Abstracts
Reports of Research


This article is confined to a discussion of the recent work in carcinogenic substances, as the aromatic hydrocarbons, with special reference to the conversion of physiological bile acids, and the relationship of sex hormones to carcinogenesis. The influence of female sex hormones on cancer formation is illustrated by its carcinogenic capacities when the hormone is injected in great quantity into experimental animals. This is regarded as of particular significance in the light of present treatment of the menopausal syndrome. Testosterone is discussed briefly as inhibitory to tumor formation. A report from the Cancer Research Laboratory of the Mt. Sinai Hospital is given.

—A. C.


Livers without metastases (group 1) from 5 patients and livers with metastases (group 2) from 5 patients, who had died from epidermoid or glandular carcinoma, were treated in the following manner. After desiccation, the liver pulp was treated by hot benzene and the lipid fraction obtained saponified by potassium hydroxide in alcohol. The non-saponifiable fraction was extracted by petroleum ether and dissolved in olive oil (0.20 gr. per cc.). The livers of 12 patients (group 3) who had died from non-neoplastic diseases, were used as controls.

One cc. of the extract solution from each group was injected subcutaneously in the dorsal region of mice, 20 mice being used for each group. No tumors were obtained with the non-saponifiable fraction from control livers. Four tumors (3 sarcomas and 1 mammary adenocarcinoma) developed in the mice injected with the fraction from group 1, and 2 tumors (1 sarcoma and 1 epidermoid carcinoma) in the mice injected with the fraction from group 2. These tumors appeared 16 months or more after the moment of inoculation.—C. A.


Methylcholanthrene applied to a surgical cutaneous scar deprived of hair follicles, produced a cancer only at the periphery of the scar, in the proliferative zone of healing. No cancer developed in other parts of the cicatrix. When 1 application of a low concentration of methylcholanthrene was followed by a second of greater strength, fewer tumors developed than in the controls.—R. J.


Intravenous injections of 20 to 50 micrograms of mesothorium into 12 rabbits were followed by the death of 5 animals before the tenth month. Among the 7 surviving rabbits, 5 developed osteosarcomas. Fracture sites were not always the place of localization of the cancerous growths. Very small amounts of radioactive substances were successful in producing tumors, but larger amounts apparently destroyed the susceptible cells since no growths appeared.—R. J.


Benzo-pyrene produced tumors in 86% of the white rats treated. Guinea pigs were, on the other hand, almost completely refractory to the action of this chemical, even when large doses were used. The authors tried to establish whether the differences were due to a different metabolism of the product in the two animals. Spectrophotometric techniques were used to detect the presence of the carcinogen and to localize and measure the amounts of the chemical in the host after certain lengths of time. The conclusions were that benzo-pyrene remains at the site of injection, and is eliminated very slowly in the case of the rat, an observation which was not seen in the guinea pigs. Here, the oil solution diffused widely and was relatively rapidly eliminated.—R. J.


Experimental study in mice (strain XVII) with an anthracenic oil showed that the acid fraction of the oil had the property of diminishing the carcinogenic action of the non-saponifiable fraction. The acid fraction, in some cases, was not responsible for the production of stomach cancer in mice.—R. J.


A solution of 2-anthramine in acetone was applied to the skin of 19 male rats (10 Wistar, 9 piebald). Between the 180th and 260th day spindle-cell tumors of the dermis

For information regarding microfilm copies of articles, abstracts of which appear in Cancer Research, application should be made to the Photoduplication Service, Army Medical Library, 7th Street and Independence Avenue, S.W., Washington 25, D. C.
Spontaneous Mammary Adeno-Carcinomas appeared in 7, and basal-cell carcinomas in 3 of the 61 tumors at the site of application. Between the 224th and 293rd day similar spindle-cell tumors appeared in 2, and squamous and basal-cell carcinomas in 1 rat of the piebald series. The remote tumors (1 adenocarcinoma of the oesophagus, 2 epitheliomas of the rectus abdominis) were in piebald rats. No tumors of the livers were found in either strain. One of the spindle-cell tumors which was grafted showed no change in histological structure after 3 passages.—E. L. K.


To investigate the relationship between liver necrosis and repair and the induction of hepatomas in A strain mice, a quantitative study of necrosis and repair following a single dose of carbon tetrachloride was made and the minimal necrotizing dose established. By using a graded series of necrotizing and non-necrotizing doses, a non-necrotizing dose was found which, when administered daily, would produce hepatomas, thus indicating that repeated liver necrosis and repair are, in all probability, not necessary for the induction of hepatomas. Also, although there was a correlation between the dose of carbon tetrachloride administered and both the degree of lobular disorganization and the increase of reticular fibers, some increase of reticular fibers was observed after the daily administration of sub-necrotizing doses of the agent. Some of the implications of these findings are discussed.—R. A. H.


The following technique was used: the opened end of a small ampoule of bee venom was gently introduced into the leaf tissues. After 5-6 days a tumor appeared at the site where the venom had been constantly applied.—R. J.


The introduction of bee venom into flower staff of Pelargonium zonale produces the same effect as that obtained on the cabbage leaf. A localized tumor begins to appear 3-4 days after the beginning of the application of venom.—R. J.


It is possible to imitate the appearance of small tumors by repeated pricking of a cabbage leaf in the same place. If the needle is soaked in bee venom, the effect on the leaf is the same, with increased intensity.—R. J.


Strain A mice were exposed daily, over an 8 hour period, to 8.8 r of gamma radiation for 287 consecutive days and were autopsied when 10.5 to 11.5 months of age. Whereas 47.3% of the control animals had lung tumors at autopsy, 76.7% of the irradiated mice were so afflicted. The relationship of gamma radiation to lung tumors is discussed.—R. A. H.


Prolonged daily feeding of large amounts of splenothelium, "a splenic and reticulo-endothelial product of Braunein," (BRAUNEIN, A., ZÉLICK, J., Kräflesforsch, 39:321. 1933) to rats, mice, and guinea pigs did not produce any immunity to experimental tumors.—G. H. H.
subcutaneous injections of 0.04 to 0.06 mgm. and even 1 mgm. were well tolerated, and the rate of growth of the tumor was consistently slowed, the treated animals surviving longer than the controls. It is possible that the vitamin B, plays an active role in the metabolism of tumors.


Daily feedings of an oil solution of a-tocopherol, 50 parts per 100 and one drop per animal, delays the growth of spontaneous tumors in the breast of mice. However, similar amounts given once or twice a week seem to have a stimulating effect on the growths.—R. J.


The subcutaneous injection of large amounts of nicotinamide (25 mgm, for each injection) lowered the rate of growth of breast tumors in mice and prolonged the life of the animals.—R. J.


Forty mice were fed different amounts of whole wheat. Among 57 adenocarcinomas observed, 28 showed a low rate of growth, as compared with the controls, but the other 29 tumors showed a faster growth rate during the first months; later the growth became slower. Actually, no very significant changes were observed. The animals fed with whole wheat survived longer than the controls.—R. J.


Intraperitoneal or subcutaneous injections of lyophilized A strain mammary carcinoma 15091a were given mice of the C57 brown, C57 black and B alb C stocks over a period of 7 weeks, and, to 12 days after the final injection, fresh tumor tissue was inoculated subcutaneously. In the majority of the treated animals the inoculated tumor grew progressively and killed the host, whereas in the majority of the untreated control animals the tumor either did not grow or regressed after a period of growth. The growth of C57 black sarcoma 1946-112 transplantable to F1 hybrid mice (Swiss × B alb C) was also stimulated, but to a lesser degree, by the prior injection of the recipient mice with lyophilized sarcoma tissue. On the other hand, lyophilized C57 black myeloid leukemia C1998 tissue administered to C57 leaden mice produced a distinct inhibition of growth of subsequent leukemic transplants. The relation of the genetic theory of tumor transplantation to tumor-immunity experiments is discussed.—R. A. H.


Twenty lymphosarcomas were found in 4,000 autopsies of rats. Almost all the tumors appeared in albino rats, males and females. These tumors must be considered as spontaneous in origin, although most of the rats had been inoculated with various types of tumors or treated with various carcinogenic substances. All the tumors developed in the ileocecal region with the exception of 2 cases. Histologically, they represented, in 18 cases, reticulo-lymphoblastic sarcomas; in 2 cases, lymphoid sarcomas. Metastases were very frequent. The tumor was successfully transplanted in 3 cases among 7 trials. One tumor was carried for 20 passages.—R. J.


Lesions of the reticular system of the liver, varying from reticulo-grandulomatosis to reticulum-cell sarcoma, were found in 22 mice in a total of 2,000 animals examined. Most of these animals had been used for experimental purposes and had received tar, benzpyrene or methylcholanthrene or had been grafted with transplantable tumors.—C. A.


A spontaneous chloroleukemia in a rat was transplanted...
into 350 rats. Thirty-nine chromas appeared, of them, 5 of them regressed spontaneously, while 6 series of transplants were successful. Metastases existed in one third of the cases, especially in the lymph nodes and the kidneys. The authors stress the existence of a secondary leukemia in some cases, following the primary growth of the tumor, by diffusion of tumor cells. This fact is considered to indicate that the leukemic cell is biologically a tumor cell. In almost all cases protoporphyrine was present in the tumors, but this substance could not be identified with the green pigment characteristic of these tumors. During the first passages x-rays as well as an uninhibited diet favored the growth of the grafts. However, later on these factors seemed to have little influence.—R. J.


Two spontaneous lymphosarcomas (tumors T 173 and T 163), located in the illococal region of the rat served for this study. These had an almost identical histological structure with the exception of the amount of stroma which was greater in tumor T 173 than in tumor T 163. The tumors were transplanted and each followed until the 7th and 20th passage, respectively. Although almost identical, these tumors showed different biological behavior. Grafts were successful in 38.5% of the cases with tumor T 163 but only in 16% of the cases with tumor T 173. Metastases were also more frequent with tumor T 163 (45% instead of 16% with tumor T 173). X-ray irradiation did not have any effect on the growth of the grafts of tumor T 173, although this agent did inhibit effectively tumor T 163. The conclusions were that 2 tumors of the same histological appearance may have different behavior as far as their development and their reaction to x-ray irradiation is concerned.—R. J.


The blood from a patient with hyperthermia, splenomegaly, adenopathies, and nodular skin lesions at the site of biopsy (the biopsy showing reticulo-granulomatosis) was injected into hens, rabbits, and mice. Only the mice gave interesting results. Ten mice received the patient’s blood intracerebrally, and 10 females ½ cc subcutaneously. Among the surviving animals 2 series of symptoms were observed: 3 mice had signs of paraplegia, 8 mice had an abdominal syndrome characterized by an ascites, the enlargement of the liver and the spleen. There was no constancy in the enlargement of lymph nodes. Histologically the lesions are described as reticuloendotheliomas, especially of the liver. It was noteworthy that, besides the inflammatory process, a proliferative process of neoplastic type with vascular invasion by the proliferative elements took place. The concomitant existence of both inflammatory and neoplastic lesions may be interpreted as a transition from inflammation to neoplasia. The neoplastic elements are more evident after several passages from mouse to mouse. A discussion follows on the etiology of the disease.—R. J.


It is the opinion of the authors that the discordance in the results of inoculation of the same tumors in rats primarily resistant to a first inoculation, is due to the fact that different kinds of tumors were tested. They found that Jensen’s sarcoma resulted in the immunity of the host following one injection. On the other hand, other varieties of sarcomas had to be injected several times before a strong immunity was developed in the host.—R. J.


Immunity is difficult to obtain by serial injections of transplantable rat epithelomas. There are differences in acquired immunity with different varieties of tumors; for example, uterine epitheliomas do not cause immunization even after a relatively large number of inoculations. One animal, however, did give a positive result after the fifth injection.—R. J.


This technic of transplantation was used in the study of the mechanism of action of chemical carcinogenesis, and also to study the behavior of tissue grafts in the process of becoming cancerous. Preliminary results seem to indicate that: 1) auto-transplants of such tissues have more chances to develop cancer than homografts; 2) the development of a tumor does not depend on the general dissemination in the organism of the carcinogenic substance, but is due to its local action.—R. J.


Both intraperitoneal and peritumoral injections of novocaine were capable of increasing considerably the number of microscopic metastases in various organs. Instead of 7% of the mice showing as was observed on the average in the controls, 50 to 60% of them in the treated group showed microscopic metastatic lesions.—R. J.


A round cell sarcoma which appeared in a rat treated over a period of time with estrogenic has been studied in successive transfer generations.—A. K.


It was found that cancer induced in rats and mice, by agents such as benzpyrene, methylcholanthrene, or β-methylaminoazobenzene, could be influenced by diet in two ways: (1) The induction of some cancers could be retarded by certain pure substances that are growth-inhibiting, such as glycuronic acid, nicotinamide, and vitamin B6, mixed with pyrophosphate. (2) In other

A substance with toxic properties, not salted out by sodium chloride but precipitated by absolute alcohol, was isolated from a mammary adenocarcinoma of the mouse.

-G. H. H.


The pathogenesis of cancer may be regarded under two aspects: 1) the mechanisms by which any somatic cell becomes a cancerous cell, and 2) the factors that release these mechanisms. The author discusses the problem in relation to cancer of the breast and of the gastric mucosa. After histophysiological studies of surgical specimens, he concludes that an analogy exists between the phenomenon of carcinogenesis of the secretory adenomatous cell of the mammary gland and that of the heterotopic secretory cell of the gastric mucosa. Both types of cell seem to have lost their permeability for mineral substances, and retain organic products of nuclear metabolism. A theory of carcinogenesis is outlined.

-G. H. H.

Clinical and Pathological Reports

Clinical investigations are sometimes included under Reports of Research

Multiple Tumors


Double cancers with different histological structure are relatively rare (1.5%). They can grow simultaneously in the same patient or be successive. The possible clinical latency of one of the tumors may be misleading in the appreciation of their real chronological appearance. The evolution of such tumors seems more rapid than other cancers. Their study does not throw any light on the etiological problem of cancer in general.—R. J.

Diagnosis—General


The theoretical foundation of two kinds of polarographic serum reactions concerning typical changes in human serum from individuals suffering from cancer, sarcoma, inflammations, infections, or certain bile or liver disorders is discussed in detail.

Some experimental facts elucidating the nature of the pathological changes in sera are reviewed. The erroneous objections to the author's original interpretation, brought forward by certain authors, especially by V. Moravek and his collaborators, are dealt with. It is shown that the experimental results of the latter authors concerning the polarographic examination of two horse sera, one normal and the other sarcomatous, are not, as these authors believe, contradictory to the present author's theory, but on the contrary, when investigated more exhaustively than those authors were able to do, even yield valuable evidence in support of it. Closely analogous results to those of the authors mentioned have been obtained by the present author with human sera and are fully explained. Finally, the cause of the pathological change in the blood stream is discussed.—Author's summary.


The aim of this communication is a critical examination of the polarographic test for cancer given by serum filtrates after deproteinization with sulfooalicylic acid. On the basis of experiments with different deproteinating agents, evidence of the albumine-like character of the substance, the increase of which indicates the pathological state, is brought forward.

A detailed study of the deproteinization of sera with sulfooalicylic acid is described which reveals some important factors in diagnostic tests: (1) proper caution must be paid to the rigorous maintenance of a fixed time interval between the precipitation of proteins and the filtration of the precipitate, and (2) the test is improved by introducing an excess of ammonia in buffered ethylamine solution. The improved test was checked by tests on 183 cancer patients and was found positive in 177 cases.
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