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Hematuria Without Microalbuminuria

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Background

Microalbuminuria is a condition in which small amounts of albumin are excreted in the urine without overt nephropathy. Based on the American Diabetic Association classification, microalbuminuria is defined as urinary excretion of albumin of 30–300 mg per 24 hours or 20–200 mcg/min or 30–300 mcg/mg creatinine. Various conditions such as diabetes, hypertension, and impaired renal tubular reabsorption can lead to microalbuminuria. Microalbuminuria is an indicator and predictor of the development of overt nephropathy. If identified and treated early, overt nephropathy can be prevented and averted. Proteinuria and hematuria are the two most common urinary abnormalities encountered during routine urinalysis. In renal dysfunction, it is common to encounter isolated proteinuria without hematuria. Also, when using a dipstick, it is not uncommon to encounter mild isolated hematuria without proteinuria. Since dipstick and protein precipitation methods lack sensitivity for trace proteinuria, immunoassays are used for the measurement of trace amounts of albumin in urine. It is commonly believed that hematuria is always associated with proteinuria or microalbuminuria. Based on this belief, many laboratories cancel microalbuminuria testing if the urine dipstick is positive for blood. We encountered several urine samples that were dipstick positive for blood but negative for microalbuminuria based on the American Diabetic Association definition.

Materials and Methods

To study this aspect more objectively, urine samples with a typical creatinine concentration were spiked with 5, 10, 20 and 50 uL of whole blood (total volume 10 mL). Using a dipstick, these aliquots were tested for blood and protein, and then analyzed for creatinine and microalbumin on a chemistry analyzer. The urine dipstick analysis was performed on the Clinitek 500 Urine Chemistry Analyzer, while the urine creatinine and microalbumin were performed on the Ortho Vitros 5600 using the Vitros CREA slides and Randox microalbumin reagent.

Results

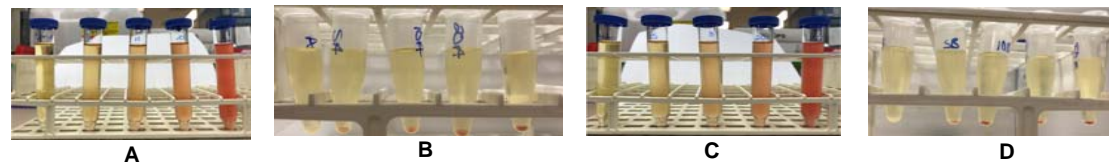


Figure 1. Visual analysis of urine specimens

Urine specimen A (Fig. 1 A and B) and urine specimen B (Fig. 1 C and D) were aliquoted and spiked with 0 (Blank), 5, 10, 20 and 50 uL of whole blood. Total volume of 10 mL. Aliquots of each were also spun down to visualize the red blood cells present (Fig. 1 B and D).

Urine Characteristics

	Specimen A					Specimen B				
	Blank	5 uL	10 uL	20 uL	50 uL	Blank	5 uL	10 uL	20 uL	50 uL
Color	Yellow	Yellow	Yellow	Orange	Red	Yellow	Yellow	Yellow	Orange	Red
Clarity	Clear	Slightly cloudy	Slightly cloudy	Cloudy	Cloudy	Clear	Slightly cloudy	Cloudy	Cloudy	Cloudy
Blood	Negative	3+	3+	3+	3+	Negative	3+	3+	3+	3+
Protein	Negative	Negative	Negative	Trace	1+	Negative	Negative	Trace	Trace	1+
Creatinine mg/dL	190.0	191.7	191.9	193.2	191.4	153.9	154.3	155.3	155.7	155.5
Microalbumin ug/mL	<5	13	24	45	113	<5	10	20	41	104
ACR	NA	7	13	23	59	NA	6	13	26	67

Table 1. Urine characteristics

Color, clarity, blood and protein were assessed by dipstick and read by the Clinitek analyzer. Creatinine and microalbumin were measured by the Ortho Vitros 5600.

Conclusions

- These findings suggest that samples with hematuria may be negative for microalbumin, and therefore, laboratories should not automatically cancel microalbumin testing if a sample is dipstick positive for blood.
- A better strategy may be to test the sample for protein using a dipstick and cancel the test for microalbumin only if the sample is positive for greater than trace protein.