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# CANCER FACTS

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National Cancer Institute • National Institutes of Health  
Department of Health and Human Services

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## National Cancer Institute Studies of Hydrazine Sulfate

In the 1980s and early 1990s, the National Cancer Institute (NCI) sponsored studies of hydrazine sulfate to evaluate whether the compound might improve patient survival or help reverse cancer cachexia, a wasting syndrome that occurs in many patients who have advanced cancer. This syndrome profoundly affects patients' quality of life as well as their health, causing weight loss, fatigue, weakness, and loss of appetite.

After hydrazine sulfate showed promising results in a small pilot study, three large-scale, randomized clinical trials of the compound were conducted in patients with advanced cancers. (Clinical trials are carried out to determine whether new treatments are safe and effective in people.) These three clinical trials did not show any improvement in cancer patient survival, weight loss, or quality of life from hydrazine sulfate.

In two of the three clinical trials, patients were permitted to take tranquilizers, alcohol, and barbiturates. Some people believed these compounds may have interfered with hydrazine sulfate, based on animal and laboratory studies. At the request of Congress, the General Accounting Office (GAO) examined this issue beginning in July 1994 and ending in April 1995. The GAO concluded that, although tranquilizers, alcohol, and barbiturates were permitted, the use of these substances did not affect the findings of the studies. The GAO published its



conclusions in the 1995 report, “Cancer Drug Research: Contrary to Allegation, NIH Hydrazine Sulfate Studies Were Not Flawed.” Copies of the GAO report are available from the U.S. General Accounting Office, Post Office Box 6015, Gaithersburg, MD 20884–6015, or call 202–512–6000. The first copy of the report is free; additional copies are \$2.00 each.

Although the Food and Drug Administration (FDA) has not approved hydrazine sulfate for marketing in the United States, a number of drugs that help fight cancer cachexia have been approved by the FDA and are available to cancer patients. No new NCI–supported studies of hydrazine sulfate are planned, but studies of other compounds that may reverse cachexia and other treatments to fight advanced cancers are under way.

## **Background**

In the 1970s, Joseph Gold, M.D., a scientist in Syracuse, New York, proposed that hydrazine sulfate could interrupt the altered glucose metabolism seen in cancer cachexia. In animal studies, Gold found that hydrazine sulfate also inhibited tumor growth and sometimes enhanced the anticancer effect of drugs. In preliminary studies in humans, Gold reported some tumor regression and other improvements in patients. Russian physicians reported similar benefits in their studies of the effects of hydrazine sulfate in cancer patients.

In the 1980s, a study of hydrazine sulfate took place at Harbor-UCLA Medical Center in Torrance, California. The trial included 65 patients with advanced nonsmall cell lung cancer who had not yet received chemotherapy. Patients were randomized (divided by chance) to receive either hydrazine sulfate or a placebo (an inactive substance resembling a medication) in addition to a chemotherapy regimen of cisplatin, vinblastine, and bleomycin. The study was funded, in part, by the NCI.

All patients received nutrition counseling to increase their intake of calories and nutrients, with no request to limit alcohol intake and no prohibition of barbiturates. Because the chemotherapy being used was highly likely to cause nausea and vomiting, patients were prescribed antiemetic drugs (drugs that prevent or reduce nausea and vomiting) to control these side effects. The antiemetics were also tranquilizers (benzodiazepines and phenothiazines).

Data from the study suggested that some patients who took hydrazine sulfate—those who were in good condition before the study began—had about a 17-week increase in survival. All patients on hydrazine sulfate had greater caloric intake; however, no significant weight gain was found. Preliminary findings from the study were presented in early 1987, and the study was published in January 1990.

Based on the findings of this pilot study, NCI sponsored three large-scale clinical trials of the effects of hydrazine sulfate in patients with two types of advanced cancer—non-small cell lung cancer and colon cancer.

In January 1988, the Cancer and Leukemia Group B (CALGB), an NCI-sponsored research network (called a cooperative group), was asked to conduct the first NCI-funded study of hydrazine sulfate. From July 1989 to February 1991, 291 patients with late-stage non-small cell lung cancer who were in good condition (well enough to not be bedridden) were treated with a chemotherapy regimen of cisplatin and vinblastine and randomized to receive either hydrazine sulfate or a placebo. Other drugs thought to stimulate appetite were not permitted. Because the chemotherapy regimen could cause severe nausea and vomiting in most patients, CALGB investigators permitted the use of antiemetic drugs that are also tranquilizers. Records show that at least one patient received barbiturates. The study results, which did not show any benefit from hydrazine sulfate, were published in June 1994.

From May 1990 to October 1992, 243 patients with nonsmall cell lung cancer were enrolled in the second NCI-funded study of hydrazine sulfate. Headed by the North Central Cancer Treatment Group (NCCTG), another NCI-cooperative group, the patients received cisplatin and etoposide as chemotherapy and were randomized to receive either hydrazine sulfate or a placebo. Because this chemotherapy regimen induces severe nausea and vomiting, patients were given antiemetic medications. The antiemetics included benzodiazepines, phenothiazines, and serotonin antagonists. Use of barbiturates and consumption of alcohol was prohibited.

The researchers did not find any differences in survival, tumor regression, toxicities, or quality of life between the patients who received hydrazine sulfate and those who received the placebo. The study was published in June 1994.

From October 1990 through November 1992, NCCTG enrolled 127 patients with metastatic colorectal cancer into a third clinical trial comparing hydrazine sulfate with a placebo. Patients in this study had had prior treatment with chemotherapy, but their tumors had not responded. Appetite stimulants, alcohol, barbiturates, and use of tranquilizers were prohibited. Antiemetic agents were permitted because advanced colorectal cancer patients may experience nausea and vomiting as a symptom of their disease. However, the use of such antiemetics was not widespread in these patients. In this study, patients who received hydrazine sulfate had a decreased survival compared with patients on placebo.

## **References**

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### **Sources of National Cancer Institute Information**

#### **Cancer Information Service**

Toll-free: 1–800–4–CANCER (1–800–422–6237)

TTY (for deaf and hard of hearing callers): 1–800–332–8615

#### **NCI Online**

##### ***Internet***

Use <http://cancer.gov> to reach the NCI’s Web site.

##### ***LiveHelp***

Cancer Information Specialists offer online assistance through the *LiveHelp* link on the NCI’s Web site.

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