such test, Micral-Test (Boehringer Mannheim Australia, Castle Hill, Australia), which relies on color block changes at albumin threshold concentrations of 0, 10, 20, 50, and 100 mg/L. The actual Micral-Test simply involves dipping the strip into a urine specimen for 5 s, then after a 5-min interval, performing a visual comparison of the reaction color with that of the supplied reference chart.

Of particular importance is the threshold at 20 mg/L, above which a pathological elevation in the albumin concentration may be present, and therefore warrants follow-up measurement of the urinary albumin excretion rate with an accurate laboratory assay. The application of Micral-Test as a screening procedure for microalbuminuria would therefore necessitate both high sensitivity and specificity to discriminate urinary albumin levels ≥20 mg/L.

Overnight timed urine specimens (n = 96) were received over a 10-wk period from diabetic patients regularly attending the outpatients clinic, and the level of urinary albumin determined with a commercial RIA kit (Pharmacia South Seas, Sydney, Australia). The imprecision (n = 28) of the RIA was 5.9, 4.9, and 6.7% at albumin levels of 3.3, 20.4, and 56.6 mg/L, respectively. Concurrently, two laboratory personnel analyzed all the urine specimens, within 4 h of receipt (maintained at room temperature), using the Micral-Test procedure and employing the principle of reading to the nearest color block. Each operator was blind to the other's results throughout the study. All strips had the same batch number.

No statistically significant difference was observed between operators with respect to their assignment of albumin concentration with the Micral-Test method (Wilcoxon's matched-pairs test, P = 0.68). A highly significant difference, however, was found between both operators' results and those for the RIA (P < 0.0001), which reflected the high proportion of misclassification between the 0 and 10 mg/L thresholds. The percentage distribution of values assigned to the 0, 10, 20, 50, and 100 mg/L blocks by the RIA and operators (mean) were 53.1, 18.2; 11.5, 43.6; 16.7, 12; 7.3, 12; and 11.5, 14.1%, respectively.

Choosing a threshold of ≥20 mg/L albumin, the sensitivity and specificity of the Micral-Test were 91.2 and 91.1%, respectively, at a prevalence of 35.4%; the positive predictive value was 84.9%, the negative predictive value was 95%. If only samples with urinary albumin levels <100 mg/L are considered, the prevalence of values ≥20 mg/L is 27.1%, and the respective sensitivity and specificity is 87.0 and 91.1%; the positive predictive value is 78.4%, the negative predictive value is 95%.

The statistical reliability of the above estimates for sensitivity and specificity were evaluated with a computer intensive technique known as the bootstrap procedure (3). Based on 1000 bootstrap samples from the data set, and also the data excluding albumin levels ≥100 mg/L, the 68% range associated with the derived parameter is sensitivity, 87.9–94.6% and 81.6–91.5%; specificity, 88.5–93.8% and 88.5–93.7%.

The findings are in general agreement with preliminary reports for the Micral-Test method (4) and results with the latex agglutination assay, AlbuSure (2). An advantage of Micral-Test, however, is its flexibility to estimate a wide range of discrete albumin levels from 0 to 100 mg/L, whereas AlbuSure is restricted to a positive or negative result at its uniquely defined cut-off (20 mg/L).

The Micral-Test therefore represents a satisfactory procedure for the initial semiquantitative screening of diabetic samples to detect urinary albumin levels ≥20 mg/L. However, if within the particular screening environment, the prevalence is markedly lower than the 26% commonly noted in most clinics, then overall performance will decrease. For example, at a prevalence of 15%, the positive predictive value will be only 63.3%, and the negative predictive value will be 97.5%.

GEORGE PHILLIPOU, PHD

FROM THE ENDOCRINE AND DIABETES LABORATORY, THE QUEEN ELIZABETH HOSPITAL, WOODVILLE, SOUTH AUSTRALIA.

ADDRESS CORRESPONDENCE TO G. PHILLIPOU, PHD, ENDOCRINE AND DIABETES LABORATORY, THE QUEEN ELIZABETH HOSPITAL, WOODVILLE, SOUTH AUSTRALIA 5011.

RIA, RADIOIMMUNOASSAY.

Acknowledgments— I thank M. Parker and D. Harrison of Boehringer Mannheim, Australia for supplying the test strips. The technical assistance of R.K. Farrant and R.G. Frith is gratefully acknowledged.

References

1. Mogensen CE: Microalbuminuria predicts clinical proteinuria and early mortality in maturity-onset diabetes. *N Engl J Med* 310:356–60, 1984
2. Sawicki PT, Heinemann L, Berger M: Comparison of methods for the determination of microalbuminuria in diabetic patients. *Diab Med* 6:412–15, 1989
3. Diaconis P, Efron B: Computer-intensive methods in statistics (Review). *Sci Am* 248(5):1416–22, 1983
4. Muller P, Schlipfenbacher R: Micral-Test®: results of a multicenter evaluation study (Abstract). *Acta Endocrinol* 124 (Suppl. 3):26, 1991

Time for a Change

In October 1986, 1248 nurses, nutritionists, pharmacists, and physicians achieved the title of CDE (1). By 1992, 6200 educators have achieved CDE certification (K. Doyle, unpublished observations).

Certification in diabetes education involves setting a standard of cur-

rent proficiency and competence in this area. Because it is a voluntary process that exceeds the minimum entry-level requirements for practice within a profession, it should be distinguished from a license to practice diabetes education (1). The CDE examination, like most certification programs, has as its main objective to see that the public receives quality care by upgrading management practices above the minimum licensure set by each health discipline. It must be taken every 5 yr to retain the title of CDE. Nevertheless, some concern has arisen that the examinations are too basic and may convey a false sense of confidence about areas for which groups of educators have not been adequately trained (e.g., a nurse providing complete nutritional counseling) (2).

The introduction of the CDE comes at the same time that the endocrinology fellowship population is declining. Of the nine traditional internal medicine subspecialties, only endocrinology and nephrology experienced a decrease in fellows between 1976 and 1988 (3). The number of first-year endocrine fellows decreased by 24%, whereas the number of all endocrine fellows decreased by 10% during this 12-yr period. By contrast, total fellows increased in infectious disease (43%), cardiology (40%), pulmonary diseases (25%), gastroenterology (14%), rheumatology (12%), and hematology and oncology (4%) (3). Although one could speculate about the etiologies for the decline in endocrinology fellows, certainly a major reason is the relatively poor reimbursement for the cognitive-oriented medical subspecialties (4). Because the prevalence of diabetes appears to be increasing (5), it seems clear that an increasing number of nonendocrinologists, including nonphysicians, such as qualified nurse practitioners, nutrition specialists, and health educators, will need to participate in the care of this patient population.

Therefore, 6 yr and 6200 CDE certificates later, we feel that it is appropriate to assess the progress of this new niche of educators. Unfortunately, we do not have any data to report. However, we are quite concerned about the common theme of complaints expressed by diabetes educators across the country, namely, that they are having a difficult time interacting with the referring physicians. In particular, many doctors feel intimidated or threatened by nurse or nutrition educators who, after passing the CDE examination, are often better trained in certain aspects of diabetes education and care than the well-intentioned physician. The result of this phenomenon is frustration among the educators, because they are qualified to provide a greater portion of the diabetes management than they are currently allowed to perform. Furthermore, it is likely that overall diabetes care would improve with increased input from the educator. It is time to move the concept of the diabetes team out of the large diabetes center and toward the primary-care physicians who manage over 90% of the diabetic patients in this country.

What are some possible solutions to these problems? First, and probably most important, we need to educate those doctors who are currently underusing the CDE. This could be achieved through articles in primary-care journals or continuing medical education programs, such as Clinical Education Program III sponsored by the American Diabetes Association. The National Certification Board for Diabetes Educators is now assisting the new or recertified educator by informing their employers of CDE certification, but perhaps this program could be expanded to include a greater number of physicians and administrators. Another problem, for which no simple solutions exist, is how to adequately reimburse educators for their highly skilled expertise. Most diabetes educators/specialists are paid less than nurse-managers who are on equal levels of the career track. This is especially true of those working in private physician's offices.

The introduction of the CDE comes at a critical period of diabetes health care in this country. It is now time to better use these talented health-care educators and specialists, because they are definitely here to stay as permanent and prominent members of the health-care team.

RUTH FARKAS-HIRSCH, MS, RN, CDE
IRL B. HIRSCH, MD

FROM THE UNIVERSITY OF WASHINGTON SCHOOL OF MEDICINE, SEATTLE, WASHINGTON.

ADDRESS CORRESPONDENCE TO RUTH FARKAS-HIRSCH, MS, RN, CDE, UNIVERSITY OF WASHINGTON MEDICAL CENTER, 1959 NE PACIFIC STREET, RC 99 SEATTLE, WA 98195.

CDE, CERTIFIED DIABETES EDUCATOR.

References

1. Paduano DJ, Anderson BJ, Ingram S: Certification: progress and prospects for diabetes educators. *Diab Educ* 13:206–209, 1987
2. Alford M: Questions about certification exam (Letter). *Diab Educ* 13:186, 1987
3. Lyttle C, Anderson RM, Levey GS, Kohrman CH: National study of internal medicine manpower: XVI. subspecialty fellowship programs, 1988 update. *Ann Int Med* 111:604–11, 1989
4. Prashker MJ, Meenan RF: Subspecialty training: is it financially worthwhile? *Ann Int Med* 115:715–19, 1991
5. Diabetes: 1991 Vital Statistics. Alexandria, VA, Am. Diabetes Assoc., 1991

Diabetic Ketoacidosis in Pregnancy

Another atypical case

I read with interest the report by Maislos et al. (1) describing an episode of DKA associated with intrauterine fetal death and urinary tract infection in a