

TABLE 3.—NUMBERS AND PERCENTAGES OF STUDY SAMPLE BY DIAGNOSTIC CATEGORY AND EXPOSURE TO DRUGS AND OTHER AGENTS

| Exposure                                     | Total       | Diagnostic category |                        |             |
|----------------------------------------------|-------------|---------------------|------------------------|-------------|
|                                              |             | Aplastic anemia     | Other blood dyscrasias | Undiagnosed |
| Total.....                                   | 138 (100.0) | 86 (100.0)          | 25 (100.0)             | 27 (100.0)  |
| Agents toxic to blood.....                   | 46 (33.3)   | 32 (37.2)           | 5 (20.0)               | 9 (33.3)    |
| Chloramphenicol.....                         | 30 (65.2)   | 25 (29.1)           | 1 (4.0)                | 4 (14.8)    |
| Other.....                                   | 16 (34.8)   | 7 (8.1)             | 4 (16.0)               | 5 (18.5)    |
| Agents not known to be toxic to blood.....   | 25 (18.1)   | 17 (19.8)           | 4 (16.0)               | 4 (14.8)    |
| Drugs not specified and chemical agents..... | 17 (12.3)   | 13 (15.1)           | 2 (8.0)                | 2 (7.4)     |
| No exposure.....                             | 14 (10.1)   | 11 (12.8)           | 2 (8.0)                | 1 (3.7)     |
| No information.....                          | 36 (26.1)   | 13 (15.1)           | 12 (48.0)              | 11 (40.7)   |

Note: If a death is classified in more than one type of exposure, it is assigned to the one above.  
Figures in parentheses are percentages.

|                              |                   |                    |
|------------------------------|-------------------|--------------------|
| 4-Amino-pteroylglutamic acid | Gold preparations | Sulfonamides       |
| Chlorpromazine               | Phenylbutazone    | Thiotepa           |
| Colchicine                   | Chloramphenicol   | Ionizing radiation |
| Diphenylhydantoin            | Prochlorperazine  |                    |
|                              | Quinaerine        |                    |

Most cases had been exposed to more than one agent. However, seven drugs, at least three chemical agents and ionizing radiation constituted the single recorded exposure in a total of 18 study deaths.

| Agents                     | Death | Agents                                            | Death |
|----------------------------|-------|---------------------------------------------------|-------|
| Chloramphenicol .....      | 3     | "Reducing pills".....                             | 1     |
| Ionizing radiation.....    | 3     | Penicillin .....                                  | 1     |
| Meprobamate .....          | 2     | Toluene .....                                     | 1     |
| Phenylbutazone .....       | 1     | Toxaphen insecticide spray.....                   | 1     |
| Digitoxin .....            | 1     | Insecticide sprays with unknown ingredients ..... | 3     |
| Protamin zinc insulin..... | 1     |                                                   |       |

The exposure to digitoxin occurred in an elderly man who had anemia with renal disease and uremia, not aplastic anemia. It was not certain that the penicillin exposure actually antedated the onset of aplastic anemia. The toluene exposure was considered a likely but not certain event. The hospital records of many of the cases with a single recorded exposure offered no assurances that careful exposure histories had been taken.

Although the bone marrow depressant effects of ionizing radiation are well-known, most hospital records of study deaths contained no reference to radiation exposure. Seven persons were stated to have had such exposure, of whom six were women past middle age. Three of these had received pelvic X-ray therapy for non-malignant menopausal conditions 12–20 years before the onset of aplastic anemia. One had received 90  $\mu$ C of radioactive iodine for diagnostic study 5–8 months before the onset of aplastic anemia and had also received chloramphenicol, meprobamate and other drugs. One had had 6000  $\mu$ C of radioactive phosphorus for polycythemia vera 5 years before anemia. The sixth person had X-ray treatment for carcinoma 5 years before the onset of a myeloproliferative disorder. The record of the remaining person, an elderly man, indicated only that extensive diagnostic X-ray and isotope studies had been done. It is difficult to assess the significance of these exposures to radiation. They were not of such magnitude nor did the time relationship to the blood dyscrasias suggest that they were causal. On the other hand, knowledge of the long-term effects of such exposures is meagre and the possibility of causal relationship cannot be disregarded.

About 15 percent of the study sample (20 cases) had reported exposure to chemical agents other than drugs. Half of these exposures were to insecticides and