

the carrier for the first of the above transport pathways of glucose. The possible role of C₃-OH for the interaction of the above sugars with the respective carriers has now been investigated using 3-deoxy-D-glucose and D-allose (with an inverted position of -OH on C₃) as potential inhibitors.

Teased renal tubules of the winter flounder (*Pseudopleuronectes americanus*) were employed as described in previous studies. The tubules were incubated at 15°C in the presence of 0.1 and 0.5 mM methyl- α -D-glucopyranoside, D-glucose, 2-deoxy-D-glucose and D-mannose and their cellular uptake was measured. As compared with these controls, 5 mM 3-deoxy-D-glucose or D-allose had no inhibitory effect. This result thus establishes a mandatory role of C₃-OH in the D-gluco-configuration for an interaction with both carriers of D-glucose transport.

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1974 #21

INDUCTION OF THE POLYAMINE BIOSYNTHETIC ENZYMES BY METHYLMERCURY

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The toxicity and long retention time of methylmercury is well known. Not as well known is the fact that methylmercury also induces hepatic protein synthesis, accompanied by increases in ribosomes, ribosomal subunits, and polyribosomes within eight days of treatment in rats (Biochem. Biophys. Res. Commun. 44: 1552-1558, 1971). The polyamines, putrescine, spermidine, and spermine may play a role in this hypertrophy process by regulating RNA metabolism. Ornithine decarboxylase (ODC), the enzyme catalyzing the

formation of putrescine, increases markedly prior to growth and proliferation in a variety of tissues (Ann. N.Y. Acad. Sci. 171: 772-782, 1970). This increase in activity parallels marked changes in RNA polymerase I activity and precedes new RNA accumulation (Biochem. Biophys. Acta 240: 273-286, 1971).

S-adenosyl-L-methionine decarboxylase (SAMD) is the enzyme that catalyzes the decarboxylation of S-adenosyl-L-methionine and regulates the ultimate synthesis of spermidine and spermine. The levels of both putrescine- and spermidine-stimulated SAMD increase during the process of hypertrophy.

Winter flounders (*Pseudopleuronectes americanus*) were injected with methylmercury (2.0 mg/kg) via the caudal vessel. At intervals the fish were sacrificed and the livers and kidneys assayed for enzyme activity. ODC activity was determined by measuring the release of $^{14}\text{CO}_2$ from DL-1- ^{14}C ornithine as previously described (Proc. Nat. Acad. Sci. U.S. 60: 1420-1427, 1968). Both putrescine- and spermidine-stimulated SAMD activities were determined by measuring the release of $^{14}\text{CO}_2$ from S-adenosyl-L-[carboxyl- ^{14}C] methionine (Cancer Res. 32: 2459-2462, 1972).

Two hours after the administration of methylmercury, ODC activity in the kidney fell to one-half basal levels and remained depressed until four hours. Enzyme activity then increased rapidly until it was five-fold basal levels at 16 hours. The patterns of both putrescine- and spermidine-stimulated SAMD activities were very similar to that of ODC: a rapid drop in activity after treatment with methylmercury followed by a steep rise and gradual decline. Putrescine-stimulated SAMD activity was maximal at 16 hours; spermidine-stimulated SAMD activity was maximal at 24 hours.

In the liver, ODC activity increased two-fold immediately after treatment. This increase was followed by a drop in activity to one-half basal levels. At 48 hours, ODC activity had increased to seven-fold basal values

and remained at this level until 72 hours. Putrescine- and spermidine-stimulated SAMD activities were depressed two hours after treatment and remained depressed until 16 hours, when they returned to basal levels.

The liver and kidney enzyme patterns seem to correlate with differences in the accumulation patterns of the methylmercury in these organs. The initial inhibition of ODC and SAMD activities would seem to be a direct reflection of the cellular damage that occurs after methylmercury administration. The temporal increases in ODC and SAMD activities are consistent with the reported temporal increase in RNA. In both liver and kidney ODC and SAMD are maximal before there is any change reported in RNA concentration. Also the increase in the number of small ribosomal subunits (Expt. Mol. Pathol. 18: 263-280, 1973) after mercury poisoning supports the hypothesis that the polyamines are intimately involved in the synthesis of ribosomes.

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1974 #22

FAILURE OF DDT TO INHIBIT CARBONIC ANHYDRASE IN VITRO IN SHELL GLAND OF THE DUCK, *Anas platyrhynchos*

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There continues to be speculation (Peakall, D.B., Chem.-Biol. Interactions, in press, 1974) that DDT causes thinning of eggshells by inhibition of carbonic anhydrase. Classical carbonic anhydrase inhibitors, such as sulfanilamide and acetazolamide, do cause egg-shell thinning in all species in which they have been tested and the mechanism is quite clear. These