

Diagnostics in Liver Diseases

5 Laboratory diagnostics

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5 Laboratory diagnostics

1 Four epochs of laboratory liver diagnostics

First epoch

► In the 2 volumes of the classical textbook of hepatology by F. TH. FRERICH'S „Klinik der Leberkrankheiten“ (“Clinical aspects of liver diseases”; 1858, 1861), there is no mention of laboratory diagnostics. (s. figs. 1.19, 1.20) • According to our knowledge, laboratory diagnostics was first presented in 1923 by G. LEPEHNE in his book „Die Leberfunktionsprüfungen, ihre Ergebnisse und ihre Methodik“ (“Liver function tests, their results and methods”). This monograph initiated the **1st epoch of biochemical liver diagnostics**. The laboratory field was again addressed by H. EPPINGER in 1937 in his textbook „Die Leberkrankheiten“ (“Liver diseases”) consisting of 52 pages; enzyme tests, however, were not mentioned. (s. fig. 5.1)

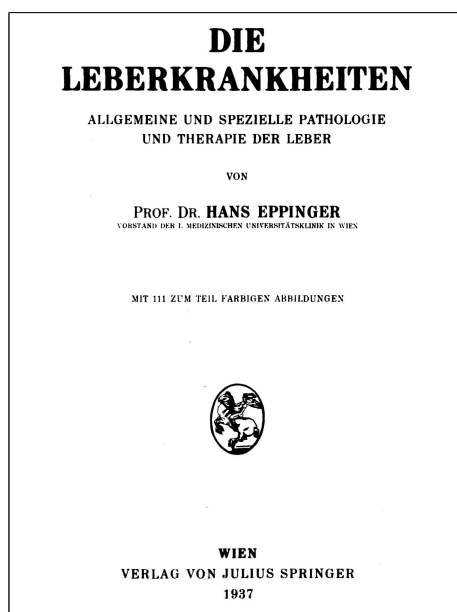


Fig. 5.1: H. EPPINGER (1879–1946): „Die Leberkrankheiten“ (“Liver diseases”), publisher J. Springer, Wien, 1937, 801 pages (*private property*) (s. fig. 1.19)

Second epoch

► The introduction of alkaline phosphatase (1933), cholinesterase (1938), aldolase (1954), transaminases (1955), γ -GT (1961) and GDH (1962) into liver diagnostics marked the onset of the **2nd epoch, the era of enzymochemistry**. • The resulting understanding with regard to the biochemistry of the liver appeared so fascinating to the hepatologists of that time that enzyme diagnostics was classified as “*biochemical biopsy*” (F. WROBLEWSKI et al., 1956). • In his monograph „Leberfunktionsproben“ (“Liver function tests”), H. SCHAEFER (1951) listed 171 liver tests, including alkaline phosphatase and cholinesterase. An up-to-date presentation of biochemical diagnostics was given by I. MAGYAR (1961) in his textbook „Erkrankungen der Leber und der Gallenwege“ (“Diseases of the liver and biliary tract”). Up to that time, ca. 200 “liver tests” were known.

Third epoch

► The discovery of the Australian antigen by B.S. BLUMBERG et al. (1965) using serological techniques can be considered as the onset of the **3rd epoch** of laboratory liver diagnostics. With the advent of modern techniques in **serology and immunology**, liver diagnostics has improved tremendously.

Fourth epoch

► The fourth epoch of liver research is based on biomolecular and microstructural methods. This **4th epoch** may some day become known as **biomolecular hepatology**. (s. p. 12!)

2 Difficulties of laboratory liver diagnostics

In order to evaluate the results of biochemical tests within a hepatological context in an adequate manner, one has to be aware of some *fundamental issues*:

(1.) Owing to the liver's large functional reserve capacity as well as to its outstanding regenerative ability, morphological damage may evade biochemical detection, i.e. the damage may remain “*biochemically silent*”.

(2.) A great number of liver tests are nonspecific, and their results are pathological in other diseases as well. It is therefore necessary to consider the specificity, sensitivity and clinical validity of the respective tests when setting up the diagnostic procedure.

(3.) In a variety of liver diseases, it often happens that only certain partial functions or cellular structures are impaired; this impairment can differ widely in intensity and extent in the individual patient. Therefore, when applying only a few biochemical tests, pathological changes may well be overlooked. For the detection of hepatocellular damage or disorders of hepatic functions, a variety of examination methods will have to be employed in order to provide a comprehensive assessment derived from the various single findings.

(4.) With increasing duration of liver or biliary tract diseases, but also with the simultaneous appearance of complications, biochemical findings become more and more ambiguous and misleading.

In order to give due consideration to these facts and reduce the uncertainties of liver diagnostics, a large number of function tests with a multitude of modifications were developed. However, the application of such “**batteries of tests**” or “**liver test arrays**” as well as “**shotgun investigations**” did not only result in unnecessary discomfort for patients and staff alike, but also in the uneconomical use of laboratory testing. Furthermore, these tests failed to improve liver diagnostics.