

**THE ROLE OF HAELAN 851®**  
**NUTRITION IN RELIEVING LEUKOPENIA**  
**IN MICE WITH LIVER CANCER**

**INTRODUCTION**

Leukopenia is the abnormal decrease in the number of white blood cells to fewer than 5,000 cells per cubic millimeter. It may be caused by an adverse drug reaction, radiation poisoning, or other pathologic conditions and may affect one or all kinds of white blood cells. The two most common forms of leukopenia are neutrophilic leukopenia and lymphocytic leukopenia.

Leukocytes, white blood cells (WBC), are the primary effector cells against infection and tissue damage. They not only neutralize or destroy organisms, but also act as scavengers, cleaning up damaged cells by phagocytosis, to initiate the repair process. Leukocytes travel by amoeboid movement and are able to penetrate tissue and then return to the blood stream. Their movement is directed by chemicals released by injured cells, a process called chemotaxis. After coming in contact with and recognizing an antigen, they engulf it (phagocytosis) and then destroy it through the release of lysosomes, from granules in their cytoplasm. When leukocytes are killed along with the pathogenic organisms they have destroyed, the resulting material is called pus, commonly found at the site of localized infections. Pus that collects because of inadequate blood or lymph drainage is called an abscess.

Clinically, serum WBC counts are important in detecting infection or immune system dysfunction. The normal WBC level is 5,000 to 10,000/mm<sup>3</sup>. An elevated (greater than 10,000) leukocyte count (leukocytosis) indicates an acute infection or disease process (such as certain types of leukemia), while a decrease in the number of leukocytes (less than 5,000) indicates either immunodeficiency, or an overwhelming infection which has depleted the WBC stores. In addition to the WBC count, the differential count is also frequently important.

A differential count measures the number of each type of cell, i.e., neutrophil, monocyte, lymphocyte, etc. There are two types of white blood cells: granulocytes (those possessing, in their cytoplasm, large granules that stain different colors under a microscope) and agranulocytes (those lacking granules). Granulocytes include basophils, eosinophils, and neutrophils. Agranulocytes include monocytes, and lymphocytes. Granulocytes are often referred to as "polys" because they are all polymorphonuclear (multi-lobed nuclei), while agranulocytes are called mononuclear (one nucleus).

Neutrophils, which make up approximately 60% of all white blood cells (WBCs), are the most active phagocytic cells in the body, and serve as the primary effector cell in inflammation. Eosinophils, 1 to 4% of total WBCs destroy parasites and are a major component of allergic reactions. The role of basophils, which make up less than 1% of all WBCs, is unclear although it is known that they release many of the chemicals involved in the inflammatory process. Monocytes, 3 to 8% of all WBCs, are extremely phagocytic. Those that have left the blood stream and settle in the tissues are called macrophages. Next to neutrophils, macrophages are the most important phagocytic WBCs.

**METHODS AND MATERIALS**

Fifty one Kunming breed mice with a body weight ranging between 20 to 25 grams were divided at random into five groups. The mice were inoculated with H<sub>22</sub> liver cancer cells before and after nutritional supplementation with Haelan 851, Platinum Formula, oral liquid nutritional beverage. Details are shown in Table I.

Eight days after inoculation of the mice with the H<sub>22</sub> liver cancer cells, the tail of the animals were cut off and the blood samples were taken to count the white cells and carry on the statistical analysis. Details are shown in Table II.

**Table I**  
**Condition of Inoculation of H<sub>22</sub> Liver Cancer Cells, Injections with Cyclophosphamide\*, and Degree of Nutritional Supplementation With Haelan 851, Platinum Formula, Oral Liquid Beverage**

<u>Group</u>	<u>H<sub>22</sub> Cancer Cell Inoculation</u>	<u>Nutritional Support Level Before and After</u>	
		<u>Consecutive 7 Days Before</u>	<u>Consecutive 8 Days After Inoculation</u>
1	No	Water Given	Water given on the 1st, 3rd 5th day, injection of saline 0.1ml/10g, ip.
2	Yes	36% Platinum Formula	36% Haelan 851 given on 1st 3rd, and 5th day, injection of cyclophosphamide -50 mg/kg ip.
3	Yes	60% Platinum Formula	60% Haelan 851 given on 1st 3rd, and 5th day, injection of cyclophosphamide -50 mg/kg ip.
4	Yes	100% Platinum Formula	100% Haelan 851 given on 1st, 3rd, and 5th day, with an injection of cyclophosphamide -50 mg/kg ip.
5	Yes	Water Given	Water given plus and injection of cyclophosphamide - 50 mg/kg ip. on the 1st, 3rd, and 5th day

Note: Cyclophosphamide is an alkylating chemotherapy agent that is prescribed in the treatment of a variety of neoplasms and as an immunosuppressant in organ transplants. Among the more serious adverse reactions are anorexia, vomiting, alopecia, , **leukopenia**, and potentially serious hemorrhagic cystitis.

**Table II**  
**Effect of Haelan 851, Platinum Formula, Nutritional Supplementation**  
**in Relieving Leukopenia Induced by Cyclophosphamide in Cancer Carrying Mice**

<u>Group</u>	<u>No. of Mice</u>	<u>White Cell Count</u> <u>pc/mm<sup>3</sup>, X+SD</u>	<u>Increased rate (%) of White Cells</u> <u>as Compared With 5th Group</u>
1	10	10495 ± 3965.4	
2	10	3010 ± 1104.5	16.7 %
3	10	3445 ± 986.7 *	33.5 %
4	10	4820 ± 1459.5 **	86.8 %
5	10	2580 ± 1140.95	

\* Means P < 0.1

\*\* Means P < 0.01

#### SUMMARY

The results of this study suggests that nutritional supplementation with Haelan 851, Platinum Formula, oral nutritional beverage, on a daily basis, for a period of one week before and eight days after the inoculation in mice with ascitic type liver cancer cell H<sub>22</sub>, may relieve the leukopenia induced by cyclophosphamide in varying degrees. The nutritional support with Haelan 851, Platinum Formula, oral nutritional beverage has shown a comparatively evident dose effective relationship. The white cell increased rate elevated to 86.8% in the group given the undiluted Haelan 851, Platinum Formula, oral liquid for nutritional support. The P value is less than 0.01, which shows a very marked significance.