fins receive direct myotomic contributions. He demonstrated, also, that the posterior half of the dorsal fin derives buds from the myotomes, but that the anterior half of the same fin receives no myotomic tissue whatsoever. The possibility of expressing the myotomic role, in limb and fin formation, in terms of a cephalocaudal gradient, therefore, should not be excluded.

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Zusammenfassung

Das Blastem, welches sich zur freien, hinteren Gliedmassenmuskulatur entwickelt, stammt bei Anuren von parietalem Mesoderm und von Ursegmenten ab. Das Vorderbein-Mesoderm dagegen ist ausschliesslich parietal. Diese Feststellungen werden durch Befunde an transplantierten Beinknospen und durch Markierungsversuche mit Kohlepartikeln gestützt.

Die Brauchbarkeit des Kohlemarkierungs-Verfahrens wurde speziell in ihrer Anwendung auf die Feststellung der Wanderrouten von Muskelzellen geprüft.

p-Aminohippuric Acid Accumulation in Kidney Slices in Cloudy Swelling

The clearance of *p*-aminohippuric acid (PAH) is generally considered as one of most important tests of kidney tubular function. Injected PAH is brought with the blood to the tubule cells, and then passes into the cells and is finally excreted in the urine. The peculiar mechanism of this phenomenon is, however, not clear.

CROSS and TAGGART[1] have recently shown that PAH is accumulated within kidney slices respiring *in vitro* when these are incubated in the presence of this substance. The same authors have also shown that 2,4-dinitrophenol (DNP), as well as some other related substances which inhibit the oxidative phosphorylation, prevents this accumulation. Other substances which decrease the respiration rate such as cyanide, azide, arsenite, fluoride, iodoacetate, fluoroacetate, and mercuric hydrochloride also decrease the accumulation of PAH within the slices. Acetate, on the other hand, has a powerful stimulating activity. It thus seems very probable that oxidative phosphorylation is involved in the accumulation phenomenon.

Oxidative phosphorylation is decreased in tissues showing cloudy swelling [2,3]. It therefore seemed interesting to study the influence on the accumulation of PAH within kidney slices *in vitro* of treatments capable of producing cloudy swelling in this organ. The results of such an investigation are described in this paper.

Several types of damaging treatments were used: (1) Intraperitoneal injection in the rat of the toxin of *Salmonella typhi murium* (0·5 ml of a 24 h culture in broth, killed by heating at 70°C for 1 h). The animals were killed 24 h after the injection. This type of treatment has been found able to produce a typical cloudy swelling in rat kidney[4,5]. ATP concentration of the organs of treated animals is decreased[6]. (2) Intraperitoneal injection of the α-toxin of *Staphylococcus pyogenes aureus* (10 hemolytic combination dosis; the toxin was kindly supplied by the Istituto Sieroterapico Vaccinogeno Toscano, Siena). This toxin produces a diffused cloudy swelling in rat kidneys, as well as a strong decrease of P/O ratio[7]. The histological changes are still present 24 h after the injection, but maximum alterations were found 96 and 120 h after the injection. (3) Intraperitoneal injection of DNP (3 mg/100 g body weight). The rats were killed 24 h after the injection. This treatment was found to produce cloudy swelling in several rat organs[8,9], as well as decrease of P/O ratio[8]. (4) Intraperitoneal injection of thyroxine (Hoffmann-La Roche, 1 mg/100 g body weight, for 2 days). The rats were killed 24 h after the last injection. Thyroxine produces decrease of P/O ratio in liver mitochondria[10–12] as well as cloudy swelling[13].

Albino rats weighing 250–300 g were used. They were killed by bleeding. Their right kidney was immediately taken out and weighed. A small fragment was used for nitrogen determination (method of Kjeldhal). Another fragment was used for the preparation of histological specimens. The remaining portion of kidney cortex was used to prepare hand cut slices for the study of PAH accumulation. This was made by the method described by CROSS and TAGGART[1], using Warburg manometers at 25°C, with 90–100 mg of slices (wet weight) and 0·001 *M* sodium *p*-aminohippurate (S.I.M.E.S., Milano). Oxygen was the gaseous phase. When added, sodium acetate had the final concentration 0·01 *M*. Oxygen uptake was recorded for 1 h. After this time, the flasks were removed and immediately transferred to the cold room at 2°C. The slices were collected on a metal nest filter and then homogenized with a gum pestle. PAH concentration in both slices and suspension fluid was determined according to the procedure of CROSS and TAGGART[1]. Readings of the optical density were made at 450 mμ in a Beckman Mod. DU spectrophotometer. The following data were calculated in each experiment: (1) QO_2: this was obtained by dividing the microliters of O_2 consumed in 1 h by the mg (wet weight) of the used amount of tissue. (2) the S/M ratio between the micromoles of PAH found within the slices (S) per g and those remaining in the suspension medium (M) per ml. (3) the quotient between this value and QO_2 (S/M: QO_2). This is indicated in the Table as Q. The standard deviation was calculated for each average. The significance of the differences between two averages was estimated by calculating the '*t*' value of Fisher. The Table reports the results. It is clear from the Table that QO_2 is significantly increased after all types of treatments. The increase was, however, particularly high after the injection of thyroxine. The significance of the results is less when the values are referred to the nitrogen content, but remain particularly high for the rats treated with thyroxine or with DNP. In fact, in last cases, nitro-

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Respiration and PAH accumulation within kidney slices of animals with cloudy swelling

Type of treatment	None	*S. typhi murium* toxin	*Staphylococcus* toxin (24 h)	*Staphylococcus* toxin (96 h)	*Staphylococcus* toxin (120 h)	DNP	Thyroxine
No. of experiments	18	7	9	4	4	6	7
Nitrogen (mg/g) . .	27·1 ± 1·20	28·6 ± 0·50	28·2 ± 1·00	31·3 ± 1·40	28·4 ± 0·80	27·3 ± 0·20	27·7 ± 0·80
QO_2	1·06 ± 0·11	1·33 ± 0·07	1·34 ± 0·14	1·34 ± 0·04	1·23 ± 0·10	1·37 ± 0·08	1·51 ± 0·11
QO_2 acetate	1·41 ± 0·11	1·63 ± 0·22	1·64 ± 0·14	1·49 ± 0·16	1·62 ± 0·10	1·62 ± 0·18	1·68 ± 0·30
Stimulation % by acetate	33·0 ± 12·0	22·5 ± 17.7	22·3 ± 7·70	11·2 ± 9·30	31·7 ± 1·50	18·2 ± 7·6	11·2 ± 13.0
S/M	5·40 ± 0·63	4·67 ± 1·03	4·79 ± 1.10	4·23 ± 0·75	3·66 ± 1·0	3·33 ± 0·45	3·59 ± 1·09
S/M acetate	6·70 ± 0·80	4·82 ± 0·99	5·43 ± 1·24	5·04 ± 0·76	4·37 ± 1·11	3·24 ± 0·46	4·24 ± 1·35
Stimulation % by acetate	24·0 ± 9·4	3·20 ± 3·00	13·3 ± 11·4	19·1 ± 6·00	19·4 ± 4·60	–2·7 ± 0·50	18·1 ± 12·1
Q	5·21 ± 0·69	3·53 ± 0·88	3·61 ± 0·85	3·13 ± 0·55	3·55 ± 0·12	2·41 ± 0·20	2·40 ± 0·72
Q acetate	4·86 ± 0·80	3·05 ± 0·98	3·52 ± 0·75	3·99 ± 0·40	3·79 ± 0·15	1·98 ± 0·16	2·64 ± 1·07

gen was not significantly increased, while it increased remarkably in all other cases studied. Acetate stimulated in all cases the O_2 uptake. Percent stimulation by acetate was not significantly modified in rats treated with the toxins of *S. typhi murium* or of *S. pyogenes aureus* (after 24 and after 120 h), but was consistently decreased in those treated either with DNP or with thyroxine, or also injected with the Staphylococcus toxin 96 h before.

The S/M ratio, either in the absence or in the presence of acetate, was not significantly decreased in rats treated with *S. typhi murium* toxin and also in those injected 24 h before with the *Staphylococcus* toxin. It was, however, strongly decreased after all other types of treatments used. Stimulation of the accumulation of PAH produced by acetate was consistently decreased in rats treated with the toxin of *S. typhi murium* and in those injected with *Staphylococcus* toxin 24 h before; it was abolished in those treated with DNP, but remained practically unmodified in the other cases.

The values of the quotient S/M: QO_2(Q) were strongly decreased in all groups of rats, either in the presence or in the absence of acetate. The extent of the decrease was particularly high in rats treated with DNP and in those injected with thyroxine.

The histological feature of the kidney of all groups studied was that of cloudy swelling. The rats treated with the *Staphylococcus* toxin sometimes also showed glomerular damage. This consisted of hypernucleosis, dilatation of the glomerular capillaries, and oedema. These alterations were particularly severe in the animals treated 96 h before with the toxin, but were generally decreased 120 h after the injection. Small foci of tubular necrosis were sometimes seen.

These results show that treatments which produce a decrease in the efficiency of oxidative phosphorylation, as well as cloudy swelling in the kidney, produce also a decrease of PAH accumulation within the kidney cortex slices.

The fact that the Q ratios are strongly decreased in all treated groups shows that the increase of the oxidative rate is without effect with respect to PAH accumulation. These facts agree with the hypothesis that the accumulation of PAH within the kidney slices probably depends upon the functioning of oxidative phosphorylation.

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Institute of General Pathology of the University of Genoa (Italy), November 26, 1958.

Riassunto

L'incorporazione dell'acido *p*-aminoippurico nelle sezioni di rene di ratto è diminuita nel rigonfiamento torbido provocato dal trattamento parenterale con tossina stafilococcioa, con dinitrofenolo o con tiroxina. Tutti questi trattamenti provocano anche dissociazione delle fosforilazioni dalle ossidazioni.

Nebennierenfunktion und Veränderungen der Leber nach Röntgenbestrahlung

Nach Ganzbestrahlung diverser Säugetiere wurden Störungen verschiedener Leberfunktionen, Leberschädigung in Form der fettigen Degeneration und Gewichtszunahme des gesamten Leberfettes beobachtet[1–3]. Nach Ellinger[1], Betz[2] und Bacq[4] werden diese Veränderungen durch die Dysfunktion des Hypophyse-Nebennieren-Systems bewirkt, als Folge der Belastung des Organismus durch Röntgenstrahlen. Adrenalektomie[2] wie auch Verabreichung von Desoxycorticosteron[1] wirken hemmend auf diese Erscheinungen. Die vorliegende Arbeit beschäftigt sich eingehender mit diesem Problem.

In unseren Versuchen wurden weisse Mäuse beiderlei Geschlechts aus dem H-Stamm verwendet. Sie wurden mit Larsen-Diät und Trinkwasser *ad libitum* gefüttert; in

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