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# Cyclosporine Measurement by Fluorescent Polarization Immunoassay Utilizing Abbott TD<sub>x</sub> Instrument

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WE HAVE evaluated the usefulness of a fluorescent polarization immunoassay (FPIA) utilizing the Abbott TD<sub>x</sub> technology for the routine measurements of cyclosporine in whole blood or plasma. This procedure was compared with the Sandoz radioimmunoassay. The evaluation was undertaken in an effort to decrease the radioactive hazard, and contain the reagent and supply costs, as well as to reduce the cost of the highly trained labor component associated with an RIA procedure. Specimens from liver, heart, heart/lung, and kidney transplant patients were analyzed, and statistical correlations were obtained. These data indicate that the FPIA assay compares favorably with the Sandoz RIA procedure and provides a reliable method for determining cyclosporine. The advantages of this procedure are that it is relatively much simpler and that it represents a less hazardous technology. Perhaps more importantly even, the FPIA assay, coupled with the use of Abbott TD<sub>x</sub> instrumentation, allows us to report the cyclosporine results in a much shorter time. Preliminary experiments with this assay suggest that it may be crossreacting with metabolites more extensively or measuring a greater number of them relative to RIA.

Cyclosporine has become the immunosuppressive agent of choice in organ transplantation and frequent monitoring of drug levels in blood or plasma has proven to be a contributing factor to the success of transplantation. We have evaluated

Abbott Laboratories' whole blood method for measuring cyclosporine using a TD<sub>x</sub> instrument and fluorescent polarization immunoassay (FPIA). Like other immunoassays for cyclosporine the FPIA antibody reacts with both the parent drug and its metabolites. Although the identity of each specific metabolite and its relative reactivity is not known, early studies indicate that crossreactivity may be greater with the FPIA antibody when compared to the Sandoz RIA method.

## MATERIALS AND METHODS

Samples were collected from kidney, heart, heart/lung, and liver transplant patients in tubes containing EDTA anticoagulant. Both RIA and FPIA were performed according to the manufacturer's instructions. HPLC assay was carried out by the procedure in routine use in our laboratory. Patients were followed throughout the course of immunosuppressive therapy immediately following transplant.

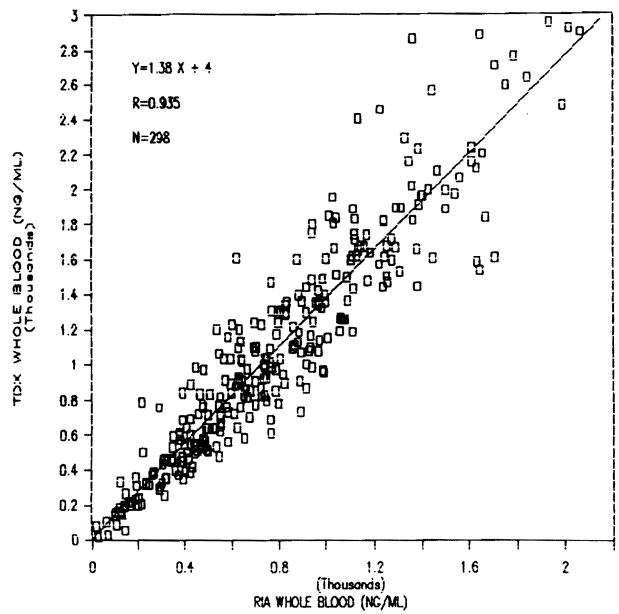


Fig. 1.

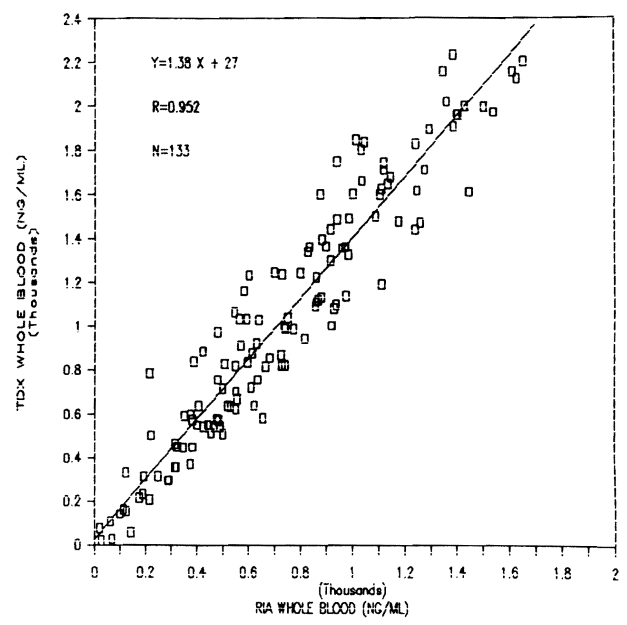


Fig. 2.

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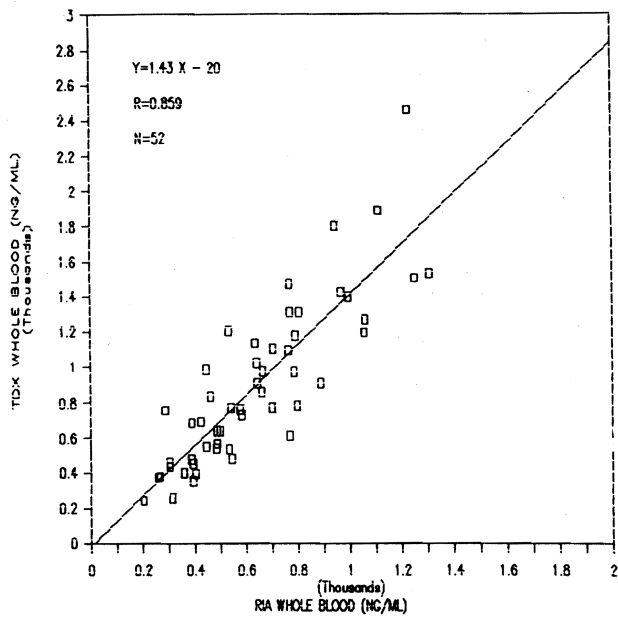


Fig. 3.

RESULTS

Figure 1 presents the FPIA-RIA comparison for all specimens analyzed. The correlation coefficient for these data is 0.935, and the regression equation is FPIA value = (1.38)(RIA value) + 4.

Figures 2-4 present the FPIA-RIA comparisons according to the organ transplanted.

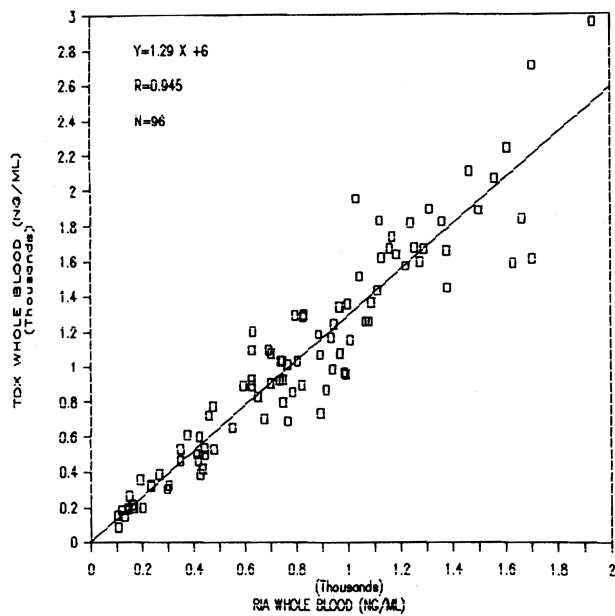


Fig. 4.

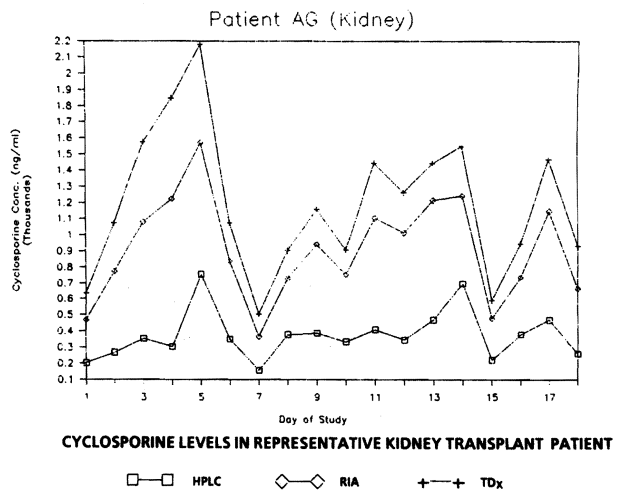


Fig. 5.

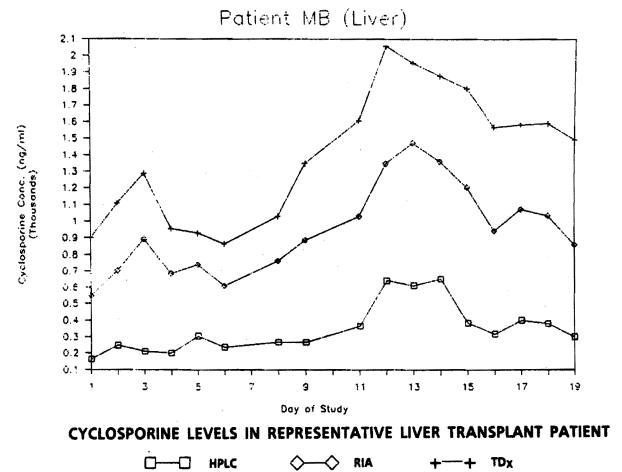


Fig. 6.

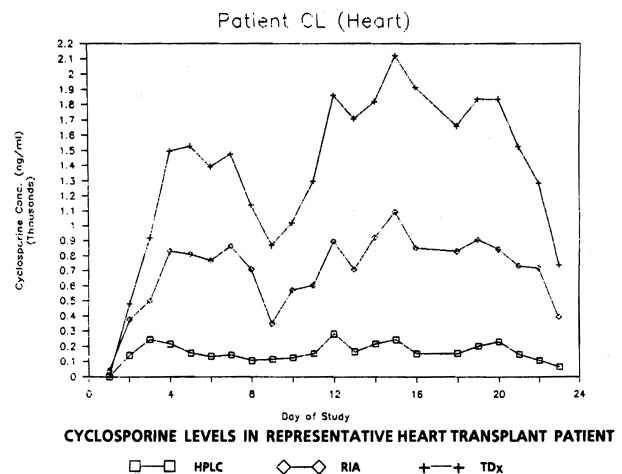


Fig. 7.

Figures 5-7 present the trend analysis of typical individual kidney, heart and liver patients.

#### CONCLUSIONS

Although there is a good correlation between the RIA and FPIA assays, the FPIA values are consistently higher (1.4 times liver and heart, 1.3 times kidney). These data would

suggest that the FPIA antibody is more highly crossreactive to metabolites or sensitive to metabolites not measured by RIA.

Studies on individual patients show that FPIA and RIA values follow a similar course, with FPIA values consistently greater than those obtained using RIA. Both immunoassays display cyclosporine values higher than those obtained by HPLC analysis, which measures only the parent drug.