Transfer of elemental and ionic mercury from mother to foetus

Group	Form of Hg	Body burden (μg Hg)	No. of mothers	Total Hg in maternal blood (ng)	Mercury in Placental-foetal units No. of units	Total Hg (ng)	Placental-foetal mercury in foetus (%)
A	Hg	1.9	4	28 ± 3.5	36	9.0 ± 0.4	47
B	Hg^{++}	1.9	4	730 ± 10.3	37	10.6 ± 0.6	1.0

the radioactive mercury vapour for $2^1/_2$ min and then sacrificed by decapitation (group A). The body burden of inhaled vapour was determined by whole body counting. Another group of animals (group B) was given labelled mercuric chloride by i.v. injection in a dose equivalent with the body burden of rats belonging to group A. They were killed $2^1/_2$ min after injection. Radioactivity was measured in the combined placental-foetal unit and in the separated foetuses and in 1 ml samples of maternal blood.

Data in Table demonstrate that the amount of mercury in blood was over 25 times greater in animals injected with ionic mercury than in vapour exposed rats. This difference is probably due to the fact that metallic mercury rapidly diffuses from blood to tissues as reported previously. Despite this difference in blood levels the total amount of mercury taken up by the placental-foetal unit was approximately the same. However, in animals exposed to the radioactive vapour nearly half of the mercury taken up by the placental-foetal unit was found in the foetus compared with 1% in the group injected with inorganic Hg.

These results indicate a potential for damage to the foetus in situations of exposure to mercury vapour. Exposure of women to mercury vapour occurs in certain occupations such as in the preparation of thermometers and calibration of pipettes[3]. Our results therefore suggest a need for teratological studies in relation to exposure to mercury vapour.

Zusammenfassung. Der Quecksilbergehalt im Mutterblut von Ratten war nach Injektionen von Quecksilbersalz 25 mal höher als derjenige von mit radioaktivem Quecksilberdampf behandelten Muttertieren. Auf den Foetus ging hingegen 47 mal mehr Quecksilber über, wenn das Muttertier Quecksilberdämpfen ausgesetzt wurde.

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Metabolic Requirements for the Uptake and Retention of H^3Norepinephrine (H^3NE) by Isolated Frog Ventricle

The incorporation of NE into granules in the nerve terminals in situ is an active process requiring energy[1,2]. In isolated left atrium of the guinea-pig, the energy utilized for NE uptake in the nerve endings can procede from glycolysis of exogenous glucose or oxidation of non-carbohydrate endogenous substrates[3]. However, in isolated frog ventricle under anoxia, exogenous glucose cannot serve as an adequate source of this energy[4]. In the present paper the metabolic requirements for the uptake and retention of H^3NE by isolated frog ventricle are studied.

Methods. Ventricles of frog (*Rana pipiens*) were prepared and mounted as previously described by FURCHGOTT et al.[5]. Ventricles were suspended in an organ bath containing 20 ml of regular Ringer solution of the following composition (expressed in m*M*): NaCl, 103,4; KCl, 1,013; $CaCl_2$, 0.9009; CO_3HNa, 1.851. In the experiments with glucose, Ringer solution contained 10 m*M* of glucose. The solution also contained 10^{-5}g/ml ethylene diaminetetraacetic acid (EDTA). A mixture of 95% O_2 and 5% CO_2 was bubbled through the bathing solution, or 95% N_2

Table I. Effect of iodoacetate (IAA) on uptake and retention of H^3NE by isolated frog ventricle under aerobic conditions

N[a]	Glucose	Treatment	H^3NE present during incubation	H^3NE in tissue 45 min after washout in dpm/g[b]
6	Present	—	5 ng/ml (5 min)	174.966 ± 26.758
	Present	IAA (10^{-4}) (20 min)	5 ng/ml (5 min)	148.786 ± 24.655

[a] Number of experiments (paired). [b] Mean ± S.E.M. See text for further details.

Table II. Effect of the combination of iodoacetate (IAA) and glucose deprivation on uptake and retention of H^3NE by isolated frog ventricle under aerobic conditions

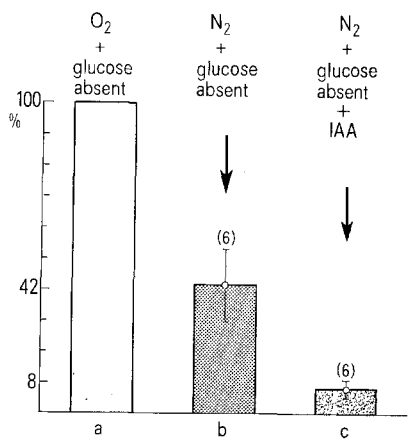
N[a]	Glucose	Treatment	H^3NE present during incubation	H^3NE in tissue 45 min after washout in dpm/g[b]
6	Absent	—	5 ng/ml (5 min)	116.363 ± 22.000
	Absent	IAA (10^{-4}) (20 min)	5 ng/ml (5 min)	129.460 ± 24.249

[a] Number of experiments (paired). [b] Mean ± S.E.M. See text for further details.

and 5% CO_2 for experiments under anoxia. All preparations were electrically driven at a frequency of 30 beats min. Ventricles were attached to force-displacement transducer (Grass model FT 03), and mechanical activity was recorded by means of a Grass polygraph. Under their respective conditions, halves were then incubated with 5ng/ml of D,L-H^3NE for 5 min, and then thoroughly washed. 4 additional washes were given over the subsequent 40 min period, at the end of which the halves were removed for analysis of radioactivity. All preparations were performed at room temperature.

The catecholamines extraction was performed according to the method of ANTON and SAYRE[6] and radioactivity was counted in a Nuclear Chicago Liquid Scintillation Spectrometer model 725. All samples were corrected for quenching with an automatic external reference standard. Under our working conditions, the radioactivity present in the alumina eluates cannot be ascribed to metabolites of H^3NE but to H^3NE itself[3]. H^3NE is expressed in terms of dpm/g of tissue. When we refer to H^3NE uptake, we mean H^3NE uptake and retention by isolated frog ventricle.

The drugs used were, D,L-norepinephrine-7-H^3 hydrochloride, specific activity, 16,7 C/mmol (New England Nuclear Corp). and sodium iodoacetate (IAA) (Kock Light Laboratories Ltd).



Comparison of the H^3NE uptake by isolated strips of frog ventricle under anoxia, anoxia + IAA (iodoacetate) and oxygenated controls. a) Controls (100% uptake) were kept in glucose-free medium and 95% O_2 and 5% CO_2 for 30 min. H^3NE (5 ng/ml) was added for 5 min and then the ventricle was washed for 40 min with glucose-free Ringer under 95% O_2 and 5% CO_2. b) Strips were incubated in a similar manner to a), but kept under a mixture of 95% N_2 and 5% CO_2. Wash solution also was under anoxia. c) All halves were kept under a combination of anoxia and glucose deprivation for 30 min. Halves were then treated with IAA (10^{-4} g/ml) for 20 min and then incubated with 5 ng/ml of H^3NE for 5 min. Wash solution also was under anoxia and glucose deprivation. The results (means ± S.E.M.) are expressed as per cent of controls for the numbers of experiments given in parentheses. See text for details.

Results and discussion. In 6 paired experiments, both halves were kept under standard conditions (O_2 and Ringer containing glucose). After a 30 min period, the experimental half was treated with IAA (10^{-4}g/ml) for 20 min (the other half served as a control), and then both were incubated with 5 ng/ml of H^3NE for 5 min. The Table I shows that there is not a statistically significant difference ($P > 0.05$) between the H^3NE uptake in preparations treated with IAA and controls. This finding provided presumptive evidence that energy necessary for the H^3NE uptake process can be produced by endogenous substrates oxidation and it is not compulsory the carbohydrate metabolism. Strong additional evidence for this conclusion was obtained in 6 paired experiments performed like the preceding series but suspended in regular Ringer in which IAA did not interfere with the H^3NE uptake (Table II). These results are similar to those previously obtained by us[4] in which exogenous glucose did not restore the ability of isolated frog ventricle, subjected to anoxia, for H^3NE uptake.

On the other hand, in preparations under anaerobic conditions and glucose deprivation, the H^3NE uptake decreased by about 58% with respect to oxygenated controls (Figure). Our results did not agree with those obtained by WAKADE and FURCHGOTT[3] in isolated left atrium of the guinea-pig, subjected to anoxia and glucose deprivation, in which the H^3NE uptake decreased by about 90%. These authors suggest that the energy necessary for the uptake could be provided by the glycolysis of exogenous glucose or by the oxidation of endogenous sustrates noncarbohydrates since the levels of endogenous carbohydrates likely could be quickly depleted.

The residual uptake of H^3NE (42%) in our experiments could be due either to a passive transport of the labeled amine across the neuronal membrane or to a great amount of endogenous carbohydrates in the isolated ventricle of frog, which could produce the energy necessary for this residual uptake.

The same Figure shows that a combination of anoxia, glucose deprivation and IAA, reduced the uptake of H^3NE by approximately 91%. This finding excluded the first possibility and provided presumptive evidence that in our experimental conditions the endogenous carbo-

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hydrates can be a source of some energy for the H^3NE uptake by isolated frog ventricle.

Resumen. El tratamiento con iodoacetato (IAA), no modifica la incorporación y retencion de H^3Norepinefrina (H^3NE) al ventriculo aislado de *Rana* oxigenado y suspendido en ringer con o sin glucosa. Bajo atmosfera de Nitrógeno y ausencia de glucosa, la incorporacion de H^3NE es bloqueada en un 58%; en estas condiciones el IAA produce un ulterior bloqueo del 33%.

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Pressor Response to Oxotremorine in Atropinized Rats

Oxotremorine, the active metabolite of tremorine, is known to produce parkinson like effects in experimental animals and has been widely recommended for evaluating potential antiparkinson drugs[1,2]. Oxotremorine has been typically classified as a muscarinic agent and reported to be devoid of nicotinic property[2,3]. Muscarinic potency of oxotremorine is comparable to acetylcholine[3]. Nicotine like effect of oxotremorine at neuromuscular junction manifested by muscular twitchings and subsequent paralysis has been reported recently[4]. We have now examined whether oxotremorine exhibits nicotinic effect on blood pressure in anesthetized and atropinized rats.

Methods. Albino rats of either sex (150 to 230 g) were anesthetized with urethane (1.4 g/kg, s.c.). Polythene tracheal, left carotid and left femoral cannulae were inserted: 100 U of heparin were then administered i.v. to each rat and these were artificially ventilated. In one set of experiment rats were pithed by inserting a suitable pithing needle through one orbit down the spinal cord. In another set of experiment bilateral adrenelactomy was performed through the abdominal route.

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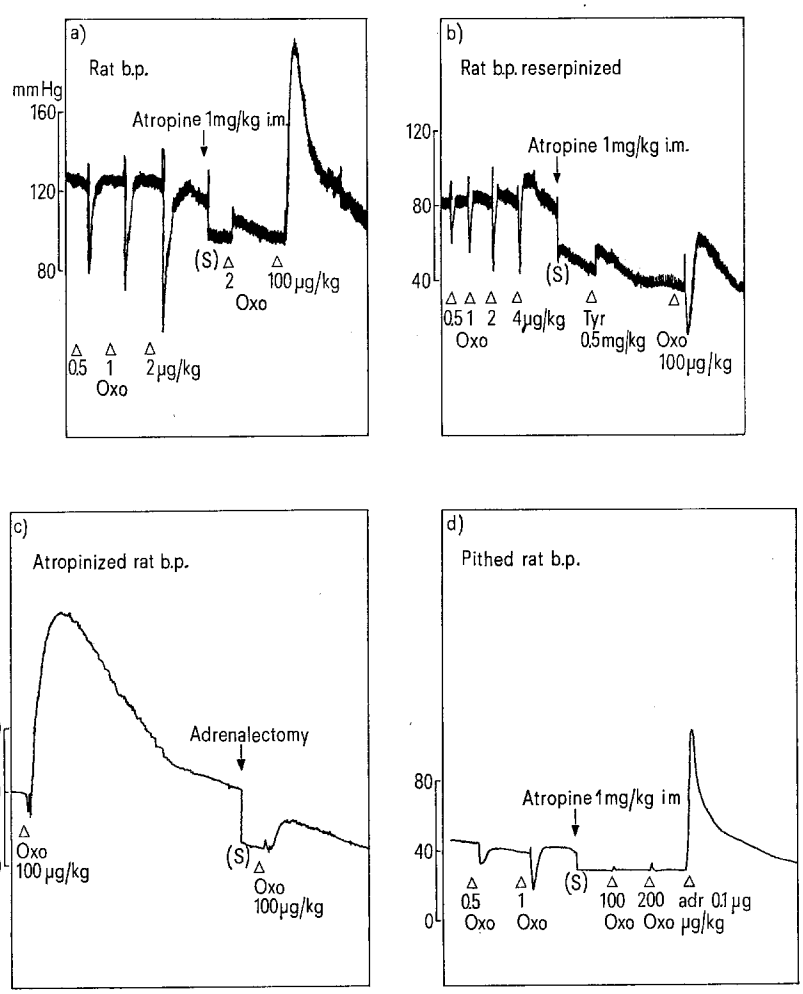

Effect of oxotremorine sesquifumarate (Oxo) on rat blood pressure. Tyr, tyramine sulfate; S, stopage of kymograph for 45 min.