

Changes in the concentrations of creatinine and cystatin C in patients with acute paraquat self-poisoning.

Roberts DM (1,2), Buckley NA (1,3). (1) South Asian Clinical Toxicology Research Collaboration; (2) University of Queensland, Australia; (3) University of NSW, Australia.

Introduction: Changes in the concentration of creatinine may help determine outcomes from acute paraquat poisoning, where an increase in creatinine of $>3\mu\text{mol/L/h}$ (dCr/dT) predicts death.(1) While an increase in creatinine usually reflects progressive renal impairment, paraquat is known to interfere with some creatinine assays that utilise the Jaffe (picric-acid) method.(2-4) Therefore, the physiological implications of elevated creatinine following paraquat poisoning is not adequately described, and other markers of renal function such as cystatin C have not been assessed. The purpose of this study is to assess the utility of serial creatinine concentrations for predicting clinical outcomes and the extent to which paraquat interferes with the creatinine assay, using cystatin C as biomarker of renal function. **Methods:** Patients presenting to two general hospitals in Sri Lanka with a history of acute paraquat poisoning were eligible. Following resuscitation and informed consent, demographic and clinical details were recorded. Serial blood samples were obtained, stored frozen and shipped to the UK to quantify the concentration of paraquat and creatinine (using the Jaffe reaction) by Syngenta and cystatin C by St Thomas' Hospital. Median and IQR values were determined and compared non-parametrically. **Results:** 26 patients were recruited to the study, 6 of whom died, and 108 blood samples were assayed. Values for dCr/dT varied within each group but they were statistically significantly: dead $10.8\mu\text{mol/L/h}$ (6.8 to 15.2) and alive $0.6\mu\text{mol/L/h}$ (-0.5 to 4.3); $P<0.0001$. A cut-off dCr/dT $>3.5\mu\text{mol/L/h}$ was the best predictor of death (figure). Changes in creatinine concentration correlated with those of cystatin C, suggesting progressive renal impairment; however, precision declined beyond $200\mu\text{mol/L}$. At the concentrations observed in this group of patients (plasma concentration $<10\text{mg/L}$), paraquat did not appear to directly increase the apparent concentration of creatinine. However, in patients with a peak paraquat concentration $>1\text{mg/L}$, the ratio of creatinine:cystatin C in serial samples increased over time, which may suggest the presence of an interfering substance. **Conclusion:** The rate of increase in creatinine may be useful for predicting outcomes in patients with acute paraquat poisoning. The extent and mechanism of interference to creatinine assays utilising the Jaffe reaction remains poorly described.

References: (1) Hum Exp Toxicol. 1996;15(3):265-8; (2) Pathology. 1995;27(2):154-6; (3) Lancet. 1981;1(8235):1424; (4) Ann Clin Biochem 1994;31(Pt 2):198-9.

Figure:

ROC of dCr/dt for predicting death

