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# Renal phosphorus regulation in thermally-injured and multiple trauma patients receiving enteral nutrition

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## Renal phosphorus regulation in thermally-injured and multiple trauma patients receiving enteral nutrition

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Profound hypophosphatemia is a common complication in thermally injured patients of which the etiology is unclear. To investigate renal phosphorus regulation, 20 adult thermally injured patients (> 20% BSA) and 20 multiple trauma patients requiring tube feedings were prospectively evaluated. Patients with renal impairment (serum creatinine > 1.6 mg/dl), alkalemia (pH > 7.50), or diabetes mellitus were excluded. Serum phosphorus concentrations (mg/dl) were collected at days 1, 3, 7, and 14 after initiation of tube feeding. Tube feedings were begun within 1-3 days post injury. Management of hypophosphatemia was shared by the nutrition support and respective primary services. A 24 hour urine was collected during week 1 and 2 for urinary phosphorus excretion (mg/d) and phosphate clearance (L/d). Data are given a mean  $\pm$  SD. Average daily phosphate intake during the 14 day study for thermally injured and multiple trauma patients was  $0.72 \pm 0.32$  mmol/kg/d ( $34 \pm 30\%$  as IV) and  $0.32 \pm 0.18$  mmol/kg/d ( $20 \pm 17\%$  as IV), respectively,  $p < 0.001$ .

Group	P - Day 1	P - Day 3	P - Day 7	P - Day 14
Thermally injured	$2.6 \pm 0.9$	$1.9 \pm 0.8^*$	$2.7 \pm 1.2^*$	$3.9 \pm 0.6$
Multiple trauma	$2.5 \pm 0.7$	$3.0 \pm 0.8$	$3.3 \pm 0.6$	$3.7 \pm 0.6$

P = serum phosphorus concentrations  
\* $p < 0.05$  between groups

Group	UP - Week 1	UP - Week 2	UCL - Week 1	UCL - Week 2
Thermally injured	$292 \pm 256$	$377 \pm 286$	$11.8 \pm 11.9$	$14.3 \pm 12.1$
Multiple trauma	$189 \pm 178$	$272 \pm 186$	$8.5 \pm 8.9$	$8.4 \pm 5.7$

UP = urinary phosphorus excretion; UCL = urinary phosphorus clearance

Despite a significantly greater intake of phosphorus, thermally injured patients had lower serum phosphorus concentration levels on days 3 and 7. Thermally injured patients had greater urinary phosphate excretion and clearance compared to multiple trauma patients ( $p = \text{N.S.}$ ). Thermally injured patients had a 40% to 55% increase in urinary excretion of phosphorus despite an intake that was 125% more than multiple trauma patients. Renal phosphorus regulation is only partially responsible for the profound hypophosphatemia observed in thermally injured patients.