Technical methods

Computerised graphic representation of clinical chemistry results

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Many years have now elapsed since computers were introduced into the clinical laboratory. Initially efforts were directed to entering results into a database where they could be compiled, stored, and printed out. Little thought was given to the presentation of the results to the clinician. In fact certain clinicians complained that the deluge of digits in the computer output made clinical assessment more instead of less tedious. To combat this, various tabular formats are used, including cumulative reports, a compilation of serial results on the same sheet which enables trends to be noted.

The graphic capability of the computer has not been exploited. We have looked at a simple pseudo-3D graphic output where test type, data of study, and test result are portrayed along the three axes (Fig. 1). In this manner, correlation of various tests can be made serially in time, and also comparison of various tests can be made in the same time frame.

Material and methods

A trial mode of this approach has been performed on an Apple II (48K) microcomputer with two 5" floppy disc drives; the graphics are portrayed on a standard Sony Trinitron television set. The pseudo-3D software is entered from a floppy disc; a second floppy disc contains the raw data, the test results, dates, and test types.

The output can be manipulated in various ways. Amplitudes of various test types can be scaled; the normal range of results are portrayed on the base plane of the graphic (Fig. 2). Peaks and craters show increased or decreased values. The display can be rotated to enable the viewer to see the hidden parts, behind peaks for example (Fig. 3), or to alter perspective and look serially along the time axis, at right angles to the normal viewing plane.

We believe that new modes of communicating results must be used in the future in the transmission and analysis of clinical data, and graphics will be effective in that coming era.

Accepted for publication 17 December 1980
Fig. 1  A case of infective hepatitis is serially followed mainly by serum determinations. The pattern as it changes over time can be easily appreciated. Elevations above the "ground plane" represent abnormally increased values and the "ground plane" represents "normality."

The serum glutamic pyruvic transaminase and serum glutamic oxalo transaminase values on 19 November were considered to be fallacious and were repeated, but the optimal values were left to illustrate how easily such values can be spotted. The time sequence of bilirubin elevation is later than the enzyme elevation and is well illustrated in the graphic. In theory the time scale should be uniform periods rather than the arbitrary testing schedule that was maintained clinically. However the trends are easily seen.
Fig. 2  The peaks can be scaled, and the perspective altered to see behind various ridges and peaks.

Fig. 3  The graphic is further rotated and one can perceive the trends looking along the time axis.

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J Clin Pathol 1981 34: 806-808
doi: 10.1136/jcp.34.7.806

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