SHORT COMMUNICATION

PLASMA FREE AMINO ACID PROFILES OF CATTLE INFECTED WITH *TRYPANOSOMA VIVAX*: A PRELIMINARY REPORT

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EMACIATION and poor productivity have been recognised as some of the major features of the chronic form of bovine trypanosomiasis. However, the biochemical and nutritional bases of the wasting and reduced growth rates of cattle with trypanosomiasis are yet to be adequately elucidated; such data may be needed, not only for the clinical management of the disease but also in the proper husbandry practice of cattle in endemic areas of trypanosomiasis for animal protein production.

Data on the plasma amino acid changes in cattle under the stress of trypanosomiasis has not been previously reported. It is the purpose of this brief communication to study the amino acid profile of normal and *T. vivax* — infected cattle.

Four male adult cattle (bulls) 2½ years of age, were brought in screened railway coaches to the University of Ibadan from Mangu near Jos — a tsetse-fly free area in Plateau State of Nigeria. The cattle were kept in fly proof housing for 3 months to acclimatize them to the local environmental conditions before the experiment. The feeding of the cattle consisted of a grass/legume fodder, a concentrate mix and a mineral salt lick with water supplied *ad libitum*. Blood samples for analyses were taken regularly at 10.00 a.m. everyday. Preinfection blood samples were taken in heparinized tubes from the cattle for the analysis of packed cell volume.

Two of the cattle were each inoculated with 55.25 x 10^6 *Trypanosoma vivax* (wild strain Bodija 4) intraperitioneally. The parasitaemia of the infected cattle was checked daily. Ten millitres of blood were obtained from each of the infected cattle (60 days post-inoculation) and also from each of the non-infected control cattle; the animals were fasted 16 hours before blood samples were collected from them. The blood was spun in a refrigerated centrifuge and the plasma was deproteinized with sulphosallcylic acid. The plasma amino acids were determined using an automatic amino acid analyser (Locarte Co. Ltd.).

The parasitaemia was fluatuating and, in most of the period of observation, low grade. The highest parasitaemia recorded was 21.5 x 10^6 trypanosomes per ml. The packed cell volumes of blood from the cattle before infection was 39%; the value at 60 days post-inoculation was 14%. The plasma amino acid profiles of *Trypanosoma vivas* — infected and non-infected control cattle are illustrated in Figure 1. In general, cattle under the stress of trypanosomiasis, show marked distortion (imbalance) of plasma amino acids. There was a net decrease of amino nitrogen in the plasma of *T. vivax* infected cattle when compared to that in the non-infected control cattle.

A two-fold increase of the value of urea was noticeable in the plasma of the infected cattle as compared to the non-infected control. Taurine, valine, isoleu-

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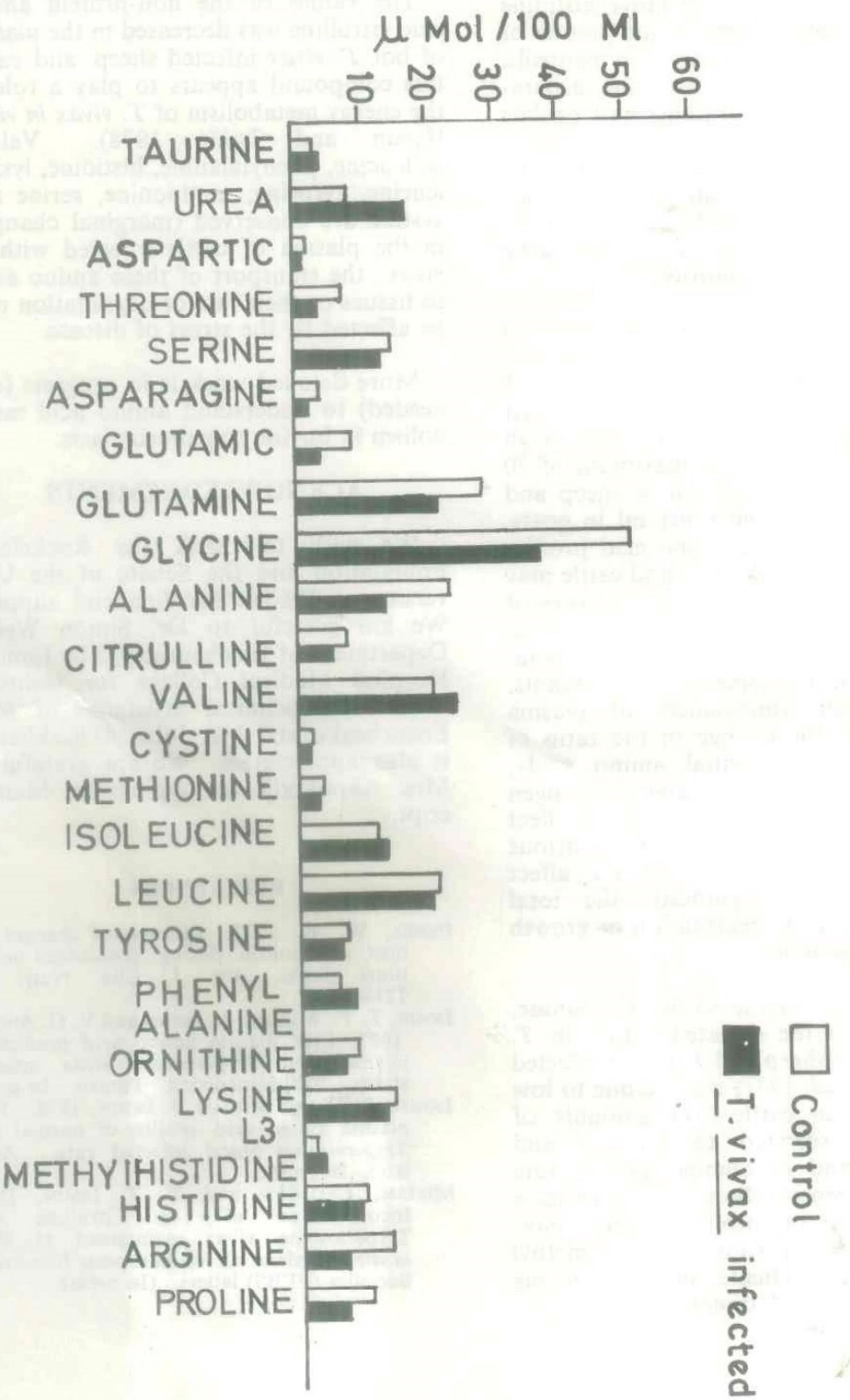

cine, phenylalanine, L-3-methyl histidine were marginally elevated in the plasma of infected cattle as compared to controls. A two-fold decrease of threonine, asparagine, glutamic acid, arginine and proline was present in the plasma of infected cattle. Marginal decreases of aspartic acid, citrulline, cystine, methionine, tyrosine, ornithine and histidine were observed in the plasma of infected cattle as compared to the controls.

Chronic trypanosomiasis in cattle is marked by a low grade fluctuating parasitaemia wih a maximum of 21.5×10^6 trypanosomes per ml; this is in contrast to the parasitaemia which, although fluctuating, may reach a maximum of 70×10^6 trypanosomes per ml in sheep and 200×10^6 trypanosomes per ml in goats. The difference in the amino acid profiles of sheep (Isoun *et al,* 1977) and cattle may be due to the variation in the intensity of the parasitaemia between sheep and cattle as well as differences in the host metabolism in the two species of ruminants. The distortion (imbalance) of plasma amino acids; the change in the ratio of essential to non-essential amino acids; and the net decrease in amino nitrogen in the *T. vivax* infected cattle could affect the transport of amino acids into various types of organs and cells and thus affect negatively protein synthesis; the total effect could lead to retardation of growth and poor production.

The decrease in the values of alanine, in contrast to the elevated values in *T. vivax* infected sheep and *T. brucei* infected rats (Isoun *et al,* 1977) may be due to low parasitaemia in cattle (low amounts of alanine are secreted to plasma) and greater demand of alanine as substrate for gluconeogenesis (Beisel, 1972) under a sustained stress of chronic trypanosomiasis. The elevated values of L-3-methyl histidine may indicate muscle wasting under the stress of disease.

The values of the non-protein amino acid citrulline was decreased in the plasma of bot *T. vivax* infected sheep and cattle this compound appears to play a role in the energy metabolism of *T. vivax in vitro.* (Isoun and Isoun 1978). Valine, isoleucine, phenylalanine, histidine, lysine, leucine, tyrosine, methionine, serine and systine are conserved (marginal changes) in the plasma of cattle infected with *T. vivax;* the transport of these amino acids to tissues or their rate of degradation may be affected by the stress of disease.

More detailed work is in progress (and needed) to understand amino acid metabolism in bovine trypanosomiasis.

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REFERENCES

BEISEL, W. R. 1972. Interrelated changes in host metabolism during generalized infectious illness. Am. J. Clin. Nutr. 25, 1254–1260.

ISOUN, T. T., MIRIAM, J., ISOUN and V. O. ANOSA, 1977. Free plasma amino acid profiles of normal and *Trypanosoma vivax* infected sheep. Tropenmedizing. Parasit. In press.

ISOUN, T. T. and MIRIAM, J. ISOUN, 1978. Free plasma amino acid profiles of normal and *Trypanosoma brucei* infected rats. Acta. trop. In press.

MIRIAM, J. ISOUN and T. T. ISOUN, 1978. Incorporation of 14C Citrulline into Trypanosoma vivax maintained at 37°C *in vitro.* Federation of European Biochemical Societies (FEBS) letters. (In press).