

## **Glutamine and alanine metabolism in lungs of septic rats.**

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### **Abstract**

1. The metabolism of glutamine and alanine in the lung was studied in rats made septic by a caecal ligation and puncture technique. 2. The blood glucose concentration was not significantly different in septic rats, but blood pyruvate, lactate, glutamine and alanine concentrations were markedly increased as compared with sham-operated rats. Conversely, blood ketone body and plasma cholesterol concentrations were significantly decreased in septic rats. Both plasma insulin and plasma glucagon concentrations were markedly elevated in response to sepsis. Sepsis resulted in a negative nitrogen balance. 3. Sepsis increased the rates of production of glutamine (52.5%,  $P$  less than 0.001), alanine (38.9%,  $P$  less than 0.001) and glutamate (48.6%,  $P$  less than 0.001) by lung slices incubated in vitro. 4. Sepsis increased lung blood flow by 27.6% ( $P$  less than 0.05). Blood flow and arteriovenous concentration difference measurement across the lung of septic rats showed an increase in the net exchange rates of glutamine (142.5%,  $P$  less than 0.001), alanine (129.4%,  $P$  less than 0.001), glutamate (100.9%,  $P$  less than 0.001) and ammonia (138.0%,  $P$  less than 0.001) as compared with sham-operated control rats. 5. Sepsis produced significant decreases in the lung concentrations of glutamine (36.8%), glutamate (20.8%), 2-oxoglutarate (64.8%) and AMP (18.3%). The lung concentrations of alanine (95.9%), ammonia (67.7%) and pyruvate (89.7%) were increased. 6. The maximal activities of glutamine synthetase (20.4%,  $P$  less than 0.05), phosphate-dependent glutaminase (18.9%,  $P$  less than 0.05) and alanine aminotransferase (25.5%,  $P$  less than 0.05) were increased, but there was no marked change in that of glutamate dehydrogenase, in the lungs of septic rats