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Alkaline Hydrolysis

An End-of-Life Alternative

by Kent A. Kruse, DVM

The recently published **2016 AAHA/IAAHPC End-of-Life Care Guidelines for Dogs and Cats** is an excellent and thorough reference for veterinary healthcare team members. As pets enter the end-of-life stage, owner caregivers depend heavily on the compassionate treatment and advice that can be best provided by veterinarians and their team members. This advice is particularly important to alleviate concern about the treatment of their pet's body after the pet has died.

Certainly, veterinarians have considerable knowledge and experience about burial and flame cremation. But because alkaline hydrolysis (AH) has only recently become commercially available for pets, this alternative to cremation may be unknown to pet owners. This article is intended to provide veterinary team members sufficient background information to confidently discuss the AH alternative with grieving clients.

What Is It?

Aquamation is one of several brand names for the scientific process known as alkaline hydrolysis. As applied to the treatment of pet remains, AH is the acceleration of the natural body decomposition through a combination of gentle water flow, temperature, and alkalinity.

The AH process mimics tissue degradation, which occurs naturally when bodies are buried in the earth.



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The process reduces the body to its basic building blocks (amino acids, small peptides, sugars, and salts) dissolved in water. The only solid remains are the mineral ash of the bones. The AH process mimics tissue degradation, which occurs naturally when bodies are buried in the earth and subjected to the effects of insects and soil bacteria.

In addition to the treatment of pet remains, AH has other potential applications, such as the disposal of laboratory tissue from research and diagnostic laboratories and for the treatment of contaminated large animal or fowl carcasses when highly infectious disease entities are either suspected or confirmed.

History

The first US patent for the AH process was issued in 1888, but the patent for the first commercial "tissue digesters" was not issued until 1994. The first units were installed in medical colleges and research facilities, including veterinary diagnostic laboratories. Because the AH process destroys all infectivity of viral and bacterial entities within tissue, digester units quickly began to be installed and utilized in a variety of research and medical centers in the United States, Japan, Scotland, Ireland, Europe, and Canada. By 2003, a total of 29 such units had been installed worldwide and were fully functioning. By 2006, more than 60 digesters had been installed in various veterinary diagnostic laboratories in the United States alone, according to Joseph Wilson, CEO of Bio-Response Solutions.

In 2005, the Mayo Clinic installed the first single-body, human AH system

to be put into commercial operation. In 2008, the first unit for pet end-of-life purposes was installed at a pet crematory in Ohio.

As a result of the success of the Mayo Clinic operation, individuals within the funeral industry began to take notice, and in 2010, a Columbus, Ohio, funeral home installed the first AH commercial unit for funeral use. Presently, the AH process for funeral disposition has been approved for the after-life treatment of human remains in 15 states and 3 Canadian provinces. AH is under regulatory review by the departments of health in other states as well. For human use by institutions such as the Mayo Clinic and for pet and institutional applications, the AH process is allowed in all 50 states and Canadian provinces, Wilson says.

Present Usage in Veterinary Medicine

Since the first Ohio installation of a pet AH unit in 2008, it is estimated that more than 60 such units are currently in use in the United States. The owners of AH pet systems include humane societies, private providers of AH services to veterinary hospitals, pet crematories offering a choice of flame cremation or AH, and some veterinary hospitals. The utilization of these units is supported by an estimated 3,000 or more veterinary practices offering the AH choice to pet owners.

Jerry Shevick, CEO of Peaceful Pets Aquamation in Newbury Park, California, offers AH services to veterinarians in the Southern California area. Shevick noted that "knowledgeable pet owners have been overwhelmingly selecting



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Comparison of cremation ashes and AH bone granules. The lack of carbon charring with AH results in a more consistent granule size and color. (Courtesy of Peaceful Pets Aquamation)

Aquamation" because it is a totally green process, provides a gentler handling of their pet, and costs about the same as cremation.

According to Shevick, some veterinarians, responding to the positive acceptance of AH by pet owners, have stopped offering flame cremation as an end-of-life option.

Veterinarians who specialize in making house calls report an increasing percentage of their practice services are responding to pet owners who want their pets to receive pain-free hospice care. It naturally follows that many also prefer their pets to end their lives in the comfort of home, in familiar surroundings with their human family around them. The gentleness and ecofriendly nature of AH, as an end-of-life solution, is particularly appealing to these pet owners.

With the increasing appeal of a gentle and green technology and the sparse availability of AH services, some veterinarians are assessing the financial feasibility of purchasing and installing AH equipment. They view the investment as a convenient means for providing the service to

their clients. The successful financial investment in AH equipment also requires an investment of time, space, infrastructure, payroll, and marketing expertise to support the volume of usage required for profitability. Consultation with those already commercially successful in providing AH services would be wise to consider.

How AH Works

The equipment used in the AH process is somewhat technical in nature but is highly automated and uncomplicated to use. Currently, the primary manufacturer of AH equipment provides units that vary in capacity from 16–96 compartments. Compartments can be adjusted to accommodate the varying body size of individual pets and are designed to assure no mixing of bones from one compartment to another. The units require a source of electricity, water, and the ability to carefully drain the units into either the municipal sanitation system or a holding tank. On average, the processing time is about 20 hours. It is estimated that the labor time is about 1.5 hours to load, unload, and prepare the bones for drying, according to Bio-Response Solutions literature.

Once started, the operation of the unit is automatic and does not require the presence of an attendant. A combination of gentle, heated water circulation and alkalinity accelerates the natural process of decomposition. At the end of the 20 hours, the remains are reduced to a solution of small peptides, amino acids, and salts. The only solids remaining are bones and mineral ash, which are rinsed, dried over a period of two days, and processed to granules. Alkaline hydrolysis returns about 20% more remains than provided by flame cremation. Because there is no carbon discoloration from burning, the processed bone granules are lighter in color, similar to white beach sand.

There are no emissions or harmful discharges from AH installations. As a result, local licensing requirements for AH installations are somewhat less onerous than those for flame cremation. Because of heightened pollution awareness, it is predicted that new or replacement cremation equipment may not be eligible for licensing, which makes AH a logical alternative.

It is important to research municipal regulations early in the investigatory process and before making an equipment investment.

However, municipalities do have disposal statutes regulating the levels of the various components found in AH effluent. Therefore, it is important to research those regulations early in the investigatory process and before making an equipment investment. Again, seeking the advice of someone experienced in the

operation of AH equipment can ease the approval process.

Advantages of Alkaline Hydrolysis

1. AH is simply an acceleration of the natural process of tissue degradation.
2. AH completely hydrolyzes both RNA and DNA.
3. AH requires 90% less energy than that used for flame cremation.
4. AH creates zero emissions of harmful greenhouse gases.
5. AH destroys all pathogens, including prions (transmissible spongiform encephalopathies).
6. AH converts chemotherapy drugs to harmless, biodegradable derivatives.
7. The AH hydrolysate (effluent) is an excellent form of fertilizer for crops or trees, or a nutrient source for anaerobic or aerobic sewage treatment plans. It is not harmful to the environment in any way.
8. Approximately 20% more remains are available to be returned to the pet owner than provided by flame cremation.
9. The bone granules are aesthetically more acceptable than the ashes resulting from cremation and are completely nontoxic to soil or water.
10. AH is generally perceived to be a gentler process than flame cremation and hence is often more appealing to pet owners.



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11. The cost to the pet owner for AH services is similar to that of flame cremation.

AH Concerns

While there are no negative technical concerns associated with alkaline hydrolysis, pet owners and veterinarians may have personal feelings about the technology based on how they would want their own earthly remains treated after death. As an example, individuals with claustrophobic tendencies may not

be comfortable with the thought of a traditional casket burial. Others, who have been taught about the fires of hell, may be reluctant to consider flame cremation.

In comparison, having one's earthly remains gently placed in a circulating bath of a heated, aqueous solution may be a comforting alternative. In

fact, funeral directors have reported that when the alkaline hydrolysis option is explained and offered to family members arranging for funerals, alkaline hydrolysis is selected over flame cremation approximately 80% of the time, Wilson reports. Similar acceptance is reported when veterinarians offer a choice to pet owners.

To be able to offer both a gentle and ecofriendly option to pet owners is a win-win for the veterinary profession.

Selecting an After-Death Service Provider

Marty Becker, DVM, noted author and speaker ("America's Veterinarian"), recently wrote that "unlike most other healthcare professionals, we provide cradle-to-grave care, and when it works like it should, a 'good death' is the bookend to a 'good life.'"

Becker points out that "the veterinary community mostly chooses who to use for these [after-death] services based on cost, or rebates, or seemingly at random" ("A Positive End to a 'Good Life,'" *Veterinary Economics*, July, 2014). The selection is also often based on loyalty to a veterinary-owned, after-care facility.

While supporting after-death services provided by a veterinary colleague is valid, there are other important factors to consider:

- Are deceased pets, including those receiving communal cremation or AH, gently handled with respect?
- Are pet remains transported in an enclosed, refrigerated van, and equipped with shelves to avoid "piling"?
- Does the provider utilize a gentle, low-energy-consuming process?
- Are the fees reasonable?
- Are those cremains or "aquamains" intended to

be returned to the pet owner properly marked to guarantee identity integrity during processing?

- Are paw-print impressions provided?
- Does the company provide a reasonable selection of containers or urns for the appropriate memorialization of a deceased pet? (Note: Paint cans are *not* acceptable!)
- Are pet remains returned by the service in a reasonable time?
- Is internet tracking information of the pet remains process available to either the veterinarian or pet owner?
- Has a practice representative visited the after-death facility so pet owners can be personally assured of the dignity and respect provided by the end-of-life process?

Veterinarians understand that while death results in a physical separation of the human-animal bond, memorialization of pet remains is important to the pet owner in maintaining the *emotional* bond to the pet. Veterinarians and team members are part of the emotional experience of those final moments, which emphasizes why the respectful treatment of a pet is so important through the end-of-life event and continuing until the pet remains are returned to the owner.

It should be cautioned, however, there may be a negative reaction to the mistaken belief that, with AH, the remains are dissolved by an acid-like solution. When it is understood that tissues are not destroyed but "disassembled" into very basic components (amino acids, small peptides, sugars, salts) in an alkaline solution, the AH process is more comfortably accepted.

Lastly, while no religious organization has taken an official position regarding alkaline hydrolysis for humans, some individuals may reject AH because they believe the process to be "disrespectful." This attitude stems from the fact that the resulting effluent may be disposed of through a municipal sanitation system. When it is understood that AH effluent contains absolutely no DNA or any element traceable to a specific human body, those concerns are usually minimized.

Conclusion

The 2016 AAHA/IAAHPC *End-of-Life Guidelines for Dogs and Cats* provide full recognition and valuable details on the complex end-of-life process in pets. Veterinarians now routinely provide pain management for pets in their final days, guide pet owners to hospice services, design specialized grieving rooms, and offer in-home euthanasia services. Team members help pet owners select a gentle option for processing their pet remains, assist in providing containers for the remains, show them how they can memorialize their pets with a jewelry piece, tree, or shrub. They also recommend trusted grief counselors. Because veterinarians care, this is all done with honor and respect for the companion animal

whose healthy life and dignified death has been entrusted to them.

The first technical advance in decades for the after-life arrangement of pet remains is now available, albeit, on a limited basis. It follows then, that it is also the ethical responsibility of veterinarians to offer that option. We know that the flame cremation process currently utilized for both humans and pets spews tons of hydrocarbons into our atmosphere. The often-toxic cremains initially may be memorialized and stored, but will almost inevitably be returned to the earth or water. The ultimate polluting effect from scattered cremains has not been documented.

In contrast, AH is proven to be overwhelmingly ecofriendly when compared to flame cremation. It is gentle, respectful, aesthetically appealing to pet owners, and no more expensive than cremation. To be able to offer both a gentle and ecofriendly option to pet owners is a win-win for the veterinary profession. These advantages alone should be incentive to proactively encourage both the availability and the utilization of alkaline hydrolysis. ✱

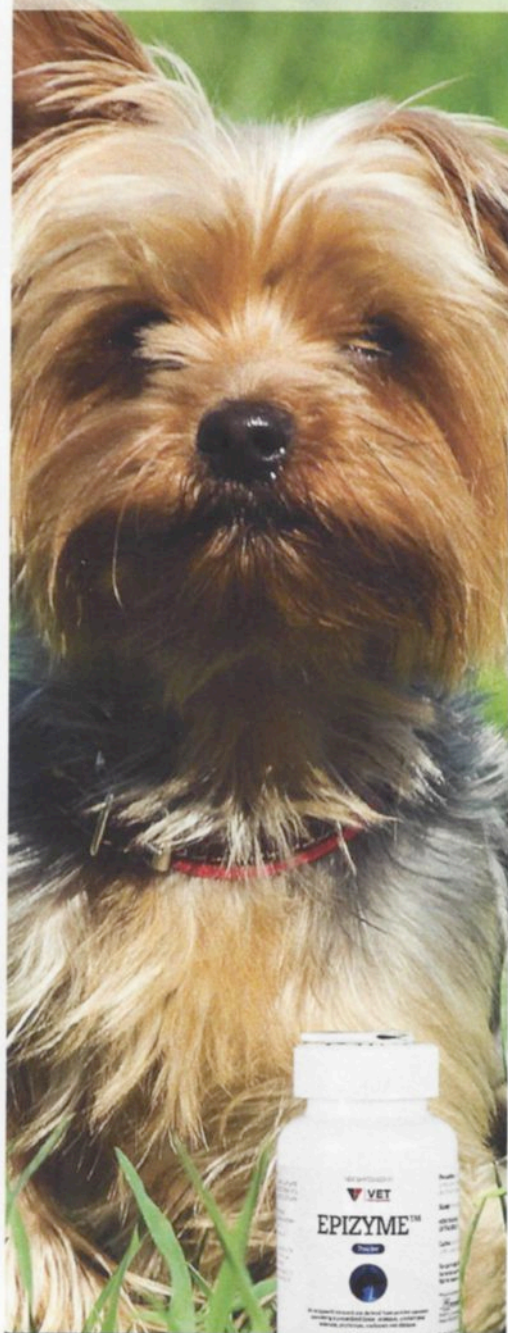


Kent A. Kruse, DVM, founded the Care Hospital for Animals in Oshkosh, Wisconsin, and was a cofounder of ImproMed, a company that pioneered the veterinary office management software industry. In recent years, he has been a frequent lecturer promoting the advancement of pet health insurance as a tool to protect the human-animal bond. He and his wife, Virginia, currently reside in Sturgeon Bay, Wisconsin.

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