

10591). Kisner et al. (1) recently reported modifying the same Lancer magnesium reagent for use in the Cobas Bio.

In this method, magnesium complexes with calmagite in alkaline solution to form a red complex, which is measured at 550 nm. The calmagite dye is prebound to the 9-ethylene-oxide adduct of *p*-nonylphenol and polyvinylpyrrolidone to prevent interference by protein. Interference from calcium and heavy metals is prevented by added EGTA and cyanide, respectively.

Working reagent was prepared according to manufacturer's instructions and three drops of wetting agent W (Technicon product no. T21-1298) were added per 50 mL of solution, to facilitate dispersal into the reaction cuvette. Reagent was prepared fresh daily.

RA 1000 settings were as follows: end-point reaction, temperature 30 °C, sample volume 4 μ L, reagent volume 350 μ L, wavelength 550 nm, delay time 2 min.

The reaction reaches completion in <1 min and absorbance is then stable for at least 10 min. The assay was calibrated with each run, with the 1 mmol/L aqueous standard supplied with the kit.

Color and concentration are linearly related to 2 mmol of Mg^{2+} per liter. Water can be used to predilute sera or urine (acidified) manually when Mg^{2+} concentrations exceed this limit. Over the linear range, within-run precision is 1–2% relative standard deviation ($n = 15$) and between-day precision 2–3% ($n = 12$ days) for both serum and urine. Analytical recovery of concentrated aqueous standard added to serum ranged from 92 to 102% for five different specimens (average, 96%). A similar experiment with six different urines yielded recoveries ranging from 90 to 109%, with one outlier at 123%. Average recovery was 102%.

Icteric sera (total bilirubin 350 μ mol/L, conjugated bilirubin 250 μ mol/L) and lipemic sera (triglyceride 15 μ mol/L) were assayed in the RA 1000 and by atomic absorption spectroscopy (IL 151 Atomic Absorption Spectrophotometer). Results for individual samples in all cases differed by <0.03 mmol/L. Hemolyzed specimens are unsuitable for analysis.

We assayed 161 sera and 46 urines by the calmagite method (RA 1000) and by atomic absorption spectroscopy and compared results by regression analysis. Serum (Figure 1) gave: RA 1000 = 0.01 + 0.97 (atomic absorption), with a standard error about the regression line (S_{yx}) of 0.03 mmol/L and coefficient of regression (r) of 0.991. The line of best fit for urine (range 0.5–8.5 mmol/L) was RA 1000 = 0.02 + 1.0 (atomic absorption); S_{yx} = 0.12 mmol/L; $r = 0.998$.

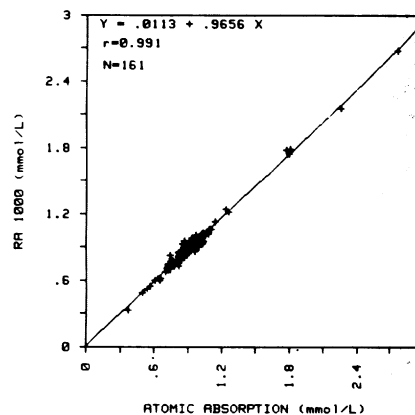


Fig. 1. Correlation between results by atomic absorption (*abscissa*) and the RA 1000 calmagite procedure (*ordinate*) for serum

The normal reference interval for serum Mg^{2+} was determined from data on specimens collected from 40 patients before admission to our hospital, who showed no biochemical evidence of electrolyte imbalance, kidney or liver dysfunction, or metabolic bone disease. The resulting gaussian distribution gave a normal interval (mean \pm 2 SD) of 0.76 to 1.00 mmol of Mg^{2+} per liter, which compares closely with that given by Lancer (2) for the original manual calmagite method, 0.74–0.95 mmol/L.

We conclude that the Lancer Magnesium Rapid Stat Kit reagents are suitable for use in the RA 1000 to determine total Mg^{2+} in serum and urine, and that results are similar to those obtained with a reference atomic absorption procedure.

References

1. Kisner HJ, Koch TR, Knoblock EC. Determination of serum and urine magnesium with a centrifugal analyzer. *Clin Chem* 29, 2120–2121 (1983).
2. Manufacturer's insert for Magnesium Rapid Stat[®] Diagnostic Kit; Lancer, Division of Sherwood Medical, St. Louis, MO 63103.

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Total Mg^{2+} Measured in Serum and Urine in the Technicon RA 1000 Random Access Analyzer by Use of Modified Manual Calmagite Procedure

To the Editor:

We have adapted the manual calmagite procedure for magnesium (Magnesium Rapid Stat Diagnostic Kit[®]) marketed by Lancer, St. Louis, MO 63103, to measure total magnesium in serum and urine in the automated RA 1000 Random Access Analyzer (Technicon Instruments Corp., Tarrytown, NY