



# The Communicator

## Hotline Consultant and Website Help Get Dantrolene to Hospital and Patient in Need Outside the U.S.

**R**ecently, Dr. Barbara Brandom took a call from a small hospital outside the United States.

"It was in the evening," she recalls, "and they had a patient in the recovery room who had symptoms that made the medical team suspect MH."

The patient, an apparently otherwise healthy adolescent male, had undergone a minor orthopedic procedure to remove some extra bone from his leg. Halothane was used, and the surgery lasted a little less than two hours. The caller reported the anesthetic was relatively uneventful, and the patient was awakening as expected in the postoperative recovery area when he suddenly became ill and went into cardiac arrest.

His serum potassium was 10 meq/L. His anesthesiologists resuscitated him and packed him in ice because his temperature was between 39.5 and 40°C. He was given fluids and bicarbonate aggressively because his urine was very dark. At this point, his CK (creatinine kinase, an enzyme present in muscle) level was over 250,000. He went into renal failure but was still conscious.

"The caller wanted to know if they should give dantrolene, and if so, where could they get some," Dr. Brandom says. From the information the caller provided, I thought this patient might be suffering from an occult myopathy, not necessarily a classic case of MH, but dantrolene might help. Because of the late hour, no offices were likely to be open, so I went to the MHAUS site ([www.mhaus.org](http://www.mhaus.org)) to look for information on how to locate dantrolene. I found and called a number for Procter & Gamble Pharmaceuticals. They shipped dantrolene immediately and the hospital received it within 24 hours," Dr. Brandom says.

"The patient had excellent care immediately post operatively and in the ICU. This medical team worked valiantly to control the hyperkalemia and to treat the patient's renal failure. And it is important to note that the

anesthesiologists called the Hotline immediately, as soon as they recognized that they needed more help in dealing with what might be MH," she adds.

However, dantrolene could not be delivered instantaneously. Symptomatic treatment kept the patient alive with good neurologic function. It was remarkable that he did not develop serious coagulopathy cardiovascular failure before dantrolene arrived. Unfortunately, two days later, the patient's CK was up over 700,000. Although he appeared to be metabolically stable, he could not be resuscitated from another hyperkalemic cardiac arrest and he died three days post-operatively.

"This was a frustrating case," Dr. Brandom says, "because the extent of his muscular disease was such that it may not have made any difference had dantrolene been given to him immediately. It is likely that he had an occult myopathy, such as Becker's muscular dystrophy. This case underscores the need for continued vigilance in the post-anesthetic care of patients with this type of muscular disease. Life-threatening complications may arise hours to days after exposure to the anesthetic that produced such severe muscular injury."

Ten years ago it was a surprise to some that succinylcholine produced hyperkalemic cardiac arrest in children with occult myopathy. Now there is more documentation that hyperkalemic cardiac arrest can occur following prolonged exposure to potent inhalation anesthetics without exposure to succinylcholine, in older patients with occult myopathy.

"It is extremely important to document these cases through the Adverse Metabolic Reaction to Anesthesia (AMRA) form available through the NAMH Registry so that 1) we can validate these events are happening and under what circumstances, and 2) we can learn to recognize and treat them better."

To obtain the AMRA form, call (412) 692-5260. ■

The *Communicator* is published four times each year by the Malignant Hyperthermia Association of the United States (MHAUS) and is made possible by a generous grant from Procter & Gamble Pharmaceuticals, manufacturers of Dantrium. The *Communicator* is intended to serve the information needs of MH susceptible families, health care professionals, and others with an interest in malignant hyperthermia.

#### EDITOR

Katherine O. Riess

#### Editorial Advisory Panel

Scott Schulman, M.D.  
Debra Merritt, C.R.N.A.  
Henry Rosenberg, M.D.  
Mary Ann Whitehill

#### FOR MHAUS

Henry Rosenberg, M.D.  
*President*

Debra R. Merritt, C.R.N.A., MSN  
*Vice President for Projects*

Ronald J. Ziegler  
*Treasurer/Secretary*

Janice L. Bays  
*Executive Director*

Shari Williams  
*Educational Programs Manager*

Josephine Nichols  
*Administrator*

Dianne Daugherty  
*Hotline Coordinator*

Cynthia L. Solyian  
*Communications Coordinator*

Malignant Hyperthermia (MH) is an inherited muscle disorder which, when triggered by potent inhalation anesthetics and some other drugs, may cause a life-threatening crisis. The incidence of MH is low, but, if untreated, the mortality rate is high. Since the advent of the antidote drug, dantrolene sodium, and with greater awareness of the syndrome, the mortality rate has decreased.

Great advances in our understanding of MH have been made since it was first recognized in the early 1960s, but the nature of the fundamental defect(s) is still unknown.

MHAUS advocates that all surgical patients undergoing general anesthesia should receive continuous temperature monitoring, that adequate supplies of dantrolene be stocked near the OR and that thorough family histories be obtained.

Copyright 2000 by MHAUS

## MHAUS Saddened by Deaths of Former Board Member Len Walit and His Wife

Three people were killed on Tuesday, July 11, 2000, when an explosion from a gas leak destroyed a three-story building in Brooklyn, NY and heavily damaged the house next door.

Leonard and Harriet Walit, the owners of the building, and their neighbor were the victims. Len served on the board of MHAUS from April 1991 to October 1995. Most of that time he served with distinction as our Treasurer.

"Len served quietly and effectively as our Treasurer for several years," Henry Rosenberg wrote in a recent letter to the board informing them of the tragedy. "He was a faithful board member and a very kind and thoughtful person."

Both Walits were known in their community as strong boosters for Brooklyn. Len was a member of his Community Board, a founder and member of his Local Development Corporation, as well as active in a number of local cultural and historical preservation organizations. Harriet was retired from the New York City Board of Education.

Len joined MHAUS because of his interest in MH and through his friend, John Larberg, a former MHAUS president. He held a bachelor's degree in economics from Brooklyn College and had studied at the Baruch College NYU School of Business Administration and The College of Insurance. After a twenty year career as a statistician and auditor in the insurance business, Len became a self-employed bookkeeper, tax preparer, and real estate salesman. He was 72 and Harriet was 66.

Countless friends and neighbors of the couple attended their memorial. We join them in their sorrow for this terrible loss. You may send condolences to the MHAUS office in care of Josephine Nichols, 39 East State St., PO Box 1069, Sherburne, NY, 13460 and we will forward them to the family.

## Make The Gift of a Lifetime

The *Gift of a Lifetime* brochure enclosed in this issue gives individuals the opportunity to help MHAUS to pursue its efforts of continuing research in finding a way to detect susceptibility before a patient's life is at stake, educating every medical professional on what to do in the event of an MH crisis and understanding the genetic inheritance factors of MH.

Your *Gift of a Lifetime* might include a Year-End Gift, Payroll Deduction, Matching Gift, Stocks or Wills/Estates/Endowments. Any one of these options will support MHAUS' goal to provide MH susceptibles and their families with the reassurance that somehow, someday, we will end the threat of MH.

For more information or additional copies of *Gift of a Lifetime*, call 1-800-98-MHAUS.

***For more information or for materials on malignant hyperthermia or MHAUS' programs, call 1-800-98-MHAUS; write MHAUS, 39 East State St., PO Box 1069, Sherburne, NY 13460; or visit us on the Internet at [www.mhaus.org](http://www.mhaus.org).***

***To contact the North American Malignant Hyperthermia Registry, call 412-692-5260, or write NAMHR, Children's Hospital, Anesthesiology Department, 3705 5th Avenue, Pittsburgh, PA 15213.***

# World Congress of Anesthesiologists

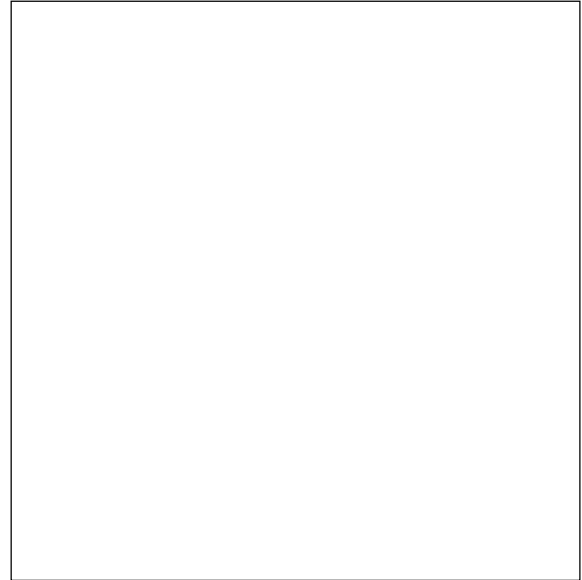
MHAUS attended the World Congress of Anesthesiologists' Meeting in Montreal, Canada, in June. The Colombia MH Association shared our booth and the Canadian MH Association had a booth as well.

The unavailability of dantrolene in many of the countries was the recurring theme relayed to many MHAUS personnel.

A few physicians expressed the idea of using a "grass roots" effort to encourage the government's acceptance of dantrolene in their countries. It was felt that Procter & Gamble, for one, could become more involved in the legal and governmental processes presently restricting dantrolene's acceptance by the governments of various countries.

Many of the physicians noted they themselves are personally working, often alone and at their own expense, toward this goal. Any help from powerful and resourceful allies would be appreciated.

*Dr. Rojas of Colombia  
Visited the MHAUS Booth >*



## Exciting Developments at European Meeting

Dr. Sheila Muldoon, chairman of the North American MH Registry Board and chair of the Department of Anesthesiology at Uniformed Services University, represented MHAUS at the 19th Annual Meeting of the European MH Group held in Hamburg, Germany, May 26-27th.

The program included sessions on the in-vitro contracture test (IVCT), development of new tests, genetic screening also had two outstanding guest lecturers, Professor Jentsch of the Molecular Neurobiology Center, University of Hamburg, and Professor Unban from the Department of Anesthesiology, University of Bonn, Germany.

Both the oral and poster presentations were excellent and there was spirited discussions on many of the topics. In the session discussing the IVCT there was a renewed emphasis on quality control in the performance of the test. Dr. Nyamkhishig Sambuughin presented results of a study entitled "Screening of the Ryanodine Receptor Gene and identification of novel mutations in the North American Malignant Hyperthermia Population." It was announced that an article providing guidelines on the use of genetic screening for MH diagnosis had been accepted for publication and will be published soon. Also a new text on malignant hyperthermia, edited by Dr. Frank Wappler from Hamburg, is in the publication phase.

Professor Albert Urwyler from Basel has been elected President of the EMHG replacing Dr Richard Ellis. The next European meeting will be held in Paris in 2001.

For more information on the EMHG, visit their website at [www.emhg.org](http://www.emhg.org).

*The Malignant Hyperthermia Association of the United States is a not-for-profit organization dedicated to reducing the morbidity and mortality of malignant hyperthermia and other heat-related disorders by: improving medical care related to MH; providing support information for patients; and improving the scientific understanding and research related to MH and other kinds of heat-related syndromes.*

# MHAUS Plans for Future With Look at Accomplishments and Goals



In July, the board and staff of MHAUS met at George Washington University in Washington, DC to plan for the coming year.

This past year saw many accomplishments for MHAUS, including countless lives saved through the Hotline, the move of the North American MH Registry to Pittsburgh Children's Hospital, the appointment of Barbara Brandom as the Registry Director, the awarding of our first research grant money and the creation of a fourth memorial fund, this time in memory of Kristin Duell.

But what's next for an organization dedicated to fighting uncommon but nonetheless life threatening heat-related disorders?

## Goal: Continue to educate all medical professionals on potential dangers of MH

"Many anesthesiologists are aware of the activities of MHAUS because of the MH Hotline," says MHAUS President Dr. Henry Rosenberg.

The Hotline was activated in 1982 as a service to medical professionals who are dealing with a clinical problem related to MH, or felt to be related to MH. Of the roughly 1500 calls to the Hotline each year, about 400 are actual clinical cases.

The expertise provided by the 31 volunteer anesthesiologists who serve as Hotline Consultants has been life saving and has been a source of valuable information concerning the presentations of MH. Those consulting the Hotline

tell us the service is invaluable for answering straightforward as well as complex questions.

Others are aware of MHAUS when researching specific issues about the disorder. They may consult the office directly for information concerning biopsy centers, current treatment protocols, current recommendations concerning preparedness for dealing with MH or similar issues.

Or they may consult [www.mhaus.org](http://www.mhaus.org) for information or to review the entire topic of MH via our slide presentation.

Specific educational programs MHAUS now has available include a hospital training manual sponsored by AstraZeneca Pharmaceuticals, and a forthcoming new version for ambulatory surgery centers.

New versions of many of our brochures and the operating room poster have been created to keep the information as freshly updated as possible.

And MHAUS continues to be a major presence at related medical meetings such as the American Society of Anesthesiologists, the American Association of Nurse Anesthetists, and the American Society of PeriAnesthesia Nurses.

"We feel it is vital to be out there spreading information about MH on a regular basis," says Dr. Rosenberg. "If you attend a major anesthesia meeting this year, stop by our booth to discuss a problem case with one of the members of the MH Hotline who are present during the exhibit hours, or pick up free educational materials."

## Goal: Actively encourage and support research into MH, especially the diagnosis of susceptibility

This year, MHAUS awarded its first research grant to Dr. Yoshitatsu Sei to support his ongoing study to help further the search for a less invasive blood test to identify MH susceptibility. That grant was recently renewed and other worthy projects are being considered as well.

One of our best tools for an epidemiologic study is, of course, the NAMH Registry, which this year was moved to Pittsburgh to take advantage of additional resources available there. Michael Young, a full time database coordinator, and Trish DiGiannurio, a part-time secretary, were hired and are now hard at work with Registry Director Dr. Barbara Brandom organizing the new systems while creating plans for using the acquired data.

Dr. Brandom hopes to host a Biopsy Center Directors' meeting either later this year or early next to educate the directors on what is happening in Europe and the process in producing a diagnostic genetic test. They will discuss issues including genetics, changes in the biopsy itself and ways in which the Registry and Biopsy Centers can work better together.

Additionally, the Registry plans to use the data to study topics such as the incidence and prevalence of MH.

*continued next page*

## *The MHAUS staff is poised to take on new challenges... >*

“There are so many things we’d like to accomplish if we can obtain the resources to do so,” says Dr. Rosenberg. “A tissue repository is envisioned in order to study the basic biochemistry and molecular genetics of MH, and of course we will continue to try to facilitate a newer, accurate less invasive diagnostic test.”

MHAUS has begun to raise funds to further clarify the molecular genetics of MH and develop such a diagnostic test. This special fund is named for a young patient who died from MH, Kristin Duell.

“The search for the genes is laborious and time consuming,” Dr. Rosenberg adds, “and will require significant resources. Because of the difficulty in acquiring funding for MH from standard sources, there are only two laboratories in the United States actively engaged in the investigation of the molecular genetics of MH. In addition, there are only eight biopsy centers in the U.S.”

### **Goal: Plan and provide other support programs**

In addition to the programs and educational materials MHAUS formulates and furthers each year for medical professionals, there are also a host of services and benefits created for MHS patients and their families.

Among them are a newly added message board where people can discuss issues affecting MHS from symptoms to how to tell their families. To participate, visit the MHAUS site at [www.mhaus.org](http://www.mhaus.org).

MHAUS has an MHS identification tag program, sponsors patient mini-conferences to help MHS individuals address issues with experts in the field, and the MHAUS office staff fields and fulfills requests for information from individuals all over the world.

MHAUS is looking into the possibility of conducting more informational sessions via the internet, and if we had the resources available, we would like to extend our involvement to create a database for the 8-10 Hotlines worldwide, create educational programs for the non-anesthesiologists, and ensure that all surgical facilities were prepared to treat MH

crises, including being fully stocked with dantrolene, the only known antidote.

### **Goal: Find a way to make this happen**

MHAUS is a not-for-profit

organization with five full-time paid staff, a volunteer Board of Directors and professional advisory councils for both MHAUS and the Registry. We are particularly grateful for the generous support of our over 2500 members, both medical and lay people, as well as corporations like Procter & Gamble Pharmaceuticals, AstraZeneca, Organon, and Augustine Medical who recognize the value of our mission.

For more information about MHAUS’ plans for this year, or to make a contribution, call 1-800-98-MHAUS, write MHAUS 39 East State St., PO Box 1069, Sherburne, NY, 13460-1069, or visit us at [www.mhaus.org](http://www.mhaus.org). ■

*MHAUS recognizes the generous support of*

# Hotline Activity Summary for the January - March 2000 Quarter



In the first 3 months of 2000, 13 Hotline consultant physicians received 97 calls – 59 for patient

consultations, 38 for questions. Six consultations involved likely MH episodes. Four patients presented with increased carbon dioxide production during surgery. Two patients developed a raised body temperature in the early postoperative period.

No one reported a death from MH, although 5 patients died from other causes (2 from infection, 1 from heart failure, 1 from lung failure, 1 from traumatic brain injury).

## **Two MHSs Received Trigger**

Of great concern were 2 cases where known MHS patients received triggering anesthetic agents. Fortunately, neither patient developed MH nor any other complication. Both cases seemed

to be due to inattention on the part of the anesthesia care providers.

In another case, the family gave a history of MH *after* the patient had emergency trauma surgery. MH-susceptible patients should inform the anesthesiologist, surgeon, and OR personnel of their MH status.

We also encourage patients to wear identification tags that declare their MH status when they cannot.

## **Factors In Diagnosis**

Many factors can complicate how we make the diagnosis of MH. Some factors relate to the surgery being performed, while others are unique to the patient.

I would like to highlight one factor, laparoscopic surgery, that was prominent in the reports from the first 3 months of 2000.

Laparoscopic surgery uses slim telescopes inserted through small incisions (so-called “keyhole” surgery) to look into the abdominal cavity. Gynecologists first introduced laparoscopy to examine and operate on the female pelvic organs. General surgeons also perform laparoscopy,

most often to remove the gall bladder or appendix.

First, the surgeon distends the abdomen with carbon dioxide (CO<sub>2</sub>) gas to create a space for the insertion of small telescopes. The pressure of the CO<sub>2</sub> gas on the diaphragm makes it difficult to breathe so patients usually require general anesthesia. The blood absorbs some of the CO<sub>2</sub> gas and transports it to the lungs for removal. Some CO<sub>2</sub> gas stimulates the sympathetic nervous system. This results in an increased heart rate and elevated exhaled (end-tidal) CO<sub>2</sub> levels, and may mimic an MH episode.

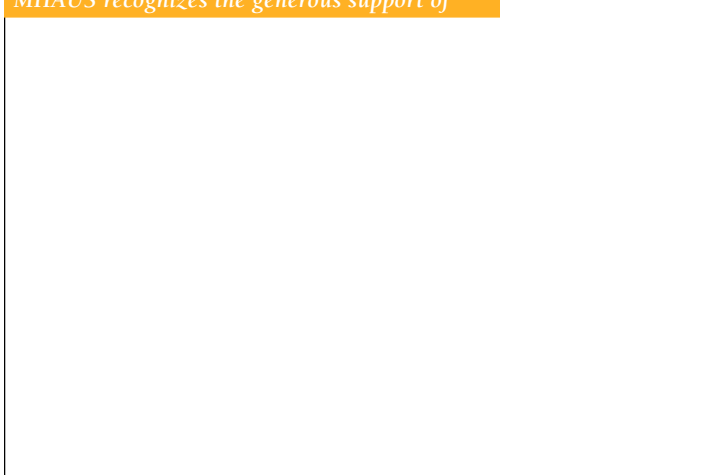
## **A Constellation of MH Signs**

The diagnosis of MH depends on observing a constellation of clinical signs. None of these signs is specific for MH, i.e., they have many causes. When these signs appear together in a patient under general anesthesia, the clinician may suspect MH. These signs include increased heart rate and breathing, elevated end-tidal CO<sub>2</sub> levels, rising body temperature, flushed or mottled skin, and fluctuating blood pressure. We consider increasing end-tidal CO<sub>2</sub> as the earliest, most sensitive sign of MH.

It is the lack of specificity of these clinical signs that at times makes the diagnosis of MH so difficult.

Three Hotline calls involved patients having

MHAUS recognizes the generous support of



## In the U.S. and Canada, the MH Hotline is 1-800-MH-HYPER. Outside the U.S., call 1-315-464-7079.

laparoscopic surgery; all 3 had elevated end-tidal CO<sub>2</sub> levels reported. One patient also had jaw muscle rigidity and temperature elevation, and received dantrolene. The Hotline consultant considered this a likely case of MH, and a muscle biopsy is scheduled to confirm the diagnosis.

In the second case, elevated end-tidal CO<sub>2</sub> was the only sign present. The patient was a heavy cigarette smoker and both the caller and the Hotline consultant thought the cause was a lung problem.

Acute appendicitis may present like an infection, with signs of increased body metabolism. During surgery, this may cause increased heart rate, temperature, and end-tidal CO<sub>2</sub>.

In the third case reported to the Hotline, the patient had a laparoscopic appendectomy but had been ill for two days before surgery. On emerging from anesthesia, the patient remained weak from the muscle relaxants typically given for this surgery. This reduced his breathing which increased the end-tidal CO<sub>2</sub>.

The caller had suspected MH until he treated the muscle weakness with the reversal agent neostigmine. Once the patient was breathing adequately the end-tidal CO<sub>2</sub> returned to normal.

This case shows how difficult it is to differentiate MH

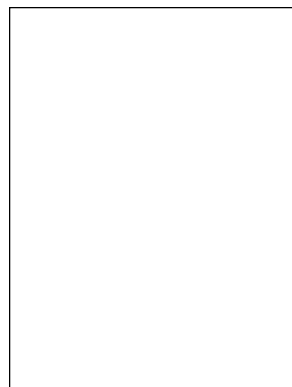
from other processes that may be going on at the same time. Acute appendicitis increases body temperature and CO<sub>2</sub> production; laparoscopy adds more CO<sub>2</sub> to the bloodstream; residual muscle weakness reduces the body's ability to exhale CO<sub>2</sub>. The combination of these three processes could easily lead to a clinical picture resembling MH.

Surgical advances such as laparoscopy offer new

challenges to our ability to detect MH. The benefits of laparoscopic surgery outweigh these problems, especially as we better understand the body's typical response to this kind of surgery. By knowing what to expect, we know when things are not as they should be and seek the cause. Sometimes the cause will be MH.

*Summarized by Gregory Allen,  
MD, FRCPC, Hotline Consultant  
(since 1988)*

## Meet This Issue's Consultant



Dr. Gregory Allen has been a Hotline Consultant since 1988, and a member of the MHAUS Professional Advisory Council since 1993. He served as Director of the North American Malignant Hyperthermia Registry from 1997 until last year when he took a position as Staff Anesthesiologist at Providence St. Peter Hospital in Olympia, Washington.

“In the 1980s when I first became involved with MH,” Dr. Allen says, “it was a matter of convincing clinicians that MHS patients could be safely anesthetized. This was especially true of

patients seeking routine dental care. In the 1990s, providing safe anesthesia became easier, thanks to advances in anesthetic pharmacology and to the educational mission of MHAUS and its consultants. It has been very satisfying to help this mission proceed. I have also benefited from studying the usual and unusual responses humans have to anesthesia and surgery, and to the explosion of molecular genetics in medicine. I am a better clinician for it.”

Dr. Allen earned his medical degree from the University of Ottawa School of Medicine and has published 15 original papers, 26 abstracts, 7 reviews, and 5 book chapters on the subject of MH.

# MHAUS Happenings, Events, and Notices

❑ **P&GP Sponsored Safe Surgery Conference in August:** On August 24th in Philadelphia, PA, P&GP and Health Learning Systems collaborated with MHAUS to sponsor a one-day discussion on the risks of MH in the ambulatory surgery center setting. Look for a report in our next issue.

❑ **Stop By Our Exhibit at the ASA:** MHAUS will be at the ASA meeting in October in San Francisco. About 15,000 anesthesiologists and nurse anesthetists attend this meeting each year, and this year, there will be an MH refresher course featured, as well as a panel on temperature monitoring that will include Drs. Henry Rosenberg and Dan Sessler. Dr. Sessler, who is also one of our Hotline Consultants, is considered an expert on this issue.

❑ **You can help MHAUS while on the Internet:** Help support MHAUS by shopping all your favorite online sources through Greater Good. Just go to [www.mhaus.org](http://www.mhaus.org) and click on the Greater Good button. MHAUS will receive a percentage of your purchases. Thanks!

❑ **Don't Leave Home Without Us:** MHAUS has ID tags to notify medical personnel of your MHS status. Each tag is imprinted with the MH Hotline number, too, which can save precious time in the event of an emergency. Call 1-800-98-MHAUS right now to request more information.

❑ **Thanks!** MHAUS is always grateful for all donations to help us keep our programs and educational materials funded. This year, we are happy to report that the average individual donation amount is at its highest in two years! That's wonderful news and we thank all of our members for their generous support!

❑ **Congratulations and Thanks to the winners of our Silent Auction:** In July, we auctioned off several items to benefit MHAUS. People all across the United States offered bids, and over \$1,100 was raised! We will be holding another Silent Auction in Spring 2001. If you would like to donate an item, please contact the office at 1(800) 98-MHAUS.

postage paid  
non-profit  
organization  
permit #39  
stamford, ct 06094

MHAUS  
39 East State Street  
P.O. Box 1069  
Sherburne, NY 13460-1069

