

Enhancement of Human Natural Killer Cytotoxic Activity by Vitamin C in Pure and Augmented Formulations

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Abstract

The antitumor activity of ascorbic acid has been reported by different investigators. In this study, we determined the in vivo effects of ascorbic acid and its modified formulation (Ultra Potent-C) on human natural killer (NK) cell activity. Twenty-two healthy subjects were given either ascorbic acid or Ultra Potent-C orally at a concentration of 60 mg kg⁻¹. Vitamin C uptake was measured in the plasma and by peripheral blood lymphocytes (PBLs). The uptake of vitamin C by PBLs was maximized at 2-4 h and was maintained at a high level up to 24 h. At the maximal point the uptake of Ultra Potent-C was higher by 18-25% than plain ascorbic acid. In addition, PBL-NK activity was measured by a 4-h ⁵¹Cr release assay using K562 as targets. The results demonstrated that ascorbic acid has a biphasic pattern of NK function; an early transient depression in NK activity (29%) at 1-4 h that is subsequently followed by a significant enhancement (200-400%) between 8 and 24 hours. However, the pattern of NK activity in the Ultra Potent-C group was different from the ascorbic acid group and the early transient depression in NK activity was not observed. We conclude that ascorbic acid or its modified form is a potent immunomodulator.