

THE IMPORTANCE OF ORAL HEALTH AND ITS IMPACT ON WHOLE BODY HEALTH: METHODS OF INTEGRATIVE ORAL HEALTH CARE

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ABBREVIATIONS

AGEs - Advanced Glycation End Products

CoQ10 – Coenzyme Q10

EO's - Essential oils

LLLT - Low Level Laser Therapy

TCVM - Traditional Chinese Veterinary Medicine

VOHC - Veterinary Oral Health Council

Introduction

It is well known that oral and dental health significantly affect systemic health in both animals and humans (1, 2). It is also important to note that periodontal disease is the single most common medical problem diagnosed in small animal patients (3, 4). Despite these facts, oral disease is often overlooked in veterinary medicine, especially when it comes to addressing chronic systemic diseases. Simply put, chronic disease in the mouth continually affects the rest of the body by supplying a source of chronic inflammation as well as a bacterial burden. When using an integrative approach to health care, it is extremely important to recognize and address oral health within the evaluation and treatment planning for all patients. In addition, oral and

dental health should be considered a vital component in the focus on preventive health and wellness.

This article features a discussion of integrative approaches to improve oral health and support veterinary dental care.

Periodontal Disease

Periodontal disease is the number one health problem in small animal patients. By just 2 years of age, 70% of cats and 80% of dogs have some form of periodontal disease (5). Small and toy breed dogs are particularly susceptible (6). Despite the frequency of this health problem, it is typically under-diagnosed. This is partially due to lack of veterinary

dental education, but also because the clinical signs of dental disease are not obvious to pet owners. These issues are “hidden” inside the mouth, and often go unnoticed until later stages of disease. Clinical signs of periodontal disease include red gums, halitosis, and gum recession (**Figure 1**). Because dental problems are often not addressed until very late in the course of disease, periodontal disease may also be the most under-treated disease in animal patients. Unfortunately, unchecked periodontal disease has numerous local and systemic consequences. Local manifestations include oronasal fistulas (**Figure 2**), endodontic lesions, pathologic jaw fractures (**Figure 3**), ocular problems, osteomyelitis, and increased incidence of oral cancer (1, 7, 8) (**Figure 4**). Systemic diseases which have been linked to

periodontal disease include osteoporosis, arthritis, adverse pregnancy effects, diabetes, and renal, hepatic, pulmonary, and cardiac diseases (2).

Integrative Oral Health

In the interest of proactively supporting oral health, *host modulation* is an exciting new approach to addressing periodontal disease for both humans and animals (9). The term *host modulation* implies supporting the host (i.e., the whole patient) to control the body’s *response* to inflammation and infection. This is important because as discussed previously, although bacterial plaque is considered to be the etiologic agent of periodontal disease, it is actually the body’s response to the plaque (i.e., the ensuing inflammatory



Figure 1: Gingivitis.



Figure 2: Oronasal fistula on the maxillary right canine of a dog. Note the probe is in the nasal cavity and blood coming from the ipsilateral nostril despite the teeth being clean.

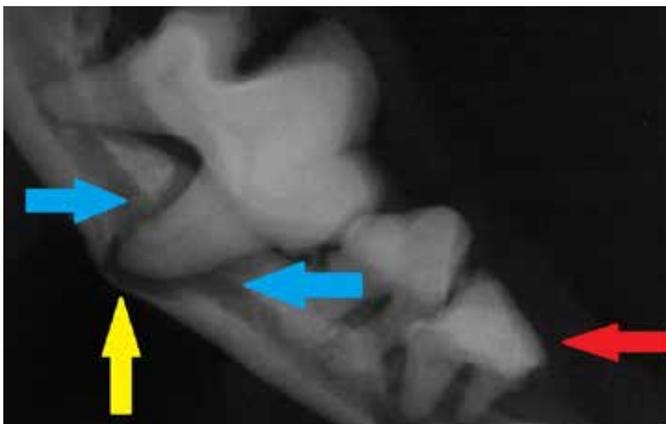


Figure 3: Example of high risk for pathologic fracture at mandibular right first molar in a small breed dog. Advanced alveolar bone loss has occurred as a result of periodontal disease (blue arrows), leaving less than 0.3 mm of bone remaining currently at the apex (yellow arrow). The third premolar is maintained in the arcade only due to the calculus bridge attaching it to the fourth premolar (red arrow).



Figure 4: Large oral mass on the maxillary right of a dog.

Figures 1-4 courtesy of Brook A. Niemiec DVM, DAVDC

cascade) that ultimately leads to periodontal disease and resultant bone loss. This means that if the acute inflammatory response can be resolved quickly, tissue injury is prevented. Alternatively, inadequate resolution and failure to return the tissues to homeostasis result in chronic inflammation and eventually periodontal disease.

There are many options available to affect host modulation and to assist the body's ability to combat gingival and general inflammation. Not surprisingly, supporting oral health starts with the same foundation as general health, namely diet and nutrition.

Diet and Nutrition

Diet and nutrition choices are paramount in overall health, including dental health. Although most of us were taught to believe that dry pet foods were beneficial to dental health, this has been disproved in specific studies (10). In fact, most kibble is too small to require any chewing action, and even when chewed it provides minimal cleaning of calculus (tartar) and only on the incisal tips of the teeth. In other words, chewing kibble does not promote cleaner teeth at the gum line, where it really matters. This myth stemmed from the belief that tartar was the best indicator for the level of oral disease. However, it is now known that gingival inflammation is a more accurate indicator for the level of oral infection. Beyond the fact that dry foods do **not** provide a mechanical "cleaning" benefit, these foods are also heavily processed via extrusion methods (high heat and pressure). Heavy processing creates Advanced Glycation End Products (AGEs), which are known to be pro-inflammatory. This means that heavily processed foods actually fuel inflammation in the body, including in the mouth and oral tissues.

Consequently, un/low-processed species-appropriate diets can be a critical piece of overall wellness in addition to oral health and general resistance to chronic inflammation. There is speculation that raw foods contain enzymes that provide an advantage for resistance to bacterial plaque as well, but this has not been proved in studies. Raw meaty bones do provide an active chewing and gum cleaning advantage. Cooking bones changes the texture to a more brittle nature, which creates a danger in the potential to splinter and cause GI perforation. Another concern regarding bones in general is the risk of damaging/breaking teeth. Veterinary dentists report that large-sized raw bones such as marrow bones rarely cause broken teeth. This is in contrast to small

and thin long bones and similar shaped objects, which are common culprits in damaging teeth. This has to do with canine oral anatomy and the physics of mastication as the dog's teeth are positioned against the object being chewed. Larger, bulky objects do not create the same angle and force on the carnassial teeth, as do smaller and longer objects. Common items seen to break teeth are nylon bones, cooked bones, antlers, hooves, and bully sticks.

In addition to the impact that type of diet has on oral health, various nutrients and nutraceuticals can help to modulate both oral and systemic inflammation (see below).

Antioxidants

Recent studies have linked chronic oxidative stress with periodontal disease (11). Oxidative stress can be defined as free-radical damage to the body's cells/tissues. In fact, proper equilibrium between free radicals and antioxidants is now thought to be the main prerequisite for healthy periodontal tissues. As such, antioxidants can play an important role in periodontal health and offer protective benefits (12).

Coenzyme Q10 (CoQ10) has been found to have specific association to periodontal disease in human patients, and supplementation with CoQ10 (both systemic and topical) shows beneficial effects on periodontal health (13-17). *Ubiquinol* is the bioactive form of CoQ10 and is therefore the preferred form for a dietary supplement. Folic acid is another nutrient studied for its effects on oral health and is demonstrated effective in preserving gum tissue and reducing the incidence of gingivitis and periodontitis (18).

Fatty Acids

Recent studies on the use of fatty acid supplements have shown beneficial results in periodontal inflammation (19-24). The anti-inflammatory actions of *Omega-3 fatty acids* are widely known for their joint benefits, but they have also been shown to support periodontal, heart, kidney, and brain health, too. Furthermore, due to the high epithelial penetration of fatty acids, topical application appears to be very useful for the treatment of local oral inflammatory diseases, including periodontitis.

A particular fatty acid called *1-tetradecanol complex (a)* is an esterified monounsaturated fatty acid that has shown very positive effects when applied topically to the gingiva. Studies (in rabbits) showed that it stopped the progression of

periodontal disease and resulted in a significant reduction in macroscopic periodontal inflammation, attachment, and bone loss (25, 26). In addition, histologic assessment demonstrated that it inhibited inflammatory cell infiltration and *osteoclastic* activity. This product offers a proactive approach to support host resilience to inflammation and therefore minimize the progression in the periodontal disease cycle. (It is worthwhile to note that 1-tetradacnal complex also has a high affinity for joint and muscle/tendon/ligament tissues and is delivered to those tissues systemically after oral absorption or ingestion).

Other nutrient/food based supplements

In some patients, such as small breed dogs that are prone to periodontal disease, it may be beneficial to provide specific nutrients to support bones (jaw), connective tissue, and the immune system. One veterinary-labeled product (b) has been designed to provide specific nutrients to support oral health.

Probiotics

The benefit of probiotics in supporting both gastrointestinal health and the overall immune system is the subject of growing focus. The mouth and oral cavity are indeed part of the gastrointestinal tract. Furthermore, the body's microbiome plays a critical role in systemic immune system function and in chronic inflammation. Recent information supports the use of probiotics both orally and topically to support oral health. Canine and human studies report significant results with reduced probing depth of periodontal pockets and decreased periodontal inflammatory mediators with the use of orally ingested and topically applied probiotics (27). Topically applied beneficial bacteria will form colonies that create a healthier biofilm in the mouth and thus help crowd out the bacteria that cause the harmful inflammation leading to periodontal disease.

Active Plaque Removal

It would be remiss not to cover one the most effective proactive methods of supporting oral health, which is back to the basics of plaque removal. Regular professional dental cleanings are extremely helpful if done properly and include subgingival scaling, as it is estimated that 60% of oral pathology is located under the gumline.

Regarding home care options, the most effective way to achieve plaque removal is with regular tooth brushing (28).

The product used on the toothbrush is not as important as the mechanical action of disrupting (wiping away) the plaque biofilm.

That said, a few natural products that can be useful when applied directly onto the gums or used on a toothbrush include coconut oil and/or therapeutic grade essential oils. Coconut oil is rich in medium chain triglycerides and lauric acid, making it antimicrobial in its own right; but it has also been shown to help draw out toxins when used on the gums, most notably with the process of "oil pulling," which is becoming increasingly popular for people to do.

Many essential oils (EOs) are known to be antimicrobial, anti-inflammatory, pain relieving and/or specifically beneficial for oral tissues and mucous membranes. Medical literature supports the use of several different EOs for treatment of oral diseases. This list includes clove, lemon, orange, basil, eucalyptus, tea tree, myrrh and copaiba. It is important to note that for EO use in any species, only therapeutic grade oils from reputable manufacturers should be employed. Even with pure EOs, caution must be used with proper dilution, depending on the use, route of application, species, and size of the patient. Most EOs should be diluted with fractionated coconut oil or another carrier oil (especially when using in cats), and proper references should be consulted for safe dosing and application techniques. A particular EO blend has been formulated specifically for gingival application to support oral health in dogs and cats (c) and contains fractionated coconut oil, copaiba, peppermint, helichrysum and myrrh. While some practitioners have concerns regarding any use of EOs in cats, this author has properly used EO products safely in cats on a regular basis with no adverse effects.

For a list of other products (some made with natural ingredients) that have been shown to be effective in the prevention or management of gum disease and have obtained the Veterinary Oral Health Council (VOHC) seal of approval, please visit VOHC.org.

It can be expected that many pet owners are not likely to perform active dental care for their pets on a daily basis, but they are certainly less likely to make that effort if they are not educated as to the value it can provide to the health of their pet (especially for small breed dogs). With more focus placed on client education regarding the importance of

oral health on total body health, compliance rates would be much higher (29). As our knowledge increases regarding the impact of periodontal health on systemic health and the role of chronic inflammation in the progression of illness and disease, it becomes more important to educate clients about the various proactive options they have in providing better oral health, and thus overall health, for their pets.

Acupuncture and TCVM

It has been well documented that acupuncture can produce analgesia via the release of endorphins, serotonin, and endogenous opioids (30-32). In fact, evidence-

based studies have reported that acupuncture improves circulation, reduces pain and inflammation, and affects the autonomic nervous system. This is compatible with the efficacy of acupuncture for pain relief by moving qi and activating *blood*, as described in Traditional Chinese Veterinary Medicine (TCVM) theory.

Many different acupuncture points can be used to treat dental pain or inflammation, or as part of a peri-operative treatment plan. Common choices may include LI 4, ST 6, ST 7, ST 36, and ST 44. (Figures 5 and 6).

LI 4

LI 4 is the source (Yuan) point of the Large Intestine meridian.

It is involved in heat and clearing and fire purging (i.e. pathogenic or inflammatory heat/fire) and moving qi to relieve pain. This acupoint is often used to treat oral pain or headaches.

Inserting a needle (or providing acupressure) at the LI 4 point stimulates the radial nerve. The radial nerve connects to the spinal cord at C5-C6, and this area overlaps with the trigeminal nerve as it enters the cranial nerve nuclei on the brainstem. This connection demonstrates anatomically and physiologically how stimulating this point can affect headaches and oral pain.

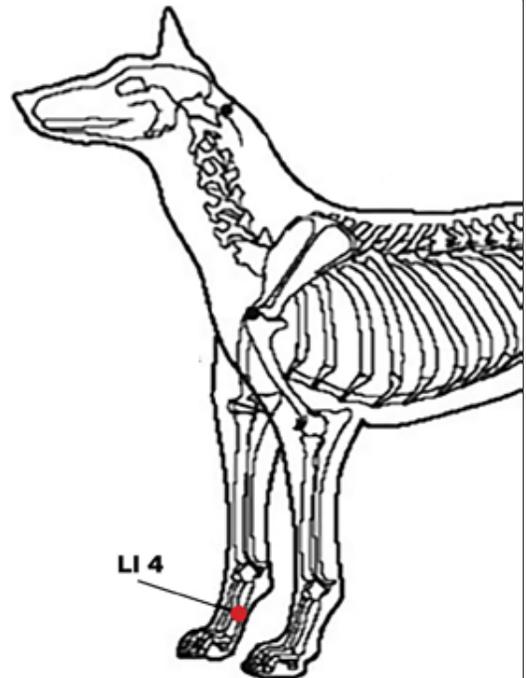
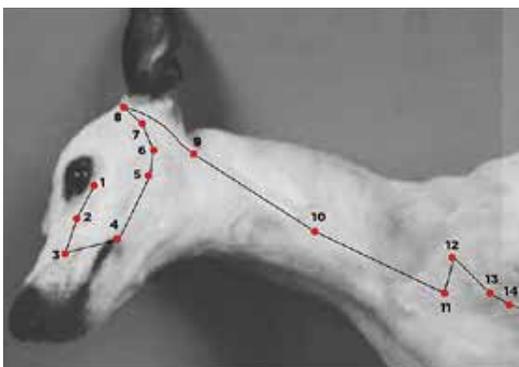


Figure 5: Large Intestine (LI) 4 acupuncture point.

ST Channel Acupuncture Points



ST 6 is associated with eliminating *wind* from the face and is commonly used for TMJ problems, toothache, and facial pain or paralysis.

ST 7 is used to affect TMJ, facial pain, lower jaw, gingivitis and tooth ache.

ST 36 is the sea (He) point of the stomach meridian. It affects freeing meridians and collaterals, thus tonifying and harmonizing *qi & blood*. Stimulating this point helps to reinforce healthy qi and eliminate pathogenic factors.

ST 44 is the Ying point of the stomach meridian. It is involved in heat clearing and fire purging as well as moving qi to relieve pain.

Figure 6: Stomach Meridian acupuncture points .

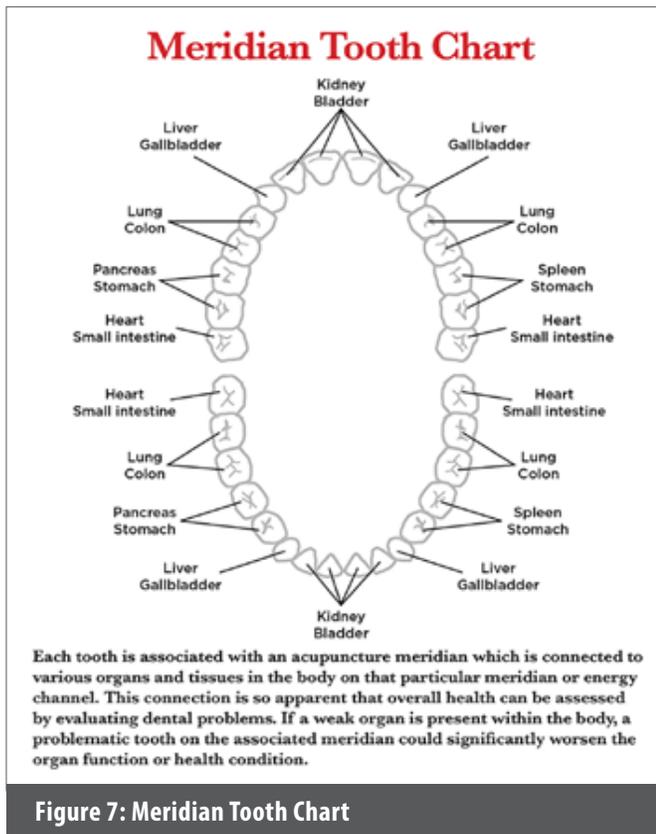
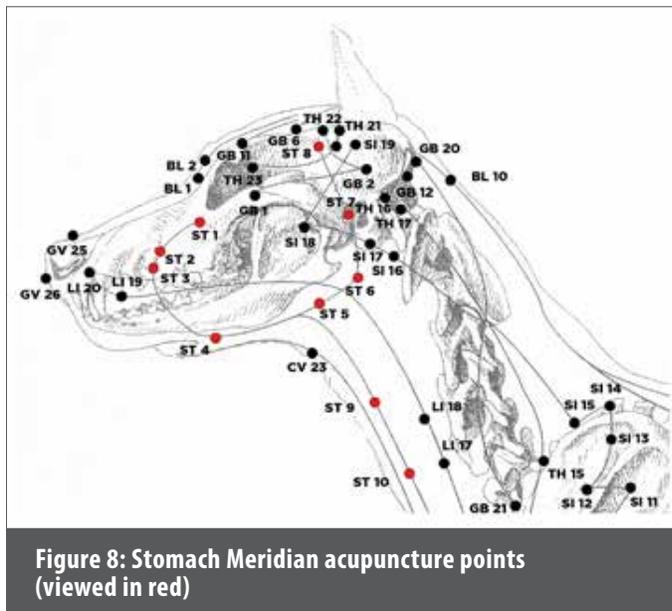


Figure 7: Meridian Tooth Chart

According to TCVM, infected or diseased teeth can affect organs on the same meridian, and conversely, dysfunction in a specific organ may lead to a problem on the corresponding tooth. This can be illustrated by a dental meridian chart, as is often used in biologic (holistic) human dentistry. (Figure 7) It can also be understood by looking at the acupuncture meridians that run through the head and neck and which are closely associated with oral and dental tissues. The Stomach (ST) Meridian runs across the lower portion of the cheek, winds along the mandible, and ascends in front of the ear, reaching the forehead. (Figure 8) Note that the facial branch of the Stomach meridian descends down the throat, passes through the diaphragm, enters the stomach, and connects with the spleen. The Large Intestine (LI) Meridian runs upward to the neck, passes through the cheek, and enters the gums of the lower teeth before it curves across the upper lip and crosses the philtrum. Looking at these relationships can explain why, for instance, ST 44 is listed to have indications for not only treating “stomach heat” such as acid indigestion and stomach ulcer, but also for treating tooth abscess. As such, it can be important to remember these relationships when addressing patients with a TCVM approach, but is also important to recognize that dental disease may be the root cause (or involved) with disease patterns of other organ systems.



Herbal Medicine

There are many herbal medications that could be used to treat a variety of oral diseases. Chinese herbal formulas should be chosen according to the patient’s individual pattern and complete assessment. Western herbs and specific single herbs can be chosen to address pain and inflammation, and also to improve healing. Common choices to help manage dental pain or peri-operative support may include California poppy (*Eschscholzia californica*), Corydalis root (*Dicentra yanhusou*), Boswellia (*Boswellia serrata*), Turmeric (*Curcuma longa*) and CBD (*Cannabinoid*) oils to name a few.

Yunnan Baiyao is a commonly used Chinese herbal formula that is well-known for its hemostatic effects. It is effective for either acute or chronic bleeding, and is often used peri-operatively for procedures where significant hemorrhage is expected. In regard to oral surgery, this may include procedures such as surgical extractions, maxillectomy, mandibulectomy, and jaw fracture repair. Yunnan Baiyao does not interfere with Western sedative drugs and can be given the same day of surgery. It is often started a day or 2 prior to surgery and continued for a few days post-operatively. When used in this manner, it has been shown to decrease hemorrhage during orognathic surgery (33). In addition to its hemostatic effects, the Yunnan Baiyao formula also provides anti-inflammatory and analgesic properties (34).

Laser Therapy

Cold laser therapy, also called Low Level Laser Therapy (LLLT), can be used to improve tissue repair and to reduce

pain and inflammation (35). LLLT works through the principle of photochemistry or photobiomodulation, as the mitochondria within cells are capable of absorbing distinct parameters of light. Laser stimulation can promote cellular energy production, specific biochemical reactions, and enhance the flow of blood and oxygen. LLLT can therefore be utilized to speed healing of oral tissues and support post-operative recovery from dental procedures (36). Laser treatments can be done immediately post-op and ideally repeated a few times over the following several days.

Ozone Therapy

For many years now, ozone has been a regular inclusion in human dental offices across Europe. In the past few years, the U.S. has caught on to the benefits of this natural element, and it is now being used in more human dental offices throughout the country. Ozone is beneficial because it is an oxidant, also called an oxidizer. Healthy cells have antioxidant enzymes in their cell membranes, such as glutathione peroxidase, superoxide dismutase, and catalase. There are also antioxidants such as vitamin C and vitamin E present in the extracellular matrix, fluids and plasma. These antioxidants protect the healthy cells from being oxidized by

ozone. On the contrary, pathogens such as bacteria, viruses, fungi, and parasites have little or no antioxidant enzymes in their cell membranes. This makes them vulnerable to oxidants. In this way, an oxidant (ozone, chlorine, etc.) will destroy the cell membrane of the pathogen, resulting in a disinfecting or sterilizing effect. In fact, one molecule of ozone will kill the same number of bacteria that requires 3,000-10,000 molecules of chlorine for the same effect, and ozone kills them 3500 times faster than chlorine (37). Furthermore, ozone leaves no toxic residues like chlorinated products. The final breakdown products of O₃ are water and oxygen. This means that ozone therapy is not only extremely safe but also very useful in oral therapies. The therapeutic effects of ozone go well beyond its ability to kill various pathogens. Studies have showed that therapeutic doses of ozone increase the delivery of oxygen to tissues, even those that are hypoxic (38). Additionally, ozone improves the immune system response and leads to better tissue healing. Ozone can be utilized as either a gas or liquid form, and can be applied to gum tissue to address gingivitis and gum disease, killing pathogens and facilitating healing. For example, ozonated gas can be injected around an infected tooth. Ozonated saline can be used as a gingival rinse and/

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or to flush periodontal pockets before and after dental cleaning. Another option includes applying ozonated olive oil onto the gums post-operatively as a home care protocol.

Homeopathy

A review of the human literature finds that homeopathy can be a useful adjunct in patients with chronic periodontitis (39). It can also be useful for treating other oral diseases, in addition to addressing oral pain and supporting recovery from surgery. Homeopathic medicines to consider for dental use may include *Arnica montana* (d), indicated for pain, inflammation, swelling and bruising. This makes such formulas beneficial for post-operative swelling, extractions, and gum surgery. *Hypericum perforatum* is commonly used for nerve pain, toothache, facial trauma and post-operatively. *Belladonna* may be used for acute gingival swelling or tooth abscess associated with redness, inflammation, and throbbing. *Ferrum phosphoricum* may be a good choice for post-surgical

bleeding following extractions or gingival surgery.

Conclusion

Periodontal disease is the most common medical problem seen in small animal patients. With increased knowledge regarding the impact of periodontal health on systemic health and the role of chronic inflammation in the progression of illness and disease, it is becoming very important to recognize oral and dental health as a vital piece of whole body health. An integrative medical approach offers many options to support oral health, treat dental disease, and complement veterinary dental procedures. 🌿

Acknowledgements

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ENDNOTES

- a. I-TDC, Elite Science
- b. Biodent, Standard Process
- c. Dog Breath, Animal EO's.
- d. T-Relief (Traumeel) - MediNatura

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