Inside the Bacteriology Laboratory: Meet MALDI

For the past year, the staff in DCPAH’s bacteriology section have been working with a new member of their team—a Matrix-Assisted Laser Desorption Ionization-Time of Flight Mass Spectrometer affectionately referred to as MALDI. What? You might think it’s a little strange to think of a piece of equipment as part of the team, but MALDI has proven to be a key player in improving productivity, turnaround time, and confidence of results. How? MALDI identifies microorganisms by measuring the patterns of proteins and matching those patterns to an extensive database. MALDI is able to identify microorganisms down to the species level.

Using MALDI doesn’t alter the beginning of the lab’s workflow. Samples that come into the bacteriology section are set up for culture on the appropriate culture plates. The next morning, cultures are examined by lab technologists. A small amount of the isolated colonies is applied to the MALDI plate (which has 96 wells). An acid matrix is then applied and the plate is ready. Inside MALDI, a laser targets each well and the resulting particles accelerate into the flight tube, are detected, and the result displayed in a spectrum.

The work that in the past could take days to up to a week (or even longer) can be done reliably by MALDI in a matter of minutes. Even though it may seem like it could, MALDI does not replace the need for skilled and experienced laboratory staff. In addition to setting up culture and MALDI plates, results must be reviewed and interpreted. MALDI allows technicians to quickly separate normal flora and/or contaminants from potential pathogens. In fact, the technologists feel that MALDI is able to identify more organisms to the species than with traditional methods and because MALDI’s database is tied into the National Institutes of Health, the nomenclature is up-to-date. In addition, as new pathogens are found in laboratories like DCPAH that are using MALDI, they can be added to MALDI’s open database. The time saved by using MALDI can be reinvested in professional development and collaboration—further innovation and staying current on emerging pathogens and other important topics.

For DCPAH’s clients, the speed at which identification can be done using MALDI means that results arrive sooner. In some cases, having an ID sooner can be the difference between life and death. Based on early ID, some clients may choose to treat empirically while waiting for susceptibility results.

Bacterial identification is always a probability, but MALDI raises the percentage of the probability which makes the staff in the bacteriology lab more confident. It feels better to have an even more concrete, higher percent probability for results provided to clients. DCPAH’s bacteriology section has always been proud of its work, but with MALDI as a part of the team, it’s gone to a whole new level.

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Unforeseen Toxicities Associated with a Pure Essential Oil Commonly Used for K9 Nose Work/Scent Training

By: Cheryl Swenson, DVM, PhD, Dipl ACVP (clinical pathology), Angie Davison, John Buchweitz, PhD

“Scent training” or “nose work” is an activity gaining popularity among dog training enthusiasts. Dogs are coached to locate target-scented objects (with applied essential oils) using their sense of smell. The most commonly employed scents are anise, birch, and clove. Typically, small amounts of these oils (diluted to 25% or less of their original concentration per label instructions) are used within enclosed containers to reduce the chance of accidental ingestion. It is alarming that users frequently assume these commercially available scents are safe but should know that the industry is unregulated. In addition to the toxicity of some oils, in particular birch, there is the potential for targeting items of a similar scent which are also toxic to dogs.

A concern that arises from this type of training is accidental poisoning, which may result from promiscuous interest and oral evaluation of the scenting-agent bottle. In addition, uninformed handlers of the undiluted material and container, especially children, may be at risk of inadvertent toxicity. Although birch oil may be toxic to both animals and humans if ingested or dermally absorbed in concentrated form, vendors often endorse its beneficial properties, “Birch oil has a medicinal yet refreshing wintergreen aroma that’s very invigorating. Helps soothe minor muscular aches and pains,” while offering a relatively gentle caution, “FOR EXTERNAL USE ONLY. Keep out of the reach of children and away from eyes. Highly concentrated. Always dilute before use. Harmful in concentration, use sparingly.” (Wyndmere Naturals, Inc., Minnetonka, MN).

Other vendors have issued strongly worded warnings about its toxicity, e.g., Pure Pro (Greenfield, MA); Nature’s Gift (Madison, TN); Nature’s Kiss Products (natureskissproducts.com); and Young Living Therapeutic Oils (younglivingtherapeuticoils.com). Of particular note is this excerpt from Pure Pro’s description of their birch oil:

IMPORTANT: Birch should be used by trained health professionals only. For your safety, we strongly recommend that Birch be used solely for diffusion into the air. Birch is toxic and can be poisonous - never ingest or use internally in any way. If applied topically, dilute into a carrier oil or lotion and use very sparingly and cautiously due to its methyl salicylate content (the same ingredient found in aspirin). DO NOT use Birch if you are allergic to aspirin. If you are taking medications containing methyl salicylate, including aspirin, do not use Birch to prevent overdose. Those taking blood thinning medications, those with high blood pressure, pregnant women, and children should not use Birch. Absolutely keep away from pets and store out of children’s reach! (purepro.com/298)

Additionally, newsletters and magazines for the aromatherapy community have included articles on its toxicity, e.g., AromaticSage (aromaticsage.com/poison).

Concerns regarding canine scent training are twofold. First, the toxicology laboratory of the Diagnostic Center for Population and Animal Health at the Michigan State University College of Veterinary Medicine confirmed a highly toxic concentration of methyl salicylate, an aromatic compound reminiscent of wintergreen with a similar structure and toxicity profile to aspirin (acetylsalicylic acid), in birch oil obtained from an online...
source linked to canine scent training. The wide constellation of clinical signs warranting consideration of possible birch oil (methyl salicylate) toxicity in a patient involved in scent training include: a greenish smell (hair coat, skin, breath, vomitus), face rubbing, vomiting, diarrhea, gastrointestinal erosions, anemia, acute kidney failure, respiratory depression, lethargy, seizures, coma, and death.\(^1\)\(^2\) Secondly, this scent is frequently incorporated into commonplace food items (e.g., sugar-free chewing gum) that often contain another chemical (xylitol) that is safe for human consumption, but toxic to dogs. In fact, all three commonly used training scents have been incorporated into chewing gums and thereby may promote the unanticipated risk of xylitol poisoning.

Therefore, it is recommended that alternative non-toxic scent(s) be actively sought to ensure safety for people and pets during the enjoyable human-animal bond activity of training dogs to locate odors. Although no toxins were identified in the anise and clove scents, these aromas are present in gums that may contain xylitol and foods intended for human consumption that may cause pancreatitis and gastrointestinal distress. Wyndmere Naturals, Inc. and other vendors of essential oils offer a wide array of floral and other scents that would not encourage dogs to seek food sources with similar odors. It is recommended that safer target scents be identified using the following criteria: 1) the plant form must not be poisonous and 2) candidate scents should be tested to rule out the presence of unanticipated toxins prior to use.

Owners or trainers suspecting birch oil poisoning should immediately contact their veterinarian or the Pet Poison Hotline 800.213.6680.

References:

Thank You, Client Input Matters at DCPAH

This spring, we asked you, our clients, to complete a brief survey to help us to learn more about what it’s like in your workplace, what’s important to you, and what you think about DCPAH. We spent the summer reviewing the results and determining ways that we can turn those insights into action items that can help us make your business with us even better and more satisfying. Throughout the next year, you’ll see some changes and new things we’ll be rolling out thanks to your feedback. Thank you to all of the clients who completed the survey.

What You Told Us About...

Submittal Forms. More than a third of survey respondents reported using information provided on the submittal form to look for test information. We’ve updated our general submittal form to give it a new look, make it more user-friendly, and ensure it contains the most up-to-date test information. The form is available on our website as a fillable PDF. Access it by visiting animalhealth.msu.edu and click on “Submittal Forms.” To order copies pre-printed with your clinic information free of charge, use the Product Order form (also available online with our submittal forms), check the appropriate box on the general submittal form (in the top left corner under “Supplies”), or call us at 517.353.1683. Other submittal forms will be updated as well and will be available soon.

Shipping. We know that good shipping options make your work easier and we strive to bring you the best options available. While we explore additional options, our FedEx mailers remain an excellent choice for your specimen shipping needs. All FedEx mailers include prepaid overnight weekday delivery to DCPAH. FedEx mailers are available in the following formats:

- **Individual** - not intended for use with ice packs; will hold up to six, 4ml tubes and are intended for exempt animal specimen shipments (sets of 6, 12, and 24)
- **Biopsy** - include two biopsy jars (small) or four biopsy jars (large) but do not include formalin
- **Insulated** - intended for use with ice packs and will hold multiple tissues, swabs, or blood/serum samples (single or sets of 3 and 6)

Overall, our clients rated DCPAH as good or above average in each of the 12 service areas for which we were seeking input. We see this as an opportunity to continue to improve and we’re looking forward to making changes that will make a difference for you.

In a random drawing of those who provided their contact information, one client, Saline Veterinary Service in Saline, MI, was selected as our grand prize winner and received a Drinkwell® Big Dog Fountain, care kit, and DCPAH gift certificate. Five clients (listed below) were selected to receive a DCPAH gift certificate and special DCPAH care package. Congratulations to our prizewinners!

Ada Hospital for Animals, Ada, MI | Capital Area Animal Medical Center, Harrisburg, PA | Eau Claire Animal Hospital, Eau Claire, WI | Red Cedar Animal Hospital, Okemos, MI | Two By Two Animal Hospital, Berrien Springs, MI
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Diseases in the News: Canine Circovirus

Diseases in the News: Dog Circovirus

We delayed the release of this issue of Diagnostic News to be able to include information on the diagnostic work we are doing related to dog circovirus. We began working on a PCR assay in response to recent cases in California and Ohio that may indicate the emergence of a new canine circovirus (now named dog circovirus). In early October, just as media reports emerged about possible dog circovirus here in Michigan, DCPAH added two real time PCR assays for canine circovirus to its test catalog. Running two PCRs for this virus is important as the initial research on the virus indicates some genetic variation. The PCR assay can be run on feces or fecal swab, or on fresh or formalin-fixed tissue. Our pathology laboratory is currently working on an in situ hybridization (ISH) technique which is a crucial next step. ISH is a method that uses DNA or RNA probes to detect virus in microscopic lesions.

Information on how to submit samples is available on our website at animalhealth.msu.edu. Click on “Available Tests” and search “circovirus.”

Please contact DCPAH at 517.353.1683 for more information on submitting samples for testing.

A full news release and additional information on circovirus developed by the AVMA (in collaboration with AAVLD) for veterinarians and the general public is available on the DCPAH website at animalhealth.msu.edu.