4692

## Relative Values of Heat and Cold on Experimentally Produced Peritonitis.

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Experiments were undertaken to throw light on the controversial question of the relative value of local applications of heat and cold on the course of peritonitis. They are based on 119 animals. Of these, 9 were sacrificed in obtaining cultures.

Experimental peritonitis was produced in dogs by the intraperitoneal injection of combined anaerobic and aerobic cultures obtained from animals in which a primary peritonitis occurred as a result of artificially produced obstruction of the cecal appendage. Peritoneal fluid was obtained with hypodermic syringe and needle and inoculated into tubes of meat digest broth, one test tube being incubated under anaerobic and the other under aerobic conditions. The 24 hour cultures of the 2 tubes were then mixed, and equal quantities of the resultant mixture introduced into the peritoneal cavity by hypodermic needles, the skin having previously been shaved and sterilized. The injection was uniformly made into the left lower quadrant at a point approximately midway between the umbilicus and anterior superior spine of the ilium. The animals were then divided into 3 groups. One group was used as control, and received no treatment except the administration of hypodermoclysis. A second group received, in addition to hypodermoclysis, a Leiter coil over the area of injection, through which a continual stream of cold brine flowed. In the third group a similar application to the abdominal wall was made, but hot water was passed through the coil. Observations every 3 hours included rectal temperatures and temperatures of the coil, the latter being obtained by a thermometer inserted between the lower surface of the coil and the abdominal wall. Hemoglobin estimation and leucocyte and differential blood count were made every 24 hours during the survival of the animal. Animals which died were immediately subjected to autopsy, and a complete protocol of the abdominal findings was recorded.

Of the animals recorded in the final series there were 25 control, 25 in which heat was applied, and 25 in which cold was applied. Of the animals surviving there were 10 each in the heat and cold series and 8 in the control series. In other words, 15 in the heat and cold

series died, while 17 in the control series died. The average duration of life, computing the average number of hours lived, of the dogs which ultimately died was, in the heat series 40.4 hours, in the cold series 29.8 hours, and in the control series 22.9 hours. The animals of all series showed a marked leucocytosis at the end of 24 hours and the maximal leucocytosis was attained during the first 48 hours. Blood counts at the end of 72 and 96 hours showed a diminishing leucocytosis, but the animals treated with cold differed from both the control series and the dogs treated by heat in that a relatively high leucocytosis tended to persist even at the end of 96 hours, whereas in both the control and the heat series the leucocyte count at this time was considerably less than it had been normally. The hemoglobin estimation in all 3 series of animals is possibly of little significance, except as indicating the efficiency of the hypodermoclysis in preventing blood concentration. All the animals showed a polymorphonuclear leucocytosis at the end of 4 hours, and by the end of 48 hours this had become maximal. Estimations made at the end of 72 and 96 hours respectively showed diminution in the number of neutrophils, and at the end of 96 hours in all 3 animals the count had been reduced to a percentage considerably below normal. The dogs treated by heat showed a somewhat higher polymorphonuclear leucocytosis than either the animals constituting the control series or the animals treated by cold. The reaction of the small mononuclear cells consisted of a diminution in the count at the end of 24 hours in all 3 series, but the count progressively rose in all 3 series during the course of the succeeding 24 hour period up to the end of 92 hours, at which time the percentage of small mononuclear cells was considerably increased over what it had been originally. This effect was particularly noted in the series of animals treated by heat. Changes affecting the large mononuclear cells, the eosinophils, and the basophils were inconstant. In the technic used the temperature under the coil registered, in the case of the animals treated by heat, usually between 105° and 106° F. Underneath the coils of the dogs treated by cold the temperature fluctuated usually between about 74° and 79°. This fluctuation is obviously greater than that which occurred in connection with the heat coil. The average normal rectal temperature in the dog varied very considerably, some of the animals showing temperatures as low as 97° and others as high as 104°. The animals constituting the control series showed rectal temperatures ranging usually between 100° and 101°. Those treated by heat showed a temperature range of

between 101° and 102°; those treated by cold showed a temperature range of between 99° and 100°.

Results seem to indicate that the local application of heat and cold to the surface of the abdomen in the treatment of experimentally produced peritonitis is a matter of relative indifference. The raising or the lowering of the general body temperature by approximately a degree apparently has no influence on the ultimate survival of the animal, since as many animals survived when treated by heat as when treated by cold. It seems quite possible, however, that the application of heat or cold is of some value since a larger number of animals so treated survived than in the series untreated by either method.

4693

## Further Studies on the Pathogenicity of Br. Abortus and Br. Melitensis for Monkeys.

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The following observations have been made in the course of preliminary studies with 48 cultures of the brucella group on 74 rhesus and 14 cynomolgus monkeys:

A single oral administration of 21 different *Br. abortus* strains produced in 24 *Macacus rhesus* and 1 *M. cynomolgus* monkeys nonfebrile infections, followed by the formation of specific agglutinins of moderately high value. The dosage varied from 7 to 400 million and in some experiments it consisted of many billions. The strains identified serologically as abortus or para-abortus varieties and in the dye test as "bovis" or "melitensis" types had been isolated from bovine pathological specimens in the United States, Germany, Hungary, Italy and Switzerland.

Blood cultures have not been successful. The value of the serum agglutinins and their persistence depends on the feeding dose. Rapid disappearance of the agglutinative power to a low titer or to the zero point is worthy of note. A cutaneous application of approximately 20,000 bacteria has induced an infection. The incubation period as indicated by the appearance of the serum reaction varied from 9 to 30 days and is influenced by the infective dose.