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Effects of Chronic Dietary Protein Restriction on the Systemic Response to Interleukin 6 in vivo

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Background: IL-6 is one of the major inflammatory cytokines and clinically it has been documented that plasma levels of IL-6 are often correlated with the severity or progression of acute and chronic inflammatory diseases. It has also been suggested that the nutritional status of the host play an important role in mediating cytokine activity, which may influence the outcome of the host. However, there is little information about the effects of malnutrition on IL-6 action.

Objective: The present study is to compare the metabolic response, including body composition, plasma glucose and albumin levels, to IL-6 bolus injection between malnourished and well-nourished rats.

Methods: A malnutrition model was established by feeding rats a 2% casein diet for 14 days. Over the same period of time, a control group, well-nourished, was fed a 20% casein diet. Body weights and food intakes were monitored every other day. At day 15, animals received an IL-6 bolus injection at a dose of 20 $\mu\text{g}/\text{kgBW}$ through their tail vein. After IL-6 administration animals were killed at 0h, 4h, 8h, 16h and 24h and organ samples of liver, lung muscle and whole blood were collected. Changes in organ water content, hematocrit, glucose level, plasma albumin and total protein concentration were determined.

Results: 2% casein diet feeding resulted in higher levels of hematocrit, but significantly lower levels of plasma glucose, albumin and total protein. Over a period of 24 h after IL-6 injection, changes in all parameters were varied between these two different dietary groups. Although in response to IL-6 injection glucose level significantly declined in both groups, the decrease in glucose level was delayed in the 2% dietary group as compared to the 20% casein group (8h post IL-6 injection in 2% group vs. 4h in 20% group). Moreover, after glucose levels returned back to the initial level in both groups at 16 hours after IL-6 injection, there was a second decrease in glucose level at 24 hours only in the 20% dietary group. In response to IL-6 administration, plasma levels of albumin and total protein decreased significantly in the group fed 20% casein diet, but no significant changes were found in the 2% dietary group. In both dietary groups there were no significant changes in organ water content.

Conclusion: Dietary protein depletion results in malnutrition at the whole body level, indicated by increased hematocrit, decreased plasma levels of glucose, total protein and albumin. This study also provides the information that different nutritional status induced by dietary protein content can alter the systemic responses to IL-6 in vivo. Further studies are needed to demonstrate whether protein supplementation can reverse these changes induced by protein malnutrition.