stances are concerned in hypersensitivity reactions, in which autoagglutination of erythrocytes and other pathological phenomena caused by allergens are involved.

Summary. The A_2 isoagglutinogen-like substance (A_2IS) from animal parasites has been prepared in a purified form from crude extracts of the cuticle of *Ascaris lumbricoides* var suum. Preliminary chemical studies indicated that this substance is a glycoprotein. The A_2IS is related to collagenase or a collagenase complex, as shown by cross hemagglutination reactions between anticollagenase sera prepared in rabbits, and the A_2IS substances adsorbed onto tannic acid treated Group O human erythrocytes. Also A_2IS reacts with anticollagenase sera in agar diffusion slides with formation of one band of precipitate. The two substances are also immunologically related as shown by the fact that they inhibit the a_2 isoagglutinins in human serum of Groups O and B when comparable amount of each substance is used per ml of serum. A_2IS and collagenase also cause anaphylactoid symptoms and death when injected intravenously into dogs. It is suggested that collagenase or substances in the collagenase complex are present in infectious organisms which may be associated with hypersensitivity.

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Renal Na-Reabsorption and O_2-Uptake in Dogs During Hypoxia and Hydrochlorothiazide Infusion. (26451)

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It seems well established that sodium reabsorption in the kidney is an active process, which requires the bulk of the oxygen consumed by the kidney. In recent reports of experiments on the dog kidney, it has been shown that there is a fixed relation between sodium reabsorption and oxygen consumption (mEq Na/net mmol O_2). Thaysen, *et al.*,(1) using different dogs with large individual variations in rate of sodium reabsorption, found a fairly constant Na/net O_2 ratio of 28.5. Following acute hemorrhage, so that no glomerular filtration and, therefore, no sodium reabsorption occurred, basal renal oxygen consumption was determined to be 1.0 μmol/g kidney/min. Deetjen and Kramer(2) found a ratio of 24 over a wide range of sodium reabsorption in the same dog. By compressing the aorta above the renal artery, they were able to decrease the tubular sodium load by decreasing the glomerular filtration rate with a resulting drop in sodium reabsorption. By extrapolating from these data, basal renal oxygen consumption, *i.e.*, when no sodium is reabsorbed, was calculated to be 1.5 μmol/g kidney/min.

The present study was undertaken with the following aims: (1) to decrease active reabsorption of sodium and oxygen consumption in the kidney by means of low arterial oxygen pressure or administration of hydro-

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chlorothiazide; (2) to determine the Na/net O_2 ratio under these conditions when tubular load and renal blood flow were essentially unchanged; and (3) to gain information about basal renal oxygen consumption under the influence of hypoxia or hydrochlorothiazide.

Twelve normal hydrated mongrels were anesthetized with nembutal (9 dogs) or with inactin† (3 dogs). A tracheal tube was inserted. After a left flank incision, a sinusoidal electromagnetic flow meter was placed around the unopened left renal artery for continuous measurement of total renal blood flow. The flow meter amplifier was a modified Kolin type(3). Mechanical zero for the flow meter was established either by cross-clamping the renal artery between flow meter and kidney for 2 to 5 sec., or by intravenous injection of 75 μg of epinephrine at the end of experiment. The deflections recorded by either method were identical. Femoral arterial pressure (using strain gauge) and renal blood flow were recorded on an Electronics for Medicine-DR8. Blood samples were collected by catheters inserted in the brachial artery and renal vein (*via* spermatic vein). The left ureter was cannulated close to the renal pelvis for urine samples. Renal oxygen uptake was calculated from renal blood flow (RBF) and renal A-V oxygen difference (Van Slyke-Neill). The creatinine infusion technic was applied for determination of glomerular filtration rate (GFR) (Beckman spectrophotometer). Amount of reabsorbed sodium was calculated as the difference between tubular load and excretion (flame photometer, Perkins Elmer). Serum and urine pH were measured with a Cambridge pH meter, and osmolalities in serum and urine by a Fiske osmometer. Hypoxia was produced by connecting the tracheal tube to a reservoir containing a gas mixture of 7.2% oxygen and 5% CO_2 in N_2. The arterial oxygen saturation under these conditions fell to an average of 35%. After a priming dose of 50 mg *i.v.*, hydrochlorothiazide was infused at a rate of 50 mg/h while the dogs were breathing room-air. In the hypoxic, as well as in the hydrochlorothiazide group, the samples were taken after an initial 20 to 40 minute period of equilibration.

† Na-ethyl-(1-methyl-propyl)-malonyl-thio-urea, Promonta GmbH, Hamburg, Germany.

TABLE I. Effect of Hypoxia and Hydrochlorothiazide upon Renal Hemodynamics, O_2 Consumption and Excretion of Water and Solutes.

	Control	Hypoxia	Hydrochlorothiazide
BP (mean), mm Hg	125	133	120
RBF, ml/min. g	4.84	4.95	3.9
GFR, ml/min. g	.81	.76	.71
Na load μeq/min. g	126	117	105
Na excretion % of load	1.19	1.55	4.91
O_2-consumption, μmol/min. g	5.6	4.95	4.37
UV, μl/min. g	16	22.4	31.7
Urine pH	6.65	6.67	—
Plasma pH	7.45	7.50	—
U/P osm	2.96	2.1	2.01
U/P creat.	76.02	53.02	24.41
C_{osm}, μl/min. g	47.5	47.0	63.7
$T^c_{H_2O}$, μl/min. g	31.5	24.6	32.0
Na/net O_2 ratio	28.6	31.1	32.0

The average of the results is shown in Table I. In hypoxia, the arterial blood pressure and RBF are nearly unchanged but there is a slight decrease in GFR and tubular sodium load. In spite of the nearly unchanged tubular load, excreted sodium, expressed in per cent of tubular load, is increased. There is a concomitant decrease in oxygen consumption during hypoxia. In addition an increase in urine volume occurs with decreases in U/P osm and U/P creat. Serum pH and urine pH are nearly unchanged. Osmotic clearance is slightly elevated. $T^c_{H_2O}$ falls from 31.5 to 24.6 μl/g kidney·min. The changes of renal function under hypoxia are reversible since after 20 minutes of room-air breathing control values were obtained.

Under the influence of hydrochlorothiazide, the RBF is reduced from 4.8 to 3.9 ml blood/g kidney · min, with a simultaneous decrease in GFR as well as in tubular sodium load. The per cent of filtered sodium excreted goes up from 1.19 to 4.91%. Renal oxygen consumption during hydrochlorothiazide infusion is the lowest in the individual experi-

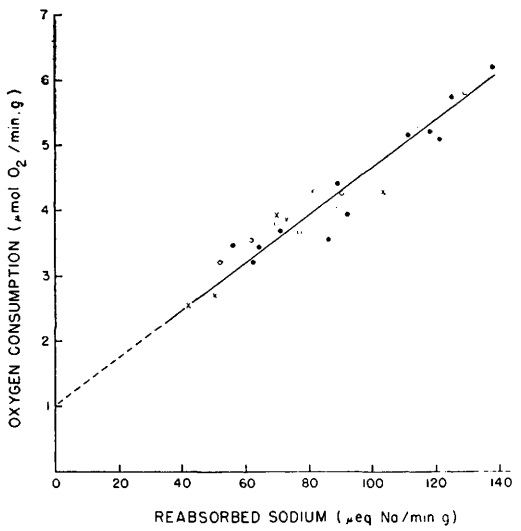

FIG. 1. Renal oxygen consumption and sodium reabsorption in dogs. ●, control; ○, hypoxia; ×, hydrochlorothiazide.

ment, as well as in the group average, when compared to control and hypoxia. Urine volume increases, as expected, with a concomitant decrease in U/P osm. and U/P creat. C_{osm} goes up from 47.5 to 65.2 μl/g kidney · min. $T^c_{H_2O}$ remains essentially unchanged.

In Fig. 1 Na-reabsorption of the individual experiments is plotted against oxygen consumption. A line drawn through the middle of the individual points intercepts the oxygen consumption axis at 1 μmol oxygen/g kidney · min, indicating basal renal oxygen consumption. There is no systematic deviation of any of the groups (control, hypoxia, hydrochlorothiazide) from this line.

In the last column of Table I the ratios Na/net O_2 are calculated for the 3 different groups (net O_2 = total oxygen consumption —basal renal oxygen consumption).

The present data suggest that active sodium reabsorption and net oxygen consumption in the dog kidney can be lowered proportionately during severe hypoxia. The fact that the alterations caused by hypoxia are abolished within 20 minutes after the dogs were again breathing room-air makes it unlikely that under these circumstances hormonal influences were involved. Furthermore, a respiratory alkalosis, which *per se* decreases sodium reabsorption, did not occur. The decrease in $T^c_{H_2O}$ indicates that the efficiency of the terminal concentrating mechanism in the medulla is diminished by hypoxia. Although it cannot be determined with certainty, this diminution in $T^c_{H_2O}$ may be caused by a decrease of active sodium reabsorption in the medulla.

Na/net O_2 ratios in all 3 groups are in the same range, *i.e.*, between 28.6 and 32. The differences are not significant. They are slightly higher than the results of Deetjen and Kramer, but in accordance with Thaysen *et al.* Thus, it seems to be well established that a fixed ratio exists in the mammalian kidney which is higher than the fixed ratio of 16-20 in the frog skin or toad bladder(4,5,6). In contrast to the frog skin or toad bladder studies where only active sodium transport was measured, the method used deriving this ratio in the mammalian kidney has not excluded the influence of nonactive sodium transport. Thus it may be that the ratio for active transported sodium in the mammalian kidney is somewhat lower.

The fact that hypoxic as well as hydrochlorothiazide values do not deviate systematically from the midline (Fig. 1) indicates that basal oxygen consumption of 1 μmol/g kidney · min is affected neither by hypoxia nor by hydrochlorothiazide.

Since renal sodium reabsorption depends upon tubular load and tubular reabsorptive activity, it is evident that primary changes in renal blood flow or filtration fraction *i.e.*, changes in GFR—as well as hormonal or drug influences upon the sodium reabsorptive mechanisms, determine renal oxygen consumption. The absence of a decrease in $T^c_{H_2O}$ to hydrochlorothiazide makes it unlikely that this drug affects sodium reabsorption in the medulla.

Summary. In anesthetized dogs renal oxygen consumption and sodium reabsorption were determined during hypoxia and under the influence of hydrochlorothiazide. In hypoxia (arterial O_2 saturation 35%) less sodium is reabsorbed and renal O_2 consumption is diminished. Urine volume is increased with a decrease in U/P_{osm}, U/P_{Creat} and $T^c_{H_2O}$. During administration of hydro-

chlorothiazide both sodium reabsorption and O_2 consumption are lowered. Urine volume and C_{osm} are elevated, U/P_{osm} and U/P_{Creat} decreased while $T^c_{H_2O}$ remains unchanged.

Plotting Na reabsorption (μeq/g min) against O_2 consumption (μmol/g min) results in a straight line which intercepts the O_2 consumption axis at 1 μmol/g min. We believe that this value may be equated with renal basal O_2 consumption; *i.e.*, without Na reabsorption. The O_2 requirement for renal sodium reabsorption is calculated to be 28.6–32 μeq Na/μmol O_2.

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Studies of Acute Respiratory Illnesses Caused by Respiratory Syncytial Virus. 1. Laboratory Findings in 109 Cases. (26452)

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Morris *et al.*(1), described the first recovery of a virus, termed chimpanzee coryza agent (CCA), from the respiratory tract of chimpanzees with an acute respiratory illness and from a laboratory worker who had been in contact with these animals. The infected chimpanzees and the laboratory worker developed complement fixing and neutralizing antibodies in response to their infections. Chanock *et al.*(2,3) reported recovery of a similar virus from 2 infants with lower respiratory tract infection and showed antibody titer increases among persons with respiratory illness as well as controls; these workers were not able, however, to provide definitive evidence for etiologic association between the virus and human illness. Chanock renamed this agent the respiratory syncytial virus. Since that time, Rowe *et al.*(4) have reported positive laboratory diagnostic findings for the respiratory syncytial agent in an infant with pneumonia. More recently, Beem *et al.*(5) have recorded laboratory findings in 41 cases of respiratory illness among children infected with the respiratory syncytial agent.

Since 1959, our clinical-laboratory groups have engaged in extensive investigations of the etiology and epidemiology of acute respiratory illness among patients admitted to the wards or to the outpatient clinics of the Children's Hospital of Philadelphia or the Hospital of the University of Pennsylvania. The present report describes the laboratory findings among 109 cases of acute respiratory illness shown to be caused by the respiratory syncytial virus. Subsequent reports(6,7) in this series describe the epidemiology of infections with the virus and the spectrum of clinical findings among patients with illnesses caused by this agent.

Materials and methods. Clinical population. The patients were children less than 8 years of age seen in outpatient clinics or admitted to wards of the Children's Hospital of Philadelphia or the Hospital of the University of Pennsylvania, and selected on the basis of having an acute respiratory illness of 4 days or less duration judged on clinical grounds to be of probable viral etiology. The majority of persons were from a low socioeconomic group, mostly Negro, and scattered geographically over a large area of Philadelphia. The cases described occurred during the period from Oct. 1959 through June