




12-1993

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Recommended Citation

Buchanan, J. W. (1993). Changing Breed Predispositions in Canine Heart Disease. *Canine Practice*, 18 (6), 12-14. Retrieved from https://repository.upenn.edu/vet_papers/120

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Changing Breed Predispositions in Canine Heart Disease

Abstract

Breed predispositions for some types of congenital heart disease were recognized 30 years ago and led to breeding experiments that confirmed the genetic transmission of specific congenital heart defects in most instances. As a result, certain breeds were associated with certain diseases, and this became a legitimate consideration in the differential diagnosis of some abnormalities in the absence of more definite diagnostic studies. As an example, a significant systolic murmur in a young Newfoundland dog means sub-aortic stenosis (SAS) until proven otherwise. The diagnosis of SAS is usually confirmed by Doppler echocardiography or angiocardiology.

Although cardiologists take breed into consideration, they still rely on proper examination and appropriate diagnostic procedures; however, practitioners are comes pressed to give opinions on the likelihood of particular diagnoses and prognoses without benefit of a full work-up. In this setting, knowledge of new and changing breed predispositions can be helpful.

In recent years, some defects and new breeds have been found to be overrepresented in cardiology clinics across the country. All practitioners need to be alert in order to recognize new breed predispositions and counsel breeders accordingly. Of particular note is the rising frequency of SAS in Golden Retriever and Rottweiler dogs. The purpose of this presentation is to describe changing breed predispositions that have been observed in recent years and share the results of a recent tabulation of data at our institution as well as 1987- 1989 data in the national Veterinary Medical Data Base (VMDB) at Purdue University.

Disciplines

Animal Diseases | Cardiology | Cardiovascular Diseases | Comparative and Laboratory Animal Medicine | Congenital, Hereditary, and Neonatal Diseases and Abnormalities | Veterinary Infectious Diseases | Veterinary Medicine

CANINE PRACTICE – CARDIOLOGY

The breed distribution of 1,320 dogs with congenital cardiovascular diseases taken from records of 154,233 dogs in the Veterinary Medical Data Base at Purdue University was examined. The changing spectrum of breed-associated abnormalities, new information about pulmonic stenosis, the appearance of new breed associations of greater statistical significance than some of the classical associations, and breed-specific prevalence rates of certain acquired abnormalities were noted.

Changing Breed Predispositions in Canine Heart Disease

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Introduction

Breed predispositions for some types of congenital heart disease were recognized 30 years ago and led to breeding experiments that confirmed the genetic transmission of specific congenital heart defects in most instances.¹ As a result, certain breeds were associated with certain diseases, and this became a legitimate consideration in the differential diagnosis of some abnormalities in the absence of more definitive diagnostic studies. As an example, a significant systolic murmur in a young Newfoundland dog means sub-aortic stenosis (SAS) until proven otherwise. The diagnosis of SAS is usually confirmed by Doppler echocardiography or angiocardiography.

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The table shown here was previously published in detail in *Current Veterinary Therapy XI* (WB Saunders Co., pp 647-655, 1992).

Materials and Methods

Table 1 is based upon analysis of the breed distribution of 1,320 dogs with congenital cardiovas-

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BREED PREDISPOSITIONS AND HEART DISEASE

TABLE 1
Breed Predispositions in Dogs With
Congenital Heart Disease

Airedale Terrier	Pulmonic stenosis (PS)-2
Beagle	PS ^a
Bichon Frise	Patent ductus arteriosus (PDA)-2
Boxer	Aortic stenosis (AS)-3
Boykin Spaniel	PS ^a
Bull Terrier	Mitral dysplasia (MD) ^a
Chihuahua	PS, ^a PDA ^a
Cocker Spaniel	PDA-1, PS-1
Collie	PDA-1
Doberman Pinscher	Atrial septal defect (ASD) ^a
English Bulldog	PS-3, Ventricular septal defect (VSD)-3, AS-1, Tetralogy of Fallot (TF) ^a
English Springer Spaniel	PDA-2
German Shepherd	Tricuspid dysplasia (TD)-3, AS-1, Persistent right aortic arch (PRAA)-2, MD, ^a PDA ^a
German Shorthair Pointer	AS ^a
Golden Retriever	AS-3, TD ^a
Great Dane	AS-1, PRAA-3, MD, ^a TD ^a
Irish Setter	PRAA ^a
Keeshond	PDA-2, TF ^a
Kerry Blue Terrier	PDA-3
Labrador Retriever	TD-3
Maltese	PDA-3
Mastiff	PS-3
Miniature Schnauzer	PS-2
Newfoundland	AS-3
Pomeranian	PDA-3
Poodles, Toy and Miniature	PDA-2
Rottweiler	AS-3
Samoyed	PS-3, AS-1, ASD ^a
Scottish Terrier	PS-2
Shetland Sheepdog	PDA-3
West Highland White Terrier	PS-3
Weimaraner	TD, ^a Peritoneopericardial hernia ^a
Yorkshire Terrier	PDA-1

Data from Veterinary Medical Data Base at Purdue University 1987-89; 1,320 dogs with congenital heart disease out of 154,233 dogs. Numbers 1-3 identify predisposed breeds represented by four or more affected dogs in which relative risk for the indicated abnormality was significantly elevated in this series ($P < 0.05$ to $P < 0.0001$)

-1 = mild increased risk (odds ratio 1.5-2.9 times all other dogs)

-2 = moderate risk (odds ratio 3-4.9 times others)

-3 = marked risk (odds ratio > 5 times others)

^aBreed-associated diseases not confirmed in this study but suggested or confirmed by others

Sex predominances = PDA (females 3:1), PS in English Bulldogs (males 4:1), Mitral and tricuspid dysplasia (males 2:1)

cular diseases out of 154,233 dogs registered in the VMDB from 1987-89. It indicates mild-1, moderate-2, or marked-3 predispositions for certain conditions based upon the relative odds ratios in breeds represented by four or more affected dogs. Breed-associated abnormalities previously suggested or confirmed by others but not supported by the 1987-89 analysis are indicated with asterisks.

Findings

The appearance of new breed associations of greater statistical significance than some of the classical associations is as interesting as the lack of association of abnormalities in some breeds. For example, the odds ratios for patent ductus arteriosus in Maltese and Pomeranians were higher than in Poodles and Collies; however, in the case of persistent right aortic arch, there were no Irish Setters in the total of 60 dogs with the condition, even though this association is entrenched in the veterinary literature.

The changing spectrum of breed-associated abnormalities could reflect a decreased incidence due to efforts by breeders to eliminate affected animals. Conversely, it could be caused by the appearance of new lines of dogs with particular abnormalities. It is likely that both factors contribute to the changing spectrum.

New information about pulmonic stenosis (PS) in English Bulldogs was of note. The condition was recognized as being common in English Bulldogs 30 years ago, and the breed is still at very high risk, with an odds ratio of 19.2. In recent years, however, PS in this breed has been found to be associated with — and probably caused by — a coronary artery anomaly (single right coronary artery with circumpulmonary left main) in eight bulldogs and one boxer to date.³ The significance of the association is that patch graft surgery to correct PS causes fatal transection of the circumpulmonary left main coronary artery. Thus, awareness of the association in this particular breed is predictive of the coronary anomaly and has important bearing on the surgical approach.

The breed-specific prevalence rates of certain acquired abnormalities also show non-random occurrence of some conditions and indicate that genetic factors have an influence on susceptibility. Examples include dilated cardiomyopathy in Doberman Pinscher dogs and sick sinus syndrome in older miniature Schnauzer dogs. As a notably changing acquired condition, pericardial effusion secondary to hemangiosarcoma is far

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more common today than chemodectoma and occurs predominantly in Golden Retriever dogs (odds ratio 7.4), German Shepherds (odds ratio 2.3), and Labrador Retrievers (odds ratio 2.2). Out of 92 dogs with pericardial effusion in our institution, brachycephalic breeds were represented by only three Boxer dogs (odds ratio 1.5), one Bulldog, and one Boston Terrier.

A new condition to be aware of is the early occurrence of chronic valvular disease (endocardiosis) with its usual complications in Cavalier King Charles Spaniels. Recent surveys of several hundred Cavaliers in this country and abroad revealed a high prevalence of systolic mitral murmurs (> 50%) in dogs 4 years and older.^{4,5} ■

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Book Reviews

Significant Books, Papers, Articles, and Software

Veterinary Gastroenterology Neil V. Anderson, editor. Second edition. 1992. \$129. Illus. 873 pp. Published by Lea & Febiger, a Division of Waverly, Inc., 428 East Preston Street, Baltimore, Maryland; (800) 251-2230.

As stated in the Preface, the present generation of leaders in the discipline of gastroenterology has produced an updated edition of *Veterinary Gastroenterology* in a readable and practical form. The book is organized in 3 parts, the first of which covers diagnosis and therapy. This part contains a thorough review of the subject with excellent sections on newer diagnostic procedures, such as laparoscopy in large animals. The sections on fluid therapy contain useful, practical information, with much needed emphasis on techniques for catheter placement and management. Part II deals with pathophysiologic mechanisms and metabolic complications of gastrointestinal disease. The section on intestinal obstruction is a complete review with sufficient reference material and updated information to be useful to those seeking such detail on the subject. In Part III, gastrointestinal diseases are presented by major clinical signs and with emphasis on the clinical aspects of disease. Overall, Part II has been improved by presenting the material by major species and by dispensing with the comparative approach used in the first edition of this book.

The overall excellent quality of this book is marred by some minor weaknesses. It is unfortun-

ate that ultrasound examination has been omitted in Part I because this modality has several applications in large and small animal gastroenterology; however, examples are given throughout the book of specific uses of ultrasound examination. Although the clinical approach to diseases used in Part III has its advantages, the presentation of some material by this format appears to be strained in Chapter 25. This chapter deals with non-painful abdominal distention in adult horses and is devoted to some topics that may not merit such attention in this book. The title of chapter 24 is puzzling also, and the excellent, detailed description of techniques for assessing the horse with abdominal pain in this chapter would seem to belong in Part I. Although this book is well written, the material well presented, and most of the figures clear and highly relevant, some of the pages in the copy received by this reviewer were out of order.

This latest edition of *Veterinary Gastroenterology* is strongly recommended as a textbook for students, practitioners, and those involved in gastrointestinal research. The authors are experts in their fields and have presented the information with the necessary insight to make this book invaluable to both the serious student and casual student of this discipline.

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