component occurs at the lymph capillary wall, since these capillaries lack a continuous basement membrane, and according to COURTICE[7] do not present an effective barrier to entering albumin. Thus it would appear that the major factor which slows the equilibration of albumin between plasma and lymph is the limited permeability of the peritubular capillary membrane.

Since $\bar{t}_{alb}$ is equivalent to a ratio of the albumin pool (A) divided by the rate of passage of albumin through this pool (F) (i.e. $\bar{t}_{alb} = A/F$), a change of $\bar{t}_{alb}$ may be the result of an altered pool size, an altered rate of passage or both. Direct evidence on the size of the interstitial albumin pool in saline and water diuresis is not at present available. It is possible that the increased flow of fluid through the interstitium after fluid loading may have depleted the interstitial albumin pool. However, because of the similar changes in $\bar{t}_{in}$ and $\bar{t}_{thio}$, any depletion should have been the same after both types of fluid loading. The significantly greater reduction in $\bar{t}_{alb}$ in water diuresis than in saline diuresis, therefore, indicates an increased rate of passage after hypoosmotic fluid load. Thus, if the main component of albumin delay occurs at the blood capillary membrane, our results provide evidence for a significant increase in albumin permeability of the peritubular capillaries in water diuresis. The mechanism for this altered capillary permeability is unknown. It is possible that a different pattern of peritubular capillary pressure changes after the infusion of saline and hypoosmotic fluid may play a role in evoking the responses we observed, but at the present time no experimental evidence is available to support such a mechanism[8].

Résumé. Ce travail compare le passage de l'albumine marquée, de l'inuline, et du thiosulfate à partir du lit capillaire dans la lymphe rénale capsulaire et hilaire, chez le chien soumis à des diurèses salines et aqueuses. Les résultats suggèrent que la perméabilité capillaire péritubulaire est influencée de manière différente par la variation des conditions de diurèse.

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Running Activity and Gastric Ulcers in the Rat

It has been reported that rats offered laboratory chow diet for 1 h/day only and allowed to run in activity wheels ate less food than correspondingly food-restricted animals in standard laboratory cages. In spite of the reduced food intake, animals in activity wheels continued to run and most of them died within 2 weeks[1]. This 'self-starvation' effect of the combined temporary food deprivation and running activity was confirmed in additional experiments[2-7]. The present study was designed to investigate whether the 'self-starvation' conditions lead to any organ changes, which could explain the early deaths of these animals.

Male Sprague-Dawley rats, weighing about 155 g each, were assigned at random either to cages with activity wheels (10 animals) or to standard laboratory cages (5 animals). A semi-synthetic high carbohydrate diet containing 20% casein and 65.6% dextrin[8] was offered for 1 h/day, between 09.00 and 10.00 h. Animals in the activity wheels consumed an average of 6.8 g food per day, while the animals in the standard cages averaged 7.8 g/day. Three rats in the activity group died during the 2-week study. These animals, and all the survivors sacrificed at the end of the experiment, were autopsied and their organs examined for gross pathologic changes. The tissues were then preserved in 10% buffered formaldehyde for subsequent histological study.

Eight of the 10 rats kept in activity wheels showed stomach lesions, ranging from superficial mucosal erosions (2 animals) to point-like ulcerations (3 animals) and large confluent areas (3 animals) of hemorrhage (Figure, B). The intestinal tract of the animals with ulceration and hemorrhage contained both fresh and digested blood. All the lesions were confined to the body and antral area of the stomach (Figure, B). The fundic area seemed to be intact. Histological examination of the gastric tissue revealed mucosal hemorrhage, superficial erosion of the mucosa, and multiple ulcers, frequently reaching the submucosa. No damage was evident either on gross or histological evaluation of the stomachs of the animals kept in standard laboratory cages (Figure, A). The remaining organs examined, adrenals, liver and kidneys were without any remarkable or consistent pathologic changes.

The reduced food intake in 'self-starved' animals has been explained either by faulty physiological signals to the hypothalamus, which simulated the feeling of satiety[1], or by a 'starvation anorexia'[7]. Our data indicate that development of bleeding gastric ulcers might have been another factor responsible for the diminished food consumption. Since all animals which died during the present experiment showed extensive gastric ulceration and presence of fresh blood in the intestinal tract, it can be assumed that the extensive loss of blood contributed to their early death.

The gastric damage observed in the present study seemed to be more extensive than the 'exertion ulcers' produced in fasting rats forced to run for several hours[9].

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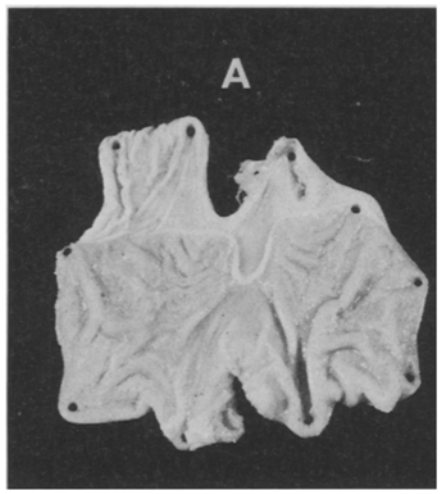

Fig. A) Stomach of a control rat. The animal was fed 1 h/day and kept in standard laboratory cage for 2 weeks.

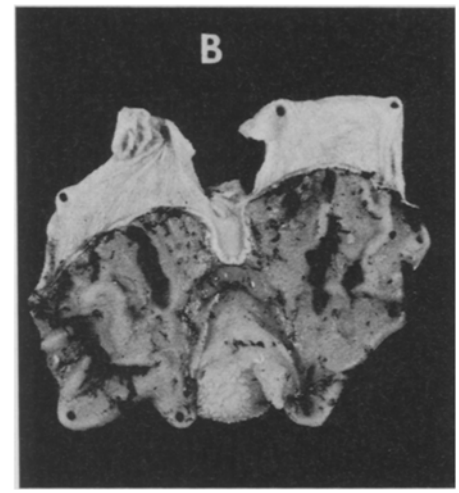

Fig. B) Stomach of an 'active' rat. The animal was fed 1 h/day and kept in an activity wheel for 2 weeks. The antral area and body of the stomach show confluent ulceration.

Most of the animals with exertion ulcers survive the procedure while in 'self-starvation' conditions, especially if the laboratory chow diet is used as the food, the majority of the animals die within 2 weeks[5]. The possible role of the composition of the diet in the 'self-starvation' phenomenon is also suggested by the observation that an isocaloric substitution of the laboratory chow diet by a high fat diet protected animals against death[5].

The pathogenesis of the gastric lesions observed in the 'self-starved' rats is not clear at this time. However, morphologically they resemble the picture of 'stress' ulcers or an acute hemorrhagic gastritis, which are at this time believed to be due to a damaged gastric mucosal barrier and increased back diffusion of hydrogen ions[10].

The results of the present study indicate that early death in 'self-starved' animals is probably a result of extensive gastric lesions and associated blood loss. Furthermore, our data suggest that gastric ulcers may be produced in rats without the use of force or drugs[11].

Zusammenfassung. Nachweis von Magenulzerationen und Magenerosionen bei Albinoratten nach bestimmter Fütterung und nachherigem Laufkäfig-Aufenthalt. Problem der Stressulzeration und die Rolle der Diät werden erörtert.

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Compartmental Analysis of Efflux of Extracellular Space Markers in Rabbit Detrusor Muscle

In a previous study[1] the volume of the extracellular space in isolated rabbit detrusor muscle was examined using [^{14}C]-labelled mannitol, sucrose, inulin and dextran. The uptake of mannitol and sucrose reached equilibrium at a volume of about 60 ml/100 g wet wt after 1–2 h whereas the uptake of inulin and dextran was not only slower, equilibration being reached after about 2 h, but also was smaller, the equilibration volume being about 43 ml/100 g wet wt. Graphical analysis of efflux data showed that the efflux of mannitol, sucrose and inulin was incomplete even after 6 h and was multicompartmental in nature. In the present study, the efflux of [^{14}C]-labelled mannitol, sucrose and inulin has been analyzed further using a computer programme, written for the APL/360 System[2], so as to obtain data on the number and sizes of compartments and their rate constants and half times.

Materials and methods. Pieces of rabbit detrusor muscle were prepared and subsequently labelled with tracer concentrations of [^{14}C]-labelled mannitol, sucrose or inulin as described previously[1]. At the end of this period tissues were removed, blotted, rinsed rapidly and transferred to a series of tubes containing tracer-free Krebs solution. Efflux was then followed for 6 h. The [^{14}C]-content of tissues and of all efflux material was determined by

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