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Comparison of Neoplasms in Six Sources of Rats [1]

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SUMMARY—We described 749 tumors from 6 sources of rats raised at 7 laboratories. The sources were "Sprague-Dawley" from 4 commercial suppliers, Osborne-Mendel, and Oregon. Highly significant differences in the incidences of endocrine and mammary tumors were found. There were significant variations in the incidences of adrenal medullary tumors among rats from the same source raised at 2 laboratories. Of the rats with endocrine tumors, 9–15% had tumors in 2 or more endocrine glands. All but 1 of the testicular tumors occurred in Oregon rats. Thyroid and pituitary tumors were more common in females; adrenal medullary and islet cell tumors of the pancreas were more frequent in males. Brain tumors occurred more often and at a younger age and were more apt to cause symptoms in males than in females. The incidence of tumors in "Sprague-Dawley" rats from different commercial sources varied as much from each other as from the other "strains." Factors that can affect the incidence of tumors and the difficulties in comparing the rates of incidence reported in the literature were discussed. We stressed the need for extreme caution in evaluation of carcinogenicity studies conducted at different laboratories and/or on rats from different sources.—J Natl Cancer Inst 50: 1243–1257, 1973.

IN LIGHT of today's concern with the carcinogenic effect of environmental contaminants and food additives, an understanding of the variation in the incidence of tumors in sources of rats raised at different laboratories is of prime importance. That differences occur among "strains" of rats has been acknowledged generally since Curtis et al. (*1*) published their report in 1931. Variations in methods, diagnostic criteria, and even definition of what constitutes a "strain" make comparative studies of tumor incidence from the literature confusing. The Armed Forces Institute of Pathology (AFIP) had a unique opportunity to study tumors in several sources of rats under more controlled conditions than those previously reported. AFIP monitored an extensive series of irradiated food experiments and reviewed all materials and reports of the participating laboratories. The tissues and data of >3,000 rats were accumulated.

This study describes 749 tumors found in 2,082 of these rats. Where tumor incidence was adequate (in endocrine and mammary tumors), statistical comparisons were made. A review of the literature has not been included, since several excellent sources are available (*2–5*).

MATERIALS AND METHODS

The rats were from a series of long-term feeding studies on the toxicity of irradiated foods. The work was contracted to 11 laboratories that conducted programs of research within specifications established by the Army. Equal numbers of male and female rats received various irradiated foods amounting to approximately one-third the dry weight of the diet. Control animals received similar diets with nonirradiated foods. The diets were compounded with protein, carbohydrate, vitamin, and mineral supplements to complete a balanced ration. The animals were killed when debilitated or at about 2 years of age. Each rat was necropsied. Histopathologic examination was performed on pituitary gland, eyes, salivary glands, skin, bone, thyroid gland, lungs, heart, stomach, 3 sections of small intestine, colon, adrenal gland, liver, pancreas, spleen, kidneys, bladder, testicles, ovary, uterus, prostate gland, cervical and mesenteric lymph nodes, 4 levels of the brain, and any other tissue with gross pathologic change. Microscopic findings and blocks of tissue were forwarded to the AFIP where each was accessioned and

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[4] The opinions and assertions contained herein are those of the authors and are not to be construed as official or as reflecting the views of the Departments of the Army or Air Force or of the Department of Defense.