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Serum Transaminase Activity in Lepromatous Leprosy

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The serum transaminases GOT (glutamate-oxalacetate-transaminase) and GPT (glutamate-pyruvate-transaminase), which have a determining share in intermediate metabolism, are present in the body ubiquitously and in an especially high concentration in heart muscle, liver or other parenchymatous organs and in skeletal muscle. The same is true for the serum dehydrogenase LDH (lactate-dehydrogenase) which is found ubiquitously in the body, and in maximum concentrations in parenchymatous organs. Determination of their activity, therefore, is an important diagnostic tool in various diseases, i.e., SGOT and SGPT for the assessment of liver disease, and LDH for myocardial infarction.

By determination of HBDH (hydroxybutyrate-dehydrogenase) the ratio of LDH/HBDH can be calculated in raised serum activity of LDH. The standard value amounts to 1.38-1.62([7]). Increase of the ratio points to a prevailing origin of LDH from the liver, the so-called liver-type of LDH. Other enzymes, such as lipase, leucine-aminopeptidase or cholinesterase, are of diagnostic value in pancreatic or renal diseases.

On the infectious diseases ward of the Bernhard Nocht-Institute for Maritime and Tropical Diseases we are mainly engaged on behavior of serum transaminases in infective hepatitis, because most of the patients treated on this ward are suffering from this disease. Recently, though, we have had to attend and to treat some patients with lepromatous leprosy. So it was obvious that we engaged in research on the behavior of serum transaminases in that infectious disease, too.

Studies on behavior of serum transaminases were published by Reali ([4]) in 1961, Ramnathan *et al.* ([3]) in 1963, Mitra ([2]) in 1968, and Shivde and Junnarkar ([5, 6]) in 1967 and 1969. The latter worked on the behavior of serum transaminases in leprosy with proved histologic changes in the liver, and later on lepromatous changes of skeletal muscle. In 58 patients with leprosy, 43 of them suffering from lepromatous leprosy, liver biopsies were taken. In 12 cases with normal tissue on liver biopsy a raised activity of serum transaminases could not be observed. The remaining 46 patients showed changes in the liver, such as signs of local inflammation, cirrhotic changes or miliary lepromas. Of these 46 patients 24 showed a raised activity of serum transaminases, and all 24 were suffering from lepromatous leprosy. In all these cases the so-called liver function tests were without pathologic findings. From examinations of cases showing raised serum transaminase activity in lepromatous damage of skeletal muscles Shivde and Junnarkar concluded that the rise in most of these cases was predominantly due to liver damage and only to less extent to changes in the skeletal muscle itself. It may be that determination of creatininkinase is a more sensitive diagnostic test. The results of their examinations were that the rise of GPT, especially in lepromatous leprosy, indicates a toxic effect on the liver cells, thus being a sensitive indicator of a liver damage.

In contrast with the above, Mitra's opinion is that the determination of serum transaminase activity is of no major significance, because the changes may be unimportant and doubtful. He observed a raised GOT-activity in phases of reaction which remained raised after subsidence of reaction. The activity of GPT has been raised only temporarily and slightly.

Since February 1969 we have had the opportunity to follow up four patients with lepromatous leprosy, one of them over a period of 15 months. The remaining three patients we treated over a period of five months, two months and the latter over a period of 40 days.

Our studies relate mainly to the first patient, a Libyan, who had been on our

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ward for 15 months. He was suffering from heavy lepromatous leprosy with many open and dirty skin sores, with involvement of the hand bones and proven miliary lepromas of the liver. Numerous acid-fast bacilli could be found in all preparations, most of all in sternal marrow. An extremely high erythrocyte sedimentation rate, a marked shift to the left in white differential blood count and a raised activity of serum transaminases GOT (79 mU/ml.) and GPT (65 mU/ml.) were the most striking laboratory findings. The total protein serum level, with 9.73 gms. per cent, and the globulins, with 72 per cent, were markedly increased. The gammaglobulin fraction took the main portion, with 39 per cent. The albumin-globulin-ratio was inversed. The value of the thymol turbidity test was only slightly increased (6.6 MLE), the Weltmann's band shortened, and the alkaline phosphatase, with 26 KAE, increased. The LDH-activity was within normal range. The relation of serum transaminases in miliary granulomas of the liver corresponded with the relation in miliary tuberculosis.

After 14 days of treatment with Rifampicin and Myambutol—the treatment had to be discontinued because of therapeutic side effects—reexamination revealed normal transaminase activities, as did follow-up studies several months later. Even in phases of reaction which could be masked with thalidomide no rise of serum transaminase activity was seen. Only once, toward the end of the patient's hospital stay, the LDH rose, predominantly the liver-type LDH. The reason for this particular finding remained unclear. A control test some days later showed again a normal activity. An attempt to get more information about specific changes of differentiation of LDH in a heart- or liver-type failed. In many determinations during the hospital treatment sometimes the "heart type," sometimes the "liver type" prevailed, without any standard elevation of total LDH.

In the second patient, a Portuguese who was living in Africa, we found in the beginning of the stationary observation (during high fever), when the diagnosis "lepromatous leprosy" was not yet confirmed, a slight rise of serum transaminases (GOT 31 mU/ml., GPT 36 mU/ml.) and of LDH (246 mU/ml.), too. The liver function tests did not show any peculiarity, except the Weltmann's band, which was extremely shortened. Serum electrophoresis showed an inversion of the albumin-globulin-ratio (albumin 40%, globulin 60%). The values of serum transaminases and LDH became normal with subsidence of fever. For the entire duration of his hospital stay a new rise in activity could not be observed. Perhaps the initial rise can be understood as a toxic effect upon the liver during the initial stage of the disease. Unfortunately, a liver biopsy could not be performed to clarify the situation.

In the last two patients, a female and a male Greek, changes in serum transaminase activity could not be observed during the whole time of hospital stay. Even the liver function tests did not show any pathologic finding. The male Greek has been on our ward only a short time, because the disease has not been marked and had been treated already in Greece. But the female Greek showed numerous lepromas on the extremities, the chest, the buttocks and the face. In the feet she was suffering from sensibility disturbances in relation to perceptivity of warmth. Sporadic acid-fast bacilli were found in a smear of the nose and in a skin test. We followed up this patient over a period of five months. In this case, also, the serum transaminase activity did not show any abnormality over the time of observation, even in phases of heavy reaction. The liver function tests showed a shortened Weltmann's band and only a very slight elevation of the thymol turbidity test. The albumin-globulin-ratio was inversed, too (albumin 47%, globulin 53%). Both patients were controlled in our outpatient department, but the serum transaminase activity never showed any changes.

Bru and Rollier (1) found that lepromas of the liver develop in the mesenchymal tissue and the periportal spaces, and that only the parenchymal tissue and the immediate surroundings of the leproma are involved in the disease process. That would mean that if lepromas were present only in the liver, transaminase activity might not be raised.

On the basis of these and our observations we believe that the rise of serum transaminase activity in lepromatous leprosy is a more sensitive indicator for beginning or already manifested damage of the liver parenchyma, but possibly normal activity does not exclude miliary lepromas of the liver. Even in the case of normal or only insignificantly altered liver function tests the determination of serum transaminase activity can give valuable information on participation of liver parenchyma in the disease process.

SUMMARY

Studies are reported of GOT and GPT activity in four cases of lepromatous leprosy observed and treated in the Clinical Department of the Bernhard Nocht-Institute for Maritime and Tropical Diseases in Hamburg. Increased activity of GOT and GPT was observed in one case. Liver biopsy in this case showed disseminated miliary lepromas. The second case showed only a slight and temporary rise of GOT and GPT. In this case liver biopsy could not be performed. In the last two cases a rise of serum transaminase activity could not be observed, even in phases of reaction. Our observations suggest that rise of serum transaminase activity in lepromatous leprosy indicates beginning or already manifested damage of liver parenchyma.

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