

over 3 years old and partial decomposition of the MgNH_4PO_4 constituent may have occurred. The presence of organic matter was noted in all calculi analyzed. The results of these analyses agree with the analyses of Smith and Hodson(2).

Discussion. Since the main constituent of the mink urinary calculi is magnesium ammonium phosphate the question of the pH of mink urine arises. This type of calculi is known to form in an alkaline urine. Vermeulen, Grove, Goetz, Ragins, and Correll (6) have reported that there is a sharp drop in the solubility of magnesium ammonium phosphate over the range of pH 6.0 to pH 7.5. Kubin and Mason(7) found that the pH of mink urine varied over the pH range 6.8 to 7.5. These figures indicate that conditions may be favorable for the formation of this type of urinary calculi.

Summary. Thirty-one mink urinary calculi have been quantitatively analyzed for calcium, magnesium, ammonia and phosphorus. The results of the analyses indicate that the main

constituent of the calculi is magnesium ammonium phosphate. Small amounts of calcium phosphate and magnesium phosphate may also be present.

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Comparative Measurements of Temperature in Liver, Lung, and Rectum of the Rabbit.* (19600)

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Several investigators have studied the temperature of either the lung or the liver (1-4), but no systematic study of liver and lung temperatures in the same animal has been recorded. Thus, Nedzel(1) reported that in dogs the liver temperature averages 0.2°C higher than the temperature of the aortic blood, and Tanaka(2) has shown that in man the lung temperature is $0.5\text{-}1.0^\circ\text{C}$ lower than the rectal temperature. In the present study the temperatures within the liver, the lung, and the rectum have been measured simultaneously, or within a few seconds, in the normothermic rabbit.

Methods. Seven rabbits, which had been maintained on an ordinary diet, were lightly anesthetized with pentobarbital given intravenously. A No. 40 copper-constantan thermocouple sealed into a No. 20 hypodermic needle (with the thermocouple junction at the bevel of the needle) was inserted through the anterior abdominal wall on the right side, at a point 2-4 cm lateral to the tip of the xiphoid process, into the parenchyma of the liver. A similar thermocouple was inserted into the parenchyma of the lung through the chest wall, on either the right or the left side, pushing the needle through the 5th or 6th interspace anterolaterally. The current was read on a Rubicon galvanometer (Model 3401-H). The accuracy of the method was

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TABLE I. Temperatures of Liver, Lung, and Rectum in 7 Rabbits.

Wt, kg	Avg liver temp., * °C	Avg lung temp., * °C	Avg rectal temp., * °C	Avg thermal gradient in °C		
				Liver	Liver	Lung
				Lung	Rectum	Rectum
5	38.73	38.51	38.70	+ .22	+ .03	— .19
2.2	39.10	38.97	38.81	+ .13	+ .29	+ .16
2.6	40.51	40.38	40.17	+ .13	+ .34	+ .21
2.5	39.01	38.75	38.70	+ .26	+ .31	+ .05
2	39.00	38.86	38.80	+ .14	+ .20	+ .06
2	39.28	39.11	38.85	+ .17	+ .43	+ .26
2.7	39.48	39.28	39.07	+ .20	+ .41	+ .21
Avg 2.7	39.30	39.12	39.01	+ .18	+ .29	+ .11

* Each temperature recorded is an average of 7 readings.

$\pm 0.035^{\circ}\text{C}$. The rectal temperature was measured by a thermometer, with an accuracy of $\pm 0.025^{\circ}\text{C}$. After the thermocouples and the thermometer were inserted, the temperatures of the 3 organs were recorded every 5 minutes for 30 minutes, each group of measurements requiring approximately 30 seconds. At the end of each experiment, the animal was killed and the position of the thermocouples determined. For our purpose a normothermic animal was considered to be one in which the rectal temperature did not vary more than $\pm 0.3^{\circ}\text{C}$ from the normal rectal temperature in the rabbit, which is $38.6\text{--}40.1^{\circ}\text{C}(5)$. The ambient air temperature was $24 \pm 2^{\circ}\text{C}$.

Results. Every animal was normothermic during the experimental period, and the thermocouples were actually in the substance of the liver and the lung. The results are summarized in Table I, which shows that the mean liver temperature exceeds the mean lung temperature in every animal, the average difference for all animals over the entire period of observations being 0.18°C . At no time was the lung temperature found to exceed the liver temperature. Also, in every animal, the liver temperature was found to exceed the rectal temperature in all observations, the overall average being 0.29°C . In all animals except No. 1, the mean lung temperature was higher than the rectal temperature, the average for the 7 animals being 0.11°C . In Rabbit No. 1, the lung temperature was consistently lower than the rectal temperature;

and in Rabbit No. 5, the lung temperature was lower than the rectal in one observation, though the mean lung temperature was higher.

The temperature difference between the liver and lung and between the liver and rectum are statistically significant at the 1% level. The temperature difference between the lung and rectum is not statistically significant because of the measurements obtained in Rabbit No. 1. In the other 6 animals of the series, the lung-rectum difference also is significant.

Summary. In a series of 7 normothermic rabbits the liver temperature was consistently higher than either the lung or rectal temperatures. The lung temperature was usually, but not consistently, higher than the rectal temperature. The mean differences were as follows: a) The liver temperature averaged 0.18°C higher than the lung temperature. b) The liver temperature averaged 0.29°C higher than the rectal temperature. c) The lung temperature averaged 0.11°C higher than the rectal temperature.

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