

prising 19 cases, 14 of the cases were in physicians, 1 in a medical assistant, and 4 were among manufacturers and technicians of roentgen-apparatus. The ratio between medical and technical cases stood at that time at 3 to 1. When Hesse analyzed his collected cases in 1911, this numerical relation had shifted markedly in favor of the technical group, as there were 26 members in the medical group and 24 members in the technical group, a ratio of approximately 1 to 1. In the American series of Brown there are 18 roentgenologists, 1 roentgen-technician, 4 physicists and 5 manufacturers of roentgen-tubes and other equipment.

Following the introduction of effective protective measures and improvements in the manufacturing technique of roentgen-tubes, the number of chronic roentgen-injuries in the manufacturing group decreased when compared to the medical group, because physicians could not apply the protective measures as effectively as the engineers (Dohan and Kienböck, 1922). Friesleben (1929) stated that an inquiry made in German hospitals and industrial establishments concerning the incidence of roentgen- and radium-injuries showed that 94 per cent of these lesions occurred in the 125 hospitals queried, while only 6 per cent of the total number were reported from the 14 industrial establishments queried. This condition seems to have undergone a change in Germany during recent years, as a note published in 1938 in the *Klinische Wochenschrift* mentioned that during 1935 to 1936 roentgen-injuries were found almost exclusively among industrial workers and seldom among attendants of roentgen- and radium-laboratories and hospitals. No information on these matters is available from other countries.

It is doubtful whether these numerical relations between the two professional groups reflect the actual conditions accurately or even approximately. It appears not unlikely that the publication of the occurrence of roentgen-cancers among workers in the manufacturing and sales departments of manufacturers of roentgen-apparatus is even less complete than among members of the medical profession (Walischewski).

VIII. SEX

The sex distribution of occupational roentgen- and radium-cancer heavily favors the male sex. There were 73 cancers in men and 4 in women (ratio approximately 18 to 1). Two of the women were physicians, one was a roentgen-assistant and one a nurse.

IX. EXPOSURE TIME

The exposure time of professional roentgen-carcinoma varies greatly with each individual case and depends, apparently, to a great extent upon the type, duration and intensity of the individual exposures sustained, which in turn determine the developmental speed of the summation effect repre-