

intent was to show that any reactants not a part of the sandwich complex are removed, so that the analytical signal measured is ultimately related only to the concentration of the antigen in the complex. Whether or not in reality all antigen molecules are actually complexed in an antibody sandwich in every immunometric assay may be questioned, especially considering the vagaries sometimes observed with antibody/antigen interaction. I regret any confusion the diagram may have caused in its attempt to completely account for all possible entities that might be generated in these immunometric reactions. The article does note that the "high-dose hook effect," in which antigen is present in excess, can occur with some PSA immunometric assays.

Table 2 is in error in that it lists "IRMA" as the principle of the Tosoh assay. The Tosoh assay is a fluorescence immunoassay (FIA), as correctly described in the text. Table 2 also lists an "acridinium" ester as the signal-producing entity for the Ciba-Coring assay. As described correctly in the text, chemiluminescence is actually produced by an "acridinium" ester.

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Use of Microwaves in Immunoassay Techniques

To the Editor:

Microwaves enhance the movement of molecules and thus shorten chemical reaction processes. Over the past few years, microwaves have been used in tissue and cell fixation techniques for optic and electron microscopy studies (1) and in immunohistochemical (2) and other staining techniques (3); thus far, they have not been used in ELISAs. We recently compared an ELISA incorporating microwave use with a conventional ELISA for the detection of antibodies to hepatitis B surface antigen (HBsAg), and double-stranded and single-stranded DNA (dsDNA and ssDNA). We used serum samples from 52 hospital patients for this comparison, of which 12 were positive for antibodies to both dsDNA and ssDNA; 20 were positive and 20 were negative for antibodies to HBsAg.

For the conventional ELISA procedure, precoated microtiter plates were incubated with serum samples in a water bath at 37 °C for 1–1.5 h. Upon the addition of horseradish peroxidase

Table 1. Detection of HBsAg, ds-DNA, and ss-DNA Antibodies by Two Methods

	n	ELISA	Microwave	t	r
HBsAg+ ^a	20	1.1915 ± 0.5561	1.2200 ± 0.5459	0.1634	0.983
HBsAg- ^a	20	0.1850 ± 0.0377	0.1753 ± 0.0397	0.9425	0.971
ds-DNA ^b	12	34.24 ± 39.77	26.35 ± 19.23	0.6267	0.896
ss-DNA ^b	12	29.73 ± 14.18	23.87 ± 12.97	1.0598	0.865

^a Absorbance values.

^b Percent of absorbance.

(HRP)-labeled antibodies, the plates were incubated for another 1–1.5 h at 37 °C in the water bath. Substrate was added, allowing color to develop for 15–20 min. The reaction was stopped with H₂SO₄ and the plate was read at 492 nm.

In the microwave method, we used a microwave oven (Model ER-692; Toshiba, Tokyo, Japan) with highest output of 650 W and a working frequency of 2450 GHz. All test reagents and procedures used in this method were the same as those for the ELISA, except that the microwave was used in place of the incubations at 37 °C. After the addition of serum samples and again after addition of HRP-labeled antibodies, the microtiter plates were placed in the microwave oven for 10 s. Substrate was added and color developed as for the conventional ELISA.

Table 1 shows that there are no statistically significant differences between the two methods in each group (HBsAg-positive group, $P > 0.5$; HBsAg-negative group, $P > 0.2$; dsDNA antibody group, $P > 0.5$; and ssDNA antibody group, $P > 0.2$). Correlation analysis indicates that the two methods are also closely correlated ($r = 0.865$ – 0.983).

Within the range of 50–650 W, the output of the microwave oven is directly proportional to irradiation time. If the microwave irradiation time is short, the output is low and thus results in a lower absorption value; if the irradiation time is inordinately long, the absorption value is also lowered because the rapidly increasing temperature degenerates and inactivates the antigen and the antibody, respectively. Our experience is that when the irradiation time is ~10 s and the output is 150 W, the average temperature in the irradiation field is 35 °C, and the results are assured to be consistent with the conventional method.

On the basis of our findings that the two methods are statistically correlated, we suggest the use of microwaves in immunoassay techniques to improve laboratory efficiency. We tried a variety of general kitchen-purpose microwave ovens and found that only those with the highest output of at least 650 W are applicable.

References

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Desferrioxamine B Increases Urinary Lead Excretion

To the Editor:

The iron-chelating agent desferrioxamine B (DFO) is capable of complexing lead in aluminum-intoxicated renal patients in chronic dialysis (1, 2). Recently, during a DFO screening test done for a patient with normal renal function, we found detectable plasma concentrations and significant urinary excretion of Pb, suggesting a potential clinical use of this drug in Pb intoxication.

The patient, a 52-year-old man who had consumed Al-containing antacids for >8 years, was referred for evaluation because of bizarre neuropsychiatric symptoms. His serum creatinine was normal (79.6 μmol/L) but his plasma Al (>17 μg/L) was above the normal values in our population (<4 μg/L). With the patient's consent we did a DFO test to evaluate tissue metal accumulation; the clinical protocol was approved by an ad hoc departmental committee.

Two grams of DFO (Desferal[®]; Ciba-Geigy, Ltd., Basle, Switzerland), equivalent to 30 mg/kg of body weight, diluted in 200 mL of 50 g/L dextrose solution, was given intravenously over 2 h. Several blood plasma samples were