Clinical research

Preliminary report on the use of *Momordica charantia* extract by HIV patients

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Momordica charantia **(CURCUBITACEAE, "Chinese Bitter Melon") is a traditional medicine and food in many oriental cultures. This article describes the results of several case histories in which extracts of *Momordica charantia* (MC) were used by HIV-infected individuals both orally and by rectal infusion. A link can be established between the actions of MC and those of a closely related plant *Trichosanthes kerilowii* (TC). Both species contain proteins capable of inhibitng HIV syncythial formation (alpha and beta momorcharins in MC, trichosanthin in TC), a critical component in the pathogenesis of HIV.**

The possible relation between the abortifacient actions of MC and TC proteins and their ability to inhibit HIV syncytial cell formation is also discussed.

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INTRODUCTION

The Chinese name for *Momordica charantia* L. (bitter melon) is *Ku Gua*. It belongs to the CURCUBITACEAE family. In Traditional Chinese Medicine (TCM), its fruit, seed, leaf, flower, stem and root can all be used as medicinal herbs. In TCM, it is considered to have COLD and BITTER nature. *Momordica charantia* has been used as an appetite stimulant, a treatment for gastrointestinal infection, and to lower the blood sugar in diabetics. Recently, it was also used to treat certain carcinoma and viral infections. Besides medicinal use, *Momordica charantia* (MC) is also a Chinese vegetable. Especially in southern China, it is a common dish for cooling the body. MC is not native to the United States.

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ITS CHEMICAL COMPOSITION includes Charantin; beta-D-Sitosterol-beta-D-glucoside; 5,25-Stigmastadien-3-beta-D-glucoside; serotonin (5-hydroxytroptamine or 5-TH), and many kinds of amino acids, such as glutamic acid, alanine, beta-alanine, galacturonic acid, amphetamine, alpha-aminobutyric acid, proline, citrulline, and pectin (1,2). Recently three proteins have been isolated from its seeds and through testing were found to have inhibitory effects on HIV infected lymph cells and monocyte/macrophages. These discoveries caused public attention and attempts to use MC as a remedy for AIDS (3,4).

Modern pharmacological research found that MC has an obvious effect in lowering blood sugar. Taking juice made from MC can significantly reduce blood sugar level in normal and alloxan induced diabetic rabbits. In the rats with hyperglycemia caused by subcutaneous injection of extract of lobus anterior hypophyseos, taking juice or extract of MC can reduce blood sugar level, with similar but stronger effects than tolbutamide (D860). Its blood sugar reduction effects in cats after pancreatectomy was not totally eliminated. This shows that the blood sugar reduction is via both pancreatic and non-pancreatic paths. Other clinical experiments did not show the blood sugar reduction in humans (1).

MC shows very low clinical toxicity but has demonstrated toxic effects in animal studies. When MC juice was given orally (6 ml/kg) to pregnant rats, it caused uterine bleeding and death within a few hours. In normal and alloxan induced diabetic rats given 6 ml/kg of MC juice orally per day, 80-90% of the rats died in 5 to 23 days. Abdominal injection of MC juice to rats at a dose of 15-40 ml/kg caused death in 6 to 18 hours. In alloxan induced diabetic rabbits, orally given 10 ml/kg of MC juice per day showed toxic effects in most animals.

	12/4/87	12/1/88	8/2/89	2/21/90	7/18/90	12/13/90	4/16/91	8/28/91
CD3	1279	945	1280	1160	1670	1200	1410	1950
CD3%	68	63	49	71	68	63	69	71
CD4	658	480	670	590	910	800	880	1120
CD4%	35	32	26	36	37	42	43	41
CD8	545	525	570	600	840	630	620	880
CD8%	29	35	22	37	34	33	33	32
CD4/CD8	1.21	0.91	1.18	0.98	1.08	1.27	1.31	1.27

TABLE 1. T-cell profiles for case history #1 ("Mr. R.").

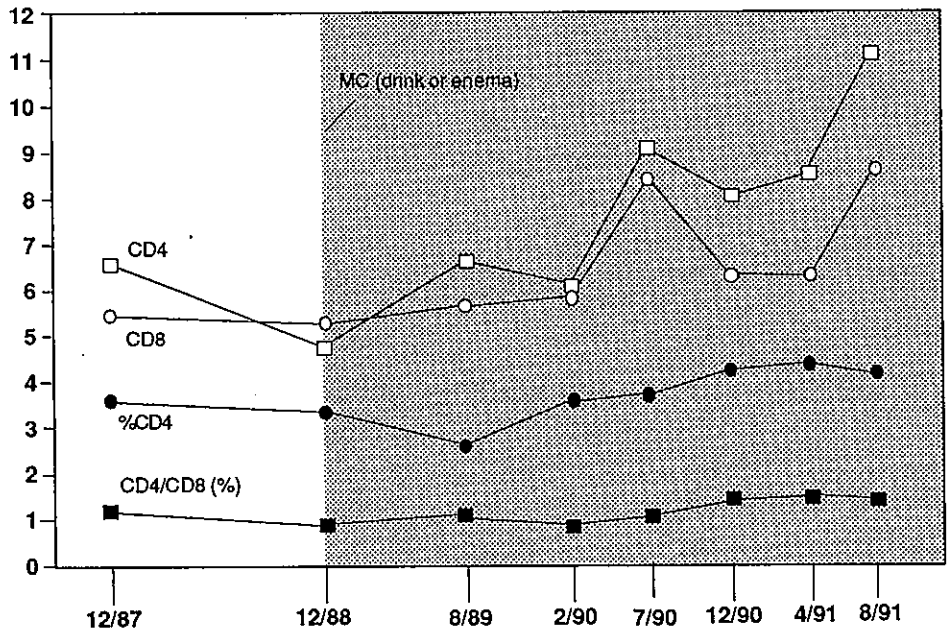

FIGURE 1. T-cell profiles for case history #1 ("Mr. R.")

Key: white squares: CD4 cells ('00/mm³); white circles: CD8 cells ('00/mm³); dark circles: CD4%; dark squares: CD4/CD8 ratio (%). Use of MC therapy is noted, with date of introduction.

ANTI-HIV PROTEINS

The basic glycoproteins, alpha- and beta- momorcharin, have been extracted and purified from the seeds of MC by Dr. Hinwing Yeung, et al. These two forms of momorcharins have similar molecular weight (29,000-31,000) but are distinct in their immunological actions. Both alpha- and beta-momorcharin are effective in the induction of mid-term abortion in mice. The clinical abortifacient effects have been tested in primary human trials in China. This abortifacient property has been also identified in another protein derived from a related member of the CURCUBITACEAE family, trichosantin from the Trichosantes kerilowii (5,6). All three have been tested in vitro and found to possess inhibitory effects on HIV-infected macrophages and T-cells. Trichosanthin, known as GLQ223 or "Compound Q", has been used in clinical trials and appears to be a promising treatment for HIV disease (7-11).

Recently, a new protein has been isolated and purified from the seeds of MC by researchers at NYU Medical Center. Termed MAP-30, this protein has been found to inhibit HIV replication and direct cell to cell infection and syncytial formation. Proteins isolated from the seed extracts of MC have been found to inhibit replication of Herpes

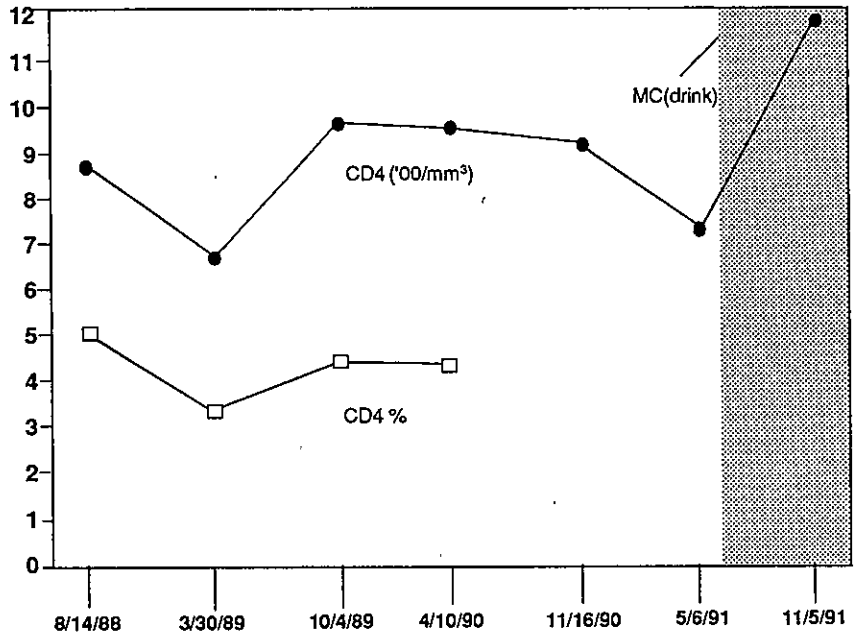

FIGURE 2. T-cell profiles of case history #2 ("Mr. M.")

Simplex virus, Type I (HSV-I) and poliovirus I. Fruit extracts of MC have been shown to inhibit cancer in rats and lymphoma in mice. Significantly, this compound does not appear to be toxic against uninfected cells. Investigator Sylvia Lee-Huang told BETA (Bulletin of Experimental AIDS Treatment) that the NIH will soon announce results of preclinical testing of MAP-30 and hopes to find a sponsor to further investigate the anti-HIV activity of the compound (12).

Interestingly enough, the primary clinical findings showed that the effective part of MC was not exclusively limited to the seeds, but could also be found in all parts of the plant. Further chemical analysis should be performed to identify ingredients other than the proteins which might also possess anti-HIV activity.

CASE HISTORIES

•**Case history #1** is a 40 year old Fillipino male ("Mr. R"), diagnosed with HIV infection in 1987. At that time his CD4 cell count was 658, %CD4 was 35 and CD4/CD8 ratio 1.21. No treatment was employed at the time.

In December 1988, tests showed drops in the CD4 count to 480, %CD4 to 32 and the CD4/CD8 ratio to 0.91. At that same time he visited his family in Northern California. At dinner, bitter melon (MC) was served, prompting one guest to comment on its traditional use in the Phillipines as a remedy for leukemia. As leukemia and HIV share many clinical aspects, the patient concluded that perhaps MC might have some benefit in treating his HIV infection. He has taken MC faithfully for three years, experimenting by using at various times the fruit, stems and leaves, which are taken as a decoction or juice. He often uses the decoction or juice as a retained enema. His immune status was monitored periodically, and his most recent tests have shown that his CD4 count went up to 1,120 with a %CD4 of 41 and CD4/CD8 ratio of 1.27. While taking MC he showed constant improvement in his T-cell profile *(Table 1 and Figure 1)*.

Not only has his T-cell profile normalized, but all other chemistries and serology have remained normal.

•**Case history #2** ("Mr.M") is a male hispanic from Long Beach CA, diagnosed as HIV+ in August 1988. His lowest CD4 count was 686 in March 1989, yet by lifestyle changes he continued to keep his CD4 counts around the 900 level for 2 years. In May 1991 his CD4 count dropped to 735, and he was started on an herbal medicine protocol designed by the author plus MC. Within four months his CD4 count increased to 1,191 (*Figure 2*).

•**Case history #3** ("Mr. L") kept relatively good records of his T-cell counts and their relationship to a variety of alternative treatments he has used (*Figure 3*). From this graph we can see that treatment with MC has a tendency to normalize the proportion of CD4 and CD8 cells. For this patient, the combination of Compound Q and MC has been the best protocol.

Many people report enhanced energy after taking MC. Others report firmer stools and and a halt or reversal of weight loss. MC also appeared to be of benefit in clearing several cases of persistent dermatitis.

No apparent toxicity has been observed in patients employing long-term MC therapy. The subject described in the first case history has been taking MC daily for over three years and has not shown any change in blood chemistries or reported any untoward effects. No patients reported liver, kidney, heart or blood abnormalities after long-term use of MC. Thus we may assume that the toxicity of MC is quite low.

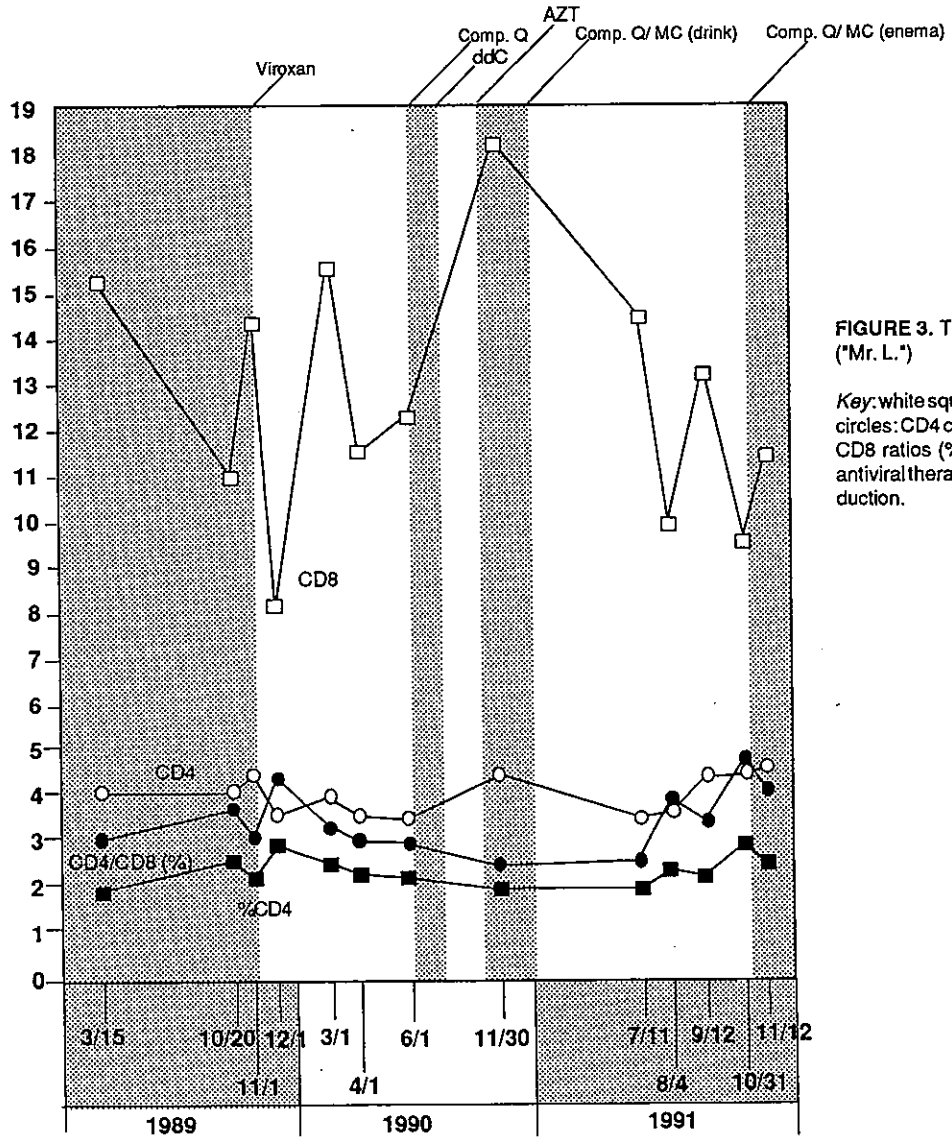

FIGURE 3. T-cell profiles for case history #3 ("Mr. L.")

Key: white squares: CD8 cells ('00/mm³); white circles: CD4 cells ('00/mm³); dark circles: CD4/CD8 ratios (%); dark squares: CD4%. Other antiviral therapies are noted, with date of introduction.

DISCUSSION

This is a very preliminary clinical observation, and although these few anecdotal case reports appear encouraging, no investigation of the anti-viral effects of MC are currently planned. However MC is most definitely a plant which warrants a much closer look.

Cell-to-cell infection is a major pathological mechanism by which HIV damages T-cells. In HIV infected individuals, only a small percentage (less than 2 per 1000) of the total number of T-cells show signs of infection, and the majority of T-cells are killed by syncytium. In the VIIth International Conference on AIDS, French researchers reported that their version of Compound-Q confirmed the American discoveries, and in addition, discovered a new means of inhibiting T-cell syncytial formation (8). MAP-30, like Compound Q, alpha- and beta- momorcharins, have the ability to inhibit cell-to-cell infection (through syncytial formation) in HIV disease.

It is also interesting to note the probable connection between the abortifacient properties of MC and its ability to inhibit HIV infection. When used to induce abortion, trichosanthin, alpha- and beta- momorcharins appear to interact with syncytial cells in the placenta. They are most effective

at mid-term pregnancy rather than early stage because syncytiotrophoblasts exist in the chorionic villi of the mature placenta at mid-term and not earlier. Since the synytium is more sensitive than the Langerhan's cells to trichosanthin, success rates for mid-term abortions and expulsions of dead fetuses were much higher than those for missed abortions, hydatiform moles and ectopic pregnancies ($p<0.01$). This is due to the fact that there were many more cytotrophoblasts of villi in the latter conditions and more syncytiotrophoblasts in the former (13).

An extracted vacuum-dried powder made from whole plant of MC has been produced by a Chinese traditional pharmaceutical factory in China. The author formulated the extraction procedures. This extract contains two parts of the ingredients; the water extracted and the alcohol extracted parts. The concentration is one gram extract equal to 25 grams of the fresh plant. This extract can be used orally or to make a solution in water to use as a retaining enema.

Further research on MC needs funding, but as a natural product, it has not attracted the interest of any pharmaceutical companies. One possibility is the PWA community and practitioners of naturopathic medicine. The author hopes that this article can serve to stimulate further analysis of this unique natural product, certainly a new and novel approach with a mechanism of action not yet seen in any other modern chemical drug design.

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