

The Medical Knowledge-Base Server MedExpert/WWW

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Background

Knowledge-based decision support systems will become more and more important in health care. Based on Internet technology such systems perfectly match the requirements (which are access from every computer, ease of use, ...) to work in clinical infrastructures for the next century.

Objective

Since summer 1998 a knowledge-base server is available in the World Wide Web at URL <http://medexpert.imc.akh-wien.ac.at> (Fig. 1). Users of this server have the possibility to apply several of knowledge-based systems for decision support in medicine.

The following systems—developed at our section—are in operation at present:

- *HEPAXPERT-III/WWW*
- *ToxoNet*
- *JAWS ABC*
- *LARSEN*.

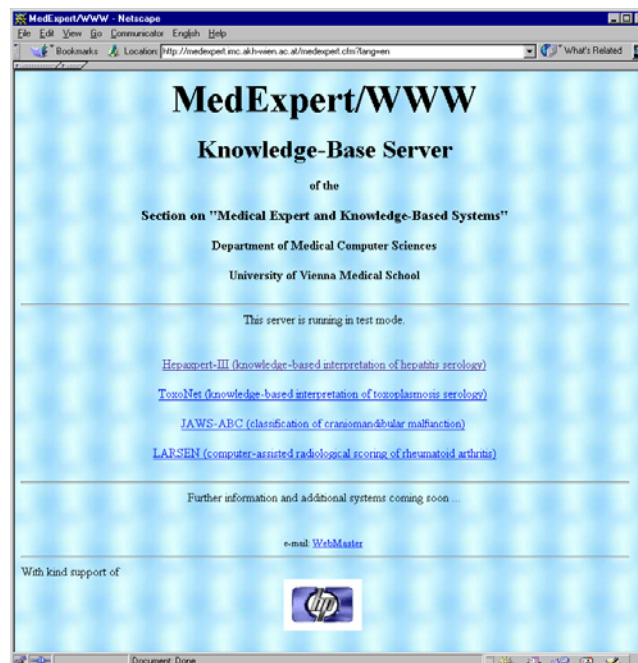


Fig. 1: Homepage of MedExpert/WWW

A description of *ToxoNet* can be found at page 21 in this journal issue. A brief description of *HEPAXPERT-III/WWW* will follow below.

Material and Methods

HEPAXPERT-III/WWW—an implementation of HEPAXPERT-III [1] for WWW—is an expert system that interprets the results of qualitative and quantitative routine serologic tests for infection with hepatitis A and B. The fully interactive system based on *Cold Fusion Application Server* is the successor of an off-line HEPAXPERT/WWW [2] that returned the results by e-mail up to 24 hours after request. The system automatically provides and interprets the result of the laboratory tests measuring antigens and antibodies, without the use of additional biochemical or clinical data, and thus helps physicians to understand complex serologic findings. To deal with all possible combinations of findings, the knowledge base of HEPAXPERT-III/WWW contains 16 rules for hepatitis A and 131 rules for hepatitis B interpretation. In analyzing serologic test results, the program compares the constellation of serologic findings with constellations that may occur in the course of hepatitis A or B infection. Possible active or passive immunization is taken into account as well. However, there are several possible sources of misinterpretation, such as deviations in the course of the disease from the assumed courses, as well as falsely positive and falsely negative findings. Therefore, in each case the program's conclusions have to be correlated with the patient's overall clinical picture.

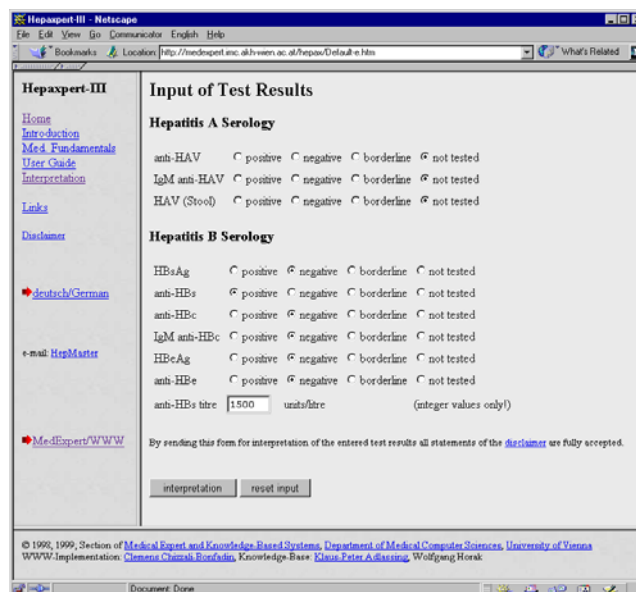


Fig. 2: Data entry page of HEPAXPERT/WWW

HEPAXPERT-III/WWW can be reached by URL <http://medexpert.imc.akh-wien.ac.at/hepax>. Serologic test results can be entered (Fig. 2) and will be interpreted immediately (Fig. 3).

Results

The reports that HEPAXPERT-III/WWW automatically generates include (a) the entered results of the tests, and (b) a detailed analysis of the results, including virus exposure, immunity, stage of illness, prognosis, infectiousness, and vaccination recommendation. It is possible to interpret incomplete and uncertain results as well as prototypical results. Furthermore, as a check on the laboratory results, any inconsistent combinations of findings are identified.

Earlier versions of HEPAXPERT have been in routine use at the hepatitis laboratory of the University of Vienna Medical School since September 1989. The structure of the knowledge base has resulted in an exceptionally practice-oriented and efficient interpretation program, among whose merits are convenient data input and fast interpretation of findings. Its acceptance among physicians is high. HEPAXPERT-III/WWW is available since April 1998.

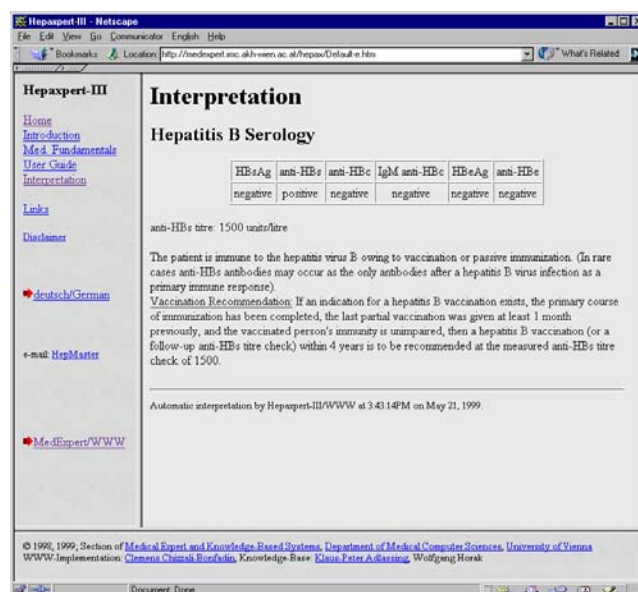


Fig. 3: Interpretation page of HEPAXPERT/WWW

Technical Specification

MedExpert/WWW is based on *Microsoft Internet Information Server*. The operating system of the Dual-Pentium-II personal computer is *Microsoft Windows NT*. The web server is extended by *Allaire Cold Fusion Application Server*. MedExpert/WWW can be accessed from any state-of-the-art WWW browser. Some applications are developed using Java and/or JavaScript. Therefore these features have to be enabled in the configuration of the browser.

Conclusion

Additional systems are under development and will be offered soon. Because of the rapidly growing importance of the Internet and of medical knowledge, interactive medical knowledge-based systems which are based on Internet and World Wide Web technology will become most important in the future.

References

- [1] Adlassnig, K.-P., Chizzali-Bonfadin, C., Kreihsl, M. & Horak, W. (1995) A Computerized System for the Interpretation of Serologic Tests for Hepatitis A and B. *LabMedica International*, 1-2, 18-19.
- [2] Chizzali-Bonfadin, C., Adlassnig, K.-P., Kreihsl, M., Hatvan, A. & Horak, W. (1997) A WWW-Accessible Knowledge-Base for the Interpretation of Hepatitis Serologic Tests. *International Journal of Medical Informatics*, 47, 57-60.