originally described by Kettle & Hilton (1982).

Cortisol*, which is the principal glucocorticoid produced by the adrenal cortex, was administered via the drinking water in a concentration of 20 mg per litre. This concentration was chosen on the basis of the daily water consumption of the rats which, in similar experiments, was about 20 ml per animal (Göthe 1970). The mean cortisol consumption has thus been estimated to be about 0.4 mg per rat per day.

In one series of experiments the animals were killed two months after the i.t. quartz-dust injection; cortisol was continuously administered. In another series of experiments the animals were killed four months after the i.t. quartz-dust injection; here the cortisol treatment began two months before the animals were killed.

The control groups consisted of rats which

a) had been injected it with 20 mg of quartz dust, but had not been administered cortisol (=quartz-treated control groups=). Groups of animals were killed two and four months respectively after the quartz-dust injection.

b) had been administered cortisol via the drinking water, but had not been treated with quartz dust (=cortisol-treated control groups=). These animals were killed two months after the beginning of the cortisol treatment.

c) had not been treated with either quartz dust or cortisol (=untreated control groups=). Groups of animals were killed after observation periods of two and four months respectively.

Autopsies were performed according to a method previously described (Göthe et al. 1968). The »wet weight« of the lungs and their regional lymph nodes (the »hilar lymph nodes=) was determined by weighing them on an analytical balance during the actual autopsy and, after drying them in a thermostat (+105°C) to constant weight, their »dry weight« was determined. The silica content of the dried organs – quartz is a type of crystalline silica (SiO₂) – was analysed according to a slight modification (Swensson & Ulfvarson 1969) of the method described by King et al. (1955b).

For statistical analysis Student's t-test (Fisher 1946) was applied. Degree of significance of differences between compared means was based on the following scale:

* Hydrocortonal® 0.5% infusionskoncentrat (AB Pharmacia, Uppsala, Sweden).
RESULTS

The final animal weight (Tables 1 and 2) was highly significantly lower in the cortisol-treated than in non-cortisol-treated groups, whereas the differences in

Table 1.
Animal weight and weight of lungs and hilar lymph nodes in groups killed two months after i.t. injection of 20 mg of quartz dust, and in corresponding untreated and cortisol-treated control groups.

<table>
<thead>
<tr>
<th>Experimental group</th>
<th>Quartz 2 months (cortisol)</th>
<th>Autopsy</th>
<th>Quartz-treated control group</th>
<th>No treatment 2 months (cortisol)</th>
<th>No treatment (no treatm.)</th>
<th>Untreated control group</th>
</tr>
</thead>
<tbody>
<tr>
<td>Animal weight (g)</td>
<td>24 210 ± 2</td>
<td>24 256 ± 3</td>
<td>10 219 ± 5</td>
<td>8 253 ± 3</td>
<td>24 2012 ± 37</td>
<td>24 2071 ± 58</td>
</tr>
<tr>
<td>Lung weight (mg)</td>
<td>24 2012 ± 37</td>
<td>24 2071 ± 58</td>
<td>10 1298 ± 50</td>
<td>8 1395 ± 35</td>
<td>24 117 ± 8</td>
<td>24 250 ± 19</td>
</tr>
<tr>
<td>Relative lung weight (%)*</td>
<td>24 9.6 ± 0.19</td>
<td>24 8.1 ± 0.21</td>
<td>10 5.9 ± 0.19</td>
<td>8 5.5 ± 0.17</td>
<td>24 0.6 ± 0.04</td>
<td>24 1.0 ± 0.07</td>
</tr>
<tr>
<td>Weight of hilar lymph nodes (mg)</td>
<td>24 117 ± 8</td>
<td>24 250 ± 19</td>
<td>9 7 ± 3</td>
<td>4 17 ± 1</td>
<td>24 0.6 ± 0.04</td>
<td>24 1.0 ± 0.07</td>
</tr>
<tr>
<td>Relative weight of hilar lymph nodes (%)*</td>
<td>24 0.6 ± 0.04</td>
<td>24 1.0 ± 0.07</td>
<td>9 7 ± 3</td>
<td>4 17 ± 1</td>
<td>24 0.6 ± 0.04</td>
<td>24 1.0 ± 0.07</td>
</tr>
</tbody>
</table>

* Wet weight of the organ in per mille of animal weight.

n = number of observations; M = arithmetic mean; \( \overline{\Sigma x} \) = standard error of the mean.

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Table 2.
Animal weight and weight of lungs and hilar lymph nodes in groups killed four months after i.t. injection of 20 mg of quartz dust, and in corresponding untreated control group.

<table>
<thead>
<tr>
<th></th>
<th>Experimental group</th>
<th>Quartz-treated control group</th>
<th>Untreated control group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Quartz</td>
<td>4 months (no treatm.)</td>
<td>4 months (no treatm.)</td>
</tr>
<tr>
<td></td>
<td>2 months</td>
<td>Autopsy</td>
<td>Autopsy</td>
</tr>
<tr>
<td></td>
<td>2 months</td>
<td>(cortisol)</td>
<td></td>
</tr>
<tr>
<td>Animal weight (g)</td>
<td>24 224 ± 5</td>
<td>20 261 ± 4</td>
<td>10 268 ± 5</td>
</tr>
<tr>
<td>Lung weight (mg)</td>
<td>24 3630 ± 130</td>
<td>20 3358 ± 135</td>
<td>10 1515 ± 43</td>
</tr>
<tr>
<td>Relative lung weight (%/oo)*</td>
<td>24 16.6 ± 0.81</td>
<td>20 12.8 ± 0.47</td>
<td>10 5.7 ± 0.17</td>
</tr>
<tr>
<td>Weight of hilar lymph nodes (mg)</td>
<td>24 288 ± 20</td>
<td>20 516 ± 32</td>
<td>5 16 ± 7</td>
</tr>
<tr>
<td>Relative weight of hilar lymph nodes (%/oo)*</td>
<td>24 1.3 ± 0.09</td>
<td>20 2.0 ± 0.11</td>
<td>5 0.06 ± 0.03</td>
</tr>
</tbody>
</table>

* Wet weight of the organ in per mille of animal weight. 

n; M;  $\Sigma \bar{x}$: see Table 1.

animal weight between the corresponding quartz-treated and non-quartz-treated groups were not significant.

The difference in lung weight between untreated and cortisol-treated control groups killed after two months was not significant (Table 1). This also applied to the differences in lung weight between experimental groups treated with both quartz dust and cortisol and corresponding quartz-treated control groups (Tables 1 and 2). On the other hand, the lung weight was highly significantly higher throughout in the quartz-treated groups than in corresponding non-quartz-treated groups, irrespective of whether or not the animals were treated with cortisol.

The lung weight of untreated rats of the strain used in these experiments increases parallel with the body weight during observation periods up to eight
months. Therefore, variations in body weight may be accompanied by variations in lung weight. In order to eliminate this factor, the absolute lung weight as well as the relative lung weight (lung weight in per mille of animal weight) was also studied. This variable was numerically higher in the cortisol-treated groups than in corresponding non-cortisol-treated groups. These differences were highly significant between the experimental groups treated with both quartz dust and cortisol and the corresponding quartz-treated control groups (Tables 1 and 2), but not significant between the cortisol-treated and untreated control groups (Table 1). Cortisol treatment thus exerts a more pronounced effect on the animal weight than on the lung weight, especially in animals injected i.t. with quartz dust.

The weight of the hilar lymph nodes was significantly lower in the cortisol-treated control group killed after two months than in the untreated control group (Table 1). In the experimental groups treated with both quartz dust and cortisol, the weight of the hilar lymph nodes was highly significantly higher than in the corresponding untreated control groups, but the weight of these nodes was also highly significantly lower than in the corresponding quartz-treated control groups (Tables 1 and 2). The weight of the hilar lymph nodes in the experimental group killed four months after the i.t. injection with quartz dust, and two months after the beginning of the cortisol treatment (Table 2), was only numerically but not significantly higher than in the quartz-treated control group already killed two months after the quartz-dust injection (Table 1).

After observation periods of up to eight months, the weight of the hilar lymph nodes of the rat strain used in these experiments does not vary in any systematic way with the variations in body weight. Thus, there is no reason to believe that variations in the body weight of the animals significantly influence the weight of these nodes. Since, however, oral cortisol treatment has a different quantitative effect on the lung and the body weights, the relative hilar lymph-node weight (lymph-node weight in per mille of animal weight) was also studied. This variable was throughout lower in the cortisol-treated groups than in the corresponding non-cortisol-treated groups. The differences were highly significant between the quartz-treated groups (Tables 1 and 2), but only just below the border line of probable significance between the non-quartz-treated groups (Table 1). Cortisol treatment thus exerts a more pronounced effect on the weight of the hilar lymph-nodes than on the body weight, especially in animals injected i.t. with quartz dust.

The silica content of the lungs was low in the untreated and cortisol-treated control groups, and the differences between these groups were not significant (Tables 3 and 4). In the groups treated with quartz dust it was, of course, considerably higher. In the experimental groups treated with both quartz dust and cortisol the pulmonary silica content was numerically, though not signi-
Table 3.
Silica content of lungs and hilar lymph nodes and lymph-drainage index in groups killed two months after i.t. injection of 20 mg of quartz dust, and in corresponding untreated and cortisol-treated control groups.

<table>
<thead>
<tr>
<th></th>
<th>Experimental group Quartz</th>
<th>Quartz-treated control group Quartz</th>
<th>Cortisol-treated control group No treatment</th>
<th>Untreated control group No treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2 months (cortisol)</td>
<td>2 months (no treatm.)</td>
<td>2 months (cortisol)</td>
<td>2 months (no treatm.)</td>
</tr>
<tr>
<td></td>
<td>Autopsy</td>
<td>Autopsy</td>
<td>Autopsy</td>
<td>Autopsy</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>n</th>
<th>M ± Sx</th>
<th>n</th>
<th>M ± Sx</th>
<th>n</th>
<th>M ± Sx</th>
<th>n</th>
<th>M ± Sx</th>
</tr>
</thead>
<tbody>
<tr>
<td>Silica content of lungs</td>
<td>19</td>
<td>11.1 ± 0.55</td>
<td>19</td>
<td>10.5 ± 0.75</td>
<td>8</td>
<td>0.1 ± 0.05</td>
<td>2</td>
<td>0.2 ± -</td>
</tr>
<tr>
<td>(mg)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relative silica content</td>
<td>19</td>
<td>22.8 ± 0.97</td>
<td>19</td>
<td>22.3 ± 1.09</td>
<td>8</td>
<td>0.3 ± 0.07</td>
<td>2</td>
<td>0.6 ± -</td>
</tr>
<tr>
<td>of lungs (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Silica content of hilar</td>
<td>19</td>
<td>0.8 ± 0.06</td>
<td>19</td>
<td>1.4 ± 0.13</td>
<td>7</td>
<td>0.01 ± 0.00</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>lymph nodes (mg)</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relative silica content</td>
<td>19</td>
<td>30.9 ± 1.66</td>
<td>19</td>
<td>25.7 ± 1.25</td>
<td>7</td>
<td>4.6 ± 0.91</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>of hilar lymph nodes (%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Silica content of lung-hi</td>
<td>19</td>
<td>11.9 ± 0.58</td>
<td>19</td>
<td>11.9 ± 0.85</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>lar-lymph-node system (mg)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Silica content of hilar</td>
<td>19</td>
<td>6.6 ± 0.38</td>
<td>19</td>
<td>12.0 ± 0.73</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>lymph nodes in % of</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>silica content of lung-hi</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>lar-lymph-node system</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lymph-drainage index</td>
<td>19</td>
<td>3.3 ± 0.19</td>
<td>19</td>
<td>6.0 ± 0.37</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

* Silica content in per mille of the organ dry weight.

n; M; Sx: see Table 1.
Table 4.
Silica content of lungs and hilar lymph nodes and lymph-drainage index in groups killed four months after i.t. injection of 20 mg of quartz dust, and in corresponding untreated control group.

<table>
<thead>
<tr>
<th></th>
<th>Experimental group</th>
<th>Quartz-treated control group</th>
<th>Untreated control group</th>
</tr>
</thead>
<tbody>
<tr>
<td>quartz</td>
<td>2 months</td>
<td>4 months (no treatm.)</td>
<td></td>
</tr>
<tr>
<td>Autopsy</td>
<td>(cortisol)</td>
<td>Autopsy</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Silica content of lungs (mg)</th>
<th>n</th>
<th>M ± Sx</th>
<th>n</th>
<th>M ± Sx</th>
<th>n</th>
<th>M ± Sx</th>
</tr>
</thead>
<tbody>
<tr>
<td>19</td>
<td>10.9 ± 0.62</td>
<td>16</td>
<td>9.5 ± 0.72</td>
<td>5</td>
<td>0.1 ± 0.09</td>
<td></td>
</tr>
<tr>
<td>Relative silica content of lungs (%/oo)*</td>
<td>19 11.3 ± 0.42</td>
<td>16 10.9 ± 0.51</td>
<td>5  0.1 ± 0.05</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Silica content of hilar lymph nodes (mg)</td>
<td>19 2.3 ± 0.14</td>
<td>16 3.1 ± 0.25</td>
<td>2  0.03 ±</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Relative silica content of hilar lymph nodes (%/oo)*</td>
<td>19 37.1 ± 2.08</td>
<td>16 28.1 ± 2.04</td>
<td>2  13.2 ±</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Silica content of lung-hilar-lymph-node system (mg)</td>
<td>19 13.2 ± 0.72</td>
<td>16 12.6 ± 0.92</td>
<td>–</td>
<td>–</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Silica content of hilar lymph nodes in % of silica content of lung-hilar-lymph-node system</td>
<td>19 17.9 ± 0.90</td>
<td>16 24.5 ± 1.27</td>
<td>–</td>
<td>–</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lymph-drainage index</td>
<td>19 4.5 ± 0.23</td>
<td>16 6.1 ± 0.32</td>
<td>–</td>
<td>–</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Silica content in per mille of the organ dry weight.

n; M; Sx: see Table 1.

Significantly, higher than in the corresponding quartz-treated control groups. Nor did the relative silica content of the lungs (silica content in per mille of the organ dry weight) differ significantly between these groups.

The silica content of the hilar lymph nodes was lower in the experimental groups treated with both quartz dust and cortisol than in the corresponding
quartz-treated control groups. The difference was highly significant between
the groups killed two months after the i.t. quartz-dust injection (Table 3), and
significant between the two groups killed four months after this injection
(Table 4). In spite of this, the relative silica content of hilar lymph nodes was
higher in the experimental groups treated with both quartz dust and cortisol
than in the corresponding quartz-treated control groups. These differences
were probably significant and significant respectively in the groups killed two
(Table 3) and four (Table 4) months after the i.t. quartz-dust injection.

The silica content of the whole lung-hilar-lymph-node system did not differ
significantly between the experimental groups treated with both quartz dust
and cortisol, and the corresponding quartz-treated control groups (Tables 3
and 4).

Two months after the i.t. quartz-dust injection, the silica content of the hilar
lymph nodes in the quartz-treated control group was about 12 per cent of the
silica content of the lung-hilar-lymph-node system, while in the experimental
groups also treated with cortisol, the corresponding value was only about 6 per
cent (Table 3). The corresponding values in the groups killed four months after
the i.t. quartz-dust injection (Table 4) were about 24 and 18 per cent in
respectively the quartz-treated control group and the experimental group in
which the cortisol treatment started two months after the quartz-dust injec-
tion – i. e. at the time when about 12 per cent of the silica in the lung-hilar-
lymph-node system was expected to be in the hilar lymph nodes. When cal-
culating the lymph-drainage index* (Göthe 1968a,b,c; Swensson et al. 1968)
these percentages are divided by the number of months between i.t. dust injec-
tion and the killing of the animals. This index, which is mainly a function
of the mean transportation rate of the i.t. injected quartz dust from the lungs
to the hilar lymph nodes during the period between quartz-dust injection
and the killing of the animals, was highly significantly lower in the experi-
mental groups treated with both quartz dust and cortisol than in the corre-
spanding quartz-treated control groups (Tables 3 and 4). This index was
also highly significantly lower in the experimental group treated with both
quartz dust and cortisol and killed two months after the quartz-dust injection
(Table 3), than in the group killed four months after the quartz-dust injection,
where the cortisol treatment was started two months after this injection
(Table 4).

* Lymph-drainage index was calculated according to the following formula:

\[ I = \frac{100 \, A}{T \, (A + B)} \]

I = lymph-drainage index
A = silica content (mg) of hilar lymph nodes
B = silica content (mg) of lungs
T = observation period (months) after i.t. quartz-dust injection.
DISCUSSION

Cortisol, in the doses studied, strongly affects the general condition of the rats and makes them cachectic. Irrespective of whether or not the animals are treated with quartz dust this catabolic effect seems to be more pronounced on the hilar lymph nodes that on the total body mass. This effect is not observable in the lungs.

In the animals treated with both quartz dust and cortisol the silica content of the hilar lymph nodes was substantially lower than in animals treated only with the same dose of quartz dust. Theoretically, this could depend either on a cortisol-induced decrease of the transport of quartz dust from the lungs to the hilar lymph nodes, or on a cortisol-induced increase of this transport from these nodes. Cortisol treatment, however, is not accompanied by a lowered silica content of the lungs; on the contrary, numerically, though not significantly, the tendency is in the opposite direction. Nor, consequently, is the silica retention in the whole lung-hilar-lymph-node system influenced by cortisol. This indicates that cortisol mainly retards transport of quartz dust from the lungs to the hilar lymph nodes. Another observation in support of this is that, irrespective of the cortisol treatment, the retention of silica in the whole lung-hilar-lymph-node system does not decrease between two and four months after the i.t. injection of quartz dust. Thus, there is no appreciable transport of quartz dust from this system via the lymph vessels leading from the hilar lymph nodes, or via the respiratory tract during this period. A possible explanation of the observation that the cortisol-induced retardation of the quartz-dust transport from the lungs to their regional lymph nodes significantly affects the silica content only in the lymph nodes, but not in the lungs, may be that any variations in the dose of quartz dust injected i.t. manifests itself most vigorously in the lungs.

The effect of the cortisol treatment on the lymph-drainage indices implies that, under the experimental conditions, this treatment retards the mean rate at which quartz dust is transported from the lungs to the hilar lymph nodes by about 50 per cent. This retarding effect is approximately the same, whether the cortisol treatment is started immediately after the i.t. injection with quartz dust or two months after this injection.

The decreased transport of quartz dust to the hilar lymph nodes can only partly explain why cortisol gives rise to a retarded weight increase of these nodes in the animals injected i.t. with quartz dust, since the relative silica content of these nodes is higher in the experimental groups treated with both quartz dust and cortisol than in the corresponding quartz-treated control group. The retarding effect of cortisol on the hilar lymph nodes is also observable in otherwise untreated animals, and thus it is not limited to the tissue reactions caused by quartz dust. However, cortisol does not significantly retard the
weight increase of the lungs, irrespective of whether or not the animals are injected i.t. with quartz dust. Thus, there are no definite indications of the existence of a specific »anti-quartz« or »anti-silicotic« effect of cortisol in these organs. Previous studies (Curran 1952; Magarey & Gough 1952; King et al. 1955a) also indicate that glucocorticoids do not have any significant effect on established silicotic fibrosis in experimental animals. Marenghi & Rota (1954) consider, on the basis of inhalation experiments in rats, that cortisone has very little influence on the initial cellular reaction to siliceous dust, whereas it does delay the transformation of reticulin into collagenous fibers. Most of the other investigators studying this problem, however, stress the influence of the glucocorticoids on the cellular reactions due to the dust. Spain et al. (1950) and Curran (1952, 1953) found that cortisone retards the phagocytosis of dust injected intraperitoneally, and – in conformity with results obtained after i.t. dust injections (Harrison et al. 1952; King et al. 1952) – found that this substance diminishes the tendency of the phagocytes to accumulate in closely packed aggregates. Owing to this, both the accumulation of quartz particles producing focal aggregates of dust and the development of discrete silicotic nodules are retarded. The observation made by Magarey & Gough (1952), that cortisone retards concentric fibrosis and causes the silicotic connective tissue in the peritoneal cavity of animals to be more diffusely distributed, could have the same explanation. Similar observations, on the effect of cortisone on cellular reactions to dust, have also been made after subcutaneous injections of fine-particles silica (Polemann 1951; Policard & Tuchmann-Duplessis 1952; Clark 1955).

Previous findings thus indicate that glucocorticoids not only retard the transport of quartz dust from the lungs via the lymphatics, but also retard the mobility of the phagocytes – and consequently, also of the dust particles – within the lungs and other organs. In vitro studies on cell cultures have also confirmed that the mobility of phagocytes is decreased (Paff & Stewart 1953) and that the phagocytosis of quartz dust is retarded by low glucocorticoid concentrations in the culture medium (Rasche 1967).

It is not possible, of course, to apply directly results obtained in vitro and in animal experiments to the conditions in human silicosis. Lung clearance seems, however, to be physiologically similar in a number of mammals (Brockhaus & Schlipkötter 1967), and the same physiological mechanisms may control dust elimination from the lungs in both rats and human subjects (Nagelschmidt 1961). Therefore, in the absence of direct observations on humans it is not unreasonable to conclude that the obvious retarding effect of cortisol on lymphatic lung clearance, combined with the failure to show any definite »anti-silicotic« effect of cortisol in the rat lung, indicates that in man, too, caution is necessary in connection with glucocorticoid treatment of silicosis.
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REFERENCES


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