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Attempt to Produce Sarcomas in Rats from Ingestion of Crude Wheat Germ Oil* by Ether Extraction.

CHRISTOPHER CARRUTHERS.† (Introduced by H. A. Mattill.)

From the Biochemical Laboratory, State University of Iowa, Iowa City, Iowa.

Rowntree and his coworkers^{1, 2, 3} recently reported the production of sarcomas in rats from the ingestion of a crude wheat germ oil made by extracting wheat germ according to Squibb's method. Ninety-three Wistar rats developed one or more intraabdominal tumors. The time necessary for the production of these tumors was shortened by increasing the dose of the oil, either mixed with the diet or administered orally. Ten Wistar rats which received 1 cc of the crude wheat germ oil spread over the food, developed tumors within 200 days, and by increasing the dose to 4 cc administered in the same way, tumors were palpable as early as 15 days in some animals and in all within 111 days. Tumors were also produced in the Buffalo and Yale albino strains.

We undertook an experiment to determine whether a crude wheat germ oil extracted from fresh wheat germ by Squibb's method would induce sarcomas in rats. Since Rowntree furnished no specifications as to the kind of ether used, except that it was peroxide-free, we distilled our ether over solid sodium hydroxide to remove the peroxides. The crude oil was perfectly clear at first, but a large amount of sediment was deposited upon standing in the refrigerator. The oil was always thoroughly shaken before it was used. Rowntree's stock diet was used throughout the experiment and the rats were kept individually in screen bottomed cages.

Beginning September 9, 1937, 3 pairs of Wistar albinos and 3 pairs of Sprague Dawley albinos were given the crude wheat germ oil mixed with the diet, each animal receiving 1 cc daily. Similarly 1 cc of refined wheat germ oil was given to 2 pairs of both strains. The initial weight of the Wistar rats varied from 89 to 122 g, the

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† Present address: The Barnard Free Skin and Cancer Hospital, St. Louis, Mo.

¹ Rowntree, L. G., Lansbury, John, and Steinberg, Arthur, *PROC. SOC. EXP. BIOL. AND MED.*, 1937, **36**, 424.

² Dorrance, G. M., and Ciccone, E. F., *PROC. SOC. EXP. BIOL. AND MED.*, 1937, **36**, 427.

³ Rowntree, L. G., Steinberg, A., Dorrance, G. M., and Ciccone, E. F., *Am. J. Cancer*, 1937, **31**, 359.

Sprague Dawley from 111 to 225 g. On April 6, 1938, after 209 days of feeding the oils, there were no palpable tumors; the dose of the oils was then increased to 3 cc per rat per day for 22 days. During this time 2 Sprague Dawley rats which had received the crude oil were found dead, but autopsy revealed no macroscopic tumors. Then for 27 days each of the remaining 10 rats received 3 cc of the crude oil daily by stomach tube. The refined oil was mixed with the diet as before. This forced feeding was followed by a drop in food consumption resulting in emaciation. At the end of this period both groups of rats were killed, but there was no evidence of tumors on autopsy.

The vitamin E content of the refined and crude wheat germ oils was approximately the same, 1.5 g of each sufficing for a successful gestation.

Conclusions. Tumors have not been observed in 20 albino rats of 2 strains, Wistar and Sprague Dawley, which were fed a crude and a refined wheat germ oil for 258 days. Perhaps all wheat germs do not contain the sarcogenic agent. Certain nutritional conditions may influence tumor production, and there may be subtle factors, as yet unappreciated, incidental to the preparation of the crude wheat germ oil.

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Hemoglobin-Methemoglobin and KCN.

MATILDA MOLDENHAUER BROOKS.*

From the University of California, Berkeley.

In a previous paper¹ it was found that the addition of comparatively small amounts of KCN to oxyhemoglobin in solution had no effect on the absorption maxima of the spectrum, as determined by spectrophotometric studies. The maxima for oxyhemoglobin solutions and for oxyhemoglobin containing KCN were identical. It was also found that when KCN was added to reduced hemoglobin, reduced by adding Stoke's reagent, the absorption spectrum again reverted to that of oxyhemoglobin. These facts were then inter-

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¹ Brooks, M. M., *Am. J. Physiol.*, 1935, **114**, 160; *Proc. Soc. Exp. Biol. and Med.*, 1932, **29**, 1228.