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#### **Authors**

Kittleson, Mark D  
Stern, Joshua A  
Brown, Donald J

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# Letters to the Editor

## Predicting development of subaortic stenosis in dogs

We are writing regarding the recent article by Javard et al<sup>1</sup> on the use of peak flow velocity through the left ventricular outflow tract (LVOT Vmax) versus effective orifice area indexed to body surface area (EOAi) to predict development of subaortic stenosis (SAS) in dogs. The current consensus method to assess SAS is Vmax across the stenotic region, determined by means of Doppler ultrasonography.<sup>2</sup> However, as noted by the authors, Vmax depends directly on both stenotic orifice area (the variable of interest) and the flow rate through the orifice. This means that Vmax cannot be considered a gold standard for determining stenosis severity. Distinguishing between unaffected dogs and those with mild SAS has been a substantial clinical problem since the advent of Doppler echocardiography in veterinary medicine. In an attempt to circumvent this flow-dependence issue, the authors used the continuity equation to calculate the functional cross-sectional area of the stenosis and indexed it to body surface area (EOAi). Although EOAi is theoretically less dependent on flow, its determination is prone to errors.<sup>3</sup> In their study, the authors compared one index to the other (neither of which is a gold standard) and combined the two indices in an attempt to improve diagnostic accuracy, both in puppies during the developmental stage of SAS and in adult dogs.

The study included dogs that were clearly affected and that were clearly unaffected. Because such dogs are easily identified through the use of current methods, they are of less interest. Instead, improving the diagnostic accuracy for equivocal and mild cases is of primary interest. Consequently, we believe that one of the most important findings of this study was one the authors noted in the third paragraph of their discussion and show

in Figure 3: that EOAi did not help determine whether adult dogs with an equivocal Vmax were affected with SAS.

Second, the authors conclude that the combination of Vmax and EOAi “may result in higher sensitivity for SAS screening” in puppies. The authors report in their discussion that there were 6 puppies with an equivocal Vmax (ie, Vmax between 1.58 and 2.08 m/s) that were subsequently defined as having SAS as adults. However, only 1 of these puppies had a low EOAi, whereas the other 5 did not. Thus, the resultant increase in sensitivity from 63% (10/16) for Vmax alone to 69% (11/16) for the combination of Vmax and EOAi was a result of this single puppy and was not significant. Consequently, we also believe that data from this study indicate that EOAi is not helpful for determining whether an adult dog with an equivocal Vmax truly does or does not have SAS and is not helpful for determining whether a puppy with an equivocal Vmax will go on to develop SAS.

Third, we found it troubling that for dogs in this study, EOAi did not decrease from puppyhood to adulthood in dogs with SAS, as would have been expected.<sup>4</sup> We believe that this was most likely due to inherent inaccuracies in the determination of EOAi.

The inability to accurately determine the presence of mild SAS, especially at an early age, has been a problem in veterinary medicine

for years. Currently, necropsy is the only definitive means for detecting mild SAS.<sup>4</sup> Newer imaging modalities for detecting mild SAS in dogs and genetic testing may be topics deserving of further discussion and scientific investigation.<sup>5</sup>

Mark D. Kittleson, DVM, PhD

Joshua A. Stern, DVM, PhD

Department of Medicine  
and Epidemiology

School of Veterinary Medicine  
University of California-Davis

Davis, Calif

Donald J. Brown, DVM, PhD

Vermont Veterinary Cardiology

Williston, Vt

1. Javard R, Bélanger M-C, Côté E, et al. Comparison of peak flow velocity through the left ventricular outflow tract and effective orifice area indexed to body surface area in Golden Retriever puppies to predict development of subaortic stenosis in adult dogs. *J Am Vet Med Assoc* 2014;245:1367–1374.
2. Menegazzo L, Bussadori C, Chiavegato D, et al. The relevance of echocardiography heart measures for breeding against the risk of subaortic and pulmonary stenosis in Boxer dogs. *J Anim Sci* 2012;90:419–428.
3. Burwash IG, Thomas DD, Sadahiro M, et al. Dependence of Gorlin formula and continuity equation valve areas on transvalvular volume flow rate in valvular aortic stenosis. *Circulation* 1994;89:827–835.
4. Pyle RL, Patterson DF, Chacko S. The genetics and pathology of discrete subaortic stenosis in the Newfoundland dog. *Am Heart J* 1976;92:324–334.
5. Aguilar F, Nesser HJ, Faletra F, et al. Imaging modalities in valvular heart disease. *Curr Cardiol Rep* 2008;10:98–103.

### Instructions for Writing a Letter to the Editor

Readers are invited to submit letters to the editor. Letters may not exceed 500 words and 6 references. Letters to the Editor must be original and cannot have been published or submitted for publication elsewhere. Not all letters are published; all letters accepted for publication are subject to editing. Those pertaining to anything published in the *JAVMA* should be received within one month of the date of publication. Submission via email ([JournalLetters@avma.org](mailto:JournalLetters@avma.org)) or fax (847-925-9329) is encouraged; authors should give their full contact information, including address, daytime telephone number, fax number, and email address.

Letters containing defamatory, libelous, or malicious statements will not be published, nor will letters representing attacks on or attempts to demean veterinary societies or their committees or agencies. Viewpoints expressed in published letters are those of the letter writers and do not necessarily represent the opinions or policies of the AVMA.

## The authors respond:

We thank Drs. Kittleson, Stern, and Brown for their insightful comments. The purposes of our study were to determine effective orifice area indexed to body surface area (EOAi) in growing Golden Retriever puppies and assess its potential usefulness as an early marker for subaortic stenosis (SAS) in puppies of this breed. In the conclusion of our article, we do not suggest replacing assessment of peak flow velocity through the left ventricular outflow tract (LVOT Vmax) with EOAI but rather advocate adding EOAI to other echocardiographic parameters to improve early detection of SAS. The study did not attempt to determine whether EOAI would help in determining whether adult dogs with an equivocal Vmax had SAS, and we specifically focused on detection of SAS in puppies. We agree that it is often difficult to differentiate dogs with mild SAS from unaffected dogs in the clinical setting, as there is no antemortem gold standard for the diagnosis of mild SAS in dogs at the present time.<sup>1</sup>

With regard to the second point raised, we agree that the slightly increased sensitivity associated with the combination of Vmax and EOAI is not significant, inasmuch as it was based on 1 patient that would have been incorrectly classified as unaffected as a puppy on the basis of Vmax alone (1.96 m/s) but would have been correctly classified as affected on the basis of EOAI (1.26 cm<sup>2</sup>/m<sup>2</sup>). Our study did not aim to prove that Vmax is not a good parameter for confirming or refuting a diagnosis of SAS, but rather to explore the incremental value of other parameters. Each echocardiographic parameter, including Vmax, mean gradient, EOAI, and Doppler velocity index, has inherent limitations and pitfalls.<sup>2-4</sup> Hence, as emphasized in our discussion as well as in the echocardiographic guidelines for humans, we should not rely on a single parameter to detect or quantify aortic stenosis or SAS but rather use a multiparametric approach. In other studies,<sup>5,6</sup> EOAI had better sensitivity than Vmax or gradient but lower specificity, so these parameters are complementary and not mutually

exclusive. In our study, 6 dogs had Vmax consistent with SAS as adults that did not meet that criterion as puppies (false-negative results). We were disappointed that only 1 of these 6 had an abnormal EOAI as a puppy. Nevertheless, the finding for this 1 dog is the first evidence that EOAI could be an early indicator of SAS in Golden Retriever puppies.

With regard to the third point raised by Drs. Kittleson, Stern, and Brown, we have a different interpretation of the results. We did not find it surprising that Vmax, a highly flow-dependent variable, increased with age as the puppies in our studies grew and suggest that this is a key limitation of applying a set Vmax as a diagnostic cutoff for SAS. Because EOAI is indexed to body surface area, it can be expected to change less or even remain constant as animals grow. The fact that EOAI remains stable during growth whereas Vmax increases provides support to the concept that EOAI may be useful for early detection of SAS. These findings provide a foundation for pursuing additional investigations in this regard.

Romain Javard, DVM  
Marie-Claude Bélanger, DVM, MSc  
University of Montreal  
Saint-Hyacinthe, QC, Canada

Étienne Côté, DVM  
University of Prince Edward Island  
Charlottetown, PE, Canada

Philippe Pibarot, DVM, PhD  
Quebec Heart and Lung Institute  
Laval University  
Sainte-Foy, QC, Canada

1. Pyle RL. Interpreting low-intensity cardiac murmurs in dogs predisposed to subaortic stenosis. *J Am Anim Hosp Assoc* 2000;36:379-382.
2. Estrada A, Maisenbacher H. Calculation of stenotic valve area. *J Vet Cardiol* 2006;8:49-53.
3. Bélanger MC, Di Fruscia R, Dumesnil JG, et al. Usefulness of the indexed effective orifice area in the assessment of subaortic stenosis in the dog. *J Vet Intern Med* 2001;15:430-437.
4. Menegazzo L, Bussadori C, Chiavegato D, et al. The relevance of echocardiography heart measures for breeding against the risk of subaortic and pulmonary stenosis in Boxer dogs. *J Anim Sci* 2012;90:419-428.
5. Pibarot P, Dumesnil JG. Low-flow, low-gradient aortic stenosis with normal and depressed left ventricular

ejection fraction. *J Am Coll Cardiol* 2012;60:1845-1853.

6. Aboulhosn J, Child JS. Left ventricular outflow obstruction. *Circulation* 2006;114:2412-2422.

## Animal welfare: a bigger issue

I was pleased to see the recent commentary by Dr. Barry Kipperman<sup>1</sup> on the role of the veterinary profession in promoting animal welfare. Battery cage confinement of laying hens and confinement of breeding sows in gestation crates have received the most attention lately, but other issues related to animals raised for human use, particularly those that prevent expression of normal behaviors, deserve our attention also. We have a long way to go yet.

Sylvia Heereens, DVM  
Berkeley Heights, NJ

1. Kipperman BS. The role of the veterinary profession in promoting animal welfare. *J Am Vet Med Assoc* 2015;246:502-504.

## Standards for detecting bacteria in chicken

A recent JAVMA News story<sup>1</sup> described a proposal from the USDA's Food Safety Inspection Service to establish new standards for the presence of *Salmonella* and *Campylobacter* bacteria in chicken parts, with the agency suggesting that, under the new standards, the percentage of chicken parts contaminated with *Salmonella* bacteria would decrease from the current 28% to 18%. Methods to prevent contamination at the farm or preprocessing level were not discussed, but could be helpful. For instance, ventilation practices that deliver minimal airflow rates over broiler litter surfaces appear to reduce *Salmonella* counts on processed carcasses and could possibly reduce the number of human illnesses.<sup>2-4</sup> In many instances, the most critical areas for improved ventilation rates are those adjacent to broiler house walls and in house corners. The proposed airflow rates are mild, with airflow of 1 to 1.5 mph producing the desirable effect when ambient relative humidity is low (eg, < 70%) and airflow of

2 to 4 mph needed when relative humidity is higher (eg, > 90%).

In addition, bacterial testing should include both quantitative (bacterial count) and qualitative (present vs absent) tests, as bacterial count provides a measure of progress in bacterial control, a critical measurement unavailable with only qualitative testing.<sup>5</sup>

Edward Mallinson, VMD

Professor Emeritus

Virginia-Maryland Regional College  
of Veterinary Medicine

Silver Spring, Md

1. Cima G. US may adopt stricter pathogen standards for poultry. *J Am Vet Med Assoc* 2015;246:582.
2. deRezende CE, Mallinson ET, Tablante NL, et al. Effect of dry litter and airflow in reducing *Salmonella* and *E. coli* populations in the broiler production environment. *J Appl Poult Res* 2001;10:245–251.
3. Mallinson ET, Carr LE, Malone GW, et al. Lower water activity in broiler litter and the reduction of *Salmonella* on farms and carcasses. Bulletin 348. Newark, Del, and College Park, Md: Cooperative Extension Services of the University of Delaware and the University of Maryland, 1995.
4. Navarotto PI, Guarino M, Heinzl E. Evaluation of total bacterial count as indicators of “risk areas” in a poultry layer house using an amperometric biosensor, in *Proceedings*. 5th Int Livestock Environment Symp, 1997.
5. Mallinson ET. Litter surface airflow: untapped opportunity? *WATT Poultry USA* 2007;December:48–58.

## Adopting dogs

The recent JAVMA News story<sup>1</sup> reviewing topics from last year’s National Council on Pet Population’s research symposium showed a much needed shift to debunking common myths about pet adopter needs and behaviors. I hope this signals a sea change in the fortunes of the millions of dogs in the United States that every year find themselves “without an owner to stand by their sides,” in the memorable words of Dr. Amy Marder, one of the speakers at the symposium. Questioning assumptions about what facilitates the bond between dogs and humans and what endangers that bond is long overdue. Owners report that dog behaviors they themselves see as problematic don’t prompt them to break the bond, and even food guarding, which shelters

have been diligently screening for in the past decade or so, wouldn’t deter them from adopting. Not only should these findings spark the removal of barriers between dogs in shelters and the people who wish to adopt them, they should also help move research interests to the human side of the relationship, to understanding what draws adopters to dogs and what can be done to facilitate that perception.

During the symposium, Dr. Emily Weiss reported on an equally fruitful area for study: identifying what owners need to keep their dogs with them, such as pet-friendly housing, affordable veterinary care, and interventions to modify problem dog behaviors, rather than focusing on traditional demographic identifiers that designate certain individuals as risky adopters.

In my opinion, shelters have, for far too long, focused on evaluating dogs in their care for agonistic behavior. This ignores the reality that the incidence of serious dog bites is extremely low, with perhaps 1 dog in 250 biting a human each year with enough pressure to send the person to an emergency department, and a great many of even those visits motivated by concern about infection rather than injury severity. “Dogs and cats that are in shelters are just dogs and cats,” says Dr. Marder; moreover, what a dog does during a behavior evaluation doesn’t necessarily predict what that dog will do in a home. Subjecting shelter dogs to special safety screenings, I believe, not only evaluates factors that adopters might not actually care about, but also sends a message that dogs in shelters are somehow different from the rest of the species and at some higher risk for harming people.

Dr. Alexandra Protopopova’s finding that adopters are often won over by a dog playing with them may perhaps provide better insight into things to look for when attempting to send more dogs home.

Janis Bradley, MA

Director of Communications  
and Publications

National Canine Research Council  
Amenia, NY

1. Kahler SC. Unmasking the shelter dog. *J Am Vet Med Assoc* 2015;246:700–705.

## Looking for alternatives for feral cats

While I appreciate Dr. Fox’s opinion, expressed in a recent letter to the editor,<sup>1</sup> that misguided altruism is driving trap-neuter-vaccinate-return (TNVR) programs, he does not offer viable alternatives for dealing with the problem of feral cats.

In my experience, many facilities euthanize feral cats for free, if someone brings them in, yet few people seek this service. Why? Because people are innately compassionate and enjoy interacting with animals at all levels of socialization. People who feed outdoor cats often seek access to spay-neuter programs, recognizing the importance of population control for outdoor cats. But because euthanasia is not a widely accepted method for controlling these populations, the alternatives boil down to allowing outdoor cats to breed uncontrollably or offering spay-neuter programs to curb reproduction to the extent possible.

Laws against drunk driving and cell phone use while driving have not resolved those problems. Outlawing outdoor cats or even outlawing the feeding of outdoor cats will not eliminate their existence. It will merely criminalize human behavior. People feed not only outdoor cats, but also birds, raccoons, and deer. They enjoy watching such animals eat, play, and groom, yet never need to touch them.

The rapid and widespread acceptance of TNVR programs demonstrates that people not only care about outdoor cats but also understand the need to limit their reproduction. Solutions to reduce or resolve outdoor cat populations must take into account the strong tendencies of the people who care for them. Spay-neuter programs represent an option people accept and pursue. Until an alternative is developed that will be as eagerly accepted by the individuals who feed these cats, I believe TNVR and similar programs are currently our best, albeit imperfect, option.

Christine Wilford, DVM  
Bellevue, Wash

1. Fox MW. Bring in the cat (lett). *J Am Vet Med Assoc* 2015;246:730.