MALARIA AND THIAMINE

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ABSTRACT

Malarial parasites caused thiamine content to increase in infected erythrocytes and decrease in plasma of infected mice. Malarial parasites could grow in thiamine deficient medium in vitro, and in thiamine deficient mouse, in vivo. But the multiplication rate was lower than usual. After infection, organs of mice such as liver, kidney, brain, and heart had still the same content of thiamine as organs of uninfected mice. Malarial parasite infected erythrocytes could have enhanced thiamine content by two ways, one was absorption from plasma in to erythrocytes and the other was biosynthesis.

One effective method to see whether there was thiamine biosynthesis, was to determine the ratio of radioactive thiamine to total thiamine in various fractions such as medium used to incubate both normal and infected erythrocytes, host cell lysate and malarial parasites cultured in vitro. The same ratios came out in all fractions except in malarial parasites, in which the ratio of radioactive thiamine and total thiamine was the lowest. The same result was obtained, although parasites were cultured in thiamine deficient medium, in vitro. All these suggest that the malarial parasite synthesize its own thiamine. Free thiamine was purified by Decalso column and the ratio of radioactive thiamine to total thiamine was determined, the results were the same as those obtained without the Decalso column. To make sure that it was thiamine that came out of column, the excitation, emission spectra, and UV spectra
was recorded of the thiochrome in isobutanol. It was found that the \( \lambda_{\text{max}} \) of UV spectra was exactly the same as the \( \lambda_{\text{max}} \) of excitation spectra at 365 nm. and emission spectra at \( \lambda_{\text{max}} \) 430 nm. These spectra were exactly the same as the reference standard.

Thiamine transportation was studied and it was found that the uptake of thiamine into infected erythrocytes was more than normal erythrocytes and no effect of thiamine antagonists, to the transport.

Most of thiamine found in the parasite was thiamine pyrophosphate (TPP). Thiamine pyrophosphokinase is the enzyme that catalyses the synthesis of TPP, a coenzyme. The specific activity of thiamine pyrophosphokinase in infected erythrocytes was more than normal erythrocytes and its activity was also detected in malarial parasites.