Lipid Peroxide and Its Accumulation in Endotoxosisis

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In previous work, we found that the administration of endotoxins from Salmonella typhimurium or Vibrio parahaemolyticus resulted in a marked hypoglycemia, lactacidemia, triglyceridemia and hypoferremia, and observed a typical disseminated intravascular coagulation (DIC) in the poisoned animals.

The liver lipid peroxide level was markedly increased in endotoxin-poisoned mice compared with that in the controls, and returned toward normal levels after two days. On the other hand, superoxide dismutase (SOD) activity showed a 27% decrease. Levels of non-protein SH in serum and liver of mice markedly decreased 18 h after injection of endotoxin, and the level in serum recovered to the normal range after 24 h, whereas that in the liver became to normal after 48 h. α-Tocopherol level rapidly decreased in the liver and blood in poisoned mice 1—6 h postintoxication. The findings indicate extensive generation of free radicals in endotoxin-poisoned animals. Glutathione reductase and glutathione peroxidase activities declined in the liver 18 h after the administration of endotoxin.

When given vitamin E-excess diet, the mice showed a low level of lipid peroxide and reduced leakage of serum lactate dehydrogenase (LDH) compared with that in the control. On the other hand, mice given vitamin E-deficient diet showed a marked increase in lipid peroxide level and serum LDH leakage. The LDH isozyme pattern nearly returned to the normal electrophoretic profile on GSH administration. However, the liver lipid peroxide level and serum LDH activity decreased at a high dose of 400 mg/kg of GSH. After α-tocopherol or GSH administration the plasma membranes of the poisoned animal liver also recovered completely from the damage as judged from the SDS electrophoretic profile compared with that of the control.

From the results obtained above, it is suggested that lipid peroxidation by free radicals occurs in a tissue ischemic state, probably induced by DIC, in endotoxin-poisoned mice.