The influence of 6% carbohydrate ingestion and age on PHA-induces lymphocyte proliferation and in vitro cytokine production was studied in 48 runners following a competitive marathon. Runners were randomly assigned to carbohydrate (C; n=23) and placebo (P; n=25) groups, with blood samples taken before, immediately after, and 1.5 hr post-race. C versus P ingestion resulted in higher plasma glucose, lower plasma cortisol, reduced neutrophilia, and monocytosis during recovery, but had no effect on the post-exercise reduction in T-lymphocytes or NK cells, or on race times. No group differences were observed for PHA-induced lymphocyte proliferation of cytokine production. However, for all subjects combined, lymphocyte proliferation and IFN-γ secretion decreased significantly below pre-race values by 1.5 hr of recovery, and these were negatively correlated with plasma cortisol. Young (< 50 years; n=36) and old (≥ 50 years; n=12) runners exhibited parallel post-race declines in lymphocyte proliferation and IFN-γ secretion, with the older group exhibiting a 33-59% lower proliferation at each time point. In conclusion, PHA-induced lymphocyte proliferation and cytokine production decreased significantly following a marathon, and this decrease was strongly linked to cortisol and only partially linked to T-cell changes. This decrease occurred in both younger and older runners and was not influenced by carbohydrate.