Acute renal failure from intoxication by *Cortinarius orellanus*: recovery using anti-oxidant therapy and steroids

Sir,

Little brown mushrooms of the Cortinarius genus of fungi are known to cause acute renal failure between 2 and 20 days after ingestion [1–4]. Renal histology typically shows interstitial nephritis [5], which has been attributed to the nephrotoxin orellanine. The toxic effect is probably exerted by production of reactive oxygen species [6]. We report a case of suspected orellanine poisoning treated with corticosteroids and N-acetylcysteine with encouraging results.

**Case.** A 66-year-old Austrian lady presented in August 1997 giving a 5-day history of colicky lower abdominal pain, diarrhoea for 3 days and vomiting for 1 day. Her urine output had decreased over 3 days. There was no haematuria or dysuria, although 2 weeks earlier she had a possible urinary tract infection treated with an antibiotic. On admission she was taking ciprofloxacin and hyoscine butylbromide which had been prescribed for presumed infectious diarrhoea. She denied having taken any over-the-counter medications.

She had been on holiday in the Irish Republic for 2 weeks before admission, and had picked some wild mushrooms, which she and her daughter ate in a soup 10 days before presentation. She had safely picked wild mushrooms for most of her life, and she identified the recently picked ones as a Cortinarius species, almost certainly *Cortinarius orellanus* (Figure 1). Unfortunately she was not aware that the species was toxic.

The only past medical history of note was that of left sided hydronephrosis in childhood treated by surgery. There was no family history of renal disease.

She was apyrexial with a blood pressure of 140/80 mmHg and was clinically euvoalamic. Abdominal examination revealed tenderness in the left iliac fossa but no peritonism.
Comment. Although we did not positively identify the presence of the toxin orellanine in this case, the typical clinical picture [1–5] and the circumstances make any other cause for the renal failure most unlikely.

The mechanism of renal toxicity has been found to be due to orellanine [6]. Orellanine is a tetrahydroxylated di-N-oxidized bipyridine which is rapidly concentrated in the kidney and has been found in renal biopsy specimens up to 6 months after ingestion [4]. It has been shown in vitro that oxidation of orellanine by biological oxidizing agents of enzymatic systems at physiological pH and under aerobic and anaerobic conditions produces an ortho-semiquinone anion radical and reactive oxygen species. This leads in vitro to a large oxygen consumption and depletion of glutathione [6], thus rendering cells more susceptible to oxidant damage.

Cortinarius mushroom poisoning frequently results in interstitial nephritis [1–5]. However, in only a few published reports have corticosteroids been given, despite their widespread use in patients with other forms of interstitial nephritis. In the series published by Bouget et al. [1], nine out of 12 patients who had acute renal failure secondary to Cortinarius poisoning were given corticosteroids. In the group of 12 patients, eight recovered rapidly but four had persistent chronic renal failure with two of these requiring long-term renal replacement therapy. In view of the mechanism of action of the toxin orellanine we treated this patient with the glutathione donor and anti-oxidant N-acetylcysteine, with subsequent improvement in renal function. This novel approach has not been reported previously and merits further investigation.

As always, prevention is better than cure. A popular north American field guide to mushrooms [7] states: ‘consequently, the mushroom hunter is warned not to eat any ‘LBMs’—little brown mushrooms’. 

\[9.5 \text{ mmol/l,}
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\[\text{stopped after 6 weeks. After 2 months her serum urea was 15.9 mmol/l, and creatinine 168 mol/l.}
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\[\text{The patient's 38-year-old daughter, who had ingested a poisoning. She was found to have acute renal failure with hyponatraemia, significant proteinuria and microscopic haematuria: serum sodium 121 mmol/l, potassium 6.9 mmol/l, urea 32.8 mmol/l, and creatinine 1032 \mu mol/l. Liver function tests and full blood count were normal with no eosinophilia. Department of Nephrology and Rachael G. Kilner Transplantation}
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