



[Home](#) > [Papers](#) > [Klaus-Peter Adlassnig](#)

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### Knowledge-Based Teleinterpretation of Hepatitis Serology Test Results

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#### Abstract

Background: Automated interpretation of any combination of laboratory test results of a specific medical field such as hepatitis serology - including rare and frequent, or even inconsistent, combinations - contributes to quality assurance in patient care, enhances the productivity and efficiency of medical work, and may also reduce costs in health care. A knowledge-based system for the interpretive analysis of hepatitis serology test results, named Hepaxpert, that covers any combination of hepatitis A and B serology test results was developed, tested, and routinely applied at one of the laboratories of the Vienna General Hospital [1]. Later its knowledge base was revised, extended to include hepatitis C serology, and discerned from its surrounding software. The established Hepaxpert knowledge modules [2] now comprise 64 possible combinations of test results for hepatitis A, 61440 possible combinations for hepatitis B, and 16 possible combinations for hepatitis C serology.

Objective: The general aim is to incorporate the Hepaxpert knowledge modules into a multi-lingual web-based system to allow for teleinterpretation of any hepatitis A, B, and C serology test result from any part of the world. The specific aims are twofold: first, the Hepaxpert knowledge modules will be integrated into a web server application to allow the input of test results via a web browser; second, the Hepaxpert server application should be able to process Hepaxpert queries without going through a browser interface; it should be possible to send serology test results packed into a web-standard protocol query to the Hepaxpert server and return the respective interpretive text by the same technical pathway.

**Methods:** The present Hepaxpert knowledge modules include a clearly arranged knowledge representation and an efficient inference method by structuring the knowledge domains into equivalence classes and using index calculation to access the respective interpretive text [1]. The main inference step will include pre- and post-processing. These knowledge modules offer input and output structures used to fill the given laboratory test results in coded form into the input and return the textual interpretation in the output structure.

**Results:** The web version of Hepaxpert [3] is currently available in the German and the English language. It is linked to a number of medical web sites dealing with hepatitis, laboratory medicine, and patient education. Its browser-less version is routinely used at the Franz Josef Hospital in Vienna, Austria. The laboratory information system of the laboratory department of this hospital forms a query record based on HTML, sends it via HTTP to the Hepaxpert intranet web server, gets the interpretation returned, and includes it in the laboratory result sheet sent to the referring physician after verification.

**Conclusion:** Teleinterpretation of hepatitis serology test results, either through a browser interface or in the browser-less mode through a network query, provides valuable support for the medical decision-making process and for quality assurance, especially in cases of rare and inconsistent laboratory findings.

#### References

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