

## CLINICAL IMAGES

## Uremic frost

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A 62-year-old man with a history of diabetic nephropathy presented with confusion, generalized swelling and shortness of breath. He had been non-compliant with dialysis therapy and then had been lost to medical follow-up for about six months. On clinical examination, the patient was somnolent and disoriented with respect to place and time. He had scattered deposits of tiny, white, friable, crystalline material on his face (Figure 1). His blood pressure was 179/80 mm Hg. Results of bloodwork showed elevated blood urea nitrogen (41.4 [normal 2.86–7.14] mmol/L) and creatinine (1865.2 [normal 61.9–132.6] mmol/L), and his arterial blood gases were consistent with metabolic acidosis (bicarbonate level 13.5 [normal 22–26] mEq/L, with an arterial pH of 7.153 (normal 7.35–7.45). Our provisional diagnosis was uremic encephalopathy and fluid overload. The crystalline material on his face was thought to be uremic frost.

The patient was admitted to the intensive care unit and hemodialysis was started immediately. Over the next week, his delirium and fluid overload resolved and the uremic frost gradually disappeared. After two weeks in hospital, he was discharged to home with a maintenance regimen of dialysis.

Uremic frost was first described by Hirschsprung in 1865 and is rarely seen today in developed countries, owing to widespread availability of hemodialysis. The phenomenon is believed to result from evaporation of sweat that contains high levels of urea and other nitrogenous waste products. These waste products crystallize on the skin, most commonly on the face.<sup>1</sup> As a cutaneous manifestation, uremic frost should be differentiated from retention keratosis, eczema and postinflammatory desquamation. However, a history of end-stage renal disease and the white, friable, crystalline characteristics of uremic frost can make its diagnosis easy. To verify that the crystals are composed of urea or nitrogenous



**Figure 1:** Friable white crystals ("uremic frost") on the face of a 62-year-old man with uremic encephalopathy.

waste, scrapings of the frost can be diluted in normal saline, which can then be tested for elevated urea nitrogen levels comparable to blood levels.<sup>2</sup>

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## REFERENCES

1. Udayakumar P, Balasubramanian S, Ramalingam KS, et al. Cutaneous manifestations in patients with chronic renal failure on hemodialysis. *Indian J Dermatol Venereol Leprol* 2006;72:119-25.
2. Pol-Rodriguez MM, Wanner M, Bhat P, et al. Uremic frost in a critically ill patient. *Kidney Int* 2008;73:790.

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