

and traverses the kidney through the by-pass circuit. As soon as completed, our detailed work will be published.

We wish to express our gratitude to the Hungarian Chinoin Co. for synthesizing p-amino hippuric acid as well as to the Hoffmann-La Roche Co. for their gift of Narconumal, and to the Ciba and Richter Co. for supplying us with mannitol.

P. GÖMÖRI, M. FÖLDI, and G. SZABÓ

First Medical Clinic of the University of Budapest, February 18, 1948.

Zusammenfassung

Bei Nierenrindenischämie (hervorgerufen nach TRUETA und Mitarbeitern durch Faradisation des Nierenhilus) wurde die Nierenfunktion geprüft. Die Glomerulusfiltration, die effektive Blutdurchströmung und die maximale PAH-Ausscheidung, sanken bedeutend ab. Auch die maximale Zuckerresorption wurde erheblich reduziert, aber erheblich weniger als die „Clearance“ die Zuckerresorption im juxtamedullären Tubulus scheint demnach zu steigen. Die PAH-Konzentration des Blutes in der Vena renalis stieg nach der Faradisation sehr stark an; die Extraktion war also herabgesetzt.

The Absence of the Effect of Percorten in Alloxan-Diabetic Dogs

Recently we published our experiments¹ performed on normal dogs; as an introduction to the present work we have to summarize our previous results.

If the kidneys are loaded with glucose by means of intravenous infusion, the amount of glucose filtered in a unit of time steadily increases at an unchanged glomerular filtration rate; tubular reabsorption increases for a time, but after reaching its maximal value the amount of sugar reabsorbed remains constant, even if glucose filtration is further enhanced. This number, the Tmg² is a stationary, reproducible, individual value. If the tubuli are forced to maximal effort, glucose reabsorption diminishes after a while³.

We could prove in our previous work that Tmg can be greatly elevated by the administration of synthetic adrenal cortex hormone (Percorten Ciba, Desoxycorticosterone acetateglucoside). We could draw the conclusion that the absolute value of Tmg depends, first of all, on the intensity of phosphorylation processes.

According to LASZT⁴ phosphorylation processes are abnormally increased in diabetes; so we thought it would be of interest to investigate the effect of Percorten on Tmg in diabetes.

Our experiments were performed on alloxan-diabetic dogs. The day before the experiment the dogs were given 100 mg/kg bodyweight alloxan intravenously and thereafter a large glucose infusion to prevent hypoglycemia. Next day the dogs were diabetic, their blood sugar was between 180–350 mg %. In such state we performed the glucose infusion and, after reaching the Tmg, we administered Percorten. As can be seen from the table, Percorten was wholly ineffective in these cases.

Further experiments for the interpretation of our results are in progress. Perhaps they can be explained according to LASZT: it is possible that the effect of

Before Percorten				
Dog No.	Clearance	Fg	Eg	Rg (Tmg)
1	4	60	34	26
2	20	276	21	255
3	11	168	104	64
4	12	120	42	78
After Percorten				
Clearance	Fg	Eg	Rg (Tmg)	
3.3	73	48	25	
19.5	312	20	292	
10.0	174	124	50	
11.0	134	57	77	

Fg = Filtered glucose mg/min. Eg = Excreted glucose mg/min.
Rg = Reabsorbed glucose mg/min.

Percorten is missing in these cases because phosphorylation processes are already increased in diabetes. LASZT was able to prove that the cells of the intestinal villi show increased glucose reabsorption in diabetes.

Blood sugar was determined by the method of FUJITA-IWATAKE. Glomerular filtration rate was calculated by means of the mannitol and creatinine clearances.

The other possibility that the effect of Percorten is missing may be because a severe tubular lesion is produced by alloxan.

We have to express our gratitude to the firm Richter, to the Ciba AG., and the firm La Roche for supplying us with mannitol, Percorten, Narconumal, and Alloxan.

M. FÖLDI, J. SÁNDOR, and G. SZABÓ

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Zusammenfassung

Es wurde in früheren Arbeiten mitgeteilt, daß die maximale tubuläre Zuckerresorption (Tmg) durch Percorten bedeutend erhöht wird. In der vorliegenden Untersuchung wird gezeigt, daß das Percorten im alloxan-diabetischen Organismus keine Wirkung auf die Tmg hat.

Statistical Investigations on the Relation between the Ultra-violet Rays of the Sun and Spasmodic Convulsions

While it is certain that tetany is a seasonal disease, the meteorological factors responsible for its acute manifestations have not been identified up to now, according to the view of those who speak of "tetanic weather". MORO¹ (Föhn) and MOURIQUAND² (Vent du midi) attach importance to the barometrical falling, but they do not report any cases, neither does GYÖRGY³, who studied the effects of sunlight following bad weather.

BAAR⁴ on the contrary observed an increased excitability by galvanic current during the days rich in sunlight and GERSTENBERGER *et al.*⁵ have seen tetany develop in

¹ E. MORO, *Klin. Wschr.* 5, 925 (1926).

² G. MOURIQUAND, *Presse méd.* 40, 1400 (1932).

³ P. GYÖRGY in: W. STEFF and P. GYÖRGY, *Avitaminosen und verwandte Krankheitszustände* (J. Springer, Berlin 1927).

⁴ H. BAAR, *Z. Kinderheilkunde* 46, 52 (1928).

⁵ H. Y. GERSTENBERGER, J. J. HARTMANN, G. R. RUSSEL, and T. S. WILDER, *J. Am. Med. Ass.* 94, 523 (1936).

¹ I. RUSZNYÁK, M. FÖLDI, and G. SZABÓ, *Exper.* 3, 420 (1947).

² J. A. SHANNON and S. FISHER, *Am. J. Physiology* 122, 765 (1938).

³ H. W. SMITH, *Lectures on the Kidney* (Kansas, 1943).

⁴ L. LASZT, *Ärztliche Monatshefte* 3, 373 (1947).

rachitic infants exposed to sunshine for a short time; both of them believe that the UV-rays of the sun are responsible for an increase of the phosphate and consequently for a decrease of the calcium ion concentration of the body fluids.

SIWE¹, reporting on researches carried out on 670 cases, was not able to find such a factor.

We have reviewed the arguments and we have considered a certain number of meteorological factors, especially those connected with sunlight, in relation to the beginning of the spasmophilic symptomatology.

Restricting our investigation to the cases with primitive convulsive and chronologically certain manifestations, concerning which we had the required meteorological data, it was possible to collect only 33 cases from the material of the Department of Pediatrics of Padova and of Pavia, both situated in the Padan Valley, at about 45 and a half degrees of northern latitude.

In these cases we have first found a certain coincidence between the beginning of the convulsion and an increase of the hours of sunshine. Indeed, when as a sign of this increase the difference between the hours of sunshine in two periods of 5 days preceding the attack is taken, the difference results of 7 h and 54 min on the average, while the same difference between two consecutive periods of 5 days drawn by lot in the same periods is hardly more than 1 h and 45 min.

Upon calculating the *t* test, according to FISHER, the difference between these two amounts does not appear significant.

Then as one of us (SARTORI) has found, using the frog heart method according to McLEAN and HASTINGS², that vitamin D₂ can produce an apparent diminution of the calcium ion concentration in the blood of infants with an improved calcium metabolism, we have postulated that also the UV-rays of the sun can cause, by the formation of natural vitamin D, an analogous decrease of calcium ions.

Therefore we have calculated also the quantities of UV-rays that have reached the terrestrial surface in the days interesting us, proceeding from the hours of sunshine and from the mean nebulosity and deducing from the declination of the sun, with the help of a graph published by K. BÜTTNER³ and substantially confirmed by unpublished researches of G. ALIVERTI (Pavia), the quantity of UV-rays, expressed in erythema doses.

And since, for astronomical reasons, in the winter-spring season in which, according to the character of the disease, all our cases fell, UV-rays undergo a gradual increase, we have calculated the erythema doses also for the 5-days periods preceding as many days drawn by chance within the same years and months in which the convulsions had occurred.

For the days on which the convulsions manifest themselves, the difference of I–II 5-days period has amounted on an average to + 2,97 erythema doses; for the days drawn by lot, the same difference has amounted to + 1.00 e.d. According to the *t* test in this case the difference between the two increases is significant (fiducial limit 5%). Thence we believe that a correlation between the increase of disposable UV-rays and the incidence of spasmophilic convulsions in subjects disposed thereto is at least probable.

Naturally, we are far from affirming that in all our cases the decisive cause of the spasmophilic convulsions has been, only or always, a greater endogenous production of vitamin D owing to UV-rays, which leads to a diminution of the calcium ion concentration in the body fluids.

In effect we do not know the quantity of UV-rays actually impinging on the skin of the subjects examined, and on the other hand we cannot even exclude that UV-rays can also act in other ways (inhalation of activated substances).

A final hypothesis should permit us to explain in a unitary manner the genesis of the spasmophilic convulsions also in those cases in which an increase of the direct radiation of the place has not occurred or in which the individuals have not been exposed to the same radiation (transport by air currents of organic condensation nuclei activated in other places or in higher atmospherical strata?).

The eventual demonstration of a final hypothesis requires much further research.

E. SARTORI and M. BOLLETTI

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Zusammenfassung

Ein Zusammenhang zwischen meteorologischen Faktoren und Spasmophilie gilt bisher als nicht bewiesen. Die Verfasser haben diese Frage neu aufgegriffen und dabei folgendes gefunden: Tage, an denen Tetanieanfälle auftreten (33 Fälle), unterscheiden sich von beliebigen andern Tagen dadurch, daß sie auf eine durchschnittlich viermal größere Sonnenstrahlungsdauer während der vorausgehenden 10 Tage folgen. Die Verfasser haben weiterhin den Ultraviolettgehalt des Tageslichtes während der den Anfällen vorausgehenden 10 Tage berechnet. Er ist im Durchschnitt dreimal so groß als während beliebiger anderer 10 Tage. Da im *t*-Test die 5%-Grenze nicht überschritten wird, ist die Differenz statistisch (schwach) gesichert.

Die Verfasser halten deshalb einen Zusammenhang zwischen spasmophilen Konvulsionen und UV-Gehalt des Tageslichtes für wahrscheinlich. Sie nehmen an, daß das UV über die Bildung von natürlichem Vitamin D zu einer Abnahme des ionisierten Ca (wie sie nach D₂-Stoß von SARTORI gefunden wurde) und damit zu den Krämpfen führt. Möglicherweise spielt auch eine Ca-Entionisierung eine Rolle, die durch Einatmung organischer Kondensationskerne der Luft (nach UV-Aktivierung) zustande kommt.

¹ S. A. SIWE, *Mshr. Kinderheilkunde* 63, 113 (1935).

² F. C. McLEAN and A. B. HASTINGS, *J. Biol. Chem.* 107, 337 (1934).

³ K. BÜTTNER, *Physikalische Bioklimatologie* (Akad. Verlagsges., Leipzig 1938).