Inhibition of DNA-Synthesis by Deoxyadenosine

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The effect of some purine derivatives on the incorporation of ^{14}C-formate into DNA (deoxyribonucleic acid) and of ^{32}P-orthophosphate into DNA and RNA (ribonucleic acid) of ascites tumor cells *in vitro* has been investigated.

When Ehrlich's ascites tumor cells were incubated *in vitro* with ^{14}C-formate it was found that adenine, adenosine and deoxyinosine had some stimulatory effect or no effect on the incorporation of ^{14}C into DNA-thymine (measured a specific activity) when these compounds were added in concentrations of 2.3—3.9 μmoles per ml cell suspension. In the presence of added deoxyadenosine, however, the specific activity of DNA-thymine was only 6—15 % of that of the control. This effect was found both in the presence and in the absence of added deoxycytidine or deoxycytidylic acid. The total radioactivity of the pooled acid-soluble thymine compounds from cells incubated in the presence of ^{14}C-formate and deoxyadenosine for about 3 h, was about twice as high as that of the control experiment without added deoxyadenosine. The specific radioactivity of these thymine compounds were, however, about the same in the two cases. It is likely, therefore, that deoxyadenosine inhibits the biosynthesis of DNA and that this inhibition is not due to a block of the biosynthesis of the thymine part of DNA.

Experiments with ^{32}P-orthophosphate have shown a similar inhibitory effect by deoxyadenosine on the incorporation of ^{32}P into DNA. Fifty per cent inhibition was obtained with about 1 μmole of deoxyadenosine per ml cell suspension. Incorporation of ^{32}P into RNA was slightly increased under these conditions.

Experiments with suspensions of Yoshida's ascites tumor cells showed that addition of deoxyadenosine in concentrations of 3.5—3.9 μmoles per ml cell suspension had only a modest inhibitory effect in incorporation of ^{14}C-formate into DNA-thymine, while deoxyinosine showed a consistent stimulation of this incorporation, suggesting that the rate of DNA-synthesis is increased by about 50 %.

Table 1. Rate of incorporation of ^{32}P-orthophosphate into RNA and DNA of Ehrlich's ascites tumor cells.

Each vessel contained 0.4 g packed cells, suspended in 1.2 ml Tyrode's solution, deoxycytidine 5 μmoles, $H_2^{32}PO_4^-$ 12 μC, glucose 55 μmoles, and sodium succinate 37 μmoles. To the experimental vessels were further added 5 μmoles of adenine compounds as indicated; final volume 2.25 ml. Incubated at 37°C with shaking. The figures are averages of two experiments.

Additions	Rate of incorporation in per cent of the control	
	RNA	DNA
Adenine	99	105
Adenosine	105	122
Deoxyadenosine	94	14

Mass Spectrometric Studies on Esters of Rosin Acids

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A mass spectrometric study has been performed on the methyl esters of the following rosin acids: *d*-pimaric, levopimaric, *iso*-*d*-pimaric, podocarpic, palustric, abietic, neoabietic, dihydroabietic, tetrahydroabietic and dehydroabietic (nomenclature of Simonsen and Barton [1], as well as on the related hydrocarbons fichtelite and retene.

All the methyl esters give excellent mass spectra showing a very strong peak due to the ionized unfragmented molecule. All the spectra differ markedly from each other and a rosin acid may be readily identified by the mass spectrum of its methyl ester. Methyl tetrahydroabietate and fichtelite have several strong peaks in common, a feature to be expected as the hydrocarbon skeleton of tetrahydroabietic acid is identical with that of fichtelite.

1. Simonsen, Sir J. *The terpenes.* Vol. III, 2nd Ed., Cambridge 1952.