Rats were used as experimental animals. In order to insure a uniform content of carbohydrate at the beginning of the test, the animals were first fasted for 48 hours after having been previously fed on an adequate normal diet. Glucose was then administered by stomach tube in 50% solution, 0.500 gm. per 100 sq. cm. of body surface. The animals were again fasted for 24, 36, 48 or 72 hours, then anesthetized with amytal and the whole liver, a sample of muscle and the heart were quickly removed and frozen in a mixture of CO_2 snow and ether. Glycogen was determined by a combination of the Pfluger method and the Shaffer-Hartmann procedure.

The glycogen content of the livers of mature female rats was invariably lower than that of mature males. However, no significant difference in the glycogen store in the liver, muscle or heart of sexually immature male and female rats was found. In castrated female animals as high or higher values were found as in males. In a series of 50 castrated female rats, half of which received sufficient theelin several times daily over a period of a week to keep them continuously in active oestrus, it was found that the injected animals behaved as normal females in respect to their glycogen stores. It is concluded that a sexual difference exists in the rate at which the carbohydrate stores are depleted in fasting. This variation is not noted before sexual maturity or after castration of the female. It is restored, however, in female castrates by the injection of theelin.

6345

A Roentgen-Ray Study in Absorption of Thorium Dioxide from Peritoneal Cavity of Albino Rat.*

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It has long been known that serous cavities have the capacity of absorbing certain injected substances. Cunningham[1] showed that, when a mixture of erythrocytes, large unfiltered carmine granules, and fine lampblack granules, made up in isotonic NaCl solution, was injected into the peritoneal cavity of animals, all 3 types of material reached the anterior mediastinal glands shortly after in-

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[1] Cunningham, R. S., *Am. J. Physiol.*, 1922, **62**, 248.

jection. His results indicate that most, if not all, of the transfer of granular material from the peritoneal cavity into the diaphragmatic lymphatics, during the first 30 minutes, takes place by means of a type of phagocytosis. His important findings give a clearer understanding of the high phagocytic capability of the lymphatic endothelial cells to remove large amounts of particulate matter from the peritoneal cavity. The diaphragm is rich in lymphatics and its lymphatic vessels anastomose with the lymphatic vessels of the

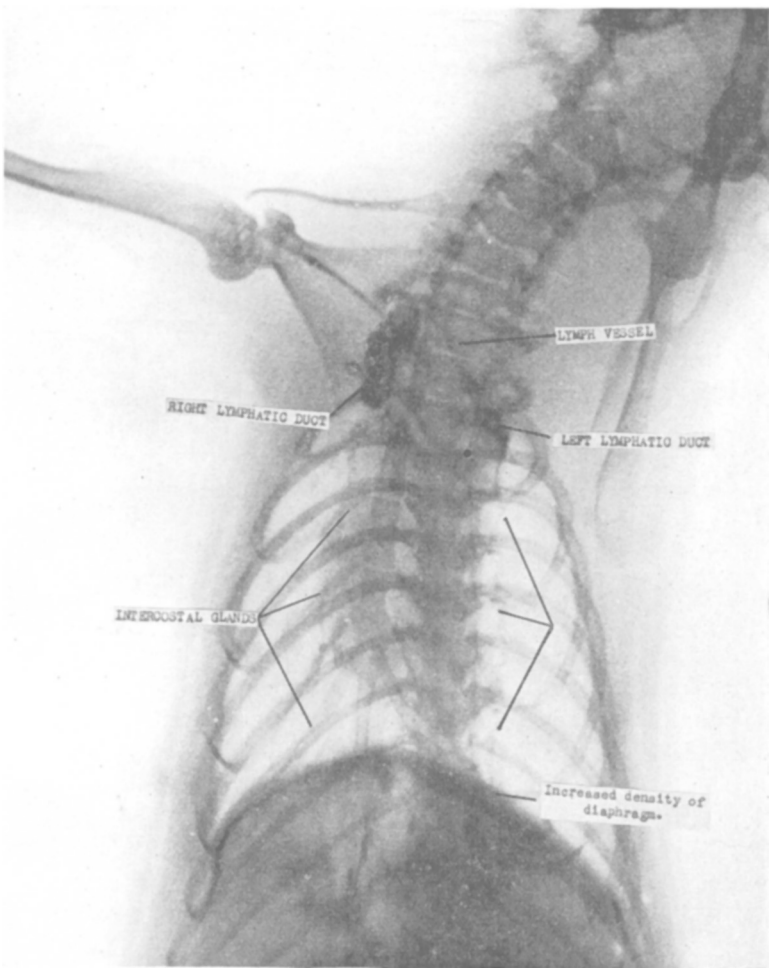

FIG. 1.

Enlargement from original film showing the connection between the lymphatic system of the diaphragm and the lymphatic ducts by way of the intercostal lymph nodes and vessels. The two lymphatic ducts are apparently connected by a lymph vessel.

pleura and the peritoneum, which, in turn, connects with the right and left lymphatic ducts. The thoracic duct, terminating in the internal jugular vein, conveys the great mass of lymph and chyle into the blood. It is the common trunk of all lymphatic vessels below the diaphragm. The right lymphatic duct receives lymph from the right upper extremity, the right thorax, right lung, right side of the heart, and from parts of the convex surface of the liver. It opens into the junction of the internal jugular and the subclavian veins separately. Absorption in this region is extremely rapid due to this network of lymphatics. The practical application of this knowledge is found in the Fowler position, whereby, upon elevating the head of the bed after operation for abdominal infection, the infected material is permitted to gravitate toward the pelvic peritoneum, which absorbs with comparative slowness, while the peritoneum in the upper abdomen absorbs very rapidly.

Our studies on the absorption of thorotrast, a colloidal thorium dioxide, from the peritoneal cavity of albino rats were undertaken to visualize, if possible in the living, by means of the roentgen ray, the routes of absorption by the lymphatic system from the peritoneal cavity to the right and left lymphatic ducts.

Three healthy albino rats were injected intraperitoneally with 0.5 cc. thorotrast. Roentgenograms made 24 hours after injection and again 2 weeks later showed very fine striations in the abdomen which closely resembled lymph vessels, previously reported by us.[2] The diaphragm showed an increased density, suggesting some absorption of the thorium in this region, probably by the lymphatics. Chest films showed clearly the intercostal glands and vessels and also the connection of these lymph vessels with the right and left lymphatic ducts, also the drainage system of the lymphatics from the peritoneal cavity, diaphragm, intercostal nodes and vessels, into the lymphatic ducts. In one, an apparent connection was observed between the 2 lymphatic ducts (Fig. 1). Whether this is but a branch of a duct, we do not know. The intraperitoneal injection of thorotrast did not injure the rats.

We believe this to be the first time that this portion of the lymphatic system has been visualized with the roentgen ray.

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[2] *J. Am. Med. Assn.*, May 21, 1932, **98**, 21, 1796.