

## **Radioactive Rose Bengal Test of Liver Function A Preliminary Report of Liv.52 Trial**

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The liver is an organ, which defies investigation in several ways. It is hidden in the right upper quadrant of the abdomen and away from other viscera in a "secret cave". Being a large organ, it presents problems in the localisation of lesions, particularly in the depth of the lobe. Further, its several functions are not affected to the same extent in disease. It also has a large reserve capacity so that even if a considerable part of the organ is affected, the liver function tests may be normal.

One of the most difficult things to assess is the extent of hepatocellular damage. The Bromsulphathalien retention test is the most sensitive test to detect hepatocellular dysfunction. However, there are several disadvantages of this test: (i) BSP of good quality is not available, (ii) being a colorimetric procedure it cannot be done in jaundiced patients, (iii) the results are obtained only after 2 hours, (iv) excretion of BSP by the liver depends on blood flow to the liver to some extent.

In spite of these drawbacks, the BSP test has stood the test of time and is even now considered one of the most sensitive tests in non-jaundiced patients.

But there is need for a reliable, sensitive test for patients with jaundice and hepatocellular damage, because viral hepatitis is endemic in many cities of India and here BSP cannot be used in the subacute stages.

Many of its shortcomings are overcome by the recent advance in nuclear medicine—the ability to produce pictures of the radioactivity within an organ. There are different types of imaging devices (1) the moving detector device or scanner and (2) the stationary detector device or the gamma camera. In the scanner the detector NaI crystal fitted with a focusing collimator and shield, moves systematically over the area of interest line by line over a period of time and a picture of the distribution of radioactivity is built up. It is essential to have at least 2 or 3 views and even then lesions in depth may be missed unless they are very large—as in large organs like the liver, lungs and the brain. Modern versions of scanners have multiple crystals instead of one, thereby scanning time is reduced and the resolution of the image is improved. In tomographic or section scanning, principles of X-ray tomography are used to separate these images of radioactivity according to their depths. Specific levels of interest can be examined without much interference from structures at other levels.

In this study a rather similar test to BSP, using radioactive isotopes was chosen by us. Rose Bengal, which is tetra-iodo-tetrachlor fluorosein, is also excreted by the liver. The only difference between BSP and Rose Bengal is that the former is conjugated with glutathione whereas Rose Bengal is conjugated with glucuronic acid before excretion. Only a very small amount is excreted by the kidney, 5% in 72 hours.

Taplin, and others in 1955 used Rose Bengal labelled with  $I^{131}$  and found that the liver uptake curve obtained by placing a scintillation counter over the liver gives a good indication of liver function.

Nordyke and Blahd and also Burkle and others estimated the disappearance of Rose Bengal  $I^{131}$  from the blood by taking the head counts and found it useful.

Our modifications of the  $I^{131}$  Rose Bengal are based on the following criticism of the test done by earlier workers:

1. If Rose Bengal is excreted by other tissues like the kidney, mere disappearance (or retention) from blood will not give an accurate idea of liver function.
2. While taking liver counts, it is important to minimise the counts done to the isotope in the biliary tract including the gall bladder.
3. The blood pool in the liver, i.e. in the sinusoids of the liver, also gives rise to counts, which are not due to the true uptake. So we modified the test by (a) taking liver counts, (b) by taking early measurements, the last one being at 6 minutes, (c) by taking the liver count/heart count ratio at one minute and six minutes.

To test its validity, we performed the test on normal controls and on patients with hepatocellular damage, mostly infective hepatitis and cirrhosis and found very little overlap between normal and abnormal liver states.

The result of the test is given as a number i.e. the liver/heart count at 6 minutes minus the liver/heart count at 1 minute. Normal counts gave a value of  $1.55 \pm 0.22$ .

In hepatitis it is  $0.55 \pm 0.21$  and in cirrhosis  $0.42 \pm 0.19$ .

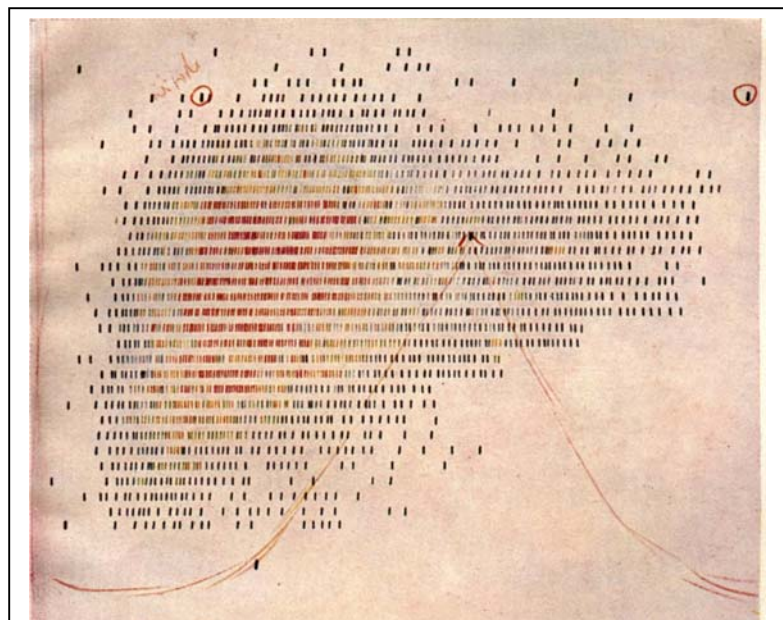
*Liv.52 Trials* – Favourable reports have been published with Liv.52. In viral hepatitis good clinical response has been obtained by Arora, etc and in cirrhosis by Mukerjee, *et al*.

So a trial is in progress in this Hospital. There was difficulty in obtaining suitable cases of viral hepatitis and so the number of the cases where Liv.52 was tried is very small. However, in some cases the results were encouraging as seen below:

### Case Report

Miss K., female, aged 35 years was referred to the liver clinic with joint pains and jaundice. She was given non-specific treatment like vitamin B-complex, fat-free diet for one month. But the jaundice persisted. She also had other clinical features like anorexia, weight loss and abdominal pain. She was given Liv.52 tablets t.i.d. for 15 days.

The jaundice cleared and liver function tests improved.  $I^{131}$  Rose Bengal liver test before Liv.52 was 0.97 and two weeks later, it was



Liver scan using Rose Bengal  $I^{131}$ . Scan taken immediately after an I.V. injection of 200 microcuries and with a Nuclear Enterprises scanner with a five-inch sodium iodide crystal. The left lobe of the liver and the lower pole of the right lobe always show lower activity because total amount of functioning liver tissue is less. The edges of the liver scan are often blurred because the liver moves freely with respiration. The colour scheme of this scanner is black, blue, violet, green, yellow and red. Black indicating low activity, and the red indicating high concentration of isotope. A 'cold' spot or improper filling suggests a hepatic lesion even though its aetiology cannot be definitely stated.

1.24.

There is an obvious reluctance on our part to stress an individual record. But this case, along with others, seems to strongly suggest that Liv.52 has a definite role in the recovery of the patient of hepatic damage. This patient when treated by conventional methods showed little response but after two weeks of Liv.52 has shown considerable recovery.

#### **REFERENCES**

1. Arora, J.K., *Aromed Forces med. J.* (1969): 3, 362.
2. Gajaraj and Munuswamy, *The Antiseptic* (1972): 8, 570.
3. Mukerjee, A.B. and Dasgupta, M. *J. Ind. med. Prof.* (1971): 12, 7853.
4. Taplin *et al.*, *J. Lab. Clin. Med.* (1955): 45, 665.
5. Nordyke and Bland, *J. Am. Med. Assoc.* (1959): 170, 1159.
6. Burkle I<sup>131</sup> Rose Bengal in liver function studies (1972): Presented in IVth Annual Conference of the S.N.M. India, Madras.