Effect of Aloe vera preparations on the human bioavailability of vitamins C and E.

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A search of the medical literature revealed that there are no articles describing the effect of Aloe vera liquid preparations' consumption on the absorption of either water-soluble or fat-soluble vitamins. Millions of Americans, and untold millions of other populations consume vitamins. It is also well known that foods, beverages, drugs or aging may adversely affect absorption. A very large number of people around the world also consume Aloe. It is thus vitally important that the combination of Aloe and vitamins be tested. Our research group took up this challenge.

For water-soluble vitamin C data was obtained on 8 normal subjects. Two forms of Aloe (AVL, a whole leaf extract, or AVG, a gel) liquid were tested in this study. The subjects appeared at a local clinical lab after an overnight fast consumed in a random fashion 500 mg of a vitamin C tablet with either 60 mL (2 oz) of either water (control), AVG, or AVL. The liquid was sipped over 5 minutes. Blood sampling was at 1, 2, 4, 6, 8, and 24 hours (fasting) post-dosing Subjects were allowed to eat their normal lunch and evening meals. One week and two weeks later the other liquids were consumed and the sampling repeated. Blood was converted to plasma, mixed with metaphosphoric acid preservative, and stored at -80^{0}C until assay by HPLC. Changes in plasma ascorbate after consumption of the different liquids are shown in Figure 1. The areas under the average plasma ascorbate change with time curves correspond to the bioavailability. The areas were determined by a graphics program. The relative areas were as follows: vitamin C alone 100%, AVG 304 % and AVL 80 %. Thus vitamin C was 3 times more bioavailable when taken with AVG but was 20 % less bioavailable with AVL. The Aloe preparations caused the absorption of ascorbate to be slowed as evidenced by the time for maximal absorption which was 2 hours for vitamin C alone, 8 hours for both AVL and AVG. A slow release drug, for instance, usually has greater efficacy for a longer period of time. AVG also increased absorption and caused a larger ascorbate concentration at 8 hours and 24 hours, thus providing more benefit. A review of the literature shows that Aloe is only the second matrix that improves ascorbic acid absorption, the first being a citrus extract (1). Since vitamin C is the most common water-soluble vitamin supplement, this Aloe result has wide-ranging applications.

Vitamin E is a fat-soluble vitamin that was given to 10 normal subjects. The same procedure as with vitamin C was followed except that vitamin E (tocopherol acetate) was given in the form of a soft capsule at a dose of 400 mg. The change in plasma E was calculated and illustrated in Figure 2. The vitamin E alone was poorly absorbed, as expected under fasting conditions, and in some time periods with the control the subjects had less E than at baseline, obviously an unhealthy situation. With the Aloe preparations after consumption, the subjects had higher plasma E than at baseline at all times even at 24 hours. Compared to the baseline, both Aloes in Figure 2 had much higher changes in plasma E at 8 and 24 hours. Thus the Aloes kept an elevated plasma E longer than the control without Aloes. The relative areas of the curves in Figure 3 were as follows: vitamin E alone using only the above baseline data 100%, AVL 198% and AVG 369%. Thus vitamin E was 2 times more bioavailable with AVL and over 3 times more with AVG. The E absorption was slowed with the Aloe liquids. The vitamin E taken alone produced a plasma E maximum at 4 hours, which then declined. The maximum occurred at 6

hours for AVL and 8 hours for AVG. Aloe preparations taken with E greatly improved the absorption of vitamin E and maintained plasma E concentrations for longer periods of time compared to the vitamin E alone. Aloe is unique in its ability to improve the bioavailability of both vitamin C and E.

The elderly population is greatly increasing in developed nations. This group is especially vulnerable to vitamin deficiency due to age-related decreases in absorption, reduced food intake, and increased drug use (2). Hemodialysis patients have low levels of ascorbate that is further reduced with hemodialysis (3). It is well known that fats improve the absorption of the lipid-soluble vitamin E but, many people take vitamins on an empty stomach and dieters consume it with a low-fat meal. In addition Orlistat, a fat absorption inhibitor used for weight loss (4), and Olestra, a fat substitute (5) significantly decreases plasma vitamin E when consumed for a long period of time. The results of our study indicate that Aloe preparations can greatly improve the absorption of both a water- and fat-soluble vitamin, is of great significance, and a potential health benefit to the population at large. Since Aloe vera and vitamins C and E are commonly used in cosmetics, the combination should be investigated to determine if Aloe improves skin absorption of these vitamins.

A review of recent literature indicates that an ingredient of Aloe has potent immunostimulatory activity (6) that has implications for wound healing and immunotherapy, perhaps providing greatest efficacy in combination with drugs where synergism could take place. An Aloe leaf pulp extract showed hypoglycemic activity with type I (Insulin-Dependent Diabetes Mellitus) and type II (non Insulin-Dependent Diabetes Mellitus) diabetic rats (7). In two rat models of arthritis Aloe significantly reduced paw swelling (8). Thus scientific research should continue with Aloe since many promising health benefits may result.

References

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Figure 1. Comparison of Bioavailability of Vitamin C alone and with Aloe Products

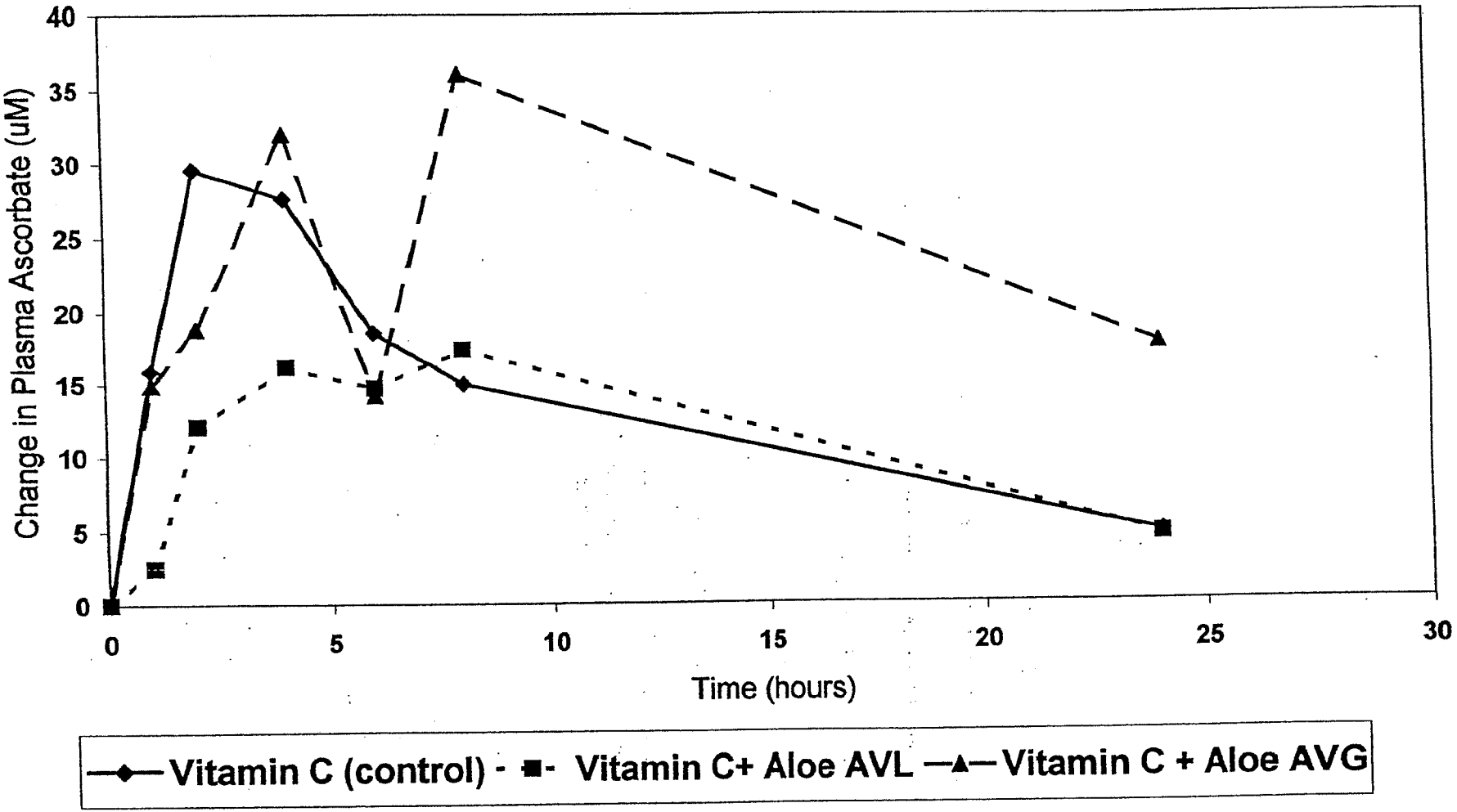

Figure 1. Comparison of Bioavailability of Vitamin E alone and with Aloe Products